

# Final Project Report



# AHU/Humidification Upgrades Multiple Facilities

University of Nebraska Medical Center Nebraska Medicine 987100 Nebraska Medicine Center Omaha, NE 68198-7100



Prepared for: Mr. Scott Winfrey Specialized Engineering Solutions 10360 Ellison Circle Omaha, NE 68134

OS Project No.: 20-185 Report Date: January 24, 2022 Prepared by:

Tyler Mueller Optimized Systems 1313 Cuming St Suite 200 Omaha, NE 68102



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# OVERVIEW

This Final Project Report provides a summary of work performed pursuant to the Air Handler Units(AHU)/Humidification Upgrade project initiated at the University of Nebraska Medical Center (UNMC) and Nebraska Medicine main campus.

Optimized Systems provided commissioning/re-commissioning and controls programming for the installation of new and/or the reconfiguration of existing humidification equipment in 11 different buildings on campus.

A total of 170 construction issues were identified during the commissioning of this project; several major issues were discovered and rectified:

- Several valves and dampers were found with issues: improper feedback positions, needing adjustments, leaking by, left in override status, and/or improperly functioning actuators
- Improperly calibrated sensors on various pieces of equipment
- Safety devices and programming protecting the air handlers were not functioning properly
- Missing critical alarms and schedules on various equipment
- Fans with their interlocks not working correctly

Please note, there are some open issues left in this report. The items listed were out of scope or we were instructed not to fix, but were items Optimized Systems felt it was important to note. As such, we were instructed to document what we saw, but assign to UNMC, rather than the subcontractor on the project.

# DEFINITIONS

The following definitions are offered to clarify the meaning of key, often used terms:

# COMMISSIONING

Commissioning is a quality control-like process done during construction that verifies that a building's heating, ventilation, and air conditioning (HVAC) and lighting systems perform correctly and according to the design intent and owner's project requirements. A key goal of commissioning is to ensure that a building will operate correctly and efficiently, thus consuming less energy. Commissioning is most commonly done for new construction and renovation projects but may also benefit equipment upgrades and retrofit projects. By its involvement in all of the traditionally separate disciplines of design, construction, and operation, commissioning helps to bring the project team together during each phase of the project with the purpose of identifying any problems or deficiencies that might otherwise go undetected. By identifying deficiencies early in the construction process, they are much less costly to correct. Industry studies show that buildings that are not commissioned will cost 8 to 20 percent more to operate.



# OPTIMIZATION

Optimization refers to the process of repairing and tuning a mechanical system's equipment, components and controls so that the mechanical systems can perform up to its maximum potential. Optimization strategies focus on achieving owner and facility specific operational requirements, while providing the optimum balance of occupant comfort, safety, and energy efficiency.

The optimization process involves:

- Identification and correction of existing deficiencies in the mechanical systems' equipment and components that are preventing the systems from performing designed. This involves considerable inspection and testing of system components for operational integrity.
- Reprogramming of the system controls to implement sequences that conform with established UNMC standards and facility-specific operational strategies.

# ISSUES

Throughout the commissioning process, issues were identified and tracked. Using Cx Alloy, issues were assigned to the appropriate personnel to be fixed and then validated by the commissioning agent from Optimized Systems. Optimized Systems is not responsible for correcting the issue, only ensuring that it has been reported to the correct personnel. At the completion of the project, all issues have been collated into reports which are attached at the end of this document and separated by issue type. A link is available at the end of this section.

# **ISSUE TYPES:**

**Closed**: Item was identified by the commissioning agent, remedied by the contractor, validated by the commissioning agent, and then closed.

**Open:** Item was identified by the commissioning agent, reported to the contractor on more than one occasion, but has not been fixed. The following items are still open on this project:

# Click here to go to the Closed Issues Report

# Click here to go to the Open Issues Report



# TESTS

Tests are created and performed by the Optimized Systems commissioning agent for this project. Tests were tracked in Cx Alloy and can contain multiple test lines, which are marked with a "yes," "no," or N/A." Some tests are attempted multiple times and notes were made below the test lines. Deficiencies discovered during testing are opened as an issue and assigned to be remedied. Tests are marked with a "Passed," "Failed," "Incomplete," or "Seasonal Testing Remaining."

**Passed** indicates that generally the requirements or intent of the test was reasonably met. There may be tests which have a "no" answer in the test lines which indicates there are minor discrepancies or items not completed (such as a trend, etc.) which are noted. The test is marked as "Passed" if the commissioning agent believes the contractor has reasonably made the accommodations requested within the contract documents.

**Failed** indicates that the requirements as we understand them for the project documents have not been met or the equipment is still not functioning properly.

**Incomplete** indicates there is work or fixes that have not been completed which the commissioning agent has requested to be addressed. The test has not necessarily failed, but the contractor still needs to complete the outstanding item.

**Seasonal Testing Remaining** indicates there are test lines to be completed when seasonal temperature and environment allow.

All tests for this project are attached at the end of the document and can be accessed quickly by clicking the following link.

# Click here to go to Tests

# PROJECT OUTCOMES

# SUMMARY

In accordance with project objectives, Optimized Systems provided the following services on new humidification equipment:

- Developed, provided, and implemented controls schemes, schematics, and points lists needed to configure and operate the humidification equipment, which were procured and installed by others.
- Programed associated economizer functions.
- Programed humidification functions.
- Commissioned new humidifiers.



For existing humidification equipment, Optimized System provided the following services:

- Performed a visual inspection and tested the basic functionality of each humidifier to identify any deficiencies that needed to be resolved, as well as any new sensors and/or controls components that needed to be added for proper operation. Testing was for basic functionality only and not to determine or verify component capacities, capabilities, or other design-related criteria. Responsibility for correcting deficiencies remains with others.
- Developed, provided and implemented controls schemes, schematics, and points lists needed to configure and operate the humidification equipment, which were procured and installed by others.
- Programed associated economizer functions.
- Programed humidification functions.
- Commissioned new humidifiers.

Optimized Systems also provided full retro-commissioning and optimization of the remaining components of the HVAC systems affected excluding those systems that have already been optimized by Optimized Systems, including:

- Performed complete retro-commissioning and reprogramming of the existing AHUs including inspection and testing for functional integrity all associated system components (excluding humidification) and identified any deficiencies that need to be resolved. The responsibility for resolving deficiencies and associated costs remains with others.
- Worked with UNMC staff to coordinate and manage correction of identified deficiencies.
- Building pressure issues were rectified with the installation of new building pressure sensors.
- Developed and programed all sequences of operations necessary for optimum performance and efficiency of the systems in accordance with UNMC standards and directives.

Optimized Systems performed all of the services above for the installation of 4 new humidifiers:

- GLC AHU01
- PDD AHU01
- CON AHU01
- WHM AHU04



A total of 13 AHUs were reprogrammed with existing humidifiers to follow the COVID sequences provided by SES. At the request of Peter Larson, WH AHU03 was optimized as a courtesy, as it works in conjunction with WHM AHU04 concerning building pressure:

- CNS AHU03
- COPH AHU01
- COPH AHU02
- DRC AHU01
- DRC AHU04
- DRCII AHU01
- MMI AHU01
- MMI AHU02
- MSC AHU01
- MSC AHU02
- SLC AHU03
- WHM AHU03
- WHM AHU05
- WHM AHU06

All AHUs are fully optimized. A total of fourteen of the AHUs were fully optimized for this project; four were not as they were recently optimized by Optimized Systems as part of a different project. A variety of deficiencies were identified and corrected at each of the facilities.

# CLOSING

It has been our pleasure working with Specialized Engineering Solutions on this UNMC and Nebraska Medicine project. We are confident that the results of these project will significantly improve the operational efficiency of your facilities and we hope you have found our involvement to be helpful and informative. If you would like to review any of the information in this report or discuss any aspects of the project, please do not hesitate to contact me.

Respectfully submitted,

Tyler Mueller, CEM 720.595.4999 Tyler.Mueller@Optimized-Systems.com

# Construction Issues

128 Issues with status closed, sorted by date identified



# TST-17-5 CLOSED HIGH

VFD drives start as soon as the ISO dampers start moving. Please adjust end switch so that dampers are allowed to open more before starting fans. Source Test 17 WHM\_AHU 3 - AHU - Humidifier/Optimization WHM\_AHU 3 - AHU - Humidifier/Optimization WHM - Wittson Hall/ McGoogan Library Due Date 3/30/2021 Created By Marcus Houser Identified On 3/16/2021 8:14 AM

Strategic wired the supply and return end switches to the drives so that the drives will not start until the isolation dampers are open.

Scott Erlenbusch on 06/22/2021 at 08:59 AM Optimized Systems

# TST-17-4 CLOSED HIGH

Return ISO damper end switch is not wired up. The return and supply isolation damper end switches should be wired in series so both dampers are open before the fans start. Source Test 17 WHM\_AHU 3 - AHU - Humidifier/Optimization

# Asset 😤 WHM\_AHU 3

Air Handling Unit
 Mechanical Room 5015A

5th Floor

WHM - Wittson Hall/ McGoogan Library

Due Date 3/30/2021

Created By Marcus Houser Identified On 3/16/2021 8:14 AM

Strategic wired the supply and return end switches to the drives so that the drives will not start until the isolation dampers are

open.

Scott Erlenbusch on 06/22/2021 at 09:00 AM Optimized Systems



OAD cracked open when commanded close, needs to be adjusted **Source** Test 17, Attempt 1, Line 62 Do the minimum outdoor air dampers open and close fully when commanded by the BAS?

#### Asset 🤹 WHM\_AHU 3

- Air Handling Unit
- Mechanical Room 5015A
- 5th Floor

WHM - Wittson Hall/

Due Date 3/30/2021

Created By Marcus Houser Identified On 3/16/2021 8:08 AM

Strategic adjusted and OS tested operation. Scott Erlenbusch on 03/25/2021 at 12:11 PM Optimized Systems



# TST-17-1 CLOSED HIGH

One bank of return air dampers has a linkage rod that has come loose. Source Test 17, Attempt 1, Line 61 Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Assigned To Asset	Scott Erlenbusch WHM_AHU 3 Air Handling Unit Mechanical Room 5015A 5th Floor WHM - Wittson Hall/ McGoogan Library
	Discipline	Controls
	Due Date	3/18/2021
	Created By	Scott Erlenbusch
	Identified On	3/4/2021 2:28 PM

I reconnected linkage and put e-ring back in so it will not come out. Scott Erlenbusch on 03/04/2021 at 02:29 PM Optimized Systems

# TST-9-6 CLOSED HIGH

OA dampers do not close all the way when commanded closed.	Asset	🧟 MMI_AHU 1
Source Test 9, Attempt 1, Line 32		Air Handling Unit
Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air		Level 5 Penthouse
dampers open?		Level 5 Penthouse
		🗄 MMI - Munroe Meyer
		Institute
	Due Date	2/4/2021
	Created By	Scott Erlenbusch
	Identified On	1/21/2021 1:14 PM
All dampers have been replaced. OS verified operation.		
Scott Erlenbusch on 05/03/2021 at 03:38 PM		
Optimized Systems		

# TST-9-4 CLOSED HIGH

There is a bank of isolation dampers on the return side that are closed.	Asset 🤹	MMI_AHU 1
Actuator is making a loud humming noise. There are four isolation dampers		Air Handling Unit
total so the unit is not starving too badly.		Level 5 Penthouse
Source Test 9		Level 5 Penthouse
MMI_AHU 1 - AHU - Humidifier/Optimization	BB	MMI - Munroe Meye Institute
	Due Date 2/4	/2021

Created By Scott Erlenbusch Identified On 1/21/2021 12:46 PM

# Return isolation dampers and actuators have been replaced.

Scott Erlenbusch on 05/03/2021 at 03:39 PM Optimized Systems



# TST-9-3 CLOSED HIGH

Building pressure sensor for AHU is located in the hallway outside the South Elevators on First floor. The outdoor air reference is located on the roof. <b>Source</b> Test 9, Attempt 1, Line 22 Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Asset	<ul> <li>MMI_AHU 1</li> <li>Air Handling Unit</li> <li>Level 5 Penthouse</li> <li>Level 5 Penthouse</li> <li>MMI - Munroe Meyer Institute</li> </ul>
	Discipline Due Date Created By Identified On	Controls 2/3/2021 Scott Erlenbusch 1/20/2021 1:30 PM

Building Static pressure sensor was changed and verified by OS. This pertains to both ahu's. Scott Erlenbusch on 05/03/2021 at 03:47 PM Optimized Systems

# TST-9-2 CLOSED HIGH

Supply/Return fan proofs and faults are wired in series. All drives would	Asset	\$	MMI_AHU 1
need to be off or faulted to fault at the BAS. The proof wiring may be ok			Air Handling Unit
because if one did not start it would not prove. The fault wiring may need to			Level 5 Penthouse
be wired differently, not sure? This is also true for AHU 2.			Level 5 Penthouse
Source Test 9		習出	Institute
MMI_AHU 1 - AHU - Humidifier/Optimization	Discipline	Cor	ntrols
	Due Date	2/3/	/2021
	Created By	Sco	ott Erlenbusch
	Identified On	1/2	0/2021 11:28 AM

Changed the point setup for the supply and return fan fault. The point is now normally closed in Insight and the fault point was changed on the supply and return drives. This was completed for AHU 1 and 2.

Scott Erlenbusch on 07/01/2021 at 01:07 PM Optimized Systems

# TST-10-5 CLOSED LOW

SA Fault is labeled Proof on the graphic Source Test 10, Attempt 1, Line 54 Does the supply fan start and stop when commanded by the BAS?

#### Asset 🧐 MMI\_AHU 2

Air Handling Unit
 Level 5 Penthouse

- Level 5 Penthouse

Institute

Due Date 2/3/2021 Created By Scott Erlenbusch

Identified On 1/20/2021 9:54 AM

OS corrected graphic point. Scott Erlenbusch on 07/01/2021 at 12:55 PM Optimized Systems



# TST-10-4 CLOSED LOW

Return Air static pressure is wrong on the graphic, reading SASP **Source** Test 10, Attempt 1, Line 18

Is the return plenum pressure sensor and analog input ranges setup properly?

#### Asset 🧐 MMI\_AHU 2

- Air Handling Unit
- Level 5 Penthouse
- Level 5 Penthouse
- MMI Munroe Meye

# Due Date 2/3/2021 Created By Scott Erlenbusch Identified On 1/20/2021 9:53 AM

#### Descriptor was incorrect, changed to RA Static Press. Scott Erlenbusch on 07/01/2021 at 12:58 PM Optimized Systems

# TST-9-1 CLOSED HIGH

Supply duct static pressure is failed on the panel point list. Point is built but	Asset
there is nothing landed in the panel.	
Source Test 9, Attempt 1, Line 20	
Is the supply duct static pressure sensor reporting an acceptable value?	
	Discipline

#### set 🔅 MMI\_AHU 1 Air Handling Unit Level 5 Penthouse

- Level 5 Penthouse
- 🖩 MMI Munroe Meye
- Institute
- Discipline Controls Due Date 2/3/2021 Created By Scott Erlenbusch Identified On 1/20/2021 7:27 AM

AHU's using the SPP sensors on the AHU to control to static. Scott Erlenbusch on 05/03/2021 at 03:48 PM Optimized Systems

# TST-12-14 CLOSED HIGH

We were not able to test the humidifier valve because the trap on the	Assigned To	UNMC
Drysteem system is bad. UNMC has ordered a trap and will replace when it	Asset	🌣 SLC_AHU 3
gets here.		Air Handling Unit
Source Test 12, Attempt 1, Line 66		Mechanical Room 3004
When humidifier valve is opened, is there steam discharging from the humidifier tubes?		■ 3rd Floor ■ SLC - Student Life Center
	Due Date	12/3/2020
	Created By	Scott Erlenbusch
	Identified On	11/19/2020 3:00 PM

Russ with UNMC Facilities installed a new steam trap and check valve. Humidifier is now operational. Scott Erlenbusch on 03/26/2021 at 12:19 PM Optimized Systems

optimized bystems



# TST-1-14 CLOSED HIGH

RPP sensor is not plumbed to the return fan section. The poly for the sensor is also on the low side of sensor and should be on the high side. Please plumb to return fan section and land on high side of sensor. <b>Source</b> Test 1 CNS_AHU 3 - AHU - Humidifier/Optimization	Asset	<ul> <li>CNS_AHU 3</li> <li>Air Handling Unit</li> <li>1st Floor Mechanical</li> <li>Room</li> <li>1st Floor</li> <li>CNS_Callage of Nursing</li> </ul>
	Discipline Due Date Created By Identified On	Controls 12/3/2020 Scott Erlenbusch 11/19/2020 2:28 PM
Strategic re-plumbed the RPP. Scott Erlenbusch on 02/24/2021 at 11:23 AM Optimized Systems TST-13-9 CLOSED HIGH		
There is no building static pressure sensor installed. Ashcroft building static pressure sensor needs to be installed. Coordinate with Optimized Systems. <b>Source</b> Test 13, Attempt 1, Line 22 Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Asset	<ul> <li>WHM_AHU 4</li> <li>Air Handling Unit</li> <li>Mechanical Room 5000</li> <li>5th Floor</li> <li>WHM - Wittson Hall/ McGoogan Library</li> </ul>
	Discipline Due Date Created By Identified On	Controls 11/27/2020 Scott Erlenbusch 11/13/2020 9:57 AM
There will be no BSP for this AHU. There was a BSP installed on AHU 3 which s Scott Erlenbusch on 06/21/2021 at 07:42 AM Optimized Systems	erves an adjoinin	g area.

# TST-13-8 CLOSED HIGH

No Return plenum static pressure sensor installed. Return Plenum static	Asset 🔅 WHM_AHU 4	
pressure needs to be installed.	Air Handling Unit	
Source Test 13, Attempt 1, Line 16	Mechanical Room 5000	
Is the return plenum pressure sensor installed between the relief air and return air damper sections, and	<b>5</b> th Floor	
after the return fan?	🖩 WHM - Wittson Hall/	
	McGoogan Library	
	Discipline Controls	
	Due Date 11/27/2020	
	Created By Scott Erlenbusch	
	Identified On 11/13/2020 9:56 AM	

Strategic has installed the RPP sensor. OS has checked install and sensor setup. Scott Erlenbusch on 03/12/2021 at 07:48 AM

Optimized Systems



# TST-12-13 CLOSED HIGH

ere is no building static pressure sensor installed. Ashcroft building static Association Associate sensor needs to be installed. Coordinate with Optimized Systems. urce Test 12, Attempt 1, Line 22 e building pressure sensor installed in the best location possible for the areas served by the unit?	<ul> <li>SLC_AHU 3</li> <li>Air Handling Unit</li> <li>Mechanical Room 3004</li> <li>3rd Floor</li> <li>SLC - Student Life Center</li> </ul>	
	Discipline	Controls
	Due Date	11/27/2020
	Created By	Scott Erlenbusch
	Identified On	11/13/2020 9:54 AM

Strategic added a building static pressure sensor but it is located on AHU 2 panel. The high side is outside the bookstore entrance and the low side is outside by the Northeast entrance. The Ashcroft is above ceiling by the high side. OS built point and verified location.

Scott Erlenbusch on 03/26/2021 at 08:03 AM Optimized Systems

# TST-8-15 CLOSED HIGH

There is no building static pressure sensor installed. Ashcroft building static	Asset	🧟 DRC2_AHU 1
pressure sensor needs to be installed. Coordinate with Optimized Systems.		Air Handling Unit
Source Test 8, Attempt 1, Line 22		Level 2 Mech Room
Is the building pressure sensor installed in the best location possible for the areas served by the unit?		2nd Floor
		🔠 DRC 2 - Durham
		<b>Research Center 2</b>
	Discipline	Controls
	Due Date	11/27/2020
	Created By	Scott Erlenbusch
	Identified On	11/13/2020 9:48 AM

Strategic installed and OS verified.

Scott Erlenbusch on 04/28/2021 at 07:27 AM Optimized Systems

# TST-6-17 CLOSED HIGH

There is no building static pressure sensor installed. Ashcroft building static	Asset 🌣 DRC1_AHU 1	
pressure sensor needs to be installed. Coordinate with Optimized Systems.	Air Handling Unit	
Source Test 6, Attempt 1, Line 22	Mechanical Room 2004	
Is the building pressure sensor installed in the best location possible for the areas served by the unit?	2nd Floor	
	🔠 DRC 1 - Durham	
	Research Center 1	
	Discipline Controls	
	Due Date 11/27/2020	
	Created By Scott Erlenbusch	
	Identified On 11/13/2020 9:44 AM	

Strategic has installed a new building static pressure sensor. High side is located in 2nd floor elevator lobby and low side is on the roof just outside the AHU 1 mechanical room.

Scott Erlenbusch on 04/09/2021 at 01:00 PM Optimized Systems



# TST-2-12 CLOSED HIGH

There is no building static pressure sensor installed. Ashcroft building static pressure sensor needs to be installed. Coordinate with Optimized Systems. <b>Source</b> Test 2, Attempt 1, Line 22 Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Asset Scon_AHU 1 Air Handling Unit Mechanical Room 1004 Ist Floor CON - College of Nursing
	Discipline Controls
	Due Date 11/27/2020
	Created By Scott Erlenbusch
	Identified On 11/13/2020 9:43 AM
2 sensors installed. 1 from the 2nd floor for AHU1 and the other for 1st floor for	AHU2. Built point on the graphic and verified

2 sensors installed. 1 from the 2nd floor for AHU1 and the other for 1st floor for AHU2. Built point on the graphic and verified Scott Erlenbusch on 02/24/2021 at 01:07 PM Optimized Systems

#### Mounting in a different location

Marcus Houser on 02/24/2021 at 09:57 AM Optimized Systems

# TST-15-13 CLOSED HIGH

CD Supply high static cutout is set too high. Please set to trip at 4".

Source Test 15, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early?

- Asset 🌣 WHM\_AHU 6
  - Air Handling Unit
  - Mechanical Room 5000
     5th Floor
     WHM Wittson Hall/
    - McGoogan Library
- Discipline Controls Due Date 11/27/2020 Created By Scott Erlenbusch
- Identified On 11/13/2020 8:26 AM

#### CD high static has been adjusted to 4" Marcus Houser on 03/22/2021 at 03:01 PM

Optimized Systems

# TST-14-10 CLOSED HIGH

HD damper is not open all the way when commanded to 100%. Source Test 14 WHM\_AHU 5 - AHU - Humidifier/Optimization

# Asset 🌣 WHM\_AHU 5

- Air Handling Unit
- Mechanical Room 5015A
- 5th Floor
- Be WHM Wittson Hall/
- **Discipline** Controls
- Due Date 11/23/2020
- Created By Scott Erlenbusch
- Identified On 11/9/2020 8:34 AM

Strategic adjusted and OS verified operation. Scott Erlenbusch on 03/22/2021 at 01:37 PM Optimized Systems



# TST-14-9 CLOSED HIGH

AHU 5 HD and CD Supply static pressure sensors are not reading	Asset	🏩 WHM_AHU 5
pressures. They are both reading 0" WC while unit is running. Please verify		Air Handling Unit
install and setup and replace if necessary.		Mechanical Room 5015A
Source Test 14. Attempt 1. Line 19		<b>5th Floor</b>
Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?		🖩 WHM - Wittson Hall/
		McGoogan Library
	Discipline	Controls
	Due Date	11/23/2020
	Created By	Scott Erlenbusch
	Identified On	11/9/2020 8:01 AM
OS verified the sensor setup and they are reading correctly		
OS verified the sensor setup and they are reading correctly. Scott Erlenbusch on 03/22/2021 at 01:38 PM Optimized Systems TST-14-8 CLOSED (HIGH)		
OS verified the sensor setup and they are reading correctly. Scott Erlenbusch on 03/22/2021 at 01:38 PM Optimized Systems TST-14-8 CLOSED [HIGH] Humidifier valve and ISO valve appear to be failsafe actuators. Please see	Asset	🌣 WHM_AHU 5
OS verified the sensor setup and they are reading correctly. Scott Erlenbusch on 03/22/2021 at 01:38 PM Optimized Systems TST-14-8 CLOSED HIGH Humidifier valve and ISO valve appear to be failsafe actuators. Please see attached files. The valves will need to be wired and tested per new	Asset	<ul> <li>WHM_AHU 5</li> <li>Air Handling Unit</li> </ul>
OS verified the sensor setup and they are reading correctly. Scott Erlenbusch on 03/22/2021 at 01:38 PM Optimized Systems TST-14-8 CLOSED HIGH Humidifier valve and ISO valve appear to be failsafe actuators. Please see attached files. The valves will need to be wired and tested per new humidifier safety sequence.	Asset	<ul> <li>WHM_AHU 5</li> <li>Air Handling Unit</li> <li>Mechanical Room 5015A</li> </ul>
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OS verified the sensor setup and they are reading correctly. Scott Erlenbusch on 03/22/2021 at 01:38 PM Optimized Systems <b>TST-14-8</b> CLOSED HIGH Humidifier valve and ISO valve appear to be failsafe actuators. Please see attached files. The valves will need to be wired and tested per new humidifier safety sequence. <b>Source</b> Test 14, Attempt 1, Line 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Asset	<ul> <li>WHM_AHU 5</li> <li>Air Handling Unit</li> <li>Mechanical Room 5015A</li> <li>5th Floor</li> <li>WHM - Wittson Hall/</li> </ul>
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Strategic wired in new safeties for the humidifier. OS tested the safeties and verified that the humidifier valve closed when safeties

went in to alarm.

Scott Erlenbusch on 03/12/2021 at 08:15 AM Optimized Systems



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# TST-15-12 CLOSED HIGH

Humidifier valve and ISO valve will need to be wired and tested per the new	Asset	🌣 WHM_AHU 6
humidifier safety sequence. (Please see Attached Files)		Air Handling Unit
Source Test 15, Attempt 1, Line 65		Mechanical Room 5000
Is the humidifier valve actuator a fail safe actuator and does it fail closed?		<ul> <li>Sth Floor</li> <li>WHM - Wittson Hall/ McGoogan Library</li> </ul>
	Discipline	Controls
	Due Date	11/23/2020
	Created By	Scott Erlenbusch
	Identified On	11/9/2020 7:49 AM

Humidifier valve is now failsafe and does close when the humidifier safeties are tripped. Scott Erlenbusch on 03/12/2021 at 08:23 AM Optimized Systems





IMG\_0292.jpg

# TST-15-11 CLOSED HIGH

Did not see a humidistat or airflow switch installed for humidifier. The humidistat and airflow switch will need to be installed per the new humidifier safety sequence and tested.

Source Test 15, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU?

#### Asset 🤹 WHM AHU 6

Air Handling Unit

Mechanical Room 5000

5th Floor

WHM - Wittson Hall/ McGoogan Library

## Discipline Controls Due Date 11/23/2020 Created By Scott Erlenbusch Identified On 11/9/2020 7:48 AM

New humidifier safeties have been installed and tested by OS. Scott Erlenbusch on 03/12/2021 at 08:22 AM Optimized Systems



# TST-13-7 CLOSED MODERATE

Pre-filter and filter pressure sensor are set up for bi-directional. These
should be set up for uni-directional.
Source Test 13, Attempt 1, Line 25
Are all the filter pressure sensors installed across each filter bank they serve?

#### Asset 🤽 WHM\_AHU 4

- Air Handling Unit
- Mechanical Room 5000
- **5th Floor** 
  - WHM Wittson Hal
  - McGoogan Library

Discipline Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 2:37 PM

Points are now set up for uni-directional and point setup has been changed. Scott Erlenbusch on 06/21/2021 at 07:41 AM Optimized Systems

# TST-15-9 CLOSED MODERATE

Hot deck temperature not reading correctly. Hot deck, BAS=76.5 degrees,	Asset 🤹 WHM_AHU 6
Fieldpiece psychrometer=85.5 degrees.	Air Handling Unit
Hot deck temperature sensor is an 18" probe so we may are probably not	Mechanical Room 5000 5th Floor
getting our sensor in to the airstream as well. May not be an issue.	🖩 WHM - Wittson Hall/
Recommend moving probe to the ductwork.	McGoogan Library
Source Test 15, Attempt 1, Line 13	Discipline Controls
Does the supply air temperature sensor report an acceptable value?	Due Date 11/20/2020
	Created By Scott Erlenbusch
	Identified On 11/6/2020 1:18 PM
Now sonsor has been installed, and verified	

New sensor has been installed, and verified Marcus Houser on 03/22/2021 at 03:01 PM Optimized Systems

# TST-15-8 CLOSED MODERATE

There are spaces not covered by the two LTD sensors installed. Add another LTD to cover these areas. **Source** Test 15, Attempt 1, Line 28 Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

#### Asset 🤹 WHM\_AHU 6

- Air Handling Unit
- Mechanical Room 5000
- **5**th Floor
- WHM Wittson Hall/ McGoogan Library
- Discipline Controls
- Due Date 11/20/2020
- Created By Scott Erlenbusch
- Identified On 11/6/2020 12:59 PM

Another LTD has been added Marcus Houser on 03/22/2021 at 03:00 PM Optimized Systems



# TST-15-7 CLOSED HIGH

Return air humidity sensor not reading correctly. BAS=28% RH. Fieldpiece
psychrometer=49.5% RH. Please replace senor.
Source Test 15, Attempt 1, Line 4
Does the return air humidity sensor report an acceptable value?

#### Asset 🧟 WHM\_AHU 6

- Air Handling Unit
- Mechanical Room 5000
- **5th Floor**

**Discipline** Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 12:49 PM

verified new sensor, completed Marcus Houser on 03/22/2021 at 03:00 PM **Optimized Systems** 

TST-13-4 CLOSED MODERATE

Minimum OA damper is open slightly when commanded closed. Source Test 13, Attempt 1, Line 62 Do the minimum outdoor air dampers open and close fully when commanded by the BAS?

- Asset 🧟 WHM AHU 4
  - Air Handling Unit Mechanical Room 5000 **5th Floor**

**Discipline** Controls Due Date 11/20/2020 Created By Scott Erlenbusch

Identified On 11/6/2020 11:24 AM

#### Minimum OAD has been adjusted.

Scott Erlenbusch on 06/21/2021 at 07:57 AM **Optimized Systems** 

# TST-13-3 CLOSED HIGH

Asset 🤽 WHM\_AHU 4 Supply and return fan VFD's will run in hand/bypass when any of the safeties are tripped. Source Test 13, Attempt 1, Line 31 **5th Floor** Are the supply and return fan VFD's prohibited from running in hand or bypass?

- Air Handling Unit
- Mechanical Room 5000
- **Discipline** Controls

Due Date 11/20/2020

Created By Scott Erlenbusch

Identified On 11/6/2020 11:22 AM

Drives will not run in hand and bypass now when safeties are tripped. Safety board takes the enable away. Scott Erlenbusch on 06/21/2021 at 10:45 AM **Optimized Systems** 



# TST-13-2 CLOSED HIGH

Return high static cutout is plumbed to the wrong port. It is plumbed to the
low side and should be plumbed to the high side.
Source Test 13, Attempt 1, Line 50
Is the high pressure safety switch installed after the return fan and between the return and relief air
dampers?

#### Asset 🧐 WHM\_AHU 4

- Air Handling Unit
- Mechanical Room 5000
- **5th Floor** 
  - WHM Wittson Ha
  - McGoogan Library

Discipline Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 11:18 AM

Has been re-plumbed Scott Erlenbusch on 06/21/2021 at 10:44 AM Optimized Systems

# TST-13-1 CLOSED MODERATE

#### Lower LTD Needs re-routed for better coverage. Source Test 13, Attempt 1, Line 28 Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

- Asset 🧐 WHM\_AHU 4
  - Air Handling Unit
     Mechanical Room 5000
     5th Floor

    - McGoogan Library
- Discipline Controls Due Date 11/20/2020
- Created By Scott Erlenbusch
- Identified On 11/6/2020 10:28 AM

#### Strategic re-routed the lower LTD.

Scott Erlenbusch on 06/21/2021 at 07:17 AM Optimized Systems



Issue 2020-11-06 10:28:21.jpg

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# TST-14-5 CLOSED HIGH

Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Asset Discipline	<ul> <li>WHM_AHU 5</li> <li>Air Handling Unit</li> <li>Mechanical Room 5015A</li> <li>5th Floor</li> <li>WHM - Wittson Hall/ McGoogan Library</li> <li>Controls</li> </ul>
	Due Date Created By Identified On	11/19/2020 Scott Erlenbusch 11/5/2020 2:17 PM
Strategic adjusted damper actuator and OS tested operation. Scott Erlenbusch on 03/22/2021 at 01:10 PM Optimized Systems		
TST-14-4 CLOSED HIGH		

Strategic installed new SSP sensors for the HD and CD on 8th floor inside the chase before the duct enters the floor. OS verified sensor setup.

Scott Erlenbusch on 03/23/2021 at 11:43 AM Optimized Systems

# TST-14-1 CLOSED HIGH

Only 1 LTD for the whole coil and also it is ran together with the mixing air temperature sensor. Need to separate the two and add another LTD Source Test 14, Attempt 1, Line 28	Asset	<ul> <li>WHM_AHU 5</li> <li>Air Handling Unit</li> <li>Mechanical Room 5015A</li> </ul>
s there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?		■ 5th Floor ■ WHM - Wittson Hall/ McGoogan Library
	Discipline	Controls
	Due Date	11/19/2020
	Created By	Scott Erlenbusch
	Identified On	11/5/2020 2:06 PM

Strategic installed 2 more LTD sensors and OS verified operation. Scott Erlenbusch on 03/23/2021 at 11:40 AM

Optimized Systems



# TST-2-11 CLOSED HIGH

High static cutout on the cold deck tripped at 6"WC. High static cutout on the hot deck tripped at 10"WC. These values are pretty high. Cold deck high static cutout is an auto reset. Please replace the cold deck high static cutout switch with a manual reset and also set both the hot deck and cold deck to trip at 4" static.

Source Test 2, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early?

#### Asset 🤹 CON\_AHU 1

- Air Handling Unit
- Mechanical Room 1004
- 1st Floor
- CON College of Nursing

Discipline Controls

Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 2:19 PM

Cold deck high limit switch has been changed to a manual reset and both switches have been re-tested and trip out at 4" in wc Marcus Houser on 02/24/2021 at 09:05 AM Optimized Systems

# TST-2-9 CLOSED HIGH

Relief damper did not close when LTD tripped. Relief never moved when we	Asset	🎭 CON_AHU 1
commanded it.		Air Handling Unit
Source Test 2, Attempt 1, Line 32		Mechanical Room 1004
Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air		1st Floor
dampers open?		CON - College of Nursing
	Discipline	Controls
	Due Date	11/16/2020
	Created By	Scott Erlenbusch
	Identified On	11/2/2020 2:15 PM

Strategic replaced the relief damper actuators and the relief damper is working properly. Scott Erlenbusch on 03/16/2021 at 08:28 AM Optimized Systems

# TST-2-8 CLOSED HIGH

Need to verify that the bypass will not run when safeties are tripped. Will not	Asset	🌣 CON_AHU 1
run in hand when LTD or safeties are tripped.		Air Handling Unit
Source Test 2, Attempt 1, Line 31		Mechanical Room 1004
Are the supply and return fan VFD's prohibited from running in hand or bypass?		1st Floor
		Be CON - College of Nursing
	Discipline	Controls
	Due Date	11/16/2020
	Created By	Scott Erlenbusch
	Identified On	11/2/2020 2:14 PM

Strategic Electric tested the VFD's while I controlled the start/stop and speed. Drives would not run in bypass or hand when the safeties were tripped.

Scott Erlenbusch on 02/23/2021 at 10:27 AM Optimized Systems



# TST-11-14 CLOSED MODERATE

Heating coil stayed closed when LTD tripped. This may not be an issue but wanted to note it. Verify coils are protected in programming. <b>Source</b> Test 11, Attempt 1, Line 33 Does the heating coil become open? (If applicable)	Asset	<ul> <li>PDD_AHU 1</li> <li>Air Handling Unit</li> <li>Level 4 Mechanical Room</li> <li>Level 4 Mechanical Room</li> <li>PDD - Pharmacy and Drug Discovery</li> </ul>
	Discipline	Optimization
	Due Date	11/16/2020
	Created By	Scott Erlenbusch
	Identified On	11/2/2020 11:32 AM
Tested, hot water pump turns on Marcus Houser on 02/25/2021 at 02:04 PM Optimized Systems		
TST-11-12 CLOSED MODERATE		
OA damper is open slightly when commanded closed.	Asset	🌣 PDD_AHU 1
Source Test 11, Attempt 1, Line 61		Air Handling Unit
Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?		Level 4 Mechanical Room
		Level 4 Mechanical Room
		Biscovery
	Discipline	Controls
	Discipline Due Date	11/16/2020
	Created By	Scott Erlenbusch
	Identified On	11/2/2020 11:29 AM
OA damper has been adjusted and we tested and verified closed position. Marcus Houser on 02/25/2021 at 01:42 PM Optimized Systems		
TST-11-11 CLOSED HIGH		
Relief air dampers are stuck at 100% open. The dampers did not move at all	Asset	PDD_AHU 1
when commanded.		Air Handling Unit
Source Test 11, Attempt 1, Line 59		Level 4 Mechanical Room
Do the relief air damper actuators fully open and close when commanded by the BAS?		PDD - Pharmacy and Drug
		Discovery
	Discipline	Controls
	Due Date	11/16/2020
	Created By	Scott Erlenbusch
	Identified On	11/2/2020 11:28 AM

Relief air dampers have been adjusted and we verified close and open all the way. New actuators were also installed. Marcus Houser on 02/25/2021 at 01:42 PM Optimized Systems



# TST-11-10 CLOSED HIGH

Supply and Return fan drives are still able to run in hand or bypass when	Asset	<ul> <li>PDD_AHU 1</li> <li>Air Handling Unit</li> </ul>
Source Test 11, Attempt 1, Line 31 Are the supply and return fan VFD's prohibited from running in hand or bypass?		<ul> <li>Level 4 Mechanical Room</li> <li>Level 4 Mechanical Room</li> <li>PDD - Pharmacy and Drug</li> </ul>
	Discipline	Controls
	Due Date Created By	11/16/2020 Scott Erlenbusch
Safety board in the panel was not wired correctly, safety relay was wired norm	Identified On	11/2/2020 11:27 AM

when a safety is on

Marcus Houser on 02/25/2021 at 02:05 PM Optimized Systems

# TST-11-9 CLOSED HIGH

High static cutout tripped at 5" WC. This is a little high but when AHU	Asset	🌣 PDD_AHU 1
started up after the safeties were tripped it ramped up to over 4" WC. Verify		Air Handling Unit
ramp in programming and set trip point to 4" if possible.		Level 4 Mechanical Room
Source Test 11, Attempt 1, Line 39		Level 4 Mechanical Room
Is the high Pressure Safety Switch calibrated properly in order to not trip early?		PDD - Pharmacy and Drug Discovery
	Discipline	Optimization
	Due Date	11/16/2020
	Created By	Scott Erlenbusch
	Identified On	11/2/2020 11:17 AM

Adjusted high static cutout to 4.5" in wc and tested Marcus Houser on 02/25/2021 at 02:03 PM Optimized Systems

# TST-11-8 CLOSED HIGH

Low static cutout tripped at 4" WC, that is a little high. Set switch to trip at	Asset	₽.	PDD_AHU 1
2.5".			Air Handling Unit
Source Test 11. Attempt 1. Line 44			Level 4 Mechanical Room
Is the low suction pressure safety switch calibrated properly in order to not trip early?		al	Level 4 Mechanical Room
			PDD - Pharmacy and Drug
			Discovery
	Discipline	Co	ntrols
	Due Date	11/	16/2020
	Created By	Sco	ott Erlenbusch
	Identified On	11/	2/2020 11:15 AM

Low Static cutout has been adjusted to 2.5" in wc: tested Marcus Houser on 02/25/2021 at 02:02 PM Optimized Systems

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# TST-11-6 CLOSED HIGH

MOA damper does not close fully when commanded. Source Test 11, Attempt 1, Line 62 Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Asset	<ul> <li>PDD_AHU 1</li> <li>Air Handling Unit</li> <li>Level 4 Mechanical Room</li> <li>Level 4 Mechanical Room</li> <li>PDD - Pharmacy and Drug Discovery</li> </ul>
	Discipline	Controls
	Due Date	11/16/2020
	Created By	Scott Erlenbusch
	Identified On	11/2/2020 10:41 AM
Damper has been adjusted and closes fully now, tested and verified Marcus Houser on 02/25/2021 at 02:02 PM Optimized Systems		
TST-11-4 CLOSED HIGH		
There are three freeze stats installed. The routing could be a little better to cover some areas that are missed. If we cannot cover these areas with existing then one LTD may need to be added. <b>Source</b> Test 11, Attempt 1, Line 28 Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Asset Discipline Due Date Created By Identified On	<ul> <li>PDD_AHU 1</li> <li>Air Handling Unit</li> <li>Level 4 Mechanical Room</li> <li>Level 4 Mechanical Room</li> <li>PDD - Pharmacy and Drug Discovery</li> <li>Controls</li> <li>11/16/2020</li> <li>Scott Erlenbusch</li> <li>11/2/2020 8:53 AM</li> </ul>
retested LTD, verified it works Marcus Houser on 02/25/2021 at 02:07 PM Optimized Systems		
3 extra freeze stats added with existing ones Marcus Houser on 02/25/2021 at 01:04 PM Optimized Systems		
TST-11-3 CLOSED HIGH		
OA humidity value is different than the NWS. BAS=52% RH, NWS=69%RH.	Asset	🌣 PDD_AHU 1

This point is coming from Panel 401. Replace outdoor humidity sensor.

Source Test 11, Attempt 1, Line 2

Does the outdoor temperature report an acceptable value?

#### Asset 🤹 PDD\_AHU 1

- Air Handling Unit
- Level 4 Mechanical Room
- Level 4 Mechanical Room
- BE PDD Pharmacy and Drug

#### **Discipline** Controls Due Date 11/16/2020

Created By Scott Erlenbusch Identified On 11/2/2020 7:55 AM

New Sensor Installed, programming updated Tyler Mueller on 03/02/2021 at 10:56 AM **Optimized Systems** 



# TST-11-2 CLOSED HIGH

P_AHU 1
landling Unit
el 4 Mechanical Room
4 Mechanical Room - Pharmacy and Drug overy
20
enbusch
20 7:54 AM
20 

on the east side of the building Marcus Houser on 02/25/2021 at 02:09 PM Optimized Systems

# TST-11-1 CLOSED HIGH

The mixed air temperature is 30 degrees. Mixed air minimum temperature is	Asset	Ф,	PDD_AHU 1
50 degrees on the graphics. Why is code letting the MAT go so low? OS to			Air Handling Unit
verify programming.			Level 4 Mechanical Room
Source Test 11		al.	Level 4 Mechanical Room
PDD AHU 1 - AHU - Humidifier/Optimization		88	PDD - Pharmacy and Drug
			Discovery
	Discipline	Ор	timization
	Due Date	11/	(16/2020
	Created By	Sc	ott Erlenbusch
	Identified On	11/	2/2020 7:43 AM

Updated Programming to limit outside air and mixed air temp Tyler Mueller on 03/02/2021 at 10:41 AM Optimized Systems



# TST-4-11 CLOSED HIGH

Label on actuator says that you can program the failsafe position. Not sure it	Asset 🤹 COPH_AHU 2	
is programmed to fail closed. When humidity safety circuit is installed it will need to be tested. This actuator is modulating. <b>Source</b> Test 4, Attempt 1, Line 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed?	<ul> <li>Air Handling Unit</li> <li>Mechanical Room 4001</li> <li>Level 4 Penthouse</li> <li>COPH - College of Publit</li> <li>Health</li> </ul>	С
	Discipline Controls Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 12:01 PM	
Tested actuator, when leaving newer it fails alread		

Tested actuator, when losing power it fails closed Marcus Houser on 03/29/2021 at 07:55 AM Optimized Systems



IMG\_0303.heic

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# TST-3-17 CLOSED HIGH

Label on actuator says that you can program the failsafe position. Not sure it is programmed to fail closed. When humidity safety circuit is installed it will need to be tested. This actuator is modulating. **Source** Test 3, Attempt 1, Line 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed?

#### Asset 🧐 COPH\_AHU 1

- Air Handling Unit
- Mechanical Room 1007
- 1st Floor
- COPH College of Public Health

Discipline Controls Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 11:57 AM

Tested failed open, Switched settings on actuator now fails closed Marcus Houser on 03/26/2021 at 09:45 AM Optimized Systems



IMG\_0301.heic

IMG\_0302.heic

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# TST-1-13 CLOSED

Humidifier appears to have a fail safe function. When new humidifier safety	Asset	🌣 CNS_AHU 3
sequence is implemented the actuator needs to be tested for failsafe		Air Handling Unit
position.		1st Floor Mechanical
Source Test 1. Attempt 1. Line 65		Room
Is the humidifier valve actuator a fail safe actuator and does it fail closed?		1st Floor
		CNS - College of Nursing
		Sciences
	Discipline	Controls
	Due Date	11/13/2020
	Created By	Scott Erlenbusch
	Identified On	10/30/2020 11:53 AM

We tested the humidistat and air flow switch with the humidifier commanded to 10%. The humidifier valve closed each time the devices lost air flow or humidity was too high.

Scott Erlenbusch on 02/24/2021 at 11:26 AM Optimized Systems



Issue 2020-10-30 11:52:48 14E08908.jpg

Issue 2020-10-30 11:52:48 9A19D4D6.jpg



# TST-1-12 CLOSED HIGH

Was not able to locate the BIM, this is where the building pressure sensor is landed. Need to locate BIM and verify sensor setup. The high and low side should also be verified for proper placement. Building static pressure sensor should be changed to the Ashcroft sensor. <b>Source</b> Test 1, Attempt 1, Line 22 Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Asset	<ul> <li>CNS_AHU 3</li> <li>Air Handling Unit</li> <li>1st Floor Mechanical</li> <li>Room</li> <li>1st Floor</li> <li>CNS - College of Nursing Sciences</li> </ul>
	Discipline Due Date Created By Identified On	Controls 11/13/2020 Scott Erlenbusch 10/30/2020 11:41 AM
Wired a new Building Static Pressure sensor to AHU 3 panel. OS verified setup a Scott Erlenbusch on 02/24/2021 at 12:48 PM Optimized Systems	and install.	
TST-1-11 CLOSED HIGH		

I was not able to locate the Supply Static Pressure sensor. This should be	Assigned To	Optimized Systems
located to verify setup.	Asset	🌣 CNS_AHU 3
Source Test 1, Attempt 1, Line 19		Air Handling Unit
Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location		1st Floor Mechanical
possible?		Room
		1st Floor
		E CNS - College of Nursing
		Sciences
	Due Date	11/13/2020
	Created By	Scott Erlenbusch
	Identified On	10/30/2020 11:37 AM
AHU was controlling to the sensor and the sensor appears to be reading correctly	1.	

Scott Erlenbusch on 11/11/2020 at 11:16 AM **Optimized Systems** 

TST-2-7 CLOSED MODERATE I did not see a return low static suction pressure switch installed and did not see a point in Panel 101. Please add a low suction static pressure switch

and incorporate in to safety circuit.

Source Test 2, Attempt 1, Line 44

Is the low suction pressure safety switch calibrated properly in order to not trip early?

## Asset 🤹 CON\_AHU 1

- Air Handling Unit
- Mechanical Room 1004
- 1st Floor
- E CON College of Nursing
- **Discipline** Controls
- Due Date 11/13/2020
- Created By Scott Erlenbusch
- Identified On 10/30/2020 10:47 AM

Low limit static pressure switch has been installed and tested trips out at 2.5" in wc

Marcus Houser on 02/24/2021 at 09:04 AM **Optimized Systems** 



# TST-2-6 CLOSED MODERATE

I did not see a return plenum pressure sensor installed. Please add sensor	Asset	🌣 CON_AHU 1
and coordinate with Optimized Systems for placement.		Air Handling Unit
Source Test 2, Attempt 1, Line 16		Mechanical Room 1004
Is the return plenum pressure sensor installed between the relief air and return air damper sections, and		1st Floor
after the return fan?		CON - College of Nursing
	Discipline	Controls
	Due Date	11/13/2020
	Created By	Scott Erlenbusch
	Identified On	10/30/2020 10:33 AM

Sensor has been installed, signal is reading voltage, and point has been created on Insight Marcus Houser on 02/24/2021 at 09:07 AM Optimized Systems

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# TST-2-3 CLOSED HIGH

The averaging sensor should be protected wherever it touches anything in the AHU.

**Source** Test 2, Attempt 1, Line 10 Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section property?

#### Asset 🤹 CON\_AHU 1

- Air Handling Unit
- Mechanical Room 1004
- 1st Floor
- CON College of Nursing

**Discipline** Controls

Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 9:21 AM

#### Avg. Sensor has new poly tubes and zip ties installed. Marcus Houser on 02/24/2021 at 09:14 AM Optimized Systems



Issue 2020-10-30 09:18:05 1BA9B875.jpg

Issue 2020-10-30 09:18:05 2777FE0C.jpg

Issue 2020-10-30 09:18:05 3F1564C9.jpg





Issue 2020-10-30 09:18:05 818B87AE.jpg

# TST-2-2 CLOSED HIGH

I do not see a return air humidity sensor installed. There is also no point in Panel 101. Please add a return air humidity sensor. **Source** Test 2, Attempt 1, Line 4 Does the return air humidity sensor report an acceptable value?

#### Asset 🧐 CON\_AHU 1

- Air Handling Unit
- Mechanical Room 1004
- 1st Floor
  - CON College of Nursing

#### **Discipline** Controls

Due Date 11/13/2020

## Created By Scott Erlenbusch

Identified On 10/30/2020 8:56 AM

Return Humidity sensor has been installed and verified it works Marcus Houser on 02/24/2021 at 09:31 AM Optimized Systems

# TST-2-1 CLOSED MODERATE

OA Humidity sensor is reporting a different value than what the National Weather Service is. Please replace outdoor air humidity sensor. **Source** Test 2, Attempt 1, Line 1 Does the outdoor humidity sensor report an acceptable value?

#### Asset 🤹 CON\_AHU 1

- Air Handling Unit
- Mechanical Room 1004
- 1st Floor
  - CON College of Nursin

## **Discipline** Controls

Due Date 11/13/2020

Created By Scott Erlenbusch

Identified On 10/30/2020 8:41 AM

Verified sensor is reading correctly Marcus Houser on 02/24/2021 at 10:04 AM Optimized Systems



# TST-8-14 CLOSED HIGH

Both of the return fans did not start at the same time. The end switches for the return isolation dampers should be wired in series so that once both dampers open the return fans would start at the same time. <b>Source</b> Test 8, Attempt 1, Line 56 Does the return fan start and stop when commanded by the BAS?	Asset		DRC2_AHU 1 Air Handling Unit Level 2 Mech Room 2nd Floor DRC 2 - Durham Research Center 2
	Discipline	Coi	ntrols
	Due Date	11/	12/2020
	Created By	Sco	ott Erlenbusch
	Identified On	10/	29/2020 2:08 PM

Strategic installed a relay that kills the start signal to the drives until all isolation dampers have been opened. Drives start at the same time now.

Scott Erlenbusch on 07/02/2021 at 08:38 AM Optimized Systems

# TST-8-13 CLOSED MODERATE

Relief damper furthest from the access door are cracked open slightly when	Asset 🤹 DRC2_AHU 1
commanded closed.	Air Handling Unit
Source Test 8, Attempt 1, Line 32	Level 2 Mech Room
Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air	2nd Floor
dampers open?	🖩 DRC 2 - Durham
	Research Center 2
	Discipline Controls
	Due Date 11/12/2020
	Created By Scott Erlenbusch
	Identified On 10/29/2020 2:06 PM
Strategic adjusted and it looks like it is sealed up.	
Scott Erlenbusch on 04/28/2021 at 08:26 AM	

**Optimized Systems** 

# TST-8-11 CLOSED HIGH

The ABB supply fan drive did run in hand while the safety was tripped. The Square D drives would not run in hand. I did not test the bypass function on	Asset	<b>Q</b> ₀ ●	DRC2_AHU 1 Air Handling Unit
the Square D drives because the drive belts are cog belts. Please verify that drives will not run in bypass with safeties tripped.			Level 2 Mech Room 2nd Floor
Source Test 8, Attempt 1, Line 31 Are the supply and return fan VFD's prohibited from running in hand or bypass?	Discipline	Con	Research Center 2
	Due Date Created By Identified On	11/1 Sco 10/2	12/2020 tt Erlenbusch 29/2020 2:04 PM

The ABB will no longer run in hand or bypass when any of the safeties are tripped. OS tested and verified. Scott Erlenbusch on 04/28/2021 at 11:37 AM Optimized Systems



# TST-8-10 CLOSED MODERATE

The Hz reading on the ABB drive is 38 Hz and the reading on the Square D drive is 42 Hz. Please verify that the VFD's are set up correctly. <b>Source</b> Test 8, Attempt 1, Line 54 Does the supply fan start and stop when commanded by the BAS?	Asset Discipline Due Date	<ul> <li>DRC2_AHU 1</li> <li>Air Handling Unit</li> <li>Level 2 Mech Room</li> <li>2nd Floor</li> <li>DRC 2 - Durham Research Center 2</li> <li>Controls</li> <li>11/12/2020</li> </ul>
	Created By	Scott Erlenbusch
	Identified On	10/29/2020 10:55 AM
Verified the speed signal to drives are correct. Scott Erlenbusch on 07/01/2021 at 01:57 PM Optimized Systems TST-6-16 CLOSED MODERATE		
Not sure where the supply static pressure sensor is located. This will need to be found and setup verified. Source Test 6, Attempt 1, Line 19 Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Asset	<ul> <li>DRC1_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 2004</li> <li>2nd Floor</li> <li>DRC 1 - Durham Research Center 1</li> </ul>
	Discipline	Controls
	Due Date	11/12/2020

Supply static pressure appears to be reading correctly and the AHU is controlling to this sensor. Did not physically verify sensor but does appear to be working correctlyl.

Created By Scott Erlenbusch Identified On 10/29/2020 8:23 AM

Scott Erlenbusch on 11/13/2020 at 07:41 AM Optimized Systems

# TST-6-15 CLOSED HIGH

Return fan 1 isolation damper does not open as quickly Return fan 2	Asset	\$	DRC1_AHU 1
isolation damper causing Return fan 2 to start before 1 and then 1 would			Air Handling Unit
fault out. The end switches on return isolation dampers should be wired in			Mechanical Room 2004
series so that both return fans start at same time.			2nd Floor
Source Test 6, Attempt 1, Line 56			Research Center 1
Does the return fan start and stop when commanded by the BAS?	Discipline	Со	ntrols
	Due Date	11/	11/2020
	Created By	Sco	ott Erlenbusch
	Identified On	10/	28/2020 3:02 PM

Strategic wired the end switches to the 24 volt system and now all dampers have to be open before starting. Scott Erlenbusch on 04/13/2021 at 01:25 PM Optimized Systems



# TST-6-13 CLOSED HIGH

Supply and return fans will run in hand and bypass when the safeties on the unit are in alarm	Asset	<ul> <li>DRC1_AHU 1</li> <li>Air Handling Unit</li> </ul>
Source Test 6, Attempt 1, Line 31 Are the supply and return fan VFD's prohibited from running in hand or bypass?		<ul> <li>Mechanical Room 2004</li> <li>2nd Floor</li> <li>DRC 1 - Durham</li> </ul>
	Discipline Due Date Created By Identified On	Controls 11/11/2020 Scott Erlenbusch 10/28/2020 2:28 PM

Strategic wired the new safety board and wired the start enable to the drives. The drives now will not run when a safety is tripped. OS verified operation.

Scott Erlenbusch on 04/13/2021 at 01:24 PM Optimized Systems

# TST-6-12 CLOSED HIGH



Strategic replaced the damper actuator with the correct actuator and we tested operation. Scott Erlenbusch on 04/28/2021 at 10:59 AM Optimized Systems

A new damper actuator was installed but it is a 95 second actuator and the old one was a 150 second actuator. Had to do this to get damper to work for the time being. When correct damper arrives it will need to be changed.

Scott Erlenbusch on 04/13/2021 at 01:27 PM Optimized Systems

# TST-6-11 CLOSED HIGH

Return dampers furthest from access door do not close all the way when	Asset	🌣 DRC1_AHU 1
commanded closed.		Air Handling Unit
Source Test 6, Attempt 1, Line 61		Mechanical Room 2004
Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?		2nd Floor
		🖩 DRC 1 - Durham
		Research Center 1
	Discipline	Controls
	Due Date	11/11/2020
	Created By	Scott Erlenbusch
	Identified On	10/28/2020 1:25 PM

Damper operation looked good when we tested 4-13-21.

Scott Erlenbusch on 04/13/2021 at 01:23 PM Optimized Systems

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### TST-7-12 CLOSED HIGH

Drive would not run in hand but would run in bypass. Please make sure	Asset	₽.	DRC1_AHU 4
drive is not able to run in bypass when safeties are tripped.			Air Handling Unit
Source Test 7, Attempt 1, Line 31			Mechanical Room 2005
Are the supply and return fan VFD's prohibited from running in hand or bypass?			(Auditorium Penthouse) 2nd Floor DRC 1 - Durham Research Center 1
Dis	cipline	Controls	
Du	le Date	11/	11/2020
Crea	ted By	Sco	ott Erlenbusch
Identif	fied On	10/2	28/2020 12:15 PM

Strategic wired the safety circuit to the supply drive. When a safety trips the drive interlock opens and drive is not permitted to run. Scott Erlenbusch on 06/08/2021 at 07:39 AM Optimized Systems

VFD drive and bypass will not run when any of the safeties are tripped. If the bypass was turned On when AHU was vacant, the bypass would come on with the isolation dampers closed. If this would happen the high static cutout should trip and shut bypass off.

Scott Erlenbusch on 06/04/2021 at 09:00 AM Optimized Systems



### TST-7-11 CLOSED HIGH

Recommend to re-route the LTD sensor so that there is better coverage on the lower chilled water coil. May want to replace sensor if we are going to re-route.

Source Test 7, Attempt 1, Line 28 Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

### Asset Scheric DRC1\_AHU 4 Air Handling Unit

- Mechanical Room 2005
- (Auditorium Penthouse)
- 2nd Floor
- B DRC 1 Durham

Research Center

Discipline Controls

Due Date 11/11/2020

Created By Scott Erlenbusch

Identified On 10/28/2020 10:34 AM

### Strategic added another LTD and OS tested operation.

Scott Erlenbusch on 06/04/2021 at 08:56 AM Optimized Systems



Issue 2020-10-28 10:34:25.jpg

### TST-7-9 CLOSED HIGH

There is no humidistat or air flow switch installed. These need to be installed per the new humidifier safety sequence. Humidifier valve and new safeties need to be tested once sequence implemented. Source Test 7, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU? DRC 1 - Durham Research Center 1 Discipline Controls Due Date 11/11/2020

Created By Scott Erlenbusch Identified On 10/28/2020 10:08 AM

High humidity cutout and air flow switch safeties have been installed and tested.

Scott Erlenbusch on 06/04/2021 at 08:54 AM Optimized Systems

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### TST-7-6 CLOSED MODERATE

Using magnehelic pressure transmitter for building pressure. The	Asset 🧐 DRC1_AHU 4
magnehelic is reading 0 and the BAS is reading06. Please verify sensor	Air Handling Unit
setup and if it is working correctly.	Mechanical Room 2005
Source Test 7, Attempt 1, Line 23	(Auditorium Penthouse)
Is the building pressure sensor reporting an acceptable value?	2nd Floor
	Bar DRC 1 - Durnam
	Research Center 1
	Discipline Controls
	Due Date 11/11/2020
	Created By Scott Erlenbusch
	Identified On 10/28/2020 9:35 AM

### New Ashcroft sensor installed for the BSP.

Scott Erlenbusch on 06/08/2021 at 07:38 AM Optimized Systems



IMG\_0254.jpg

### TST-7-5 CLOSED MODERATE

MAT sensor needs re-secured in one place. Source Test 7, Attempt 1, Line 8 Does the mixed air temperature sensor report an acceptable value?

# AssetSolutionAssetAir Handling UnitImage: Antiperiod Antiperi

### MAT sensor has been secured.

Scott Erlenbusch on 06/08/2021 at 07:42 AM Optimized Systems

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### TST-7-1 CLOSED HIGH

Return air temperature sensor is not reading correctly. Sensor needs to be replaced.	Asset 🌣 DRC1_AHU 4 Mir Handling Unit
Source Test 7, Attempt 1, Line 5 Does the return air temperature sensor report an acceptable value?	<ul> <li>Mechanical Room 2005</li> <li>(Auditorium Penthouse)</li> <li>2nd Floor</li> <li>DRC 1 - Durham</li> <li>Recorrect Contex 1</li> </ul>
	Discipline Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 1:48 PM
Strategic replace return temp sensor. Scott Erlenbusch on 06/04/2021 at 08:51 AM Optimized Systems	
TST-8-8 CLOSED HIGH	
There is no humidistat or air flow switch installed. Humidistat and airflow switch will need to be installed per new humidifier safety sequence.	Asset 🌣 DRC2_AHU 1 Mir Handling Unit

Source Test 8, Attempt 1, Line 67

Is the humidistat located between the humidity sensor and the smoke detector on the AHU?

 All Handling Onit
 Level 2 Mech Room
 ⊇nd Floor
 BRC 2 - Durham Research Center 2
 Discipline Controls
 Due Date 11/10/2020

Created By Scott Erlenbusch

Identified On 10/27/2020 10:55 AM

Humidistat and air flow switch were installed and tested for proper operation. Scott Erlenbusch on 04/28/2021 at 11:35 AM Optimized Systems

Humidifier safeties have been installed. OS tested and verified operation.

Scott Erlenbusch on 04/28/2021 at 08:23 AM Optimized Systems



### TST-8-6 CLOSED HIGH

Humidifier actuator notes a spring return. The actuator failsafe will need to be verified when new humidifier safety circuit is installed. Source Test 8, Attempt 1, Line 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed?

### Asset 🧟 DRC2\_AHU 1

- Air Handling Unit
- Level 2 Mech Room
- 2nd Floor

**Discipline** Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 10:46 AM

Humidifier valve fails closed when the safeties are tripped. Scott Erlenbusch on 04/28/2021 at 11:34 AM **Optimized Systems** 



IMG\_0247.jpg

TST-8-5 CLOSED HIGH

There is no return low suction static cutout installed on the AHU and no point in Panel 201. Please install low static cutout switch and wire in to safety circuit.

Source Test 8, Attempt 1, Line 44 Is the low suction pressure safety switch calibrated properly in order to not trip early?

### Asset 🧐 DRC2 AHU 1

Air Handling Unit

Level 2 Mech Room

2nd Floor

Be DRC 2 - Durham

**Discipline** Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 10:17 AM

Low static pressure cutout was installed and trips at 2.5 inWC. OS verified operation. Scott Erlenbusch on 04/28/2021 at 11:34 AM **Optimized Systems** 



### TST-8-4 CLOSED HIGH

There is no supply high static cutout on the AHU and no point in Panel 201.	Asset	🌣 DRC2_AHU 1
Please install high static cutout switch and wire in to safety circuit.		Air Handling Unit
Source Test 8, Attempt 1, Line 39		Level 2 Mech Room
Is the high Pressure Safety Switch calibrated properly in order to not trip early?		<ul> <li>2nd Floor</li> <li>DRC 2 - Durham</li> <li>Research Center 2</li> </ul>
	Discipline	Controls
	Due Date	11/10/2020
	Created By	Scott Erlenbusch
Id	entified On	10/27/2020 10:16 AM
High static pressure cutout was installed and trips at 4 inWC. OS verified operation.		

Scott Erlenbusch on 04/28/2021 at 11:33 AM Optimized Systems

### TST-8-3 CLOSED HIGH

There are three LTD's installed but a couple could be added for better coverage. Not sure of the length of the LTD's, maybe longer ones could be added to get needed coverage. **Source** Test 8, Attempt 1, Line 28 Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

Asset	\$	DRC2	AHU	1
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Air Handling Unit
 Level 2 Mech Room
 2nd Floor
 DRC 2 - Durham
 Research Center 2

Discipline Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 10:07 AM

Strategic installed 3 more LTD's in to the circuit, 6 total. Scott Erlenbusch on 04/28/2021 at 08:22 AM Optimized Systems



IMG\_0243.jpg



IMG\_0244.jpg

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### TST-8-2 CLOSED HIGH

There is a return static pressure magnehelic transmitter installed before the return fans and a relief DP magnehelic transmitter installed after the return fan in the relief plenum. The relief DP high and low side are on either side of the relief damper. OS to change programming and use the Relief DP as the RPP sensor and plumb the sensor correctly.

Source Test 8, Attempt 1, Line 16

Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?

### Asset 🤽 DRC2\_AHU 1

- Air Handling Unit
- Level 2 Mech Room
- 2nd Floor
- 🖩 DRC 2 Di
  - Research Center 2

Discipline Optimization Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 9:42 AM

Strategic left the relief DP and installed a new Belimo RPP. OS verified setup. Scott Erlenbusch on 04/28/2021 at 07:29 AM Optimized Systems



TST-8-1 CLOSED MODERATE

Outdoor humidity is 20% less than what NWS is reporting. BAS=64% RH, NWS=88% RH. Please replace OA Humidity sensor. Source Test 8, Attempt 1, Line 1 Does the outdoor humidity sensor report an acceptable value?

### Asset 🧐 DRC2\_AHU 1

- Air Handling Unit
- Level 2 Mech Room
- 2nd Floor ■ DRC 2 - Durham
  - Research Center 2

Discipline Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 8:09 AM

Strategic installed a new OAT and OAH sensor. Scott Erlenbusch on 04/29/2021 at 09:54 AM

Optimized Systems

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### TST-6-10 CLOSED

Supply plenum pressure sensor is a magnehelic transmitter. Not sure if it	Asset	🌣 DRC1_AHU 1
has been calibrated or if it is reading correctly. Please verify supply pressure		Air Handling Unit
is reading correctly.		Mechanical Room 2004
Source Test 6		<ul> <li>2nd Floor</li> <li>DRC 1 - Durham</li> </ul>
DRC1_AHU 1 - AHU - Humidifier/Optimization		Research Center 1
	Discipline	Controls
	Due Date	11/9/2020
	Created By	Scott Erlenbusch
	Identified On	10/26/2020 2:16 PM

Strategic installed a Belimo DP sensor and OS verified operation. 4-20mv, 0-6 inWC. Scott Erlenbusch on 04/13/2021 at 02:09 PM Optimized Systems

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### TST-6-8 CLOSED

There are not enough low temperature detectors installed to cover the chilled water coil adequately. There are three installed but could use a couple more. Some of the issue may be where to install more LTD's on outside of unit.

Source Test 6, Attempt 1, Line 28

Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

### Asset 🧐 DRC1\_AHU 1

- Air Handling Unit
- Mechanical Room 2004
- 2nd Floor
- 🖩 DRC 1 Du
  - Research Center 1

Discipline Controls Due Date 11/9/2020 Created By Scott Erlenbusch Identified On 10/26/2020 2:15 PM

Strategic installed 3 more LTD safeties and removed them from the 120 volt circuit. All the safeties are now on 24 volt and utilize the RIB safety board. OS verified operation.

Scott Erlenbusch on 04/13/2021 at 01:22 PM Optimized Systems



Issue 2020-10-26 14:12:52 026B39E2.jpg



Issue 2020-10-26 14:12:52 026DDC9E.jpg

Issue 2020-10-26 14:12:52 08BC36C7.jpg





Issue 2020-10-26 14:12:52 382908D1.jpg

### TST-6-9 CLOSED

Humidifier isolation valve is in operator commanded open. Source Test 6 DRC1\_AHU 1 - AHU - Humidifier/Optimization

### Asset 🤹 DRC1\_AHU 1

 Air Handling Unit
 Mechanical Room 2004
 2nd Floor
 DRC 1 - Durham Research Center 1

Due Date 11/9/2020 Created By Scott Erlenbusch Identified On 10/26/2020 2:15 PM

This issue has been corrected by UNMC. Scott Erlenbusch on 11/11/2020 at 11:42 AM Optimized Systems

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### TST-6-7 CLOSED HIGH

### Asset 🧟 DRC1\_AHU 1 Return static pressure is located on the suction side of the return fans. The Air Handling Unit relief damper DP is located between the relief and return damper sections. Mechanical Room 2004 Both of these sensors are magnehelic transmitters. Not sure if the 2nd Floor magnehelics are calibrated or reading correctly. OS to change programming so that the Relief DP is used for the RPP and verify that the sensor is plumbed properly. **Discipline** Optimization Source Test 6, Attempt 1, Line 16 Due Date 11/9/2020 Is the return plenum pressure sensor installed between the relief air and return air damper sections, and Created By Scott Erlenbusch after the return fan? Identified On 10/26/2020 1:53 PM

Control wires were disconnected from the old Rel Dp transmitter and connected to the New RPP sensor. OS verified the point setup and operation.

Scott Erlenbusch on 04/28/2021 at 10:58 AM **Optimized Systems** 



IMG\_0229.jpg



IMG\_0230.jpg

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### TST-6-6 CLOSED

Humidistat and air flow switch have not been installed. Humidistat and air flow switch should be installed and wired per new humidifier safety sequence. <b>Source</b> Test 6, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Asset	<ul> <li>DRC1_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 2004</li> <li>2nd Floor</li> <li>DRC 1 - Durham Research Center 1</li> </ul>
	Discipline Due Date Created By Identified On	Controls 11/9/2020 Scott Erlenbusch 10/26/2020 1:11 PM

Strategic installed new humidifier safeties and OS tested the operation. Humidifier valve fails closed when the safeties go in to alarm.

Scott Erlenbusch on 04/09/2021 at 12:57 PM Optimized Systems

### TST-6-5 CLOSED

Humidifier valve is a fail safe actuator and the humidifier isolation valve is as	Asset 🧐 DRC1_AHU 1	
well. Fail safe needs to be verified when new humidifier safety sequence is	Air Handling L	Jnit
installed.	Mechanical Re	oom 2004
Source Test 6, Attempt 1, Line 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed?	■ 2nd Floor B DRC 1 - Durha Research Cen	am Iter 1
Dis	cipline Controls	
Du	ue Date 11/9/2020	
Crea	ated By Scott Erlenbusch	
Identit	fied On 10/26/2020 1:04 P	M

Strategic installed new humidifier safeties and OS tested the operation. Humidifier valve fails closed when the safeties go in to alarm.

Scott Erlenbusch on 04/09/2021 at 12:57 PM Optimized Systems



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### TST-6-4 CLOSED HIGH

Do not see a return low suction static pressure point in the panel and did not see any relief gates on the return plenum. Please install return low suction pressure switch and wire in to safety circuit. <b>Source</b> Test 6, Attempt 1, Line 44 Is the low suction pressure safety switch calibrated properly in order to not trip early?	Asset	<ul> <li>DRC1_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 2004</li> <li>2nd Floor</li> <li>DRC 1 - Durham Research Center 1</li> </ul>
	Discipline	Controls
	Due Date	11/9/2020
	Created By	Scott Erlenbusch
	Identified On	10/26/2020 12:54 PM
Strategic installed and OS verified operation. Trips at 2.5 inWC. Scott Erlenbusch on 04/13/2021 at 01:20 PM Optimized Systems		
TST-6-3 CLOSED HIGH		
Do not see a supply high static pressure cutout switch installed. Please install Pressure switch and wire in to safety circuit. <b>Source</b> Test 6, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Asset	<ul> <li>DRC1_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 2004</li> <li>2nd Floor</li> <li>DRC 1 - Durham Research Center 1</li> </ul>
	Discipline	Controls
	Due Date	11/9/2020
	Created By	Scott Erlenbusch
	Identified On	10/26/2020 12:53 PM
Strategic installed and OS verified operation. Trips at 4 inWC. Scott Erlenbusch on 04/13/2021 at 01:20 PM Optimized Systems		
TST-6-2 CLOSED HIGH		
Supply air temperature sensor not reporting the correct value. BAS=57.4 degrees. Fluke=52.2 degrees. Replace supply air temperature sensor and install in the supply duct right off the AHU. <b>Source</b> Test 6, Attempt 1, Line 13 Does the supply air temperature sensor report an acceptable value?	Asset	<ul> <li>DRC1_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 2004</li> <li>2nd Floor</li> <li>DRC 1 - Durham</li> </ul>
		Research Center 1
	Discipline	Controls
	Due Date	11/9/2020
	Created By	Scott Erlenbusch
	Identified On	10/26/2020 12:27 PM

Strategic installed new SAT sensor and OS verified temperature.

Scott Erlenbusch on 04/09/2021 at 12:55 PM Optimized Systems



### TST-6-1 CLOSED MODERATE

The MAT sensor is an averaging sensor but only covers the top half of the AHU. Please install (4) new mixed air averaging sensors and consult Optimized Systems for routing and wiring matrix to single input. <b>Source</b> Test 6, Attempt 1, Line 10 Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section	Asset	<ul> <li>DRC1_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 2004</li> <li>2nd Floor</li> <li>DRC 1 - Durham</li> </ul>
properly?	Discipline Due Date Created By Identified On	Controls 11/9/2020 Scott Erlenbusch 10/26/2020 11:06 AM

Strategic installed new MAT averaging sensors. OS verified temperature. Scott Erlenbusch on 04/09/2021 at 12:55 PM Optimized Systems



dampers open?

### TST-1-7 CLOSED HIGH

Minimum outdoor air damper was still open 8% when unit was tripped on LTD. Verify programming is closing dampers correctly on safety trip. **Source** Test 1, Attempt 1, Line 32 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air

Asset 🤹 CNS AHU 3

Air Handling Unit

1st Floor Mechanical

Room

1st Floor

CNS - College of Nursing Sciences

Discipline Optimization Due Date 10/30/2020 Created By Scott Erlenbusch Identified On 10/16/2020 9:00 AM

Minimum outdoor air damper was closed when we tripped the LTD. Scott Erlenbusch on 02/24/2021 at 12:52 PM Optimized Systems

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### TST-1-6 CLOSED MODERATE

There are three LTD sensors installed. There is roughly 18" between each pass. Where each sensor ends there is a small area on the water inlet side of the coil that the sensor misses. You can probably get by with the current LTD Setup, but you should add 1 LTD sensor.

Source Test 1, Attempt 1, Line 28

Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

### Asset 🧐 CNS\_AHU 3

- Air Handling Unit
- 1st Floor Mechanica
- Room
- 1st Floor
- CNS College of Nursing Sciences
- **Discipline** Controls
- Due Date 10/30/2020
- Created By Scott Erlenbusch
- Identified On 10/16/2020 8:55 AM

### Strategic installed an extra LTD.

Scott Erlenbusch on 02/24/2021 at 11:27 AM Optimized Systems



Issue 2020-10-16 08:54:11 4B6FE335.jpg

Issue 2020-10-16 08:54:11 6598BA61.jpg

### TST-1-5 CLOSED HIGH

Do not see a Low suction static cutout installed for the return duct. Install low static pressure switch and wire in to the safety circuit. **Source** Test 1, Attempt 1, Line 44 Is the low suction pressure safety switch calibrated properly in order to not trip early?

### Asset 🤹 CNS\_AHU 3

- Air Handling Unit
- 1st Floor Mechanica
- Room
- 1st Floor
- CNS College of Nursing Sciences
- Discipline Controls Due Date 10/29/2020 Created By Scott Erlenbusch Identified On 10/15/2020 2:33 PM

Strategic installed a Low Static cutout. OS tested and verified that the switch tripped at 2.25". Scott Erlenbusch on 02/24/2021 at 12:53 PM

Optimized Systems

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### TST-1-4 CLOSED HIGH

I do not see a humidistat or air flow switch installed. These will have to be added and wired per new safety sequence. <b>Source</b> Test 1, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Asset	<ul> <li>CNS_AHU 3</li> <li>Air Handling Unit</li> <li>1st Floor Mechanical</li> <li>Room</li> <li>1st Floor</li> <li>Stroop</li> <li>CNS - College of Nursing</li> </ul>
	Discipline Due Date Created By Identified On	Sciences Controls 10/29/2020 Scott Erlenbusch 10/15/2020 1:50 PM

Strategic installed air flow switch and humidistat. OS verified humidifier valve closed when air flow was lost and when supply humidity was greater than humidistat setpoint.

Scott Erlenbusch on 02/24/2021 at 11:21 AM Optimized Systems

### TST-1-2 CLOSED MODERATE

RSP sensor is set up to read +/-5". The sensor should be set up to read	
+/-2.5". This would make the sensor read more accurately with the smaller	
scale. This sensor is for informational purposes only. It is not used by	
programming.	
Source Test 1, Attempt 1, Line 18	
Is the return plenum pressure sensor and analog input ranges setup properly?	

### Asset 🤹 CNS\_AHU 3

Air Handling Unit
 1st Floor Mechanical
 Room
 1st Floor
 CNS - College of Nursi Sciences

### Discipline Controls Due Date 10/29/2020 Created By Scott Erlenbusch Identified On 10/15/2020 10:39 AM

OS changed setup on sensor and verified operation. Scott Erlenbusch on 02/24/2021 at 11:18 AM Optimized Systems

### TST-1-1 CLOSED HIGH

RPP sensor values and the BAS value are not reading the same. Return plenum pressure sensor (RPP) inputs are not set up the same as the point in the BAS. This should be set up as +/-2.5". **Source** Test 1, Attempt 1, Line 16 Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?

### Asset 🤹 CNS\_AHU 3

- Air Handling Unit
- □ 1st Floor Mechanical
- Room
- 1st Floor
- E CNS College of Nursing

### Scier

Discipline Controls Due Date 10/29/2020 Created By Scott Erlenbusch Identified On 10/15/2020 10:36 AM

Strategic Electric plumbed the poly correctly to the RPP sensor. OS changed the RPP sensor setup to +/- 1" WC and verified operation.

Scott Erlenbusch on 02/24/2021 at 11:15 AM Optimized Systems

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### TST-4-10 CLOSED HIGH

The supply air humidity sensor reading is very high. Recommend replacing humidity sensor.	Asset	<ul> <li>COPH_AHU 2</li> <li>Air Handling Unit</li> </ul>
Source Test 4, Attempt 1, Line 11		Mechanical Room 4001
Does the supply air humidity sensor report an acceptable value?		COPH - College of Public     Health
	Discipline	Controls
	Due Date	10/27/2020
	Created By	Scott Erlenbusch
	Identified On	10/13/2020 10:50 AM
Marcus Houser on 03/26/2021 at 11:03 AM Optimized Systems TST-3-15 CLOSED (HIGH)		
With the building pressure issues that MCPH has, it is recommended that	Asset	🌣 COPH_AHU 1
the sensor be replaced with an Ashcroft pressure sensor. This is true for		Air Handling Unit
AHU 1 and 2.		Mechanical Room 1007
Source Test 3, Attempt 1, Line 22		1st Floor     CODH College of Dublic
Is the building pressure sensor installed in the best location possible for the areas served by the unit?		Health
	Discipline	Controls
	Due Date	10/27/2020
	Created By	Scott Erlenbusch
	Identified On	10/13/2020 10·46 AM

### Ashcroft installed on 2nd Floor South West commons in RM2001 Marcus Houser on 03/26/2021 at 09:47 AM Optimized Systems



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### TST-3-14 CLOSED HIGH

Return air humidity sensor is reading 100%RH. Recommend replacing humidity sensor. Source Test 3, Attempt 1, Line 4

Does the return air humidity sensor report an acceptable value?

### Asset 🤹 COPH\_AHU 1

- Air Handling Unit
- Mechanical Room 1007
- 1st Floor
- COPH College of Public Health

Discipline Controls Due Date 10/27/2020 Created By Scott Erlenbusch Identified On 10/13/2020 10:06 AM

New sensor has been installed and verified Marcus Houser on 03/26/2021 at 09:28 AM Optimized Systems

### TST-12-12 CLOSED MODERATE

The low side of the return plenum static pressure sensor is plumbed in to the relief duct work after the relief damper. Low side should reference the mechanical room space. **Source** Test 12, Attempt 1, Line 16 Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? Asset 🤹 SLC\_AHU 3

Air Handling Unit

Mechanical Room 3004

- 3rd Floor
  - SLC Student Life Center

Discipline Controls Due Date 10/27/2020 Created By Scott Erlenbusch Identified On 10/13/2020 7:48 AM

Identified On 10/12/2020 10:26 AM

Strategic removed the poly and RPP is now referencing the mechanical space. Scott Erlenbusch on 03/26/2021 at 08:15 AM Optimized Systems

### TST-12-10 CLOSED HIGH

Supply high static cutout tripped at 7.25". This setting is way too high.	Asset	\$	SLC_AHU 3
Please set the high static switch to trip at 4".			Air Handling Unit
Source Test 12, Attempt 1, Line 39			Mechanical Room 3004
Is the high Pressure Safety Switch calibrated properly in order to not trip early?		al.	3rd Floor
			SLC - Student Life Center
	Discipline	Co	ntrols
	Due Date	10/	26/2020
	Created By	Sco	ott Erlenbusch

Strategic adjusted high static switch and it now trips at 4" WC. Scott Erlenbusch on 03/26/2021 at 11:21 AM Optimized Systems

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# TST-12-9 CLOSED HIGH

The only damper that close when the high static tripped was the minimum	Asset	\$	SLC_AHU 3
outdoor air damper. The outdoor damper remained open and the relief			Air Handling Unit
remained open. The return damper remained closed. These dampers			Mechanical Room 3004
should be programmed to fail with outdoor and relief closed and return open			3rd Floor
when the high static trips. OS to verify programming is closing the dampers	Discipline	Opt	imization
correctly when a safety trips.	Due Date	10/2	26/2020
Source Test 12, Attempt 1, Line 43	Created By	Sco	tt Erlenbusch
dampers open?	Identified On	10/	12/2020 10:22 AM

Todd Bishop changed the programming so that the dampers would open/close to the correct position. OS tested operation. Scott Erlenbusch on 03/29/2021 at 10:24 AM Optimized Systems

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### TST-12-8 CLOSED MODERATE

There is one LTD sensor installed and it is routed in a vertical fashion.	Asset	\$	SLC_AHU 3
Typically the LTD is routed in a horizontal fashion. If re-routed horizontally			Air Handling Unit
then 1 additional LTD sensor would probably need to be installed.			Mechanical Room 3004
Source Test 12, Attempt 1, Line 28			3rd Floor SLC - Student Life Center
Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or	Discipline	Col	ntrols
	Due Date	10/	26/2020
	Created By	Sco	ott Erlenbusch
	Identified On	10/	12/2020 10:00 AM

Strategic installed an extra LTD and OS tested operation. Both LTD's are now run horizontal. Scott Erlenbusch on 03/26/2021 at 12:18 PM Optimized Systems

### Strategic installed another LTD and OS tested.

Scott Erlenbusch on 03/26/2021 at 08:45 AM Optimized Systems



### IMG\_0120.jpg

### TST-12-7 CLOSED HIGH

Supply fan will still run in hand and in bypass when the LTD is tripped. This	Asset	🌣 SLC_AHU 3
is also true when the supply high static cutout is tripped.		Air Handling Unit
Source Test 12, Attempt 1, Line 31		Mechanical Room 3004
Are the supply and return fan VFD's prohibited from running in hand or bypass?		Jind Floor
	Dissipling	
	Discipline	Controls
	Due Date	10/26/2020
	Created By	Scott Erlenbusch
	Identified On	10/12/2020 9:57 AM

OS corrected the dip switch setting on S2-7. Dip switch was on and needed to be off for safety interlock to work. Supply drive will now not run in hand or bypass when the safeties are tripped.

Scott Erlenbusch on 03/26/2021 at 12:16 PM Optimized Systems

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### TST-12-6 CLOSED

Supply air high static cutout is installed after supply fan but it is also installed after supply isolation damper. This could cause AHU to overpressurize and not shut fans down. **Source** Test 12, Attempt 1, Line 40 Is the high Pressure Safety Switch Installed after the supply fan?

### Asset SLC\_AHU 3 Air Handling Unit Mechanical Room 3004 3rd Floor SLC - Student Life Center Discipline Controls Due Date 10/26/2020 Created By Scott Erlenbusch

Identified On 10/12/2020 9:40 AM

Strategic moved the poly to the supply cabin and OS verified.

Scott Erlenbusch on 03/26/2021 at 12:12 PM Optimized Systems



Issue 2020-10-12 09:39:48.jpg

### TST-12-5 CLOSED HIGH

Return low suction pressure cutout switch is not installed. There are return duct isolation dampers and if they were to close the return fan could speed up and duct would be very negative. Please install a low static pressure switch and wire in to safety circuit. **Source** Test 12, Attempt 1, Line 44 Is the low suction pressure safety switch calibrated properly in order to not trip early?

### Asset 🤹 SLC\_AHU 3

Air Handling Unit

Mechanical Room 3004

- 3rd Floor
  - SLC Student Life Center

**Discipline** Controls

Due Date 10/26/2020

Created By Scott Erlenbusch Identified On 10/12/2020 9:36 AM

Strategic installed Low static cutout and OS tested operation. Tripped at 2.5". Scott Erlenbusch on 03/26/2021 at 12:09 PM Optimized Systems



### TST-12-4 CLOSED

Humidifier valve is a failsafe actuator. Verify that the failsafe works correctly	Asset	🌣 SLC_AHU 3
and wire per the new humidifier safety sequence.		Air Handling Unit
Source Test 12, Attempt 1, Line 65		Mechanical Room 3004
Is the humidifier valve actuator a fail safe actuator and does it fail closed?		Jrd Floor
		SLC - Student Life Center
	Discipline	Controls
	Due Date	10/26/2020
	Created By	Scott Erlenbusch
	Identified On	10/12/2020 9:02 AM

Humidifier valve is fail safe and the valve fails closed on power loss or humidifier safety goes in to alarm. Scott Erlenbusch on 03/26/2021 at 12:09 PM Optimized Systems



IMG\_0118.jpg

### TST-12-2 CLOSED HIGH

There is no humidistat or airflow switch installed for the humidifier. Humidifier safeties will need to be installed and tested per new sequence. **Source** Test 12, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU?

### Asset 🧐 SLC\_AHU 3

- Air Handling Unit
- Mechanical Room 3004
- 3rd Floor
  - SLC Student Life Center

**Discipline** Controls

- Due Date 10/26/2020
- Created By Scott Erlenbusch
- Identified On 10/12/2020 8:52 AM

Strategic installed humidifier safeties and OS tested. Scott Erlenbusch on 03/26/2021 at 12:07 PM Optimized Systems



### TST-12-1 CLOSED MODERATE

Return damper does not close fully, there is small gap when dampers are	Asset	SLC_AHU 3
commanded closed.		An Handling Offic     Mechanical Room 3004
Source Test 12, Attempt 1, Line 61		and Floor
Do the return and outdoor air (economizer) dampers open and close tully when commanded by the BAS?		But SLC - Student Life Cente
	Discipline	Controls
	Due Date	10/26/2020
	Created By	Scott Erlenbusch
	Identified On	10/12/2020 8:40 AM
Unit heater in the penthouse for AHU 2 is valved off.	Assigned To	UNMC
Source Test 4	Asset	🤹 COPH AHU 2
COPH_AHU 2 - AHU - Humidifier/Optimization		Air Handling Unit
		Mechanical Room 4001
		Level 4 Penthouse
		Level 4 Penthouse COPH - College of Public
		■ Level 4 Penthouse © COPH - College of Public Health
	Due Date	<ul> <li>Level 4 Penthouse</li> <li>COPH - College of Publ Health</li> <li>10/23/2020</li> </ul>

Identified On 10/9/2020 2:33 PM

valve is now open Marcus Houser on 03/26/2021 at 11:00 AM Optimized Systems

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### TST-4-6 CLOSED HIGH

Return static pressure sensor appears to be failed. The display is blank and sensor is reading -4.13"WC.The penthouse is the relief plenum and sensor is causing penthouse to be negative. This could be a problem with cold air coming in to penthouse in the winter. Please replace return plenum static pressure sensor.

Source Test 4, Attempt 1, Line 17 Is the return plenum pressure sensor reporting an acceptable value?

### Asset Scoph\_AHU 2 Air Handling Unit Air Handling Unit Mechanical Room 4001 Level 4 Penthouse COPH - College of Public Health Discipline Controls Due Date 10/23/2020 Created By Scott Erlenbusch

Identified On 10/9/2020 11:01 AM

Sensor has been replaced and plumb correctly to show the suction side of the return fans Marcus Houser on 03/29/2021 at 07:54 AM Optimized Systems



IMG\_0111.jpg

### TST-4-5 CLOSED HIGH

Input ranges on the AHU supply static pressure sensor are the same as the point set up in the BAS, but sensor values and BAS values differ. Sensor reads 1.4"WC and the BAS is reporting 1.16"WC. Sensor is also set up for bi-directional, the sensor should be set up for uni-directional. Please verify sensor is good and zero sensor. Replace if sensor is bad. **Source** Test 4, Attempt 1, Line 21 Is the supply duct static pressure sensor and analog input ranges setup properly?

### Asset 🤹 COPH\_AHU 2

Asset Scorn\_And 2 Air Handling Unit Mechanical Room 4001 Level 4 Penthouse COPH - College of Publi Health Discipline Controls Due Date 10/23/2020

Created By Scott Erlenbusch Identified On 10/9/2020 10:36 AM

Changed sensor to uni-directional and zeroed it. Sensor is now reading more accurately Marcus Houser on 03/29/2021 at 07:53 AM Optimized Systems



### TST-4-4 CLOSED HIGH

There is no humidistat or airflow switch installed for the humidifier. Humidifier safeties will need to be installed and tested per new sequence. <b>Source</b> Test 4, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Asset Discipline Due Date Created By Identified On	<ul> <li>COPH_AHU 2</li> <li>Air Handling Unit</li> <li>Mechanical Room 4001</li> <li>Level 4 Penthouse</li> <li>COPH - College of Public Health</li> <li>Controls</li> <li>10/23/2020</li> <li>Scott Erlenbusch</li> <li>10/9/2020 10:25 AM</li> </ul>
Both safeties have been installed and tested by OS Marcus Houser on 03/29/2021 at 07:52 AM Optimized Systems		
ISI-4-2 CLOSED HIGH		
Supply high static cutout is set to trip at 5.25"WC. This pressure setting is too high. Set static cutout to 4". Source Test 4, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Asset	<ul> <li>COPH_AHU 2</li> <li>Air Handling Unit</li> <li>Mechanical Room 4001</li> <li>Level 4 Penthouse</li> <li>COPH - College of Public Health</li> </ul>
	Discipline	Controls
	Due Date	10/23/2020
	Created By	Scott Erlenbusch
	Identified On	10/9/2020 9:32 AM
Cutout has been adjusted to 4.25" inwc Marcus Houser on 03/26/2021 at 02:03 PM Optimized Systems		
TST-4-1 CLOSED HIGH		
Minimum outdoor air damper when released did not go back to 0%. May be programming related. Source Test 4, Attempt 1, Line 62 Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Asset	<ul> <li>COPH_AHU 2</li> <li>Air Handling Unit</li> <li>Mechanical Room 4001</li> <li>Level 4 Penthouse</li> <li>COPH - College of Public Health</li> </ul>
	Discipline	Optimization
	Due Date	10/23/2020
	Created By	Scott Erlenbusch

Dampers have been adjusted and re-tested. Marcus Houser on 03/26/2021 at 01:39 PM Optimized Systems



### TST-3-13 CLOSED HIGH

Averaging sensor rubbing on the vertical support of the chilled water coil. Please protect the averaging sensor wherever it is touching anything that could damage it. <b>Source</b> Test 3, Attempt 1, Line 10 Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Asset Discipline Due Date Created By Identified On	<ul> <li>COPH_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 1007</li> <li>1st Floor</li> <li>COPH - College of Public Health</li> <li>Controls</li> <li>10/22/2020</li> <li>Scott Erlenbusch</li> <li>10/8/2020 2:52 PM</li> </ul>
This has been corrected, poly tube to protect it Marcus Houser on 03/26/2021 at 09:27 AM Optimized Systems		
TST-3-12 CLOSED HIGH		
There is no humidistat or airflow switch installed for the humidifier. Humidifier safeties will need to be installed and tested per new sequence. <b>Source</b> Test 3, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Asset	<ul> <li>COPH_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 1007</li> <li>1st Floor</li> <li>COPH - College of Public Health</li> </ul>
	Discipline	Controls
	Due Date	10/22/2020
	Identified On	10/8/2020 2:07 PM
Humidifier safeties have been installed and OS tested operation. Scott Erlenbusch on 03/26/2021 at 01:10 PM Optimized Systems		
TST-3-11 CLOSED HIGH		
Filter pressure sensor settings do not match the point setup in Siemens. This is giving you an inaccurate reading. <b>Source</b> Test 3, Attempt 1, Line 27 Are all the filter pressure sensors and analog input ranges setup properly?	Asset	<ul> <li>COPH_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 1007</li> <li>1st Floor</li> <li>COPH - College of Public Health</li> <li>Controls</li> </ul>
	Due Date	10/22/2020
	Created By	Scott Erlenbusch
	Identified On	10/8/2020 2:04 PM

Changed Device range to match the sensor, checked and verified Marcus Houser on 03/26/2021 at 09:27 AM Optimized Systems



### TST-3-10 CLOSED MODERATE

Filter differential is reading .94" WC. The pre-filters are pretty dirty	Assigned To	UNMC
Source Test 3 Attempt 1 Line 26	Assigned To Asset	
Are all the filter pressure sensors reporting an acceptable value?	7,0001	Air Handling Unit
		Mechanical Room 1007
		1st Floor
		🖩 COPH - College of Public
		Health
	Due Date	10/22/2020
	Created By	Scott Erlenbusch
	Identified On	10/8/2020 2:03 PM
Verified sensor is setup correctly Marcus Houser on 03/26/2021 at 09:26 AM Optimized Systems		
TST-3-8 CLOSED HIGH		
Return static pressure sensor is installed on the suction side of the return	Asset	🌣 COPH_AHU 1
fan. That is why we are seeing negative values for the return static		Air Handling Unit
pressure. The poly for this sensor needs to be plumbed in to the return		Mechanical Room 1007
plenum		1st Floor
Source Test 3 Attempt 1 Line 16		COPH - College of Public
Is the return plenum pressure sensor installed between the relief air and return air damper sections, and		Health
after the return fan?	Discipline	Controls
	Due Date	10/22/2020
	Created By	Scott Erlenbusch
	Identified On	10/8/2020 1:49 PM
Tubing has been corrected, RSP sensor is ok, Hiller installed new RPP sensor Marcus Houser on 03/26/2021 at 09:20 AM Optimized Systems TST-3-6 CLOSED HIGH	OS Verified	
When the LTD tripped programming is not closing the mixed air dampers	Asset	🔅 COPH_AHU 1
correctly.		Air Handling Unit
Source Test 3		Mechanical Room 1007
COPH_AHU 1 - AHU - Humidifier/Optimization		🔳 1st Floor
		E COPH - College of Public
	_	Health
	Due Date	10/22/2020
	Created By	Scott Erlenbusch

Spoke with Todd Bishop and he fixed the programming and now the dampers are working correctly during a low temp alarm. Scott Erlenbusch on 10/08/2020 at 11:25 AM

Identified On 10/8/2020 11:24 AM

Optimized Systems



### TCT\_3\_5 CLOSED HICH

Outdoor air damper furthest from the access door does not close fully when	Asset	🍖 COPH_AHU 1
commanded.		Air Handling Unit
Source Test 3		Mechanical Room 1007
COPH_AHU 1 - AHU - Humidifier/Optimization		1st Floor
		te cOPH - College of Public
	Discipling	Controls
	Discipline	10/22/2020
	Due Date	10/22/2020
	Created By	
	Identified On	10/8/2020 11:21 AM
Marcus Houser on 03/26/2021 at 09:40 AM Optimized Systems		
Supply high static is bypassed at the pressure switch. Please wire switch	Asset	🔹 COPH_AHU 1
properly and verify operation.		Air Handling Unit
Source Test 3, Attempt 1, Line 39		Mechanical Room 1007
Is the high Pressure Safety Switch calibrated properly in order to not trip early?		
		Health
	Discipline	Controls
	Due Date	10/22/2020
	Created By	Scott Erlenbusch
	Identified On	10/8/2020 11:18 AM
Strategic replaced high static cutout switch and set it to trip at 4.25 inWC. OS v Scott Erlenbusch on 03/29/2021 at 10:20 AM Optimized Systems	erified the wiring at	tested.
TST-3-3 CLOSED HIGH		
Supply high static pressure switch tripped at 9" WC. Please adjust so that	Asset	🌣 COPH_AHU 1

Source Test 3, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early?

- Mechanical Room 1007
- 1st Floor
- **E** COPH College of Public
- **Discipline** Controls
- Due Date 10/22/2020
- Created By Scott Erlenbusch
- Identified On 10/8/2020 11:16 AM

Strategic replaced high static cutout switch and set it to trip at 4.25 inWC. Scott Erlenbusch on 03/29/2021 at 10:19 AM Optimized Systems

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### TST-3-2 CLOSED HIGH

Minimum outdoor air damper did not move when commanded. Damper was	Asset	COPH_AHU 1
always closed.		Mechanical Room 1007
Source Test 3, Attempt 1, Line 62		- 1st Floor
Do the minimum outdoor air dampers open and close fully when commanded by the BAS?		
		Health
	Discipline	Controls
	Due Date	10/22/2020
	Croated By	Scott Erlophusch
	Identified On	10/8/2020 10:18 AM
Actuator has been replaced, tested and verified Marcus Houser on 03/26/2021 at 09:36 AM Optimized Systems		
Actuator has been replaced, tested and verified Marcus Houser on 03/26/2021 at 09:36 AM Optimized Systems TST-3-1 CLOSED MODERATE	Accet	
Actuator has been replaced, tested and verified Marcus Houser on 03/26/2021 at 09:36 AM Optimized Systems <b>TST-3-1</b> CLOSED MODERATE Middle damper blade on the return damper looks to be bent. Small gap in that demonstrates assumed of fully should	Asset	COPH_AHU 1
Actuator has been replaced, tested and verified Marcus Houser on 03/26/2021 at 09:36 AM Optimized Systems <b>TST-3-1</b> CLOSED MODERATE Middle damper blade on the return damper looks to be bent. Small gap in that damper when commanded fully closed.	Asset	<ul> <li>COPH_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 1007</li> </ul>
Actuator has been replaced, tested and verified Marcus Houser on 03/26/2021 at 09:36 AM Optimized Systems <b>TST-3-1</b> CLOSED MODERATE Middle damper blade on the return damper looks to be bent. Small gap in that damper when commanded fully closed. <b>Source</b> Test 3, Attempt 1, Line 61	Asset	<ul> <li>COPH_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 1007</li> <li>1st Eloor</li> </ul>
Actuator has been replaced, tested and verified Marcus Houser on 03/26/2021 at 09:36 AM Optimized Systems <b>TST-3-1</b> CLOSED MODERATE Middle damper blade on the return damper looks to be bent. Small gap in that damper when commanded fully closed. <b>Source</b> Test 3, Attempt 1, Line 61 Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Asset	<ul> <li>COPH_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 1007</li> <li>1st Floor</li> <li>COPH - College of Public</li> </ul>
Actuator has been replaced, tested and verified Marcus Houser on 03/26/2021 at 09:36 AM Optimized Systems <b>TST-3-1</b> CLOSED MODERATE Middle damper blade on the return damper looks to be bent. Small gap in that damper when commanded fully closed. <b>Source</b> Test 3, Attempt 1, Line 61 Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Asset	<ul> <li>COPH_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 1007</li> <li>1st Floor</li> <li>COPH - College of Public Health</li> </ul>
Actuator has been replaced, tested and verified Marcus Houser on 03/26/2021 at 09:36 AM Optimized Systems <b>TST-3-1</b> CLOSED MODERATE Middle damper blade on the return damper looks to be bent. Small gap in that damper when commanded fully closed. <b>Source</b> Test 3, Attempt 1, Line 61 Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Asset	<ul> <li>COPH_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 1007</li> <li>1st Floor</li> <li>COPH - College of Public Health</li> <li>Mechanical</li> </ul>
Actuator has been replaced, tested and verified Marcus Houser on 03/26/2021 at 09:36 AM Optimized Systems <b>TST-3-1 CLOSED MODERATE</b> Middle damper blade on the return damper looks to be bent. Small gap in that damper when commanded fully closed. <b>Source</b> Test 3, Attempt 1, Line 61 Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Asset Discipline Due Date	<ul> <li>COPH_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 1007</li> <li>1st Floor</li> <li>COPH - College of Public Health</li> <li>Mechanical</li> <li>10/22/2020</li> </ul>
Actuator has been replaced, tested and verified Marcus Houser on 03/26/2021 at 09:36 AM Optimized Systems <b>TST-3-1</b> CLOSED MODERATE Middle damper blade on the return damper looks to be bent. Small gap in that damper when commanded fully closed. <b>Source</b> Test 3, Attempt 1, Line 61 Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Asset Discipline Due Date Created By	<ul> <li>COPH_AHU 1</li> <li>Air Handling Unit</li> <li>Mechanical Room 1007</li> <li>1st Floor</li> <li>COPH - College of Public Health</li> <li>Mechanical</li> <li>10/22/2020</li> <li>Scott Erlenbusch</li> </ul>

new actuator has been installed, tested and verified Marcus Houser on 03/26/2021 at 09:35 AM Optimized Systems

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# Construction Issues

42 Issues with status open, sorted by date identified



### TST-4-12 OPEN HIGH

When testing Humidifier valve noticed very little steam pressure. Source Test 4 COPH\_AHU 2 - AHU - Humidifier/Optimization

### Asset 🤹 COPH\_AHU 2

- Air Handling Unit
- Mechanical Room 4001
- Level 4 Penthouse
- COPH College of Public Health

### Due Date 4/9/2021 Created By Marcus Houser

### Identified On 3/26/2021 2:01 PM

### TST-14-11 OPEN HIGH

WHM AHU 5 and 6 safeties are not set up like a normal AHU. When the CD high static or an LTD go in to alarm the enable is lost on the CD drives but not on the HD drive. When the HD high static goes in to alarm the HD drives lose the enable but the CD drives do not. Code does however shut the unit down when any of these alarms are present. Strategic is pricing what it would cost to kill the enable to all the drives when any of the safeties would trip.

**Source** Test 14, Attempt 2, Line 28 Is there enough low limit safety devices installed in order to o

Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

### Asset 🤹 WHM\_AHU 5

Air Handling Unit

- Mechanical Room 5015A5th Floor
- WHM Wittson Hal
- Due Date 4/6/2021 Created By Scott Erlenbusch Identified On 3/23/2021 11:55 AM

### TST-17-3 OPEN HIGH

Exhaust dampers not opening all the way. Bottom blade is getting hung up	Assigned To UNMC	
on directional blending vane behind it.	Asset 🌣 WHM_AHU 3	
Source Test 17, Attempt 1, Line 59	Air Handling Unit	
Do the relief air damper actuators fully open and close when commanded by the BAS?	Mechanical Room 5015A	
	<b>5th Floor</b>	
	🔠 WHM - Wittson Hall/	
	McGoogan Library	
	Due Date 3/30/2021	
	Created By Marcus Houser	
	Identified On 3/16/2021 8:11 AM	

Please repair and verify operation. Scott Erlenbusch on 05/07/2021 at 10:37 AM Optimized Systems

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### TST-15-14 OPEN HIGH

There are two screws holding the humidifier actuator on. Marcus tightened those up, but there are two screws missing. Please get new screws and install.

Source Test 15 WHM\_AHU 6 - AHU - Humidifier/Optimization

### Asset 🤹 WHM\_AHU 6

- Air Handling Unit
- Mechanical Room 5000
- **5th Floor** 
  - WHM Wittson Hal

### Due Date 3/26/2021 Created By Scott Erlenbusch Identified On 3/12/2021 8:31 AM

### TST-9-10 OPEN MODERATE

There is a number of graphic errors that were seen for both AHU 1 and 2. **Source** Test 9 MMI\_AHU 1 - AHU - Humidifier/Optimization

### Asset 🤹 MMI\_AHU 1

- Air Handling Unit
- Level 5 Penthouse
- Level 5 Penthouse
- MMI Munroe Meyer Institute

Due Date 2/5/2021

Created By Scott Erlenbusch

Identified On 1/22/2021 7:54 AM

### TST-9-9 OPEN HIGH

PHWP is in alarm for overfrequency. Source Test 9 MMI AHU 1 - AHU - Humidifier/Optimization

### Asset 🤽 MMI\_AHU 1

Air Handling Unit

- Level 5 Penthouse
- Level 5 Penthouse
- MMI Munroe Meyer Institute

### Due Date 2/4/2021

Created By Scott Erlenbusch Identified On 1/21/2021 1:44 PM

### TST-9-8 OPEN HIGH

When we opened the heating valve for each AHU the boilers would go into a low flow alarm. Currently there is only one hot water pump running. Once the other pumps are ready to run this may go away.

Source Test 9, Attempt 1, Line 63

Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)

### Asset 🤹 MMI\_AHU 1

 Air Handling Unit
 Level 5 Penthouse
 Level 5 Penthouse
 MMI - Munroe Meyer Institute

Due Date 2/4/2021 Created By Scott Erlenbusch Identified On 1/21/2021 1:34 PM



### TST-9-7 OPEN HIGH

Heating coil did not open on an LTD. Just want this noted to verify programming is working correctly. This was also found on AHU 2. **Source** Test 9, Attempt 1, Line 33 Does the heating coil become open? (If applicable)

### Asset 🤽 MMI\_AHU 1

- Air Handling Unit
- Level 5 Penthouse
- Level 5 Penthouse
- MMI Munroe Meyer Institute

### Due Date 2/4/2021 Created By Scott Erlenbusch Identified On 1/21/2021 1:17 PM

### TST-9-5 OPEN HIGH

The mechanical room floor next to AHU 1 supply fans shakes quite a bit while unit is running. Do the supply fans need balanced after the cleaning? **Source** Test 9 MML\_AHU 1 - AHU - Humidifier/Optimization

### Asset 🤹 MMI\_AHU 1

- Air Handling Unit
- Level 5 Penthouse
- Level 5 Penthouse
- MMI Munroe Meyer Institute

Due Date 2/4/2021

### Created By Scott Erlenbusch

Identified On 1/21/2021 12:47 PM

### TST-10-6 OPEN HIGH

Building pressure sensor for AHU is located in the hallway outside the North Elevator on First floor. The outdoor air reference is located on the roof. **Source** Test 10, Attempt 1, Line 22

Is the building pressure sensor installed in the best location possible for the areas served by the unit?

### Asset 🤹 MMI\_AHU 2

Air Handling Unit
 Level 5 Penthouse

- Level 5 Penthouse
- Lever 5 Penthouse
- Institute

Discipline Controls

Due Date 2/3/2021

Created By Scott Erlenbusch

Identified On 1/20/2021 1:29 PM

### TST-10-3 OPEN HIGH

Did not see an SSP sensor in the panel. Unit is being controlled by the SPP at the AHU.

Source Test 10, Attempt 1, Line 19

Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?

### Asset 🤹 MMI\_AHU 2

Air Handling Unit
 Level 5 Penthouse

- Level 5 Penthouse
- Institute

Discipline Controls

Due Date 2/3/2021

Created By Scott Erlenbusch

Identified On 1/20/2021 8:58 AM



### TST-10-2 OPEN HIGH

Airflow switch is jumpered out and the sensor is not installed in the supply chamber.

**Source** Test 10, Attempt 1, Line 68 Is the airflow switch plumbed in to the AHU supply air plenum?

### Asset 🤹 MMI\_AHU 2

- Air Handling Unit
- Level 5 Penthouse
- Level 5 Penthouse
- MMI Munroe Meye Institute

Discipline Controls Due Date 2/3/2021 Created By Scott Erlenbusch

Identified On 1/20/2021 8:40 AM

### TST-10-1 OPEN HIGH

Return dampers did not move at all when any of the safeties were tripped. I believe all the dampers are slated to be changed at some point. Just wanted to note.

Source Test 10, Attempt 1, Line 32

Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?

### Asset 🤹 MMI\_AHU 2

Air Handling Unit

- Level 5 Penthouse
- Level 5 Penthouse
  - Institute

Discipline Controls Due Date 2/3/2021 Created By Scott Erlenbusch

Identified On 1/20/2021 8:33 AM

### TST-15-10 OPEN HIGH

Cold deck supply fan drives are overridden to 80% because the fans are not controlling to supply static. Recommend replacing static pressure sensors for CD static and HD static that are 2/3 down the ductwork. Lenny from Energy Group said that is why drives are overridden. Please verify static pressure sensor is installed and setup correctly. Replace if necessary.

Source Test 15, Attempt 1, Line 19

Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?

### Asset 🧟 WHM\_AHU 6

Asset Set Air Handling Unit Air Handling Unit Mechanical Room 5000 Sth Floor WHM - Wittson Hall/ McGoogan Library Discipline Controls Due Date 11/20/2020

Created By Scott Erlenbusch Identified On 11/6/2020 1:37 PM

Construction Issues | Printed on 12/29/2021 | Page 5 of 20



### TST-13-6 OPEN HIGH

Return CO2 sensor is broken or needs to be re- installed in duct. Source Test 13 WHM\_AHU 4 - AHU - Humidifier/Optimization

### Asset 🧐 WHM\_AHU 4

- Air Handling Unit
- Mechanical Room 5000
- **5th Floor** 
  - WHM Wittson Hal
    - McGoogan Libra

Discipline Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 11:31 AM



Issue 2020-11-06 11:31:17.jpg

# TST-14-7 OPEN HIGH

AHU is lacking proper airflow when it is not economizing. Programming needs to be looked at Source Test 14 WHM AHU 5 - AHU - Humidifier/Optimization

### Asset 🧐 WHM\_AHU 5

- Air Handling Unit
- Mechanical Room 5015A
- 5th Floor
- B WHM Wittson Hall/
  - McGoogan Library

**Discipline** Optimization

Due Date 11/19/2020

Created By Scott Erlenbusch

Identified On 11/5/2020 2:23 PM

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### TST-14-3 OPEN HIGH

Cold Deck High static safety switch tripped at 8.5" in WC. This setting	Asset	🌣 WHM_AHU 5
seems excessive, verify what this setpoint should be and set safety switch.		Air Handling Unit
Please set to 4".		Mechanical Room 5015A
Source Test 14, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early?		<ul> <li>Sth Floor</li> <li>WHM - Wittson Hall/ McGoogan Library</li> </ul>
	Discipline	Controls
	Due Date	11/19/2020
	Created By	Scott Erlenbusch
	Identified On	11/5/2020 2:11 PM

OS had strategic set both HD and CD pressure switches to 5" until programming is added. Scott Erlenbusch on 03/22/2021 at 01:40 PM Optimized Systems


# TST-14-2 OPEN HIGH

OA damper did not close all the way. Source Test 14, Attempt 1, Line 32 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?

## Asset 🔅 WHM\_AHU 5 Air Handling Unit

- Mechanical Room 5015A
- 5th Floor
  - WHM Wittson Ha
  - McGoogan Library

Discipline Controls Due Date 11/19/2020 Created By Scott Erlenbusch Identified On 11/5/2020 2:09 PM

OAD still does seal tightly. The square shaft on the damper is smashed down and may need to be reworked. Scott Erlenbusch on 03/22/2021 at 01:41 PM Optimized Systems



IMG\_0705.heic

IMG 0706.heic

IMG\_0707.heic





Issue TST-14-2 2021-03-22 13:44:31.jpg

# TST-15-6 OPEN HIGH

When AHU is not in economizer mode it appears to be starving for air. Verify correct programming. Source Test 15 WHM\_AHU 6 - AHU - Humidifier/Optimization

## Asset 🤹 WHM\_AHU 6

- Air Handling Unit
- Mechanical Room 5000
- **5th Floor**
- Image: WHM Wittson Hall/McGoogan Library

Discipline Optimization Due Date 11/19/2020

Created By Scott Erlenbusch

Identified On 11/5/2020 12:54 PM

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## TST-15-5 OPEN HIGH

Relief dampers are still open slightly when commanded closed. Source Test 15, Attempt 1, Line 59 Do the relief air damper actuators fully open and close when commanded by the BAS?

#### Asset 🧐 WHM\_AHU 6

- Air Handling Unit
- Mechanical Room 5000
- 5th Floor
- WHM Wittson Hal
  - McGoogan Library

Discipline Controls Due Date 11/19/2020 Created By Scott Erlenbusch Identified On 11/5/2020 12:52 PM

Dampers have been adjusted, still a slight gap Marcus Houser on 03/22/2021 at 02:59 PM Optimized Systems



IMG\_0711.heic

IMG\_0712.heic

# TST-15-4 OPEN HIGH

CD supply fan is overridden to 80% speed because the fan was not controlling to supply static pressure sensor. Verify the supply static pressure sensor is installed and setup correctly. **Source** Test 15, Attempt 1, Line 54 Does the supply fan start and stop when commanded by the BAS?

#### Asset 🤹 WHM AHU 6

- Air Handling Unit
- Mechanical Room 5000
- **5th Floor**
- WHM Wittson Hall/ McGoogan Library

## Discipline Controls Due Date 11/19/2020 Created By Scott Erlenbusch Identified On 11/5/2020 12:50 PM

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## TST-15-2 OPEN MODERATE

Preheat valve remained closed and Face/Bypass damper remained at 0% Face. May not be an issue but wanted to note. Verify programming will protect the coils.

**Source** Test 15, Attempt 1, Line 33 Does the heating coil become open? (If applicable)

#### Asset 🧐 WHM\_AHU 6

- Air Handling Unit
- Mechanical Room 5000
- **5th Floor**
- WHM Wittson Hall
- McGoogan Library

Discipline Optimization Due Date 11/19/2020 Created By Scott Erlenbusch

Identified On 11/5/2020 12:40 PM

# TST-2-10 OPEN HIGH

The programming for this AHU really should be looked at. When the cold deck LTD is tripped the steam valve on the hot deck goes full open. This steam valve can overheat the chamber. Not sure this should go open 100% on an LTD. All parts of the programming should be looked at so that the AHU works correctly. **Source** Test 2, Attempt 1, Line 33 Does the heating coil become open? (If applicable)

## Asset 🤹 CON\_AHU 1

- Air Handling Unit
- Mechanical Room 1004
- 1st Floor
- 🔠 CON College of Nursing

#### **Discipline** Optimization

- Due Date 11/16/2020
- Created By Scott Erlenbusch
- Identified On 11/2/2020 2:16 PM

# TST-11-13 OPEN HIGH

Supply plenum pressure went up to over 4"WC when the AHU re-started from a safety failure. May need to look at the programming. Verify ramp speed in programming. Source Test 11 PDD\_AHU 1 - AHU - Humidifier/Optimization

#### Asset 🧐 PDD\_AHU 1

Air Handling Unit
 Level 4 Mechanical Room
 Level 4 Mechanical Room
 PDD - Pharmacy and Druce

Discovery

Discipline Optimization Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 11:31 AM



## TST-2-4 OPEN HIGH

The return dampers on the cold deck side of the AHU are open further than	Asset	🌣 CON_AHU 1
the other return dampers. The return dampers need to be adjusted or		Air Handling Unit
repaired.		Mechanical Room 1004
Source Test 2, Attempt 1, Line 61		Solution     Solution
Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Discipling	Controlo
	Discipline	11/12/2020
	Due Date	11/13/2020
	Created By	Scott Erlenbusch
	Identified On	10/30/2020 9:21 AM

Select Pro calls out a minimum of 400" lbs for this damper bank. A third 180" lb actuator could be added to assist operation. Scott Erlenbusch on 03/16/2021 at 08:44 AM Optimized Systems

Dampers have been adjusted still a little bit of a gap, but look a lot better. Need to verify actuators are big enough to close dampers 2 (180lb) actuators. Dampers have 5 banks of opposing dampers with seals, 80 sqft

Marcus Houser on 02/24/2021 at 09:18 AM Optimized Systems





Heating coil did not open, may be programmed to maintain the MAT. Verify programming will protect the coils. **Source** Test 8, Attempt 1, Line 33 Does the heating coil become open? (If applicable)

#### Asset 🧐 DRC2\_AHU 1

- Air Handling Unit
   Level 2 Mech Room
- 2nd Floor
- BRC 2 Durbar
  - Research Center 2

Discipline Optimization Due Date 11/12/2020

Created By Scott Erlenbusch

Identified On 10/29/2020 2:05 PM

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## TST-6-14 OPEN HIGH

Heating coil did not open on LTD, it may be looking at MAT. This may not be an issue but wanted to note. Please verify programming will protect the coils.

**Source** Test 6, Attempt 1, Line 33 Does the heating coil become open? (If applicable)

#### Asset 🧐 DRC1\_AHU 1

- Air Handling Unit
- Mechanical Room 2004
- 2nd Floor
- 🖩 DRC 1 Du
  - Research Center 1

Discipline Optimization Due Date 11/11/2020 Created By Scott Erlenbusch Identified On 10/28/2020 2:29 PM

# TST-7-10 OPEN HIGH

Unit heater for South end of AHU 4 mechanical room does not appear to be heating. Thermostat set at 60 degrees and the space temp is 50 degrees. Fan is on but valve does not appear to be open. **Source** Test 7 DRC1\_AHU 4 - AHU - Humidifier/Optimization

## Asset 🤹 DRC1\_AHU 4

- Air Handling Unit
- Mechanical Room 2005
- (Auditorium Penthouse)
- 2nd Floor
- DRC 1 Durham

Discipline Controls Due Date 11/11/2020 Created By Scott Erlenbusch Identified On 10/28/2020 10:25 AM



# TST-7-7 OPEN MODERATE

Low side of building pressure sensor is ran in to a drain vent that goes up to the roof. Could not verify if the low side is actually making it outside the building.

Source Test 7, Attempt 1, Line 23

Is the building pressure sensor reporting an acceptable value?

#### Asset 🧐 DRC1\_AHU 4

- Air Handling Unit
- Mechanical Room 2005
- (Auditorium Penthouse)
- 2nd Floor
- Besearch Center

**Discipline** Controls

- Due Date 11/11/2020
- Created By Scott Erlenbusch
- Identified On 10/28/2020 9:46 AM



Issue\_TST-7-7\_2020-10-28\_10\_14\_04.jpg

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## TST-7-3 OPEN HIGH

There are two smoke dampers that are closed on the two return ducts that

go down through the floor. Source Test 7 DRC1\_AHU 4 - AHU - Humidifier/Optimization

#### Asset 🤽 DRC1\_AHU 4

- Air Handling Unit
- Mechanical Room 2005
- (Auditorium Penthouse)
- 2nd Floor
- Besearch Center 1
- Discipline Controls
- Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 3:11 PM



Issue\_TST-7-3\_2020-10-28\_10\_16\_41\_(1).jpg



Issue\_TST-7-3\_2020-10-28\_10\_16\_41.jpg

# TST-7-2 OPEN HIGH

Humidity sensor in the space is not reading correctly. Space humidity setpoint was 40% RH and the BAS was reporting 40% RH in the space. The actual space humidity level was 60% RH. The humidity in the space was 10-15% higher in the back of the auditorium than it was in the front. Measured with Amprobe humidity sensor. Sensor will need to be replaced. **Source** Test 7 DRC1\_AHU 4 - AHU - Humidifier/Optimization

#### Asset 🤹 DRC1\_AHU 4

- Air Handling Unit
- Mechanical Room 2005
- (Auditorium Penthouse)
- **2nd Floor**
- Be DRC 1 Durham Research Center
- Discipline Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 3:10 PM



## TST-8-7 OPEN MODERATE

Panel 201 points list notes a humidifier isolation valve but there is not one installed. OS to verify that point is not used in programming and delete. **Source** Test 8, Attempt 1, Line 65

Is the humidifier valve actuator a fail safe actuator and does it fail closed?

#### Asset 🤹 DRC2\_AHU 1

- Air Handling Unit
- Level 2 Mech Room
- 2nd Floor
- BB DRC 2 D
  - Research Center 2

Discipline Optimization Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 10:53 AM

# TST-1-10 OPEN HIGH

Supply fan vfd 2 has a bad display or is faulty. Source Test 1 CNS\_AHU 3 - AHU - Humidifier/Optimization

## Assigned To UNMC

Asset 🤹 CNS\_AHU 3

- Air Handling Unit
- 1st Floor Mechanical
- Room
- 1st Floor
- CNS College of Nursing Sciences

Due Date 10/30/2020 Created By Scott Erlenbusch Identified On 10/16/2020 9:15 AM



Issue 2020-10-16 09:12:09.jpg

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## TST-1-9 OPEN MODERATE

Discipline Controls Due Date 10/30/2020 Created By Scott Erlenbusch	BAS speed for the supply and return fans are 6% lower than what the drive percentage is. Please verify VFD setup. Source Test 1, Attempt 1, Line 55 Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Asset	<ul> <li>CNS_AHU 3</li> <li>Air Handling Unit</li> <li>1st Floor Mechanical</li> <li>Room</li> <li>1st Floor</li> <li>1st Floor</li> <li>CNS - College of Nursing Sciences</li> </ul>
Identified On 10/16/2020 9:10 AM		Discipline Due Date Created By Identified On	Controls 10/30/2020 Scott Erlenbusch 10/16/2020 9:10 AM

Strategic verified signal to drive. OS may have to adjust scale in drive to get it to read correctly. Scott Erlenbusch on 02/24/2021 at 11:22 AM Optimized Systems

## TST-1-8 OPEN HIGH

Minimum outdoor air damper was still open 8% when unit tripped on high	Asset	🤹 CNS_AHU 3
static cutout. Verify that programming is closing the damper correctly on a		Air Handling Unit
safety trip.		1st Floor Mechanical
Source Test 1. Attempt 1. Line 43		Room
Do the minimum outdoor air, economizer outdoor air, and relief air damners close, and the return air		Ist Floor
dampers open?		CNS - College of Nursing
		Sciences
	Discipline	Optimization
	Due Date	10/30/2020
	Created By	Scott Erlenbusch
	Identified On	10/16/2020 9:07 AM

Minimum outdoor air damper was closed when we tripped AHU on LTD and LSP. OS will need to verify programming of the safeties.

Scott Erlenbusch on 02/24/2021 at 12:51 PM Optimized Systems

# TST-1-3 OPEN HIGH

Humidifier was running when I came to the AHU. The humidity valve is open 40% and there is not a lot of steam coming out of the tubes. It looks like a lot of the orifices may be plugged up. Please clean orifices if needed. **Source** Test 1, Attempt 1, Line 66 When humidifier valve is opened, is there steam discharging from the humidifier tubes?

## Asset 🤹 CNS\_AHU 3

- Air Handling Unit
- □ 1st Floor Mechanical
- Room
- 1st Floor
- CNS College of Nursing Sciences

Discipline Mechanical Due Date 10/29/2020 Created By Scott Erlenbusch Identified On 10/15/2020 1:47 PM



# TST-12-11 OPEN HIGH

Supply air humidity sensor is located after the duct detector and is roughly 10' downstream of the humidifier. There is not a lot of room for the humidifier devices on this unit. The humidifier is in the duct work and not alot of room to get the air mixed with humidity before duct detector and humidity sensors. This needs to be investigated to figure out best plan. **Source** Test 12, Attempt 1, Line 12

Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.

#### Assigned To Optimized Systems Asset 🌣 SLC\_AHU 3

- Air Handling Unit
  - Mechanical Room 3004
- 3rd Floor
- - SLC Student Life Cente
- Due Date 10/26/2020 Created By Scott Erlenbusch Identified On 10/12/2020 12:48 PM

# TST-12-3 OPEN

Supply air duct detector is located 5 ft downstream of humidifier. There is nothing between the humidifier and duct detector and there is a very good chance there will be frequent duct detector alarms. Recommend that duct detector is moved further downstream of the high humidity cutout and humidity sensor.

Source Test 12 SLC\_AHU 3 - AHU - Humidifier/Optimization

## Assigned To Optimized Systems

- Asset 🤹 SLC\_AHU 3
  - Air Handling Unit
  - Mechanical Room 3004
  - 3rd Floor
  - SLC Student Life Center

Due Date 10/26/2020 Created By Scott Erlenbusch Identified On 10/12/2020 9:02 AM



Issue 2020-10-12 08:57:04.jpg





## TST-4-9 OPEN HIGH

Not sure what pressure the supply fans are controlled by. Graphics show that the supply static setpoint is 1"WC. The ahu static is 1.45" and the first floor static is .88. OS to verify that programming is controlling to the correct static pressure sensor. **Source** Test 4, Attempt 1, Line 20

Is the supply duct static pressure sensor reporting an acceptable value?

## Asset 🤹 COPH\_AHU 2

- Air Handling Unit
- Mechanical Room 4001
- Level 4 Penthouse
- COPH College of Public Health

Discipline Optimization Due Date 10/23/2020 Created By Scott Erlenbusch Identified On 10/9/2020 2:53 PM

Verified the setup of the SSP which is located in room 1025 above the ceiling. Sensor is set to 4-20, 0-2.5 inWC. Scott Erlenbusch on 03/29/2021 at 10:06 AM Optimized Systems

# TST-4-7 OPEN

Supply fan VFD-3B display is bad or some other issue. Source Test 4 COPH\_AHU 2 - AHU - Humidifier/Optimization

#### Assigned To UNMC Asset 🌣 COPH\_AHU 2

Air Handling Unit
 Machanical Deem 40

- Mechanical Room 4001
- Level 4 Penthouse
- COPH College of Public Health

Due Date 10/23/2020 Created By Scott Erlenbusch Identified On 10/9/2020 12:00 PM



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## TST-4-3 OPEN MODERATE

Not sure if this going to be an issue but wanted to note it so it could be discussed. Heating coil opened to 37% and then closed back down. I believe the heating valve is probably trying to maintain the hot deck temperature. OS to verify programming will protect the coils on a safety trip. **Source** Test 4, Attempt 1, Line 33 Does the heating coil become open? (If applicable)

#### Asset 🧐 COPH\_AHU 2

- Air Handling Unit
- Mechanical Room 4001
- Level 4 Penthouse
- COPH College of Public Health

Discipline Optimization Due Date 10/23/2020 Created By Scott Erlenbusch Identified On 10/9/2020 10:01 AM

# TST-3-9 OPEN HIGH

Supply duct static pressure sensor is installed on the supply cabin of the AHU. There is another supply static pressure sensor on Third floor that is not being used.

Source Test 3, Attempt 1, Line 19

Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?

## Asset 🤽 COPH\_AHU 1

- Air Handling Unit
- Mechanical Room 1007
- 1st Floor
  - COPH College of Public Health
- Discipline Optimization
- Due Date 10/22/2020
- Created By Scott Erlenbusch
- Identified On 10/8/2020 1:55 PM





17 Tests sorted by name



# **#1 CNS\_AHU 3 - AHU -**Humidifier/Optimization



Optimized Systems | UNMC Humidifier/Optimization | 20-185

INCOMPLETE	81% Yes   1% No   15% N/A	14 ISSUES
	A	Assigned To Optimized Systems Asset 🤹 CNS_AHU 3
Attempts		
Attempt	No. 1 FAILED	Status set by Scott Erlenbusch on 10/30/2020.
AIR HAND	LING UNIT - SYSTEM DEFICIENCIES TEST.	
THESE TE EQUIPMEI OVERALL PRACTICE	STS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH NT OPERATION, SENSOR VERIFICATION, AS WELL AS CONTROL SYSTEM DESIGN AND INSTALLATION S.	
IF A SENS APPLICAB COMMENT	OR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR LE MARK THE TEST ANSWER AS N/A. USE NOTES AND IS AS OFTEN AS NECESSARY.	
SENSOR \	/ERIFICATION:	
OUTDOOF APPLICAB	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF LE):	
YES 1	Does the outdoor humidity sensor report an acceptable value?	Scott Erlenbusch on 10/15/2020 12:53 PM
YES 2	Does the outdoor temperature report an acceptable value?	Scott Erlenbusch on 10/15/2020 12:53 PM
YES 3	Document if these sensors are locally wired to the controller, or if they are glo values.	bal Scott Erlenbusch on 10/15/2020 12:53 PM
	The graphics and programming are probably using the campus OAT and OA The OAT and OAH points in this panel are failed.	H. Scott Erlenbusch on 10/15/2020 12:54 PM
RETURN A	IR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):	
YES 4	Does the return air humidity sensor report an acceptable value?	Scott Erlenbusch on 10/30/2020 11:23 AM
	BAS=19% RH, Amprobe=17.9% RH	Scott Erlenbusch on 10/30/2020 11:25 AM
RETURN A	IR TEMPERATURE SENSOR VERIFICATION:	
YES 5	Does the return air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/15/2020 12:04 PM
	BAS=70.3 degrees, Fluke=71.3 degrees	Scott Erlenbusch on 10/15/2020 12:04 PM
YES 6	Is the return air temperature sensor installed in the return air plenum and not the outdoor air or relief air plenums?	near Scott Erlenbusch on 10/16/2020 7:40 AM
YES 7	Is the return air temperature sensor probe the proper length for the size of du installed in?	ct it is Scott Erlenbusch on 10/16/2020 7:40 AM
	18" probe	Scott Erlenbusch on 10/16/2020 7:41 AM



MIXED AIF	R (ECONOMIZER) TEMPERATURE SENSORS:		
YES 8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/15/2020 1:09 PM	
	BAS=51.1, Fluke=51.7 degrees	Scott Erlenbusch on 10/15/2020 1:10 PM	
YES 9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 10/15/2020 1:36 PM	
<b>YES</b> 10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 10/15/2020 1:36 PM	
SUPPLY A	IR HUMIDITY SENSOR VERIFICATION:		
<b>YES</b> 11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 10/30/2020 11:33 AM	
	BAS=36% RH, Amprobe=35% RH	Scott Erlenbusch on 10/30/2020 11:34 AM	
YES 12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 10/16/2020 9:15 AM	
	Humidity sensor is roughly 15' from the humidifier and the chilled water coil is located in between.	Scott Erlenbusch on 10/16/2020 9:15 AM	
SUPPLY A	IR TEMPERATURE SENSORS:		
<b>YES</b> 13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/15/2020 1:51 PM	
	BAS=55.5 degrees, Fluke=54.8 degrees.	Scott Erlenbusch on 10/15/2020 1:53 PM	
<b>YES</b> 14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 10/15/2020 1:38 PM	
<b>YES</b> 15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 10/15/2020 1:38 PM	
	18" probe	Scott Erlenbusch on 10/15/2020 1:38 PM	
STATIC AND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:			
RETURN F	PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):		
NO 16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-1-1	Scott Erlenbusch on 10/16/2020 9:57 AM	
NO 17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/15/2020 10:36 AM	
NO 18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/16/2020 8:45	
	1 Issue: TST-1-2	7 491	
SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):			
<b>YES</b> 19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 11/11/2020 11:16 AM	
	The supply static pressure on the AHU is setup correctly and is reading correctly. Supply static pressure sensor does appear to be reading correctly and AHU is controlling to that setpoint. Did not physically find the sensor.	Scott Erlenbusch on 11/11/2020 11:18 AM	
	1 Issue: TST-1-11		
YES 20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/30/2020 11:43 AM	
21	Is the supply duct static pressure sensor and analog input ranges setup properly?		

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BUILD	DING F	PRESSURE SENSOR (IF APPLICABLE):	
NO	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit? 1 Issue: TST-1-12	Scott Erlenbusch on 10/30/2020 11:38 AM
YES	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/30/2020 11:43 AM
	24	Is the building pressure sensor and analog input ranges setup properly?	
FILTE	R PR	ESSURE SENSORS (IF APPLICABLE):	
YES	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 10/15/2020 11:32 AM
YES	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 10/15/2020 11:33 AM
YES	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 10/15/2020 11:34 AM
SAFE	TY DE	VICES VERIFICATION:	
LOW	LIMIT	SAFETY DEVICE:	
NO	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 10/16/2020 8:45 AM
		There are three LTD sensors installed. There is roughly 18" between each pass. Where each sensor ends there is a small area on the water inlet side of the coil that the sensor misses.	Scott Erlenbusch on 10/16/2020 8:50 AM
		1 Issue: TST-1-6	
YES	29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 10/16/2020 8:55 AM
WHE	N THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED	
YES	30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/16/2020 8:55 AM
YES	31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/16/2020 8:55 AM
NO	32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? 1 Issue: TST-1-7	Scott Erlenbusch on 10/16/2020 9:00 AM
NO	33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 10/16/2020 8:55
		Heating coil looks to be maintaining the hot deck temperature.	Scott Erlenbusch on 10/16/2020 9:00 AM
SUPP APPL	PLY PL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	
N/A	34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 10/15/2020 1:51 PM
N/A	35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 10/15/2020 1:51 PM
WHE	N THE CH IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	
N/A	36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/15/2020 1:51 PM
N/A	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/15/2020 1:51 PM

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N/A	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/15/2020 1:51 PM	
SUPP	LY PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):		
YES	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/16/2020 9:00	
		Tripped at 3.25"	Scott Erlenbusch on 10/16/2020 9:00 AM	
YES	40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 10/16/2020 9:00 AM	
WHEN TRIPF	N THE PED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS		
YES	41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/16/2020 9:00 AM	
YES	42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/16/2020 9:00 AM	
NO	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? 1 Issue: TST-1-8	Scott Erlenbusch on 10/16/2020 9:07 AM	
RETU APPL	RN PL ICABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):		
NO	44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/15/2020 2:24 PM	
		Do not see a Low static cutout installed for the return duct. There are also no points in the panel for a low static.	Scott Erlenbusch on 10/15/2020 2:24 PM	
		1 Issue: TST-1-5		
N/A	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 10/15/2020 2:32 PM	
WHEN SWIT	N THE CH IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED		
N/A	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/15/2020 2:32 PM	
N/A	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/15/2020 2:32 PM	
N/A	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/15/2020 2:32 PM	
RETU	RN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):		
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/15/2020 2:32 PM	
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 10/15/2020 2:32 PM	
WHEN THE RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED				
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/15/2020 2:32 PM	
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/15/2020 2:32 PM	
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/15/2020 2:32 PM	
FAN EQUIPMENT VERIFICATION:				

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SUPPLY FAN:				
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/16/2020 9:07 AM	
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/16/2020 9:10 AM	
		BAS speed for the supply and return fans are 6% lower than what the drive percentage is.	Scott Erlenbusch on 10/16/2020 9:10 AM	
		1 Issue: TST-1-9		
RETU	RN FA	N: (IF APPLICABLE)		
YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/16/2020 9:07 AM	
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/16/2020 9:10 AM	
MINIM VERIF	IUM C	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:		
NORM	/IAL O	PERATION VERIFICATION:		
N/A	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/16/2020 9:16 AM	
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/16/2020 9:16 AM	
YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 10/16/2020 9:16 AM	
YES	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 10/16/2020 9:16 AM	
YES	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 10/16/2020 9:16 AM	
HEAT	ING A	ND COOLING COILS VERIFICATION:		
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/16/2020 9:16 AM	
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/16/2020 9:16 AM	
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):		
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 11/12/2020 8:13 AM	
		Humidifier valve needs to be tested to see if the humidifier valve fails closed. This should be tested when the airflow switch and humidistat are installed.	Scott Erlenbusch on 10/15/2020 1:45 PM	
		1 Issue: TST-1-13 3 Files: IMG_0299.heic   IMG_0304.heic   IMG_0305.heic		
YES	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes? 1 Issue: TST-1-3	Scott Erlenbusch on 10/15/2020 1:45 PM	
HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):				
Humii Humii Air Fi	DISTA DIFIEF LOW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.		
NO	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU? 1 Issue: TST-1-4	Scott Erlenbusch on 10/15/2020 1:48 PM	



## #1 CNS\_AHU 3 - AHU - Humidifier/Optimization | Optimized Systems | UNMC Humidifier/Optimization | 20-185

NO	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 10/15/2020 1:48 PM
NO	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 10/15/2020 1:48 PM
TEST	COMF	PLETION VERIFICATION:	
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 10/16/2020 9:16 AM
Atte	mpt N	No. 2 INCOMPLETE State	us set by Scott Erlenbusch on 2/23/2021.
AIR H	ANDL	NG UNIT - SYSTEM DEFICIENCIES TEST.	
THES EQUII OVER PRAC	e tes Pmen Rall C Tices	TS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH T OPERATION, SENSOR VERIFICATION, AS WELL AS ONTROL SYSTEM DESIGN AND INSTALLATION S.	
IF A S APPL COMN	ENSC ICABL MENTS	R, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY.	
SENS	or ve	ERIFICATION:	
oute Appl	OOR ICABL	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E):	
YES	1	Does the outdoor humidity sensor report an acceptable value?	Scott Erlenbusch on 2/23/2021 9:34 AM
YES	2	Does the outdoor temperature report an acceptable value?	Scott Erlenbusch on 2/23/2021 9:34 AM
YES	3	Document if these sensors are locally wired to the controller, or if they are global values.	Scott Erlenbusch on 2/23/2021 9:34 AM
		The graphics and programming are probably using the campus OAT and OAH. The OAT and OAH points in this panel are failed.	Scott Erlenbusch on 2/23/2021 9:34 AM
RETU	RN AI	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):	
YES	4	Does the return air humidity sensor report an acceptable value?	Scott Erlenbusch on 2/23/2021 9:34 AM
		BAS=19% RH, Amprobe=17.9% RH	Scott Erlenbusch on 2/23/2021 9:34 AM
RETU	RN AI	R TEMPERATURE SENSOR VERIFICATION:	
YES	5	Does the return air temperature sensor report an acceptable value? BAS=70.3 degrees, Fluke=71.3 degrees	Scott Erlenbusch on 2/23/2021 9:34 AM Scott Erlenbusch on 2/23/2021 9:34 AM
YES	6	Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?	Scott Erlenbusch on 2/23/2021 9:34 AM
YES	7	Is the return air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 2/23/2021 9:34 AM
		18" probe	Scott Erlenbusch on 2/23/2021 9:34 AM
MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:			
YES	8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 2/23/2021 9:34 AM
		BAS=51.1, Fluke=51.7 degrees	Scott Erlenbusch on 2/23/2021 9:34 AM
YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 2/23/2021 9:34 AM
YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 2/23/2021 9:34 AM

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#### SUPPLY AIR HUMIDITY SENSOR VERIFICATION:

YES	11	Does the supply air humidity sensor report an acceptable value? BAS=36% RH, Amprobe=35% RH	Scott Erlenbusch on 2/23/2021 9:34 AM Scott Erlenbusch on 2/23/2021 9:34 AM		
YES	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor	Scott Erlenbusch on 2/23/2021 9:34 AM		
		Humidity sensor is roughly 15' from the humidifier and the chilled water coil is located in between.	Scott Erlenbusch on 2/23/2021 9:34 AM		
SUPPL		R TEMPERATURE SENSORS:			
YES	13	Does the supply air temperature sensor report an acceptable value? BAS=55.5 degrees, Fluke=54.8 degrees.	Scott Erlenbusch on 2/23/2021 9:34 AM Scott Erlenbusch on 2/23/2021 9:34 AM		
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 2/23/2021 9:34 AM		
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 2/23/2021 9:34 AM		
		18" probe	Scott Erlenbusch on 2/23/2021 9:34 AM		
STATIO		D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:			
RETUR	rn pl	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):			
YES	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 2/24/2021 11:10 AM		
YES	17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 2/24/2021 11:10 AM		
YES	18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 2/24/2021 11:10 AM		
SUPPL	Y DU	ICT STATIC PRESSURE SENSOR (IF APPLICABLE):			
YES	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 2/23/2021 9:34 AM		
		The supply static pressure on the AHU is setup correctly and is reading correctly. Supply static pressure sensor does appear to be reading correctly and AHU is controlling to that setpoint. Did not physically find the sensor.	Scott Erlenbusch on 2/23/2021 9:34 AM		
YES	20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 2/23/2021 9:34 AM		
	21	Is the supply duct static pressure sensor and analog input ranges setup properly?			
BUILD	ING F	RESSURE SENSOR (IF APPLICABLE):			
YES	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 2/23/2021 9:34 AM		
		New building pressure sensor installed in the Third Floor commons area West End.	Scott Erlenbusch on 2/23/2021 9:35 AM		
YES	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 2/23/2021 9:34 AM		
YES	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 2/23/2021 9:35 AM		
FILTER	R PRE	ESSURE SENSORS (IF APPLICABLE):			
YES	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 2/23/2021 9:34 AM		
YES	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 2/23/2021 9:34 AM		
YES	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 2/23/2021 9:34 AM		
SAFET	SAFETY DEVICES VERIFICATION:				

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LOW LIMIT SAFETY DEVICE:					
<b>YES</b> 28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 2/23/2021 9:35 AM			
	Strategic installed one more LTD and they tested LTD operation.	Scott Erlenbusch on 2/23/2021 9:36 AM			
<b>YES</b> 29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 2/23/2021 9:34 AM			
WHEN THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED				
<b>YES</b> 30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 2/23/2021 9:34 AM			
<b>YES</b> 31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 2/23/2021 9:34 AM			
<b>YES</b> 32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 2/24/2021 12:55 PM			
<b>YES</b> 33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 2/24/2021 12:55 PM			
	Heating coil looks to be maintaining the hot deck temperature.	Scott Erlenbusch on 2/23/2021 9:34 AM			
SUPPLY PL APPLICABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):				
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 2/23/2021 9:34 AM			
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 2/23/2021 9:34 AM			
WHEN THE SWITCH IS	WHEN THE SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED				
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 2/23/2021 9:34 AM			
N/A 37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 2/23/2021 9:34 AM			
N/A 38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 2/23/2021 9:34 AM			
SUPPLY PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):				
YES 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? Tripped at 3.25"	Scott Erlenbusch on 2/23/2021 9:34 AM Scott Erlenbusch on 2/23/2021 9:34 AM			
<b>YES</b> 40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 2/23/2021 9:34 AM			
WHEN THE TRIPPED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS				
<b>YES</b> 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 2/23/2021 9:34 AM			
<b>YES</b> 42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 2/23/2021 9:34 AM			
NO 43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 2/23/2021 9:34 AM			
RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):					
<b>YES</b> 44	44 Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 2/24/2021 12:55 PM			
	Tripped at 2.25"WC	Scott Erlenbusch on 2/24/2021 12:56 PM			
<b>YES</b> 45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 2/24/2021 12:56 PM			



WHEN THE RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED					
<b>YES</b> 46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 2/24/2021 12:56 PM			
<b>YES</b> 47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 2/24/2021 12:56 PM			
<b>YES</b> 48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 2/24/2021 12:56 PM			
RETURN	PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):				
N/A 49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 2/23/2021 9:34 AM			
N/A 50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 2/23/2021 9:34 AM			
WHEN TH TRIPPED	E RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS				
N/A 51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 2/23/2021 9:34 AM			
N/A 52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 2/23/2021 9:34 AM			
N/A 53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 2/23/2021 9:34 AM			
FAN EQU	PMENT VERIFICATION:				
SUPPLY I	AN:				
<b>YES</b> 54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 2/23/2021 9:34 AM			
<b>YES</b> 55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS? BAS speed for the supply and return fans are 6% lower than what the drive percentage is.	Scott Erlenbusch on 2/23/2021 9:34 AM Scott Erlenbusch on 2/23/2021 9:34 AM			
RETURN	FAN: (IF APPLICABLE)				
<b>YES</b> 56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 2/23/2021 9:34 AM			
YES 57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 2/23/2021 9:34 AM			
MINIMUM VERIFICA	OA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER TION:				
NORMAL	OPERATION VERIFICATION:				
N/A 58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 2/23/2021 9:34 AM			
<b>YES</b> 59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 2/23/2021 9:34 AM			
<b>YES</b> 60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 2/23/2021 9:34 AM			
<b>YES</b> 61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 2/23/2021 9:34 AM			
YES 62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 2/23/2021 9:34 AM			
HEATING	HEATING AND COOLING COILS VERIFICATION:				
<b>YES</b> 63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 2/23/2021 9:34 AM			



YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 2/23/2021 9:34 AM	
HUMID	IFIEF	R VERIFICATION (IF APPLICABLE):		
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed? Verified the humidifier valve closes when one of the humidifier safeties trip.	Scott Erlenbusch on 2/23/2021 9:34 AM Scott Erlenbusch on 2/24/2021 12:57 PM	
YES	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 2/23/2021 9:34 AM	
HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):				
HUMIDISTAT AND AIRFLOW SWITCH ARE USED TO SHUT THE HUMIDIFIER VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR AIR FLOW SWITCH IS NOT CLOSED.				
YES	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 2/24/2021 11:12 AM	
YES	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 2/24/2021 11:12 AM	
YES	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 2/24/2021 11:12 AM	
TEST COMPLETION VERIFICATION:				
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 2/23/2021 9:34 AM	

#### **Issues** 14

## TST-1-1 CLOSED HIGH

RPP sensor values and the BAS value are not reading the same. Return plenum pressure sensor (RPP) inputs are not set up the same as the point in the BAS. This should be set up as +/-2.5". **Source** Test 1, Attempt 1, Line 16 Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? Asset 🌣 CNS\_AHU 3 Discipline Controls Due Date 10/29/2020 Created By Scott Erlenbusch Identified On 10/15/2020 10:36 AM

Strategic Electric plumbed the poly correctly to the RPP sensor. OS changed the RPP sensor setup to +/- 1" WC and verified operation.

Scott Erlenbusch on 02/24/2021 at 11:15 AM Optimized Systems



## TST-1-2 CLOSED MODERATE

RSP sensor is set up to read +/-5". The sensor should be set up to read +/-2.5". This would make the sensor read more accurately with the smaller scale. This sensor is for informational purposes only. It is not used by programming.

Source Test 1, Attempt 1, Line 18 Is the return plenum pressure sensor and analog input ranges setup properly? Asset 🔅 CNS\_AHU 3 Discipline Controls Due Date 10/29/2020 Created By Scott Erlenbusch Identified On 10/15/2020 10:39 AM

OS changed setup on sensor and verified operation. Scott Erlenbusch on 02/24/2021 at 11:18 AM Optimized Systems

# TST-1-3 OPEN HIGH

Humidifier was running when I came to the AHU. The humidity valve is open 40% and there is not a lot of steam coming out of the tubes. It looks like a lot of the orifices may be plugged up. Please clean orifices if needed. **Source** Test 1, Attempt 1, Line 66 When humidifier valve is opened, is there steam discharging from the humidifier tubes?

Asset 🌣 CNS\_AHU 3 Discipline Mechanical Due Date 10/29/2020 Created By Scott Erlenbusch Identified On 10/15/2020 1:47 PM

## TST-1-4 CLOSED HIGH

I do not see a humidistat or air flow switch installed. These will have to be added and wired per new safety sequence. **Source** Test 1, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU? Asset 🔅 CNS\_AHU 3 Discipline Controls Due Date 10/29/2020 Created By Scott Erlenbusch Identified On 10/15/2020 1:50 PM

Strategic installed air flow switch and humidistat. OS verified humidifier valve closed when air flow was lost and when supply humidity was greater than humidistat setpoint.

Scott Erlenbusch on 02/24/2021 at 11:21 AM Optimized Systems

# TST-1-5 CLOSED HIGH

Do not see a Low suction static cutout installed for the return duct. Install low static pressure switch and wire in to the safety circuit. **Source** Test 1, Attempt 1, Line 44 Is the low suction pressure safety switch calibrated properly in order to not trip early? Asset 🔅 CNS\_AHU 3 Discipline Controls Due Date 10/29/2020 Created By Scott Erlenbusch Identified On 10/15/2020 2:33 PM

Strategic installed a Low Static cutout. OS tested and verified that the switch tripped at 2.25". Scott Erlenbusch on 02/24/2021 at 12:53 PM Optimized Systems



## TST-1-6 CLOSED MODERATE

There are three LTD sensors installed. There is roughly 18" between each pass. Where each sensor ends there is a small area on the water inlet side of the coil that the sensor misses. You can probably get by with the current LTD Setup, but you should add 1 LTD sensor.

Source Test 1, Attempt 1, Line 28

Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

Asset 🔅 CNS\_AHU 3 Discipline Controls Due Date 10/30/2020 Created By Scott Erlenbusch Identified On 10/16/2020 8:55 AM

#### Strategic installed an extra LTD.

Scott Erlenbusch on 02/24/2021 at 11:27 AM Optimized Systems



Issue 2020-10-16 08:54:11 4B6FE335.jpg

Issue 2020-10-16 08:54:11 6598BA61.jpg

# TST-1-7 CLOSED HIGH

Minimum outdoor air damper was still open 8% when unit was tripped on LTD. Verify programming is closing dampers correctly on safety trip. **Source** Test 1, Attempt 1, Line 32

Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air

Asset % CNS\_AHU 3 Discipline Optimization Due Date 10/30/2020 Created By Scott Erlenbusch Identified On 10/16/2020 9:00 AM

Minimum outdoor air damper was closed when we tripped the LTD. Scott Erlenbusch on 02/24/2021 at 12:52 PM Optimized Systems



dampers open?

## TST-1-8 OPEN HIGH

Minimum outdoor air damper was still open 8% when unit tripped on high static cutout. Verify that programming is closing the damper correctly on a safety trip.

Source Test 1, Attempt 1, Line 43 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Asset 🔅 CNS\_AHU 3 Discipline Optimization Due Date 10/30/2020 Created By Scott Erlenbusch Identified On 10/16/2020 9:07 AM

Minimum outdoor air damper was closed when we tripped AHU on LTD and LSP. OS will need to verify programming of the safeties.

Scott Erlenbusch on 02/24/2021 at 12:51 PM Optimized Systems



BAS speed for the supply and return fans are 6% lower than what the drive percentage is. Please verify VFD setup. **Source** Test 1, Attempt 1, Line 55 Does the supply fan VFD (if applicable) respond to the speed signal from the BAS? Asset 🌣 CNS\_AHU 3 Discipline Controls Due Date 10/30/2020 Created By Scott Erlenbusch Identified On 10/16/2020 9:10 AM

Strategic verified signal to drive. OS may have to adjust scale in drive to get it to read correctly. Scott Erlenbusch on 02/24/2021 at 11:22 AM Optimized Systems

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## TST-1-10 OPEN HIGH

Supply fan vfd 2 has a bad display or is faulty. Source Test 1 CNS\_AHU 3 - AHU - Humidifier/Optimization Assigned To UNMC Asset 🌣 CNS\_AHU 3 Due Date 10/30/2020 Created By Scott Erlenbusch Identified On 10/16/2020 9:15 AM



Issue 2020-10-16 09:12:09.jpg

## TST-1-11 CLOSED HIGH

I was not able to locate the Supply Static Pressure sensor. This should be located to verify setup. Source Test 1, Attempt 1, Line 19 Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? Assigned To Optimized Systems Asset CNS\_AHU 3 Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 11:37 AM

AHU was controlling to the sensor and the sensor appears to be reading correctly. Scott Erlenbusch on 11/11/2020 at 11:16 AM Optimized Systems

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## TST-1-12 CLOSED HIGH

Was not able to locate the BIM, this is where the building pressure sensor is landed. Need to locate BIM and verify sensor setup. The high and low side should also be verified for proper placement. Building static pressure sensor should be changed to the Ashcroft sensor.

Source Test 1, Attempt 1, Line 22

Is the building pressure sensor installed in the best location possible for the areas served by the unit?

Asset 🍕 CNS\_AHU 3 Discipline Controls Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 11:41 AM

Wired a new Building Static Pressure sensor to AHU 3 panel. OS verified setup and install. Scott Erlenbusch on 02/24/2021 at 12:48 PM Optimized Systems

# TST-1-13 CLOSED

Humidifier appears to have a fail safe function. When new humidifier safety sequence is implemented the actuator needs to be tested for failsafe position. **Source** Test 1, Attempt 1, Line 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed? Asset 🌣 CNS\_AHU 3 Discipline Controls Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 11:53 AM

We tested the humidistat and air flow switch with the humidifier commanded to 10%. The humidifier valve closed each time the devices lost air flow or humidity was too high.

Scott Erlenbusch on 02/24/2021 at 11:26 AM Optimized Systems





# TST-1-14 CLOSED HIGH

RPP sensor is not plumbed to the return fan section. The poly for the sensor is also on the low side of sensor and should be on the high side. Please plumb to return fan section and land on high side of sensor. Source Test 1 CNS\_AHU 3 - AHU - Humidifier/Optimization

Asset 🧐 CNS\_AHU 3 **Discipline** Controls Due Date 12/3/2020 Created By Scott Erlenbusch Identified On 11/19/2020 2:28 PM

Strategic re-plumbed the RPP. Scott Erlenbusch on 02/24/2021 at 11:23 AM **Optimized Systems** 

## Photos 3



Line 65

IMG 0304.heic Line 65

Line 65

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# **#2 CON\_AHU 1 - AHU -**Humidifier/Optimization

Optimized Systems | UNMC Humidifier/Optimization | 20-185

75% Yes | 0% No | 22% N/A



11 ISSUES

Assigned To Optimized Systems Asset 🔅 CON\_AHU 1

Attempts

INCOMPLETE

Attempt N	No. 1 FAILED	Status set by Scott Erlenbusch on 11/12/2020.			
AIR HANDL	NG UNIT - SYSTEM DEFICIENCIES TEST.				
THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.					
IF A SENSOR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR APPLICABLE MARK THE TEST ANSWER AS N/A. USE NOTES AND COMMENTS AS OFTEN AS NECESSARY.					
SENSOR VE	ERIFICATION:				
OUTDOOR TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):					
NO 1	Does the outdoor humidity sensor report an acceptable value? 1 Issue: TST-2-1	Scott Erlenbusch on 10/30/2020 8:39 AM			
YES 2	Does the outdoor temperature report an acceptable value? BAS=34 degrees, NWS=32 degrees	Scott Erlenbusch on 10/30/2020 8:41 AM Scott Erlenbusch on 10/30/2020 8:42 AM			
YES 3	Document if these sensors are locally wired to the controller, or if they are glob values.	Scott Erlenbusch on 10/30/2020 8:42 AM			
	The temperature and humidity on the graphic are campus global points. Ther local OA humidity and temperature points in Panel 101.	e are Scott Erlenbusch on 10/30/2020 8:43 AM			
RETURN AI	RETURN AIR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):				
N/A 4	Does the return air humidity sensor report an acceptable value? 1 Issue: TST-2-2	Scott Erlenbusch on 10/30/2020 8:46 AM			
RETURN AIR TEMPERATURE SENSOR VERIFICATION:					
YES 5	Does the return air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/30/2020 9:01 AM			
	BAS=76.5 degrees, Amprobe=75.7 degrees.	Scott Erlenbusch on 10/30/2020 9:02 AM			
YES 6	Is the return air temperature sensor installed in the return air plenum and not r the outdoor air or relief air plenums?	Near Scott Erlenbusch on 10/30/2020 8:56 AM			
YES 7	Is the return air temperature sensor probe the proper length for the size of duc installed in?	t it is Scott Erlenbusch on 10/30/2020 8:56 AM			

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		18" probe on the discharge of the return fan.	Scott Erlenbusch on 10/30/2020 8:57
			AM
MIXE	DAIR	(ECONOMIZER) TEMPERATURE SENSORS:	
YES	8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/30/2020 9:12 AM
		BAS=59 degrees, Amprobe=55 degrees on one end and 65 degrees on the other for an average of 60 degrees.	Scott Erlenbusch on 10/30/2020 9:15 AM
YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 10/30/2020 9:15 AM
YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly? 1 Issue: TST-2-3	Scott Erlenbusch on 10/30/2020 9:15 AM
SUPP	ly Aif	R HUMIDITY SENSOR VERIFICATION:	
NO	11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 10/30/2020 9:35 AM
		Should be replaced during humidifier installation.	Scott Erlenbusch on 11/13/2020 6:55 AM
N/A	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 10/30/2020 9:35 AM
SUPP	ly Aif	R TEMPERATURE SENSORS:	
YES	13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/30/2020 10:23 AM
		BAS=93 degrees, Fluke=93 degrees.	Scott Erlenbusch on 10/30/2020 10:24 AM
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 10/30/2020 10:23
		an abourate reading.	AM
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 11/2/2020 2:24 PM
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in? Need to verify when unit goes down.	Scott Erlenbusch on 11/2/2020 2:24 PM Scott Erlenbusch on 10/30/2020 10:25 AM
YES	15 C ANI	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in? Need to verify when unit goes down.	Scott Erlenbusch on 11/2/2020 2:24 PM Scott Erlenbusch on 10/30/2020 10:25 AM
YES STAT RETU	15 C ANI RN PL	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in? Need to verify when unit goes down. DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	Scott Erlenbusch on 11/2/2020 2:24 PM Scott Erlenbusch on 10/30/2020 10:25 AM
YES STATI RETU N/A	15 C ANI RN PL 16	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in? Need to verify when unit goes down. DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-2-6	Scott Erlenbusch on 11/2/2020 2:24 PM Scott Erlenbusch on 10/30/2020 10:25 AM Scott Erlenbusch on 10/30/2020 10:31 AM
YES STATI RETU N/A	15 C ANE RN PL 16 17	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in? Need to verify when unit goes down. DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-2-6 Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/30/2020 10:25 AM Scott Erlenbusch on 10/30/2020 10:25 AM Scott Erlenbusch on 10/30/2020 10:31 AM
YES STATI RETU N/A	15 C ANI RN PL 16 17 18	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in? Need to verify when unit goes down. DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-2-6 Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/30/2020 10:25 AM Scott Erlenbusch on 10/30/2020 10:35 AM Scott Erlenbusch on 10/30/2020 10:33 AM Scott Erlenbusch on 10/30/2020 10:33 AM
YES STATI RETU N/A N/A SUPP	15 C ANI RN PL 16 17 18 LY DU	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in? Need to verify when unit goes down. DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-2-6 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/30/2020 10:25 AM Scott Erlenbusch on 10/30/2020 10:25 AM Scott Erlenbusch on 10/30/2020 10:31 AM Scott Erlenbusch on 10/30/2020 10:33 AM
YES STATI RETU N/A N/A SUPP YES	15 C ANI RN PL 16 17 18 LY DU 19	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in? Need to verify when unit goes down. DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-2-6 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 11/2/2020 2:24 PM Scott Erlenbusch on 10/30/2020 10:25 AM Scott Erlenbusch on 10/30/2020 10:31 AM Scott Erlenbusch on 10/30/2020 10:33 AM Scott Erlenbusch on 10/30/2020 10:33 AM
YES STATI RETU N/A N/A SUPP YES	15 C ANI RN PL 16 17 18 LY DU 19	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in? Need to verify when unit goes down. DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-2-6 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? Did not physically find the supply static pressure sensor. Sensor was reporting an acceptable value and fans were controlling to the sensor.	Scott Erlenbusch on 11/2/2020 2:24 PM Scott Erlenbusch on 10/30/2020 10:25 AM Scott Erlenbusch on 10/30/2020 10:31 AM Scott Erlenbusch on 10/30/2020 10:33 AM Scott Erlenbusch on 10/30/2020 10:33 AM Scott Erlenbusch on 11/12/2020 10:02 AM
YES STATI RETU N/A N/A SUPP YES	15 C ANI RN PL 16 17 18 LY DU 19 20	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in? Need to verify when unit goes down. DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-2-6 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? Did not physically find the supply static pressure sensor. Sensor was reporting an acceptable value?	Scott Erlenbusch on 11/2/2020 2:24 PM Scott Erlenbusch on 10/30/2020 10:25 AM Scott Erlenbusch on 10/30/2020 10:31 AM Scott Erlenbusch on 10/30/2020 10:33 AM Scott Erlenbusch on 10/30/2020 10:33 AM Scott Erlenbusch on 11/12/2020 10:02 AM Scott Erlenbusch on 11/12/2020 10:02 AM
YES STATI RETU N/A N/A SUPP YES	15 C ANI RN PL 16 17 18 LY DU 19 20 21	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in? Need to verify when unit goes down. DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-2-6 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? IS the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? Did not physically find the supply static pressure sensor. Sensor was reporting an acceptable value and fans were controlling to the sensor. Is the supply duct static pressure sensor reporting an acceptable value? Is the supply duct static pressure sensor reporting an acceptable value? Is the supply duct static pressure sensor reporting an acceptable value? Is the supply duct static pressure sensor reporting an acceptable value? Is the supply duct static pressure sensor reporting an acceptable value? Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/2/2020 2:24 PM Scott Erlenbusch on 10/30/2020 10:25 AM Scott Erlenbusch on 10/30/2020 10:31 AM Scott Erlenbusch on 10/30/2020 10:33 AM Scott Erlenbusch on 10/30/2020 10:33 AM Scott Erlenbusch on 11/12/2020 10:02 AM Scott Erlenbusch on 11/12/2020 10:02 AM

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NO	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit? 1 Issue: TST-2-12	Scott Erlenbusch on 11/13/2020 9:41 AM	
N/A	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/2/2020 3:00 PM	
N/A	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 11/2/2020 3:00 PM	
FILTE	r pre	ESSURE SENSORS (IF APPLICABLE):		
N/A	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 11/2/2020 2:57 PM	
N/A	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 11/2/2020 2:57 PM	
N/A	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 11/2/2020 2:58 PM	
SAFE	TY DE	VICES VERIFICATION:		
LOW	LIMIT	SAFETY DEVICE:		
YES	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 11/2/2020 2:10 PM	
		Good coverage on the hot deck and cold deck.	Scott Erlenbusch on 11/2/2020 2:10 PM	
YES	29	Does the freeze stat trip when sprayed with freeze spray? On both hot deck and cold deck.	Scott Erlenbusch on 11/2/2020 2:10 PM Scott Erlenbusch on 11/2/2020 2:11 PM	
WHEN	N THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED		
YES	30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/2/2020 2:11 PM	
YES	31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/2/2020 2:11 PM	
		Need to verify that the bypass will not run when safeties are tripped. Will not run in hand when LTD or safeties are tripped.	Scott Erlenbusch on 11/2/2020 2:12 PM	
		1 Issue: TST-2-8		
NO	32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/2/2020 2:14 PM	
		Relief damper did not close when LTD tripped.	Scott Erlenbusch on 11/2/2020 2:14 PM	
		1 Issue: TST-2-9		
YES	33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 11/2/2020 2:15 PM Scott Erlenbusch on 11/2/2020 2:15 PM	
		1 Issue: TST-2-10		
SUPP	I Y PI	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF		
APPLICABLE):				
N/A	34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 10/30/2020 10:40 AM	
N/A	35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 10/30/2020 10:45 AM	
WHEN THE SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED				
N/A	36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/30/2020 10:45 AM	
N/A	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/30/2020 10:45 AM	
N/A	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/30/2020 10:45 AM	
SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):				

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NO	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? High static cutout on the cold deck tripped at 6"WC. High static cutout on the hot deck tripped at 10"WC. These values are pretty high. Cold deck high static cutout is an auto reset.	Scott Erlenbusch on 11/2/2020 2:16 PM Scott Erlenbusch on 11/2/2020 2:18 PM	
YES	40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 11/2/2020 2:19 PM	
WHEN TRIPP	N THE PED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS		
YES	41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/2/2020 2:19 PM	
YES	42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/2/2020 2:19 PM	
YES	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/2/2020 2:20 PM	
RETU APPLI	RN PL CABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):		
N/A	44	Is the low suction pressure safety switch calibrated properly in order to not trip early? 1 Issue: TST-2-7	Scott Erlenbusch on 10/30/2020 10:45 AM	
N/A	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 10/30/2020 10:47 AM	
WHEN SWITC	N THE CH IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED		
N/A	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/30/2020 10:47 AM	
N/A	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/30/2020 10:47 AM	
N/A	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/30/2020 10:47 AM	
RETU	RN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):		
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/30/2020 10:47 AM	
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 10/30/2020 10:47 AM	
WHEN THE RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED				
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/30/2020 10:47 AM	
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/30/2020 10:47 AM	
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/30/2020 10:47 AM	
FAN EQUIPMENT VERIFICATION:				
SUPPLY FAN:				
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 11/2/2020 2:20 PM	
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 11/2/2020 2:22 PM	
RETURN FAN: (IF APPLICABLE)				



<b>YES</b> 56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 11/2/2020 2:20 PM	
YES 57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 11/2/2020 2:22 PM	
MINIMUM OA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER VERIFICATION:			
NORMAL	OPERATION VERIFICATION:		
N/A 58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/30/2020 9:21 AM	
NO 59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 11/2/2020 2:23 PM	
<b>YES</b> 60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 11/2/2020 2:23 PM	
NO 61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS? 1 Issue: TST-2-4	Scott Erlenbusch on 11/2/2020 2:23 PM	
N/A 62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 11/2/2020 2:26 PM	
HEATING	AND COOLING COILS VERIFICATION:		
<b>YES</b> 63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 11/2/2020 2:26 PM	
<b>YES</b> 64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 11/2/2020 2:30 PM	
HUMIDIFI	R VERIFICATION (IF APPLICABLE):		
N/A 65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 10/30/2020 8:33 AM	
	There is no humidifier on AHU 1. This will be installed as part of the humidifier project. Controls and safeties to be wired per new humidifier sequence.	Scott Erlenbusch on 10/30/2020 8:34 AM	
N/A 66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 10/30/2020 8:33 AM	
HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):			
HUMIDIST HUMIDIFIE AIR FLOW	AT AND AIRFLOW SWITCH ARE USED TO SHUT THE ER VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.		
N/A 67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 10/30/2020 8:32 AM	
N/A 68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 10/30/2020 8:32 AM	
N/A 69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 10/30/2020 8:32 AM	
TEST CON	IPLETION VERIFICATION:		
<b>YES</b> 70	Have all overrides on the AHU been released?	Scott Erlenbusch on 11/2/2020 2:30 PM	

Attempt No. 2 INCOMPLETE

Status set by Scott Erlenbusch on 2/23/2021.

AIR HANDLING UNIT - SYSTEM DEFICIENCIES TEST.



THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.				
IF A SENSOR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR APPLICABLE MARK THE TEST ANSWER AS N/A. USE NOTES AND COMMENTS AS OFTEN AS NECESSARY.				
SENSO	OR VE	RIFICATION:		
OUTDOOR TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):				
YES	1	Does the outdoor humidity sensor report an acceptable value?	Scott Erlenbusch on 2/24/2021 1:08 PM	
		61% RH, New OA temp and humidity sensor installed on the second level North side of building. Located above the dock	Scott Erlenbusch on 2/24/2021 1:11 PM	
YES	2	Does the outdoor temperature report an acceptable value?	Scott Erlenbusch on 2/23/2021 10:06 AM	
		BAS=34 degrees, NWS=32 degrees	Scott Erlenbusch on 2/23/2021 10:06 AM	
YES	3	Document if these sensors are locally wired to the controller, or if they are global	Scott Erlenbusch on 2/23/2021 10:06	
		The temperature and humidity on the graphic are campus global points. There are local OA humidity and temperature points in Panel 101.	AM Scott Erlenbusch on 2/23/2021 10:06 AM	
RETUR	RN AIF	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):		
YES	4	Does the return air humidity sensor report an acceptable value?	Scott Erlenbusch on 2/24/2021 1:11 PM	
RETUR	rn Aif	R TEMPERATURE SENSOR VERIFICATION:		
YES	5	Does the return air temperature sensor report an acceptable value?	Scott Erlenbusch on 2/23/2021 10:06 AM	
		BAS=76.5 degrees, Amprobe=75.7 degrees.	Scott Erlenbusch on 2/23/2021 10:06 AM	
YES	6	Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?	Scott Erlenbusch on 2/23/2021 10:06 AM	
YES	7	Is the return air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 2/23/2021 10:06 AM	
		18" probe on the discharge of the return fan.	Scott Erlenbusch on 2/23/2021 10:06 AM	
MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:				
YES	8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 2/23/2021 10:06 AM	
		BAS=59 degrees, Amprobe=55 degrees on one end and 65 degrees on the other for an average of 60 degrees.	Scott Erlenbusch on 2/23/2021 10:06 AM	
YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 2/23/2021 10:06 AM	
YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 2/23/2021 10:06 AM	
SUPPLY AIR HUMIDITY SENSOR VERIFICATION:				
YES	11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 2/24/2021 1:11 PM	
		New sensor was installed in the supply plenum.	Scott Erlenbusch on 2/24/2021 1:12 PM	
YES	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 2/24/2021 1:12 PM	

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SUPPL	Y AIF	R TEMPERATURE SENSORS:	
YES	13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 2/23/2021 10:06 AM
		BAS=93 degrees, Fluke=93 degrees.	Scott Erlenbusch on 2/23/2021 10:06 AM
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 2/23/2021 10:06 AM
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 2/23/2021 10:06 AM
		Need to verify when unit goes down.	Scott Erlenbusch on 2/23/2021 10:06 AM
STATIC	C ANE	DIFFERENTIAL PRESSURE SENSORS VERIFICATION:	
RETUR	RN PL	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	
YES	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 2/24/2021 1:12 PM
		RPP sensor installed. OS created point and verified install.	Scott Erlenbusch on 2/24/2021 1:13 PM
YES	17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 2/24/2021 1:13 PM
YES	18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 2/24/2021 1:13 PM
SUPPL	Y DU	CT STATIC PRESSURE SENSOR (IF APPLICABLE):	
YES	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 2/23/2021 10:06 AM
		Did not physically find the supply static pressure sensor. Sensor was reporting an acceptable value and fans were controlling to the sensor.	Scott Erlenbusch on 2/23/2021 10:06 AM
YES	20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 2/23/2021 10:06 AM
	21	Is the supply duct static pressure sensor and analog input ranges setup properly?	
BUILDI	NG P	RESSURE SENSOR (IF APPLICABLE):	
YES	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 2/24/2021 1:13 PM
		Ashcroft sensor installed on Second Floor North of elevators.	Scott Erlenbusch on 2/24/2021 1:14 PM
YES	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 2/24/2021 1:14 PM
YES	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 2/24/2021 1:14 PM
FILTER	R PRE	SSURE SENSORS (IF APPLICABLE):	
N/A	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 2/23/2021 10:06 AM
N/A	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 2/23/2021 10:06 AM
N/A	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 2/23/2021 10:06 AM
SAFET	Y DE	VICES VERIFICATION:	
LOW L	IMIT S	SAFETY DEVICE:	
YES	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 2/23/2021 10:06 AM
		Good coverage on the hot deck and cold deck.	Scott Erlenbusch on 2/23/2021 10:06 AM



YES 29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 2/23/2021 10:06
	On both hot deck and cold deck.	AM Scott Erlenbusch on 2/23/2021 10:06 AM
WHEN THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED	
<b>YES</b> 30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 2/23/2021 10:06 AM
<b>YES</b> 31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 2/23/2021 10:06 AM
	Strategic Electric tested the VFD's while I controlled the start/stop and speed. Drives would not run in bypass or hand when the safeties were tripped.	Scott Erlenbusch on 2/23/2021 10:26 AM
<b>YES</b> 32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/16/2021 8:26 AM
	Strategic Electric replaced the relief damper actuators and the relief damper is now operational.	Scott Erlenbusch on 3/16/2021 8:27 AM
<b>YES</b> 33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 2/23/2021 10:06 AM
	Went to 100% open.	Scott Erlenbusch on 2/23/2021 10:06 AM
SUPPLY PI APPLICABI	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 2/24/2021 1:15 PM
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 2/23/2021 10:06 AM
WHEN THE SWITCH IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 2/23/2021 10:06 AM
N/A 37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 2/23/2021 10:06 AM
N/A 38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 2/23/2021 10:06 AM
SUPPLY PI	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
<b>YES</b> 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? Strategic set hot deck and cold deck high static switches to trip at 4" WC. OS verified.	Scott Erlenbusch on 2/24/2021 1:15 PM Scott Erlenbusch on 2/24/2021 1:16 PM
<b>YES</b> 40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 2/23/2021 10:06 AM
WHEN THE TRIPPED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS	
<b>YES</b> 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 2/23/2021 10:06 AM
<b>YES</b> 42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 2/23/2021 10:06 AM
YES 43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 2/23/2021 10:06 AM
RETURN P APPLICABI	LENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF .E):	

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YES	44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 2/24/2021 1:17 PM
		2.5" WC	Scott Erlenbusch on 2/24/2021 1:17 PM
YES	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 2/24/2021 1:17 PM
WHEN SWIT	N THE CH IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	
YES	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 2/24/2021 1:17 PM
YES	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 2/24/2021 1:17 PM
YES	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 2/24/2021 1:17 PM
RETU	IRN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 2/23/2021 10:06 AM
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 2/23/2021 10:06 AM
WHEN TRIPP	N THE PED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS	
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 2/23/2021 10:06 AM
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 2/23/2021 10:06 AM
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 2/23/2021 10:06 AM
FAN E	EQUIP	MENT VERIFICATION:	
SUPP	'LY FA	N:	
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 2/23/2021 10:06 AM
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 2/23/2021 10:06 AM
RETU	IRN FA	N: (IF APPLICABLE)	
YES			
	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 2/23/2021 10:06 AM
YES	56 57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 2/23/2021 10:06 AM Scott Erlenbusch on 2/23/2021 10:06 AM
YES MININ VERIF	56 57 IUM C FICATI	Does the return fan start and stop when commanded by the BAS? Does the return fan VFD (if applicable) respond to the speed signal from the BAS? A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:	Scott Erlenbusch on 2/23/2021 10:06 AM Scott Erlenbusch on 2/23/2021 10:06 AM
MININ VERIF	56 57 IUM C ICATI ICATI	Does the return fan start and stop when commanded by the BAS? Does the return fan VFD (if applicable) respond to the speed signal from the BAS? A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON: PERATION VERIFICATION:	Scott Erlenbusch on 2/23/2021 10:06 AM Scott Erlenbusch on 2/23/2021 10:06 AM
YES MININ VERIF NORM	56 57 IUM C ICATI IAL O 58	Does the return fan start and stop when commanded by the BAS? Does the return fan VFD (if applicable) respond to the speed signal from the BAS? A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON: PERATION VERIFICATION: Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 2/23/2021 10:06 AM Scott Erlenbusch on 2/23/2021 10:06 AM Scott Erlenbusch on 2/23/2021 10:06 AM
YES MININ VERIF NORM N/A	56 57 AUM C FICATI MAL O 58 59	Does the return fan start and stop when commanded by the BAS? Does the return fan VFD (if applicable) respond to the speed signal from the BAS? A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON: PERATION VERIFICATION: Do the face/bypass damper actuators fully open and close when commanded by the BAS? Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 2/23/2021 10:06 AM Scott Erlenbusch on 2/23/2021 10:06 AM Scott Erlenbusch on 2/23/2021 10:06 AM
YES MININ VERIF NORM N/A YES	56 57 AUM C FICATI MAL O 58 59 60	Does the return fan start and stop when commanded by the BAS? Does the return fan VFD (if applicable) respond to the speed signal from the BAS? A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON: PERATION VERIFICATION: Do the face/bypass damper actuators fully open and close when commanded by the BAS? Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 2/23/2021 10:06 AM Scott Erlenbusch on 2/23/2021 10:06 AM Scott Erlenbusch on 2/23/2021 10:06 AM Scott Erlenbusch on 3/16/2021 8:27 AM Scott Erlenbusch on 2/23/2021 10:06



		Return and OA dampers do close fully.	Scott Erlenbusch on 2/24/2021 1:18 PM
N/A	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 2/23/2021 10:06 AM
HEAT	ING A	ND COOLING COILS VERIFICATION:	
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 2/23/2021 10:06 AM
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 2/23/2021 10:06 AM
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):	
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 2/24/2021 1:19 PM
N/A	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 2/23/2021 10:06 AM
		Steam is not active to the humidifier, the manual isolation valve is closed until programming installed.	Scott Erlenbusch on 2/24/2021 1:20 PM
HUMI APPL	DISTA ICABL	T AND AIRFLOW SWITCH SAFETY VERIFICATION (IF E):	
humi humi air fi	DISTA DIFIEF LOW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.	
YES	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 2/24/2021 1:20 PM
		Located in the same cabin, supply cabin.	Scott Erlenbusch on 2/24/2021 1:21 PM
YES	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 2/24/2021 1:21 PM
YES	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 2/24/2021 1:21 PM
		OS verified.	Scott Erlenbusch on 2/24/2021 1:21 PM
TEST	COMF	PLETION VERIFICATION:	
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 2/23/2021 10:06 AM

#### Issues 11

#### TST-2-1 CLOSED MODERATE

OA Humidity sensor is reporting a different value than what the National Weather Service is. Please replace outdoor air humidity sensor. **Source** Test 2, Attempt 1, Line 1 Does the outdoor humidity sensor report an acceptable value? Asset 🔅 CON\_AHU 1 Discipline Controls Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 8:41 AM

#### Verified sensor is reading correctly Marcus Houser on 02/24/2021 at 10:04 AM Optimized Systems



#### TST-2-2 CLOSED HIGH

I do not see a return air humidity sensor installed. There is also no point in Panel 101. Please add a return air humidity sensor. **Source** Test 2, Attempt 1, Line 4 Does the return air humidity sensor report an acceptable value? Asset 🔅 CON\_AHU 1 Discipline Controls Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 8:56 AM

Return Humidity sensor has been installed and verified it works Marcus Houser on 02/24/2021 at 09:31 AM Optimized Systems

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### TST-2-3 CLOSED HIGH

The averaging sensor should be protected wherever it touches anything in the AHU.

**Source** Test 2, Attempt 1, Line 10 Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section property? Asset 🌣 CON\_AHU 1 Discipline Controls Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 9:21 AM

Avg. Sensor has new poly tubes and zip ties installed. Marcus Houser on 02/24/2021 at 09:14 AM

Optimized Systems



Issue 2020-10-30 09:18:05 1BA9B875.jpg



Issue 2020-10-30 09:18:05 3F1564C9.jpg



Issue 2020-10-30 09:18:05 2777FE0C.jpg



Issue 2020-10-30 09:18:05 818B87AE.jpg

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#### TST-2-4 OPEN HIGH

The return dampers on the cold deck side of the AHU are open further than the other return dampers. The return dampers need to be adjusted or repaired.

Source Test 2, Attempt 1, Line 61 Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS? Asset 🌣 CON\_AHU 1 Discipline Controls Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 9:21 AM

Select Pro calls out a minimum of 400" lbs for this damper bank. A third 180" lb actuator could be added to assist operation. Scott Erlenbusch on 03/16/2021 at 08:44 AM Optimized Systems

Dampers have been adjusted still a little bit of a gap, but look a lot better. Need to verify actuators are big enough to close dampers 2 (180lb) actuators. Dampers have 5 banks of opposing dampers with seals, 80 sqft Marcus Houser on 02/24/2021 at 09:18 AM Optimized Systems





I did not see a return plenum pressure sensor installed. Please add sensor and coordinate with Optimized Systems for placement.

Source Test 2, Attempt 1, Line 16

Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?

Asset 🌣 CON\_AHU 1 Discipline Controls Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 10:33 AM

Sensor has been installed, signal is reading voltage, and point has been created on Insight Marcus Houser on 02/24/2021 at 09:07 AM Optimized Systems



#### TST-2-7 CLOSED MODERATE

I did not see a return low static suction pressure switch installed and did not see a point in Panel 101. Please add a low suction static pressure switch and incorporate in to safety circuit. **Source** Test 2, Attempt 1, Line 44 Is the low suction pressure safety switch calibrated properly in order to not trip early? Asset 🌣 CON\_AHU 1 Discipline Controls Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 10:47 AM

Low limit static pressure switch has been installed and tested trips out at 2.5" in wc Marcus Houser on 02/24/2021 at 09:04 AM Optimized Systems

TST-2-8 CLOSED HIGH

Need to verify that the bypass will not run when safeties are tripped. Will not run in hand when LTD or safeties are tripped. **Source** Test 2, Attempt 1, Line 31 Are the supply and return fan VFD's prohibited from running in hand or bypass? Asset 🔅 CON\_AHU 1 Discipline Controls Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 2:14 PM

Strategic Electric tested the VFD's while I controlled the start/stop and speed. Drives would not run in bypass or hand when the safeties were tripped.

Scott Erlenbusch on 02/23/2021 at 10:27 AM Optimized Systems

## TST-2-9 CLOSED HIGH

Relief damper did not close when LTD tripped. Relief never moved when we commanded it. Source Test 2, Attempt 1, Line 32 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Asset 🌣 CON\_AHU 1 Discipline Controls Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 2:15 PM

Strategic replaced the relief damper actuators and the relief damper is working properly. Scott Erlenbusch on 03/16/2021 at 08:28 AM Optimized Systems



### TST-2-10 OPEN HIGH

The programming for this AHU really should be looked at. When the cold deck LTD is tripped the steam valve on the hot deck goes full open. This steam valve can overheat the chamber. Not sure this should go open 100% on an LTD. All parts of the programming should be looked at so that the AHU works correctly.

**Source** Test 2, Attempt 1, Line 33 Does the heating coil become open? (If applicable) Asset 🔅 CON\_AHU 1 Discipline Optimization Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 2:16 PM

## TST-2-11 CLOSED HIGH

High static cutout on the cold deck tripped at 6"WC. High static cutout on the hot deck tripped at 10"WC. These values are pretty high. Cold deck high static cutout is an auto reset. Please replace the cold deck high static cutout switch with a manual reset and also set both the hot deck and cold deck to trip at 4" static.

Source Test 2, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated property in order to not trip early? Asset S CON\_AHU 1 Discipline Controls Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 2:19 PM

Cold deck high limit switch has been changed to a manual reset and both switches have been re-tested and trip out at 4" in wc Marcus Houser on 02/24/2021 at 09:05 AM Optimized Systems

## TST-2-12 CLOSED HIGH

There is no building static pressure sensor installed. Ashcroft building static pressure sensor needs to be installed. Coordinate with Optimized Systems. **Source** Test 2, Attempt 1, Line 22 Is the building pressure sensor installed in the best location possible for the areas served by the unit?

Asset 🔅 CON\_AHU 1 Discipline Controls Due Date 11/27/2020 Created By Scott Erlenbusch Identified On 11/13/2020 9:43 AM

2 sensors installed. 1 from the 2nd floor for AHU1 and the other for 1st floor for AHU2. Built point on the graphic and verified Scott Erlenbusch on 02/24/2021 at 01:07 PM Optimized Systems

Mounting in a different location Marcus Houser on 02/24/2021 at 09:57 AM Optimized Systems

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# **#3 COPH\_AHU 1 - AHU -**Humidifier/Optimization



Optimized Systems | UNMC Humidifier/Optimization | 20-185

PASSED	84% Yes   0% No   15% N/A		15 ISSUES
	A	ssigned To Asset	Optimized Systems
Attempts			
Attempt I	No. 1 FAILED	Status set t	by Scott Erlenbusch on 10/30/2020.
AIR HANDL	ING UNIT - SYSTEM DEFICIENCIES TEST.		
THESE TES EQUIPMEN OVERALL O PRACTICES	STS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH T OPERATION, SENSOR VERIFICATION, AS WELL AS CONTROL SYSTEM DESIGN AND INSTALLATION S.		
IF A SENSO APPLICABL COMMENTS	DR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR .E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY.		
SENSOR V	ERIFICATION:		
OUTDOOR APPLICABL	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E):		
YES 1	Does the outdoor humidity sensor report an acceptable value? 34%	Scot Scot	t Erlenbusch on 10/8/2020 7:52 AM t Erlenbusch on 10/8/2020 7:53 AM
YES 2	Does the outdoor temperature report an acceptable value? 59.8 degrees	Scot Scot	t Erlenbusch on 10/8/2020 7:53 AM t Erlenbusch on 10/8/2020 7:53 AM
YES 3	Document if these sensors are locally wired to the controller, or if they are glob	oal Scot	t Erlenbusch on 10/8/2020 7:59 AM
	The temp and humidity points on the graphic are global points. There are OA and OAH sensors wired in to the panel but the humidity is failed and the temperature shows -39 degrees.	T Scot	t Erlenbusch on 10/8/2020 8:01 AM
RETURN AI	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):		
NO 4	Does the return air humidity sensor report an acceptable value?	Sco	ott Erlenbusch on 10/13/2020 11:44 AM
	100% RH	Sco	ott Erlenbusch on 10/13/2020 10:05
	1 Issue: TST-3-14		
RETURN AI	R TEMPERATURE SENSOR VERIFICATION:		
YES 5	Does the return air temperature sensor report an acceptable value? 71.9 degrees, Fluke = 72.7 degrees.	Scot Scot	t Erlenbusch on 10/8/2020 2:57 PM t Erlenbusch on 10/8/2020 2:57 PM
YES 6	Is the return air temperature sensor installed in the return air plenum and not n the outdoor air or relief air plenums?	ear Scot	t Erlenbusch on 10/8/2020 2:58 PM
YES 7	Is the return air temperature sensor probe the proper length for the size of duc installed in?	t it is Scot	t Erlenbusch on 10/8/2020 3:02 PM



		18" probe	Scott Erlenbusch on 10/8/2020 3:02 PM
MIXED	AIR	ECONOMIZER) TEMPERATURE SENSORS:	
YES	8	Does the mixed air temperature sensor report an acceptable value? 73 degrees. Fluke meter - 74.5 degrees	Scott Erlenbusch on 10/8/2020 2:44 PM Scott Erlenbusch on 10/8/2020 2:45 PM
YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 10/8/2020 2:45 PM
YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly? 1 Issue: TST-3-13	Scott Erlenbusch on 10/8/2020 2:46 PM
SUPPL	Y AIF	R HUMIDITY SENSOR VERIFICATION:	
YES	11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 10/13/2020 10:05 AM
		Supply humidity was 60%, Return humidity was 45%. NWS = 30% humidity.	Scott Erlenbusch on 10/8/2020 2:37 PM
YES	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 10/8/2020 2:37 PM
		Humidity sensor is roughly 8' from humidifier. The chilled water coil is also located after the humidifier.	Scott Erlenbusch on 10/8/2020 2:38 PM
SUPPL	Y AIF	R TEMPERATURE SENSORS:	
YES	13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/8/2020 2:26 PM
		Measured the supply air temperature with my Fluke meter and the temperature was 4 degrees cooler than the temperature sensor on the AHU. I dont think I was getting an accurate reading where my probe was located. I think the air was mixed better after the supply fan squirrel cage.	Scott Erlenbusch on 10/8/2020 2:29 PM
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 10/8/2020 2:20 PM
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 10/8/2020 2:20 PM
		18" probe	Scott Erlenbusch on 10/8/2020 3:02 PM
STATIC		D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:	
RETUR	RN PL	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	
NO	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-3-8	Scott Erlenbusch on 10/8/2020 1:47 PM
NO	17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/8/2020 1:50 PM
YES	18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/8/2020 1:50 PM
SUPPL	Y DU	CT STATIC PRESSURE SENSOR (IF APPLICABLE):	
NO	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 10/8/2020 1:52 PM
		There is another supply static sensor that is installed on 3rd floor according to the panel point address report. This sensor is not on the graphics and is not controlling the supply fans. I have not been able to locate this sensor to verify sensor install and setup.	Scott Erlenbusch on 10/13/2020 12:01 PM
		1 Issue: TST-3-9	
YES	20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/8/2020 1:55 PM
YES	21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/8/2020 1:55 PM



BUILDING PRESSURE SENSOR (IF APPLICABLE):

YES	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 10/13/2020 8:45 AM
		The high side pressure tap plate is located on 2nd floor in the hallway outside Room 2007. The pressure sensor is located on 1st floor above the ceiling in hallway outside Room 1009. I low side runs up to the Southwest corner where there is a Red Rocket and outdoor temperature sensor.	Scott Erlenbusch on 10/15/2020 8:32 AM
		There are also building differential pressure sensors on each floor. They are located on either side of the doors that separate the offices from the classroom spaces and measure the differential pressure between AHU 1 and AHU 2 spaces.	
		1 Issue: TST-3-15	
YES	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/8/2020 1:59 PM
YES	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/15/2020 9:31 AM
FILTE	r pre	ESSURE SENSORS (IF APPLICABLE):	
YES	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 10/8/2020 2:00 PM
NO	26	Are all the filter pressure sensors reporting an acceptable value? 1 Issue: TST-3-10	Scott Erlenbusch on 10/8/2020 2:00 PM
NO	27	Are all the filter pressure sensors and analog input ranges setup properly? 1 Issue: TST-3-11	Scott Erlenbusch on 10/8/2020 2:03 PM
SAFE	TY DE	VICES VERIFICATION:	
LOW		SAFETY DEVICE:	
YES	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 10/8/2020 10:20 AM
YES	29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 10/8/2020 11:18 AM
YES WHEN	29 N THE	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 10/8/2020 11:18 AM
YES WHEN YES	29 N THE 30	Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/8/2020 11:18 AM Scott Erlenbusch on 10/8/2020 10:34 AM
YES WHEN YES	29 N THE 30 31	Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/8/2020 11:18 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM
YES WHEN YES YES	29 N THE 30 31 32	Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/8/2020 11:18 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM Marcus Houser on 3/26/2021 9:47 AM
YES WHEN YES YES YES	29 N THE 30 31 32 33	Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? (If applicable)	Scott Erlenbusch on 10/8/2020 11:18 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM Marcus Houser on 3/26/2021 9:47 AM Scott Erlenbusch on 10/8/2020 10:34 AM
YES WHEN YES YES YES SUPP APPLI	29 N THE 30 31 32 33 LY PL CABL	Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? (If applicable) ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	Scott Erlenbusch on 10/8/2020 11:18 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM Marcus Houser on 3/26/2021 9:47 AM Scott Erlenbusch on 10/8/2020 10:34 AM
YES WHEN YES YES YES SUPP APPLI	29 N THE 30 31 32 33 LY PL CABL 34	Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? (If applicable) ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 10/8/2020 11:18 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM
YES WHEN YES YES YES SUPP APPL N/A	29 N THE 30 31 32 33 LY PL CABL 34 35	Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Does the heating coil become open? (If applicable) ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.) Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 10/8/2020 11:18 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 9:38 AM
YES WHEN YES YES YES SUPP APPLI N/A	29 N THE 30 31 32 33 LY PL CABL 34 35 N THE CH IS	Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? (If applicable) Does the heating coil become open? (If applicable) ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.) Is the low Suction Pressure Safety Switch Installed before the supply fan? SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY	Scott Erlenbusch on 10/8/2020 11:18 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 9:38 AM
YES WHEN YES YES YES SUPP APPLI N/A N/A WHEN SWITC	29 N THE 30 31 32 33 LY PL CABL 34 35 N THE CH IS 36	Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Does the heating coil become open? (If applicable) ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.) Is the low Suction Pressure Safety Switch Installed before the supply fan? SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY PLENUM LOW SUCTION PRESSURE SAFETY Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/8/2020 11:18 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 9:38 AM Scott Erlenbusch on 10/8/2020 9:38 AM
YES WHEN YES YES YES SUPP APPLI N/A N/A WHEN SWITC	29 N THE 30 31 32 33 LY PL CABL 34 35 N THE CH IS 36 37	Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? (If applicable) ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.) Is the low Suction Pressure Safety Switch Installed before the supply fan? SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY RIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/8/2020 11:18 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM Marcus Houser on 3/26/2021 9:47 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 9:38 AM Scott Erlenbusch on 10/8/2020 9:38 AM
YES WHEN YES YES YES SUPP APPL N/A N/A WHEN SWITC N/A	29 N THE 30 31 32 33 33 LY PL CABL 34 35 N THE CH IS 36 37 38	Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? (If applicable) ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.) Is the low Suction Pressure Safety Switch Installed before the supply fan? SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY RIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/8/2020 11:18 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 10:34 AM Scott Erlenbusch on 10/8/2020 9:38 AM Scott Erlenbusch on 10/8/2020 9:38 AM Scott Erlenbusch on 10/8/2020 9:38 AM Scott Erlenbusch on 10/8/2020 9:38 AM

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SUPPLY	PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
NO 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/8/2020 11:12 AM
	Supply high static tripped at 9"WC. Supply high static is also bypassed (both wires are landed under same contact terminal on pressure switch) so the AHU did not shut down when switch tripped.	Scott Erlenbusch on 10/8/2020 12:46 PM
	2 Issues: TST-3-4   TST-3-3	
<b>YES</b> 40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 10/8/2020 11:13 AM
WHEN TH TRIPPED	E SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS 	
NO 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/8/2020 2:05 PM
NO 42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/8/2020 2:05 PM
NO 43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/8/2020 2:05 PM
RETURN APPLICA	PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF BLE):	
YES 44	Is the low suction pressure safety switch calibrated properly in order to not trip	Scott Erlenbusch on 10/8/2020 1:21 PM
	Tripped at 2.75" WC.	Scott Erlenbusch on 10/8/2020 1:29 PM
YES 45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 10/8/2020 1:30 PM
WHEN TH SWITCH	E RETURN PLENUM LOW SUCTION PRESSURE SAFETY S TRIPPED	
<b>YES</b> 46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/8/2020 1:30 PM
YES 47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/8/2020 1:30 PM
<b>YES</b> 48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/8/2020 1:30 PM
RETURN	PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
N/A 49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/8/2020 9:38 AM
N/A 50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 10/8/2020 9:38 AM
WHEN TH TRIPPED	E RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS	
N/A 51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/8/2020 9:38 AM
N/A 52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/8/2020 9:38 AM
N/A 53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/8/2020 9:38 AM
FAN EQU	PMENT VERIFICATION:	
SUPPLY	AN:	
YES 54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/8/2020 10:10 AM
YES 55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/8/2020 10:10 AM



RETURN FAN: (IF APPLICABLE)				
YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/8/2020 10:10 AM	
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/8/2020 10:10 AM	
MINIM VERIF	UM C	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:		
NORM	IAL O	PERATION VERIFICATION:		
N/A	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/8/2020 10:10 AM	
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/8/2020 1:30 PM	
YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 10/8/2020 10:11 AM	
NO	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS? 1 Issue: TST-3-1	Scott Erlenbusch on 10/8/2020 10:11 AM	
NO	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS? 1 Issue: TST-3-2	Scott Erlenbusch on 10/8/2020 10:10 AM	
HEATI	NG A	ND COOLING COILS VERIFICATION:		
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/8/2020 1:31 PM	
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/8/2020 1:31 PM	
HUMIE	DIFIEF	R VERIFICATION (IF APPLICABLE):		
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 11/12/2020 8:13 AM	
		Label on actuator says that you can program the failsafe position. Not sure it is programmed to fail closed. When humidity safety circuit is installed it will need to be tested. This actuator is modulating.	Scott Erlenbusch on 10/8/2020 8:24 AM	
		1 Issue: TST-3-17 2 Files: IMG_0301.heic   IMG_0302.heic		
YES	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 10/8/2020 8:20 AM	
HUMIE APPLI	DISTA CABL	T AND AIRFLOW SWITCH SAFETY VERIFICATION (IF E):		
humie humie air fl	DISTA DIFIEF LOW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.		
NO	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU? 1 Issue: TST-3-12	Scott Erlenbusch on 10/8/2020 2:05 PM	
NO	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 10/8/2020 2:05 PM	
NO	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 10/8/2020 2:05 PM	
TEST	COM	PLETION VERIFICATION:		
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 10/8/2020 3:03 PM	

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Atterr	npt N	IO. 2 PASSED	Status set by Scott Erlenbusch on 3/29/2021.
AIR HA	NDLI	NG UNIT - SYSTEM DEFICIENCIES TEST.	
THESE EQUIPI OVERA PRACT	E TES MEN <sup>-</sup> ALL C FICES	TS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH FOPERATION, SENSOR VERIFICATION, AS WELL AS ONTROL SYSTEM DESIGN AND INSTALLATION	
if a se Applic Comm	ENSO CABLI ENTS	R, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR E MARK THE TEST ANSWER AS N/A. USE NOTES AND & AS OFTEN AS NECESSARY.	
SENSC	DR VE	RIFICATION:	
OUTDO APPLIO	DOR <sup>-</sup> CABL	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E):	
YES	1	Does the outdoor humidity sensor report an acceptable value?	Scott Erlenbusch on 3/26/2021 12:53 PM
		34%	Scott Erlenbusch on 3/26/2021 12:53 PM
YES	2	Does the outdoor temperature report an acceptable value?	Scott Erlenbusch on 3/26/2021 12:53 PM
		59.8 degrees	Scott Erlenbusch on 3/26/2021 12:53 PM
YES	3	Document if these sensors are locally wired to the controller, or if they are globa values.	Scott Erlenbusch on 3/26/2021 12:53
		The temp and humidity points on the graphic are global points. There are OAT and OAH sensors wired in to the panel but the humidity is failed and the temperature shows -39 degrees.	Scott Erlenbusch on 3/26/2021 12:53 PM
RETUR	rn Aii	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):	
YES	4	Does the return air humidity sensor report an acceptable value?	Scott Erlenbusch on 3/29/2021 10:01 AM
		36% RH	Scott Erlenbusch on 3/29/2021 10:11 AM
RETUR	RN All	R TEMPERATURE SENSOR VERIFICATION:	
YES	5	Does the return air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/26/2021 12:53 PM
		71.9 degrees, Fluke = 72.7 degrees.	Scott Erlenbusch on 3/26/2021 12:53 PM
YES	6	Is the return air temperature sensor installed in the return air plenum and not ne the outdoor air or relief air plenums?	ar Scott Erlenbusch on 3/26/2021 12:53 PM
YES	7	Is the return air temperature sensor probe the proper length for the size of duct i installed in?	it is Scott Erlenbusch on 3/26/2021 12:53 PM
		18" probe	Scott Erlenbusch on 3/26/2021 12:53 PM
MIXED	AIR (	ECONOMIZER) TEMPERATURE SENSORS:	
YES	8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/26/2021 12:53 PM
		73 degrees. Fluke meter - 74.5 degrees	Scott Erlenbusch on 3/26/2021 12:53 PM
YES	9	Is the mixed air temperature sensor installed between the return air plenum and outdoor air plenums, and is able to sense a good mixture of both?	the Scott Erlenbusch on 3/26/2021 12:53 PM



<b>YES</b> 10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 3/26/2021 12:53 PM
SUPPLY A	R HUMIDITY SENSOR VERIFICATION:	
YES 11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 3/26/2021 12:53 PM
	Supply humidity was 60%, Return humidity was 45%. NWS = 30% humidity.	Scott Erlenbusch on 3/26/2021 12:53 PM
<b>YES</b> 12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 3/26/2021 12:53 PM
	Humidity sensor is roughly 8' from humidifier. The chilled water coil is also located after the humidifier.	Scott Erlenbusch on 3/26/2021 12:53 PM
SUPPLY A	R TEMPERATURE SENSORS:	
<b>YES</b> 13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/26/2021 12:53 PM
	Measured the supply air temperature with my Fluke meter and the temperature was 4 degrees cooler than the temperature sensor on the AHU. I dont think I was getting an accurate reading where my probe was located. I think the air was mixed better after the supply fan squirrel cage.	Scott Erlenbusch on 3/26/2021 12:53 PM
YES 14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 3/26/2021 12:53 PM
YES 15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 3/26/2021 12:53 PM
	18" probe	Scott Erlenbusch on 3/26/2021 12:53 PM
STATIC AN	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:	
RETURN P	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	
<b>YES</b> 16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 3/29/2021 10:11 AM
YES 17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/29/2021 10:11 AM
YES 18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/26/2021 12:53 PM
SUPPLY D	JCT STATIC PRESSURE SENSOR (IF APPLICABLE):	
YES 19		
	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 3/29/2021 10:14 AM
	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? It looks like AHU 1 is controlling to the SSP located on the AHU. There is another supply static sensor that is installed on 3rd floor Room 3009. I have verified the sensor setup, 4-20ma, 0-2.5 inWC.	Scott Erlenbusch on 3/29/2021 10:14 AM Scott Erlenbusch on 3/29/2021 10:14 AM
<b>YES</b> 20	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? It looks like AHU 1 is controlling to the SSP located on the AHU. There is another supply static sensor that is installed on 3rd floor Room 3009. I have verified the sensor setup, 4-20ma, 0-2.5 inWC.	Scott Erlenbusch on 3/29/2021 10:14 AM Scott Erlenbusch on 3/29/2021 10:14 AM Scott Erlenbusch on 3/26/2021 12:53 PM
YES 20 YES 21	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? It looks like AHU 1 is controlling to the SSP located on the AHU. There is another supply static sensor that is installed on 3rd floor Room 3009. I have verified the sensor setup, 4-20ma, 0-2.5 inWC. Is the supply duct static pressure sensor reporting an acceptable value? Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/29/2021 10:14 AM Scott Erlenbusch on 3/29/2021 10:14 AM Scott Erlenbusch on 3/26/2021 12:53 PM Scott Erlenbusch on 3/26/2021 12:53 PM
YES 20 YES 21 BUILDING	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? It looks like AHU 1 is controlling to the SSP located on the AHU. There is another supply static sensor that is installed on 3rd floor Room 3009. I have verified the sensor setup, 4-20ma, 0-2.5 inWC. Is the supply duct static pressure sensor reporting an acceptable value? Is the supply duct static pressure sensor and analog input ranges setup properly? PRESSURE SENSOR (IF APPLICABLE):	Scott Erlenbusch on 3/29/2021 10:14 AM Scott Erlenbusch on 3/29/2021 10:14 AM Scott Erlenbusch on 3/26/2021 12:53 PM Scott Erlenbusch on 3/26/2021 12:53 PM



There are also building differential pressure sensors on each floor. They are located on either side of the doors that separate the offices from the classroom spaces and measure the differential pressure between AHU 1 and AHU 2 spaces.	РМ
YES 23 Is the building pressure sensor reporting an acceptable value? Scott E	rlenbusch on 3/26/2021 12:53 PM
YES 24 Is the building pressure sensor and analog input ranges setup properly? Scott E	rlenbusch on 3/26/2021 12:53 PM
FILTER PRESSURE SENSORS (IF APPLICABLE):	
YES 25 Are all the filter pressure sensors installed across each filter bank they serve? Scott E	rlenbusch on 3/26/2021 12:53 PM
YES 26 Are all the filter pressure sensors reporting an acceptable value? Scott E	rlenbusch on 3/29/2021 10:17 AM
YES 27 Are all the filter pressure sensors and analog input ranges setup properly? Scott E	rlenbusch on 3/29/2021 10:17 AM
SAFETY DEVICES VERIFICATION:	
LOW LIMIT SAFETY DEVICE:	
YES 28 Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	rlenbusch on 3/26/2021 12:53 PM
YES 29 Does the freeze stat trip when sprayed with freeze spray? Scott E	rlenbusch on 3/26/2021 12:53 PM
WHEN THE LOW LIMIT SAFETY CIRCUIT IS TRIPPED	
YES 30 Do the low limit safety device(s) automatically shutdown the unit fans through a Scott E hardwired interlock independent of the BAS?	rlenbusch on 3/26/2021 12:53 PM
YES 31 Are the supply and return fan VFD's prohibited from running in hand or bypass? Scott E	rlenbusch on 3/26/2021 12:53 PM
YES 32 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, Scott E and the return air dampers open?	rlenbusch on 3/26/2021 12:53 PM
YES 33 Does the heating coil become open? (If applicable) Scott E	rlenbusch on 3/26/2021 12:53 PM
SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):	
N/A 34 Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.) Scott E	rlenbusch on 3/26/2021 12:53 PM
N/A 35 Is the low Suction Pressure Safety Switch Installed before the supply fan? Scott E	rlenbusch on 3/26/2021 12:53 PM
WHEN THE SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED	
N/A 36 Do the safety device(s) automatically shutdown the unit fans through a hardwired Scott E interlock independent of the BAS?	rlenbusch on 3/26/2021 12:53 PM
N/A 37 Are the supply and return fan VFD's prohibited from running in hand or bypass? Scott E	rlenbusch on 3/26/2021 12:53 PM
N/A 38 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Scott E	rlenbusch on 3/26/2021 12:53 PM
SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	

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YES	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/29/2021 10:17 AM	
		Strategic replaced high static pressure switch and set to trip at 4.25 inWC.	Scott Erlenbusch on 3/29/2021 10:18 AM	
YES	40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 3/26/2021 12:53 PM	
WHEN TRIPP	N THE PED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS		
YES	41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/29/2021 10:18 AM	
YES	42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/29/2021 10:18 AM	
YES	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/29/2021 10:18 AM	
RETU APPLI	RN PL CABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):		
YES	44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/26/2021 12:53 PM	
		Tripped at 2.75" WC.	Scott Erlenbusch on 3/26/2021 12:53 PM	
YES	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 3/26/2021 12:53 PM	
WHEN SWITC	N THE	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED		
YES	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/26/2021 12:53 PM	
YES	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/26/2021 12:53 PM	
YES	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/26/2021 12:53 PM	
RETU	RN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):		
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/26/2021 12:53 PM	
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 3/26/2021 12:53 PM	
WHEN THE RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED				
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/26/2021 12:53 PM	
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/26/2021 12:53 PM	
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/26/2021 12:53 PM	
FAN EQUIPMENT VERIFICATION:				
SUPPLY FAN:				
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/26/2021 12:53 PM	
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/26/2021 12:53 PM	

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RETURN FAN: (IF APPLICABLE)			
YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/26/2021 12:53 PM
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/26/2021 12:53 PM
MININ VERIF	/UM C FICAT	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:	
NORM	MAL O	PERATION VERIFICATION:	
N/A	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 3/26/2021 12:53 PM
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 3/26/2021 12:53 PM
YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 3/26/2021 12:53 PM
YES	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 3/29/2021 10:18 AM
YES	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 3/29/2021 10:19 AM
HEAT	ING A	ND COOLING COILS VERIFICATION:	
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/26/2021 12:53 PM
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/26/2021 12:53 PM
HUMI	DIFIE	R VERIFICATION (IF APPLICABLE):	
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 3/26/2021 12:53 PM
		Humidity valve does fail closed when either the HHC or AFS go into alarm.	Scott Erlenbusch on 3/26/2021 1:09 PM
YES	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 3/26/2021 12:53 PM
HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):			
HUMIDISTAT AND AIRFLOW SWITCH ARE USED TO SHUT THE HUMIDIFIER VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR AIR FLOW SWITCH IS NOT CLOSED.			
YES	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 3/26/2021 1:08 PM
YES	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 3/26/2021 1:08 PM
YES	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 3/26/2021 1:08 PM
TEST COMPLETION VERIFICATION:			
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 3/26/2021 12:53 PM

**Issues** 15



#### TST-3-1 CLOSED MODERATE

Middle damper blade on the return damper looks to be bent. Small gap in that damper when commanded fully closed. **Source** Test 3, Attempt 1, Line 61 Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS? Asset 🔅 COPH\_AHU 1 Discipline Mechanical Due Date 10/22/2020 Created By Scott Erlenbusch Identified On 10/8/2020 10:12 AM

new actuator has been installed, tested and verified Marcus Houser on 03/26/2021 at 09:35 AM Optimized Systems

#### TST-3-2 CLOSED HIGH

Minimum outdoor air damper did not move when commanded. Damper was always closed.

Source Test 3, Attempt 1, Line 62 Do the minimum outdoor air dampers open and close fully when commanded by the BAS? Asset 🔅 COPH\_AHU 1 Discipline Controls Due Date 10/22/2020 Created By Scott Erlenbusch Identified On 10/8/2020 10:18 AM

Actuator has been replaced, tested and verified Marcus Houser on 03/26/2021 at 09:36 AM Optimized Systems

TST-3-3 CLOSED HIGH

Supply high static pressure switch tripped at 9" WC. Please adjust so that unit will trip at 4". Source Test 3, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated property in order to not trip early? Asset 🔅 COPH\_AHU 1 Discipline Controls Due Date 10/22/2020 Created By Scott Erlenbusch Identified On 10/8/2020 11:16 AM

Strategic replaced high static cutout switch and set it to trip at 4.25 inWC. Scott Erlenbusch on 03/29/2021 at 10:19 AM Optimized Systems

## TST-3-4 CLOSED HIGH

Supply high static is bypassed at the pressure switch. Please wire switch properly and verify operation. Source Test 3, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early? Asset 🔅 COPH\_AHU 1 Discipline Controls Due Date 10/22/2020 Created By Scott Erlenbusch Identified On 10/8/2020 11:18 AM

Strategic replaced high static cutout switch and set it to trip at 4.25 inWC. OS verified the wiring at tested. Scott Erlenbusch on 03/29/2021 at 10:20 AM Optimized Systems



#### TST-3-5 CLOSED HIGH

Outdoor air damper furthest from the access door does not close fully when

commanded. Source Test 3 COPH\_AHU 1 - AHU - Humidifier/Optimization Asset 🔅 COPH\_AHU 1 Discipline Controls Due Date 10/22/2020 Created By Scott Erlenbusch Identified On 10/8/2020 11:21 AM

Damper linkage has been adjusted and now closes all the way. Tested and Verified Marcus Houser on 03/26/2021 at 09:40 AM Optimized Systems

### TST-3-6 CLOSED HIGH

When the LTD tripped programming is not closing the mixed air dampers correctly. **Source** Test 3 COPH\_AHU 1 - AHU - Humidifier/Optimization Asset Scoph\_AHU 1 Due Date 10/22/2020 Created By Scott Erlenbusch Identified On 10/8/2020 11:24 AM

Spoke with Todd Bishop and he fixed the programming and now the dampers are working correctly during a low temp alarm. Scott Erlenbusch on 10/08/2020 at 11:25 AM Optimized Systems

## TST-3-8 CLOSED HIGH

Return static pressure sensor is installed on the suction side of the return fan. That is why we are seeing negative values for the return static pressure. The poly for this sensor needs to be plumbed in to the return plenum. **Source** Test 3, Attempt 1, Line 16

Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?

Asset 🌣 COPH\_AHU 1 Discipline Controls Due Date 10/22/2020 Created By Scott Erlenbusch Identified On 10/8/2020 1:49 PM

Tubing has been corrected, RSP sensor is ok, Hiller installed new RPP sensor OS Verified Marcus Houser on 03/26/2021 at 09:20 AM Optimized Systems

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#### TST-3-9 OPEN HIGH

Supply duct static pressure sensor is installed on the supply cabin of the AHU. There is another supply static pressure sensor on Third floor that is not being used.

Source Test 3, Attempt 1, Line 19

Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?

Asset 🌣 COPH\_AHU 1 Discipline Optimization Due Date 10/22/2020 Created By Scott Erlenbusch Identified On 10/8/2020 1:55 PM

## TST-3-10 CLOSED MODERATE

Filter differential is reading .94" WC. The pre-filters are pretty dirty. **Source** Test 3, Attempt 1, Line 26 Are all the filter pressure sensors reporting an acceptable value? Assigned To UNMC Asset 🔅 COPH\_AHU 1 Due Date 10/22/2020 Created By Scott Erlenbusch Identified On 10/8/2020 2:03 PM

Verified sensor is setup correctly Marcus Houser on 03/26/2021 at 09:26 AM Optimized Systems

TST-3-11 CLOSED HIGH

Filter pressure sensor settings do not match the point setup in Siemens. This is giving you an inaccurate reading. **Source** Test 3, Attempt 1, Line 27 Are all the filter pressure sensors and analog input ranges setup properly? Asset 🔅 COPH\_AHU 1 Discipline Controls Due Date 10/22/2020 Created By Scott Erlenbusch Identified On 10/8/2020 2:04 PM

Changed Device range to match the sensor, checked and verified Marcus Houser on 03/26/2021 at 09:27 AM Optimized Systems

## TST-3-12 CLOSED HIGH

There is no humidistat or airflow switch installed for the humidifier. Humidifier safeties will need to be installed and tested per new sequence. **Source** Test 3, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU? Asset 🌣 COPH\_AHU 1 Discipline Controls Due Date 10/22/2020 Created By Scott Erlenbusch Identified On 10/8/2020 2:07 PM

Humidifier safeties have been installed and OS tested operation. Scott Erlenbusch on 03/26/2021 at 01:10 PM Optimized Systems



#### TST-3-13 CLOSED HIGH

Averaging sensor rubbing on the vertical support of the chilled water coil. Please protect the averaging sensor wherever it is touching anything that could damage it.

Source Test 3, Attempt 1, Line 10

Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?

Asset 🍕 COPH\_AHU 1 Discipline Controls Due Date 10/22/2020 Created By Scott Erlenbusch Identified On 10/8/2020 2:52 PM

This has been corrected, poly tube to protect it Marcus Houser on 03/26/2021 at 09:27 AM Optimized Systems

TST-3-14 CLOSED HIGH

Return air humidity sensor is reading 100%RH. Recommend replacing humidity sensor. Source Test 3, Attempt 1, Line 4 Does the return air humidity sensor report an acceptable value? Asset 🌣 COPH\_AHU 1 Discipline Controls Due Date 10/27/2020 Created By Scott Erlenbusch Identified On 10/13/2020 10:06 AM

New sensor has been installed and verified

Marcus Houser on 03/26/2021 at 09:28 AM Optimized Systems



## TST-3-15 CLOSED HIGH

With the building pressure issues that MCPH has, it is recommended that the sensor be replaced with an Ashcroft pressure sensor. This is true for AHU 1 and 2.

Source Test 3, Attempt 1, Line 22 Is the building pressure sensor installed in the best location possible for the areas served by the unit? Asset S COPH\_AHU 1 Discipline Controls Due Date 10/27/2020 Created By Scott Erlenbusch Identified On 10/13/2020 10:46 AM

Ashcroft installed on 2nd Floor South West commons in RM2001 Marcus Houser on 03/26/2021 at 09:47 AM Optimized Systems



IMG\_0131.jpg



## TST-3-17 CLOSED HIGH

Label on actuator says that you can program the failsafe position. Not sure it is programmed to fail closed. When humidity safety circuit is installed it will need to be tested. This actuator is modulating. **Source** Test 3, Attempt 1, Line 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed? Asset 🌣 COPH\_AHU 1 Discipline Controls Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 11:57 AM

Tested failed open, Switched settings on actuator now fails closed Marcus Houser on 03/26/2021 at 09:45 AM Optimized Systems



IMG\_0301.heic

IMG\_0302.heic

#### Photos 2





IMG\_0301.heic Line 65



IMG\_0302.heic Line 65

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## **#4 COPH\_AHU 2 - AHU -**Humidifier/Optimization



Optimized Systems | UNMC Humidifier/Optimization | 20-185

NCOMPLETE	84% Yes   0% No   15% N/A	12 ISSUES
	A	Asset 🔅 COPH_AHU 2
Attempts		
Attempt		Status set by Marcus Houser on 3/29/2021.
AIR HANDL	ING UNIT - SYSTEM DEFICIENCIES TEST.	
THESE TES EQUIPMEN OVERALL ( PRACTICE	STS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH IT OPERATION, SENSOR VERIFICATION, AS WELL AS CONTROL SYSTEM DESIGN AND INSTALLATION S.	
IF A SENSO APPLICABI COMMENT	DR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR LE MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY.	
SENSOR V	ERIFICATION:	
OUTDOOR APPLICABI	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF _E):	
YES 1	Does the outdoor humidity sensor report an acceptable value?	Scott Erlenbusch on 10/9/2020 11:22 Alv
YES 2	Does the outdoor temperature report an acceptable value?	Scott Erlenbusch on 10/9/2020 11:22 AM
YES 3	Document if these sensors are locally wired to the controller, or if they are glob values.	bal Scott Erlenbusch on 10/9/2020 11:22 AN
	Graphics are using the campus global temperature and humidity. Panel point report shows AHU 2 outdoor temperature and humidity points	Scott Erlenbusch on 10/9/2020 11:24 AN
RETURN A	IR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):	
YES 4	Does the return air humidity sensor report an acceptable value?	Scott Erlenbusch on 10/9/2020 12:59 PM
	49%RH	Scott Erlenbusch on 10/9/2020 12:59 PM
RETURN A	IR TEMPERATURE SENSOR VERIFICATION:	
YES 5	Does the return air temperature sensor report an acceptable value? BAS=70.75 degrees, Fluke=71.3 degrees.	Scott Erlenbusch on 10/9/2020 1:01 PM Scott Erlenbusch on 10/9/2020 1:10 PM
YES 6	Is the return air temperature sensor installed in the return air plenum and not r the outdoor air or relief air plenums?	near Scott Erlenbusch on 10/9/2020 1:01 PM
YES 7	Is the return air temperature sensor probe the proper length for the size of due installed in?	ct it is Scott Erlenbusch on 10/9/2020 1:01 PM Scott Erlenbusch on 10/9/2020 1:01 PM

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YES	8	Does the mixed air temperature sensor report an acceptable value? BAS= 72.8 degrees, Fluke=72.5 degrees	Scott Erlenbusch on 10/9/2020 1:03 PM Scott Erlenbusch on 10/9/2020 1:04 PM	
YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 10/9/2020 1:04 PM	
YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 10/9/2020 1:04 PM	
SUPP	LY AIF	R HUMIDITY SENSOR VERIFICATION:		
NO	11	Does the supply air humidity sensor report an acceptable value? BAS=86%RH. This reading seems kind of high.	Marcus Houser on 3/29/2021 10:30 AM Scott Erlenbusch on 10/9/2020 1:14 PM	
		1 Issue: TST-4-10		
YES	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 10/9/2020 1:12 PM	
		10' from the humidifier to the humidity sensor with the chilled water coil between them.	Scott Erlenbusch on 10/9/2020 1:13 PM	
SUPP	LY AIF	R TEMPERATURE SENSORS:		
YES	13	Does the supply air temperature sensor report an acceptable value? BAS=55.44 degrees, Fluke=55.9 degrees.	Scott Erlenbusch on 10/9/2020 1:08 PM Scott Erlenbusch on 10/9/2020 1:08 PM	
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 10/9/2020 1:09 PM	
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 10/9/2020 1:09 PM	
		18" probe	Scott Erlenbusch on 10/9/2020 1:09 PM	
STATI	IC ANE	DIFFERENTIAL PRESSURE SENSORS VERIFICATION:		
RETU	RN PL	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):		
YES	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 10/9/2020 11:00 AM	
NO	17	Is the return plenum pressure sensor reporting an acceptable value? 1 Issue: TST-4-6	Marcus Houser on 3/29/2021 10:30 AM	
YES	18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/9/2020 11:05 AM	
SUPP	LY DU	CT STATIC PRESSURE SENSOR (IF APPLICABLE):		
YES	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 10/15/2020 8:21 AM	
		Checked the supply pressure sensor on the AHU 2. The supply static sensor that is 2/3 down the duct work is in room 1025. The sensor setup is correct.	Scott Erlenbusch on 10/15/2020 8:21 AM	
YES	20	Is the supply duct static pressure sensor reporting an acceptable value? 1 Issue: TST-4-9	Marcus Houser on 3/29/2021 7:56 AM	
YES	21	Is the supply duct static pressure sensor and analog input ranges setup properly? 1 Issue: TST-4-5	Marcus Houser on 3/29/2021 7:56 AM	
BUILDING PRESSURE SENSOR (IF APPLICABLE):				
YES	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 10/13/2020 10:52 AM	
		Outside reference is on the outside of the penthouse. The high side is plumbed to the 1st floor East cubicle area. Differential pressure sensor is located in Siemens panel for AHU 2. Recommend replacing sensor with the Ashcroft pressure sensor.	Scott Erlenbusch on 10/13/2020 10:54 AM	

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<b>YES</b> 23	Is the building pressure sensor reporting an acceptable value? Value does fluctuate though.	Scott Erlenbusch on 10/9/2020 2:10 PM Scott Erlenbusch on 10/9/2020 2:10 PM		
<b>YES</b> 24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/9/2020 2:10 PM		
FILTER PF	ESSURE SENSORS (IF APPLICABLE):			
YES 25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 10/9/2020 1:19 PM		
<b>YES</b> 26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 10/9/2020 1:22 PM		
YES 27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 10/9/2020 1:22 PM		
SAFETY D	EVICES VERIFICATION:			
LOW LIMIT	SAFETY DEVICE:			
<b>YES</b> 28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 10/9/2020 10:01 AM		
YES 29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 10/9/2020 10:01 AM		
WHEN THE	E LOW LIMIT SAFETY CIRCUIT IS TRIPPED			
<b>YES</b> 30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/9/2020 10:01 AM		
<b>YES</b> 31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/9/2020 10:01 AM		
<b>YES</b> 32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/9/2020 10:01 AM		
NO 33	Does the heating coil become open? (If applicable)	Marcus Houser on 3/29/2021 10:30 AM		
	Heating coil opened to 37% and then closed back down. I believe the heating valve is probably trying to maintain the hot deck temperature.	Scott Erlenbusch on 10/9/2020 9:56 AM		
	1 Issue: TST-4-3			
SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):				
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 10/9/2020 10:20 AM		
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 10/9/2020 10:20 AM		
WHEN THE SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED				
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/9/2020 10:20 AM		
N/A 37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/9/2020 10:20 AM		
N/A 38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/9/2020 10:20 AM		
SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):				
NO 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? Tripped at 5.25" WC.	Marcus Houser on 3/29/2021 10:30 AM Marcus Houser on 3/29/2021 10:30 AM		
	1 Issue: TST-4-2			
<b>YES</b> 40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 10/9/2020 9:30 AM		
WHEN THE TRIPPED	E SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS			

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YES	41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/9/2020 9:31 AM	
YES	42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/9/2020 9:31 AM	
YES	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/9/2020 9:31 AM	
RETU APPL	RN PL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):		
YES	44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/9/2020 9:27 AM	
		Tripped at 2.5" WC.	Scott Erlenbusch on 10/9/2020 9:27 AM	
YES	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 10/9/2020 9:27 AM	
WHEN SWIT	N THE CH IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED		
YES	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/9/2020 9:30 AM	
YES	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/9/2020 9:30 AM	
YES	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/9/2020 9:30 AM	
RETU	RN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):		
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/9/2020 10:21 AM	
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 10/9/2020 10:21 AM	
WHEN TRIPF	N THE PED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS		
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/9/2020 10:21 AM	
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/9/2020 10:22 AM	
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/9/2020 10:22 AM	
FAN E	EQUIP	MENT VERIFICATION:		
SUPPLY FAN:				
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/9/2020 10:22 AM	
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/9/2020 10:22 AM	
RETURN FAN: (IF APPLICABLE)				
YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/9/2020 10:22 AM	
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/9/2020 10:22 AM	
MINIMUM OA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER VERIFICATION:				
NORMAL OPERATION VERIFICATION:				



N/A	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/9/2020 9:05 AM
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/9/2020 10:22 AM
YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 10/9/2020 9:05 AM
YES	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 10/9/2020 9:05 AM
NO	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS? 1 Issue: TST-4-1	Marcus Houser on 3/29/2021 10:31 AM
HEAT	ING A	ND COOLING COILS VERIFICATION:	
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/9/2020 10:22 AM
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/9/2020 10:22 AM
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):	
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Marcus Houser on 3/29/2021 7:56 AM
		Label on actuator says that you can program the failsafe position. Not sure it is programmed to fail closed. When humidity safety circuit is installed it will need to be tested. This actuator is modulating.	Scott Erlenbusch on 10/8/2020 9:30 AM
		1 Issue: TST-4-11	
YES	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 10/8/2020 9:29 AM
HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):			
humii humii air fi	DISTA DIFIEF LOW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.	
NO	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Marcus Houser on 3/29/2021 10:31 AM
		1 Issue: TST-4-4	
YES	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Marcus Houser on 3/29/2021 7:56 AM
YES	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Marcus Houser on 3/29/2021 7:56 AM
TEST COMPLETION VERIFICATION:			
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 10/13/2020 12:02 PM

Attempt No. 2 INCOMPLETE

Status set by Marcus Houser on 3/29/2021.

AIR HANDLING UNIT - SYSTEM DEFICIENCIES TEST.

THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.



IF A SENSOR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR
APPLICABLE MARK THE TEST ANSWER AS N/A. USE NOTES AND
COMMENTS AS OFTEN AS NECESSARY.

#### SENSOR VERIFICATION:

## OUTDOOR TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):

YES	1	Does the outdoor humidity sensor report an acceptable value?	Marcus Houser on 3/29/2021 10:31 AM	
YES	2	Does the outdoor temperature report an acceptable value?	Marcus Houser on 3/29/2021 10:31 AM	
YES	3	Document if these sensors are locally wired to the controller, or if they are global values.	Marcus Houser on 3/29/2021 10:31 AM	
		Graphics are using the campus global temperature and humidity. Panel point report shows AHU 2 outdoor temperature and humidity points	Marcus Houser on 3/29/2021 10:31 AM	
RETU	RN All	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):		
YES	4	Does the return air humidity sensor report an acceptable value?	Marcus Houser on 3/29/2021 10:31 AM	
		49%RH	Marcus Houser on 3/29/2021 10:31 AM	
RETU	RN All	R TEMPERATURE SENSOR VERIFICATION:		
YES	5	Does the return air temperature sensor report an acceptable value?	Marcus Houser on 3/29/2021 10:31 AM	
		BAS=70.75 degrees, Fluke=71.3 degrees.	Marcus Houser on 3/29/2021 10:31 AM	
YES	6	Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?	Marcus Houser on 3/29/2021 10:31 AM	
YES	7	Is the return air temperature sensor probe the proper length for the size of duct it is installed in?	Marcus Houser on 3/29/2021 10:31 AM	
		18" probe	Marcus Houser on 3/29/2021 10:31 AM	
MIXE	D AIR (	ECONOMIZER) TEMPERATURE SENSORS:		
YES	8	Does the mixed air temperature sensor report an acceptable value?	Marcus Houser on 3/29/2021 10:31 AM	
		BAS= 72.8 degrees, Fluke=72.5 degrees	Marcus Houser on 3/29/2021 10:31 AM	
YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Marcus Houser on 3/29/2021 10:31 AM	
YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Marcus Houser on 3/29/2021 10:31 AM	
SUPP	LY AIF	R HUMIDITY SENSOR VERIFICATION:		
YES	11	Does the supply air humidity sensor report an acceptable value?	Marcus Houser on 3/29/2021 10:31 AM	
		New sensor installed	Marcus Houser on 3/29/2021 10:31 AM	
YES	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Marcus Houser on 3/29/2021 10:31 AM	
		10' from the humidifier to the humidity sensor with the chilled water coil between them.	Marcus Houser on 3/29/2021 10:31 AM	
SUPPLY AIR TEMPERATURE SENSORS:				
YES	13	Does the supply air temperature sensor report an acceptable value?	Marcus Houser on 3/29/2021 10:31 AM	
		BAS=55.44 degrees, Fluke=55.9 degrees.	Marcus Houser on 3/29/2021 10:31 AM	
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Marcus Houser on 3/29/2021 10:31 AM	
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Marcus Houser on 3/29/2021 10:31 AM	



	18" probe	Marcus Houser on 3/29/2021 1	0:31 AM
STATIC AN	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:		
RETURN PI	LENUM STATIC PRESSURE SENSOR (IF APPLICABLE):		
<b>YES</b> 16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Marcus Houser on 3/29/2021 1	0:31 AM
<b>YES</b> 17	Is the return plenum pressure sensor reporting an acceptable value?	Marcus Houser on 3/29/2021 1	0:31 AM
<b>YES</b> 18	Is the return plenum pressure sensor and analog input ranges setup properly?	Marcus Houser on 3/29/2021 1	0:31 AM
SUPPLY DU	JCT STATIC PRESSURE SENSOR (IF APPLICABLE):		
<b>YES</b> 19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Marcus Houser on 3/29/2021 1	0:31 AM
	Checked the supply pressure sensor on the AHU 2. The supply static sensor that is 2/3 down the duct work is in room 1025. The sensor setup is correct.	Marcus Houser on 3/29/2021 1	0:31 AM
YES 20	Is the supply duct static pressure sensor reporting an acceptable value?	Marcus Houser on 3/29/2021 1	0:31 AM
YES 21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Marcus Houser on 3/29/2021 1	0:31 AM
BUILDING F	PRESSURE SENSOR (IF APPLICABLE):		
YES 22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Marcus Houser on 3/29/2021 1	0:31 AM
	Outside reference is on the outside of the penthouse. The high side is plumbed to the 1st floor East cubicle area. Differential pressure sensor is located in Siemens panel for AHU 2. Recommend replacing sensor with the Ashcroft pressure sensor.	Marcus Houser on 3/29/2021 1	0:31 AM
<b>YES</b> 23	Is the building pressure sensor reporting an acceptable value? Value does fluctuate though.	Marcus Houser on 3/29/2021 1 Marcus Houser on 3/29/2021 1	0:31 AM 10:31 AM
<b>YES</b> 24	Is the building pressure sensor and analog input ranges setup properly?	Marcus Houser on 3/29/2021 1	0:31 AM
FILTER PRI	ESSURE SENSORS (IF APPLICABLE):		
YES 25	Are all the filter pressure sensors installed across each filter bank they serve?	Marcus Houser on 3/29/2021 1	0:31 AM
<b>YES</b> 26	Are all the filter pressure sensors reporting an acceptable value?	Marcus Houser on 3/29/2021 1	0:31 AM
YES 27	Are all the filter pressure sensors and analog input ranges setup properly?	Marcus Houser on 3/29/2021 1	0:31 AM
SAFETY DE	VICES VERIFICATION:		
LOW LIMIT	SAFETY DEVICE:		
<b>YES</b> 28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Marcus Houser on 3/29/2021 1	0:31 AM
YES 29	Does the freeze stat trip when sprayed with freeze spray?	Marcus Houser on 3/29/2021 1	0:31 AM
WHEN THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED		
<b>YES</b> 30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Marcus Houser on 3/29/2021 1	0:31 AM
YES 31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Marcus Houser on 3/29/2021 1	0:31 AM
<b>YES</b> 32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Marcus Houser on 3/29/2021 1	0:31 AM
<b>YES</b> 33	Does the heating coil become open? (If applicable) Heating coil opened to 37% and then closed back down. I believe the heating valve is probably trying to maintain the hot deck temperature.	Marcus Houser on 3/29/2021 1 Marcus Houser on 3/29/2021 1	0:31 AM 0:31 AM



SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):				
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Marcus Houser on 3/29/2021 10:31 AM		
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Marcus Houser on 3/29/2021 10:31 AM		
WHEN THE SWITCH IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED			
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Marcus Houser on 3/29/2021 10:31 AM		
N/A 37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Marcus Houser on 3/29/2021 10:31 AM		
N/A 38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Marcus Houser on 3/29/2021 10:31 AM		
SUPPLY PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
<b>YES</b> 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? Tripped at 4.25" WC.	Marcus Houser on 3/29/2021 10:32 AM Marcus Houser on 3/29/2021 10:32 AM		
<b>YES</b> 40	Is the high Pressure Safety Switch Installed after the supply fan?	Marcus Houser on 3/29/2021 10:31 AM		
WHEN THE TRIPPED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS			
YES 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Marcus Houser on 3/29/2021 10:31 AM		
<b>YES</b> 42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Marcus Houser on 3/29/2021 10:31 AM		
YES 43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Marcus Houser on 3/29/2021 10:31 AM		
RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):				
YES 44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Marcus Houser on 3/29/2021 10:31 AM		
	Tripped at 2.5" WC.	Marcus Houser on 3/29/2021 10:31 AM		
<b>YES</b> 45	Is the low suction pressure safety switch installed before the return fan?	Marcus Houser on 3/29/2021 10:31 AM		
WHEN THE SWITCH IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED			
YES 46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Marcus Houser on 3/29/2021 10:31 AM		
YES 47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Marcus Houser on 3/29/2021 10:31 AM		
YES 48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Marcus Houser on 3/29/2021 10:31 AM		
RETURN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
N/A 49	Is the high pressure safety switch calibrated properly in order to not trip early?	Marcus Houser on 3/29/2021 10:31 AM		
N/A 50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Marcus Houser on 3/29/2021 10:31 AM		
WHEN THE RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED				
N/A 51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Marcus Houser on 3/29/2021 10:31 AM		
N/A 52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Marcus Houser on 3/29/2021 10:31 AM		

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Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, Marcus Houser on 3/29/2021 10:31 AM N/A 53 and the return air dampers open? FAN EQUIPMENT VERIFICATION: SUPPLY FAN: YES 54 Does the supply fan start and stop when commanded by the BAS? Marcus Houser on 3/29/2021 10:31 AM YES 55 Does the supply fan VFD (if applicable) respond to the speed signal from the BAS? Marcus Houser on 3/29/2021 10:31 AM RETURN FAN: (IF APPLICABLE) Does the return fan start and stop when commanded by the BAS? Marcus Houser on 3/29/2021 10:31 AM YES 56 YES 57 Does the return fan VFD (if applicable) respond to the speed signal from the BAS? Marcus Houser on 3/29/2021 10:31 AM MINIMUM OA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER VERIFICATION: NORMAL OPERATION VERIFICATION: N/A 58 Do the face/bypass damper actuators fully open and close when commanded by Marcus Houser on 3/29/2021 10:31 AM the BAS? Marcus Houser on 3/29/2021 10:31 AM YES 59 Do the relief air damper actuators fully open and close when commanded by the BAS? **YES** 60 Do the return and outdoor air (economizer) dampers open and close inverse of Marcus Houser on 3/29/2021 10:31 AM each other when commanded by the BAS? Do the return and outdoor air (economizer) dampers open and close fully when YES 61 Marcus Houser on 3/29/2021 10:31 AM commanded by the BAS? YES 62 Do the minimum outdoor air dampers open and close fully when commanded by the Marcus Houser on 3/29/2021 10:32 AM BAS? HEATING AND COOLING COILS VERIFICATION: Does the AHU Heating Coil Valve Open and Close Fully when commanded by the Marcus Houser on 3/29/2021 10:31 AM YES 63 BAS? (If Applicable) YES 64 Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the Marcus Houser on 3/29/2021 10:31 AM BAS? (If Applicable) HUMIDIFIER VERIFICATION (IF APPLICABLE): Is the humidifier valve actuator a fail safe actuator and does it fail closed? Marcus Houser on 3/29/2021 10:31 AM YES 65 Marcus Houser on 3/29/2021 10:31 AM Label on actuator says that you can program the failsafe position. Not sure it is programmed to fail closed. When humidity safety circuit is installed it will need to be tested. This actuator is modulating. YES 66 When humidifier valve is opened, is there steam discharging from the humidifier Marcus Houser on 3/29/2021 10:31 AM tubes? HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE): HUMIDISTAT AND AIRFLOW SWITCH ARE USED TO SHUT THE HUMIDIFIER VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR AIR FLOW SWITCH IS NOT CLOSED. YES 67 Is the humidistat located between the humidity sensor and the smoke detector on Marcus Houser on 3/29/2021 10:32 AM the AHU? YES 68 Is the airflow switch plumbed in to the AHU supply air plenum? Marcus Houser on 3/29/2021 10:31 AM Does the humidifier valve close when either the air flow switch or humidistat switch YES 69 Marcus Houser on 3/29/2021 10:31 AM open? TEST COMPLETION VERIFICATION:

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YES 70 Have all overrides on the AHU been released?

#### **Issues** 12

#### TST-4-1 CLOSED HIGH

Minimum outdoor air damper when released did not go back to 0%. May be programming related. **Source** Test 4, Attempt 1, Line 62 Do the minimum outdoor air dampers open and close fully when commanded by the BAS? Asset Scopped Copped Co

Dampers have been adjusted and re-tested. Marcus Houser on 03/26/2021 at 01:39 PM Optimized Systems

TST-4-2 CLOSED HIGH

Supply high static cutout is set to trip at 5.25"WC. This pressure setting is too high. Set static cutout to 4". **Source** Test 4, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early? Asset 🌣 COPH\_AHU 2 Discipline Controls Due Date 10/23/2020 Created By Scott Erlenbusch Identified On 10/9/2020 9:32 AM

Cutout has been adjusted to 4.25" inwc Marcus Houser on 03/26/2021 at 02:03 PM Optimized Systems

## TST-4-3 OPEN MODERATE

Not sure if this going to be an issue but wanted to note it so it could be discussed. Heating coil opened to 37% and then closed back down. I believe the heating valve is probably trying to maintain the hot deck temperature. OS to verify programming will protect the coils on a safety trip. **Source** Test 4, Attempt 1, Line 33 Does the heating coil become open? (If applicable)

Asset S COPH\_AHU 2 Discipline Optimization Due Date 10/23/2020 Created By Scott Erlenbusch Identified On 10/9/2020 10:01 AM



Marcus Houser on 3/29/2021 10:31 AM
## TST-4-4 CLOSED HIGH

There is no humidistat or airflow switch installed for the humidifier. Humidifier safeties will need to be installed and tested per new sequence. **Source** Test 4, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU? Asset 🔅 COPH\_AHU 2 Discipline Controls Due Date 10/23/2020 Created By Scott Erlenbusch Identified On 10/9/2020 10:25 AM

Both safeties have been installed and tested by OS Marcus Houser on 03/29/2021 at 07:52 AM Optimized Systems

## TST-4-5 CLOSED HIGH

Input ranges on the AHU supply static pressure sensor are the same as the point set up in the BAS, but sensor values and BAS values differ. Sensor reads 1.4"WC and the BAS is reporting 1.16"WC. Sensor is also set up for bi-directional, the sensor should be set up for uni-directional. Please verify sensor is good and zero sensor. Replace if sensor is bad. **Source** Test 4, Attempt 1, Line 21 Is the supply duct static pressure sensor and analog input ranges setup properly? Asset S COPH\_AHU 2 Discipline Controls Due Date 10/23/2020 Created By Scott Erlenbusch Identified On 10/9/2020 10:36 AM

Changed sensor to uni-directional and zeroed it. Sensor is now reading more accurately Marcus Houser on 03/29/2021 at 07:53 AM Optimized Systems

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### TST-4-6 CLOSED HIGH

Return static pressure sensor appears to be failed. The display is blank and sensor is reading -4.13"WC. The penthouse is the relief plenum and sensor is causing penthouse to be negative. This could be a problem with cold air coming in to penthouse in the winter. Please replace return plenum static pressure sensor.

**Source** Test 4, Attempt 1, Line 17 Is the return plenum pressure sensor reporting an acceptable value? Asset 🔅 COPH\_AHU 2 Discipline Controls Due Date 10/23/2020 Created By Scott Erlenbusch Identified On 10/9/2020 11:01 AM

Sensor has been replaced and plumb correctly to show the suction side of the return fans Marcus Houser on 03/29/2021 at 07:54 AM Optimized Systems



IMG\_0111.jpg

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## TST-4-7 OPEN

Supply fan VFD-3B display is bad or some other issue. Source Test 4 COPH\_AHU 2 - AHU - Humidifier/Optimization Assigned To UNMC Asset 🌣 COPH\_AHU 2 Due Date 10/23/2020 Created By Scott Erlenbusch Identified On 10/9/2020 12:00 PM



TST-4-8 CLOSED HIGH

Unit heater in the penthouse for AHU 2 is valved off. Source Test 4 COPH\_AHU 2 - AHU - Humidifier/Optimization Assigned To UNMC Asset 🔅 COPH\_AHU 2 Due Date 10/23/2020 Created By Scott Erlenbusch Identified On 10/9/2020 2:33 PM

valve is now open Marcus Houser on 03/26/2021 at 11:00 AM Optimized Systems

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## TST-4-9 OPEN HIGH

Not sure what pressure the supply fans are controlled by. Graphics show that the supply static setpoint is 1"WC. The ahu static is 1.45" and the first floor static is .88. OS to verify that programming is controlling to the correct static pressure sensor.

Source Test 4, Attempt 1, Line 20 Is the supply duct static pressure sensor reporting an acceptable value? Asset S COPH\_AHU 2 Discipline Optimization Due Date 10/23/2020 Created By Scott Erlenbusch Identified On 10/9/2020 2:53 PM

Verified the setup of the SSP which is located in room 1025 above the ceiling. Sensor is set to 4-20, 0-2.5 inWC. Scott Erlenbusch on 03/29/2021 at 10:06 AM Optimized Systems

## TST-4-10 CLOSED HIGH

The supply air humidity sensor reading is very high. Recommend replacing humidity sensor. **Source** Test 4, Attempt 1, Line 11 Does the supply air humidity sensor report an acceptable value? Asset 🌣 COPH\_AHU 2 Discipline Controls Due Date 10/27/2020 Created By Scott Erlenbusch Identified On 10/13/2020 10:50 AM

Humidity sensor has been replaced, verified point setup Marcus Houser on 03/26/2021 at 11:03 AM Optimized Systems



## TST-4-11 CLOSED HIGH

Label on actuator says that you can program the failsafe position. Not sure it is programmed to fail closed. When humidity safety circuit is installed it will need to be tested. This actuator is modulating. **Source** Test 4, Attempt 1, Line 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed? Asset 🌣 COPH\_AHU 2 Discipline Controls Due Date 11/13/2020 Created By Scott Erlenbusch Identified On 10/30/2020 12:01 PM

#### Tested actuator, when losing power it fails closed Marcus Houser on 03/29/2021 at 07:55 AM Optimized Systems



IMG\_0303.heic

TST-4-12 OPEN HIGH

When testing Humidifier valve noticed very little steam pressure. Source Test 4 COPH\_AHU 2 - AHU - Humidifier/Optimization Asset S COPH\_AHU 2 Due Date 4/9/2021 Created By Marcus Houser Identified On 3/26/2021 2:01 PM

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# #5 DGC\_AHU 1 - AHU -Humidifier/Optimization

Optimized Systems | UNMC Humidifier/Optimization | 20-185

5% Yes | 1% No | 0% N/A



Assigned To Optimized Systems Asset 🧐 DGC AHU 1

Attempts

INCOMPLETE

Attempt No. 1 INCOMPLETE

Status set by Scott Erlenbusch on 10/7/2020.

AIR HANDLING UNIT - SYSTEM DEFICIENCIES TEST.

THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.

IF A SENSOR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR APPLICABLE MARK THE TEST ANSWER AS N/A. USE NOTES AND COMMENTS AS OFTEN AS NECESSARY.

#### SENSOR VERIFICATION:

OUTDOOR TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):

1 Does the outdoor humidity sensor report an acceptable value?

2 Does the outdoor temperature report an acceptable value?

3 Document if these sensors are locally wired to the controller, or if they are global values.

RETURN AIR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):

4 Does the return air humidity sensor report an acceptable value?

#### RETURN AIR TEMPERATURE SENSOR VERIFICATION:

- 5 Does the return air temperature sensor report an acceptable value?
- 6 Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?
- 7 Is the return air temperature sensor probe the proper length for the size of duct it is installed in?

#### MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:

- 8 Does the mixed air temperature sensor report an acceptable value?
- 9 Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?
- 10 Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?

#### SUPPLY AIR HUMIDITY SENSOR VERIFICATION:

11 Does the supply air humidity sensor report an acceptable value?

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12 Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.

#### SUPPLY AIR TEMPERATURE SENSORS:

- 13 Does the supply air temperature sensor report an acceptable value?
- 14 Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?
- 15 Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?

STATIC AND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:

#### RETURN PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):

- 16 Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?
- 17 Is the return plenum pressure sensor reporting an acceptable value?
- 18 Is the return plenum pressure sensor and analog input ranges setup properly?

#### SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):

- 19 Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?
- 20 Is the supply duct static pressure sensor reporting an acceptable value?
- 21 Is the supply duct static pressure sensor and analog input ranges setup properly?

#### BUILDING PRESSURE SENSOR (IF APPLICABLE):

- Is the building pressure sensor installed in the best location possible for the areas served by the unit?
- 23 Is the building pressure sensor reporting an acceptable value?
- 24 Is the building pressure sensor and analog input ranges setup properly?

#### FILTER PRESSURE SENSORS (IF APPLICABLE):

- 25 Are all the filter pressure sensors installed across each filter bank they serve?
- 26 Are all the filter pressure sensors reporting an acceptable value?
- 27 Are all the filter pressure sensors and analog input ranges setup properly?

#### SAFETY DEVICES VERIFICATION:

#### LOW LIMIT SAFETY DEVICE:

- 28 Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?
- 29 Does the freeze stat trip when sprayed with freeze spray?

#### WHEN THE LOW LIMIT SAFETY CIRCUIT IS TRIPPED...

- 30 Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?
- 31 Are the supply and return fan VFD's prohibited from running in hand or bypass?
- 32 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?
- 33 Does the heating coil become open? (If applicable)

SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):

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- 34 Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)
- 35 Is the low Suction Pressure Safety Switch Installed before the supply fan?

WHEN THE SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED...

- 36 Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?
- 37 Are the supply and return fan VFD's prohibited from running in hand or bypass?
- 38 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?

#### SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):

- 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early?
- 40 Is the high Pressure Safety Switch Installed after the supply fan?

## WHEN THE SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED...

- 41 Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?
- 42 Are the supply and return fan VFD's prohibited from running in hand or bypass?
- 43 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?

## RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):

- 44 Is the low suction pressure safety switch calibrated properly in order to not trip early?
- 45 Is the low suction pressure safety switch installed before the return fan?

## WHEN THE RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED...

- 46 Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?
- 47 Are the supply and return fan VFD's prohibited from running in hand or bypass?
- 48 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?

#### RETURN PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):

- 49 Is the high pressure safety switch calibrated properly in order to not trip early?
- 50 Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?

## WHEN THE RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED...

- 51 Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?
- 52 Are the supply and return fan VFD's prohibited from running in hand or bypass?
- 53 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?

#### FAN EQUIPMENT VERIFICATION:

#### SUPPLY FAN:

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	54	Does the supply fan start and stop when commanded by the BAS?			
	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?			
RETU	RETURN FAN: (IF APPLICABLE)				
	56	Does the return fan start and stop when commanded by the BAS?			
	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?			
MININ VERI	MUM C FICAT	DA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ION:			
NOR	MAL O	PERATION VERIFICATION:			
	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?			
	59	Do the relief air damper actuators fully open and close when commanded by the BAS?			
	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?			
	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?			
	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?			
HEAT	TING A	ND COOLING COILS VERIFICATION:			
	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)			
	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)			
HUM	IDIFIEI	R VERIFICATION (IF APPLICABLE):			
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 3/2/2021 9:31 AM		
NO	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 3/29/2021 11:12 AM		
		Manual isolation valve for the steam was valved off to the humidifier, could not test.	Scott Erlenbusch on 3/29/2021 11:13 AM		
HUM APPL	IDISTA ICABL	T AND AIRFLOW SWITCH SAFETY VERIFICATION (IF E):			
hum hum air f	IDISTA IDIFIEI IDIV S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.			
YES	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 3/29/2021 11:14 AM		
		Located after the duct detector.	Scott Erlenbusch on 3/29/2021 11:14 AM		
YES	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 3/2/2021 9:32 AM		
YES	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 3/2/2021 9:32 AM		

#### TEST COMPLETION VERIFICATION:

70 Have all overrides on the AHU been released?



## TEST #6 DRC1\_AHU 1 - AHU -**Humidifier/Optimization**



Optimized Systems | UNMC Humidifier/Optimization | 20-185

INCOMPLETE	77% Yes   0% No   22% N/A	17 ISSUES
		Assigned To Optimized Systems Asset 🔅 DRC1_AHU 1
Attempts		
Attempt	No. 1 FAILED	Status set by Scott Erlenbusch on 10/29/2020.
AIR HANDL	ING UNIT - SYSTEM DEFICIENCIES TEST.	
These tes Equipmen Overall ( Practice	STS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH IT OPERATION, SENSOR VERIFICATION, AS WELL AS CONTROL SYSTEM DESIGN AND INSTALLATION S.	
IF A SENSO APPLICABI COMMENT	DR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR LE MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY.	
SENSOR V	ERIFICATION:	
OUTDOOR APPLICABI	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF $_{\rm LE}$ ):	
N/A 1	Does the outdoor humidity sensor report an acceptable value?	Scott Erlenbusch on 10/26/2020 10:32
	There is no humidity point in Panel 202. The humidity point on the graphics virtual and that point is reading a little low. The virtual point reports 63% and Accuweather is reporting 77%.	is a Scott Erlenbusch on 10/26/2020 10:35 AM
YES 2	Does the outdoor temperature report an acceptable value?	Scott Erlenbusch on 10/26/2020 10:35
	BAS=22 degrees, Accuweather=22 degrees.	Scott Erlenbusch on 10/26/2020 10:36 AM
YES 3	Document if these sensors are locally wired to the controller, or if they are glo values.	bal Scott Erlenbusch on 10/26/2020 10:36 AM
	OAT is wired in to panel 202.	Scott Erlenbusch on 10/26/2020 10:37 AM
RETURN A	IR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):	
YES 4	Does the return air humidity sensor report an acceptable value?	Scott Erlenbusch on 10/28/2020 2:47
	BAS=23% RH, Amprobe=21% RH	Scott Erlenbusch on 10/28/2020 2:48 PM
RETURN A	IR TEMPERATURE SENSOR VERIFICATION:	
YES 5	Does the return air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/26/2020 10:46
	BAS=73.2, Fluke=73.1	AM Scott Erlenbusch on 10/26/2020 10:47 AM
YES 6	Is the return air temperature sensor installed in the return air plenum and not the outdoor air or relief air plenums?	near Scott Erlenbusch on 10/26/2020 10:48 AM

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YES	7	Is the return air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 10/26/2020 10:48 AM		
		6" probe, probe is not very long but is reading accurately.	Scott Erlenbusch on 10/26/2020 10:49 AM		
MIXE	DAIR	(ECONOMIZER) TEMPERATURE SENSORS:			
NO	8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/26/2020 10:59		
		BAS=55.6 degrees, Fluke=50.2 degrees. The MAT is an averaging sensor and will probably give you a much more accurate average temperature than the Fluke probe sensor. Part of the reason there is such a difference in temperature is that the two OA dampers are not operating the same. One is open much further than the other.	Scott Erlenbusch on 10/26/2020 12:15 PM		
YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 10/26/2020 11:00 AM		
NO	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly? 1 Issue: TST-6-1	Scott Erlenbusch on 10/26/2020 11:01 AM		
SUPP	PLY AIF	R HUMIDITY SENSOR VERIFICATION:			
YES	11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 10/28/2020 2:52 PM		
		BAS=29% RH, Amprobe=35% RH	Scott Erlenbusch on 10/28/2020 2:53 PM		
YES	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 10/26/2020 12:20 PM		
		Humidity sensor is located 20 feet down stream of the humidifier and the chilled water coil is located between the two.	Scott Erlenbusch on 10/26/2020 12:24 PM		
SUPP	PLY AIF	R TEMPERATURE SENSORS:			
NO	13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/26/2020 12:24 PM		
		BAS=57.4 degrees. Fluke=52.2 degrees.	Scott Erlenbusch on 10/26/2020 12:27 PM		
		1 Issue: TST-6-2			
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 10/26/2020 12:27 PM		
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 10/26/2020 12:27 PM		
		Supply air is mixed well before the sensor and the cabin is pressurized so sensor should be able to read accurately.	Scott Erlenbusch on 10/26/2020 12:30 PM		
STAT	IC ANI	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:			
RETU	RETURN PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):				
NO	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-6-7	Scott Erlenbusch on 10/26/2020 1:50 PM		
NO	17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/26/2020 1:55 PM		
NO	18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/26/2020 1:55 PM		
SUPP	PLY DL	ICT STATIC PRESSURE SENSOR (IF APPLICABLE):			
NO	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 10/29/2020 8:22 AM		
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		I am not sure where the SSP sensor is located. It is reading 1.86" static and the AHU SPP is reading 2.3".	Scott Erlenbusch on 10/26/2020 2:17 PM
		1 Issue: TST-6-16	
2	20	Is the supply duct static pressure sensor reporting an acceptable value?	
2	21	Is the supply duct static pressure sensor and analog input ranges setup properly?	
BUILDIN	NG P	RESSURE SENSOR (IF APPLICABLE):	
NO 2	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 11/13/2020 9:43 AM
		Did not see a building pressure point in Panel 202. Relief damper looks to be programmed to mirror the outdoor air damper.	Scott Erlenbusch on 10/26/2020 2:05 PM
		1 Issue: TST-6-17	
N/A 2	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/26/2020 2:04 PM
N/A 2	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/26/2020 2:04 PM
FILTER	PRE	ESSURE SENSORS (IF APPLICABLE):	
N/A 2	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 10/26/2020 2:06 PM
N/A 2	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 10/26/2020 2:06 PM
N/A 2	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 10/26/2020 2:06 PM
SAFETY	Y DE	VICES VERIFICATION:	
LOW LI	МΙΤ	SAFETY DEVICE:	
NO 2	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil? 1 Issue: TST-6-8	Scott Erlenbusch on 10/26/2020 2:06 PM
YES 2	29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 10/28/2020 2:26 PM
WHEN <sup>-</sup>	THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED	
YES 3	30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/28/2020 2:26 PM
NO 3	31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/28/2020 2:26 PM
		1 Issue: TST-6-13	
YES 3	32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/28/2020 2:28 PM
NO 3	33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 10/28/2020 2:28 PM
		Heating coil did not open, it may be looking at MAT.	Scott Erlenbusch on 10/28/2020 2:28 PM
		1 Issue: TST-6-14	
SUPPLY APPLIC	Y PL ABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	
N/A 3	34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 10/26/2020 12:52 PM



N/A	35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 10/26/2020 12:34 PM	
WHEN SWITC	THE H IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED		
N/A	36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/26/2020 12:49 PM	
N/A	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/26/2020 12:49 PM	
N/A	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/26/2020 12:49 PM	
SUPPL	Y PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):		
NO	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/26/2020 12:52 PM	
		Do not see a high static pressure point in the panel but there are relief gates at the supply chamber that appear to be rated at 6". The relief gates have a 6 painted on them.	Scott Erlenbusch on 10/26/2020 12:53 PM	
		1 Issue: TST-6-3		
N/A	40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 10/26/2020 12:49 PM	
WHEN TRIPPE	THE ED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS		
N/A	41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/26/2020 12:49 PM	
N/A	42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/26/2020 12:49 PM	
N/A	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/26/2020 12:49 PM	
RETUR APPLIC	RN PL CABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):		
NO	44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/26/2020 12:53 PM	
		Do not see a low static pressure point in the panel and did not see any relief gates on the return plenum.	Scott Erlenbusch on 10/26/2020 12:54 PM	
		1 Issue: TST-6-4		
N/A	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 10/26/2020 12:54 PM	
WHEN SWITC	THE H IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED		
N/A	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/26/2020 12:54 PM	
N/A	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/26/2020 12:54 PM	
N/A	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/26/2020 12:54 PM	
RETURN PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):				
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/26/2020 12:54 PM	
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 10/26/2020 12:54 PM	

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WHEN TRIPF	WHEN THE RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED				
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/26/2020 12:54 PM		
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/26/2020 12:54 PM		
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/26/2020 12:54 PM		
FAN E	EQUIP	MENT VERIFICATION:			
SUPP	PLY FA	N:			
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/28/2020 2:26 PM		
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/28/2020 2:26 PM		
RETU	IRN FA	N: (IF APPLICABLE)			
YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/28/2020 2:26 PM		
		1 ISSUE: 151-0-15			
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/28/2020 2:26 PM		
MININ VERIF	IUM C	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:			
NORM	/AL O	PERATION VERIFICATION:			
N/A	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/26/2020 12:54 PM		
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/28/2020 1:41 PM		
YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 10/28/2020 1:41 PM		
NO	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS? 2 Issues: TST-6-12   TST-6-11	Scott Erlenbusch on 10/26/2020 12:11 PM		
N/A	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 10/26/2020 12:54 PM		
HEAT	ING A	ND COOLING COILS VERIFICATION:			
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/29/2020 8:21 AM		
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/29/2020 8:21 AM		
нимі	HUMIDIFIER VERIFICATION (IF APPLICABLE):				
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 10/26/2020 1:04 PM		
		1 ISSUE: I S1-6-5			
YES	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 10/26/2020 11:35 AM		
HUMI APPL	HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):				

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HUMIDISTA HUMIDIFIE AIR FLOW	AT AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.			
N/A 67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU? 1 Issue: TST-6-6	Scott Erlenbusch on 10/26/2020 1:11 PM		
N/A 68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 10/26/2020 1:11 PM		
N/A 69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 10/26/2020 1:11 PM		
TEST COM	PLETION VERIFICATION:			
YES 70	Have all overrides on the AHU been released?	Scott Erlenbusch on 10/26/2020 2:17 PM		
Attempt		Status set by Scott Erlenbusch on 4/9/2021.		
7 acompt				
AIR HANDL	ING UNIT - SYSTEM DEFICIENCIES TEST.			
THESE TES EQUIPMEN OVERALL ( PRACTICE)	STS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH T OPERATION, SENSOR VERIFICATION, AS WELL AS CONTROL SYSTEM DESIGN AND INSTALLATION S.			
IF A SENSO APPLICABL COMMENT	DR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR .E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY.			
SENSOR V	SENSOR VERIFICATION:			
OUTDOOR APPLICABL	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E):			
N/A 1	Does the outdoor humidity sensor report an acceptable value?	Scott Erlenbusch on 4/9/2021 7:37 AM		
	There is no humidity point in Panel 202. The humidity point on the graphics is a virtual and that point is reading a little low. The virtual point reports 63% and Accuweather is reporting 77%.	Scott Erlenbusch on 4/9/2021 7:37 AM		
YES 2	Does the outdoor temperature report an acceptable value?	Scott Erlenbusch on 4/9/2021 7:37 AM		
	BAS=22 degrees, Accuweather=22 degrees.	Scott Erlenbusch on 4/9/2021 7:37 AM		
YES 3	Document if these sensors are locally wired to the controller, or if they are global values.	Scott Erlenbusch on 4/9/2021 7:37 AM		
	OAT is wired in to panel 202.	Scott Erlenbusch on 4/9/2021 7:37 AM		
RETURN AIR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):				
YES 4	Does the return air humidity sensor report an acceptable value? BAS=23% RH, Amprobe=21% RH	Scott Erlenbusch on 4/9/2021 7:37 AM Scott Erlenbusch on 4/9/2021 7:37 AM		
RETURN A	R TEMPERATURE SENSOR VERIFICATION:			
YES 5	Does the return air temperature sensor report an acceptable value? BAS=73.2, Fluke=73.1	Scott Erlenbusch on 4/9/2021 7:37 AM Scott Erlenbusch on 4/9/2021 7:37 AM		
YES 6	Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?	Scott Erlenbusch on 4/9/2021 7:37 AM		

YES 7 Is the return air temperature sensor probe the proper length for the size of duct it is Scott Erlenbusch on 4/9/2021 7:37 AM installed in?

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	6" probe, probe is not very long but is reading accurately.	Scott Erlenbusch on 4/9/2021 7:37 AM			
MIXED AIR	MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:				
YES 8	Does the mixed air temperature sensor report an acceptable value? Strategic replaced the mixed air temperature sensor and OS verified operation.	Scott Erlenbusch on 4/9/2021 7:39 AM Scott Erlenbusch on 4/9/2021 7:40 AM			
YES 9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 4/9/2021 7:37 AM			
YES 10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 4/9/2021 7:39 AM			
SUPPLY A	R HUMIDITY SENSOR VERIFICATION:				
YES 11	Does the supply air humidity sensor report an acceptable value? BAS=29% RH, Amprobe=35% RH	Scott Erlenbusch on 4/9/2021 7:37 AM Scott Erlenbusch on 4/9/2021 7:37 AM			
<b>YES</b> 12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 4/9/2021 7:37 AM			
	Humidity sensor is located 20 feet down stream of the humidifier and the chilled water coil is located between the two.	Scott Erlenbusch on 4/9/2021 7:37 AM			
SUPPLY A	R TEMPERATURE SENSORS:				
<b>YES</b> 13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 4/9/2021 12:47 PM			
	Strategic replace SAT sensor and sensor read 55 degrees.	Scott Erlenbusch on 4/9/2021 12:47 PM			
<b>YES</b> 14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 4/9/2021 7:37 AM			
YES 15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 4/9/2021 7:37 AM			
	Supply air is mixed well before the sensor and the cabin is pressurized so sensor should be able to read accurately.	Scott Erlenbusch on 4/9/2021 7:37 AM			
STATIC AN	ID DIFFERENTIAL PRESSURE SENSORS VERIFICATION:				
RETURN P	LENUM STATIC PRESSURE SENSOR (IF APPLICABLE):				
<b>YES</b> 16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 4/28/2021 11:01 AM			
YES 17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 4/28/2021 11:01 AM			
<b>YES</b> 18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 4/28/2021 11:01 AM			
	0-10v,6 to .6 inWC.	Scott Erlenbusch on 4/28/2021 11:01 AM			
SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):					
YES 19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in	Scott Erlenbusch on 4/9/2021 7:40 AM			
	SSP sensor is located above the ceiling in Room 8011.	Scott Erlenbusch on 4/9/2021 12:48 PM			
YES 20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 4/9/2021 12:48 PM			
YES 21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 4/9/2021 12:48 PM			
BUILDING	PRESSURE SENSOR (IF APPLICABLE):				
<b>YES</b> 22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 4/9/2021 12:49 PM			



	High side was installed in elevator lobby on second floor and the low side is on the roof just outside AHU 1 mechanical room.	Scott Erlenbusch on 4/9/2021 12:53 PM		
YES 23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 4/9/2021 12:53 PM		
YES 24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 4/9/2021 12:53 PM		
FILTER PF	ESSURE SENSORS (IF APPLICABLE):			
N/A 25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 4/9/2021 7:37 AM		
N/A 26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 4/9/2021 7:37 AM		
N/A 27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 4/9/2021 7:37 AM		
SAFETY D	EVICES VERIFICATION:			
LOW LIMIT	SAFETY DEVICE:			
<b>YES</b> 28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 4/13/2021 1:09 PM		
	Strategic added 3 more LTD safeties and removed them from the 120 volt circuit.	Scott Erlenbusch on 4/13/2021 1:10 PM		
YES 29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 4/9/2021 7:37 AM		
WHEN TH	E LOW LIMIT SAFETY CIRCUIT IS TRIPPED			
<b>YES</b> 30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 4/9/2021 7:37 AM		
<b>YES</b> 31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 4/13/2021 1:10 PM		
YES 32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 4/9/2021 7:37 AM		
<b>YES</b> 33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 4/13/2021 1:10 PM		
	Heating coil did not open, it may be looking at MAT.	Scott Erlenbusch on 4/9/2021 7:37 AM		
SUPPLY P APPLICAB	LENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF LE):			
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 4/13/2021 1:15 PM		
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 4/13/2021 1:15 PM		
WHEN THI SWITCH IS	E SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY 5 TRIPPED			
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 4/13/2021 1:15 PM		
N/A 37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 4/13/2021 1:15 PM		
N/A 38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 4/13/2021 1:15 PM		
SUPPLY P	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
YES 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? Strategic installed a High static pressure switch and it trips at 4 inWC.	Scott Erlenbusch on 4/13/2021 1:13 PM Scott Erlenbusch on 4/13/2021 1:14 PM		
<b>YES</b> 40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 4/13/2021 1:15 PM		
WHEN THI TRIPPED.	E SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS			
YES 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 4/13/2021 1:15 PM		



YES 42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 4/13/2021 1:15 PM			
<b>YES</b> 43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 7/1/2021 1:58 PM			
	Code needs to be looked at.	Scott Erlenbusch on 4/13/2021 1:15 PM			
RETURN P APPLICABL	LENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):				
YES 44	Is the low suction pressure safety switch calibrated properly in order to not trip	Scott Erlenbusch on 4/13/2021 1:15 PM			
	Strategic installed a Low static cutout and it trips at 2.5 inWC.	Scott Erlenbusch on 4/13/2021 1:16 PM			
<b>YES</b> 45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 4/13/2021 1:16 PM			
WHEN THE SWITCH IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED				
<b>YES</b> 46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 4/13/2021 1:16 PM			
YES 47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 4/13/2021 1:16 PM			
YES 48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 7/1/2021 1:58 PM			
	Code needs to be looked at.	Scott Erlenbusch on 4/13/2021 1:16 PM			
RETURN P	LENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):				
N/A 49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 4/9/2021 7:37 AM			
N/A 50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 4/9/2021 7:37 AM			
WHEN THE TRIPPED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS				
N/A 51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 4/9/2021 7:37 AM			
N/A 52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 4/9/2021 7:37 AM			
N/A 53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 4/9/2021 7:37 AM			
FAN EQUIF	MENT VERIFICATION:				
SUPPLY FA	N:				
<b>YES</b> 54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 4/9/2021 7:37 AM			
<b>YES</b> 55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 4/9/2021 7:37 AM			
RETURN FAN: (IF APPLICABLE)					
<b>YES</b> 56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 4/9/2021 7:37 AM			
YES 57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 4/9/2021 7:37 AM			
MINIMUM OA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER VERIFICATION:					
NORMAL O	NORMAL OPERATION VERIFICATION:				
N/A 58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 4/9/2021 7:37 AM			
<b>YES</b> 59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 4/9/2021 7:37 AM			



YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 4/9/2021 7:37 AM		
YES	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 4/28/2021 11:02 AM		
		The bad damper actuator for the furthest OAD has been replaced.	Scott Erlenbusch on 4/28/2021 11:03 AM		
N/A	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 4/9/2021 7:37 AM		
HEAT	ING A	ND COOLING COILS VERIFICATION:			
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 4/9/2021 7:37 AM		
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 4/9/2021 7:37 AM		
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):			
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 4/9/2021 7:37 AM		
YES	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 4/9/2021 7:37 AM		
HUMI APPL	HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):				
humi humi air fi	DISTA DIFIEF LOW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.			
YES	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 4/9/2021 12:54 PM		
YES	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 4/9/2021 12:54 PM		
YES	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 4/9/2021 12:54 PM		
TEST	TEST COMPLETION VERIFICATION:				
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 4/9/2021 7:37 AM		

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### TST-6-1 CLOSED MODERATE

The MAT sensor is an averaging sensor but only covers the top half of the AHU. Please install (4) new mixed air averaging sensors and consult Optimized Systems for routing and wiring matrix to single input. Source Test 6, Attempt 1, Line 10

Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?

Asset 🧟 DRC1\_AHU 1 **Discipline** Controls Due Date 11/9/2020 Created By Scott Erlenbusch Identified On 10/26/2020 11:06 AM

Strategic installed new MAT averaging sensors. OS verified temperature. Scott Erlenbusch on 04/09/2021 at 12:55 PM

**Optimized Systems** 



#### IMG\_0222\_(1).jpg

## TST-6-2 CLOSED HIGH

Supply air temperature sensor not reporting the correct value. BAS=57.4 degrees. Fluke=52.2 degrees. Replace supply air temperature sensor and install in the supply duct right off the AHU. Source Test 6, Attempt 1, Line 13 Does the supply air temperature sensor report an acceptable value?

Asset 🧐 DRC1 AHU 1 **Discipline** Controls Due Date 11/9/2020 Created By Scott Erlenbusch Identified On 10/26/2020 12:27 PM

Strategic installed new SAT sensor and OS verified temperature. Scott Erlenbusch on 04/09/2021 at 12:55 PM **Optimized Systems** 



## TST-6-3 CLOSED HIGH

Do not see a supply high static pressure cutout switch installed. Please install Pressure switch and wire in to safety circuit. **Source** Test 6, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early? Asset 🍕 DRC1\_AHU 1 Discipline Controls Due Date 11/9/2020 Created By Scott Erlenbusch Identified On 10/26/2020 12:53 PM

Strategic installed and OS verified operation. Trips at 4 inWC. Scott Erlenbusch on 04/13/2021 at 01:20 PM Optimized Systems

## TST-6-4 CLOSED HIGH

Do not see a return low suction static pressure point in the panel and did not see any relief gates on the return plenum. Please install return low suction pressure switch and wire in to safety circuit. **Source** Test 6, Attempt 1, Line 44 Is the low suction pressure safety switch calibrated properly in order to not trip early? Asset 🌣 DRC1\_AHU 1 Discipline Controls Due Date 11/9/2020 Created By Scott Erlenbusch Identified On 10/26/2020 12:54 PM

Strategic installed and OS verified operation. Trips at 2.5 inWC. Scott Erlenbusch on 04/13/2021 at 01:20 PM Optimized Systems



### TST-6-5 CLOSED

Humidifier valve is a fail safe actuator and the humidifier isolation valve is as well. Fail safe needs to be verified when new humidifier safety sequence is installed.

**Source** Test 6, Attempt 1, Line 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed? Asset 🔅 DRC1\_AHU 1 Discipline Controls Due Date 11/9/2020 Created By Scott Erlenbusch Identified On 10/26/2020 1:04 PM

## Strategic installed new humidifier safeties and OS tested the operation. Humidifier valve fails closed when the safeties go in to alarm.

Scott Erlenbusch on 04/09/2021 at 12:57 PM Optimized Systems



Issue 2020-10-26 13:04:33 4404A984.jpg



Issue 2020-10-26 13:04:33 724C5CED.jpg

## TST-6-6 CLOSED

Humidistat and air flow switch have not been installed. Humidistat and air flow switch should be installed and wired per new humidifier safety sequence.

Source Test 6, Attempt 1, Line 67

Is the humidistat located between the humidity sensor and the smoke detector on the AHU?

Asset % DRC1\_AHU 1 Discipline Controls Due Date 11/9/2020 Created By Scott Erlenbusch Identified On 10/26/2020 1:11 PM

Strategic installed new humidifier safeties and OS tested the operation. Humidifier valve fails closed when the safeties go in to

#### alarm.

Scott Erlenbusch on 04/09/2021 at 12:57 PM Optimized Systems



## TST-6-7 CLOSED HIGH

Return static pressure is located on the suction side of the return fans. The relief damper DP is located between the relief and return damper sections. Both of these sensors are magnehelic transmitters. Not sure if the magnehelics are calibrated or reading correctly. OS to change programming so that the Relief DP is used for the RPP and verify that the sensor is plumbed properly.

Asset % DRC1\_AHU 1 Discipline Optimization Due Date 11/9/2020 Created By Scott Erlenbusch Identified On 10/26/2020 1:53 PM

Source Test 6, Attempt 1, Line 16

Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?

Control wires were disconnected from the old Rel Dp transmitter and connected to the New RPP sensor. OS verified the point setup and operation.

Scott Erlenbusch on 04/28/2021 at 10:58 AM Optimized Systems





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### TST-6-8 CLOSED

There are not enough low temperature detectors installed to cover the chilled water coil adequately. There are three installed but could use a couple more. Some of the issue may be where to install more LTD's on outside of unit.

Source Test 6, Attempt 1, Line 28

Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

Asset 🔅 DRC1\_AHU 1 Discipline Controls Due Date 11/9/2020 Created By Scott Erlenbusch Identified On 10/26/2020 2:15 PM

Strategic installed 3 more LTD safeties and removed them from the 120 volt circuit. All the safeties are now on 24 volt and utilize the RIB safety board. OS verified operation.

Scott Erlenbusch on 04/13/2021 at 01:22 PM Optimized Systems

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Issue 2020-10-26 14:12:52 026B39E2.jpg



Issue 2020-10-26 14:12:52 08BC36C7.jpg



Issue 2020-10-26 14:12:52 026DDC9E.jpg

## TST-6-9 CLOSED



Issue 2020-10-26 14:12:52 382908D1.jpg

Humidifier isolation valve is in operator commanded open. Source Test 6 DRC1\_AHU 1 - AHU - Humidifier/Optimization

Asset 🧐 DRC1\_AHU 1 Due Date 11/9/2020 Created By Scott Erlenbusch Identified On 10/26/2020 2:15 PM

#### This issue has been corrected by UNMC. Scott Erlenbusch on 11/11/2020 at 11:42 AM **Optimized Systems**

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## TST-6-10 CLOSED

Supply plenum pressure sensor is a magnehelic transmitter. Not sure if it has been calibrated or if it is reading correctly. Please verify supply pressure is reading correctly. Source Test 6

DRC1\_AHU 1 - AHU - Humidifier/Optimization

Asset 🔅 DRC1\_AHU 1 Discipline Controls Due Date 11/9/2020 Created By Scott Erlenbusch Identified On 10/26/2020 2:16 PM

Strategic installed a Belimo DP sensor and OS verified operation. 4-20mv, 0-6 inWC. Scott Erlenbusch on 04/13/2021 at 02:09 PM Optimized Systems

## TST-6-11 CLOSED HIGH

Return dampers furthest from access door do not close all the way when commanded closed. Source Test 6, Attempt 1, Line 61 Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS? Asset <sup>1</sup>% DRC1\_AHU 1 Discipline Controls Due Date 11/11/2020 Created By Scott Erlenbusch Identified On 10/28/2020 1:25 PM

Damper operation looked good when we tested 4-13-21. Scott Erlenbusch on 04/13/2021 at 01:23 PM Optimized Systems



Outdoor air damper furthest from the access door do not open all the way when commanded fully open. Please adjust damper and/or repair. **Source** Test 6, Attempt 1, Line 61 Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS? Asset State DRC1\_AHU 1 Discipline Controls Created By Scott Erlenbusch Identified On 10/28/2020 1:33 PM

Strategic replaced the damper actuator with the correct actuator and we tested operation. Scott Erlenbusch on 04/28/2021 at 10:59 AM Optimized Systems

A new damper actuator was installed but it is a 95 second actuator and the old one was a 150 second actuator. Had to do this to get damper to work for the time being. When correct damper arrives it will need to be changed.

Scott Erlenbusch on 04/13/2021 at 01:27 PM Optimized Systems



### TST-6-13 CLOSED HIGH

Supply and return fans will run in hand and bypass when the safeties on the unit are in alarm. Source Test 6, Attempt 1, Line 31 Are the supply and return fan VFD's prohibited from running in hand or bypass? Asset 🔅 DRC1\_AHU 1 Discipline Controls Due Date 11/11/2020 Created By Scott Erlenbusch Identified On 10/28/2020 2:28 PM

Strategic wired the new safety board and wired the start enable to the drives. The drives now will not run when a safety is tripped. OS verified operation.

Scott Erlenbusch on 04/13/2021 at 01:24 PM Optimized Systems

## TST-6-14 OPEN HIGH

Heating coil did not open on LTD, it may be looking at MAT. This may not be an issue but wanted to note. Please verify programming will protect the coils.

**Source** Test 6, Attempt 1, Line 33 Does the heating coil become open? (If applicable) Asset % DRC1\_AHU 1 Discipline Optimization Due Date 11/11/2020 Created By Scott Erlenbusch Identified On 10/28/2020 2:29 PM

## TST-6-15 CLOSED HIGH

Return fan 1 isolation damper does not open as quickly Return fan 2 isolation damper causing Return fan 2 to start before 1 and then 1 would fault out. The end switches on return isolation dampers should be wired in series so that both return fans start at same time. **Source** Test 6, Attempt 1, Line 56 Does the return fan start and stop when commanded by the BAS? Asset S DRC1\_AHU 1 Discipline Controls Due Date 11/11/2020 Created By Scott Erlenbusch Identified On 10/28/2020 3:02 PM

Strategic wired the end switches to the 24 volt system and now all dampers have to be open before starting. Scott Erlenbusch on 04/13/2021 at 01:25 PM Optimized Systems

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## TST-6-16 CLOSED MODERATE

Not sure where the supply static pressure sensor is located. This will need to be found and setup verified. Source Test 6, Attempt 1, Line 19

Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?

Asset 🔅 DRC1\_AHU 1 Discipline Controls Due Date 11/12/2020 Created By Scott Erlenbusch Identified On 10/29/2020 8:23 AM

Supply static pressure appears to be reading correctly and the AHU is controlling to this sensor. Did not physically verify sensor but does appear to be working correctlyl.

Scott Erlenbusch on 11/13/2020 at 07:41 AM Optimized Systems

### TST-6-17 CLOSED HIGH

There is no building static pressure sensor installed. Ashcroft building static pressure sensor needs to be installed. Coordinate with Optimized Systems. **Source** Test 6, Attempt 1, Line 22 Is the building pressure sensor installed in the best location possible for the areas served by the unit?

Asset % DRC1\_AHU 1 Discipline Controls Due Date 11/27/2020 Created By Scott Erlenbusch Identified On 11/13/2020 9:44 AM

Strategic has installed a new building static pressure sensor. High side is located in 2nd floor elevator lobby and low side is on the roof just outside the AHU 1 mechanical room.

Scott Erlenbusch on 04/09/2021 at 01:00 PM Optimized Systems



# **#7 DRC1\_AHU 4 - AHU -**Humidifier/Optimization

Optimized Systems | UNMC Humidifier/Optimization | 20-185







YES	7	Is the return air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 10/27/2020 1:49 PM		
MIXED	AIR	(ECONOMIZER) TEMPERATURE SENSORS:			
NO	8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/28/2020 8:48		
		BAS=72 degrees, Fluke=68 degrees.	Scott Erlenbusch on 10/28/2020 8:56		
		1 Issue: TST-7-5	7 чүт		
YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 10/28/2020 8:58 AM		
YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 10/28/2020 8:58 AM		
SUPPI	ly Aif	R HUMIDITY SENSOR VERIFICATION:			
YES	11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 10/28/2020 9:04 AM		
		BAS=6.7% RH, Amprobe=9.6% RH	Scott Erlenbusch on 10/28/2020 9:05 AM		
YES	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 10/28/2020 9:04 AM		
		Humidity sensor is 25' downstream of the humidifier. It is located next to the duct detector and there are two coils that are located in between the humidifier and sensor.	Scott Erlenbusch on 10/28/2020 9:07 AM		
SUPPL	LY AIF	R TEMPERATURE SENSORS:			
YES	13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/28/2020 9:02 AM		
		BAS=93 degrees, Amprobe=92 degrees.	Scott Erlenbusch on 10/28/2020 9:02 AM		
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 10/28/2020 9:03 AM		
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 10/28/2020 9:03 AM		
		Supply temperature sensor is an averaging sensor.	Scott Erlenbusch on 10/28/2020 9:04 AM		
STATI	C ANI	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:			
RETUR	RN PL	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):			
N/A	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 10/28/2020 9:27		
		No return fan	Scott Erlenbusch on 10/28/2020 9:27 AM		
N/A	17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/28/2020 9:27 AM		
N/A	18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/28/2020 9:27 AM		
SUPPL	SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):				
YES	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 10/28/2020 9:28 AM		
		Supply static pressure sensor is installed on the supply chamber of AHU. Single Zone unit.	Scott Erlenbusch on 10/28/2020 9:28 AM		



YES	20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/28/2020 9:30 AM
YES	21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/28/2020 9:30 AM
BUILD	DING F	PRESSURE SENSOR (IF APPLICABLE):	
YES	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 10/28/2020 9:33 AM
NO	23	Is the building pressure sensor reporting an acceptable value? 2 Issues: TST-7-7   TST-7-6	Scott Erlenbusch on 10/28/2020 9:33 AM
YES	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/28/2020 9:48 AM
FILTE	R PRE	ESSURE SENSORS (IF APPLICABLE):	
N/A	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 10/28/2020 9:50 AM
N/A	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 10/28/2020 9:50 AM
N/A	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 10/28/2020 9:50 AM
SAFE	TY DE	VICES VERIFICATION:	
LOW I	LIMIT	SAFETY DEVICE:	
YES	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil? 1 Issue: TST-7-11	Scott Erlenbusch on 10/28/2020 10:33 AM
YES	29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 10/28/2020 12:14
WHEN THE LOW LIMIT SAFETY CIRCUIT IS TRIPPED			
WHEN	N THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED	1 101
WHEN YES	N THE 30	LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/28/2020 12:14 PM
WHEN YES	N THE 30 31	LOW LIMIT SAFETY CIRCUIT IS TRIPPED         Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:14 PM
WHEN YES	N THE 30 31	LOW LIMIT SAFETY CIRCUIT IS TRIPPED         Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?         1 Issue: TST-7-12	Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:14 PM
WHEN YES NO YES	30 31 32	LOW LIMIT SAFETY CIRCUIT IS TRIPPED         Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?         1 Issue: TST-7-12         Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:15 PM
WHEN YES NO YES	30 31 32 33	LOW LIMIT SAFETY CIRCUIT IS TRIPPED         Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?         1 Issue: TST-7-12         Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? (If applicable)	Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:15 PM Scott Erlenbusch on 10/28/2020 12:15 PM
WHEN YES NO YES	N THE 30 31 32 33	LOW LIMIT SAFETY CIRCUIT IS TRIPPED         Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?         1 Issue: TST-7-12         Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?         Does the heating coil become open? (If applicable)         Preheat coil opened but the face/bypass had not opened yet.	Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:15 PM Scott Erlenbusch on 10/28/2020 12:15 PM
WHEN YES NO YES YES	30 31 32 33 33 LY PL	LOW LIMIT SAFETY CIRCUIT IS TRIPPED         Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?         1 Issue: TST-7-12         Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?         Does the heating coil become open? (If applicable)         Preheat coil opened but the face/bypass had not opened yet.         ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:15 PM Scott Erlenbusch on 10/28/2020 12:15 PM
WHEN YES NO YES YES SUPP APPLI	N THE 30 31 32 33 ILY PL ICABL 34	LOW LIMIT SAFETY CIRCUIT IS TRIPPED         Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?         1 Issue: TST-7-12         Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? (If applicable)         Does the heating coil become open? (If applicable)         Preheat coil opened but the face/bypass had not opened yet.         ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):         Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:15 PM Scott Erlenbusch on 10/28/2020 12:15 PM Scott Erlenbusch on 10/28/2020 12:16 PM
<ul> <li>WHEN</li> <li>YES</li> <li>NO</li> <li>YES</li> <li>YES</li> <li>SUPP</li> <li>APPLI</li> <li>N/A</li> <li>N/A</li> </ul>	N THE 30 31 32 33 LY PL ICABL 34 35	LOW LIMIT SAFETY CIRCUIT IS TRIPPED         Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?         1 Issue: TST-7-12         Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?         Does the heating coil become open? (If applicable)         Preheat coil opened but the face/bypass had not opened yet.         ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):         Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)         Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:15 PM Scott Erlenbusch on 10/28/2020 12:15 PM Scott Erlenbusch on 10/28/2020 12:16 PM Scott Erlenbusch on 10/28/2020 9:50 AM
WHEN YES NO YES YES SUPP APPLI N/A N/A WHEN SWITC	N THE 30 31 32 33 33 LY PL ICABL 34 35 N THE CH IS	LOW LIMIT SAFETY CIRCUIT IS TRIPPED         Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?         1 Issue: TST-7-12         Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?         Does the heating coil become open? (If applicable)         Preheat coil opened but the face/bypass had not opened yet.         ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF         D: s the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)         Is the low Suction Pressure Safety Switch Installed before the supply fan?         SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY	Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:15 PM Scott Erlenbusch on 10/28/2020 12:16 PM Scott Erlenbusch on 10/28/2020 12:16 PM
WHEN YES NO YES YES SUPP APPLI N/A N/A WHEN SWITC N/A	N THE 30 31 32 33 33 LY PL ICABL 34 35 N THE CH IS 36	LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? 1 Issue: TST-7-12 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? (If applicable) Does the heating coil become open? (If applicable) Preheat coil opened but the face/bypass had not opened yet. ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.) Is the low Suction Pressure Safety Switch Installed before the supply fan? SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY PrippeD Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:14 PM Scott Erlenbusch on 10/28/2020 12:15 PM Scott Erlenbusch on 10/28/2020 12:15 PM Scott Erlenbusch on 10/28/2020 12:16 PM Scott Erlenbusch on 10/28/2020 9:50 AM Scott Erlenbusch on 10/28/2020 9:50 AM

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N/A	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/28/2020 9:50 AM
N/A	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/28/2020 9:50 AM
SUPPI	LY PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
N/A	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 11/13/2020 7:44 AM
N/A	40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 10/28/2020 9:57 AM
WHEN TRIPP	I THE ED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS	
N/A	41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/28/2020 9:57 AM
N/A	42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/28/2020 9:57 AM
N/A	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/28/2020 9:57 AM
RETUI APPLI	RN PL CABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	
N/A	44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/28/2020 9:57 AM
N/A	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 10/28/2020 9:57 AM
WHEN SWITC	I THE CH IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	
N/A	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/28/2020 9:57 AM
N/A	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/28/2020 9:57 AM
N/A	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/28/2020 9:57 AM
RETU	rn Pl	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/28/2020 9:57 AM
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 10/28/2020 9:57 AM
WHEN THE RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED			
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/28/2020 9:57 AM
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/28/2020 9:57 AM
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/28/2020 9:57 AM
FAN EQUIPMENT VERIFICATION:			
SUPPLY FAN:			
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/28/2020 10:39 AM

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YES 55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/28/2020 10:39 AM	
RETURN FAN: (IF APPLICABLE)			
N/A 56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/28/2020 10:39 AM	
N/A 57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/28/2020 10:39 AM	
MINIMUM ( VERIFICAT	DA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ION:		
NORMAL O	PERATION VERIFICATION:		
YES 58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/28/2020 10:08 AM	
<b>YES</b> 59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/28/2020 11:12 AM	
<b>YES</b> 60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 10/28/2020 11:12 AM	
<b>YES</b> 61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 10/28/2020 11:12 AM	
N/A 62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 10/28/2020 11:12 AM	
HEATING A	ND COOLING COILS VERIFICATION:		
<b>YES</b> 63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/28/2020 11:12 AM	
<b>YES</b> 64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/28/2020 11:12 AM	
HUMIDIFIE	R VERIFICATION (IF APPLICABLE):		
<b>YES</b> 65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 10/28/2020 10:05 AM	
	Humidifier was in operator 0% when I arrived at unit. I left the humidifier off because it was not controlling to its setpoint.	Scott Erlenbusch on 10/28/2020 10:06 AM	
	2 Files: IMG_0256.heic   IMG_0257.heic		
<b>YES</b> 66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 10/28/2020 10:06 AM	
HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):			
HUMIDISTAT AND AIRFLOW SWITCH ARE USED TO SHUT THE HUMIDIFIER VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR AIR FLOW SWITCH IS NOT CLOSED.			
NO 67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU? 1 Issue: TST-7-9	Scott Erlenbusch on 10/28/2020 10:06 AM	
NO 68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 10/28/2020 10:08 AM	
NO 69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 10/28/2020 10:08 AM	
TEST COM	PLETION VERIFICATION:		
<b>YES</b> 70	Have all overrides on the AHU been released?	Scott Erlenbusch on 10/28/2020 12:16 PM	

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Attemp	ot N		Status set by Scott Erlenbusch on 6/4/2021.
AIR HAN	IDLI	NG UNIT - SYSTEM DEFICIENCIES TEST.	
THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.			
IF A SENSOR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR APPLICABLE MARK THE TEST ANSWER AS N/A. USE NOTES AND COMMENTS AS OFTEN AS NECESSARY.			
SENSOR	R VE	RIFICATION:	
OUTDOC APPLICA	or 1 Able	EMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E):	
YES 1		Does the outdoor humidity sensor report an acceptable value?	Scott Erlenbusch on 6/4/2021 8:45 AM
		BAS=38% RH, NWS=46%.	Scott Erlenbusch on 6/4/2021 8:45 AM
YES 2		Does the outdoor temperature report an acceptable value?	Scott Erlenbusch on 6/4/2021 8:45 AM
		BAS=34.9 degrees, NWS=36 degrees.	Scott Erlenbusch on 6/4/2021 8:45 AM
YES 3		Document if these sensors are locally wired to the controller, or if they are global values.	Scott Erlenbusch on 6/4/2021 8:45 AM
		There is a point in panel 202 for AHU 1 OAT. The points on the graphic are virtua points.	Scott Erlenbusch on 6/4/2021 8:45 AM
RETURN	I AIF	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):	
YES 4		Does the return air humidity sensor report an acceptable value? BAS=35.5% RH, Amprobe=42% RH	Scott Erlenbusch on 6/4/2021 8:45 AM Scott Erlenbusch on 6/4/2021 8:45 AM
RETURN	I AIF	R TEMPERATURE SENSOR VERIFICATION:	
YES 5		Does the return air temperature sensor report an acceptable value?	Scott Erlenbusch on 6/4/2021 8:48 AM
YES 6		Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?	Scott Erlenbusch on 6/4/2021 8:45 AM
YES 7		Is the return air temperature sensor probe the proper length for the size of duct it i installed in?	s Scott Erlenbusch on 6/4/2021 8:45 AM
MIXED A	AR (	ECONOMIZER) TEMPERATURE SENSORS:	
YES 8		Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 6/4/2021 8:48 AM
YES 9		Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 6/4/2021 8:45 AM
YES 10	)	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 6/4/2021 8:45 AM
SUPPLY AIR HUMIDITY SENSOR VERIFICATION:			
<b>YES</b> 11	1	Does the supply air humidity sensor report an acceptable value? BAS=6.7% RH, Amprobe=9.6% RH	Scott Erlenbusch on 6/4/2021 8:45 AM Scott Erlenbusch on 6/4/2021 8:45 AM
YES 12	2	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 6/4/2021 8:45 AM
		Humidity sensor is 25' downstream of the humidifier. It is located next to the duct detector and there are two coils that are located in between the humidifier and sensor.	Scott Erlenbusch on 6/4/2021 8:45 AM
SUPPLY	AIR	TEMPERATURE SENSORS:	

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YES	13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 6/4/2021 8:45 AM	
		BAS=93 degrees, Amprobe=92 degrees.		
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 6/4/2021 8:45 AM	
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 6/4/2021 8:45 AM	
		Supply temperature sensor is an averaging sensor.	Scott Erlenbusch on 6/4/2021 8:45 AM	
STAT	IC ANI	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:		
RETU	RN PL	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):		
N/A	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 6/4/2021 8:45 AM	
		No return fan	Scott Erlenbusch on 6/4/2021 8:45 AM	
N/A	17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 6/4/2021 8:45 AM	
N/A	18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 6/4/2021 8:45 AM	
SUPP	LY DU	ICT STATIC PRESSURE SENSOR (IF APPLICABLE):		
YES	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 6/4/2021 8:45 AM	
		Supply static pressure sensor is installed on the supply chamber of AHU. Single Zone unit.	Scott Erlenbusch on 6/4/2021 8:45 AM	
YES	20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 6/4/2021 8:45 AM	
YES	21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 6/4/2021 8:45 AM	
BUILD	DING F	PRESSURE SENSOR (IF APPLICABLE):		
YES	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 6/4/2021 8:45 AM	
YES	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 6/8/2021 7:36 AM	
		New Ashcroft sensor installed.	Scott Erlenbusch on 6/8/2021 7:36 AM	
YES	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 6/4/2021 8:45 AM	
FILTE	R PRE	ESSURE SENSORS (IF APPLICABLE):		
N/A	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 6/4/2021 8:45 AM	
N/A	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 6/4/2021 8:45 AM	
N/A	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 6/4/2021 8:45 AM	
SAFETY DEVICES VERIFICATION:				
LOW LIMIT SAFETY DEVICE:				
YES	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 6/4/2021 8:45 AM	
YES	29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 6/4/2021 8:45 AM	
WHEN THE LOW LIMIT SAFETY CIRCUIT IS TRIPPED				
YES	30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 6/4/2021 8:45 AM	
YES	31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 6/4/2021 9:00 AM	
YES	32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 6/4/2021 8:45 AM	

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YES 33	Does the heating coil become open? (If applicable) Preheat coil opened but the face/bypass had not opened yet.	Scott Erlenbusch on 6/4/2021 8:45 AM Scott Erlenbusch on 6/4/2021 8:45 AM	
SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):			
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 6/4/2021 8:45 AM	
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 6/4/2021 8:45 AM	
WHEN THE SWITCH IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED		
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 6/4/2021 8:45 AM	
N/A 37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 6/4/2021 8:45 AM	
N/A 38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 6/4/2021 8:45 AM	
SUPPLY PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):		
YES 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? Tripped at 4 inWC.	Scott Erlenbusch on 6/4/2021 9:01 AM Scott Erlenbusch on 6/4/2021 9:01 AM	
YES 40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 6/4/2021 9:01 AM	
WHEN THE TRIPPED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS		
<b>YES</b> 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 6/4/2021 9:02 AM	
YES 42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 6/4/2021 9:02 AM	
<b>YES</b> 43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 6/4/2021 9:02 AM	
	Programming should be verified when installed.	Scott Erlenbusch on 6/4/2021 9:02 AM	
RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):			
<b>YES</b> 44	Is the low suction pressure safety switch calibrated properly in order to not trip	Scott Erlenbusch on 6/4/2021 9:03 AM	
	Tripped at 2.5 inWC.	Scott Erlenbusch on 6/4/2021 9:03 AM	
<b>YES</b> 45	Is the low suction pressure safety switch installed before the return fan? No return fan, but is located in return plenum.	Scott Erlenbusch on 6/4/2021 9:03 AM Scott Erlenbusch on 6/4/2021 9:04 AM	
WHEN THE RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED			
<b>YES</b> 46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 6/4/2021 9:04 AM	
<b>YES</b> 47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 6/4/2021 9:04 AM	
YES 48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 6/4/2021 9:04 AM	
	New programming needs to be verified.	Scott Erlenbusch on 6/4/2021 9:04 AM	
RETURN PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
N/A 49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 6/4/2021 8:45 AM	


N/A 50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 6/4/2021 8:45 AM	
WHEN THE RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED			
N/A 51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 6/4/2021 8:45 AM	
N/A 52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 6/4/2021 8:45 AM	
N/A 53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 6/4/2021 8:45 AM	
FAN EQUIF	MENT VERIFICATION:		
SUPPLY F	AN:		
<b>YES</b> 54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 6/4/2021 8:45 AM	
<b>YES</b> 55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 6/4/2021 8:45 AM	
RETURN F	AN: (IF APPLICABLE)		
N/A 56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 6/4/2021 8:45 AM	
N/A 57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 6/4/2021 8:45 AM	
MINIMUM ( VERIFICAT	DA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ION:		
NORMAL C	PERATION VERIFICATION:		
<b>YES</b> 58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 6/4/2021 8:45 AM	
<b>YES</b> 59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 6/4/2021 8:45 AM	
<b>YES</b> 60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 6/4/2021 8:45 AM	
<b>YES</b> 61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 6/4/2021 8:45 AM	
N/A 62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 6/4/2021 8:45 AM	
HEATING A	ND COOLING COILS VERIFICATION:		
<b>YES</b> 63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 6/4/2021 8:45 AM	
<b>YES</b> 64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 6/4/2021 8:45 AM	
HUMIDIFIE	R VERIFICATION (IF APPLICABLE):		
<b>YES</b> 65	Is the humidifier valve actuator a fail safe actuator and does it fail closed? Humidifier was in operator 0% when I arrived at unit. I left the humidifier off because it was not controlling to its setpoint.	Scott Erlenbusch on 6/4/2021 8:45 AM Scott Erlenbusch on 6/4/2021 8:45 AM	
<b>YES</b> 66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 6/4/2021 8:45 AM	
HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):			
HUMIDISTAT AND AIRFLOW SWITCH ARE USED TO SHUT THE HUMIDIFIER VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR AIR FLOW SWITCH IS NOT CLOSED.			

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#### #7 DRC1\_AHU 4 - AHU - Humidifier/Optimization | Optimized Systems | UNMC Humidifier/Optimization | 20-185

YES	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 6/4/2021 9:05 AM
YES	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 6/4/2021 9:05 AM
YES	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 6/4/2021 9:06 AM
TEST	COMF	PLETION VERIFICATION:	
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 6/4/2021 8:45 AM

Issues 10

#### TST-7-1 CLOSED HIGH

Return air temperature sensor is not reading correctly. Sensor needs to be replaced. Source Test 7, Attempt 1, Line 5

Does the return air temperature sensor report an acceptable value?

Asset 🔅 DRC1\_AHU 4 Discipline Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 1:48 PM

#### Strategic replace return temp sensor.

Scott Erlenbusch on 06/04/2021 at 08:51 AM Optimized Systems

# TST-7-2 OPEN HIGH

Humidity sensor in the space is not reading correctly. Space humidity setpoint was 40% RH and the BAS was reporting 40% RH in the space. The actual space humidity level was 60% RH. The humidity in the space was 10-15% higher in the back of the auditorium than it was in the front. Measured with Amprobe humidity sensor. Sensor will need to be replaced. **Source** Test 7 DRC1\_AHU 4 - AHU - Humidifier/Optimization Asset 🔅 DRC1\_AHU 4 Discipline Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 3:10 PM

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## TST-7-3 OPEN HIGH

There are two smoke dampers that are closed on the two return ducts that go down through the floor. Source Test 7 DRC1\_AHU 4 - AHU - Humidifier/Optimization Asset % DRC1\_AHU 4 Discipline Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 3:11 PM



Issue\_TST-7-3\_2020-10-28\_10\_16\_41\_(1).jpg



Issue\_TST-7-3\_2020-10-28\_10\_16\_41.jpg



MAT sensor needs re-secured in one place. Source Test 7, Attempt 1, Line 8 Does the mixed air temperature sensor report an acceptable value? Asset 🔅 DRC1\_AHU 4 Discipline Controls Created By Scott Erlenbusch Identified On 10/28/2020 8:58 AM

MAT sensor has been secured. Scott Erlenbusch on 06/08/2021 at 07:42 AM Optimized Systems

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#### TST-7-6 CLOSED MODERATE

Using magnehelic pressure transmitter for building pressure. The magnehelic is reading 0 and the BAS is reading -.06. Please verify sensor setup and if it is working correctly. **Source** Test 7, Attempt 1, Line 23 Is the building pressure sensor reporting an acceptable value? Asset 🔅 DRC1\_AHU 4 Discipline Controls Due Date 11/11/2020 Created By Scott Erlenbusch Identified On 10/28/2020 9:35 AM

New Ashcroft sensor installed for the BSP. Scott Erlenbusch on 06/08/2021 at 07:38 AM Optimized Systems



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#### TST-7-7 OPEN MODERATE

Low side of building pressure sensor is ran in to a drain vent that goes up to the roof. Could not verify if the low side is actually making it outside the building.

**Source** Test 7, Attempt 1, Line 23 Is the building pressure sensor reporting an acceptable value?

Asset 🔅 DRC1\_AHU 4 Discipline Controls Due Date 11/11/2020 Created By Scott Erlenbusch Identified On 10/28/2020 9:46 AM



lssue\_TST-7-7\_2020-10-28\_10\_14\_04.jpg

# TST-7-9 CLOSED HIGH

There is no humidistat or air flow switch installed. These need to be installed per the new humidifier safety sequence. Humidifier valve and new safeties need to be tested once sequence implemented. **Source** Test 7, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU? Asset 🔅 DRC1\_AHU 4 Discipline Controls Due Date 11/11/2020 Created By Scott Erlenbusch Identified On 10/28/2020 10:08 AM

High humidity cutout and air flow switch safeties have been installed and tested. Scott Erlenbusch on 06/04/2021 at 08:54 AM Optimized Systems

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# TST-7-10 OPEN HIGH

Unit heater for South end of AHU 4 mechanical room does not appear to be heating. Thermostat set at 60 degrees and the space temp is 50 degrees. Fan is on but valve does not appear to be open. **Source Test 7** DRC1\_AHU 4 - AHU - Humidifier/Optimization Asset 🌣 DRC1\_AHU 4 Discipline Controls Due Date 11/11/2020 Created By Scott Erlenbusch Identified On 10/28/2020 10:25 AM

# TST-7-11 CLOSED HIGH

Recommend to re-route the LTD sensor so that there is better coverage on the lower chilled water coil. May want to replace sensor if we are going to re-route.

Source Test 7, Attempt 1, Line 28

Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

Asset % DRC1\_AHU 4 Discipline Controls Due Date 11/11/2020 Created By Scott Erlenbusch Identified On 10/28/2020 10:34 AM

#### Strategic added another LTD and OS tested operation.

Scott Erlenbusch on 06/04/2021 at 08:56 AM Optimized Systems



Issue 2020-10-28 10:34:25.jpg



#### TST-7-12 CLOSED HIGH

Drive would not run in hand but would run in bypass. Please make sure drive is not able to run in bypass when safeties are tripped. **Source** Test 7, Attempt 1, Line 31 Are the supply and return fan VFD's prohibited from running in hand or bypass? Asset 🔅 DRC1\_AHU 4 Discipline Controls Due Date 11/11/2020 Created By Scott Erlenbusch Identified On 10/28/2020 12:15 PM

Strategic wired the safety circuit to the supply drive. When a safety trips the drive interlock opens and drive is not permitted to run. Scott Erlenbusch on 06/08/2021 at 07:39 AM Optimized Systems

VFD drive and bypass will not run when any of the safeties are tripped. If the bypass was turned On when AHU was vacant, the bypass would come on with the isolation dampers closed. If this would happen the high static cutout should trip and shut bypass off.

Scott Erlenbusch on 06/04/2021 at 09:00 AM Optimized Systems

#### Photos 2



IMG\_0256.heic Line 65



IMG\_0257.heic Line 65



# **#8 DRC2\_AHU 1 - AHU -**



Optimized Systems | UNMC Humidifier/Optimization | 20-185



INCOMPLETE	80% Yes   0% No   20% N/A	14 ISSUES
		Assigned To Optimized Systems Asset 🌣 DRC2_AHU 1
Attempts		
Attempt N	No. 1 FAILED	Status set by Scott Erlenbusch on 10/29/2020.
AIR HANDL	NG UNIT - SYSTEM DEFICIENCIES TEST.	
THESE TES EQUIPMEN OVERALL C PRACTICES	TS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH T OPERATION, SENSOR VERIFICATION, AS WELL AS CONTROL SYSTEM DESIGN AND INSTALLATION 3.	
IF A SENSO APPLICABL COMMENTS	R, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY.	
SENSOR VE	ERIFICATION:	
OUTDOOR APPLICABL	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E):	
NO 1	Does the outdoor humidity sensor report an acceptable value?	Scott Erlenbusch on 10/27/2020 8:06
	BAS=64% RH, NWS=88% RH	Scott Erlenbusch on 10/27/2020 8:10
	1 Issue: TST-8-1	
YES 2	Does the outdoor temperature report an acceptable value?	Scott Erlenbusch on 10/27/2020 8:11
	BAS=24 degrees, NWS=20 degrees.	Scott Erlenbusch on 10/27/2020 8:11 AM
YES 3	Document if these sensors are locally wired to the controller, or if they are glues	obal Scott Erlenbusch on 10/27/2020 8:12
	There is a local point in the panel 201 for the OAT, but no point in panel for Both of the points on the graphic are virtual points for AHU 1.	OAH. Scott Erlenbusch on 10/27/2020 8:13 AM
RETURN AI	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):	
YES 4	Does the return air humidity sensor report an acceptable value?	Scott Erlenbusch on 10/27/2020 8:24
	BAS=17.6%, Amprobe=18%.	Scott Erlenbusch on 10/27/2020 8:25 AM
RETURN AI	R TEMPERATURE SENSOR VERIFICATION:	
YES 5	Does the return air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/27/2020 8:32
	BAS=73.3 degrees, Fluke=72.7 degrees, It looks like an Athena era sensor	Scott Erlenbusch on 10/27/2020 8:34
YES 6	Is the return air temperature sensor installed in the return air plenum and no the outdoor air or relief air plenums?	t near Scott Erlenbusch on 10/27/2020 8:34 AM

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YES 7	Is the return air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 10/27/2020 8:35 AM
	6" probe. appears to be reading correctly.	Scott Erlenbusch on 10/27/2020 8:36 AM
MIXED AIR	(ECONOMIZER) TEMPERATURE SENSORS:	
YES 8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/27/2020 8:48
	BAS=73.4 degrees, Fluke=71.7 degrees.	Scott Erlenbusch on 10/27/2020 8:49
		7
YES 9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 10/27/2020 8:50 AM
YES 10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 10/27/2020 8:50 AM
	MAT averaging sensor covers the top 2/3 of the AHU cabin. The return dampers in the cabin before are located in the top half of the AHU.	Scott Erlenbusch on 10/27/2020 8:52 AM
	6 Files: IMG_0236.heic   IMG_0237.heic   IMG_0238.heic   IMG_0239.heic   IMG_0240.heic	IMG_0241.heic
SUPPLY AI	R HUMIDITY SENSOR VERIFICATION:	
YES 11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 10/27/2020 9:03
	BAS=36.4% RH, Amprobe=31.8% RH.	Scott Erlenbusch on 10/27/2020 9:04 AM
<b>YES</b> 12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor	Scott Erlenbusch on 10/27/2020 9:07
	Humidity sensor is located 5' down stream from the humidifier and after the cooling coil.	Scott Erlenbusch on 10/27/2020 9:07 AM
SUPPLY AI	R TEMPERATURE SENSORS:	
YES 13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/27/2020 9:13
	BAS=59.1 degrees, Fluke=58.4 degrees.	AM Scott Erlenbusch on 10/27/2020 9:14
		7 NVI
YES 14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 10/27/2020 9:14 AM
YES 15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 10/27/2020 9:14 AM
	6" probe. Athena era sensor.	Scott Erlenbusch on 10/27/2020 9:15 AM
STATIC AN	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:	
RETURN P	LENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	
NO 16	Is the return plenum pressure sensor installed between the relief air and return air	Scott Erlenbusch on 10/27/2020 9:37
	damper sections, and after the return fan?	AM Scott Erlenbusch on 10/27/2020 9:41
	fans and a relief DP magnehelic transmitter installed after the return fan in the relief plenum. The relief DP high and low side are on either side of the relief damper. New pressure sensors may need to be installed and plumbed to the correct area to get proper return plenum static.	AM
	1 Issue: TST-8-2	
NO 17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/27/2020 9:43 AM
NO 18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/27/2020 9:43 AM



SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):			
YES	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 10/27/2020 9:51 AM
		Located above ceiling in RM 8099E (Corridor)	Scott Erlenbusch on 10/27/2020 9:51 AM
YES	20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/29/2020 12:57 PM
YES	21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/29/2020 12:57 PM
BUILDI	NG P	RESSURE SENSOR (IF APPLICABLE):	
NO	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 11/13/2020 9:47 AM
		Did not see a building pressure point in panel 201.	Scott Erlenbusch on 10/27/2020 9:59 AM
		1 Issue: TST-8-15	
N/A	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/27/2020 9:59 AM
N/A	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/27/2020 9:59 AM
FILTER	R PRE	ESSURE SENSORS (IF APPLICABLE):	
N/A	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 10/27/2020 10:02
		There are magnehelics across both filter banks but they are not transmitters.	Scott Erlenbusch on 10/27/2020 10:02 AM
N/A	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 10/27/2020 10:02 AM
N/A	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 10/27/2020 10:02 AM
SAFET	Y DE	VICES VERIFICATION:	
LOW LI	іміт :	SAFETY DEVICE:	
NO	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil? 1 Issue: TST-8-3	Scott Erlenbusch on 10/27/2020 10:05 AM
YES	29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 10/29/2020 2:02 PM
WHEN	THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED	
YES	30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/29/2020 2:02 PM
NO	31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/29/2020 2:02 PM
		1 Issue: TST-8-11	
YES	32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? 1 Issue: TST-8-13	Scott Erlenbusch on 10/29/2020 2:04 PM
NO	33	Does the heating coil become open? (If applicable) 1 Issue: TST-8-12	Scott Erlenbusch on 10/29/2020 2:04 PM
SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF			
APPLICABLE):			

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N/A	34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 10/27/2020 10:11 AM	
N/A	35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 10/27/2020 10:11 AM	
WHEN SWITC	THE H IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED		
N/A	36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/27/2020 10:11 AM	
N/A	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/27/2020 10:11 AM	
N/A	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/27/2020 10:11 AM	
SUPPL	Y PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):		
NO	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/27/2020 10:15 AM	
		1 Issue: ISI-8-4		
N/A	40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 10/27/2020 10:16 AM	
WHEN TRIPPI	THE ED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS		
N/A	41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/27/2020 10:16 AM	
N/A	42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/27/2020 10:16 AM	
N/A	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/27/2020 10:16 AM	
RETUF APPLIC	RN PL CABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):		
NO	44	Is the low suction pressure safety switch calibrated properly in order to not trip early? 1 Issue: TST-8-5	Scott Erlenbusch on 10/27/2020 10:16 AM	
N/A	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 10/27/2020 10:18 AM	
WHEN SWITC	THE H IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED		
N/A	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/27/2020 10:18 AM	
N/A	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/27/2020 10:18 AM	
N/A	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/27/2020 10:18 AM	
RETURN PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):				
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/27/2020 10:18 AM	
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 10/27/2020 10:18 AM	
WHEN TRIPPI	THE ED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS		

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N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/27/2020 10:18 AM	
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/27/2020 10:18 AM	
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/27/2020 10:18 AM	
FAN E	QUIP	MENT VERIFICATION:		
SUPP	LY FA	N:		
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/29/2020 2:06 PM	
		1 Issue: TST-8-10		
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/29/2020 12:57 PM	
RETU	RN FA	N: (IF APPLICABLE)		
YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/29/2020 2:06 PM	
_		1 ISSUE: I S I-8-14		
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/29/2020 10:54 AM	
MINIM VERIF	IUM O FICATI	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:		
NORM	/AL O	PERATION VERIFICATION:		
N/A	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/27/2020 10:21 AM	
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/29/2020 2:08 PM	
		All dampers were closed when on site Tuesday. The return was full open.	Scott Erlenbusch on 10/27/2020 10:23 AM	
YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 10/29/2020 2:08 PM	
YES	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 10/29/2020 2:08 PM	
YES	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 10/29/2020 2:08 PM	
HEAT	ING A	ND COOLING COILS VERIFICATION:		
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/29/2020 2:08 PM	
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/29/2020 2:08 PM	
HUMIDIFIER VERIFICATION (IF APPLICABLE):				
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 10/27/2020 10:44 AM	
		Humidifier valve was in operator at 0% when on site. Sticker on top of humidifier actuator notes that the actuator was converted to 4/20 ma input, but the point is set up for voltage.	Scott Erlenbusch on 10/27/2020 10:50 AM	
		2 Issues: TST-8-7   TST-8-6		
YES	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 10/29/2020 10:49 AM	

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	Opened to 30% and there was steam coming out of humidifier.	Scott Erlenbusch on 10/29/2020 10:49 AM			
HUMIDISTA APPLICABL	HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):				
HUMIDISTA HUMIDIFIE AIR FLOW	HUMIDISTAT AND AIRFLOW SWITCH ARE USED TO SHUT THE HUMIDIFIER VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR AIR FLOW SWITCH IS NOT CLOSED.				
NO 67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU? 1 Issue: TST-8-8	Scott Erlenbusch on 10/27/2020 10:54 AM			
N/A 68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 10/27/2020 10:55 AM			
N/A 69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 10/27/2020 10:55 AM			
TEST COM	PLETION VERIFICATION:				
<b>YES</b> 70	Have all overrides on the AHU been released?	Scott Erlenbusch on 10/27/2020 10:55 AM			
Attempt	No. 2 INCOMPLETE Sta	tus set by Scott Erlenbusch on 4/28/2021.			
AIR HANDL	ING UNIT - SYSTEM DEFICIENCIES TEST.				
THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.					
IF A SENSOR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR APPLICABLE MARK THE TEST ANSWER AS N/A. USE NOTES AND COMMENTS AS OFTEN AS NECESSARY.					
APPLICABL	E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY.				
APPLICABL COMMENT	E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY. ERIFICATION:				
APPLICABL COMMENT SENSOR V OUTDOOR APPLICABL	E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY. ERIFICATION: TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E):				
APPLICABL COMMENT SENSOR V OUTDOOR APPLICABL	E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY. ERIFICATION: TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E): Does the outdoor humidity sensor report an acceptable value? BAS=49% RH, NWS=56% RH	Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/29/2021 9:51 AM			
APPLICABL COMMENT SENSOR V OUTDOOR APPLICABL YES 1	E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY. ERIFICATION: TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E): Does the outdoor humidity sensor report an acceptable value? BAS=49% RH, NWS=56% RH Does the outdoor temperature report an acceptable value? BAS=64 degrees, NWS=62 degrees.	Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/29/2021 7:18 AM Scott Erlenbusch on 4/29/2021 9:52 AM			
APPLICABL COMMENT SENSOR V OUTDOOR APPLICABL YES 1 YES 2 YES 3	E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY. ERIFICATION: TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E): Does the outdoor humidity sensor report an acceptable value? BAS=49% RH, NWS=56% RH Does the outdoor temperature report an acceptable value? BAS=64 degrees, NWS=62 degrees.	Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/28/2021 7:18 AM Scott Erlenbusch on 4/28/2021 7:18 AM			
APPLICABL COMMENT SENSOR V OUTDOOR APPLICABL YES 1 YES 2 YES 3	E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY. ERIFICATION: TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E): Does the outdoor humidity sensor report an acceptable value? BAS=49% RH, NWS=56% RH Does the outdoor temperature report an acceptable value? BAS=64 degrees, NWS=62 degrees. Document if these sensors are locally wired to the controller, or if they are global values. A new OAT and OAH sensor was installed. OAT- 0.6.2, OAH-0.2.4	Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/28/2021 7:18 AM Scott Erlenbusch on 4/28/2021 7:18 AM Scott Erlenbusch on 4/28/2021 7:18 AM			
APPLICABL COMMENT SENSOR V OUTDOOR APPLICABL YES 1 YES 2 YES 3 RETURN A	E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY. ERIFICATION: TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E): Does the outdoor humidity sensor report an acceptable value? BAS=49% RH, NWS=56% RH Does the outdoor temperature report an acceptable value? BAS=64 degrees, NWS=62 degrees. Document if these sensors are locally wired to the controller, or if they are global values. A new OAT and OAH sensor was installed. OAT- 0.6.2, OAH-0.2.4 R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):	Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/28/2021 7:18 AM Scott Erlenbusch on 4/29/2021 9:52 AM Scott Erlenbusch on 4/29/2021 9:53 AM			
APPLICABL COMMENT SENSOR V OUTDOOR APPLICABL YES 1 YES 2 YES 3 RETURN A YES 4	E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY. ERIFICATION: TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E): Does the outdoor humidity sensor report an acceptable value? BAS=49% RH, NWS=56% RH Does the outdoor temperature report an acceptable value? BAS=64 degrees, NWS=62 degrees. Document if these sensors are locally wired to the controller, or if they are global values. A new OAT and OAH sensor was installed. OAT- 0.6.2, OAH-0.2.4 R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE): Does the return air humidity sensor report an acceptable value? BAS=17.6%, Amprobe=18%.	Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/28/2021 7:18 AM Scott Erlenbusch on 4/28/2021 7:18 AM Scott Erlenbusch on 4/29/2021 9:53 AM Scott Erlenbusch on 4/28/2021 7:18 AM Scott Erlenbusch on 4/28/2021 7:18 AM			
APPLICABL COMMENT SENSOR V OUTDOOR APPLICABL YES 1 YES 2 YES 3 RETURN A RETURN A	E MARK THE TEST ANSWER AS N/A. USE NOTES AND SAS OFTEN AS NECESSARY. ERIFICATION: TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E): Does the outdoor humidity sensor report an acceptable value? BAS=49% RH, NWS=56% RH Does the outdoor temperature report an acceptable value? BAS=64 degrees, NWS=62 degrees. Document if these sensors are locally wired to the controller, or if they are global values. A new OAT and OAH sensor was installed. OAT- 0.6.2, OAH-0.2.4 R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE): Does the return air humidity sensor report an acceptable value? BAS=17.6%, Amprobe=18%. R TEMPERATURE SENSOR VERIFICATION:	Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/29/2021 9:51 AM Scott Erlenbusch on 4/28/2021 7:18 AM Scott Erlenbusch on 4/28/2021 7:18 AM Scott Erlenbusch on 4/29/2021 9:53 AM Scott Erlenbusch on 4/28/2021 7:18 AM Scott Erlenbusch on 4/28/2021 7:18 AM			



YES 6	Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?	Scott Erlenbusch on 4/28/2021 7:18 AM	
YES 7	Is the return air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 4/28/2021 7:18 AM	
	6" probe. appears to be reading correctly.	Scott Erlenbusch on 4/28/2021 7:18 AM	
MIXED AIR	(ECONOMIZER) TEMPERATURE SENSORS:		
YES 8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 4/28/2021 7:18 AM	
	BAS=73.4 degrees, Fluke=71.7 degrees.	Scott Erlenbusch on 4/28/2021 7:18 AM	
YES 9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 4/28/2021 7:18 AM	
YES 10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 4/28/2021 7:18 AM	
	MAT averaging sensor covers the top 2/3 of the AHU cabin. The return dampers in the cabin before are located in the top half of the AHU.	Scott Erlenbusch on 4/28/2021 7:18 AM	
SUPPLY AIR	R HUMIDITY SENSOR VERIFICATION:		
YES 11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 4/28/2021 7:18 AM	
	BAS=36.4% RH, Amprobe=31.8% RH.	Scott Erlenbusch on 4/28/2021 7:18 AM	
YES 12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 4/28/2021 7:18 AM	
	Humidity sensor is located 5' down stream from the humidifier and after the cooling coil.	Scott Erlenbusch on 4/28/2021 7:18 AM	
SUPPLY AIR	R TEMPERATURE SENSORS:		
<b>YES</b> 13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 4/28/2021 7:18 AM	
	BAS=59.1 degrees, Fluke=58.4 degrees.	Scott Erlenbusch on 4/28/2021 7:18 AM	
<b>YES</b> 14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 4/28/2021 7:18 AM	
YES 15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 4/28/2021 7:18 AM	
	6" probe. Athena era sensor.	Scott Erlenbusch on 4/28/2021 7:18 AM	
STATIC ANI	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:		
RETURN PL	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):		
<b>YES</b> 16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 4/28/2021 7:32 AM	
	Strategic installed an RPP sensor. 0-10v,6 to .6 inWC.	Scott Erlenbusch on 4/28/2021 7:32 AM	
YES 17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 4/28/2021 7:33 AM	
<b>YES</b> 18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 4/28/2021 7:33 AM	
SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):			
<b>YES</b> 19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 4/28/2021 7:18 AM	
	Located above ceiling in RM 8099E (Corridor)	Scott Erlenbusch on 4/28/2021 7:18 AM	
YES 20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 4/28/2021 7:18 AM	
YES 21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 4/28/2021 7:18 AM	

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YES 22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 4/28/2021 7:31 AM	
	Strategic installed BSP sensor and OS verified operation.	Scott Erlenbusch on 4/28/2021 7:31 AM	
YES 23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 4/28/2021 7:31 AM	
<b>YES</b> 24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 4/28/2021 7:31 AM	
FILTER PR	ESSURE SENSORS (IF APPLICABLE):		
N/A 25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 4/28/2021 7:18 AM	
	There are magnehelics across both filter banks but they are not transmitters.	Scott Erlenbusch on 4/28/2021 7:18 AM	
N/A 26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 4/28/2021 7:18 AM	
N/A 27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 4/28/2021 7:18 AM	
SAFETY D	EVICES VERIFICATION:		
LOW LIMIT	SAFETY DEVICE:		
<b>YES</b> 28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 4/28/2021 8:18 AM	
	Strategic added 3 more LTD's to the circuit.	Scott Erlenbusch on 4/28/2021 8:19 AM	
YES 29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 4/28/2021 7:18 AM	
WHEN THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED		
<b>YES</b> 30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 4/28/2021 7:18 AM	
<b>YES</b> 31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 4/28/2021 11:27 AM	
<b>YES</b> 32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 4/28/2021 7:18 AM	
<b>YES</b> 33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 4/28/2021 11:27 AM	
	Heating coil does not open, code must control to preheat temp.	Scott Erlenbusch on 4/28/2021 11:28 AM	
SUPPLY P APPLICAB	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):		
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 4/28/2021 7:18 AM	
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 4/28/2021 7:18 AM	
WHEN THE SWITCH IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED		
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 4/28/2021 7:18 AM	
N/A 37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 4/28/2021 7:18 AM	
N/A 38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 4/28/2021 7:18 AM	
SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
<b>YES</b> 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 4/28/2021 11:28	
	A high static pressure cutout was installed and trips at 4 inWC.	Scott Erlenbusch on 4/28/2021 11:28 AM	



<b>YES</b> 40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 4/28/2021 11:29 AM		
WHEN THE SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED				
<b>YES</b> 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 4/28/2021 11:29 AM		
<b>YES</b> 42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 4/28/2021 11:29 AM		
<b>YES</b> 43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 4/28/2021 11:29 AM		
	Programming must be verified when new program is installed.	Scott Erlenbusch on 4/28/2021 11:30 AM		
RETURN P APPLICABI	LENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF .E):			
<b>YES</b> 44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 4/28/2021 11:30 AM		
	A low static pressure cutout was installed and trips at 2.5 inWC.	Scott Erlenbusch on 4/28/2021 11:30 AM		
<b>YES</b> 45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 4/28/2021 11:30 AM		
WHEN THE SWITCH IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED			
<b>YES</b> 46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 4/28/2021 11:31 AM		
<b>YES</b> 47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 4/28/2021 11:31 AM		
<b>YES</b> 48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 4/28/2021 11:31 AM		
	Programming must be verified when new program is installed.	Scott Erlenbusch on 4/28/2021 11:31 AM		
RETURN P	LENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
N/A 49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 4/28/2021 7:18 AM		
N/A 50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 4/28/2021 7:18 AM		
WHEN THE TRIPPED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS			
N/A 51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 4/28/2021 7:18 AM		
N/A 52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 4/28/2021 7:18 AM		
N/A 53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 4/28/2021 7:18 AM		
FAN EQUIPMENT VERIFICATION:				
SUPPLY F	AN:			
<b>YES</b> 54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 4/28/2021 7:18 AM		
<b>YES</b> 55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 4/28/2021 7:18 AM		
RETURN FAN: (IF APPLICABLE)				
<b>YES</b> 56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 4/28/2021 7:18 AM		

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YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 4/28/2021 7:18 AM	
MININ VERIF	IUM O	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:		
NORM	/IAL OI	PERATION VERIFICATION:		
N/A	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 4/28/2021 7:18 AM	
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 4/28/2021 7:18 AM	
		All dampers were closed when on site Tuesday. The return was full open.	Scott Erlenbusch on 4/28/2021 7:18 AM	
YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 4/28/2021 7:18 AM	
YES	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 4/28/2021 7:18 AM	
YES	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 4/28/2021 7:18 AM	
HEAT	ING A	ND COOLING COILS VERIFICATION:		
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 4/28/2021 7:18 AM	
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 4/28/2021 7:18 AM	
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):		
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 4/28/2021 7:18 AM	
		Humidifier valve was in operator at 0% when on site. Sticker on top of humidifier actuator notes that the actuator was converted to 4/20 ma input, but the point is set up for voltage.	Scott Erlenbusch on 4/28/2021 7:18 AM	
YES	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 4/28/2021 7:18 AM	
		Opened to 30% and there was steam coming out of humidifier.	Scott Erlenbusch on 4/28/2021 7:18 AM	
HUMI APPL	DISTA ICABL	T AND AIRFLOW SWITCH SAFETY VERIFICATION (IF E):		
humi humi air f	DISTA DIFIEF LOW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.		
YES	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 4/28/2021 8:20 AM	
		The humidistat is located in the same chamber as the duct detector.	Scott Erlenbusch on 4/28/2021 8:20 AM	
YES	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 4/28/2021 8:19 AM	
YES	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 4/28/2021 11:31 AM	
		Strategic and OS verified the humidifier safeties operation.	Scott Erlenbusch on 4/28/2021 11:32 AM	
TEST	TEST COMPLETION VERIFICATION:			
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 4/28/2021 7:18 AM	

**Issues** 14



#### TST-8-1 CLOSED MODERATE

Outdoor humidity is 20% less than what NWS is reporting. BAS=64% RH, NWS=88% RH. Please replace OA Humidity sensor. **Source** Test 8, Attempt 1, Line 1 Does the outdoor humidity sensor report an acceptable value? Asset 🔅 DRC2\_AHU 1 Discipline Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 8:09 AM

Strategic installed a new OAT and OAH sensor. Scott Erlenbusch on 04/29/2021 at 09:54 AM Optimized Systems

#### TST-8-2 CLOSED HIGH

There is a return static pressure magnehelic transmitter installed before the return fans and a relief DP magnehelic transmitter installed after the return fan in the relief plenum. The relief DP high and low side are on either side of the relief damper. OS to change programming and use the Relief DP as the RPP sensor and plumb the sensor correctly.

Source Test 8, Attempt 1, Line 16

Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?

Asset % DRC2\_AHU 1 Discipline Optimization Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 9:42 AM

Strategic left the relief DP and installed a new Belimo RPP. OS verified setup. Scott Erlenbusch on 04/28/2021 at 07:29 AM Optimized Systems





#### TST-8-3 CLOSED HIGH

There are three LTD's installed but a couple could be added for better coverage. Not sure of the length of the LTD's, maybe longer ones could be added to get needed coverage.

Source Test 8, Attempt 1, Line 28

Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

Asset 🧐 DRC2\_AHU 1 **Discipline** Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 10:07 AM

#### Strategic installed 3 more LTD's in to the circuit, 6 total.

Scott Erlenbusch on 04/28/2021 at 08:22 AM **Optimized Systems** 



IMG 0243.jpg

# TST-8-4 CLOSED HIGH

There is no supply high static cutout on the AHU and no point in Panel 201. Please install high static cutout switch and wire in to safety circuit. Source Test 8, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early?

Asset 🧟 DRC2 AHU 1 **Discipline** Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 10:16 AM

High static pressure cutout was installed and trips at 4 inWC. OS verified operation. Scott Erlenbusch on 04/28/2021 at 11:33 AM **Optimized Systems** 



#### TST-8-5 CLOSED HIGH

There is no return low suction static cutout installed on the AHU and no point in Panel 201. Please install low static cutout switch and wire in to safety circuit.

Source Test 8, Attempt 1, Line 44 Is the low suction pressure safety switch calibrated properly in order to not trip early? Asset % DRC2\_AHU 1 Discipline Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 10:17 AM

Low static pressure cutout was installed and trips at 2.5 inWC. OS verified operation. Scott Erlenbusch on 04/28/2021 at 11:34 AM Optimized Systems

# TST-8-6 CLOSED HIGH

Humidifier actuator notes a spring return. The actuator failsafe will need to be verified when new humidifier safety circuit is installed. **Source** Test 8, Attempt 1, Line 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed? Asset % DRC2\_AHU 1 Discipline Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 10:46 AM

#### Humidifier valve fails closed when the safeties are tripped.

Scott Erlenbusch on 04/28/2021 at 11:34 AM Optimized Systems



IMG\_0247.jpg



IMG\_0250.jpg

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#### TST-8-7 OPEN MODERATE

Panel 201 points list notes a humidifier isolation valve but there is not one installed. OS to verify that point is not used in programming and delete. **Source** Test 8, Attempt 1, Line 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed?

Asset 🔅 DRC2\_AHU 1 Discipline Optimization Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 10:53 AM

# TST-8-8 CLOSED HIGH

There is no humidistat or air flow switch installed. Humidistat and airflow switch will need to be installed per new humidifier safety sequence. **Source** Test 8, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU?

Asset 🌣 DRC2\_AHU 1 Discipline Controls Due Date 11/10/2020 Created By Scott Erlenbusch Identified On 10/27/2020 10:55 AM

Humidistat and air flow switch were installed and tested for proper operation. Scott Erlenbusch on 04/28/2021 at 11:35 AM Optimized Systems

Humidifier safeties have been installed. OS tested and verified operation. Scott Erlenbusch on 04/28/2021 at 08:23 AM Optimized Systems

# TST-8-10 CLOSED MODERATE

The Hz reading on the ABB drive is 38 Hz and the reading on the Square D drive is 42 Hz. Please verify that the VFD's are set up correctly. **Source** Test 8, Attempt 1, Line 54 Does the supply fan start and stop when commanded by the BAS?

Asset S DRC2\_AHU 1 Discipline Controls Due Date 11/12/2020 Created By Scott Erlenbusch Identified On 10/29/2020 10:55 AM

Verified the speed signal to drives are correct. Scott Erlenbusch on 07/01/2021 at 01:57 PM Optimized Systems

# TST-8-11 CLOSED HIGH

The ABB supply fan drive did run in hand while the safety was tripped. The Square D drives would not run in hand. I did not test the bypass function on the Square D drives because the drive belts are cog belts. Please verify that drives will not run in bypass with safeties tripped.

Source Test 8, Attempt 1, Line 31

Are the supply and return fan VFD's prohibited from running in hand or bypass?

Asset S DRC2\_AHU 1 Discipline Controls Due Date 11/12/2020 Created By Scott Erlenbusch Identified On 10/29/2020 2:04 PM

The ABB will no longer run in hand or bypass when any of the safeties are tripped. OS tested and verified. Scott Erlenbusch on 04/28/2021 at 11:37 AM Optimized Systems

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#### TST-8-12 OPEN MODERATE

Heating coil did not open, may be programmed to maintain the MAT. Verify programming will protect the coils. **Source** Test 8, Attempt 1, Line 33 Does the heating coil become open? (If applicable) Asset 🔅 DRC2\_AHU 1 Discipline Optimization Due Date 11/12/2020 Created By Scott Erlenbusch Identified On 10/29/2020 2:05 PM

#### TST-8-13 CLOSED MODERATE

Relief damper furthest from the access door are cracked open slightly when commanded closed.

Source Test 8, Attempt 1, Line 32 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Asset 🔅 DRC2\_AHU 1 Discipline Controls Due Date 11/12/2020 Created By Scott Erlenbusch Identified On 10/29/2020 2:06 PM

Strategic adjusted and it looks like it is sealed up. Scott Erlenbusch on 04/28/2021 at 08:26 AM Optimized Systems

#### TST-8-14 CLOSED HIGH

Both of the return fans did not start at the same time. The end switches for the return isolation dampers should be wired in series so that once both dampers open the return fans would start at the same time. **Source** Test 8, Attempt 1, Line 56 Does the return fan start and stop when commanded by the BAS? Asset % DRC2\_AHU 1 Discipline Controls Due Date 11/12/2020 Created By Scott Erlenbusch Identified On 10/29/2020 2:08 PM

Strategic installed a relay that kills the start signal to the drives until all isolation dampers have been opened. Drives start at the

same time now. Scott Erlenbusch on 07/02/2021 at 08:38 AM Optimized Systems

#### TST-8-15 CLOSED HIGH

There is no building static pressure sensor installed. Ashcroft building static pressure sensor needs to be installed. Coordinate with Optimized Systems. **Source** Test 8, Attempt 1, Line 22 Is the building pressure sensor installed in the best location possible for the areas served by the unit?

Asset 🔅 DRC2\_AHU 1 Discipline Controls Due Date 11/27/2020 Created By Scott Erlenbusch Identified On 11/13/2020 9:48 AM

Strategic installed and OS verified. Scott Erlenbusch on 04/28/2021 at 07:27 AM Optimized Systems

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#### Photos 6



IMG\_0236.heic Line 10



IMG\_0238.heic Line 10



IMG\_0240.heic Line 10



IMG\_0237.heic Line 10



IMG\_0239.heic Line 10



IMG\_0241.heic Line 10



# TEST #9 MMI AHU 1 - AHU -**Humidifier/Optimization**



#### RETURN AIR TEMPERATURE SENSOR VERIFICATION:

YES 5 Does the return air temperature sensor report an acceptable value? Scott Erlenbusch on 1/19/2021 1:28 PM YES 6 Is the return air temperature sensor installed in the return air plenum and not near Scott Erlenbusch on 1/19/2021 1:28 PM the outdoor air or relief air plenums? YES 7 Is the return air temperature sensor probe the proper length for the size of duct it is Scott Erlenbusch on 1/19/2021 1:28 PM installed in?

Scott Erlenbusch on 1/19/2021 1:29 PM

6" probe in the middle of the return plenum.

MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:

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YES	8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 1/19/2021 1:16 PM
YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 1/19/2021 1:18 PM
YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 1/19/2021 1:18 PM
SUPP	ly Aif	R HUMIDITY SENSOR VERIFICATION:	
YES	11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 1/19/2021 12:41 PM
		20.4%	Scott Erlenbusch on 1/19/2021 12:42 PM
YES	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 1/19/2021 12:43 PM
		Located in the supply plenum. 15 feet downstream of the humidifier, after the chilled water coil.	Scott Erlenbusch on 1/19/2021 12:44 PM
SUPP	ly Aif	R TEMPERATURE SENSORS:	
YES	13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 1/19/2021 12:45 PM
		75 degrees.	Scott Erlenbusch on 1/19/2021 12:45 PM
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 1/19/2021 12:45 PM
		Located in the supply plenum.	Scott Erlenbusch on 1/19/2021 12:46 PM
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 1/19/2021 12:49 PM
		6" probe in the middle of the supply plenum.	Scott Erlenbusch on 1/19/2021 12:50 PM
STATI		6" probe in the middle of the supply plenum.	Scott Erlenbusch on 1/19/2021 12:50 PM
STAT	IC ANI RN PL	6" probe in the middle of the supply plenum. D DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	Scott Erlenbusch on 1/19/2021 12:50 PM
STATI RETU YES	IC ANI RN PL 16	6" probe in the middle of the supply plenum. D DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 1/19/2021 12:50 PM Scott Erlenbusch on 1/19/2021 1:41 PM
STATI RETU YES	IC ANI RN PL 16 17	6" probe in the middle of the supply plenum. D DIFFERENTIAL PRESSURE SENSORS VERIFICATION: LENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 1/19/2021 12:50 PM Scott Erlenbusch on 1/19/2021 1:41 PM Scott Erlenbusch on 1/19/2021 3:23 PM
STATI RETU YES YES	IC ANI RN PL 16 17 18	6" probe in the middle of the supply plenum. D DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 1/19/2021 12:50 PM Scott Erlenbusch on 1/19/2021 1:41 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/19/2021 3:23 PM
STATI RETU YES YES SUPP	IC ANI RN PL 16 17 18 LY DU	6" probe in the middle of the supply plenum. D DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE):	Scott Erlenbusch on 1/19/2021 12:50 PM Scott Erlenbusch on 1/19/2021 1:41 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/19/2021 3:23 PM
STATI RETU YES YES SUPP NO	IC ANI RN PL 16 17 18 LY DU 19	6" probe in the middle of the supply plenum. D DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 1/19/2021 12:50 PM Scott Erlenbusch on 1/19/2021 1:41 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/21/2021 12:39 PM
STATI RETU YES YES SUPP NO	IC ANI RN PL 16 17 18 LY DU 19	6" probe in the middle of the supply plenum. DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? AHU is using the SPP sensor located on the unit to control static pressure. This sensor is reading correctly and is set up correctly.	Scott Erlenbusch on 1/19/2021 12:50 PM Scott Erlenbusch on 1/19/2021 1:41 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/21/2021 12:39 PM Scott Erlenbusch on 1/21/2021 12:40 PM
STATI RETU YES YES SUPP NO	C ANI RN PL 16 17 18 LY DU 19 20	6" probe in the middle of the supply plenum. DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? AHU is using the SPP sensor located on the unit to control static pressure. This sensor is reading correctly and is set up correctly. Is the supply duct static pressure sensor reporting an acceptable value? 1 Issue: TST-9-1	Scott Erlenbusch on 1/19/2021 12:50 PM Scott Erlenbusch on 1/19/2021 1:41 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/21/2021 12:39 PM Scott Erlenbusch on 1/21/2021 12:40 PM
STATI RETU YES YES SUPP NO	C ANI RN PL 16 17 18 LY DU 19 20 21	6" probe in the middle of the supply plenum. D DIFFERENTIAL PRESSURE SENSORS VERIFICATION: LENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? AHU is using the SPP sensor located on the unit to control static pressure. This sensor is reading correctly and is set up correctly. Is the supply duct static pressure sensor reporting an acceptable value? 1 Issue: TST-9-1 Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 1/19/2021 12:50 PM Scott Erlenbusch on 1/19/2021 1:41 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/21/2021 12:39 PM Scott Erlenbusch on 1/21/2021 12:40 PM
STATI RETU YES YES SUPP NO	C ANI RN PL 16 17 18 LY DU 19 20 21 21	6" probe in the middle of the supply plenum. DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? OCT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? AHU is using the SPP sensor located on the unit to control static pressure. This sensor is reading correctly and is set up correctly. Is the supply duct static pressure sensor reporting an acceptable value? 1 Issue: TST-9-1 Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 1/19/2021 12:50 PM Scott Erlenbusch on 1/19/2021 1:41 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/21/2021 3:23 PM Scott Erlenbusch on 1/21/2021 12:39 PM Scott Erlenbusch on 1/21/2021 12:40 PM
STATI RETU YES YES SUPP NO	C ANE RN PL 16 17 18 LY DU 19 20 21 21 21 22	6" probe in the middle of the supply plenum. D DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? AHU is using the SPP sensor located on the unit to control static pressure. This sensor is reading correctly and is set up correctly. Is the supply duct static pressure sensor reporting an acceptable value? 1 Issue: TST-9-1 Is the supply duct static pressure sensor and analog input ranges setup properly? PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor and analog input ranges setup properly? PRESSURE SENSOR (IF APPLICABLE): Is the building pressure sensor installed in the best location possible for the areas served by the unit? 1 Issue: TST-9-3	Scott Erlenbusch on 1/19/2021 12:50 PM Scott Erlenbusch on 1/19/2021 1:41 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/21/2021 12:39 PM Scott Erlenbusch on 1/21/2021 12:40 PM Scott Erlenbusch on 1/20/2021 7:26 AM Scott Erlenbusch on 1/21/2021 12:39 PM
STATI RETU YES YES SUPP NO NO BUILD	C ANI RN PL 16 17 18 LY DU 19 20 21 21 21 22 23	6" probe in the middle of the supply plenum. DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? AHU is using the SPP sensor located on the unit to control static pressure. This sensor is reading correctly and is set up correctly. Is the supply duct static pressure sensor reporting an acceptable value? 1 Issue: TST-9-1 Is the supply duct static pressure sensor and analog input ranges setup properly? PRESSURE SENSOR (IF APPLICABLE): Is the building pressure sensor installed in the best location possible for the areas served by the unit? 1 Issue: TST-9-3 Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 1/19/2021 12:50 PM Scott Erlenbusch on 1/19/2021 1:41 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/19/2021 3:23 PM Scott Erlenbusch on 1/21/2021 3:23 PM Scott Erlenbusch on 1/21/2021 12:39 PM Scott Erlenbusch on 1/21/2021 12:40 PM Scott Erlenbusch on 1/20/2021 7:26 AM Scott Erlenbusch on 1/21/2021 12:39 PM

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<b>YES</b> 24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 1/20/2021 1:30 PM				
FILTER PRESSURE SENSORS (IF APPLICABLE):						
YES 25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 1/19/2021 1:05 PM				
<b>YES</b> 26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 1/19/2021 1:05 PM				
YES 27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 1/19/2021 1:05 PM				
SAFETY D	EVICES VERIFICATION:					
LOW LIMIT	LOW LIMIT SAFETY DEVICE:					
<b>YES</b> 28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 1/21/2021 1:10 PM				
YES 29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 1/21/2021 1:10 PM				
WHEN THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED					
<b>YES</b> 30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 1/21/2021 1:15 PM				
<b>YES</b> 31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 1/21/2021 1:15 PM				
YES 32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 1/21/2021 1:11 PM				
	Programming is calling them to be closed but the OA dampers on the unit do not close all the way. Dampers are supposed to be replaced at some point.	Scott Erlenbusch on 1/21/2021 1:12 PM				
	1 Issue: TST-9-6					
NO 33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 1/21/2021 1:16 PM				
	No,Is the actuator controlling to preheat temperature?	Scott Erienbusch on 1/21/2021 1:15 PM				
APPLICABL	E):					
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 1/20/2021 1:58 PM				
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 1/20/2021 1:58 PM				
WHEN THE SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED						
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 1/20/2021 1:58 PM				
N/A 37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 1/20/2021 1:58 PM				
N/A 38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 1/20/2021 1:58 PM				
SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):						
YES 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? Tripped at 5.25".	Scott Erlenbusch on 1/21/2021 1:18 PM Scott Erlenbusch on 1/21/2021 1:18 PM				
YES 40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 1/21/2021 1:18 PM				
WHEN THE TRIPPED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS					
<b>YES</b> 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 1/21/2021 1:18 PM				
YES 42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 1/21/2021 1:18 PM				



YES	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 1/21/2021 1:18 PM		
RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):					
YES	44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 1/21/2021 1:18 PM		
		Tripped at 3.5".	Scott Erlenbusch on 1/21/2021 1:19 PM		
YES	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 1/21/2021 1:19 PM		
WHEN THE RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED					
YES	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 1/21/2021 1:19 PM		
YES	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 1/21/2021 1:19 PM		
YES	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 1/21/2021 1:19 PM		
RETU	RN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 1/20/2021 1:58 PM		
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 1/20/2021 1:58 PM		
WHEN TRIPF	N THE PED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS			
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 1/20/2021 1:58 PM		
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 1/20/2021 1:58 PM		
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 1/20/2021 1:58 PM		
FAN E	QUIP	MENT VERIFICATION:			
SUPP	LY FA	N:			
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 1/21/2021 12:41 PM		
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 1/21/2021 12:41 PM		
RETURN FAN: (IF APPLICABLE)					
YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 1/21/2021 12:42 PM		
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 1/21/2021 12:42 PM		
MININ VERIF	IUM O	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:			
NORM	AL O	PERATION VERIFICATION:			
N/A	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 1/20/2021 1:58 PM		
		We are not testing because the dampers are going to be replaced.	Scott Erlenbusch on 1/20/2021 1:58 PM		
N/A	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 1/20/2021 1:58 PM		

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N/A	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 1/20/2021 1:58 PM	
N/A	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 1/20/2021 1:58 PM	
N/A	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 1/20/2021 1:58 PM	
HEAT	ING AI	ND COOLING COILS VERIFICATION:		
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable) 1 Issue: TST-9-8	Scott Erlenbusch on 1/20/2021 8:50 AM	
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 1/20/2021 8:50 AM	
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):		
N/A	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed? Self contained steam generator provides steam to the humidifier.	Scott Erlenbusch on 1/20/2021 1:48 PM Scott Erlenbusch on 1/20/2021 1:49 PM	
N/A	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 1/20/2021 1:49 PM	
HUMII APPL	DISTA ICABL	T AND AIRFLOW SWITCH SAFETY VERIFICATION (IF E):		
HUMIDISTAT AND AIRFLOW SWITCH ARE USED TO SHUT THE HUMIDIFIER VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR AIR FLOW SWITCH IS NOT CLOSED.				
YES	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 1/20/2021 1:55 PM	
		Humidistats for both humidifiers are located in the supply cabin. I did not see smoke detectors in the supply cabin, assuming they are further down the duct.	Scott Erlenbusch on 1/20/2021 1:57 PM	
YES	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 1/20/2021 1:57 PM	
N/A	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 1/20/2021 1:57 PM	
TEST	COMF	PLETION VERIFICATION:		
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 1/21/2021 12:47 PM	
Attempt No. 2 INCOMPLETE Status set by Scott Erlenbusch on 5/3/2021.				
AIR HANDLING UNIT - SYSTEM DEFICIENCIES TEST.				
THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.				
IF A SENSOR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR APPLICABLE MARK THE TEST ANSWER AS N/A. USE NOTES AND COMMENTS AS OFTEN AS NECESSARY.				
SENSOR VERIFICATION:				

OUTDOOR TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):

YES 1 Does the outdoor humidity sensor report an acceptable value?

Scott Erlenbusch on 5/3/2021 3:49 PM

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YES2Does the outdoor temperature report an acceptable value? BAS=40 degrees, NWS=41 degrees.Scott Erlenbusch on 5/3/2021 3:49 PI Scott Erlenbusch on 5
YES3Document if these sensors are locally wired to the controller, or if they are global values. These points are not local to Panel 502, they are in Panel 201.Scott Erlenbusch on 5/3/2021 3:49 PlRETURN AIR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):Scott Erlenbusch on 5/3/2021 3:49 PlYES4Does the return air humidity sensor report an acceptable value? 20.4%Scott Erlenbusch on 5/3/2021 3:49 PlRETURN AIR TEMPERATURE SENSOR VERIFICATION:Scott Erlenbusch on 5/3/2021 3:49 PlYES5Does the return air temperature sensor report an acceptable value? Scott Erlenbusch on 5/3/2021 3:49 PlYES6Is the return air temperature sensor report an acceptable value? Scott Erlenbusch on 5/3/2021 3:49 PlYES7Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?Scott Erlenbusch on 5/3/2021 3:49 PlYES7Is the return air temperature sensor probe the proper length for the size of duct it is installed in? 6" probe in the middle of the return plenum.Scott Erlenbusch on 5/3/2021 3:49 PlMIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:Yet Si a Scott Erlenbusch on 5/3/2021 3:49 PlYES8Does the mixed air temperature sensor report an acceptable value?Scott Erlenbusch on 5/3/2021 3:49 Pl
These points are not local to Panel 502, they are in Panel 201.Scott Erlenbusch on 5/3/2021 3:49 PIRETURN AIR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):Scott Erlenbusch on 5/3/2021 3:49 PIYES 4Does the return air humidity sensor report an acceptable value? 20.4%Scott Erlenbusch on 5/3/2021 3:49 PIRETURN AIR TEMPERATURE SENSOR VERIFICATION:Scott Erlenbusch on 5/3/2021 3:49 PIYES 5Does the return air temperature sensor report an acceptable value? the outdoor air or relief air plenums?Scott Erlenbusch on 5/3/2021 3:49 PIYES 7Is the return air temperature sensor probe the proper length for the size of duct it is installed in? 6" probe in the middle of the return plenum.Scott Erlenbusch on 5/3/2021 3:49 PIMIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:Scott Erlenbusch on 5/3/2021 3:49 PIYES 8Does the mixed air temperature sensor report an acceptable value?Scott Erlenbusch on 5/3/2021 3:49 PI
RETURN AIR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):         YES       4       Does the return air humidity sensor report an acceptable value?       Scott Erlenbusch on 5/3/2021 3:49 PI         20.4%       Scott Erlenbusch on 5/3/2021 3:49 PI         RETURN AIR TEMPERATURE SENSOR VERIFICATION:       Scott Erlenbusch on 5/3/2021 3:49 PI         YES       5       Does the return air temperature sensor report an acceptable value?       Scott Erlenbusch on 5/3/2021 3:49 PI         YES       6       Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?       Scott Erlenbusch on 5/3/2021 3:49 PI         YES       7       Is the return air temperature sensor probe the proper length for the size of duct it is installed in?       Scott Erlenbusch on 5/3/2021 3:49 PI         MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:       MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:       Scott Erlenbusch on 5/3/2021 3:49 PI         YES       8       Does the mixed air temperature sensor report an acceptable value?       Scott Erlenbusch on 5/3/2021 3:49 PI
YES4Does the return air humidity sensor report an acceptable value? 20.4%Scott Erlenbusch on 5/3/2021 3:49 PI Scott Erlenbusch on 5/3/2021 3:49 PI Scott Erlenbusch on 5/3/2021 3:49 PI Scott Erlenbusch on 5/3/2021 3:49 PIRETURN AIR TEMPERATURE SENSOR VERIFICATION:Image: Contemport and acceptable value?Scott Erlenbusch on 5/3/2021 3:49 PI Scott Erlenbusch on 5/3/2021 3:49 PIMIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:Scott Erlenbusch on 5/3/2021 3:49 PI Scott Erlenbusch on 5/3/2021 3:49 PIYES8Does the mixed air temperature sensor report an acceptable value?Scott Erlenbusch on 5/3/2021 3:49 PI
RETURN AIR TEMPERATURE SENSOR VERIFICATION:         YES       5       Does the return air temperature sensor report an acceptable value?       Scott Erlenbusch on 5/3/2021 3:49 PI         YES       6       Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?       Scott Erlenbusch on 5/3/2021 3:49 PI         YES       7       Is the return air temperature sensor probe the proper length for the size of duct it is installed in?       Scott Erlenbusch on 5/3/2021 3:49 PI         6" probe in the middle of the return plenum.       Scott Erlenbusch on 5/3/2021 3:49 PI         MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:       Scott Erlenbusch on 5/3/2021 3:49 PI         YES       8       Does the mixed air temperature sensor report an acceptable value?       Scott Erlenbusch on 5/3/2021 3:49 PI
YES5Does the return air temperature sensor report an acceptable value?Scott Erlenbusch on 5/3/2021 3:49 PIYES6Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?Scott Erlenbusch on 5/3/2021 3:49 PIYES7Is the return air temperature sensor probe the proper length for the size of duct it is installed in? 6" probe in the middle of the return plenum.Scott Erlenbusch on 5/3/2021 3:49 PIMIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:YES8Does the mixed air temperature sensor report an acceptable value?Scott Erlenbusch on 5/3/2021 3:49 PI
YES       6       Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?       Scott Erlenbusch on 5/3/2021 3:49 Pl         YES       7       Is the return air temperature sensor probe the proper length for the size of duct it is installed in?       Scott Erlenbusch on 5/3/2021 3:49 Pl         6" probe in the middle of the return plenum.       Scott Erlenbusch on 5/3/2021 3:49 Pl       Scott Erlenbusch on 5/3/2021 3:49 Pl         MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:       YES       8       Does the mixed air temperature sensor report an acceptable value?       Scott Erlenbusch on 5/3/2021 3:49 Pl
YES       7       Is the return air temperature sensor probe the proper length for the size of duct it is installed in?       Scott Erlenbusch on 5/3/2021 3:49 Pl         6" probe in the middle of the return plenum.       Scott Erlenbusch on 5/3/2021 3:49 Pl         MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:       Scott Erlenbusch on 5/3/2021 3:49 Pl         YES       8       Does the mixed air temperature sensor report an acceptable value?       Scott Erlenbusch on 5/3/2021 3:49 Pl
6" probe in the middle of the return plenum.       Scott Erlenbusch on 5/3/2021 3:49 Pl         MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:         YES 8       Does the mixed air temperature sensor report an acceptable value?       Scott Erlenbusch on 5/3/2021 3:49 Pl
MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:         YES       8       Does the mixed air temperature sensor report an acceptable value?       Scott Erlenbusch on 5/3/2021 3:49 Pr
YES         8         Does the mixed air temperature sensor report an acceptable value?         Scott Erlenbusch on 5/3/2021 3:49 Pl
YES 9 Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?
YES 10 Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?
SUPPLY AIR HUMIDITY SENSOR VERIFICATION:
YES       11       Does the supply air humidity sensor report an acceptable value?       Scott Erlenbusch on 5/3/2021 3:49 Pl         20.4%       Scott Erlenbusch on 5/3/2021 3:49 Pl
YES 12 Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.
Located in the supply plenum. 15 feet downstream of the humidifier, after the chilled water coil. Scott Erlenbusch on 5/3/2021 3:49 Pl
SUPPLY AIR TEMPERATURE SENSORS:
YES       13       Does the supply air temperature sensor report an acceptable value?       Scott Erlenbusch on 5/3/2021 3:49 Pl         75 degrees.       Scott Erlenbusch on 5/3/2021 3:49 Pl
YES 14 Is the supply air temperature sensor installed downstream of all coils in order to get Scott Erlenbusch on 5/3/2021 3:49 Pl an accurate reading?
Located in the supply plenum. Scott Erlenbusch on 5/3/2021 3:49 Pl
YES 15 Is the supply air temperature sensor probe the proper length for the size of duct it is Scott Erlenbusch on 5/3/2021 3:49 Pl installed in?
6" probe in the middle of the supply plenum. Scott Erlenbusch on 5/3/2021 3:49 Pl
STATIC AND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:
RETURN PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):
YES 16 Is the return plenum pressure sensor installed between the relief air and return air Scott Erlenbusch on 5/3/2021 3:49 Pl damper sections, and after the return fan?

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<b>YES</b> 17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 5/3/2021 3:49 PM		
YES 18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 5/3/2021 3:49 PM		
SUPPLY DU	JCT STATIC PRESSURE SENSOR (IF APPLICABLE):			
<b>YES</b> 19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 5/3/2021 3:50 PM		
	AHU is using the SPP sensor located on the unit to control static pressure. This sensor is reading correctly and is set up correctly.	Scott Erlenbusch on 5/3/2021 3:49 PM		
<b>YES</b> 20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 5/3/2021 3:50 PM		
YES 21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 5/3/2021 3:50 PM		
BUILDING F	PRESSURE SENSOR (IF APPLICABLE):			
YES 22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 5/3/2021 3:50 PM		
	building static pressure sensors have been changed and verified for both AHU's.	Scott Erlenbusch on 5/3/2021 3:50 PM		
<b>YES</b> 23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 5/3/2021 3:50 PM		
<b>YES</b> 24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 5/3/2021 3:49 PM		
FILTER PRI	ESSURE SENSORS (IF APPLICABLE):			
YES 25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 5/3/2021 3:49 PM		
<b>YES</b> 26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 5/3/2021 3:49 PM		
YES 27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 5/3/2021 3:49 PM		
SAFETY DE	VICES VERIFICATION:			
LOW LIMIT	SAFETY DEVICE:			
<b>YES</b> 28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 5/3/2021 3:49 PM		
YES 29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 5/3/2021 3:49 PM		
WHEN THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED			
<b>YES</b> 30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM		
YES 31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 5/3/2021 3:49 PM		
<b>YES</b> 32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 5/3/2021 3:49 PM		
	Programming is calling them to be closed but the OA dampers on the unit do not close all the way. Dampers are supposed to be replaced at some point.	Scott Erlenbusch on 5/3/2021 3:49 PM		
NO 33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 5/3/2021 3:49 PM		
	No,Is the actuator controlling to preheat temperature?	Scott Erlenbusch on 5/3/2021 3:49 PM		
SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):				
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 5/3/2021 3:49 PM		
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 5/3/2021 3:49 PM		
WHEN THE SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED				
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM		

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N/A 3	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 5/3/2021 3:49 PM		
N/A 3	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 5/3/2021 3:49 PM		
SUPPLY	Y PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
YES 3	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? Tripped at 5.25".	Scott Erlenbusch on 5/3/2021 3:49 PM Scott Erlenbusch on 5/3/2021 3:49 PM		
YES 4	10	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 5/3/2021 3:49 PM		
WHEN THE SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED					
YES 4	11	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM		
YES 4	12	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 5/3/2021 3:49 PM		
YES 4	13	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 5/3/2021 3:49 PM		
RETURN APPLIC/	n Pl Abl	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):			
YES 4	14	Is the low suction pressure safety switch calibrated properly in order to not trip	Scott Erlenbusch on 5/3/2021 3:49 PM		
		Tripped at 3.5".	Scott Erlenbusch on 5/3/2021 3:49 PM		
YES 4	15	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 5/3/2021 3:49 PM		
WHEN T SWITCH	THE H IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED			
YES 4	16	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM		
YES 4	17	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 5/3/2021 3:49 PM		
YES 4	18	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 5/3/2021 3:49 PM		
RETURN	N PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
N/A 4	19	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 5/3/2021 3:49 PM		
N/A 5	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 5/3/2021 3:49 PM		
WHEN THE RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED					
N/A 5	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM		
N/A 5	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 5/3/2021 3:49 PM		
N/A 5	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 5/3/2021 3:49 PM		
FAN EQ	UIP	MENT VERIFICATION:			
SUPPLY	Y FA	N:			
YES 5	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM		
YES 5	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM		
RETURN FAN: (IF APPLICABLE)					
YES 5	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM		
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YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM			
MINIMUM OA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER VERIFICATION:						
NORM	NORMAL OPERATION VERIFICATION:					
N/A 5	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM			
		We are not testing because the dampers are going to be replaced.	Scott Erlenbusch on 5/3/2021 3:49 PM			
N/A	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM			
N/A	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM			
N/A	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM			
N/A	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 5/3/2021 3:49 PM			
HEAT	ING A	ND COOLING COILS VERIFICATION:				
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 5/3/2021 3:49 PM			
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 5/3/2021 3:49 PM			
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):				
N/A	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed? Self contained steam generator provides steam to the humidifier.	Scott Erlenbusch on 5/3/2021 3:49 PM Scott Erlenbusch on 5/3/2021 3:49 PM			
N/A	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 5/3/2021 3:49 PM			
HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):						
HUMIDISTAT AND AIRFLOW SWITCH ARE USED TO SHUT THE HUMIDIFIER VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR AIR FLOW SWITCH IS NOT CLOSED.						
YES	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 5/3/2021 3:49 PM			
		Humidistats for both humidifiers are located in the supply cabin. I did not see smoke detectors in the supply cabin, assuming they are further down the duct.	Scott Erlenbusch on 5/3/2021 3:49 PM			
YES	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 5/3/2021 3:49 PM			
N/A	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 5/3/2021 3:49 PM			
TEST	COM	PLETION VERIFICATION:				
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 5/3/2021 3:49 PM			

Issues 10



#### TST-9-1 CLOSED HIGH

Supply duct static pressure is failed on the panel point list. Point is built but there is nothing landed in the panel. Source Test 9, Attempt 1, Line 20 Is the supply duct static pressure sensor reporting an acceptable value? Asset 🔅 MMI\_AHU 1 Discipline Controls Due Date 2/3/2021 Created By Scott Erlenbusch Identified On 1/20/2021 7:27 AM

AHU's using the SPP sensors on the AHU to control to static. Scott Erlenbusch on 05/03/2021 at 03:48 PM Optimized Systems

#### TST-9-2 CLOSED HIGH

Supply/Return fan proofs and faults are wired in series. All drives would need to be off or faulted to fault at the BAS. The proof wiring may be ok because if one did not start it would not prove. The fault wiring may need to be wired differently, not sure? This is also true for AHU 2. **Source** Test 9 MMI\_AHU 1 - AHU - Humidifier/Optimization Asset % MMI\_AHU 1 Discipline Controls Due Date 2/3/2021 Created By Scott Erlenbusch Identified On 1/20/2021 11:28 AM

Changed the point setup for the supply and return fan fault. The point is now normally closed in Insight and the fault point was changed on the supply and return drives. This was completed for AHU 1 and 2. Scott Erlenbusch on 07/01/2021 at 01:07 PM Optimized Systems

#### TST-9-3 CLOSED HIGH

Building pressure sensor for AHU is located in the hallway outside the South Elevators on First floor. The outdoor air reference is located on the roof. **Source** Test 9, Attempt 1, Line 22 Is the building pressure sensor installed in the best location possible for the areas served by the unit?

Asset 🌣 MMI\_AHU 1 Discipline Controls Due Date 2/3/2021 Created By Scott Erlenbusch Identified On 1/20/2021 1:30 PM

Building Static pressure sensor was changed and verified by OS. This pertains to both ahu's. Scott Erlenbusch on 05/03/2021 at 03:47 PM Optimized Systems



#### TST-9-4 CLOSED HIGH

There is a bank of isolation dampers on the return side that are closed. Actuator is making a loud humming noise. There are four isolation dampers total so the unit is not starving too badly.

Source Test 9 MMI\_AHU 1 - AHU - Humidifier/Optimization Asset 🔅 MMI\_AHU 1 Due Date 2/4/2021 Created By Scott Erlenbusch Identified On 1/21/2021 12:46 PM

Return isolation dampers and actuators have been replaced. Scott Erlenbusch on 05/03/2021 at 03:39 PM Optimized Systems

TST-9-5 OPEN HIGH

The mechanical room floor next to AHU 1 supply fans shakes quite a bit while unit is running. Do the supply fans need balanced after the cleaning? **Source** Test 9 MML\_AHU 1 - AHU - Humidifier/Optimization Asset 🔅 MMI\_AHU 1 Due Date 2/4/2021 Created By Scott Erlenbusch Identified On 1/21/2021 12:47 PM

# TST-9-6 CLOSED HIGH

OA dampers do not close all the way when commanded closed. Source Test 9, Attempt 1, Line 32 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Asset 🗞 MMI\_AHU 1 Due Date 2/4/2021 Created By Scott Erlenbusch Identified On 1/21/2021 1:14 PM

All dampers have been replaced. OS verified operation. Scott Erlenbusch on 05/03/2021 at 03:38 PM Optimized Systems

# TST-9-7 OPEN HIGH

Heating coil did not open on an LTD. Just want this noted to verify programming is working correctly. This was also found on AHU 2. **Source** Test 9, Attempt 1, Line 33 Does the heating coil become open? (If applicable)

Asset 🔅 MMI\_AHU 1 Due Date 2/4/2021 Created By Scott Erlenbusch Identified On 1/21/2021 1:17 PM

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#### TST-9-8 OPEN HIGH

When we opened the heating valve for each AHU the boilers would go into a low flow alarm. Currently there is only one hot water pump running. Once the other pumps are ready to run this may go away.

Source Test 9, Attempt 1, Line 63

Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)

Asset 🔅 MMI\_AHU 1 Due Date 2/4/2021 Created By Scott Erlenbusch Identified On 1/21/2021 1:34 PM



PHWP is in alarm for overfrequency. Source Test 9 MMI\_AHU 1 - AHU - Humidifier/Optimization Asset 🗞 MMI\_AHU 1 Due Date 2/4/2021 Created By Scott Erlenbusch Identified On 1/21/2021 1:44 PM

# TST-9-10 OPEN MODERATE

There is a number of graphic errors that were seen for both AHU 1 and 2. Source Test 9 MMI\_AHU 1 - AHU - Humidifier/Optimization Asset 🧐 MMI\_AHU 1 Due Date 2/5/2021 Created By Scott Erlenbusch Identified On 1/22/2021 7:54 AM

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# **#10 MMI\_AHU 2 - AHU -**Humidifier/Optimization

Optimized Systems | UNMC Humidifier/Optimization | 20-185



FAILED         68% Yes   5% No   25% N/A         6 ISSUES					
		Assigned T Ass	Fo Optimized Systems et  葉  MMI_AHU 2		
Attempts					
Attempt N	IO. 1 FAILED	Status s	et by Scott Erlenbusch on 2/16/2021.		
AIR HANDLI	NG UNIT - SYSTEM DEFICIENCIES TEST.				
THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.					
IF A SENSO APPLICABLE COMMENTS	R, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR E MARK THE TEST ANSWER AS N/A. USE NOTES AND AS OFTEN AS NECESSARY.				
SENSOR VE	RIFICATION:				
OUTDOOR T	EMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E):				
YES 1	Does the outdoor humidity sensor report an acceptable value? BAS=44% RH, NWS=46% RH.	Sc Sc	ott Erlenbusch on 1/20/2021 1:27 PM ott Erlenbusch on 1/20/2021 1:27 PM		
YES 2	Does the outdoor temperature report an acceptable value? BAS=49 degrees, NWS=46 degrees.	Sc Sc	ott Erlenbusch on 1/20/2021 1:25 PM ott Erlenbusch on 1/20/2021 1:26 PM		
YES 3	Document if these sensors are locally wired to the controller, or if they are g values.	global Sc	ott Erlenbusch on 1/20/2021 1:27 PM		
	These sensors are wired in to Panel 501.	Sc	ott Erlenbusch on 1/20/2021 1:27 PM		
RETURN AIF	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):				
YES 4	Does the return air humidity sensor report an acceptable value? BAS=17.9% RH, Amprobe=13.7%. Return air co2 was also pretty close.	Sc Sc	ott Erlenbusch on 1/20/2021 1:40 PM ott Erlenbusch on 1/20/2021 1:43 PM		
RETURN AIR TEMPERATURE SENSOR VERIFICATION:					
YES 5	Does the return air temperature sensor report an acceptable value? BAS=72.36 degrees, Amprobe=73.6 degrees.	Sc Sc	ott Erlenbusch on 1/20/2021 1:42 PM ott Erlenbusch on 1/20/2021 1:42 PM		
YES 6	Is the return air temperature sensor installed in the return air plenum and no the outdoor air or relief air plenums?	ot near Sc	ott Erlenbusch on 1/20/2021 9:56 AM		
YES 7	Is the return air temperature sensor probe the proper length for the size of c installed in?	duct it is Sc	ott Erlenbusch on 1/20/2021 9:56 AM		
MIXED AIR (	ECONOMIZER) TEMPERATURE SENSORS:				
YES 8	Does the mixed air temperature sensor report an acceptable value? BAS=70.5 degrees, Amprobe=70.3 degrees.	Sc Sc	ott Erlenbusch on 1/20/2021 1:46 PM ott Erlenbusch on 1/20/2021 1:47 PM		

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YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 1/20/2021 9:56 AM		
YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 1/20/2021 9:56 AM		
SUPPI	_Y AIF	R HUMIDITY SENSOR VERIFICATION:			
YES	11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 1/21/2021 12:33 PM		
YES	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 1/21/2021 12:33 PM		
SUPPI	_Y AIF	R TEMPERATURE SENSORS:			
YES	13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 1/21/2021 12:33 PM		
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 1/21/2021 12:33 PM		
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 1/21/2021 12:33 PM		
STATI		D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:			
RETUR	RN PL	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):			
YES	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 1/20/2021 9:51 AM		
YES	17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 1/20/2021 9:51 AM		
YES	18	Is the return plenum pressure sensor and analog input ranges setup properly? 1 Issue: TST-10-4	Scott Erlenbusch on 1/20/2021 9:51 AM		
SUPPL	_Y DU	ICT STATIC PRESSURE SENSOR (IF APPLICABLE):			
NO	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 1/20/2021 8:57 AM		
		Unit is being controlled by the SPP on the AHU.	Scott Erlenbusch on 1/20/2021 8:59 AM		
		1 Issue: TST-10-3			
YES	20	Is the supply duct static pressure sensor reporting an acceptable value? SPP value	Scott Erlenbusch on 1/20/2021 1:47 PM Scott Erlenbusch on 1/20/2021 1:47 PM		
YES	21	Is the supply duct static pressure sensor and analog input ranges setup properly? SPP setup is correct.	Scott Erlenbusch on 1/20/2021 1:47 PM Scott Erlenbusch on 1/20/2021 1:48 PM		
BUILD	ING F	RESSURE SENSOR (IF APPLICABLE):			
NO	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit? 1 Issue: TST-10-6	Scott Erlenbusch on 1/20/2021 1:28 PM		
YES	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 1/20/2021 9:55 AM		
YES	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 1/20/2021 9:55 AM		
FILTER	FILTER PRESSURE SENSORS (IF APPLICABLE):				
YES	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 1/20/2021 9:55 AM		
YES	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 1/20/2021 9:55 AM		
YES	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 1/20/2021 9:55 AM		
SAFETY DEVICES VERIFICATION:					

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LOW LIMIT	LOW LIMIT SAFETY DEVICE:				
<b>YES</b> 28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 1/20/2021 8:30 AM			
YES 29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 1/20/2021 8:30 AM			
WHEN THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED				
<b>YES</b> 30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 1/20/2021 8:30 AM			
YES 31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 1/20/2021 8:30 AM			
NO 32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? 1 Issue: TST-10-1	Scott Erlenbusch on 1/20/2021 8:31 AM			
<b>YES</b> 33	Does the heating coil become open? (If applicable) Heating coil did not open on any of the safety trips. Heating valve must be controlled by the preheat temp.	Scott Erlenbusch on 1/20/2021 8:33 AM Scott Erlenbusch on 1/20/2021 8:35 AM			
SUPPLY PL APPLICABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):				
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 1/20/2021 7:30 AM			
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 1/20/2021 7:30 AM			
WHEN THE SWITCH IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED				
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 1/20/2021 7:30 AM			
N/A 37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 1/20/2021 7:30 AM			
N/A 38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 1/20/2021 7:30 AM			
SUPPLY PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):				
YES 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? Tripped at 5.25".	Scott Erlenbusch on 1/20/2021 8:35 AM Scott Erlenbusch on 1/20/2021 8:35 AM			
<b>YES</b> 40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 1/20/2021 8:35 AM			
WHEN THE TRIPPED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS				
<b>YES</b> 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 1/20/2021 8:35 AM			
YES 42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 1/20/2021 8:35 AM			
<b>YES</b> 43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 1/20/2021 8:35 AM			
RETURN P	RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):				
<b>YES</b> 44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 1/20/2021 8:36 AM			
	Tripped at 4.5".	Scott Erlenbusch on 1/20/2021 8:36 AM			
<b>YES</b> 45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 1/20/2021 8:36 AM			
WHEN THE SWITCH IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED				

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YES	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 1/20/2021 8:36 AM		
YES	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 1/20/2021 8:36 AM		
YES	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 1/20/2021 8:36 AM		
RETU	RN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 1/20/2021 7:30 AM		
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 1/20/2021 7:30 AM		
WHEN TRIPF	N THE PED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS			
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 1/20/2021 7:30 AM		
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 1/20/2021 7:30 AM		
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 1/20/2021 7:30 AM		
FAN E	EQUIP	MENT VERIFICATION:			
SUPP	'LY FA	N:			
YES	54	Does the supply fan start and stop when commanded by the BAS? 1 Issue: TST-10-5	Scott Erlenbusch on 1/20/2021 8:36 AM		
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 1/20/2021 8:36 AM		
RETU	RN FA	AN: (IF APPLICABLE)			
YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 1/20/2021 8:36 AM		
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 1/20/2021 8:36 AM		
MINIM VERIF	IUM C	DA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ION:			
NORM	/IAL O	PERATION VERIFICATION:			
N/A	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 1/21/2021 12:33 PM		
		Did not test the dampers because they are going to be replaced.	Scott Erlenbusch on 1/20/2021 8:37 AM		
N/A	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 1/21/2021 12:33 PM		
N/A	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 1/21/2021 12:33 PM		
N/A	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 1/21/2021 12:33 PM		
N/A	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 1/21/2021 12:33 PM		
HEAT	HEATING AND COOLING COILS VERIFICATION:				
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 1/21/2021 12:33 PM		
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 1/20/2021 8:49 AM		
HUMI	DIFIE	R VERIFICATION (IF APPLICABLE):			

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N/A	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed? Self contained steam generator controls amount of steam.	Scott Erlenbusch on 1/20/2021 8:38 AM Scott Erlenbusch on 1/20/2021 8:39 AM	
N/A	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 1/20/2021 8:38 AM	
HUMI APPL	DISTA ICABL	T AND AIRFLOW SWITCH SAFETY VERIFICATION (IF E):		
humii humii air fi	DISTA DIFIEF LOW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.		
YES	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 1/21/2021 12:36 PM	
		There are two duct detectors on the supply fan cabin ceiling but I dont believe they are active. The humidistats are located in the supply fan cabin.	Scott Erlenbusch on 1/21/2021 12:37 PM	
NO	68	Is the airflow switch plumbed in to the AHU supply air plenum? 1 Issue: TST-10-2	Scott Erlenbusch on 1/20/2021 8:39 AM	
N/A	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 1/20/2021 8:40 AM	
TEST COMPLETION VERIFICATION:				
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 1/21/2021 12:38 PM	

#### Issues 6

#### TST-10-1 OPEN HIGH

Return dampers did not move at all when any of the safeties were tripped. I believe all the dampers are slated to be changed at some point. Just wanted to note. **Source** Test 10, Attempt 1, Line 32

Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?

Asset 🌣 MMI\_AHU 2 Discipline Controls Due Date 2/3/2021 Created By Scott Erlenbusch Identified On 1/20/2021 8:33 AM

# TST-10-2 OPEN HIGH

Airflow switch is jumpered out and the sensor is not installed in the supply chamber. Source Test 10, Attempt 1, Line 68 Is the airflow switch plumbed in to the AHU supply air plenum? Asset % MMI\_AHU 2 Discipline Controls Due Date 2/3/2021 Created By Scott Erlenbusch Identified On 1/20/2021 8:40 AM



### TST-10-3 OPEN HIGH

Did not see an SSP sensor in the panel. Unit is being controlled by the SPP at the AHU.

**Source** Test 10, Attempt 1, Line 19 Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? Asset 🔅 MMI\_AHU 2 Discipline Controls Due Date 2/3/2021 Created By Scott Erlenbusch Identified On 1/20/2021 8:58 AM



Return Air static pressure is wrong on the graphic, reading SASP **Source** Test 10, Attempt 1, Line 18 Is the return plenum pressure sensor and analog input ranges setup properly?

Asset S MMI\_AHU 2 Due Date 2/3/2021 Created By Scott Erlenbusch Identified On 1/20/2021 9:53 AM

Descriptor was incorrect, changed to RA Static Press. Scott Erlenbusch on 07/01/2021 at 12:58 PM Optimized Systems

TST-10-5 CLOSED LOW

SA Fault is labeled Proof on the graphic Source Test 10, Attempt 1, Line 54 Does the supply fan start and stop when commanded by the BAS? Asset 🔅 MMI\_AHU 2 Due Date 2/3/2021 Created By Scott Erlenbusch Identified On 1/20/2021 9:54 AM

OS corrected graphic point. Scott Erlenbusch on 07/01/2021 at 12:55 PM Optimized Systems



Building pressure sensor for AHU is located in the hallway outside the North Elevator on First floor. The outdoor air reference is located on the roof. **Source** Test 10, Attempt 1, Line 22 Is the building pressure sensor installed in the best location possible for the areas served by the unit?

Asset 🔅 MMI\_AHU 2 Discipline Controls Due Date 2/3/2021 Created By Scott Erlenbusch Identified On 1/20/2021 1:29 PM

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# **#11 PDD\_AHU 1 - AHU -**Humidifier/Optimization





INCOMPLETE 80% Yes   1% No   17% N/A			
		Assigned To Optimized Systems Asset 🧐 PDD_AHU 1	
Attempts			
Attempt N		Status set by Scott Erlenbusch on 11/12/2020.	
AIR HANDL	ING UNIT - SYSTEM DEFICIENCIES TEST.		
THESE TES EQUIPMEN OVERALL C PRACTICES	TS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH T OPERATION, SENSOR VERIFICATION, AS WELL AS CONTROL SYSTEM DESIGN AND INSTALLATION S.		
IF A SENSC APPLICABL COMMENTS	OR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY.		
SENSOR VE	ERIFICATION:		
OUTDOOR APPLICABL	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E):		
NO 1	Does the outdoor humidity sensor report an acceptable value? BAS=37 degrees, NWS=31 degrees.	Scott Erlenbusch on 11/2/2020 7:51 AM Scott Erlenbusch on 11/2/2020 7:52 AM	
	1 Issue: TST-11-2		
NO 2	Does the outdoor temperature report an acceptable value? BAS=52% RH. NWS=69%RH	Scott Erlenbusch on 11/2/2020 7:52 AM Scott Erlenbusch on 11/2/2020 7:55 AM	
	1 Issue: TST-11-3		
YES 3	Document if these sensors are locally wired to the controller, or if they are g values.	Iobal Scott Erlenbusch on 11/2/2020 7:55 AM	
	The OA and OAH values appear to be coming from Panel 401.	Scott Erlenbusch on 11/2/2020 7:56 AM	
RETURN AI	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):		
YES 4	Does the return air humidity sensor report an acceptable value?	Scott Erlenbusch on 11/2/2020 7:59 AM	
	BAS=14.6% RH, Amprobe=12.7% RH	Scott Erlenbusch on 11/2/2020 8:00 AM	
RETURN AI	R TEMPERATURE SENSOR VERIFICATION:		
YES 5	Does the return air temperature sensor report an acceptable value? BAS=71.7 degrees, Amprobe=71.7 degrees.	Scott Erlenbusch on 11/2/2020 8:01 AM Scott Erlenbusch on 11/2/2020 8:02 AM	
YES 6	Is the return air temperature sensor installed in the return air plenum and no the outdoor air or relief air plenums?	t near Scott Erlenbusch on 11/2/2020 8:06 AM	
YES 7	Is the return air temperature sensor probe the proper length for the size of c installed in?	uct it is Scott Erlenbusch on 11/2/2020 8:07 AM	
	18" probe	Scott Erlenbusch on 11/2/2020 8:07 AM	

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#### MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:

YES	8	Does the mixed air temperature sensor report an acceptable value? BAS=39.6 degrees, Amprobe 42.5 degrees.	Scott Erlenbusch on 11/2/2020 8:12 AM Scott Erlenbusch on 11/2/2020 8:13 AM	
YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 11/2/2020 8:07 AM	
YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 11/2/2020 8:07 AM	
SUPP	LY AIF	R HUMIDITY SENSOR VERIFICATION:		
N/A	11	Does the supply air humidity sensor report an acceptable value? I did not see a supply humidity sensor installed and there is no point for one in Panel 401.	Scott Erlenbusch on 11/2/2020 8:14 AM Scott Erlenbusch on 11/2/2020 8:15 AM	
N/A	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 11/2/2020 8:15 AM	
SUPP	LY AIF	R TEMPERATURE SENSORS:		
YES	13	Does the supply air temperature sensor report an acceptable value? BAS=62.5 degrees, Amprobe=63 degrees.	Scott Erlenbusch on 11/2/2020 8:18 AM Scott Erlenbusch on 11/2/2020 8:19 AM	
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 11/2/2020 8:11 AM	
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 11/2/2020 8:11 AM	
		18" probe	Scott Erlenbusch on 11/2/2020 8:11 AM	
STAT	IC ANI	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:		
RETU	RN PL	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):		
YES	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 11/2/2020 8:22 AM	
YES	17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/2/2020 8:24 AM	
		.01"WC	Scott Erlenbusch on 11/2/2020 8:24 AM	
YES	18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 11/2/2020 8:24 AM	
SUPP	LY DU	ICT STATIC PRESSURE SENSOR (IF APPLICABLE):		
YES	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 11/12/2020 10:04 AM	
		Did not physically find the static pressure sensor. Sensor was reporting an acceptable value and the fans were controlling to that value.	Scott Erlenbusch on 11/12/2020 10:05 AM	
YES	20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/12/2020 10:05 AM	
	21	Is the supply duct static pressure sensor and analog input ranges setup properly?		
BUILDING PRESSURE SENSOR (IF APPLICABLE):				
YES	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 11/2/2020 11:56 AM	
		Spoke with Tyler and he had a new one installed on 1st floor.	Scott Erlenbusch on 11/2/2020 11:56 AM	
YES	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/2/2020 10:23 AM	
YES	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 11/2/2020 11:54 AM	

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		Spott Erlandugah an 11/2/2020 11:54				
	the AHU is not setup correctly and not plumbed correctly.	AM				
FILTER PR	FILTER PRESSURE SENSORS (IF APPLICABLE):					
YES 25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 11/2/2020 8:34 AM				
<b>YES</b> 26	Are all the filter pressure sensors reporting an acceptable value? .34"WC	Scott Erlenbusch on 11/2/2020 8:35 AM Scott Erlenbusch on 11/2/2020 8:35 AM				
YES 27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 11/2/2020 8:36 AM				
SAFETY DE	VICES VERIFICATION:					
LOW LIMIT	SAFETY DEVICE:					
YES 28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil? 1 Issue: TST-11-4	Scott Erlenbusch on 11/2/2020 8:51 AM				
YES 29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 11/2/2020 11:26 AM				
WHEN THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED					
<b>YES</b> 30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/2/2020 11:26 AM				
NO 31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/2/2020 11:26				
	1 Issue: TST-11-10					
NO 32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/2/2020 11:31 AM				
NO 33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 11/2/2020 11:31				
	Heating coil stayed closed when LTD tripped. This may not be an issue but wanted to note it.	Scott Erlenbusch on 11/2/2020 11:32 AM				
	1 Issue: TST-11-14					
SUPPLY PL APPLICABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):					
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 11/2/2020 10:00 AM				
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 11/2/2020 10:00 AM				
WHEN THE SWITCH IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED					
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/2/2020 10:00 AM				
N/A 37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/2/2020 10:00 AM				
N/A 38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/2/2020 10:00 AM				
SUPPLY PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):					
NO 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 11/13/2020 8:02 AM				
	1 Issue: TST-11-9					

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<b>YES</b> 40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 11/2/2020 10:00 AM			
WHEN TH TRIPPED.	WHEN THE SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED				
<b>YES</b> 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/2/2020 11:26 AM			
NO 42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/2/2020 11:26 AM			
NO 43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/2/2020 11:26 AM			
RETURN F	PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF LE):				
NO 44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 11/2/2020 11:13 AM			
	Tripped at 4" WC, that seems a little high.	Scott Erlenbusch on 11/2/2020 11:14 AM			
	1 Issue: TST-11-8				
<b>YES</b> 45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 11/2/2020 11:15 AM			
WHEN TH SWITCH IS	E RETURN PLENUM LOW SUCTION PRESSURE SAFETY S TRIPPED				
<b>YES</b> 46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/2/2020 11:15 AM			
NO 47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/2/2020 11:15 AM			
NO 48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/2/2020 11:15 AM			
RETURN F	PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):				
N/A 49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 11/2/2020 9:59 AM			
N/A 50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 11/2/2020 9:59 AM			
WHEN TH TRIPPED.	E RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS				
N/A 51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/2/2020 9:59 AM			
N/A 52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/2/2020 9:59 AM			
N/A 53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/2/2020 9:59 AM			
FAN EQUIPMENT VERIFICATION:					
SUPPLY F	AN:				
YES 54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 11/2/2020 11:31 AM			
YES 55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 11/2/2020 10:02 AM			
RETURN	RETURN FAN: (IF APPLICABLE)				
<b>YES</b> 56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 11/2/2020 11:31 AM			

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YES 57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 11/2/2020 10:02 AM			
MINIMUM ( VERIFICAT	MINIMUM OA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER VERIFICATION:				
NORMAL C	PERATION VERIFICATION:				
N/A 58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 11/2/2020 10:03 AM			
NO 59	Do the relief air damper actuators fully open and close when commanded by the BAS? 1 Issue: TST-11-11	Scott Erlenbusch on 11/2/2020 11:27 AM			
<b>YES</b> 60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 11/2/2020 10:42 AM			
<b>YES</b> 61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS? 1 Issue: TST-11-12	Scott Erlenbusch on 11/2/2020 10:42 AM			
NO 62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS? 1 Issue: TST-11-6	Scott Erlenbusch on 11/2/2020 10:40 AM			
HEATING A	ND COOLING COILS VERIFICATION:				
<b>YES</b> 63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 11/2/2020 10:42 AM			
<b>YES</b> 64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 11/2/2020 10:42 AM			
HUMIDIFIE	R VERIFICATION (IF APPLICABLE):				
N/A 65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 11/2/2020 10:43 AM			
N/A 66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 11/2/2020 10:45 AM			
HUMIDISTA APPLICABI	AT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF .E):				
HUMIDISTAT AND AIRFLOW SWITCH ARE USED TO SHUT THE HUMIDIFIER VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR AIR FLOW SWITCH IS NOT CLOSED.					
N/A 67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 11/2/2020 10:45 AM			
N/A 68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 11/2/2020 10:45 AM			
N/A 69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 11/2/2020 10:45 AM			
TEST COM	PLETION VERIFICATION:				
<b>YES</b> 70	Have all overrides on the AHU been released?	Scott Erlenbusch on 11/2/2020 11:30 AM			

Attempt No. 2 INCOMPLETE

Status set by Scott Erlenbusch on 3/29/2021.

AIR HANDLING UNIT - SYSTEM DEFICIENCIES TEST.



THESE T EQUIPM OVERAL PRACTIO	THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.				
IF A SEN APPLICA COMME	NSO ABLE NTS	R, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR E MARK THE TEST ANSWER AS N/A. USE NOTES AND AS OFTEN AS NECESSARY.			
SENSOF	R VE	RIFICATION:			
OUTDOO APPLICA	or 1 Able	EMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E):			
YES 1		Does the outdoor humidity sensor report an acceptable value?	Scott Erlenbusch on 3/29/2021 10:34 AM		
		Strategic replaced the sensor but the humidity is still reading differently than NWS at Eppley. BAS=31% RH,NWS=42% RH.	Scott Erlenbusch on 3/29/2021 10:41 AM		
NO 2		Does the outdoor temperature report an acceptable value?	Scott Erlenbusch on 3/29/2021 10:25 AM		
		Strategic replaced the OAT and OAH sensor but temperature is still a little off because the sensor is located on the Southeast side of the building. It is probably getting some direct sun. May need to get some sort of shield for the sensor. BAS=68 degrees, NWS=59 degrees.	Scott Erlenbusch on 3/29/2021 10:34 AM		
YES 3		Document if these sensors are locally wired to the controller, or if they are global values.	Scott Erlenbusch on 3/29/2021 10:25 AM		
		The OA and OAH values appear to be coming from Panel 401.	Scott Erlenbusch on 3/29/2021 10:25 AM		
RETURN	N AIF	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):			
YES 4		Does the return air humidity sensor report an acceptable value?	Scott Erlenbusch on 3/29/2021 10:25 AM		
		BAS=14.6% RH, Amprobe=12.7% RH	Scott Erlenbusch on 3/29/2021 10:25 AM		
RETURN	N AIF	R TEMPERATURE SENSOR VERIFICATION:			
YES 5		Does the return air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/29/2021 10:25 AM		
		BAS=71.7 degrees, Amprobe=71.7 degrees.	Scott Erlenbusch on 3/29/2021 10:25 AM		
YES 6		Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?	Scott Erlenbusch on 3/29/2021 10:25 AM		
YES 7		Is the return air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 3/29/2021 10:25 AM		
		18" probe	Scott Erlenbusch on 3/29/2021 10:25 AM		
MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:					
YES 8		Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/29/2021 10:25 AM		
		BAS=39.6 degrees, Amprobe 42.5 degrees.	Scott Erlenbusch on 3/29/2021 10:25 AM		
YES 9		Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 3/29/2021 10:25 AM		
<b>YES</b> 10	0	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 3/29/2021 10:25 AM		
SUPPLY	AIR	HUMIDITY SENSOR VERIFICATION:			

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<b>YES</b> 11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 3/29/2021 10:43
	Strategic installed a Supply humidity sensor.	Scott Erlenbusch on 3/29/2021 10:43 AM
YES 12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 3/29/2021 10:43 AM
	Installed 10' downstream of the humidifier.	Scott Erlenbusch on 3/29/2021 10:45 AM
SUPPLY A	IR TEMPERATURE SENSORS:	
<b>YES</b> 13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/29/2021 10:25 AM
	BAS=62.5 degrees, Amprobe=63 degrees.	Scott Erlenbusch on 3/29/2021 10:25 AM
<b>YES</b> 14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 3/29/2021 10:25 AM
YES 15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 3/29/2021 10:25 AM
	18" probe	Scott Erlenbusch on 3/29/2021 10:25 AM
STATIC A	ND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:	
RETURN	PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	
<b>YES</b> 16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 3/29/2021 10:25 AM
YES 17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/29/2021 10:25
	.01"WC	Scott Erlenbusch on 3/29/2021 10:25 AM
YES 18	.01"WC Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM
YES 18 SUPPLY [	.01"WC Is the return plenum pressure sensor and analog input ranges setup properly? UCT STATIC PRESSURE SENSOR (IF APPLICABLE):	Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM
YES 18 SUPPLY D YES 19	.01"WC         Is the return plenum pressure sensor and analog input ranges setup properly?         UCT STATIC PRESSURE SENSOR (IF APPLICABLE):         Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM
YES 18 SUPPLY [ YES 19	.01"WC         Is the return plenum pressure sensor and analog input ranges setup properly?         UCT STATIC PRESSURE SENSOR (IF APPLICABLE):         Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?         Did not physically find the static pressure sensor. Sensor was reporting an acceptable value and the fans were controlling to that value.	Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM
YES 18 SUPPLY I YES 19 YES 20	.01"WC         Is the return plenum pressure sensor and analog input ranges setup properly?         UCT STATIC PRESSURE SENSOR (IF APPLICABLE):         Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?         Did not physically find the static pressure sensor. Sensor was reporting an acceptable value and the fans were controlling to that value.         Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM
YES       18         SUPPLY I         YES       19         YES       20         21	.01"WCIs the return plenum pressure sensor and analog input ranges setup properly?UCT STATIC PRESSURE SENSOR (IF APPLICABLE):Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?Did not physically find the static pressure sensor. Sensor was reporting an acceptable value and the fans were controlling to that value.Is the supply duct static pressure sensor reporting an acceptable value?Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM
YES 18 SUPPLY I YES 19 YES 20 21 BUILDING	.01"WC         Is the return plenum pressure sensor and analog input ranges setup properly?         UCT STATIC PRESSURE SENSOR (IF APPLICABLE):         Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?         Did not physically find the static pressure sensor. Sensor was reporting an acceptable value and the fans were controlling to that value.         Is the supply duct static pressure sensor reporting an acceptable value?         Is the supply duct static pressure sensor and analog input ranges setup properly?         PRESSURE SENSOR (IF APPLICABLE):	Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM
YES       18         SUPPLY I         YES       19         YES       20         21         BUILDING         YES       22	.01"WC         Is the return plenum pressure sensor and analog input ranges setup properly?         DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):         Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?         Did not physically find the static pressure sensor. Sensor was reporting an acceptable value and the fans were controlling to that value.         Is the supply duct static pressure sensor reporting an acceptable value?         Is the supply duct static pressure sensor and analog input ranges setup properly?         PRESSURE SENSOR (IF APPLICABLE):         Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM
YES       18         SUPPLY I       19         YES       19         YES       20         21       10         BUILDING       22	.01"WC         Is the return plenum pressure sensor and analog input ranges setup properly?         PUCT STATIC PRESSURE SENSOR (IF APPLICABLE):         Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?         Did not physically find the static pressure sensor. Sensor was reporting an acceptable value and the fans were controlling to that value.         Is the supply duct static pressure sensor reporting an acceptable value?         Is the supply duct static pressure sensor and analog input ranges setup properly?         PRESSURE SENSOR (IF APPLICABLE):         Is the building pressure sensor installed in the best location possible for the areas served by the unit?         Spoke with Tyler and he had a new one installed on 1st floor.	Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM
YES       18         SUPPLY I         YES       19         YES       20         21         BUILDING         YES       22	.01"WC         Is the return plenum pressure sensor and analog input ranges setup properly?         UCT STATIC PRESSURE SENSOR (IF APPLICABLE):         Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?         Did not physically find the static pressure sensor. Sensor was reporting an acceptable value and the fans were controlling to that value.         Is the supply duct static pressure sensor reporting an acceptable value?         Is the supply duct static pressure sensor and analog input ranges setup properly?         PRESSURE SENSOR (IF APPLICABLE):         Is the building pressure sensor installed in the best location possible for the areas served by the unit?         Spoke with Tyler and he had a new one installed on 1st floor.         Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM
YES       18         SUPPLY I         YES       19         YES       20         21         BUILDING         YES       22         YES       23         YES       24	.01"WC         Is the return plenum pressure sensor and analog input ranges setup properly?         UCT STATIC PRESSURE SENSOR (IF APPLICABLE):         Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?         Did not physically find the static pressure sensor. Sensor was reporting an acceptable value and the fans were controlling to that value.         Is the supply duct static pressure sensor reporting an acceptable value?         Is the supply duct static pressure sensor and analog input ranges setup properly?         PRESSURE SENSOR (IF APPLICABLE):         Is the building pressure sensor installed in the best location possible for the areas served by the unit?         Spoke with Tyler and he had a new one installed on 1st floor.         Is the building pressure sensor reporting an acceptable value?         Is the building pressure sensor reporting an acceptable value?         Is the building pressure sensor installed in the best location possible for the areas served by the unit?         Spoke with Tyler and he had a new one installed on 1st floor.         Is the building pressure sensor reporting an acceptable value?         Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM
YES       18         SUPPLY I         YES       19         YES       20         21         BUILDING         YES       22         YES       23         YES       24	.01"WCIs the return plenum pressure sensor and analog input ranges setup properly?UCT STATIC PRESSURE SENSOR (IF APPLICABLE):Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?Did not physically find the static pressure sensor. Sensor was reporting an acceptable value and the fans were controlling to that value.Is the supply duct static pressure sensor reporting an acceptable value?Is the supply duct static pressure sensor and analog input ranges setup properly?PRESSURE SENSOR (IF APPLICABLE):Is the building pressure sensor installed in the best location possible for the areas served by the unit?Spoke with Tyler and he had a new one installed on 1st floor.Is the building pressure sensor and analog input ranges setup properly?Is the building pressure sensor and analog input ranges setup properly?Is the building pressure sensor reporting an acceptable value?Is the building pressure sensor and analog input ranges setup properly?There is a new building pressure sensor installed in 1st floor lobby. The one on the AHU is not setup correctly and not plumbed correctly.	Scott Erlenbusch on 3/29/2021 10:25 AM Scott Erlenbusch on 3/29/2021 10:25 AM

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YES	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 3/29/2021 10:25 AM		
YES	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 3/29/2021 10:25 AM		
		.34"WC	Scott Erlenbusch on 3/29/2021 10:25 AM		
YES	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 3/29/2021 10:25 AM		
SAFE	TY DE	VICES VERIFICATION:			
LOW	LIMIT	SAFETY DEVICE:			
YES	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 3/29/2021 10:25 AM		
YES	29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 3/29/2021 10:25 AM		
WHEN	N THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED			
YES	30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/29/2021 10:25 AM		
YES	31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/29/2021 10:45 AM		
		Strategic found that the safety relay board was not wired correctly. They re-wired and OS tested operation.	Scott Erlenbusch on 3/29/2021 10:47 AM		
YES	32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/29/2021 10:46 AM		
YES	33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 3/29/2021 10:46 AM		
		Heating coil stayed closed when LTD tripped. This may not be an issue but wanted to note it.	Scott Erlenbusch on 3/29/2021 10:25 AM		
SUPP APPL	'LY PL ICABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):			
N/A	34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 3/29/2021 10:25 AM		
N/A	35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 3/29/2021 10:25 AM		
WHEN SWIT	N THE	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED			
N/A	36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/29/2021 10:25 AM		
N/A	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/29/2021 10:25 AM		
N/A	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/29/2021 10:25 AM		
SUPP	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):				
YES	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/29/2021 10:47 AM		
		High static cutout is set to trip at 5 inWC. This is a little high, but when the AHU ramps up from a restart the SPP will get up to 4+ inWC.	Scott Erlenbusch on 3/29/2021 10:48 AM		
YES	40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 3/29/2021 10:25 AM		



YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/29/2021	10:25 AM	
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/29/2021	10:25 AM	
SUPPL		N:			
		and the return air dampers open?		AM	
N/A	52	Are the supply and return tan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/29/2021	10:25 AM	
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/29/2021	10:25 AM	
WHEN TRIPP	THE ED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS			
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 3/29/2021	10:25 AM	
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/29/2021	10:25 AM	
RETUR	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):				
YES	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/29/2021	10:53 AM	
YES	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/29/2021	10:52 AM	
		Strategic found that the safety relay board was not wired correctly. They re-wired and OS tested operation.	Scott Erlenbusch on 3/29/2021	10:53 AM	
YES	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/29/2021	10:25 AM	
WHEN SWITC	THE	RETURN PLENUM LOW SUCTION PRESSURE SAFETY IRIPPED			
YES	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 3/29/2021	10:25 AM	
		Strategic re-adjusted. Tripped at 2.5" WC.	Scott Erlenbusch on 3/29/2021	10:59 AM	
YES	44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/29/2021	10:56 AM	
RETUR APPLI	RN PL CABLI	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):			
YES	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/29/2021	10:49 AM	
YES	42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/29/2021	10:48 AM	
		Strategic found that the safety relay board was not wired correctly. They re-wired and OS tested operation.	Scott Erlenbusch on 3/29/2021	10:49 AM	
YES	41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/29/2021	10:25 AM	
WHEN THE SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED					

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YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/29/2021 10:25 AM
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/29/2021 10:25 AM
MINIM VERIF	IUM O FICATI	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:	
NORN	/IAL OI	PERATION VERIFICATION:	
N/A	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 3/29/2021 10:25 AM
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 3/29/2021 10:52 AM
YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 3/29/2021 10:25 AM
YES	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 3/29/2021 10:25 AM
YES	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 3/29/2021 10:52 AM
HEAT	ING A	ND COOLING COILS VERIFICATION:	
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/29/2021 10:25 AM
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/29/2021 10:25 AM
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):	
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 3/29/2021 10:50 AM
N/A	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 3/29/2021 10:25 AM
		When we tested the humidifier valve the manual steam valve was valved off.	Scott Erlenbusch on 3/29/2021 10:51 AM
HUMI APPL	DISTA ICABL	T AND AIRFLOW SWITCH SAFETY VERIFICATION (IF E):	
Humi Humi Air F	DISTA DIFIEF LOW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.	
YES	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 3/29/2021 10:50 AM
YES	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 3/29/2021 10:50 AM
YES	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 3/29/2021 10:50 AM
		OS tested the safeties and the humidifier valve closed when the safeties went in to alarm.	Scott Erlenbusch on 3/29/2021 10:52 AM
TEST	COMF	PLETION VERIFICATION:	
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 3/29/2021 10:25 AM

**Issues** 12

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## TST-11-1 CLOSED HIGH

The mixed air temperature is 30 degrees. Mixed air minimum temperature is 50 degrees on the graphics. Why is code letting the MAT go so low? OS to verify programming. **Source** Test 11

PDD\_AHU 1 - AHU - Humidifier/Optimization

Asset SPDD\_AHU 1 Discipline Optimization Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 7:43 AM

Updated Programming to limit outside air and mixed air temp Tyler Mueller on 03/02/2021 at 10:41 AM Optimized Systems

# TST-11-2 CLOSED HIGH

OA temperature value differs from the NWS temperature. BAS=37 degrees, NWS=31 degrees. Source Test 11, Attempt 1, Line 1 Does the outdoor humidity sensor report an acceptable value? Asset S PDD\_AHU 1 Discipline Controls Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 7:54 AM

Stregtic changed sensor, reading 4 degree difference between the campus BMS temp, sensor might be picking up heat from being on the east side of the building

Marcus Houser on 02/25/2021 at 02:09 PM Optimized Systems

# TST-11-3 CLOSED HIGH

OA humidity value is different than the NWS. BAS=52% RH, NWS=69%RH. This point is coming from Panel 401. Replace outdoor humidity sensor. **Source** Test 11, Attempt 1, Line 2 Does the outdoor temperature report an acceptable value? Asset % PDD\_AHU 1 Discipline Controls Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 7:55 AM

New Sensor Installed, programming updated Tyler Mueller on 03/02/2021 at 10:56 AM Optimized Systems

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### TST-11-4 CLOSED HIGH

There are three freeze stats installed. The routing could be a little better to cover some areas that are missed. If we cannot cover these areas with existing then one LTD may need to be added. **Source** Test 11, Attempt 1, Line 28

Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

Asset % PDD\_AHU 1 Discipline Controls Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 8:53 AM

retested LTD, verified it works Marcus Houser on 02/25/2021 at 02:07 PM Optimized Systems

#### 3 extra freeze stats added with existing ones

Marcus Houser on 02/25/2021 at 01:04 PM

TST-11-6 CLOSED HIGH

**Optimized Systems** 

MOA damper does not close fully when commanded. Source Test 11, Attempt 1, Line 62 Do the minimum outdoor air dampers open and close fully when commanded by the BAS? Asset S PDD\_AHU 1 Discipline Controls Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 10:41 AM

Damper has been adjusted and closes fully now, tested and verified Marcus Houser on 02/25/2021 at 02:02 PM Optimized Systems

# TST-11-8 CLOSED HIGH

Low static cutout tripped at 4" WC, that is a little high. Set switch to trip at 2.5".

**Source** Test 11, Attempt 1, Line 44 Is the low suction pressure safety switch calibrated properly in order to not trip early? Asset % PDD\_AHU 1 Discipline Controls Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 11:15 AM

Low Static cutout has been adjusted to 2.5" in wc: tested Marcus Houser on 02/25/2021 at 02:02 PM Optimized Systems

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### TST-11-9 CLOSED HIGH

High static cutout tripped at 5" WC. This is a little high but when AHU started up after the safeties were tripped it ramped up to over 4" WC. Verify ramp in programming and set trip point to 4" if possible. **Source** Test 11, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early? Asset % PDD\_AHU 1 Discipline Optimization Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 11:17 AM

Adjusted high static cutout to 4.5" in wc and tested Marcus Houser on 02/25/2021 at 02:03 PM Optimized Systems

TST-11-10 CLOSED HIGH

Supply and Return fan drives are still able to run in hand or bypass when any of the safeties are tripped. Source Test 11, Attempt 1, Line 31 Are the supply and return fan VFD's prohibited from running in hand or bypass? Asset % PDD\_AHU 1 Discipline Controls Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 11:27 AM

Safety board in the panel was not wired correctly, safety relay was wired normally closed. Tested and verified drives do not turn on

when a safety is on Marcus Houser on 02/25/2021 at 02:05 PM Optimized Systems

# TST-11-11 CLOSED HIGH

Relief air dampers are stuck at 100% open. The dampers did not move at all when commanded. Source Test 11, Attempt 1, Line 59 Do the relief air damper actuators fully open and close when commanded by the BAS? Asset 🔅 PDD\_AHU 1 Discipline Controls Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 11:28 AM

Relief air dampers have been adjusted and we verified close and open all the way. New actuators were also installed. Marcus Houser on 02/25/2021 at 01:42 PM

Optimized Systems

TST-11-12 CLOSED MODERATE

OA damper is open slightly when commanded closed. Source Test 11, Attempt 1, Line 61 Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS? Asset 🔅 PDD\_AHU 1 Discipline Controls Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 11:29 AM

OA damper has been adjusted and we tested and verified closed position. Marcus Houser on 02/25/2021 at 01:42 PM

Optimized Systems



# TST-11-13 OPEN HIGH

PDD\_AHU 1 - AHU - Humidifier/Optimization

Supply plenum pressure went up to over 4"WC when the AHU re-started from a safety failure. May need to look at the programming. Verify ramp speed in programming. Source Test 11 Asset 🌣 PDD\_AHU 1 Discipline Optimization Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 11:31 AM



Heating coil stayed closed when LTD tripped. This may not be an issue but wanted to note it. Verify coils are protected in programming. **Source** Test 11, Attempt 1, Line 33 Does the heating coil become open? (If applicable) Asset Specific PDD\_AHU 1 Discipline Optimization Due Date 11/16/2020 Created By Scott Erlenbusch Identified On 11/2/2020 11:32 AM

Tested, hot water pump turns on Marcus Houser on 02/25/2021 at 02:04 PM Optimized Systems

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# **#12 SLC\_AHU 3 - AHU -**Humidifier/Optimization

Optimized Systems | UNMC Humidifier/Optimization | 20-185



NCOMPLET	E 77% Yes   2% No   20% N/A	14 ISSUES
	A	Assigned To Optimized Systems Asset 🖏 SLC_AHU 3
Attempts		
Attempt	No. 1 FAILED	Status set by Scott Erlenbusch on 11/19/2020
AIR HAND	LING UNIT - SYSTEM DEFICIENCIES TEST.	
THESE TE EQUIPME OVERALL PRACTICE	STS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH NT OPERATION, SENSOR VERIFICATION, AS WELL AS CONTROL SYSTEM DESIGN AND INSTALLATION ES.	
IF A SENS APPLICAE COMMEN	OR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR SLE MARK THE TEST ANSWER AS N/A. USE NOTES AND TS AS OFTEN AS NECESSARY.	
SENSOR	/ERIFICATION:	
OUTDOOF APPLICAE	R TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF SLE):	
YES 1	Does the outdoor humidity sensor report an acceptable value?	Scott Erlenbusch on 10/12/2020 12:1 PN
YES 2	Does the outdoor temperature report an acceptable value?	Scott Erlenbusch on 10/12/2020 12:13 PN
YES 3	Document if these sensors are locally wired to the controller, or if they are glo values.	bal Scott Erlenbusch on 10/12/2020 12:1
	There are SLC temp and humidity points in panel 302. These are not the po being used on the AHU 3 graphic. Those points I could not find in any of the panels.	nts Scott Erlenbusch on 10/12/2020 12:1 SLC PN
RETURN	AIR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):	
YES 4	Does the return air humidity sensor report an acceptable value?	Scott Erlenbusch on 10/12/2020 12:19
RETURN	AIR TEMPERATURE SENSOR VERIFICATION:	
YES 5	Does the return air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/12/2020 12:20
	BAS=73.1 degrees, Fluke=72.5 degrees.	Scott Erlenbusch on 10/12/2020 12:29 PN
YES 6	Is the return air temperature sensor installed in the return air plenum and not the outdoor air or relief air plenums?	near Scott Erlenbusch on 10/12/2020 12:20
YES 7	Is the return air temperature sensor probe the proper length for the size of du installed in?	ct it is Scott Erlenbusch on 10/12/2020 12:20 PN
	18" probe	Scott Erlenbusch on 10/12/2020 12:29 PM
	R (ECONOMIZER) TEMPERATURE SENSORS	

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YES	8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/12/2020 12:32 PM		
		BAS=70.3 degrees, Fluke=69.8 degrees.	Scott Erlenbusch on 10/12/2020 12:33 PM		
YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 10/12/2020 12:33 PM		
YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 10/12/2020 12:33 PM		
SUPP	ly Aif	R HUMIDITY SENSOR VERIFICATION:			
YES	11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 10/12/2020 12:39 PM		
NO	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor. 1 Issue: TST-12-11	Scott Erlenbusch on 10/12/2020 12:40 PM		
SUPP	ly Aif	R TEMPERATURE SENSORS:			
YES	13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 10/12/2020 12:52 PM		
		BAS=54.1 degrees, Fluke=Same	Scott Erlenbusch on 10/12/2020 12:52 PM		
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 10/12/2020 12:50 PM		
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 10/12/2020 12:50 PM		
		18" probe	Scott Erlenbusch on 10/12/2020 12:50 PM		
STATIC AND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:					
STATI	C ANI	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:			
STATI RETU	C ANI RN PL	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):			
STATI RETU	C ANI RN PL 16	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-12-12	Scott Erlenbusch on 10/12/2020 11:23 AM		
STATI RETUR YES	C ANI RN PL 16 17	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-12-12 Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM		
STATI RETU YES YES	C ANI RN PL 16 17 18	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-12-12 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM		
STATI RETU YES YES SUPP	C ANI RN PL 16 17 18 LY DU	DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-12-12 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM		
STATI RETU YES YES SUPP	C ANI RN PL 16 17 18 LY DL 19	DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-12-12 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 3:26 PM		
STATI RETU YES YES SUPP	C ANI RN PL 16 17 18 LY DL 19	DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-12-12 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? Pressure tap is in room 1041. The pressure sensor is in room 1043.	Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM		
STATI RETU YES YES SUPP YES	C ANI RN PL 16 17 18 LY DL 19 20	DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-12-12 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? Pressure tap is in room 1041. The pressure sensor is in room 1043. Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 PM Scott Erlenbusch on 10/12/2020 3:26 PM Scott Erlenbusch on 10/12/2020 12:54 PM		
STATI RETU YES YES SUPP YES YES	C ANI RN PL 16 17 18 LY DL 19 20 21	DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-12-12 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? ICT STATIC PRESSURE SENSOR (IF APPLICABLE): Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? Pressure tap is in room 1041. The pressure sensor is in room 1043. Is the supply duct static pressure sensor reporting an acceptable value? Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 3:26 PM Scott Erlenbusch on 10/12/2020 3:26 PM Scott Erlenbusch on 10/12/2020 12:54 PM		
STATI RETU YES YES SUPP YES YES BUILD	C ANI RN PL 16 17 18 LY DL 19 20 21 21	DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-12-12 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? IS the return plenum pressure sensor installed at least 2/3's down the duct, or in the best location possible? Pressure tap is in room 1041. The pressure sensor is in room 1043. Is the supply duct static pressure sensor reporting an acceptable value? Is the supply duct static pressure sensor and analog input ranges setup properly? RESSURE SENSOR (IF APPLICABLE):	Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 3:26 PM Scott Erlenbusch on 10/12/2020 3:26 PM Scott Erlenbusch on 10/12/2020 12:54 PM		
STATI RETU YES YES SUPP YES YES BUILD NO	C ANI RN PL 16 17 18 LY DL 19 20 21 21 22	DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-12-12 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? IS the return plenum pressure sensor installed at least 2/3's down the duct, or in the best location possible? Pressure tap is in room 1041. The pressure sensor is in room 1043. Is the supply duct static pressure sensor reporting an acceptable value? Is the supply duct static pressure sensor reporting an acceptable value? Is the supply duct static pressure sensor reporting an acceptable value? Is the supply duct static pressure sensor reporting an acceptable value? Is the supply duct static pressure sensor and analog input ranges setup properly? Is the supply duct static pressure sensor and analog input ranges setup properly? Is the supply duct static pressure sensor and analog input ranges setup properly? Is the supply duct static pressure sensor and analog input ranges setup properly? Is the supply duct static pressure sensor and analog input ranges setup properly? Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 3:26 PM Scott Erlenbusch on 10/12/2020 3:26 PM Scott Erlenbusch on 10/12/2020 12:54 PM Scott Erlenbusch on 10/13/2020 7:43 AM		
STATI RETU YES YES SUPP YES YES BUILD	C ANI RN PL 16 17 18 LY DL 19 20 21 21 21 22	DIFFERENTIAL PRESSURE SENSORS VERIFICATION: ENUM STATIC PRESSURE SENSOR (IF APPLICABLE): Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? 1 Issue: TST-12-12 Is the return plenum pressure sensor reporting an acceptable value? Is the return plenum pressure sensor and analog input ranges setup properly? Is the return plenum pressure sensor and analog input ranges setup properly? Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? Pressure tap is in room 1041. The pressure sensor is in room 1043. Is the supply duct static pressure sensor and analog input ranges setup properly? Is the supply duct static pressure sensor and analog input ranges setup properly? Is the supply duct static pressure sensor and analog input ranges setup properly? Is the supply duct static pressure sensor and analog input ranges setup properly? Is the supply duct static pressure sensor and analog input ranges setup properly? Is the supply duct static pressure sensor and analog input ranges setup properly? Is the building pressure sensor installed in the best location possible for the areas served by the unit? There was not a building pressure sensor point in the panel.	Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 AM Scott Erlenbusch on 10/12/2020 11:23 PM Scott Erlenbusch on 10/12/2020 3:26 PM Scott Erlenbusch on 10/12/2020 12:54 PM Scott Erlenbusch on 10/13/2020 7:43 AM Scott Erlenbusch on 10/13/2020 7:43 AM		

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N/A	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 10/12/2020 1:04 PM
N/A	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 10/12/2020 1:04 PM
FILTER	R PRE	ESSURE SENSORS (IF APPLICABLE):	
YES	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 10/12/2020 11:12 AM
YES	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 10/12/2020 11:12 AM
YES	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 10/12/2020 11:12 AM
SAFET	Y DE	VICES VERIFICATION:	
LOW L	IMIT	SAFETY DEVICE:	
NO	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil? 1 Issue: TST-12-8	Scott Erlenbusch on 10/12/2020 9:58 AM
YES	29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 10/12/2020 9:58 AM
WHEN	THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED	
YES	30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/12/2020 9:56 AM
NO	31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/12/2020 9:56
		Return fan did lose its start enable and would not run in bypass or hand.	Scott Erlenbusch on 10/12/2020 10:00
		1 Issue: TST-12-7	
YES	32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/12/2020 9:58 AM
YES	33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 10/12/2020 9:58 AM
SUPPL APPLIC	Y PL CABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	
N/A	34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 10/12/2020 9:13 AM
N/A	35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 10/12/2020 9:13 AM
WHEN SWITC	THE H IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	
N/A	36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/12/2020 9:13 AM
N/A	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/12/2020 9:13 AM
N/A	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/12/2020 9:13 AM
SUPPL	Y PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
NO	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/12/2020 10:18 AM
		1 Issue: TST-12-10	

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YES 40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 10/12/2020 9:37 AM				
	1 Issue: TST-12-6					
WHEN TI TRIPPED	WHEN THE SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED					
YES 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/12/2020 10:18 AM				
NO 42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/12/2020 10:19 AM				
	Return fan drive did not run in hand or bypass when High cutout was tripped.	Scott Erlenbusch on 10/12/2020 10:29 AM				
NO 43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? 1 Issue: TST-12-9	Scott Erlenbusch on 10/12/2020 10:19 AM				
RETURN APPLICA	PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF BLE):					
NO 44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/12/2020 9:34 AM				
	Return low suction pressure cutout was not installed.	Scott Erlenbusch on 10/12/2020 9:14				
	1 Issue: TST-12-5					
N/A 45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 10/12/2020 9:13 AM				
WHEN TI SWITCH	IE RETURN PLENUM LOW SUCTION PRESSURE SAFETY S TRIPPED					
N/A 46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/12/2020 9:13 AM				
N/A 47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/12/2020 9:13 AM				
N/A 48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/12/2020 9:13 AM				
RETURN	PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):					
N/A 49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 10/12/2020 9:18 AM				
N/A 50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 10/12/2020 9:18 AM				
WHEN TI TRIPPED	IE RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS					
N/A 51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 10/12/2020 9:18 AM				
N/A 52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 10/12/2020 9:18 AM				
N/A 53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 10/12/2020 9:18 AM				
FAN EQU	FAN EQUIPMENT VERIFICATION:					
SUPPLY	FAN:					
<b>YES</b> 54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/12/2020 9:27 AM				



YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/12/2020 9:27 AM		
RETU	IRN FA	N: (IF APPLICABLE)			
YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 10/12/2020 9:27 AM		
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 10/12/2020 9:27 AM		
MININ VERIF	IUM C	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:			
NOR	/AL O	PERATION VERIFICATION:			
YES	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/12/2020 8:22 AM		
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 10/12/2020 10:11 AM		
YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 10/12/2020 8:35 AM		
NO	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS? 1 Issue: TST-12-1	Scott Erlenbusch on 10/12/2020 8:39 AM		
YES	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 10/12/2020 8:35 AM		
HEAT	'ING A	ND COOLING COILS VERIFICATION:			
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/12/2020 8:40 AM		
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 10/12/2020 8:44 AM		
HUMI	DIFIE	R VERIFICATION (IF APPLICABLE):			
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 11/12/2020 10:06 AM		
		1 Issue: TST-12-4			
N/A	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 11/19/2020 2:58 PM		
		Have not been able to test, UNMC still needs to install a seal on humidifier and replace trap.	Scott Erlenbusch on 11/12/2020 10:06 AM		
		1 Issue: TST-12-14			
HUMI APPL	DISTA ICABL	T AND AIRFLOW SWITCH SAFETY VERIFICATION (IF E):			
HUMI HUMI AIR F	DISTA DIFIEF LOW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.			
NO	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU? 1 Issue: TST-12-2	Scott Erlenbusch on 10/12/2020 8:52 AM		
NO	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 10/12/2020 8:52 AM		
NO	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 10/12/2020 8:52 AM		
TEST	TEST COMPLETION VERIFICATION:				

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Scott Erlenbusch on 11/12/2020 10:06 YES 70 Have all overrides on the AHU been released? AM Attempt No. 2 INCOMPLETE Status set by Scott Erlenbusch on 3/26/2021. AIR HANDLING UNIT - SYSTEM DEFICIENCIES TEST. THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES. IF A SENSOR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR APPLICABLE MARK THE TEST ANSWER AS N/A. USE NOTES AND COMMENTS AS OFTEN AS NECESSARY. SENSOR VERIFICATION: OUTDOOR TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF APPLICABLE): YES 1 Does the outdoor humidity sensor report an acceptable value? Scott Erlenbusch on 3/26/2021 7:18 AM YES 2 Does the outdoor temperature report an acceptable value? Scott Erlenbusch on 3/26/2021 7:18 AM YES 3 Document if these sensors are locally wired to the controller, or if they are global Scott Erlenbusch on 3/26/2021 7:18 AM values Scott Erlenbusch on 3/26/2021 7:18 AM There are SLC temp and humidity points in panel 302. These are not the points being used on the AHU 3 graphic. Those points I could not find in any of the SLC panels. RETURN AIR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE): YES 4 Does the return air humidity sensor report an acceptable value? Scott Erlenbusch on 3/26/2021 7:18 AM RETURN AIR TEMPERATURE SENSOR VERIFICATION: YES 5 Does the return air temperature sensor report an acceptable value? Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:18 AM BAS=73.1 degrees, Fluke=72.5 degrees. YES 6 Is the return air temperature sensor installed in the return air plenum and not near Scott Erlenbusch on 3/26/2021 7:18 AM the outdoor air or relief air plenums? YES 7 Is the return air temperature sensor probe the proper length for the size of duct it is Scott Erlenbusch on 3/26/2021 7:18 AM installed in? Scott Erlenbusch on 3/26/2021 7:18 AM 18" probe MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS: YES 8 Does the mixed air temperature sensor report an acceptable value? Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:18 AM BAS=70.3 degrees, Fluke=69.8 degrees. YES 9 Is the mixed air temperature sensor installed between the return air plenum and the Scott Erlenbusch on 3/26/2021 7:18 AM outdoor air plenums, and is able to sense a good mixture of both? YES 10 Is the mixed air temperature sensor an averaging sensor, and covers the area of Scott Erlenbusch on 3/26/2021 7:18 AM the mixed air section properly? SUPPLY AIR HUMIDITY SENSOR VERIFICATION: **YES** 11 Does the supply air humidity sensor report an acceptable value? Scott Erlenbusch on 3/26/2021 7:18 AM

Is the supply air humidity sensor located in the correct location? Document the

distance from the humidifier to the humidity sensor.

Scott Erlenbusch on 3/26/2021 7:18 AM



NO 12

		Humidity sensor is located 10' from the humidifier and is 4' downstream of the duct detector.	Scott Erlenbusch on 3/26/2021 7:21 AM
SUPPI	LY AIF	R TEMPERATURE SENSORS:	
YES	13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/26/2021 7:18 AM
	10	BAS=54.1 degrees, Fluke=Same	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 3/26/2021 7:18 AM
		18" probe	Scott Erlenbusch on 3/26/2021 7:18 AM
STATI	C ANI	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:	
RETU	rn pl	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	
YES	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/26/2021 7:18 AM
SUPPI	LY DU	ICT STATIC PRESSURE SENSOR (IF APPLICABLE):	
YES	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 3/26/2021 7:18 AM
		Pressure tap is in room 1041. The pressure sensor is in room 1043.	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/26/2021 7:18 AM
BUILD	ING F	RESSURE SENSOR (IF APPLICABLE):	
N/A	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 3/26/2021 7:21 AM
		Building pressure sensor for SLC is located on the AHU 2 panel.	Scott Erlenbusch on 3/26/2021 7:22 AM
N/A	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/26/2021 7:18 AM
N/A	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/26/2021 7:18 AM
FILTE	r pre	ESSURE SENSORS (IF APPLICABLE):	
YES	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 3/26/2021 7:18 AM
SAFE	TY DE	VICES VERIFICATION:	
LOW L		SAFETY DEVICE:	
YES	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 3/26/2021 7:34 AM
		Strategic added an LTD and OS tested.	Scott Erlenbusch on 3/26/2021 7:34 AM
YES	29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 3/26/2021 7:18 AM
WHEN	I THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED	
YES	30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/26/2021 7:18 AM

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YES	31	Are the supply and return fan VFD's prohibited from running in hand or bypass? Supply and Return fan did lose its start enable and would not run in bypass or hand.	Scott Erlenbusch on 3/26/2021 7:35 AM Scott Erlenbusch on 3/26/2021 7:35 AM
YES	32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 3/26/2021 7:18 AM
SUPP APPL	LY PL ICABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	
N/A	34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 3/26/2021 7:18 AM
N/A	35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 3/26/2021 7:18 AM
WHEN SWIT	N THE CH IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	
N/A	36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/26/2021 7:18 AM
N/A	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/26/2021 7:18 AM
N/A	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/26/2021 7:18 AM
SUPP	LY PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
YES	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/26/2021 12:20 PM
		4"WC	Scott Erlenbusch on 3/26/2021 12:20 PM
YES	40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 3/26/2021 7:18 AM
YES WHEN TRIPF	40 N THE PED	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS	Scott Erlenbusch on 3/26/2021 7:18 AM
YES WHEN TRIPF YES	40 N THE PED 41	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:18 AM
YES WHEN TRIPF YES	40 N THE PED 41 42	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Supply and Return fan drive did not run in hand or bypass when High cutout was tripped.	Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/26/2021 7:36 AM
YES WHEN TRIPF YES YES	40 N THE PED 41 42 43	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Supply and Return fan drive did not run in hand or bypass when High cutout was tripped. Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/29/2021 10:23 AM
YES WHEN TRIPF YES YES RETU APPL	40 N THE PED 41 42 43 RN PL	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Supply and Return fan drive did not run in hand or bypass when High cutout was tripped. Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/29/2021 10:23 AM
YES WHEN TRIPF YES YES RETU APPL YES	40 N THE PED 41 42 43 RN PL ICABL 44	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Supply and Return fan drive did not run in hand or bypass when High cutout was tripped. Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/29/2021 10:23 AM
YES WHEN TRIPF YES YES RETU APPL YES	40 N THE PED 41 42 43 RN PL ICABL 44	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Supply and Return fan drive did not run in hand or bypass when High cutout was tripped. Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low suction pressure safety switch calibrated properly in order to not trip early? 2.5"WC	Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/26/2021 10:23 AM Scott Erlenbusch on 3/26/2021 12:21 PM Scott Erlenbusch on 3/26/2021 12:22 PM
YES WHEN TRIPF YES YES RETU APPL YES	40 N THE PED 41 42 43 RN PL ICABL 44 45	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Supply and Return fan drive did not run in hand or bypass when High cutout was tripped. Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low suction pressure safety switch calibrated properly in order to not trip early? 2.5"WC Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/29/2021 10:23 AM Scott Erlenbusch on 3/29/2021 10:23 PM Scott Erlenbusch on 3/26/2021 12:22 PM
YES WHEN TRIPF YES YES RETU APPL YES YES	40 N THE PED 41 42 43 43 RN PL CABL 44 45 N THE CH IS	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Supply and Return fan drive did not run in hand or bypass when High cutout was tripped. Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low suction pressure safety switch calibrated properly in order to not trip early? 2.5"WC Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY RETURN PLENUM LOW SUCTION PRESSURE SAFETY SURE SAFETY SURE SAFETY SURE SAFETY SURE SAFETY SURE SAFETY SURE SAFETY SURE SAFETY fan fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY SURE SAFET	Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/29/2021 10:23 AM Scott Erlenbusch on 3/29/2021 10:23 PM Scott Erlenbusch on 3/26/2021 12:22 PM
YES WHEN TRIPF YES YES RETU APPL YES YES WHEN SWITC YES	40 N THE ED 41 42 43 RN PL ICABL 44 45 N THE CH IS 46	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Supply and Return fan drive did not run in hand or bypass when High cutout was tripped. Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low suction pressure safety switch calibrated properly in order to not trip early? 2.5"WC Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY RIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:18 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/26/2021 7:36 AM Scott Erlenbusch on 3/29/2021 10:23 AM Scott Erlenbusch on 3/26/2021 12:22 PM Scott Erlenbusch on 3/26/2021 12:22 PM

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YES	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/29/2021 10:23 AM
RETU	RN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/26/2021 7:18 AM
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 3/26/2021 7:18 AM
WHEN TRIPF	N THE PED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS	
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/26/2021 7:18 AM
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/26/2021 7:18 AM
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/26/2021 7:18 AM
FAN E	QUIP	MENT VERIFICATION:	
SUPP	LY FA	N:	
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/26/2021 7:18 AM
RETU	RN FA	N: (IF APPLICABLE)	
YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/26/2021 7:18 AM
MINIM VERIF	IUM O	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:	
NORM	AL O	PERATION VERIFICATION:	
YES	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 3/26/2021 12:22 PM
YES	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 3/26/2021 7:18 AM
HEAT	ING A	ND COOLING COILS VERIFICATION:	
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/26/2021 7:18 AM
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/26/2021 7:18 AM
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):	
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 3/26/2021 7:18 AM
N/A	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 3/26/2021 7:18 AM
		Have not been able to test, UNMC still needs to install a seal on humidifier and replace trap.	Scott Erlenbusch on 3/26/2021 7:18 AM



HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):				
HUMIDISTAT AND AIRFLOW SWITCH ARE USED TO SHUT THE HUMIDIFIER VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR AIR FLOW SWITCH IS NOT CLOSED.				
NO 67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 3/26/2021 7:18 AM		
	Yes, but the smoke detector is located before before both the humidistat and the humidity sensor.	Scott Erlenbusch on 3/26/2021 7:43 AM		
YES 68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 3/26/2021 7:43 AM		
<b>YES</b> 69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 3/26/2021 12:22 PM		
TEST COM	PLETION VERIFICATION:			
<b>YES</b> 70	Have all overrides on the AHU been released?	Scott Erlenbusch on 3/26/2021 7:18 AM		

#### **Issues** 14

# TST-12-1 CLOSED MODERATE

Return damper does not close fully, there is small gap when dampers are	Asset 🧐 SLC_AHU 3
commanded closed.	Discipline Controls
Source Test 12, Attempt 1, Line 61	Due Date 10/26/2020
Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Created By Scott Erlenbusch
	Identified On 10/12/2020 8:40 AM

Strategic adjusted damper, there is a slight gap when closed but should be fine. Scott Erlenbusch on 03/26/2021 at 12:06 PM Optimized Systems

# TST-12-2 CLOSED HIGH

There is no humidistat or airflow switch installed for the humidifier. Humidifier safeties will need to be installed and tested per new sequence. **Source** Test 12, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU? Asset SLC\_AHU 3 Discipline Controls Due Date 10/26/2020 Created By Scott Erlenbusch Identified On 10/12/2020 8:52 AM

Strategic installed humidifier safeties and OS tested. Scott Erlenbusch on 03/26/2021 at 12:07 PM Optimized Systems



# TST-12-3 OPEN

Supply air duct detector is located 5 ft downstream of humidifier. There is nothing between the humidifier and duct detector and there is a very good chance there will be frequent duct detector alarms. Recommend that duct detector is moved further downstream of the high humidity cutout and humidity sensor.

Source Test 12 SLC\_AHU 3 - AHU - Humidifier/Optimization Assigned To Optimized Systems Asset SLC\_AHU 3 Due Date 10/26/2020 Created By Scott Erlenbusch Identified On 10/12/2020 9:02 AM



Issue 2020-10-12 08:57:04.jpg



### TST-12-4 CLOSED

Humidifier valve is a failsafe actuator. Verify that the failsafe works correctly and wire per the new humidifier safety sequence. **Source** Test 12, Attempt 1, Line 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed? Asset % SLC\_AHU 3 Discipline Controls Due Date 10/26/2020 Created By Scott Erlenbusch Identified On 10/12/2020 9:02 AM

Humidifier valve is fail safe and the valve fails closed on power loss or humidifier safety goes in to alarm. Scott Erlenbusch on 03/26/2021 at 12:09 PM Optimized Systems



IMG\_0118.jpg

## TST-12-5 CLOSED HIGH

Return low suction pressure cutout switch is not installed. There are return duct isolation dampers and if they were to close the return fan could speed up and duct would be very negative. Please install a low static pressure switch and wire in to safety circuit.

Source Test 12, Attempt 1, Line 44

Is the low suction pressure safety switch calibrated properly in order to not trip early?

Asset 🔅 SLC\_AHU 3 Discipline Controls Due Date 10/26/2020 Created By Scott Erlenbusch Identified On 10/12/2020 9:36 AM

Strategic installed Low static cutout and OS tested operation. Tripped at 2.5". Scott Erlenbusch on 03/26/2021 at 12:09 PM Optimized Systems



### TST-12-6 CLOSED

Supply air high static cutout is installed after supply fan but it is also installed after supply isolation damper. This could cause AHU to overpressurize and not shut fans down. **Source** Test 12, Attempt 1, Line 40 Is the high Pressure Safety Switch Installed after the supply fan? Asset % SLC\_AHU 3 Discipline Controls Due Date 10/26/2020 Created By Scott Erlenbusch Identified On 10/12/2020 9:40 AM

Strategic moved the poly to the supply cabin and OS verified. Scott Erlenbusch on 03/26/2021 at 12:12 PM Optimized Systems



Issue 2020-10-12 09:39:48.jpg

TST-12-7 CLOSED HIGH

Supply fan will still run in hand and in bypass when the LTD is tripped. This is also true when the supply high static cutout is tripped. Source Test 12, Attempt 1, Line 31 Are the supply and return fan VFD's prohibited from running in hand or bypass? Asset SLC\_AHU 3 Discipline Controls Due Date 10/26/2020 Created By Scott Erlenbusch Identified On 10/12/2020 9:57 AM

OS corrected the dip switch setting on S2-7. Dip switch was on and needed to be off for safety interlock to work. Supply drive will now not run in hand or bypass when the safeties are tripped.

Scott Erlenbusch on 03/26/2021 at 12:16 PM Optimized Systems

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#### TST-12-8 CLOSED MODERATE

There is one LTD sensor installed and it is routed in a vertical fashion. Typically the LTD is routed in a horizontal fashion. If re-routed horizontally then 1 additional LTD sensor would probably need to be installed. **Source** Test 12, Attempt 1, Line 28 Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil? Asset 🍕 SLC\_AHU 3 Discipline Controls Due Date 10/26/2020 Created By Scott Erlenbusch Identified On 10/12/2020 10:00 AM

Strategic installed an extra LTD and OS tested operation. Both LTD's are now run horizontal. Scott Erlenbusch on 03/26/2021 at 12:18 PM Optimized Systems

Strategic installed another LTD and OS tested.

Scott Erlenbusch on 03/26/2021 at 08:45 AM Optimized Systems



IMG\_0120.jpg



#### TST-12-9 CLOSED HIGH

The only damper that close when the high static tripped was the minimum outdoor air damper. The outdoor damper remained open and the relief remained open. The return damper remained closed. These dampers should be programmed to fail with outdoor and relief closed and return open when the high static trips. OS to verify programming is closing the dampers correctly when a safety trips.

Source Test 12, Attempt 1, Line 43

Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?

Asset SLC\_AHU 3 Discipline Optimization Due Date 10/26/2020 Created By Scott Erlenbusch Identified On 10/12/2020 10:22 AM

Todd Bishop changed the programming so that the dampers would open/close to the correct position. OS tested operation. Scott Erlenbusch on 03/29/2021 at 10:24 AM Optimized Systems

# TST-12-10 CLOSED HIGH

Supply high static cutout tripped at 7.25". This setting is way too high. Please set the high static switch to trip at 4". Source Test 12, Attempt 1, Line 39

Is the high Pressure Safety Switch calibrated properly in order to not trip early?

Strategic adjusted high static switch and it now trips at 4" WC. Scott Erlenbusch on 03/26/2021 at 11:21 AM Optimized Systems

# TST-12-11 OPEN HIGH

Supply air humidity sensor is located after the duct detector and is roughly 10' downstream of the humidifier. There is not a lot of room for the humidifier devices on this unit. The humidifier is in the duct work and not alot of room to get the air mixed with humidity before duct detector and humidity sensors. This needs to be investigated to figure out best plan. **Source** Test 12, Attempt 1, Line 12

Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.

Asset SLC\_AHU 3 Discipline Controls Due Date 10/26/2020 Created By Scott Erlenbusch Identified On 10/12/2020 10:26 AM

Assigned To Optimized Systems Asset SLC\_AHU 3 Due Date 10/26/2020 Created By Scott Erlenbusch Identified On 10/12/2020 12:48 PM



#### TST-12-12 CLOSED MODERATE

The low side of the return plenum static pressure sensor is plumbed in to the relief duct work after the relief damper. Low side should reference the mechanical room space.

Source Test 12, Attempt 1, Line 16

Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?

Asset SLC\_AHU 3 Discipline Controls Due Date 10/27/2020 Created By Scott Erlenbusch Identified On 10/13/2020 7:48 AM

Strategic removed the poly and RPP is now referencing the mechanical space. Scott Erlenbusch on 03/26/2021 at 08:15 AM Optimized Systems

### TST-12-13 CLOSED HIGH

There is no building static pressure sensor installed. Ashcroft building static pressure sensor needs to be installed. Coordinate with Optimized Systems. **Source** Test 12, Attempt 1, Line 22 Is the building pressure sensor installed in the best location possible for the areas served by the unit?

Asset 🔅 SLC\_AHU 3 Discipline Controls Due Date 11/27/2020 Created By Scott Erlenbusch Identified On 11/13/2020 9:54 AM

Strategic added a building static pressure sensor but it is located on AHU 2 panel. The high side is outside the bookstore entrance and the low side is outside by the Northeast entrance. The Ashcroft is above ceiling by the high side. OS built point and verified

location. Scott Erlenbusch on 03/26/2021 at 08:03 AM Optimized Systems

# TST-12-14 CLOSED HIGH

We were not able to test the humidifier valve because the trap on the Drysteem system is bad. UNMC has ordered a trap and will replace when it gets here. **Source** Test 12, Attempt 1, Line 66 When humidifier valve is opened, is there steam discharging from the humidifier tubes? Assigned To UNMC Asset SLC\_AHU 3 Due Date 12/3/2020 Created By Scott Erlenbusch Identified On 11/19/2020 3:00 PM

Russ with UNMC Facilities installed a new steam trap and check valve. Humidifier is now operational. Scott Erlenbusch on 03/26/2021 at 12:19 PM Optimized Systems



# **#17 WHM\_AHU 3 - AHU -**Humidifier/Optimization





INCOMPLETE	70% Yes   1% No   28% N/A	5 ISSUES
	P	ssigned To Optimized Systems Asset 🔅 WHM_AHU 3
Attempts		
Attempt No. 1 INCOMPLETE Status set by Scott Erlenbusch on 3/4/2021.		
AIR HANDLING UNIT - SYSTEM DEFICIENCIES TEST.		
THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.		
IF A SENSOR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR APPLICABLE MARK THE TEST ANSWER AS N/A. USE NOTES AND COMMENTS AS OFTEN AS NECESSARY.		
SENSOR VERIFICATION:		
OUTDOOR TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):		
YES 1	Does the outdoor humidity sensor report an acceptable value? 29%	Scott Erlenbusch on 3/4/2021 2:54 PM Scott Erlenbusch on 3/4/2021 2:54 PM
YES 2	Does the outdoor temperature report an acceptable value? 64 degrees	Scott Erlenbusch on 3/4/2021 2:54 PM Scott Erlenbusch on 3/4/2021 2:55 PM
YES 3	Document if these sensors are locally wired to the controller, or if they are glo	bal Scott Erlenbusch on 3/4/2021 2:55 PM
	These sensors are global temp and humidity sensors (Campus). I did not se local points in the panel.	e any Scott Erlenbusch on 3/4/2021 2:56 PM
RETURN AIR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):		
YES 4	Does the return air humidity sensor report an acceptable value? Reading 30.2% RH	Marcus Houser on 3/15/2021 2:22 PM Marcus Houser on 3/15/2021 2:22 PM
RETURN AIR TEMPERATURE SENSOR VERIFICATION:		
YES 5	Does the return air temperature sensor report an acceptable value? BAS=71.5 degrees, Probe=71.5 degrees.	Scott Erlenbusch on 3/4/2021 3:10 PM Scott Erlenbusch on 3/4/2021 2:59 PM
YES 6	Is the return air temperature sensor installed in the return air plenum and not the outdoor air or relief air plenums?	Scott Erlenbusch on 3/4/2021 3:00 PM
YES 7	Is the return air temperature sensor probe the proper length for the size of du installed in?	ct it is Scott Erlenbusch on 3/4/2021 3:06 PM
	18" probe	Scott Erlenbusch on 3/4/2021 3:06 PM
MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:		

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If the mixed air temperature sensor installed between the return air plenum and the duration of air plenums, and is able to sense a good mixture of both?       Marcus Houser on 3/15/2021 2:22 PM         Image: State of the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air temperature sensor report an acceptable value?       Marcus Houser on 3/15/2021 2:23 PM         Image: State of the mixed air temperature sensor report an acceptable value?       Marcus Houser on 3/15/2021 2:23 PM         Image: State of the mixed air temperature sensor report an acceptable value?       Marcus Houser on 3/15/2021 2:23 PM         Image: State of the mixed air temperature sensor report an acceptable value?       Marcus Houser on 3/15/2021 2:23 PM         Image: State of the mixed air temperature sensor report an acceptable value?       Marcus Houser on 3/15/2021 2:23 PM         Image: State of the supply air temperature sensor report an acceptable value?       Marcus Houser on 3/15/2021 2:24 PM         Image: State of the supply air temperature sensor report an acceptable value?       Marcus Houser on 3/15/2021 2:24 PM         Image: State of the supply air temperature sensor probe the proper length for the size of ducit it is an accurate reading?       Marcus Houser on 3/15/2021 2:24 PM         Image: State of the mixed air temperature sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:24 PM         Image: State of the mixed air temperature sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2	YES	8	Does the mixed air temperature sensor report an acceptable value?	Marcus Houser on 3/15/2021 2:22 PM
Image: Structure and any section property?       Marcus Houser on 3/15/2021 2:22 PM         SUPPLY AIR HUMIDITY SENSOR VERIFICATION:       Marcus Houser on 3/15/2021 2:23 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:23 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:23 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:23 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:23 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:23 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:23 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:23 PM         SUPPLY AIR TEMPERATURE SENSORS:       Marcus Houser on 3/15/2021 2:23 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:24 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:24 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:24 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:24 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:24 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:24 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:24 PM         Image: Section property?       Marcus Houser on 3/15/2021 2:24 PM         Image: Secti	YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Marcus Houser on 3/15/2021 2:22 PM
SUPPLY AIR HUMIDITY SENSOR VERIFICATION:       Marcus Houser on 3/15/2021 2.23 PM         Image: State of the supply air humidity sensor report an acceptable value?       Marcus Houser on 3/15/2021 2.23 PM         Image: State of the supply air humidity sensor located in the correct location? Document the distance from the humiditier       Marcus Houser on 3/15/2021 2.23 PM         Image: State of the humiditier       Marcus Houser on 3/15/2021 2.23 PM         SUPPLY AIR TEMPERATURE SENSORS:       Marcus Houser on 3/15/2021 2.23 PM         Image: State of the humiditier       Marcus Houser on 3/15/2021 2.23 PM         Image: State of the supply air temperature sensor report an acceptable value?       Marcus Houser on 3/15/2021 2.24 PM         Image: State of the supply air temperature sensor installed downstream of all colis in order to get an accurate reading?       Marcus Houser on 3/15/2021 2.24 PM         Image: State of the supply air temperature sensor installed downstream of all colis in order to get an accurate reading?       Marcus Houser on 3/15/2021 2.24 PM         Image: State of the supply air temperature sensor installed downstream of all colis in order to get an accurate reading?       Marcus Houser on 3/15/2021 2.24 PM         Image: State of the supply air temperature sensor installed between the relief air and return air damper sections, and after the return fan?       Marcus Houser on 3/15/2021 2.24 PM         Image: State of the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?       Marcus Houser on 3/15	YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Marcus Houser on 3/15/2021 2:22 PM
I1       Does the supply air humidity sensor report an acceptable value?       Marcus Houser on 3/15/2021 2.23 PM         IVES       12       is the supply air humidity sensor located in the correct location? Document the distance from the humidity sensor.       Marcus Houser on 3/15/2021 2.23 PM         IVES       12       is the supply air humidity sensor located in the correct location? Document the distance from the humidity sensor.       Marcus Houser on 3/15/2021 2.23 PM         SUPPLY AIR       TEMPERATURE SENSORS:       Marcus Houser on 3/15/2021 2.23 PM         IVES       13       Does the supply air temperature sensor report an acceptable value?       Marcus Houser on 3/15/2021 2.24 PM         IVES       14       Is the supply air temperature sensor installed downstream of all colis in order to get an accurate reading?       Marcus Houser on 3/15/2021 2.24 PM         IVES       15       Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?       Marcus Houser on 3/15/2021 2.24 PM         IVES       15       Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?       Marcus Houser on 3/15/2021 2.24 PM         IVES       16       Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?       Marcus Houser on 3/15/2021 2.24 PM         IVES       17       Is the return plenum pressure sensor installed between the reli	SUPPI	ly Aif	R HUMIDITY SENSOR VERIFICATION:	
Reading 52.9% RH         Marcus Houser on 3/15/2021 2.23 PM           If is the supply air humidify ensor located in the correct location? Document the diatance from the humidify sensor.         Marcus Houser on 3/15/2021 2.23 PM           SUPPLY AIR TEMPERATURE SENSORS:         Marcus Houser on 3/15/2021 2.23 PM           If is the supply air temperature sensor report an acceptable value?         Marcus Houser on 3/15/2021 2.23 PM           If is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?         Marcus Houser on 3/15/2021 2.24 PM           If is the supply air temperature sensor probe the proper length for the size of duct it is installed in?         Marcus Houser on 3/15/2021 2.24 PM           If is the supply air temperature sensor probe the proper length for the size of duct it is installed in?         Marcus Houser on 3/15/2021 2.24 PM           If is the supply air temperature sensor installed between the relief air and return air damper sections, and after the return fair?         Marcus Houser on 3/15/2021 2.24 PM           If is the return plenum pressure sensor reporting an acceptable value?         Marcus Houser on 3/15/2021 2.24 PM           If is the return plenum pressure sensor reporting an acceptable value?         Marcus Houser on 3/15/2021 2.24 PM           If is the return plenum pressure sensor reporting an acceptable value?         Marcus Houser on 3/15/2021 2.24 PM           If is the return plenum pressure sensor reporting an acceptable value?         Marcus Houser on 3/15/2021 2.24 PM	YES	11	Does the supply air humidity sensor report an acceptable value?	Marcus Houser on 3/15/2021 2:23 PM
12       Is the supply air humidify sensor located in the correct location? Document the distance from the humidifier to the humidify sensor.       Marcus Houser on 3/15/2021 2.23 PM         AHU does not have a humidifier       Marcus Houser on 3/15/2021 2.23 PM         SUPPLY AR TEMPERATURE SENSORS:       Marcus Houser on 3/15/2021 2.23 PM         Image: Signal and the supply air temperature sensor report an acceptable value?       Marcus Houser on 3/15/2021 2.24 PM         Image: Signal and acceptable value?       Marcus Houser on 3/15/2021 2.24 PM         Image: Signal and acceptable value?       Marcus Houser on 3/15/2021 2.24 PM         Image: Signal and acceptable value?       Marcus Houser on 3/15/2021 2.24 PM         Image: Signal and acceptable value?       Marcus Houser on 3/15/2021 2.24 PM         Image: Signal and acceptable value?       Marcus Houser on 3/15/2021 2.24 PM         Image: Signal and the relation andeceptable value?       Marcus Houser on 3/15/2			Reading 52.9% RH	Marcus Houser on 3/15/2021 2:23 PM
AHU does not have a humidifier       Marcus Houser on 3/15/2021 223 PM         SUPPLY AIR TEMPERATURE SENSORS:       Marcus Houser on 3/15/2021 223 PM         YES       13       Does the supply air temperature sensor report an acceptable value?       Marcus Houser on 3/15/2021 224 PM         YES       14       Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?       Marcus Houser on 3/15/2021 224 PM         YES       15       Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?       Marcus Houser on 3/15/2021 2:24 PM         YES       16       Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?       Marcus Houser on 3/15/2021 2:24 PM         YES       16       Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?       Marcus Houser on 3/15/2021 2:24 PM         YES       17       Is the return plenum pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:24 PM         YES       18       Is the return plenum pressure sensor installed at least 2/3's down the duct, or in the best location possible?       Marcus Houser on 3/15/2021 2:25 PM         YES       19       Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?       Marcus Houser on 3/15/2021 2:25 PM         YMA <td< td=""><td>YES</td><td>12</td><td>Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.</td><td>Marcus Houser on 3/15/2021 2:23 PM</td></td<>	YES	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Marcus Houser on 3/15/2021 2:23 PM
SUPPLY AIR TEMPERATURE SENSORS:       Marcus Houser on 3/15/2021 2.23 PM         YES       13       Does the supply air temperature sensor report an acceptable value?       Marcus Houser on 3/15/2021 2.24 PM         YES       14       Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?       Marcus Houser on 3/15/2021 2.24 PM         YES       15       Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?       Marcus Houser on 3/15/2021 2.24 PM         YES       16       Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?       Marcus Houser on 3/15/2021 2.24 PM         STATIC AND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:       Marcus Houser on 3/15/2021 2.24 PM         YES       16       Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?       Marcus Houser on 3/15/2021 2.24 PM         YES       17       Is the return plenum pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2.25 PM         SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2.25 PM         SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2.25 PM         MArcus Houser on 3/15/2021 2.25 PM       Marcus Houser on 3/15/2021 2.25 PM         SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):			AHU does not have a humidifier	Marcus Houser on 3/15/2021 2:23 PM
Yess       13       Does the supply air temperature sensor report an acceptable value? reading 53.9 Deg F       Marcus Houser on 3/15/2021 2:24 PM         Yess       14       Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?       Marcus Houser on 3/15/2021 2:24 PM         Yess       15       Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?       Marcus Houser on 3/15/2021 2:24 PM         Yess       16       Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?       Marcus Houser on 3/15/2021 2:24 PM         STATIC AND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:       Marcus Houser on 3/15/2021 2:24 PM         RETURN PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:24 PM         Yess       16       Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?       Marcus Houser on 3/15/2021 2:24 PM         Yess       17       Is the return plenum pressure sensor and analog input ranges setup property? e.25 to 2.5' inwc       Marcus Houser on 3/15/2021 2:25 PM         SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:25 PM         Yess       18       Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?       Marcus Houser on 3/15/2021 2:25 PM         Yest	SUPPI	LY AIF	R TEMPERATURE SENSORS:	
reading 53.9 Deg F       Marcus Houser on 3/15/2021 2:24 PM         YES       14       Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?       Marcus Houser on 3/15/2021 2:24 PM         YES       15       Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?       Marcus Houser on 3/15/2021 2:24 PM         YES       16       Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?       Marcus Houser on 3/15/2021 2:24 PM         STATIC AND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:       Marcus Houser on 3/15/2021 2:24 PM         RETURN PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:24 PM         YES       16       Is the return plenum pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:24 PM         YES       17       Is the return plenum pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:24 PM         YES       18       Is the return plenum pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:25 PM         IVA       19       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IVA       20       Is the supply duc	YES	13	Does the supply air temperature sensor report an acceptable value?	Marcus Houser on 3/15/2021 2:23 PM
YES       14       Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?       Marcus Houser on 3/15/2021 2:24 PM         YES       15       Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?       Marcus Houser on 3/15/2021 2:24 PM         YES       18" probe       Marcus Houser on 3/15/2021 2:24 PM         STATIC AND DIFFERENTIAL PRESSURE SENSOR VERIFICATION:       Marcus Houser on 3/15/2021 2:24 PM         RETURN PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:24 PM         YES       16       Is the return plenum pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:24 PM         YES       17       Is the return plenum pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:24 PM         YES       18       Is the return plenum pressure sensor installed at least 2/3's down the duct, or in the best location possible?       Marcus Houser on 3/15/2021 2:25 PM         SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:25 PM         IVA       19       Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?       Marcus Houser on 3/15/2021 2:25 PM         IVA       20       Is the supply duct static pressure and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM      <			reading 53.9 Deg F	Marcus Houser on 3/15/2021 2:24 PM
YES       15       Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?       Marcus Houser on 3/15/2021 2:24 PM         YES       16" probe       Marcus Houser on 3/15/2021 2:24 PM         STATIC AND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:       RETURN PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):         YES       16       Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?       Marcus Houser on 3/15/2021 2:24 PM         YES       17       Is the return plenum pressure sensor installed between the relief air and return air reading. 07"inwc       Marcus Houser on 3/15/2021 2:24 PM         YES       18       Is the return plenum pressure sensor and analog input ranges setup property?       Marcus Houser on 3/15/2021 2:25 PM         SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:25 PM         WIA       19       Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?       Marcus Houser on 3/15/2021 2:25 PM         WIA       20       Is the supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         WIA       21       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         BUILDING PRESSURE SENSOR (IF APPLICABLE):       22       Is the	YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Marcus Houser on 3/15/2021 2:24 PM
18" probe       Marcus Houser on 3/15/2021 2:24 PM         STATIC AND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:         RETURN PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):         YES       16       is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?       Marcus Houser on 3/15/2021 2:24 PM         YES       17       is the return plenum pressure sensor installed between the relief air and return air reading.07"inwc       Marcus Houser on 3/15/2021 2:24 PM         YES       18       is the return plenum pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:24 PM         YES       18       is the return plenum pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:25 PM         IMA       19       is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IMA       20       is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IMA       21       is the supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         IMA       22       is the building pressure sensor installed at least 2/3's down the duct, or in the buser on 3/15/2021 2:25 PM <t< td=""><td>YES</td><td>15</td><td>Is the supply air temperature sensor probe the proper length for the size of duct it is</td><td>Marcus Houser on 3/15/2021 2:24 PM</td></t<>	YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is	Marcus Houser on 3/15/2021 2:24 PM
STATIC AND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:         RETURN PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):         YES       16       Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?       Marcus Houser on 3/15/2021 2:24 PM         YES       17       Is the return plenum pressure sensor reporting an acceptable value? meading .07"inwc       Marcus Houser on 3/15/2021 2:24 PM         YES       17       Is the return plenum pressure sensor reporting an acceptable value? marcus Houser on 3/15/2021 2:25 PM       Marcus Houser on 3/15/2021 2:25 PM         YES       18       Is the return plenum pressure sensor and analog input ranges setup properly? accus Houser on 3/15/2021 2:25 PM       Marcus Houser on 3/15/2021 2:25 PM         SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:25 PM         IVA       19       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IVA       20       Is the supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         IVA       21       Is the supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         IVIA       21       Is the building pressure sensor installed in the best location possible for the areas served by the unit?       22			18" probe	Marcus Houser on 3/15/2021 2:24 PM
RETURN PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):         YES       16       Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?       Marcus Houser on 3/15/2021 2:24 PM         YES       17       Is the return plenum pressure sensor reporting an acceptable value? reading.07"inwc       Marcus Houser on 3/15/2021 2:24 PM         YES       17       Is the return plenum pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:24 PM         YES       18       Is the return plenum pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         YES       18       Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?       Marcus Houser on 3/15/2021 2:25 PM         IVA       20       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IVA       20       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IVA       21       Is the supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         IVA       21       Is the supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         IVIA       21       Is the building p	STATI	C ANI	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:	
YES       16       Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?       Marcus Houser on 3/15/2021 2:24 PM         YES       17       Is the return plenum pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:24 PM         YES       18       Is the return plenum pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:24 PM         YES       18       Is the return plenum pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:25 PM         IVIA       19       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IVIA       20       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IVIA       20       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IVIA       21       Is the supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         E22       Is the building pressure sensor installed in the best location possible for the areas served by the unit?       Is the building pressure sensor and analog input ranges setup properly?         23       I	RETU	RN PL	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	
YES       17       Is the return plenum pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:24 PM         YES       18       Is the return plenum pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         YES       18       Is the return plenum pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:25 PM         IVA       19       Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?       Marcus Houser on 3/15/2021 2:25 PM         IVA       20       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IVA       21       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         BUILDING PRESSURE SENSOR (IF APPLICABLE):       22       Is the building pressure sensor installed in the best location possible for the areas served by the unit?       23         23       Is the building pressure sensor reporting an acceptable value?       E         24       Is the building pressure sensor and analog input ranges setup properly?       E         FILTER PRESSURE SENSORS (IF APPLICABLE):       E         YES       25       Are all the filter pressure sensor	YES	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Marcus Houser on 3/15/2021 2:24 PM
reading .07"inwc       Marcus Houser on 3/15/2021 2:24 PM         YES       18       Is the return plenum pressure sensor and analog input ranges setup properly? -2.5 to 2.5" inwc       Marcus Houser on 3/15/2021 2:25 PM Marcus Houser on 3/15/2021 2:25 PM         SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:25 PM         IMA       19       Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?       Marcus Houser on 3/15/2021 2:25 PM         IMA       20       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IMA       20       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IMA       20       Is the supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         IDUILDING PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:25 PM         22       Is the building pressure sensor installed in the best location possible for the areas served by the unit?       Marcus Houser on 3/15/2021 2:25 PM         23       Is the building pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:26 PM         24       Is the building pressure sensor and analog input ranges setup properly?       FILTER PRESSURE SENSORS (IF APPLICABLE):         YES	YES	17	Is the return plenum pressure sensor reporting an acceptable value?	Marcus Houser on 3/15/2021 2:24 PM
YES       18       Is the return plenum pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):       Marcus Houser on 3/15/2021 2:25 PM         IMA       19       Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?       Marcus Houser on 3/15/2021 2:25 PM         IMA       20       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IMA       20       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IMA       20       Is the supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         IMA       21       Is the supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         BUILDING PRESSURE SENSOR (IF APPLICABLE):       22       Is the building pressure sensor installed in the best location possible for the areas served by the unit?       23         23       Is the building pressure sensor and analog input ranges setup properly?       FILTER PRESSURE SENSORS (IF APPLICABLE):         YES       25       Are all the filter pressure sensors installed across each filter bank they serve?       Marcus Houser on 3/15/2021 2:26 PM			reading .07"inwc	Marcus Houser on 3/15/2021 2:24 PM
SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):         Image: Supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?       Marcus Houser on 3/15/2021 2:25 PM         Image: Supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         Image: Supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         Image: Supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         BUILDING PRESSURE SENSOR (IF APPLICABLE):       Is the building pressure sensor installed in the best location possible for the areas served by the unit?         23       Is the building pressure sensor reporting an acceptable value?         24       Is the building pressure sensor and analog input ranges setup properly?         FILTER PRESSURE SENSORS (IF APPLICABLE):         Image: Sensor Sensor and analog input ranges setup properly?         Marcus Houser on 3/15/2021 2:26 PM	YES	18	Is the return plenum pressure sensor and analog input ranges setup properly? -2.5 to 2.5" inwc	Marcus Houser on 3/15/2021 2:25 PM Marcus Houser on 3/15/2021 2:25 PM
IMA       19       Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?       Marcus Houser on 3/15/2021 2:25 PM         IMA       20       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         IMA       21       Is the supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         BUILDING PRESSURE SENSOR (IF APPLICABLE):       22       Is the building pressure sensor installed in the best location possible for the areas served by the unit?         23       Is the building pressure sensor and analog input ranges setup properly?       Is the building pressure sensor and analog input ranges setup properly?         24       Is the building pressure sensor and analog input ranges setup properly?       FILTER PRESSURE SENSORS (IF APPLICABLE):         YES       25       Are all the filter pressure sensor installed across each filter bank they serve?       Marcus Houser on 3/15/2021 2:26 PM	SUPPI	LY DU	ICT STATIC PRESSURE SENSOR (IF APPLICABLE):	
Image: NMA 20       Is the supply duct static pressure sensor reporting an acceptable value?       Marcus Houser on 3/15/2021 2:25 PM         Image: NMA 21       Is the supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         BUILDING PRESSURE SENSOR (IF APPLICABLE):       22       Is the building pressure sensor installed in the best location possible for the areas served by the unit?       23         23       Is the building pressure sensor reporting an acceptable value?       24       Is the building pressure sensor and analog input ranges setup properly?         FILTER PRESSURE SENSORS (IF APPLICABLE):       Image: Setup properly?       Marcus Houser on 3/15/2021 2:26 PM	N/A	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Marcus Houser on 3/15/2021 2:25 PM
NA       21       Is the supply duct static pressure sensor and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:25 PM         BUILDING PRESSURE SENSOR (IF APPLICABLE):       22       Is the building pressure sensor installed in the best location possible for the areas served by the unit?       23         23       Is the building pressure sensor reporting an acceptable value?       24       Is the building pressure sensor and analog input ranges setup properly?         FILTER PRESSURE SENSORS (IF APPLICABLE):       YES       25       Are all the filter pressure sensors installed across each filter bank they serve?       Marcus Houser on 3/15/2021 2:26 PM	N/A	20	Is the supply duct static pressure sensor reporting an acceptable value?	Marcus Houser on 3/15/2021 2:25 PM
BUILDING PRESSURE SENSOR (IF APPLICABLE):         22       Is the building pressure sensor installed in the best location possible for the areas served by the unit?         23       Is the building pressure sensor reporting an acceptable value?         24       Is the building pressure sensor and analog input ranges setup properly?         FILTER PRESSURE SENSORS (IF APPLICABLE):         YES       25       Are all the filter pressure sensors installed across each filter bank they serve?       Marcus Houser on 3/15/2021 2:26 PM	N/A	21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Marcus Houser on 3/15/2021 2:25 PM
22       Is the building pressure sensor installed in the best location possible for the areas served by the unit?         23       Is the building pressure sensor reporting an acceptable value?         24       Is the building pressure sensor and analog input ranges setup properly?         FILTER PRESSURE SENSORS (IF APPLICABLE):         YES       25         Are all the filter pressure sensor installed across each filter bank they serve?       Marcus Houser on 3/15/2021 2:26 PM	BUILD	ING F	RESSURE SENSOR (IF APPLICABLE):	
23       Is the building pressure sensor reporting an acceptable value?         24       Is the building pressure sensor and analog input ranges setup properly?         FILTER PRESSURE SENSORS (IF APPLICABLE):         YES       25       Are all the filter pressure sensors installed across each filter bank they serve?       Marcus Houser on 3/15/2021 2:26 PM		22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	
24       Is the building pressure sensor and analog input ranges setup properly?         FILTER PRESSURE SENSORS (IF APPLICABLE):         YES       25         Are all the filter pressure sensors installed across each filter bank they serve?       Marcus Houser on 3/15/2021 2:26 PM		23	Is the building pressure sensor reporting an acceptable value?	
FILTER PRESSURE SENSORS (IF APPLICABLE):         YES       25         Are all the filter pressure sensors installed across each filter bank they serve?       Marcus Houser on 3/15/2021 2:26 PM		24	Is the building pressure sensor and analog input ranges setup properly?	
YES 25 Are all the filter pressure sensors installed across each filter bank they serve? Marcus Houser on 3/15/2021 2:26 PM	FILTE	r Pre	ESSURE SENSORS (IF APPLICABLE):	
	YES	25	Are all the filter pressure sensors installed across each filter bank they serve?	Marcus Houser on 3/15/2021 2:26 PM
YES 26 Are all the filter pressure sensors reporting an acceptable value? Marcus Houser on 3/15/2021 2:26 PM	YES	26	Are all the filter pressure sensors reporting an acceptable value?	Marcus Houser on 3/15/2021 2:26 PM
YES       27       Are all the filter pressure sensors and analog input ranges setup properly?       Marcus Houser on 3/15/2021 2:26 PM         0 to 2.5" inwc       Marcus Houser on 3/15/2021 2:26 PM	YES	27	Are all the filter pressure sensors and analog input ranges setup properly? 0 to 2.5" inwc	Marcus Houser on 3/15/2021 2:26 PM Marcus Houser on 3/15/2021 2:26 PM

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#### SAFETY DEVICES VERIFICATION:

#### LOW LIMIT SAFETY DEVICE:

WHEN THE SWITCH IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	
<b>YES</b> 45	Is the low suction pressure safety switch installed before the return fan?	Marcus Houser on 3/16/2021 8:00 AM
	Trips at 2.5" inwc	Marcus Houser on 3/16/2021 8:00 AM
<b>YES</b> 44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Marcus Houser on 3/16/2021 8:00 AM
RETURN PL APPLICABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	
YES 43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Marcus Houser on 3/15/2021 2:30 PM
YES 42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Marcus Houser on 3/15/2021 2:30 PM
<b>YES</b> 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Marcus Houser on 3/15/2021 2:30 PM
WHEN THE TRIPPED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS	
YES 40	Is the high Pressure Safety Switch Installed after the supply fan?	Marcus Houser on 3/15/2021 2:30 PM
<b>YES</b> 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? 4.75" inwc	Marcus Houser on 3/15/2021 2:29 PM Marcus Houser on 3/15/2021 2:29 PM
SUPPLY PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
N/A 38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Marcus Houser on 3/16/2021 8:02 AM
N/A 37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Marcus Houser on 3/16/2021 8:02 AM
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Marcus Houser on 3/16/2021 8:01 AM
WHEN THE SWITCH IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Marcus Houser on 3/16/2021 7:57 AM
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Marcus Houser on 3/16/2021 7:57 AM
SUPPLY PL APPLICABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	
N/A 33	Does the heating coil become open? (If applicable)	Marcus Houser on 3/16/2021 8:02 AM
<b>YES</b> 32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Marcus Houser on 3/16/2021 7:59 AM
<b>YES</b> 31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Marcus Houser on 3/16/2021 8:02 AM
YES 30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Marcus Houser on 3/16/2021 7:58 AM
WHEN THE		Marcus Houser on 3/13/2021 2.20 FW
	mixed air chamber or coll?	Margue Houser on 2/15/2021 2:26 DM
YES 28	Is there enough low limit safety devices installed in order to cover the area of the	Marcus Houser on 3/15/2021 2:26 PM



YES	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Marcus Houser on 3/16/2021 8:00 AM
YES	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Marcus Houser on 3/16/2021 8:00 AM
YES	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Marcus Houser on 3/16/2021 8:00 AM
RETU	IRN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Marcus Houser on 3/16/2021 8:01 AM
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Marcus Houser on 3/16/2021 8:00 AM
WHEN TRIPF	N THE PED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS	
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Marcus Houser on 3/16/2021 8:01 AM
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Marcus Houser on 3/16/2021 8:01 AM
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Marcus Houser on 3/16/2021 8:01 AM
FAN E	EQUIP	MENT VERIFICATION:	
SUPP	PLY FA	N:	
YES	54	Does the supply fan start and stop when commanded by the BAS?	Marcus Houser on 3/16/2021 8:05 AM
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Marcus Houser on 3/16/2021 8:05 AM
RETU	IRN FA	N: (IF APPLICABLE)	
YES	56	Does the return fan start and stop when commanded by the BAS?	Marcus Houser on 3/16/2021 8:04 AM
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Marcus Houser on 3/16/2021 8:04 AM
MININ VERIF	IUM O	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:	
NORM	AL O	PERATION VERIFICATION:	
YES	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Marcus Houser on 3/16/2021 8:11 AM
NO	59	Do the relief air damper actuators fully open and close when commanded by the BAS? 1 Issue: TST-17-3	Marcus Houser on 3/16/2021 8:11 AM
YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Marcus Houser on 3/16/2021 8:08 AM
NO	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS? 1 Issue: TST-17-1	Marcus Houser on 3/16/2021 8:08 AM
NO	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS? 1 Issue: TST-17-2	Marcus Houser on 3/16/2021 8:08 AM
HEAT	ING A	ND COOLING COILS VERIFICATION:	
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Marcus Houser on 3/16/2021 8:13 AM
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Marcus Houser on 3/16/2021 8:12 AM
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):	

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N/A	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Marcus Houser on 3/16/2021 8:12 AM		
N/A	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Marcus Houser on 3/16/2021 8:12 AM		
HUMI APPL	DISTA ICABL	T AND AIRFLOW SWITCH SAFETY VERIFICATION (IF E):			
humi humi air f	DISTA DIFIEF LOW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR GWITCH IS NOT CLOSED.			
N/A	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Marcus Houser on 3/16/2021 8:13 AM		
N/A	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Marcus Houser on 3/16/2021 8:13 AM		
N/A	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Marcus Houser on 3/16/2021 8:13 AM		
TEST	COMF	PLETION VERIFICATION:			
YES	70	Have all overrides on the AHU been released?	Marcus Houser on 3/16/2021 8:13 AM		
Atte	mpt N	No. 2 INCOMPLETE	tatus set by Scott Erlenbusch on 3/25/2021.		
AIR H	ANDL	NG UNIT - SYSTEM DEFICIENCIES TEST.			
THES EQUII OVER PRAC	THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.				
IF A S APPL COMN	ENSC ICABL MENTS	R, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY.			
SENS	or ve	ERIFICATION:			
oute Appl	OOR ICABL	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E):			
YES	1	Does the outdoor humidity sensor report an acceptable value?	Scott Erlenbusch on 3/25/2021 12:10 PM		
		29%	Scott Erlenbusch on 3/25/2021 12:10 PM		
YES	2	Does the outdoor temperature report an acceptable value?	Scott Erlenbusch on 3/25/2021 12:10 PM		
		64 degrees	Scott Erlenbusch on 3/25/2021 12:10 PM		
YES	3	Document if these sensors are locally wired to the controller, or if they are global values.	Scott Erlenbusch on 3/25/2021 12:10 PM		
		These sensors are global temp and humidity sensors (Campus). I did not see any local points in the panel.	Scott Erlenbusch on 3/25/2021 12:10 PM		
RETU	RN AI	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):			
YES	4	Does the return air humidity sensor report an acceptable value?	Scott Erlenbusch on 3/25/2021 12:10 PM		
		Reading 30.2% RH	Scott Erlenbusch on 3/25/2021 12:10 PM		
RETU	RN AI	R TEMPERATURE SENSOR VERIFICATION:			

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TES 5	5	Does the return air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/25/2021	12:10 PM
		BAS=71.5 degrees, Probe=71.5 degrees.	Scott Erlenbusch on 3/25/2021	12:10 PM
YES 6	6	Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?	Scott Erlenbusch on 3/25/2021	12:10 PM
YES 7	7	Is the return air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 3/25/2021	12:10 PM
		18" probe	Scott Erlenbusch on 3/25/2021	12:10 PM
MIXED	AIR (	ECONOMIZER) TEMPERATURE SENSORS:		
YES 8	3	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/25/2021	12:10 PM
YES 9	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 3/25/2021	12:10 PM
YES 1	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 3/25/2021	12:10 PM
SUPPLY	y aif	R HUMIDITY SENSOR VERIFICATION:		
YES 1	11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 3/25/2021	12:10 PM
		Reading 52.9% RH	Scott Erlenbusch on 3/25/2021	12:10 PM
YES 1	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor	Scott Erlenbusch on 3/25/2021	12:10 PM
		AHU does not have a humidifier	Scott Erlenbusch on 3/25/2021	12:10 PM
SUPPLY	Y AIF	R TEMPERATURE SENSORS:		
SUPPLY	Y AIF 13	R TEMPERATURE SENSORS: Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/25/2021	12:10 PM
SUPPLY	Y AIF 13	R TEMPERATURE SENSORS: Does the supply air temperature sensor report an acceptable value? reading 53.9 Deg F	Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021	12:10 PM 12:10 PM
SUPPLY YES 1 YES 1	Y AIF 13 14	R TEMPERATURE SENSORS:         Does the supply air temperature sensor report an acceptable value?         reading 53.9 Deg F         Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021	12:10 PM 12:10 PM 12:10 PM
SUPPLY YES 1 YES 1 YES 1	Y AIF 13 14 15	R TEMPERATURE SENSORS:         Does the supply air temperature sensor report an acceptable value?         reading 53.9 Deg F         Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?         Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021	12:10 PM 12:10 PM 12:10 PM 12:10 PM
SUPPLY YES 1 YES 1 YES 1	Y AIF 13 14 15	R TEMPERATURE SENSORS:         Does the supply air temperature sensor report an acceptable value?         reading 53.9 Deg F         Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?         Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?         18" probe	Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021	12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM
SUPPLY YES 1 YES 1 YES 1 STATIC	Y AIF 13 14 15	R TEMPERATURE SENSORS:         Does the supply air temperature sensor report an acceptable value?         reading 53.9 Deg F         Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?         Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?         18" probe         DIFFERENTIAL PRESSURE SENSORS VERIFICATION:	Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021	12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM
SUPPLY YES 1 YES 1 YES 1 STATIC RETURN	Y AIF 13 14 15 : ANE N PL	R TEMPERATURE SENSORS:         Does the supply air temperature sensor report an acceptable value?         reading 53.9 Deg F         Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?         Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?         18" probe         DIFFERENTIAL PRESSURE SENSORS VERIFICATION:         ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021	12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM
SUPPLY YES 1 YES 1 YES 1 STATIC RETURI	Y AIF 13 14 15 N PL 16	R TEMPERATURE SENSORS:         Does the supply air temperature sensor report an acceptable value?         reading 53.9 Deg F         Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?         Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?         18" probe         DIFFERENTIAL PRESSURE SENSORS VERIFICATION:         ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):         Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021	12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM
SUPPLY YES 1 YES 1 YES 1 STATIC RETURI YES 1 YES 1	Y AIF 13 14 15 15 N PL 16 17	R TEMPERATURE SENSORS:         Does the supply air temperature sensor report an acceptable value?         reading 53.9 Deg F         Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?         Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?         18" probe         DIFFERENTIAL PRESSURE SENSORS VERIFICATION:         ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):         Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?         Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021	12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM
SUPPLY YES 1 YES 1 YES 1 STATIC RETURI YES 1 YES 1	Y AIF 13 14 15 15 15 16 17	R TEMPERATURE SENSORS:         Does the supply air temperature sensor report an acceptable value?         reading 53.9 Deg F         Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?         Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?         18" probe         DIFFERENTIAL PRESSURE SENSORS VERIFICATION:         ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):         Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?         Is the return plenum pressure sensor reporting an acceptable value?         reading .07"inwc	Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021	12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM
SUPPLY YES 1 YES 1 YES 1 STATIC RETURI YES 1 YES 1	Y AIF 13 14 15 15 15 16 17 18	R TEMPERATURE SENSORS:         Does the supply air temperature sensor report an acceptable value?         reading 53.9 Deg F         Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?         Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?         18" probe         DIFFERENTIAL PRESSURE SENSORS VERIFICATION:         ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):         Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?         Is the return plenum pressure sensor reporting an acceptable value?         reading .07"inwc         Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021	12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM
SUPPLY YES 1 YES 1 YES 1 YES 1 YES 1 YES 1	Y AIF 13 14 15 15 15 16 17 18	R TEMPERATURE SENSORS:         Does the supply air temperature sensor report an acceptable value?         reading 53.9 Deg F         Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?         Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?         18" probe         DIFFERENTIAL PRESSURE SENSORS VERIFICATION:         ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):         Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?         Is the return plenum pressure sensor reporting an acceptable value?         reading .07"inwc         Is the return plenum pressure sensor and analog input ranges setup properly?         -2.5 to 2.5" inwc	Scott Erlenbusch on 3/25/2021 Scott Erlenbusch on 3/25/2021	12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10 PM 12:10

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N/A	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 3/25/2021 12:10 PM
N/A	20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/25/2021 12:10 PM
N/A	21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/25/2021 12:10 PM
BUILD	DING F	PRESSURE SENSOR (IF APPLICABLE):	
YES	22	Is the building pressure sensor installed in the best location possible for the areas	Scott Erlenbusch on 6/22/2021 8:22 AM
		Installed in 3rd floor corridor by East entrance.	Scott Erlenbusch on 6/22/2021 8:23 AM
YES	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 6/22/2021 8:23 AM
YES	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 6/22/2021 8:23 AM
FILTE	R PR	ESSURE SENSORS (IF APPLICABLE):	
YES	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 3/25/2021 12:10 PM
YES	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 3/25/2021 12:10 PM
YES	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 3/25/2021 12:10
		0 to 2.5" inwc	Scott Erlenbusch on 3/25/2021 12:10 PM
SAFE	TY DE	VICES VERIFICATION:	
LOW	LIMIT	SAFETY DEVICE:	
YES	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 3/25/2021 12:10 PM
YES	29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 3/25/2021 12:10 PM
WHEN	N THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED	
YES	30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/25/2021 12:10 PM
YES	31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/25/2021 12:10 PM
YES	32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/25/2021 12:10 PM
N/A	33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 3/25/2021 12:10 PM
SUPP APPL	PLY PL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	
N/A	34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 3/25/2021 12:10 PM
N/A	35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 3/25/2021 12:10 PM
WHEN SWIT	N THE CH IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	
N/A	36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/25/2021 12:10 PM



N/A	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
N/A	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
SUPPL	Y PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
YES	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/25/2021 12:	10 PM	
		4.75" inwc	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
YES	40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
WHEN TRIPPI	THE ED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS			
YES	41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
YES	42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
YES	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
RETUF APPLIC	rn Pl Cabli	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):			
YES	44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
		Trips at 2.5" inwc	Scott Erlenbusch on 3/25/2021 12: F	10 °M	
YES	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
WHEN SWITC	THE H IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED			
YES	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
YES	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/25/2021 12: F	10 °M	
YES	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
RETUR	RN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
WHEN TRIPPI	THE ED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS			
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/25/2021 12: F	10 PM	
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/25/2021 12: F	10 >M	
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/25/2021 12: F	10 >M	
FAN E	FAN EQUIPMENT VERIFICATION:				

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#17 WHM\_AHU 3 - AHU - Humidifier/Optimization | Optimized Systems | UNMC Humidifier/Optimization | 20-185

SUPP	LY FA	N:		
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/25/2021	12:10 PM
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/25/2021	12:10 PM
RETU	RN FA	N: (IF APPLICABLE)		
YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/25/2021	12:10 PM
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/25/2021	12:10 PM
MINIM VERIF	IUM O	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:		
NORN	/IAL OI	PERATION VERIFICATION:		
YES	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 3/25/2021	12:10 PM
NO	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 3/25/2021	12:10 PM
YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 3/25/2021	12:10 PM
YES	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 3/25/2021	12:11 PM
N/A	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 3/25/2021	12:11 PM
HEAT	ING A	ND COOLING COILS VERIFICATION:		
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/25/2021	12:10 PM
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/25/2021	12:10 PM
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):		
N/A	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 3/25/2021	12:10 PM
N/A	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 3/25/2021	12:10 PM
HUMI APPL	DISTA ICABL	T AND AIRFLOW SWITCH SAFETY VERIFICATION (IF E):		
humi humi air fi	DISTA DIFIEF LOW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.		
N/A	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 3/25/2021	12:10 PM
N/A	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 3/25/2021	12:10 PM
N/A	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 3/25/2021	12:10 PM
TEST	COMF	PLETION VERIFICATION:		
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 3/25/2021	12:10 PM

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#### **Issues** 5

#### TST-17-1 CLOSED HIGH

One bank of return air dampers has a linkage rod that has come loose. Source Test 17, Attempt 1, Line 61 Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS? Assigned To Scott Erlenbusch Asset 🔅 WHM\_AHU 3 Discipline Controls Due Date 3/18/2021 Created By Scott Erlenbusch Identified On 3/4/2021 2:28 PM

I reconnected linkage and put e-ring back in so it will not come out. Scott Erlenbusch on 03/04/2021 at 02:29 PM Optimized Systems

## TST-17-2 CLOSED HIGH

OAD cracked open when commanded close, needs to be adjusted **Source** Test 17, Attempt 1, Line 62 Do the minimum outdoor air dampers open and close fully when commanded by the BAS? Asset 🔅 WHM\_AHU 3 Due Date 3/30/2021 Created By Marcus Houser Identified On 3/16/2021 8:08 AM

Strategic adjusted and OS tested operation. Scott Erlenbusch on 03/25/2021 at 12:11 PM Optimized Systems

## TST-17-3 OPEN HIGH

Exhaust dampers not opening all the way. Bottom blade is getting hung up on directional blending vane behind it. **Source** Test 17, Attempt 1, Line 59 Do the relief air damper actuators fully open and close when commanded by the BAS? Assigned To UNMC Asset 🔅 WHM\_AHU 3 Due Date 3/30/2021 Created By Marcus Houser Identified On 3/16/2021 8:11 AM

Please repair and verify operation. Scott Erlenbusch on 05/07/2021 at 10:37 AM

TST-17-4 CLOSED HIGH

**Optimized Systems** 

Return ISO damper end switch is not wired up. The return and supply isolation damper end switches should be wired in series so both dampers

are open before the fans start.

Source Test 17 WHM\_AHU 3 - AHU - Humidifier/Optimization Asset 🔅 WHM\_AHU 3 Due Date 3/30/2021 Created By Marcus Houser Identified On 3/16/2021 8:14 AM

Strategic wired the supply and return end switches to the drives so that the drives will not start until the isolation dampers are

open.

Scott Erlenbusch on 06/22/2021 at 09:00 AM Optimized Systems

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## TST-17-5 CLOSED HIGH

VFD drives start as soon as the ISO dampers start moving. Please adjust end switch so that dampers are allowed to open more before starting fans.

Source Test 17 WHM\_AHU 3 - AHU - Humidifier/Optimization Asset 🔅 WHM\_AHU 3 Due Date 3/30/2021 Created By Marcus Houser Identified On 3/16/2021 8:14 AM

Strategic wired the supply and return end switches to the drives so that the drives will not start until the isolation dampers are

open.

Scott Erlenbusch on 06/22/2021 at 08:59 AM Optimized Systems

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## **#13 WHM\_AHU 4 - AHU -**Humidifier/Optimization



80% Yes | 0% No | 20% N/A



Assigned To Optimized Systems Asset 🖏 WHM\_AHU 4

#### Attempts

INCOMPLETE

Attempt N		Status set by Scott Erlenbusch on 11/9/2020.					
AIR HANDLING UNIT - SYSTEM DEFICIENCIES TEST.							
THESE TES EQUIPMEN OVERALL C PRACTICES	THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.						
IF A SENSC APPLICABL COMMENTS	R, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY.						
SENSOR VE	ERIFICATION:						
OUTDOOR APPLICABL	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E):						
YES 1	Does the outdoor humidity sensor report an acceptable value? BAS=36.4% RH, NWS=39% RH.	Scott Erlenbusch on 11/6/2020 1:59 PM Scott Erlenbusch on 11/6/2020 2:02 PM					
YES 2	Does the outdoor temperature report an acceptable value? BAS=74.24 degrees, NWS=75 degrees.	Scott Erlenbusch on 11/6/2020 2:01 PM Scott Erlenbusch on 11/6/2020 2:01 PM					
YES 3	Document if these sensors are locally wired to the controller, or if they are global values.	Scott Erlenbusch on 11/6/2020 2:02 PM					
	These points are local to AHU 8 Panel.	Scott Erlenbusch on 11/6/2020 2:02 PM					
RETURN AI	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):						
YES 4	Does the return air humidity sensor report an acceptable value? BAS=32.7% RH, Fieldpiece psychrometer=38.8% RH	Scott Erlenbusch on 11/6/2020 2:20 PM Scott Erlenbusch on 11/6/2020 2:20 PM					
RETURN AI	R TEMPERATURE SENSOR VERIFICATION:						
YES 5	Does the return air temperature sensor report an acceptable value? BAS=77.4 degrees, Fieldpiece psychrometer=77.7 degrees	Scott Erlenbusch on 11/6/2020 2:17 PM Scott Erlenbusch on 11/6/2020 2:18 PM					
YES 6	Is the return air temperature sensor installed in the return air plenum and not neat the outdoor air or relief air plenums?	r Scott Erlenbusch on 11/6/2020 2:18 PM					
YES 7	Is the return air temperature sensor probe the proper length for the size of duct it installed in?	is Scott Erlenbusch on 11/6/2020 2:18 PM					
	18" probe	Scott Erlenbusch on 11/6/2020 2:18 PM					
MIXED AIR	(ECONOMIZER) TEMPERATURE SENSORS:						
YES 8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 11/6/2020 2:22 PM					
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		BAS=74.2 degrees, Fieldpiece psychrometer=74 degrees	Scott Erlenbusch on 11/6/2020 2:22 PM
YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 11/6/2020 2:23 PM
YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 11/6/2020 2:23 PM
SUPP	PLY AIF	R HUMIDITY SENSOR VERIFICATION:	
YES	11	Does the supply air humidity sensor report an acceptable value? BAS=68.9% RH, Fieldpiece psychrometer=66.9% RH	Scott Erlenbusch on 11/6/2020 2:14 PM Scott Erlenbusch on 11/6/2020 2:15 PM
YES	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 11/6/2020 2:15 PM
SUPP	PLY AIF	R TEMPERATURE SENSORS:	
YES	13	Does the supply air temperature sensor report an acceptable value? BAS=55.5 degrees, Fieldpiece psychrometer=56.5 degrees.	Scott Erlenbusch on 11/6/2020 2:14 PM Scott Erlenbusch on 11/6/2020 2:14 PM
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 11/6/2020 2:15 PM
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 11/6/2020 2:16 PM
		18" probe.	Scott Erlenbusch on 11/6/2020 2:16 PM
STAT	IC ANI	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:	
RETU	IRN PL	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	
NO	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 11/13/2020 9:55 AM
		I did not see one installed or in the points list.	Scott Erlenbusch on 11/6/2020 2:33 PM
		1 Issue: ISI-13-8	
N/A	17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/6/2020 2:28 PM
N/A	18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 11/6/2020 2:28 PM
SUPF	PLY DU	ICT STATIC PRESSURE SENSOR (IF APPLICABLE):	
YES	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 11/9/2020 10:50 AM
		Above ceiling in room 3018.	Scott Erlenbusch on 11/9/2020 10:50 AM
YES	20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/9/2020 10:50 AM
YES	21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 11/9/2020 10:50 AM
BUILD	DING F	RESSURE SENSOR (IF APPLICABLE):	
NO	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 11/13/2020 9:57 AM
		Did not see one installed or in points list.	Scott Erlenbusch on 11/6/2020 2:32 PM
		1 Issue: TST-13-9	
N/A	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/6/2020 2:32 PM
N/A	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 11/6/2020 2:32 PM
FILTE	R PRE	ESSURE SENSORS (IF APPLICABLE):	



<b>YES</b> 25	Are all the filter pressure sensors installed across each filter bank they serve? 1 Issue: TST-13-7	Scott Erlenbusch on 11/6/2020 2:37 PM
<b>YES</b> 26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 11/6/2020 2:40 PM
YES 27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 11/6/2020 2:40 PM
SAFETY I	DEVICES VERIFICATION:	
LOW LIM	T SAFETY DEVICE:	
YES 28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil? 1 Issue: TST-13-1	Scott Erlenbusch on 11/6/2020 10:28 AM
YES 29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 11/6/2020 10:48 AM
WHEN TH	E LOW LIMIT SAFETY CIRCUIT IS TRIPPED	
YES 30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/6/2020 11:21 AM
NO 31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/6/2020 11:21 AM
	1 Issue: TST-13-3	
<b>YES</b> 32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/6/2020 11:22 AM
<b>YES</b> 33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 11/6/2020 11:22 AM
	Preheat coil went to 100% open.	Scott Erlenbusch on 11/6/2020 11:22 AM
SUPPLY APPLICA	PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF BLE):	
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 11/6/2020 10:24 AM
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 11/6/2020 10:24 AM
WHEN TH SWITCH	E SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY S TRIPPED	
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/6/2020 10:24 AM
N/A 37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/6/2020 10:24 AM
N/A 38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/6/2020 10:24 AM
SUPPLY	PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
<b>YES</b> 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 11/6/2020 10:48 AM
	Supply high static tripped at 4".	Scott Erlenbusch on 11/6/2020 10:49 AM
<b>YES</b> 40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 11/6/2020 10:49 AM
WHEN TH TRIPPED	E SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS	
<b>YES</b> 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/6/2020 11:21 AM

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NO	42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/6/2020 11:21 AM			
YES	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/6/2020 11:21 AM			
RETUR APPLIC	RN PL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):				
N/A	44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 11/6/2020 10:24 AM			
N/A	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 11/6/2020 10:24 AM			
WHEN SWITC	THE H IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY RIPPED				
N/A	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/6/2020 10:24 AM			
N/A	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/6/2020 10:24 AM			
N/A	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/6/2020 10:24 AM			
RETUR	RN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):				
YES	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 11/6/2020 11:17 AM			
		tripped @ 3.75"	Scott Erlenbusch on 11/6/2020 11:16 AM			
YES	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers? 1 Issue: TST-13-2	Scott Erlenbusch on 11/6/2020 11:17 AM			
WHEN TRIPPE	THE ED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS				
YES	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/6/2020 11:19 AM			
NO	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/6/2020 11:19 AM			
YES	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/6/2020 11:19 AM			
FAN EC	QUIPI	IENT VERIFICATION:				
SUPPL	SUPPLY FAN					
		N				
YES	54	N: Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 11/6/2020 11:21 AM			
YES	54 55	Does the supply fan start and stop when commanded by the BAS? Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 11/6/2020 11:21 AM Scott Erlenbusch on 11/6/2020 11:21 AM			
YES : YES : RETUR	54 55 RN FA	Does the supply fan start and stop when commanded by the BAS? Does the supply fan VFD (if applicable) respond to the speed signal from the BAS? N: (IF APPLICABLE)	Scott Erlenbusch on 11/6/2020 11:21 AM Scott Erlenbusch on 11/6/2020 11:21 AM			
YES : YES : RETUR	54 55 RN FA 56	Does the supply fan start and stop when commanded by the BAS? Does the supply fan VFD (if applicable) respond to the speed signal from the BAS? N: (IF APPLICABLE) Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 11/6/2020 11:21 AM Scott Erlenbusch on 11/6/2020 11:21 AM Scott Erlenbusch on 11/6/2020 11:21			
YES : YES : RETUR YES :	54 55 RN FA 56 57	<ul> <li>N: Does the supply fan start and stop when commanded by the BAS?</li> <li>Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?</li> <li>N: (IF APPLICABLE)</li> <li>Does the return fan start and stop when commanded by the BAS?</li> <li>Does the return fan VFD (if applicable) respond to the speed signal from the BAS?</li> </ul>	Scott Erlenbusch on 11/6/2020 11:21 AM Scott Erlenbusch on 11/6/2020 11:21 AM Scott Erlenbusch on 11/6/2020 11:21 AM			
YES RETUR YES YES MINIMU VERIFI	54 55 8N FA 56 57 JM O CATI	N:       Does the supply fan start and stop when commanded by the BAS?         Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?         N: (IF APPLICABLE)         Does the return fan start and stop when commanded by the BAS?         Does the return fan start and stop when commanded by the BAS?         Does the return fan VFD (if applicable) respond to the speed signal from the BAS?         A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER         DN:	Scott Erlenbusch on 11/6/2020 11:21 AM Scott Erlenbusch on 11/6/2020 11:21 AM Scott Erlenbusch on 11/6/2020 11:21 AM Scott Erlenbusch on 11/6/2020 11:21 AM			
YES RETUR YES YES MINIMU VERIFI	54 55 8N FA 56 57 JM O CATI	Does the supply fan start and stop when commanded by the BAS? Does the supply fan VFD (if applicable) respond to the speed signal from the BAS? N: (IF APPLICABLE) Does the return fan start and stop when commanded by the BAS? Does the return fan VFD (if applicable) respond to the speed signal from the BAS? A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER DN: PERATION VERIFICATION:	Scott Erlenbusch on 11/6/2020 11:21 AM Scott Erlenbusch on 11/6/2020 11:21 AM Scott Erlenbusch on 11/6/2020 11:21 AM			

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YES	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 11/6/2020 11:24 AM
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 11/6/2020 11:24 AM
NO	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 11/6/2020 11:23 AM
		Return and outdoor air dampers are on separate output signals.	Scott Erlenbusch on 11/6/2020 11:23 AM
YES	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 11/6/2020 11:24 AM
NO	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS? 1 Issue: TST-13-4	Scott Erlenbusch on 11/6/2020 11:24 AM
HEAT	ING A	ND COOLING COILS VERIFICATION:	
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 11/6/2020 11:24 AM
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 11/6/2020 11:24 AM
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):	
N/A	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 11/6/2020 11:26 AM
N/A	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 11/6/2020 11:27 AM
HUMI APPL	DISTA ICABL	T AND AIRFLOW SWITCH SAFETY VERIFICATION (IF E):	
HUMI HUMI AIR F	DISTA DIFIEF LOW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.	
N/A	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 11/6/2020 11:27 AM
N/A	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 11/6/2020 11:27 AM
N/A	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 11/6/2020 11:27 AM
TEST	COM	PLETION VERIFICATION:	
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 11/6/2020 11:29 AM

Attempt No. 2 INCOMPLETE

Status set by Scott Erlenbusch on 3/2/2021.

AIR HANDLING UNIT - SYSTEM DEFICIENCIES TEST.

THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.

IF A SENSOR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR APPLICABLE MARK THE TEST ANSWER AS N/A. USE NOTES AND COMMENTS AS OFTEN AS NECESSARY.



#### SENSOR VERIFICATION:

## OUTDOOR TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):

AFFLICAL	DLE).	
YES 1	Does the outdoor humidity sensor report an acceptable value? BAS=36.4% RH, NWS=39% RH.	Scott Erlenbusch on 3/2/2021 9:35 AM Scott Erlenbusch on 3/2/2021 9:35 AM
YES 2	Does the outdoor temperature report an acceptable value? BAS=74.24 degrees, NWS=75 degrees.	Scott Erlenbusch on 3/2/2021 9:35 AM Scott Erlenbusch on 3/2/2021 9:35 AM
YES 3	Document if these sensors are locally wired to the controller, or if they are global values.	Scott Erlenbusch on 3/2/2021 9:35 AM
	These points are local to AHU 8 Panel.	Scott Erlenbusch on 3/2/2021 9:35 AM
RETURN	AIR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):	
YES 4	Does the return air humidity sensor report an acceptable value? BAS=32.7% RH, Fieldpiece psychrometer=38.8% RH	Scott Erlenbusch on 3/2/2021 9:35 AM Scott Erlenbusch on 3/2/2021 9:35 AM
RETURN	AIR TEMPERATURE SENSOR VERIFICATION:	
YES 5	Does the return air temperature sensor report an acceptable value? BAS=77.4 degrees, Fieldpiece psychrometer=77.7 degrees	Scott Erlenbusch on 3/2/2021 9:35 AM Scott Erlenbusch on 3/2/2021 9:35 AM
YES 6	Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?	Scott Erlenbusch on 3/2/2021 9:35 AM
YES 7	Is the return air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 3/2/2021 9:35 AM
	18" probe	Scott Erlenbusch on 3/2/2021 9:35 AM
MIXED AI	R (ECONOMIZER) TEMPERATURE SENSORS:	
YES 8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/2/2021 9:35 AM
	BAS=74.2 degrees, Fieldpiece psychrometer=74 degrees	Scott Erlenbusch on 3/2/2021 9:35 AM
YES 9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 3/2/2021 9:35 AM
<b>YES</b> 10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 3/2/2021 9:35 AM
SUPPLY /	IR HUMIDITY SENSOR VERIFICATION:	
YES 11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 3/2/2021 9:35 AM
	BAS=68.9% RH, Fieldpiece psychrometer=66.9% RH	Scott Erlenbusch on 3/2/2021 9:35 AM
<b>YES</b> 12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 3/2/2021 9:35 AM
SUPPLY /	NR TEMPERATURE SENSORS:	
YES 13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/2/2021 9:35 AM
	BAS=55.5 degrees, Fieldpiece psychrometer=56.5 degrees.	Scott Erlenbusch on 3/2/2021 9:35 AM
<b>YES</b> 14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 3/2/2021 9:35 AM
YES 15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 3/2/2021 9:35 AM
	18" probe.	Scott Erlenbusch on 3/2/2021 9:35 AM
STATIC A	ND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:	



RETU	RN PL	ENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	
YES	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 3/12/2021 7:46 AM
YES	17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/12/2021 7:46 AM
YES	18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/12/2021 7:46 AM
SUPP	LY DU	CT STATIC PRESSURE SENSOR (IF APPLICABLE):	
YES	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 3/2/2021 9:35 AM
		Above ceiling in room 3018.	Scott Erlenbusch on 3/2/2021 9:35 AM
YES	20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/2/2021 9:35 AM
YES	21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/2/2021 9:35 AM
BUILD	ING P	RESSURE SENSOR (IF APPLICABLE):	
N/A	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 6/21/2021 7:01 AM
		BSP sensor was installed on AHU 03 panel. AHU 3 and 4 serve adjoining spaces.	Scott Erlenbusch on 6/21/2021 7:02 AM
N/A	23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/2/2021 9:35 AM
N/A	24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/2/2021 9:35 AM
FILTE	r pre	SSURE SENSORS (IF APPLICABLE):	
YES	25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 3/2/2021 9:35 AM
YES	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 3/2/2021 9:35 AM
YES	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 3/2/2021 9:35 AM
SAFE	TY DE	VICES VERIFICATION:	
LOW L		SAFETY DEVICE:	
YES	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Scott Erlenbusch on 3/2/2021 9:35 AM
YES	29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 3/2/2021 9:35 AM
WHEN	I THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED	
YES	30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/2/2021 9:35 AM
YES	31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 6/21/2021 10:43 AM
YES	32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/2/2021 9:35 AM
YES	33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 3/2/2021 9:35 AM
		Preheat coil went to 100% open.	Scott Erlenbusch on 3/2/2021 9:35 AM
SUPPI APPLI	LY PL CABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	
N/A	34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 3/2/2021 9:35 AM
N/A	35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 3/2/2021 9:35 AM
WHEN	I THE CH IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	



N/A	36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/2/2021 9:35 AM
N/A	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/2/2021 9:35 AM
N/A	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/2/2021 9:35 AM
SUPP	LY PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
YES	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? Supply high static tripped at 4".	Scott Erlenbusch on 3/2/2021 9:35 AM Scott Erlenbusch on 3/2/2021 9:35 AM
YES	40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 3/2/2021 9:35 AM
WHEN TRIPF	N THE PED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS	
YES	41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/2/2021 9:35 AM
YES	42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 6/21/2021 10:43 AM
YES	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/2/2021 9:35 AM
RETU APPLI	RN PL ICABL	LENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	
YES	44	Is the low suction pressure safety switch calibrated properly in order to not trip	Scott Erlenbusch on 6/21/2021 8:04 AM
		yes, 2.5 inWC. A new low static cutout switch was added so that you could tell which pressure cutout was tripped. Before both pressure switches tripped same point.	Scott Erlenbusch on 6/21/2021 8:03 AM
YES	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 6/21/2021 8:04 AM
YES WHEN SWITC	45 N THE CH IS	Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	Scott Erlenbusch on 6/21/2021 8:04 AM
YES WHEN SWITC	45 N THE CH IS 46	Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 6/21/2021 8:04 AM Scott Erlenbusch on 6/21/2021 10:43 AM
YES WHEN SWITC YES	45 N THE CH IS 46 47	Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 6/21/2021 8:04 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM
YES WHEN SWITC YES YES	45 N THE CH IS 46 47 48	Is the low suction pressure safety switch installed before the return fan?          RETURN PLENUM LOW SUCTION PRESSURE SAFETY         TRIPPED         Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?         Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 6/21/2021 8:04 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM
YES WHEN SWITC YES YES	45 N THE CH IS 46 47 48	Is the low suction pressure safety switch installed before the return fan?          RETURN PLENUM LOW SUCTION PRESSURE SAFETY         TRIPPED         Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?         Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?         Programming will need to be verified.	Scott Erlenbusch on 6/21/2021 8:04 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM
YES WHEN SWITC YES YES YES	45 N THE CH IS 46 47 48	Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Programming will need to be verified. ENUM HIGH PRESSURE SAFETY SWITCH (JE APPLICABLE):	Scott Erlenbusch on 6/21/2021 8:04 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM
YES WHEN SWITC YES YES RETU	45 N THE CH IS 46 47 48 8 RN PL	Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Programming will need to be verified. ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE): Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 6/21/2021 8:04 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM
YES WHEN SWITC YES YES RETU	45 N THE CH IS 46 47 48 48 RN PL 49	Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Programming will need to be verified. ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE): Is the high pressure safety switch calibrated properly in order to not trip early? tripped @ 3.75"	Scott Erlenbusch on 6/21/2021 8:04 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM
YES WHEN SWITC YES YES RETU N/A	45 N THE CH IS 46 47 48 RN PL 49 50	Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Programming will need to be verified. ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE): Is the high pressure safety switch calibrated properly in order to not trip early? tripped @ 3.75" Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 6/21/2021 8:04 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 7:13 AM Scott Erlenbusch on 3/2/2021 9:35 AM
YES WHEN SWITC YES YES YES RETU N/A WHEN TRIPF	45 N THE CH IS 46 47 48 48 RN PL 49 50 50 N THE	Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Programming will need to be verified. ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE): Is the high pressure safety switch calibrated properly in order to not trip early? tripped @ 3.75" Is the high pressure safety switch installed after the return fan and between the return and relief air dampers? RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS	Scott Erlenbusch on 6/21/2021 8:04 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 7:13 AM Scott Erlenbusch on 6/21/2021 7:13 AM
YES WHEN SWITC YES YES RETU N/A WHEN TRIPF	45 N THE CH IS 46 47 48 48 RN PL 49 50 50 N THE ED 51	Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Programming will need to be verified. ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE): Is the high pressure safety switch calibrated properly in order to not trip early? tripped @ 3.75" Is the high pressure safety switch installed after the return fan and between the return and relief air dampers? RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 6/21/2021 8:04 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 7:13 AM Scott Erlenbusch on 6/21/2021 7:13 AM Scott Erlenbusch on 6/21/2021 7:13 AM
YES WHEN SWITC YES YES RETU N/A WHEN TRIPF	45 N THE CH IS 46 47 48 48 RN PL 49 50 50 N THE ED 51 52	Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Programming will need to be verified. ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE): Is the high pressure safety switch calibrated properly in order to not trip early? tripped @ 3.75" Is the high pressure safety switch installed after the return fan and between the return and relief air dampers? RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 6/21/2021 8:04 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 7:13 AM Scott Erlenbusch on 6/21/2021 7:13 AM Scott Erlenbusch on 6/21/2021 7:13 AM Scott Erlenbusch on 6/21/2021 7:13 AM
YES WHEN SWITC YES YES YES RETU N/A WHEN TRIPF N/A	45 N THE CH IS 46 47 48 48 RN PL 49 50 S 50 S THE ED 51 52 53	Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Programming will need to be verified. ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE): Is the high pressure safety switch calibrated properly in order to not trip early? tripped @ 3.75" Is the high pressure safety switch installed after the return fan and between the return and relief air dampers? RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 6/21/2021 8:04 AM Scott Erlenbusch on 6/21/2021 10:43 AM Scott Erlenbusch on 6/21/2021 7:13 AM Scott Erlenbusch on 6/21/2021 7:13 AM Scott Erlenbusch on 6/21/2021 7:13 AM Scott Erlenbusch on 6/21/2021 7:13 AM

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FAN E	FAN EQUIPMENT VERIFICATION:				
SUPPL	SUPPLY FAN:				
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/2/2021 9:35 AM		
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/2/2021 9:35 AM		
RETUR	RN FA	N: (IF APPLICABLE)			
YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/2/2021 9:35 AM		
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/2/2021 9:35 AM		
MINIM VERIFI	UM O ICATI	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:			
NORM	AL O	PERATION VERIFICATION:			
YES	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 3/2/2021 9:35 AM		
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 3/2/2021 9:35 AM		
YES	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 6/21/2021 10:43 AM		
		Return and outdoor air dampers are on separate output signals.	Scott Erlenbusch on 3/2/2021 9:35 AM		
YES	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 3/2/2021 9:35 AM		
YES	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 6/21/2021 10:44 AM		
HEATI	NG A	ND COOLING COILS VERIFICATION:			
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/2/2021 9:35 AM		
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/2/2021 9:35 AM		
HUMID	DIFIEF	R VERIFICATION (IF APPLICABLE):			
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 3/2/2021 9:35 AM		
N/A	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 3/2/2021 9:35 AM		
		Steam is valved off to the humidifier valve so was not able to verify.	Scott Erlenbusch on 3/2/2021 9:36 AM		
HUMID APPLIC	DISTA CABL	T AND AIRFLOW SWITCH SAFETY VERIFICATION (IF E):			
HUMID HUMID AIR FL	DISTA DIFIEF .OW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.			
YES	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 3/2/2021 9:37 AM		
YES	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 3/2/2021 9:37 AM		
YES	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 3/2/2021 9:37 AM		
TEST (	COMF	PLETION VERIFICATION:			
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 3/2/2021 9:35 AM		



#### Issues 8



Lower LTD Needs re-routed for better coverage. Source Test 13, Attempt 1, Line 28 Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil? Asset % WHM\_AHU 4 Discipline Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 10:28 AM

#### Strategic re-routed the lower LTD.

Scott Erlenbusch on 06/21/2021 at 07:17 AM Optimized Systems



#### Issue 2020-11-06 10:28:21.jpg

#### TST-13-2 CLOSED HIGH

Return high static cutout is plumbed to the wrong port. It is plumbed to the low side and should be plumbed to the high side.

Source Test 13, Attempt 1, Line 50

Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?

Asset % WHM\_AHU 4 Discipline Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 11:18 AM

Has been re-plumbed Scott Erlenbusch on 06/21/2021 at 10:44 AM Optimized Systems



#### TST-13-3 CLOSED HIGH

Supply and return fan VFD's will run in hand/bypass when any of the safeties are tripped. Source Test 13, Attempt 1, Line 31 Are the supply and return fan VFD's prohibited from running in hand or bypass? Asset 🔅 WHM\_AHU 4 Discipline Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 11:22 AM

Drives will not run in hand and bypass now when safeties are tripped. Safety board takes the enable away. Scott Erlenbusch on 06/21/2021 at 10:45 AM Optimized Systems

#### TST-13-4 CLOSED MODERATE

Minimum OA damper is open slightly when commanded closed. **Source** Test 13, Attempt 1, Line 62 Do the minimum outdoor air dampers open and close fully when commanded by the BAS? Asset 🔅 WHM\_AHU 4 Discipline Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 11:24 AM

Minimum OAD has been adjusted. Scott Erlenbusch on 06/21/2021 at 07:57 AM Optimized Systems

## TST-13-6 OPEN HIGH

WHM\_AHU 4 - AHU - Humidifier/Optimization

Return CO2 sensor is broken or needs to be re- installed in duct. **Source** Test 13

Asset 🔅 WHM\_AHU 4 Discipline Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 11:31 AM



Issue 2020-11-06 11:31:17.jpg

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#### TST-13-7 CLOSED MODERATE

Pre-filter and filter pressure sensor are set up for bi-directional. These should be set up for uni-directional. **Source** Test 13, Attempt 1, Line 25 Are all the filter pressure sensors installed across each filter bank they serve? Asset 🔅 WHM\_AHU 4 Discipline Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 2:37 PM

Points are now set up for uni-directional and point setup has been changed. Scott Erlenbusch on 06/21/2021 at 07:41 AM Optimized Systems

#### TST-13-8 CLOSED HIGH

No Return plenum static pressure sensor installed. Return Plenum static pressure needs to be installed. **Source** Test 13, Attempt 1, Line 16 Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan? Asset % WHM\_AHU 4 Discipline Controls Due Date 11/27/2020 Created By Scott Erlenbusch Identified On 11/13/2020 9:56 AM

Strategic has installed the RPP sensor. OS has checked install and sensor setup. Scott Erlenbusch on 03/12/2021 at 07:48 AM Optimized Systems



There is no building static pressure sensor installed. Ashcroft building static pressure sensor needs to be installed. Coordinate with Optimized Systems. **Source** Test 13, Attempt 1, Line 22 Is the building pressure sensor installed in the best location possible for the areas served by the unit?

Asset % WHM\_AHU 4 Discipline Controls Due Date 11/27/2020 Created By Scott Erlenbusch Identified On 11/13/2020 9:57 AM

There will be no BSP for this AHU. There was a BSP installed on AHU 3 which serves an adjoining area. Scott Erlenbusch on 06/21/2021 at 07:42 AM Optimized Systems



# **#14 WHM\_AHU 5 - AHU -**Humidifier/Optimization





INCOMPLETE	62% Yes   1% No   35% N/A	10 ISSUES
	4	Assigned To Optimized Systems Asset 🧐 WHM_AHU 5
Attempts		
Attempt	No. 1 FAILED	Status set by Scott Erlenbusch on 11/9/2020
AIR HANDL	ING UNIT - SYSTEM DEFICIENCIES TEST.	
THESE TES EQUIPMEN OVERALL ( PRACTICES	STS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH IT OPERATION, SENSOR VERIFICATION, AS WELL AS CONTROL SYSTEM DESIGN AND INSTALLATION S.	
IF A SENSO APPLICABL COMMENT	DR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR LE MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY.	
SENSOR V	ERIFICATION:	
OUTDOOR APPLICABL	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF .E):	
YES 1	Does the outdoor humidity sensor report an acceptable value? BAS=27% RH, NWS=33% RH.	Scott Erlenbusch on 11/5/2020 2:43 PM Scott Erlenbusch on 11/5/2020 2:43 PM
YES 2	Does the outdoor temperature report an acceptable value? BAS=71.8 degrees, NWS=73 degrees.	Scott Erlenbusch on 11/5/2020 2:43 PM Scott Erlenbusch on 11/5/2020 2:43 PM
YES 3	Document if these sensors are locally wired to the controller, or if they are glo	bal Scott Erlenbusch on 11/5/2020 2:43 PM
	These sensors are global.	Scott Erlenbusch on 11/5/2020 2:44 PM
RETURN A	IR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):	
YES 4	Does the return air humidity sensor report an acceptable value? BAS=60% RH, Amprobe=57.2% RH	Scott Erlenbusch on 11/9/2020 8:06 AM Scott Erlenbusch on 11/9/2020 8:07 AM
RETURN A	IR TEMPERATURE SENSOR VERIFICATION:	
YES 5	Does the return air temperature sensor report an acceptable value? BAS=67.2 degrees, Amprobe=69.6 degrees.	Scott Erlenbusch on 11/9/2020 8:12 AM Scott Erlenbusch on 11/9/2020 8:12 AM
YES 6	Is the return air temperature sensor installed in the return air plenum and not the outdoor air or relief air plenums?	near Scott Erlenbusch on 11/9/2020 8:12 AM
YES 7	Is the return air temperature sensor probe the proper length for the size of du installed in? Picture shows maybe a 12" probe.	ct it is Scott Erlenbusch on 11/9/2020 8:28 AM Scott Erlenbusch on 11/9/2020 8:28 AM
MIXED AIR	(ECONOMIZER) TEMPERATURE SENSORS	
YES 8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 11/9/2020 8:31 AM

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	BAS=71.5 degrees, Fluke=70.8 degrees.	Scott Erlenbusch on 11/9/2020 8:32 AM
YES 9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 11/9/2020 8:32 AM
YES 10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 11/9/2020 8:32 AM
SUPPLY AI	R HUMIDITY SENSOR VERIFICATION:	
YES 11	Does the supply air humidity sensor report an acceptable value? BAS=45.2% RH, Amprobe=42% RH.	Scott Erlenbusch on 11/9/2020 8:53 AM Scott Erlenbusch on 11/9/2020 8:54 AM
<b>YES</b> 12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 11/9/2020 8:55 AM
	Humidity sensor is located about 5' downstream of humidifier. It may be better if the sensor was a little further down hot deck duct so the air has a chance to mix with humidity.	Scott Erlenbusch on 11/9/2020 9:00 AM
SUPPLY AI	R TEMPERATURE SENSORS:	
<b>YES</b> 13	Does the supply air temperature sensor report an acceptable value? CD BAS=55.6 degrees, Amprobe=55.8 degrees. HD BAS=80.5 degrees, Amprobe=79 degrees.	Scott Erlenbusch on 11/9/2020 8:39 AM Scott Erlenbusch on 11/9/2020 8:53 AM
<b>YES</b> 14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 11/9/2020 8:53 AM
YES 15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 11/9/2020 9:02 AM
STATIC AN	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:	
RETURN P	LENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	
N/A 16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 11/9/2020 9:06 AM
	No return fan installed. Do not see a return static pressure sensor installed. There is also not one listed in the Panel.	Scott Erlenbusch on 11/13/2020 8:20 AM
N/A 17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/9/2020 9:06 AM
N/A 18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 11/9/2020 9:06 AM
SUPPLY DU	JCT STATIC PRESSURE SENSOR (IF APPLICABLE):	
NO 19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? 1 Issue: TST-14-9	Scott Erlenbusch on 11/9/2020 7:59 AM
NO 20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/9/2020 8:01 AM
NO 21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 11/9/2020 8:01 AM
BUILDING F	PRESSURE SENSOR (IF APPLICABLE):	
N/A 22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 11/9/2020 9:07 AM
	Do not see a building static pressure sensor installed. There is also not one listed in the Panel.	Scott Erlenbusch on 11/9/2020 9:08 AM
N/A 23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/9/2020 9:07 AM
N/A 24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 11/9/2020 9:07 AM
FILTER PR	ESSURE SENSORS (IF APPLICABLE):	
YES 25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 11/9/2020 9:17 AM

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YES	26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 11/9/2020 9:17 AM		
YES	27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 11/9/2020 9:17 AM		
SAFET	Y DE	VICES VERIFICATION:			
LOW L	IMIT	SAFETY DEVICE:			
NO	28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil? 1 Issue: TST-14-1	Scott Erlenbusch on 11/5/2020 2:04 PM		
YES	29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 11/5/2020 2:06 PM		
WHEN	THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED			
YES	30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/5/2020 2:07 PM		
YES	31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/5/2020 2:07 PM		
NO	32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? 1 Issue: TST-14-2	Scott Erlenbusch on 11/5/2020 2:08 PM		
NO	33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 11/5/2020 2:07 PM		
		Chilled water valve went 100%	Scott Erlenbusch on 11/5/2020 2:08 PM		
SUPPL APPLIC	Y PL CABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):			
N/A	34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 11/5/2020 2:09 PM		
N/A	35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 11/5/2020 2:09 PM		
WHEN SWITC	THE H IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED			
N/A	36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/5/2020 2:09 PM		
N/A	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/5/2020 2:09 PM		
N/A	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/5/2020 2:09 PM		
SUPPL	Y PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
NO	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? Hot Deck - 4.5" Cold Deck - 8.5"	Scott Erlenbusch on 11/5/2020 2:10 PM Scott Erlenbusch on 11/5/2020 2:11 PM		
		1 Issue: TST-14-3			
YES	40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 11/5/2020 2:10 PM		
WHEN TRIPPE	THE ED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS			
YES	41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/5/2020 2:12 PM		
YES	42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/5/2020 2:13 PM		
YES	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/5/2020 2:14 PM		
RETUR	RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):				



N/A	44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 11/5/2020 2:14 PM		
N/A	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 11/5/2020 2:14 PM		
WHEN SWIT	N THE CH IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED			
N/A	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/5/2020 2:15 PM		
N/A	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/5/2020 2:15 PM		
N/A	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/5/2020 2:15 PM		
RETU	RN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):			
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 11/5/2020 2:15 PM		
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 11/5/2020 2:15 PM		
WHEN TRIPF	N THE PED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS			
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/5/2020 2:15 PM		
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/5/2020 2:15 PM		
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/5/2020 2:15 PM		
FAN E	QUIP	MENT VERIFICATION:			
SUPP	LY FA	N:			
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 11/5/2020 2:15 PM		
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS? 1 Issue: TST-14-4	Scott Erlenbusch on 11/5/2020 2:15 PM		
RETU	RN FA	N: (IF APPLICABLE)			
N/A	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 11/5/2020 2:16 PM		
N/A	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 11/5/2020 2:16 PM		
MININ VERIF	IUM O	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:			
NORM	IAL OI	PERATION VERIFICATION:			
NO	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS? 1 Issue: TST-14-5	Scott Erlenbusch on 11/5/2020 2:16 PM		
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 11/5/2020 2:17 PM		
N/A	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 11/5/2020 2:17 PM		
N/A	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 11/5/2020 2:17 PM		
N/A	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 11/5/2020 2:17 PM		
	HEATING AND COOLING COILS VERIFICATION:				



YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 11/5/2020 2:17 PM		
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 11/5/2020 2:17 PM		
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):			
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 11/9/2020 7:50 AM		
		Humidifier Valve and ISO valve appear to be failsafe actuators. Please see attached files. The valves will need to be wired and tested per new humidifier safety sequence.	Scott Erlenbusch on 11/11/2020 10:02 AM		
		1 Issue: TST-14-8			
YES	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 11/9/2020 7:51 AM		
HUMII APPLI	DISTA ICABL	T AND AIRFLOW SWITCH SAFETY VERIFICATION (IF E):			
humii humii air fi	DISTA DIFIEF LOW S	T AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.			
N/A	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 11/9/2020 7:51 AM		
N/A	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 11/9/2020 7:51 AM		
N/A	69	Does the humidifier valve close when either the air flow switch or humidistat switc open?	h Scott Erlenbusch on 11/9/2020 7:51 AM		
TEST	COMF	PLETION VERIFICATION:			
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 11/9/2020 7:51 AM		
Atter	npt N		tatus set by Scott Erlenbusch on 3/12/2021.		
AIR H	AIR HANDLING UNIT - SYSTEM DEFICIENCIES TEST.				
THES EQUIF OVER PRAC	E TES PMEN ALL C TICES	TS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH T OPERATION, SENSOR VERIFICATION, AS WELL AS CONTROL SYSTEM DESIGN AND INSTALLATION 3.			
IF A S APPLI COMN	ENSO ICABL //ENTS	R, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY.			

SENSOR VERIFICATION:

OUTDOOR TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):

YES	1	Does the outdoor humidity sensor report an acceptable value? BAS=27% RH, NWS=33% RH.	Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM
YES	2	Does the outdoor temperature report an acceptable value? BAS=71.8 degrees, NWS=73 degrees.	Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM
YES	3	Document if these sensors are locally wired to the controller, or if they are global values.	Scott Erlenbusch on 3/12/2021 7:49 AM
		These sensors are global.	Scott Erlenbusch on 3/12/2021 7:49 AM

RETURN AIR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):

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YES 4	Does the return air humidity sensor report an acceptable value? BAS=60% RH, Amprobe=57.2% RH	Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM				
RETURN	RETURN AIR TEMPERATURE SENSOR VERIFICATION:					
YES 5	Does the return air temperature sensor report an acceptable value? BAS=67.2 degrees, Amprobe=69.6 degrees.	Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM				
YES 6	Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?	Scott Erlenbusch on 3/12/2021 7:49 AM				
YES 7	Is the return air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 3/12/2021 7:49 AM				
	Picture shows maybe a 12" probe.	Scott Erlenbusch on 3/12/2021 7:49 AM				
MIXED A	R (ECONOMIZER) TEMPERATURE SENSORS:					
YES 8	Does the mixed air temperature sensor report an acceptable value? BAS=71.5 degrees, Fluke=70.8 degrees.	Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM				
YES 9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 3/12/2021 7:49 AM				
YES 10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 3/12/2021 7:49 AM				
SUPPLY	AIR HUMIDITY SENSOR VERIFICATION:					
YES 11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 3/12/2021 7:49 AM				
	BAS=45.2% RH, Amprobe=42% RH.	Scott Erlenbusch on 3/12/2021 7:49 AM				
YES 12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 3/12/2021 7:49 AM				
	Humidity sensor is located about 5' downstream of humidifier. It may be better if the sensor was a little further down hot deck duct so the air has a chance to mix with humidity.	Scott Erlenbusch on 3/12/2021 7:49 AM				
SUPPLY	AIR TEMPERATURE SENSORS:					
YES 13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/12/2021 7:49 AM				
	CD BAS=55.6 degrees, Amprobe=55.8 degrees. HD BAS=80.5 degrees, Amprobe=79 degrees.	Scott Erlenbusch on 3/12/2021 7:49 AM				
YES 14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 3/12/2021 7:49 AM				
YES 15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 3/12/2021 7:49 AM				
STATIC A	ND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:					
RETURN	PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):					
N/A 16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 3/12/2021 7:49 AM				
	No return fan installed. Do not see a return static pressure sensor installed. There is also not one listed in the Panel.	Scott Erlenbusch on 3/12/2021 7:49 AM				
N/A 17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/12/2021 7:49 AM				
N/A 18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/12/2021 7:49 AM				
SUPPLY	DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):					
YES 19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 3/23/2021 11:32 AM				

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	Strategic installed new SSP sensors for the CD and HD on 8th floor chase.	Scott Erlenbusch on 3/23/2021 11:33 AM
YES 20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/23/2021 11:33 AM
YES 21	Is the supply duct static pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/23/2021 11:33 AM
	4-20ma, 0-10 inWC	Scott Erlenbusch on 3/23/2021 11:33 AM
BUILDING F	PRESSURE SENSOR (IF APPLICABLE):	
N/A 22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 3/12/2021 7:49 AM
	Do not see a building static pressure sensor installed. There is also not one listed in the Panel.	Scott Erlenbusch on 3/12/2021 7:49 AM
N/A 23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/12/2021 7:49 AM
N/A 24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/12/2021 7:49 AM
FILTER PRE	ESSURE SENSORS (IF APPLICABLE):	
YES 25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 3/12/2021 7:49 AM
YES 26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 3/12/2021 7:49 AM
YES 27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 3/12/2021 7:49 AM
SAFETY DE	VICES VERIFICATION:	
LOW LIMIT	SAFETY DEVICE:	
	Is there enough low limit safety devices installed in order to cover the area of the	Scott Erlenbusch on 3/23/2021 11:34
YES 28	mixed air chamber or coil?	AM
YES 28	mixed air chamber or coil? Strategic added 2 low limit sensors and OS verified operation.	AM Scott Erlenbusch on 3/23/2021 11:35 AM
28	mixed air chamber or coil? Strategic added 2 low limit sensors and OS verified operation.	AM Scott Erlenbusch on 3/23/2021 11:35 AM
YES 29	Instance enough low limit safety devices instaned in order to cover the area of the mixed air chamber or coil?         Strategic added 2 low limit sensors and OS verified operation.         1 Issue: TST-14-11         Does the freeze stat trip when sprayed with freeze spray?	AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/12/2021 7:49 AM
YES 29 WHEN THE	Installed in order to cover the area of the mixed air chamber or coil?         Strategic added 2 low limit sensors and OS verified operation.         1 Issue: TST-14-11         Does the freeze stat trip when sprayed with freeze spray?         LOW LIMIT SAFETY CIRCUIT IS TRIPPED	AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/12/2021 7:49 AM
YES 29 WHEN THE YES 30	Installed in order to cover the area of the mixed air chamber or coil?         Strategic added 2 low limit sensors and OS verified operation.         1 Issue: TST-14-11         Does the freeze stat trip when sprayed with freeze spray?         LOW LIMIT SAFETY CIRCUIT IS TRIPPED         Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM
YES       29         WHEN THE       YES       30         YES       31	Instruction of the low limit sensors and OS verified operation.         1 Issue: TST-14-11         Does the freeze stat trip when sprayed with freeze spray?         LOW LIMIT SAFETY CIRCUIT IS TRIPPED         Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?	AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM
YES       29         WHEN       THE         YES       30         YES       31         YES       32	Instruction of the endogrinow minit safety devices installed in order to cover the area of the mixed air chamber or coil?         Strategic added 2 low limit sensors and OS verified operation.         1 Issue: TST-14-11         Does the freeze stat trip when sprayed with freeze spray?         LOW LIMIT SAFETY CIRCUIT IS TRIPPED         Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?         Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 11:35 AM
YES       29         WHEN THE         YES       30         YES       31         YES       32         YES       33	It is there enough how minit safety devices installed in order to cover the area of the mixed air chamber or coil? Strategic added 2 low limit sensors and OS verified operation. 1 Issue: TST-14-11 Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Does the heating coil become open? (If applicable)	AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/23/2021 11:43 AM
YES       29         WHEN       THE         YES       30         YES       31         YES       32         YES       33	Instruction of the endogrifted ministrated in order to cover the area of the mixed air chamber or coil?         Strategic added 2 low limit sensors and OS verified operation.         1 Issue: TST-14-11         Does the freeze stat trip when sprayed with freeze spray?         LOW LIMIT SAFETY CIRCUIT IS TRIPPED         Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?         Are the supply and return fan VFD's prohibited from running in hand or bypass?         Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?         Does the heating coil become open? (If applicable)         Chilled water valve went 100%	AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/23/2021 11:43 AM
YES       29         WHEN THE         YES       30         YES       31         YES       32         YES       33         SUPPLY PL         APPLICABL	It is the e endogrifted winner safety devices installed in order to cover the area of the mixed air chamber or coil? Strategic added 2 low limit sensors and OS verified operation. 1 Issue: TST-14-11 Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Does the heating coil become open? (If applicable) Chilled water valve went 100% ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/23/2021 11:43 AM
YES       29         WHEN THE       YES         YES       30         YES       31         YES       32         YES       33         SUPPLY PL         APPLICABL         N/A       34	It is the e endigin for minit safety devices installed in order to cover the area of the mixed air chamber or coil? Strategic added 2 low limit sensors and OS verified operation. 1 Issue: TST-14-11 Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Does the heating coil become open? (If applicable) Chilled water valve went 100% ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/23/2021 11:43 AM Scott Erlenbusch on 3/12/2021 7:49 AM
YES       29         WHEN THE         YES       30         YES       31         YES       32         YES       33         SUPPLY PL         APPLICABL         N/A       34	Is the e chough dow limit safety devices installed in order to cover the area of the mixed air chamber or coil? Strategic added 2 low limit sensors and OS verified operation. 1 Issue: TST-14-11 Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Does the heating coil become open? (If applicable) Chilled water valve went 100% ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.) Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/23/2021 11:43 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM
YES       29         WHEN THE         YES       30         YES       31         YES       32         YES       33         YES       33         SUPPLY PL         APPLICABL         N/A       34         N/A       35         WHEN THE         SWITCH IS	Is the low Suction Pressure Safety Switch Calibrated properly in order to the supply far? Strategic added 2 low limit sensors and OS verified operation. 1 Issue: TST-14-11 Does the freeze stat trip when sprayed with freeze spray? LOW LIMIT SAFETY CIRCUIT IS TRIPPED Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Does the heating coil become open? (If applicable) Chilled water valve went 100% ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.) Is the low Suction Pressure Safety Switch Installed before the supply fan? SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/23/2021 11:43 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM
YES       29         WHEN THE         YES       30         YES       31         YES       32         YES       33         YES       33         SUPPLY PL APPLICABL         N/A       34         N/A       35         WHEN THE SWITCH IS         N/A       36	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.) Is the low Suction Pressure Safety Switch Installed before the supply fan? Supply PLENUM LOW SUCTION PRESSURE SAFETY SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/23/2021 11:35 AM Scott Erlenbusch on 3/23/2021 11:43 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 7:49 AM



N/A	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/12/2021 7:49 AM			
N/A	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/12/2021 7:49 AM			
SUPP	LY PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):				
YES	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/23/2021 11:37			
		Hot Deck - 5" Cold Deck - 5" We may have to go back and lower the static cutout to 4" when the new programming is loaded.	Scott Erlenbusch on 3/23/2021 11:37 AM			
YES	40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 3/12/2021 7:49 AM			
WHEN THE SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED						
YES	41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/12/2021 7:49 AM			
YES	42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/12/2021 7:49 AM			
YES	43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/12/2021 7:49 AM			
RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):						
NO	44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/23/2021 11:37			
		There is no low static cutout installed because there is no return fan on the unit. The hot deck supply fan does act as a return fan and we may need to add a low static if we decide that it is needed.	Scott Erlenbusch on 3/23/2021 11:39 AM			
N/A	45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 3/12/2021 7:49 AM			
WHEN THE RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED						
N/A	46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/12/2021 7:49 AM			
N/A	47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/12/2021 7:49 AM			
N/A	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/12/2021 7:49 AM			
RETURN PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):						
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/12/2021 7:49 AM			
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 3/12/2021 7:49 AM			
WHEN THE RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED						
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/12/2021 7:49 AM			
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/12/2021 7:49 AM			
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/12/2021 7:49 AM			
FAN E	FAN EQUIPMENT VERIFICATION:					
SUPPLY FAN:						

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YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/12/2021 7:49 AM			
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/12/2021 7:49 AM			
RETURN FAN: (IF APPLICABLE)						
N/A	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/12/2021 7:49 AM			
N/A	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/12/2021 7:49 AM			
MININ VERIF	MINIMUM OA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER VERIFICATION:					
NORM	IAL OI	PERATION VERIFICATION:				
YES	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 3/23/2021 11:39 AM			
		Strategic adjusted and OS verified operation.	Scott Erlenbusch on 3/23/2021 11:39 AM			
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 3/12/2021 7:49 AM			
N/A	60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?	Scott Erlenbusch on 3/12/2021 7:49 AM			
N/A	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 3/12/2021 7:49 AM			
N/A	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 3/12/2021 7:49 AM			
HEAT	ING A	ND COOLING COILS VERIFICATION:				
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/12/2021 7:49 AM			
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/12/2021 7:49 AM			
HUMI	DIFIEF	R VERIFICATION (IF APPLICABLE):				
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed? Humidifier valve is failsafe and closes when the humidifier safeties are in alarm.	Scott Erlenbusch on 3/12/2021 7:49 AM Scott Erlenbusch on 3/12/2021 8:16 AM			
YES	66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 3/12/2021 7:49 AM			
HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):						
HUMIDISTAT AND AIRFLOW SWITCH ARE USED TO SHUT THE HUMIDIFIER VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR AIR FLOW SWITCH IS NOT CLOSED.						
YES	67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 3/12/2021 8:16 AM			
YES	68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 3/12/2021 8:16 AM			
YES	69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 3/12/2021 8:16 AM			
TEST COMPLETION VERIFICATION:						
YES	70	Have all overrides on the AHU been released?	Scott Erlenbusch on 3/12/2021 7:49 AM			

**Issues** 10

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## TST-14-1 CLOSED HIGH

Only 1 LTD for the whole coil and also it is ran together with the mixing air temperature sensor. Need to separate the two and add another LTD **Source** Test 14, Attempt 1, Line 28

Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

Asset S WHM\_AHU 5 Discipline Controls Due Date 11/19/2020 Created By Scott Erlenbusch Identified On 11/5/2020 2:06 PM

Strategic installed 2 more LTD sensors and OS verified operation. Scott Erlenbusch on 03/23/2021 at 11:40 AM Optimized Systems

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## TST-14-2 OPEN HIGH

OA damper did not close all the way. Source Test 14, Attempt 1, Line 32 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?

Asset 🧐 WHM\_AHU 5 **Discipline** Controls Due Date 11/19/2020 Created By Scott Erlenbusch Identified On 11/5/2020 2:09 PM

OAD still does seal tightly. The square shaft on the damper is smashed down and may need to be reworked. Scott Erlenbusch on 03/22/2021 at 01:41 PM

Optimized Systems





IMG\_0705.heic





Issue TST-14-2 2021-03-22 13:44:31.jpg

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IMG\_0706.heic

#### TST-14-3 OPEN HIGH

Cold Deck High static safety switch tripped at 8.5" in WC. This setting seems excessive, verify what this setpoint should be and set safety switch. Please set to 4". **Source** Test 14, Attempt 1, Line 39

Is the high Pressure Safety Switch calibrated properly in order to not trip early?

Asset 🌣 WHM\_AHU 5 Discipline Controls Due Date 11/19/2020 Created By Scott Erlenbusch Identified On 11/5/2020 2:11 PM

OS had strategic set both HD and CD pressure switches to 5" until programming is added. Scott Erlenbusch on 03/22/2021 at 01:40 PM Optimized Systems

## TST-14-4 CLOSED HIGH

Cold Deck fans in operation at 80% because SSP sensors are not controlling speed. Verify supply static pressure sensor installation and setup. Re-install or replace if necessary. **Source** Test 14, Attempt 1, Line 55 Does the supply fan VFD (if applicable) respond to the speed signal from the BAS? Asset 🔅 WHM\_AHU 5 Discipline Controls Due Date 11/19/2020 Created By Scott Erlenbusch Identified On 11/5/2020 2:16 PM

Strategic installed new SSP sensors for the HD and CD on 8th floor inside the chase before the duct enters the floor. OS verified sensor setup.

Scott Erlenbusch on 03/23/2021 at 11:43 AM Optimized Systems

#### TST-14-5 CLOSED HIGH

F/B dampers furthest from access door need adjusted, not closing right Source Test 14, Attempt 1, Line 58 Do the face/bypass damper actuators fully open and close when commanded by the BAS? Asset S WHM\_AHU 5 Discipline Controls Due Date 11/19/2020 Created By Scott Erlenbusch Identified On 11/5/2020 2:17 PM

Strategic adjusted damper actuator and OS tested operation. Scott Erlenbusch on 03/22/2021 at 01:10 PM Optimized Systems

## TST-14-7 OPEN HIGH

AHU is lacking proper airflow when it is not economizing. Programming needs to be looked at Source Test 14 WHM\_AHU 5 - AHU - Humidifier/Optimization Asset 🔅 WHM\_AHU 5 Discipline Optimization Due Date 11/19/2020 Created By Scott Erlenbusch Identified On 11/5/2020 2:23 PM

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#### TST-14-8 CLOSED HIGH

Humidifier valve and ISO valve appear to be failsafe actuators. Please see attached files. The valves will need to be wired and tested per new humidifier safety sequence. Source Test 14, Attempt 1, Line 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed?

Asset 🧟 WHM\_AHU 5 **Discipline** Controls Due Date 11/23/2020 Created By Scott Erlenbusch Identified On 11/9/2020 7:57 AM

Strategic wired in new safeties for the humidifier. OS tested the safeties and verified that the humidifier valve closed when safeties went in to alarm.

Scott Erlenbusch on 03/12/2021 at 08:15 AM **Optimized Systems** 



IMG\_0281.jpg

## TST-14-9 CLOSED HIGH

AHU 5 HD and CD Supply static pressure sensors are not reading pressures. They are both reading 0" WC while unit is running. Please verify install and setup and replace if necessary.

Source Test 14, Attempt 1, Line 19

Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?

Asset 🤽 WHM\_AHU 5 **Discipline** Controls Due Date 11/23/2020 Created By Scott Erlenbusch Identified On 11/9/2020 8:01 AM

OS verified the sensor setup and they are reading correctly. Scott Erlenbusch on 03/22/2021 at 01:38 PM **Optimized Systems** 



#### TST-14-10 CLOSED HIGH

HD damper is not open all the way when commanded to 100%. Source Test 14 WHM\_AHU 5 - AHU - Humidifier/Optimization Asset 🔅 WHM\_AHU 5 Discipline Controls Due Date 11/23/2020 Created By Scott Erlenbusch Identified On 11/9/2020 8:34 AM

Strategic adjusted and OS verified operation. Scott Erlenbusch on 03/22/2021 at 01:37 PM Optimized Systems

#### TST-14-11 OPEN HIGH

WHM AHU 5 and 6 safeties are not set up like a normal AHU. When the CD high static or an LTD go in to alarm the enable is lost on the CD drives but not on the HD drive. When the HD high static goes in to alarm the HD drives lose the enable but the CD drives do not. Code does however shut the unit down when any of these alarms are present. Strategic is pricing what it would cost to kill the enable to all the drives when any of the safeties would trip.

Asset 🔅 WHM\_AHU 5 Due Date 4/6/2021 Created By Scott Erlenbusch Identified On 3/23/2021 11:55 AM

Source Test 14, Attempt 2, Line 28

Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?

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# **#15 WHM\_AHU 6 - AHU -**Humidifier/Optimization

Optimized Systems | UNMC Humidifier/Optimization | 20-185

62% Yes | 4% No | 31% N/A



12 ISSUES

Assigned To Optimized Systems Asset 😤 WHM\_AHU 6

### Attempts

INCOMPLETE

Attempt N	IO. 1 FAILED	Status set by Scott Erlenbusch on 11/9/2020.
AIR HANDLI	NG UNIT - SYSTEM DEFICIENCIES TEST.	
THESE TES EQUIPMENT OVERALL C PRACTICES	TS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH FOPERATION, SENSOR VERIFICATION, AS WELL AS ONTROL SYSTEM DESIGN AND INSTALLATION	
IF A SENSO APPLICABLI COMMENTS	R, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR E MARK THE TEST ANSWER AS N/A. USE NOTES AND & AS OFTEN AS NECESSARY.	
SENSOR VE	RIFICATION:	
OUTDOOR	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF E):	
YES 1	Does the outdoor humidity sensor report an acceptable value?	Scott Erlenbusch on 11/6/2020 12:43
	BAS=38% RH, NWS=44% RH	Scott Erlenbusch on 11/6/2020 12:43 PM
YES 2	Does the outdoor temperature report an acceptable value?	Scott Erlenbusch on 11/6/2020 12:43
	BAS=70 degrees, NWS=72 degrees.	Scott Erlenbusch on 11/6/2020 12:43 PM
YES 3	Document if these sensors are locally wired to the controller, or if they are globa values.	I Scott Erlenbusch on 11/6/2020 12:43 PM
	These sensors are global sensors.	Scott Erlenbusch on 11/6/2020 12:43 PM
RETURN AI	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):	
NO 4	Does the return air humidity sensor report an acceptable value?	Scott Erlenbusch on 11/6/2020 12:47 PM
	BAS=28% RH. Fieldpiece psychrometer=49.5% RH.	Scott Erlenbusch on 11/6/2020 12:48 PM
	1 Issue: TST-15-7	
RETURN AI	R TEMPERATURE SENSOR VERIFICATION:	
YES 5	Does the return air temperature sensor report an acceptable value?	Scott Erlenbusch on 11/6/2020 12:49 PM
	BAS=67.2 degrees, Fieldpiece psychrometer=66.8 degrees.	Scott Erlenbusch on 11/6/2020 12:50 PM
YES 6	Is the return air temperature sensor installed in the return air plenum and not ne the outdoor air or relief air plenums?	ar Scott Erlenbusch on 11/6/2020 12:50 PM
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YES	7	Is the return air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 11/6/2020 12:51 PM
		6" probe.	Scott Erlenbusch on 11/6/2020 12:51 PM
MIXE	) AIR	(ECONOMIZER) TEMPERATURE SENSORS:	
YES	8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 11/6/2020 12:57
		BAS=72 degrees, Fluke meter=72.5 degrees	PM Scott Erlenbusch on 11/6/2020 12:57
			PM
YES	9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 11/6/2020 12:57 PM
YES	10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 11/6/2020 12:57 PM
SUPP	LY AIF	R HUMIDITY SENSOR VERIFICATION:	
YES	11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 11/6/2020 1:08 PM
		BAS=22.9% RH, Fieldpiece psychrometer=28.6% RH. Located on the hot deck.	Scott Erlenbusch on 11/6/2020 1:08 PM
YES	12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 11/6/2020 1:04 PM
SUPP	LY AIF	R TEMPERATURE SENSORS:	
NO	13	Does the supply air temperature sensor report an acceptable value?	Scott Erlenbusch on 11/6/2020 1:15 PM
		Cold deck, BAS=53.7. Fieldpiece=52.6 degrees. Hot deck, BAS=77 degrees, Fieldpiece=85.5 degrees.	Scott Erlenbusch on 11/6/2020 1:19 PM
		1 Issue: TST-15-9	
YES	14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 11/6/2020 1:04 PM
YES	15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 11/6/2020 1:06 PM
		18" probe.	Scott Erlenbusch on 11/6/2020 1:06 PM
STAT	IC ANI	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:	
RETU	RN PL	LENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	
N/A	16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 11/6/2020 1:20 PM
		No return fan.	Scott Erlenbusch on 11/13/2020 8:23 AM
N/A	17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/6/2020 1:20 PM
N/A	18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 11/6/2020 1:20 PM
SUPP	LY DL	ICT STATIC PRESSURE SENSOR (IF APPLICABLE):	
YES	19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible? 1 Issue: TST-15-10	Scott Erlenbusch on 11/6/2020 1:32 PM
NO	20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/6/2020 1:44 PM
	21	Is the supply duct static pressure sensor and analog input ranges setup properly?	
BUILD	DING F	PRESSURE SENSOR (IF APPLICABLE):	
N/A	22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 11/6/2020 1:47 PM
		Did not see one installed and did not see one in the points list.	Scott Erlenbusch on 11/6/2020 1:48 PM
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N/A 23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 11/6/2020 1:47 PM	
N/A 24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 11/6/2020 1:47 PM	
FILTER PR	ESSURE SENSORS (IF APPLICABLE):		
YES 25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 11/6/2020 1:54 PM	
<b>YES</b> 26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 11/6/2020 1:54 PM	
YES 27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 11/6/2020 1:54 PM	
SAFETY DI	EVICES VERIFICATION:		
LOW LIMIT	SAFETY DEVICE:		
NO 28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil? 1 Issue: TST-15-8	Scott Erlenbusch on 11/6/2020 12:58 PM	
<b>YES</b> 29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 11/5/2020 12:37 PM	
WHEN THE	LOW LIMIT SAFETY CIRCUIT IS TRIPPED		
<b>YES</b> 30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/5/2020 12:37 PM	
NO 31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/5/2020 12:37 PM	
<b>YES</b> 32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/5/2020 12:38 PM	
	Return bypass damper opened to 15% when AHU tripped.	Scott Erlenbusch on 11/5/2020 12:38 PM	
NO 33	Does the heating coil become open? (If applicable)	Scott Erlenbusch on 11/5/2020 12:39 PM	
	Preheat valve remained closed and Face/Bypass damper remained at 0% Face.	Scott Erlenbusch on 11/5/2020 12:40 PM	
	1 Issue: TST-15-2		
SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):			
N/A 34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 11/5/2020 12:40 PM	
N/A 35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 11/5/2020 12:40 PM	
WHEN THE SWITCH IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED		
N/A 36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/5/2020 12:40 PM	
N/A 37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/5/2020 12:40 PM	
N/A 38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/5/2020 12:40 PM	
SUPPLY PI	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):		
<b>YES</b> 39	Is the high Pressure Safety Switch calibrated properly in order to not trip early?	Scott Erlenbusch on 11/5/2020 12:41	
	CD high static cutout tripped at 4.75". HD high static cutout tripped at 3.5".	Scott Erlenbusch on 11/5/2020 12:42	
	1 Issue: TST-15-13	PM	

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YES 40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 11/5/2020 12:42 PM
WHEN THE TRIPPED	SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS	
<b>YES</b> 41	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/5/2020 12:43 PM
	Safeties are not on a RIB board, they have the ice cube relays for each safety. We tested each high static when the LTD safety was tripped. Each high static relay lost power when we tripped high static cutouts. The system did alarm for high static pressure.	Scott Erlenbusch on 11/5/2020 12:47 PM
NO 42	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/5/2020 12:48 PM
<b>YES</b> 43	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/5/2020 12:48 PM
	Will need to be verified when new programming is installed.	Scott Erlenbusch on 11/5/2020 12:48 PM
RETURN PI APPLICABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	
N/A 44	Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 11/5/2020 12:48 PM
N/A 45	Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 11/5/2020 12:48 PM
WHEN THE SWITCH IS	RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	
N/A 46	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/5/2020 12:48 PM
N/A 47	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/5/2020 12:48 PM
N/A 48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/5/2020 12:48 PM
RETURN PI	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
N/A 49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 11/5/2020 12:48 PM
N/A 50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 11/5/2020 12:48 PM
WHEN THE TRIPPED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS	
N/A 51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 11/5/2020 12:48 PM
N/A 52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 11/5/2020 12:49 PM
N/A 53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 11/5/2020 12:49 PM
FAN EQUIP	MENT VERIFICATION:	
SUPPLY FA	N:	
YES 54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 11/5/2020 12:49 PM



<b>YES</b> 55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 11/5/2020 12:49 PM	
RETURN FAN: (IF APPLICABLE)			
<b>YES</b> 56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 11/5/2020 12:49 PM	
<b>YES</b> 57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 11/5/2020 12:49 PM	
MINIMUM ( VERIFICAT	DA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ION:		
NORMAL C	PERATION VERIFICATION:		
<b>YES</b> 58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 11/5/2020 12:50 PM	
NO 59	Do the relief air damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 11/5/2020 12:52 PM	
NO 60	Do the return and outdoor air (economizer) dampers open and close inverse of	Scott Erlenbusch on 11/5/2020 12:51	
	each other when commanded by the BAS?	PM Seett Erlenbusch en 11/5/2020 12:51	
	Return bypass damper and OA dampers are on different signals because of the unit configuration.	Scott Energiasch on 11/5/2020 12:52 PM	
<b>YES</b> 61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 11/5/2020 12:52 PM	
N/A 62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 11/5/2020 12:52 PM	
HEATING A	ND COOLING COILS VERIFICATION:		
<b>YES</b> 63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 11/5/2020 12:53 PM	
<b>YES</b> 64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 11/5/2020 12:53 PM	
HUMIDIFIE	R VERIFICATION (IF APPLICABLE):		
<b>YES</b> 65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 11/9/2020 9:53 AM	
	Appears the humidifier valve is a failsafe actuator. Please see files attached to Issue	Dakota Zimmerman on 11/10/2020 9:43 AM	
	1 Issue: TST-15-12		
<b>YES</b> 66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 11/9/2020 7:42 AM	
HUMIDISTA APPLICABL	AT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF .E):		
HUMIDISTA HUMIDIFIE AIR FLOW	AT AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.		
N/A 67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU? 1 Issue: TST-15-11	Scott Erlenbusch on 11/9/2020 7:46 AM	
N/A 68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 11/9/2020 7:46 AM	
N/A 69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 11/9/2020 7:46 AM	
TEST COM	PLETION VERIFICATION:		

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YES 70	Have all overrides on the AHU been released?	Scott Erlenbusch on 11/9/2020 7:46 AM
Attempt	No. 2 INCOMPLETE	atus set by Scott Erlenbusch on 3/12/2021.
AIR HANDL	ING UNIT - SYSTEM DEFICIENCIES TEST.	
THESE TES EQUIPMEN OVERALL O PRACTICES	STS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH T OPERATION, SENSOR VERIFICATION, AS WELL AS CONTROL SYSTEM DESIGN AND INSTALLATION S.	
IF A SENSO APPLICABL COMMENT	DR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR .E MARK THE TEST ANSWER AS N/A. USE NOTES AND S AS OFTEN AS NECESSARY.	
SENSOR V	ERIFICATION:	
OUTDOOR APPLICABL	TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF .E):	
YES 1	Does the outdoor humidity sensor report an acceptable value? BAS=38% RH, NWS=44% RH	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM
YES 2	Does the outdoor temperature report an acceptable value? BAS=70 degrees, NWS=72 degrees.	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM
YES 3	Document if these sensors are locally wired to the controller, or if they are global	Scott Erlenbusch on 3/12/2021 8:20 AM
	These sensors are global sensors.	Scott Erlenbusch on 3/12/2021 8:20 AM
RETURN A	R HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):	
YES 4	Does the return air humidity sensor report an acceptable value?	Marcus Houser on 3/23/2021 11:38 AM
	BAS=28% RH. Fieldpiece psychrometer=49.5% RH.	Scott Erlenbusch on 3/12/2021 8:20 AM
<b>RETURN A</b>	IR TEMPERATURE SENSOR VERIFICATION:	
YES 5	Does the return air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/12/2021 8:20 AM
	BAS=67.2 degrees, Fieldpiece psychrometer=66.8 degrees.	Scott Erlenbusch on 3/12/2021 8:20 AM
YES 6	Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?	Scott Erlenbusch on 3/12/2021 8:20 AM
YES 7	Is the return air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 3/12/2021 8:20 AM
	6" probe.	Scott Erlenbusch on 3/12/2021 8:20 AM
MIXED AIR	(ECONOMIZER) TEMPERATURE SENSORS:	
YES 8	Does the mixed air temperature sensor report an acceptable value?	Scott Erlenbusch on 3/12/2021 8:20 AM
	BAS=72 degrees, Fluke meter=72.5 degrees	Scott Erlenbusch on 3/12/2021 8:20 AM
YES 9	Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?	Scott Erlenbusch on 3/12/2021 8:20 AM
<b>YES</b> 10	Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?	Scott Erlenbusch on 3/12/2021 8:20 AM
SUPPLY AI	R HUMIDITY SENSOR VERIFICATION:	
YES 11	Does the supply air humidity sensor report an acceptable value?	Scott Erlenbusch on 3/12/2021 8:20 AM
	BAS=22.9% RH, Fieldpiece psychrometer=28.6% RH. Located on the hot deck.	Scott Erlenbusch on 3/12/2021 8:20 AM



YES 12	Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.	Scott Erlenbusch on 3/12/2021 8:20 AM
SUPPLY AIR TEMPERATURE SENSORS:		
<b>YES</b> 13	Does the supply air temperature sensor report an acceptable value? Cold deck, BAS=53.7. Fieldpiece=52.6 degrees. Hot deck, BAS=77 degrees, Fieldpiece=85.5 degrees. (HD sensor has been replaced)	Marcus Houser on 3/23/2021 11:49 AM Marcus Houser on 3/23/2021 11:49 AM
<b>YES</b> 14	Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?	Scott Erlenbusch on 3/12/2021 8:20 AM
<b>YES</b> 15	Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?	Scott Erlenbusch on 3/12/2021 8:20 AM
	18" probe.	Scott Erlenbusch on 3/12/2021 8:20 AM
STATIC AN	D DIFFERENTIAL PRESSURE SENSORS VERIFICATION:	
RETURN P	LENUM STATIC PRESSURE SENSOR (IF APPLICABLE):	
N/A 16	Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?	Scott Erlenbusch on 3/12/2021 8:20 AM
	No return fan.	Scott Erlenbusch on 3/12/2021 8:20 AM
N/A 17	Is the return plenum pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/12/2021 8:20 AM
N/A 18	Is the return plenum pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/12/2021 8:20 AM
SUPPLY D	JCT STATIC PRESSURE SENSOR (IF APPLICABLE):	
<b>YES</b> 19	Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?	Scott Erlenbusch on 3/12/2021 8:20 AM
NO 20	Is the supply duct static pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/12/2021 8:20 AM
21	Is the supply duct static pressure sensor and analog input ranges setup properly?	
BUILDING	PRESSURE SENSOR (IF APPLICABLE):	
N/A 22	Is the building pressure sensor installed in the best location possible for the areas served by the unit?	Scott Erlenbusch on 3/12/2021 8:20 AM
	Did not see one installed and did not see one in the points list.	Scott Erlenbusch on 3/12/2021 8:20 AM
N/A 23	Is the building pressure sensor reporting an acceptable value?	Scott Erlenbusch on 3/12/2021 8:20 AM
N/A 24	Is the building pressure sensor and analog input ranges setup properly?	Scott Erlenbusch on 3/12/2021 8:20 AM
FILTER PR	ESSURE SENSORS (IF APPLICABLE):	
<b>YES</b> 25	Are all the filter pressure sensors installed across each filter bank they serve?	Scott Erlenbusch on 3/12/2021 8:20 AM
<b>YES</b> 26	Are all the filter pressure sensors reporting an acceptable value?	Scott Erlenbusch on 3/12/2021 8:20 AM
YES 27	Are all the filter pressure sensors and analog input ranges setup properly?	Scott Erlenbusch on 3/12/2021 8:20 AM
SAFETY D	EVICES VERIFICATION:	
LOW LIMIT	SAFETY DEVICE:	
YES 28	Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?	Marcus Houser on 3/23/2021 11:48 AM
	low limit safeties have been added	Marcus Houser on 3/23/2021 11:49 AM
YES 29	Does the freeze stat trip when sprayed with freeze spray?	Scott Erlenbusch on 3/12/2021 8:20 AM

WHEN THE LOW LIMIT SAFETY CIRCUIT IS TRIPPED...



YES	30	Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/12/2021 8:20 AM
YES	31	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Marcus Houser on 3/23/2021 11:48 AM
YES	32	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/12/2021 8:20 AM
		Return bypass damper opened to 15% when AHU tripped.	Scott Erlenbusch on 3/12/2021 8:20 AM
NO	33	Does the heating coil become open? (If applicable) Preheat valve remained closed and Face/Bypass damper remained at 0% Face.	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM
SUPP APPLI	LY PL CABL	ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	
N/A	34	Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)	Scott Erlenbusch on 3/12/2021 8:20 AM
N/A	35	Is the low Suction Pressure Safety Switch Installed before the supply fan?	Scott Erlenbusch on 3/12/2021 8:20 AM
WHEN SWIT	N THE CH IS	SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED	
N/A	36	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/12/2021 8:20 AM
N/A	37	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/12/2021 8:20 AM
N/A	38	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/12/2021 8:20 AM
SUPP	LY PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
YES	39	Is the high Pressure Safety Switch calibrated properly in order to not trip early? CD high static cutout tripped at 4.75". HD high static cutout tripped at 3.5".	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM
YES	40	Is the high Pressure Safety Switch Installed after the supply fan?	Scott Erlenbusch on 3/12/2021 8:20 AM
WHEN TRIPF	40 N THE PED	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS	Scott Erlenbusch on 3/12/2021 8:20 AM
YES WHEN TRIPF YES	40 N THE PED 41	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM
YES WHEN TRIPF	40 N THE PED 41	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Safeties are not on a RIB board, they have the ice cube relays for each safety. We tested each high static when the LTD safety was tripped. Each high static relay lost power when we tripped high static cutouts. The system did alarm for high static pressure.	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM
YES WHEN TRIPF YES	40 N THE PED 41	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Safeties are not on a RIB board, they have the ice cube relays for each safety. We tested each high static when the LTD safety was tripped. Each high static relay lost power when we tripped high static cutouts. The system did alarm for high static pressure. Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Marcus Houser on 3/23/2021 11:48 AM
YES WHEN TRIPF YES YES	40 N THE PED 41 42 43	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Safeties are not on a RIB board, they have the ice cube relays for each safety. We tested each high static when the LTD safety was tripped. Each high static relay lost power when we tripped high static cutouts. The system did alarm for high static pressure. Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Marcus Houser on 3/23/2021 11:48 AM Scott Erlenbusch on 3/12/2021 8:20 AM
YES YES YES	40 N THE PED 41 42 43	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Safeties are not on a RIB board, they have the ice cube relays for each safety. We tested each high static when the LTD safety was tripped. Each high static relay lost power when we tripped high static cutouts. The system did alarm for high static pressure. Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Will need to be verified when new programming is installed.	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Marcus Houser on 3/23/2021 11:48 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM
YES YES YES RETU APPLI	40 N THE PED 41 42 43 RN PL CABL	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Safeties are not on a RIB board, they have the ice cube relays for each safety. We tested each high static when the LTD safety was tripped. Each high static relay lost power when we tripped high static cutouts. The system did alarm for high static pressure. Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Will need to be verified when new programming is installed. ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E):	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Marcus Houser on 3/23/2021 11:48 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM
YES YES YES RETU APPLI	40 N THE ED 41 42 43 RN PL CABL 44	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Safeties are not on a RIB board, they have the ice cube relays for each safety. We tested each high static when the LTD safety was tripped. Each high static relay lost power when we tripped high static cutouts. The system did alarm for high static pressure. Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Will need to be verified when new programming is installed. ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low suction pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Marcus Houser on 3/23/2021 11:48 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM
YES WHEN TRIPF YES YES RETU APPLI N/A	40 N THE ED 41 42 43 RN PL CABL 44 45	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Safeties are not on a RIB board, they have the ice cube relays for each safety. We tested each high static when the LTD safety was tripped. Each high static relay lost power when we tripped high static cutouts. The system did alarm for high static pressure. Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Will need to be verified when new programming is installed. ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low suction pressure safety switch calibrated properly in order to not trip early? Is the low suction pressure safety switch installed before the return fan?	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Marcus Houser on 3/23/2021 11:48 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM
YES WHEN TRIPF YES YES RETU APPLI N/A WHEN SWITC	40 N THE PED 41 42 43 RN PL CABL 44 45 N THE CH IS	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Safeties are not on a RIB board, they have the ice cube relays for each safety. We tested each high static when the LTD safety was tripped. Each high static relay lost power when we tripped high static cutouts. The system did alarm for high static pressure. Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Will need to be verified when new programming is installed. ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low suction pressure safety switch calibrated properly in order to not trip early? Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY RIPPED	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Marcus Houser on 3/23/2021 11:48 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM
YES WHEN TRIPF YES YES RETU APPLI N/A WHEN SWITC N/A	40 N THE PED 41 42 43 RN PL CABL 44 45 N THE CH IS 46	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Safeties are not on a RIB board, they have the ice cube relays for each safety. We tested each high static when the LTD safety was tripped. Each high static relay lost power when we tripped high static cutouts. The system did alarm for high static pressure. Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Will need to be verified when new programming is installed. ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low suction pressure safety switch calibrated properly in order to not trip early? Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Marcus Houser on 3/23/2021 11:48 AM Scott Erlenbusch on 3/12/2021 8:20 AM
YES YES YES RETU APPLI N/A WHEN SWITC N/A	40 N THE PED 41 42 43 RN PL CABL 44 45 N THE CH IS 46 47	Is the high Pressure Safety Switch Installed after the supply fan? SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Safeties are not on a RIB board, they have the ice cube relays for each safety. We tested each high static when the LTD safety was tripped. Each high static relay lost power when we tripped high static cutouts. The system did alarm for high static pressure. Are the supply and return fan VFD's prohibited from running in hand or bypass? Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open? Will need to be verified when new programming is installed. ENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF E): Is the low suction pressure safety switch calibrated properly in order to not trip early? Is the low suction pressure safety switch installed before the return fan? RETURN PLENUM LOW SUCTION PRESSURE SAFETY TRIPPED Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS? Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Scott Erlenbusch on 3/12/2021 8:20 AM Marcus Houser on 3/23/2021 11:48 AM Scott Erlenbusch on 3/12/2021 8:20 AM



N/A	48	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/12/2021 8:20 AM
RETUR	RN PL	ENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):	
N/A	49	Is the high pressure safety switch calibrated properly in order to not trip early?	Scott Erlenbusch on 3/12/2021 8:20 AM
N/A	50	Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?	Scott Erlenbusch on 3/12/2021 8:20 AM
WHEN TRIPP	THE ED	RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS	
N/A	51	Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?	Scott Erlenbusch on 3/12/2021 8:20 AM
N/A	52	Are the supply and return fan VFD's prohibited from running in hand or bypass?	Scott Erlenbusch on 3/12/2021 8:20 AM
N/A	53	Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?	Scott Erlenbusch on 3/12/2021 8:20 AM
FAN E	QUIPI	MENT VERIFICATION:	
SUPPL	Y FA	N:	
YES	54	Does the supply fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/12/2021 8:20 AM
YES	55	Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/12/2021 8:20 AM
RETUR	RN FA	N: (IF APPLICABLE)	
YES	56	Does the return fan start and stop when commanded by the BAS?	Scott Erlenbusch on 3/12/2021 8:20 AM
YES	57	Does the return fan VFD (if applicable) respond to the speed signal from the BAS?	Scott Erlenbusch on 3/12/2021 8:20 AM
MINIM VERIF	UM O ICATI	A, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER ON:	
NORM	AL OI	PERATION VERIFICATION:	
YES	58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?	Scott Erlenbusch on 3/12/2021 8:20 AM
YES	59	Do the relief air damper actuators fully open and close when commanded by the BAS2	Marcus Houser on 3/23/2021 11:44 AM
		Relief dampers have been adjusted	Marcus Houser on 3/23/2021 11:44 AM
NO	60	Do the return and outdoor air (economizer) dampers open and close inverse of	Scott Erlenbusch on 3/12/2021 8:20 AM
		each other when commanded by the BAS?	Scott Erlenbusch on 3/12/2021 8:20 AM
		unit configuration.	
YES	61	Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 3/12/2021 8:20 AM
N/A	62	Do the minimum outdoor air dampers open and close fully when commanded by the BAS?	Scott Erlenbusch on 3/12/2021 8:20 AM
HEATI	HEATING AND COOLING COILS VERIFICATION:		
YES	63	Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/12/2021 8:20 AM
YES	64	Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)	Scott Erlenbusch on 3/12/2021 8:20 AM
HUMIE	DIFIEF	R VERIFICATION (IF APPLICABLE):	
YES	65	Is the humidifier valve actuator a fail safe actuator and does it fail closed?	Scott Erlenbusch on 3/12/2021 8:20 AM
		Humidifier valve is failsafe and the valve does close when the humidifier safeties are tripped.	Scott Erlenbusch on 3/12/2021 8:20 AM
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<b>YES</b> 66	When humidifier valve is opened, is there steam discharging from the humidifier tubes?	Scott Erlenbusch on 3/12/2021 8:20 AM
HUMIDIST APPLICAE	AT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF LE):	
Humidist Humidifie Air Flow	AT AND AIRFLOW SWITCH ARE USED TO SHUT THE R VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR SWITCH IS NOT CLOSED.	
<b>YES</b> 67	Is the humidistat located between the humidity sensor and the smoke detector on the AHU?	Scott Erlenbusch on 3/12/2021 8:20 AM
<b>YES</b> 68	Is the airflow switch plumbed in to the AHU supply air plenum?	Scott Erlenbusch on 3/12/2021 8:20 AM
<b>YES</b> 69	Does the humidifier valve close when either the air flow switch or humidistat switch open?	Scott Erlenbusch on 3/12/2021 8:20 AM
TEST CON	IPLETION VERIFICATION:	
<b>YES</b> 70	Have all overrides on the AHU been released?	Scott Erlenbusch on 3/12/2021 8:20 AM

#### **Issues** 12

### TST-15-2 OPEN MODERATE

Preheat valve remained closed and Face/Bypass damper remained at 0% Face. May not be an issue but wanted to note. Verify programming will protect the coils. **Source** Test 15, Attempt 1, Line 33 Does the heating coil become open? (If applicable) Asset % WHM\_AHU 6 Discipline Optimization Due Date 11/19/2020 Created By Scott Erlenbusch Identified On 11/5/2020 12:40 PM

## TST-15-4 OPEN HIGH

CD supply fan is overridden to 80% speed because the fan was not controlling to supply static pressure sensor. Verify the supply static pressure sensor is installed and setup correctly. **Source** Test 15, Attempt 1, Line 54 Does the supply fan start and stop when commanded by the BAS? Asset % WHM\_AHU 6 Discipline Controls Due Date 11/19/2020 Created By Scott Erlenbusch Identified On 11/5/2020 12:50 PM



### TST-15-5 OPEN HIGH

Relief dampers are still open slightly when commanded closed. Source Test 15, Attempt 1, Line 59 Do the relief air damper actuators fully open and close when commanded by the BAS? Asset % WHM\_AHU 6 Discipline Controls Due Date 11/19/2020 Created By Scott Erlenbusch Identified On 11/5/2020 12:52 PM

#### Dampers have been adjusted, still a slight gap

Marcus Houser on 03/22/2021 at 02:59 PM Optimized Systems



#### IMG\_0711.heic

IMG\_0712.heic

## TST-15-6 OPEN HIGH

When AHU is not in economizer mode it appears to be starving for air. Verify correct programming. Source Test 15 WHM\_AHU 6 - AHU - Humidifier/Optimization Asset S WHM\_AHU 6 Discipline Optimization Due Date 11/19/2020 Created By Scott Erlenbusch Identified On 11/5/2020 12:54 PM

## TST-15-7 CLOSED HIGH

Return air humidity sensor not reading correctly. BAS=28% RH. Fieldpiece psychrometer=49.5% RH. Please replace senor. **Source** Test 15, Attempt 1, Line 4 Does the return air humidity sensor report an acceptable value? Asset % WHM\_AHU 6 Discipline Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 12:49 PM

verified new sensor, completed Marcus Houser on 03/22/2021 at 03:00 PM Optimized Systems

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### TST-15-8 CLOSED MODERATE

There are spaces not covered by the two LTD sensors installed. Add another LTD to cover these areas. **Source** Test 15, Attempt 1, Line 28 Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil? Asset % WHM\_AHU 6 Discipline Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 12:59 PM

#### Another LTD has been added

Marcus Houser on 03/22/2021 at 03:00 PM Optimized Systems

### TST-15-9 CLOSED MODERATE

Hot deck temperature not reading correctly. Hot deck, BAS=76.5 degrees, Fieldpiece psychrometer=85.5 degrees. Hot deck temperature sensor is an 18" probe so we may are probably not getting our sensor in to the airstream as well. May not be an issue. Recommend moving probe to the ductwork. **Source** Test 15, Attempt 1, Line 13 Does the supply air temperature sensor report an acceptable value? Asset 🔅 WHM\_AHU 6 Discipline Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 1:18 PM

New sensor has been installed, and verified Marcus Houser on 03/22/2021 at 03:01 PM Optimized Systems

## TST-15-10 OPEN HIGH

Cold deck supply fan drives are overridden to 80% because the fans are not controlling to supply static. Recommend replacing static pressure sensors for CD static and HD static that are 2/3 down the ductwork. Lenny from Energy Group said that is why drives are overridden. Please verify static pressure sensor is installed and setup correctly. Replace if necessary. **Source** Test 15, Attempt 1, Line 19

Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?

Asset 🔅 WHM\_AHU 6 Discipline Controls Due Date 11/20/2020 Created By Scott Erlenbusch Identified On 11/6/2020 1:37 PM



## TST-15-11 CLOSED HIGH

Did not see a humidistat or airflow switch installed for humidifier. The humidistat and airflow switch will need to be installed per the new humidifier safety sequence and tested.

**Source** Test 15, Attempt 1, Line 67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU? Asset 🔅 WHM\_AHU 6 Discipline Controls Due Date 11/23/2020 Created By Scott Erlenbusch Identified On 11/9/2020 7:48 AM

New humidifier safeties have been installed and tested by OS. Scott Erlenbusch on 03/12/2021 at 08:22 AM Optimized Systems

TST-15-12 CLOSED HIGH

Humidifier valve and ISO valve will need to be wired and tested per the new humidifier safety sequence. (Please see Attached Files) **Source** Test 15, Attempt 1, Line 65
Is the humidifier valve actuator a fail safe actuator and does it fail closed?

Asset 🔅 WHM\_AHU 6 Discipline Controls Due Date 11/23/2020 Created By Scott Erlenbusch Identified On 11/9/2020 7:49 AM

Humidifier valve is now failsafe and does close when the humidifier safeties are tripped. Scott Erlenbusch on 03/12/2021 at 08:23 AM Optimized Systems







IMG\_0293.jpg

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## TST-15-13 CLOSED HIGH

CD Supply high static cutout is set too high. Please set to trip at 4". **Source** Test 15, Attempt 1, Line 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early?

Asset 🔅 WHM\_AHU 6 Discipline Controls Due Date 11/27/2020 Created By Scott Erlenbusch Identified On 11/13/2020 8:26 AM

CD high static has been adjusted to 4" Marcus Houser on 03/22/2021 at 03:01 PM Optimized Systems

## TST-15-14 OPEN HIGH

There are two screws holding the humidifier actuator on. Marcus tightened those up, but there are two screws missing. Please get new screws and install.

Source Test 15 WHM\_AHU 6 - AHU - Humidifier/Optimization Asset S WHM\_AHU 6 Due Date 3/26/2021 Created By Scott Erlenbusch Identified On 3/12/2021 8:31 AM



# **#16 WHM\_AHU 9 - AHU -**Humidifier/Optimization

Optimized Systems | UNMC Humidifier/Optimization | 20-185



INCOMPLETE

0% Yes | 0% No | 0% N/A

0 ISSUES

Note

Optimized Systems performed a point to point checkout before the AHU was started.

Attempts

Attempt No. 1 INCOMPLETE

Status set by Scott Erlenbusch on 10/7/2020.

Assigned To Optimized Systems Asset 🌣 WHM AHU 9

AIR HANDLING UNIT - SYSTEM DEFICIENCIES TEST.

THESE TESTS ARE INTENDED TO IDENTIFY DEFICIENCIES WITH EQUIPMENT OPERATION, SENSOR VERIFICATION, AS WELL AS OVERALL CONTROL SYSTEM DESIGN AND INSTALLATION PRACTICES.

IF A SENSOR, DEVICE, OR PIECE OF EQUIPMENT IS NOT USED OR APPLICABLE MARK THE TEST ANSWER AS N/A. USE NOTES AND COMMENTS AS OFTEN AS NECESSARY.

#### SENSOR VERIFICATION:

OUTDOOR TEMPERATURE AND HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):

- 1 Does the outdoor humidity sensor report an acceptable value?
- 2 Does the outdoor temperature report an acceptable value?
- 3 Document if these sensors are locally wired to the controller, or if they are global values.

RETURN AIR HUMIDITY SENSOR VERIFICATION (IF APPLICABLE):

4 Does the return air humidity sensor report an acceptable value?

#### RETURN AIR TEMPERATURE SENSOR VERIFICATION:

- 5 Does the return air temperature sensor report an acceptable value?
- 6 Is the return air temperature sensor installed in the return air plenum and not near the outdoor air or relief air plenums?
- 7 Is the return air temperature sensor probe the proper length for the size of duct it is installed in?

#### MIXED AIR (ECONOMIZER) TEMPERATURE SENSORS:

- 8 Does the mixed air temperature sensor report an acceptable value?
- 9 Is the mixed air temperature sensor installed between the return air plenum and the outdoor air plenums, and is able to sense a good mixture of both?
- 10 Is the mixed air temperature sensor an averaging sensor, and covers the area of the mixed air section properly?

#### SUPPLY AIR HUMIDITY SENSOR VERIFICATION:

11 Does the supply air humidity sensor report an acceptable value?

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12 Is the supply air humidity sensor located in the correct location? Document the distance from the humidifier to the humidity sensor.

#### SUPPLY AIR TEMPERATURE SENSORS:

- 13 Does the supply air temperature sensor report an acceptable value?
- 14 Is the supply air temperature sensor installed downstream of all coils in order to get an accurate reading?
- 15 Is the supply air temperature sensor probe the proper length for the size of duct it is installed in?

STATIC AND DIFFERENTIAL PRESSURE SENSORS VERIFICATION:

#### RETURN PLENUM STATIC PRESSURE SENSOR (IF APPLICABLE):

- 16 Is the return plenum pressure sensor installed between the relief air and return air damper sections, and after the return fan?
- 17 Is the return plenum pressure sensor reporting an acceptable value?
- 18 Is the return plenum pressure sensor and analog input ranges setup properly?

#### SUPPLY DUCT STATIC PRESSURE SENSOR (IF APPLICABLE):

- 19 Is the supply duct static pressure sensor installed at least 2/3's down the duct, or in the best location possible?
- 20 Is the supply duct static pressure sensor reporting an acceptable value?
- 21 Is the supply duct static pressure sensor and analog input ranges setup properly?

#### BUILDING PRESSURE SENSOR (IF APPLICABLE):

- 22 Is the building pressure sensor installed in the best location possible for the areas served by the unit?
- 23 Is the building pressure sensor reporting an acceptable value?
- 24 Is the building pressure sensor and analog input ranges setup properly?

#### FILTER PRESSURE SENSORS (IF APPLICABLE):

- 25 Are all the filter pressure sensors installed across each filter bank they serve?
- 26 Are all the filter pressure sensors reporting an acceptable value?
- 27 Are all the filter pressure sensors and analog input ranges setup properly?

#### SAFETY DEVICES VERIFICATION:

#### LOW LIMIT SAFETY DEVICE:

- 28 Is there enough low limit safety devices installed in order to cover the area of the mixed air chamber or coil?
- 29 Does the freeze stat trip when sprayed with freeze spray?

#### WHEN THE LOW LIMIT SAFETY CIRCUIT IS TRIPPED...

- 30 Do the low limit safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?
- 31 Are the supply and return fan VFD's prohibited from running in hand or bypass?
- 32 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?
- 33 Does the heating coil become open? (If applicable)

SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):

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- 34 Is the low Suction Pressure Safety Switch calibrated properly in order to not trip early? (Record the value at which the unit tripped in the Notes.)
- 35 Is the low Suction Pressure Safety Switch Installed before the supply fan?

WHEN THE SUPPLY PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED...

- 36 Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?
- 37 Are the supply and return fan VFD's prohibited from running in hand or bypass?
- 38 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?

#### SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):

- 39 Is the high Pressure Safety Switch calibrated properly in order to not trip early?
- 40 Is the high Pressure Safety Switch Installed after the supply fan?

## WHEN THE SUPPLY PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED...

- 41 Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?
- 42 Are the supply and return fan VFD's prohibited from running in hand or bypass?
- 43 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?

## RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH (IF APPLICABLE):

- 44 Is the low suction pressure safety switch calibrated properly in order to not trip early?
- 45 Is the low suction pressure safety switch installed before the return fan?

## WHEN THE RETURN PLENUM LOW SUCTION PRESSURE SAFETY SWITCH IS TRIPPED...

- 46 Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?
- 47 Are the supply and return fan VFD's prohibited from running in hand or bypass?
- 48 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?

#### RETURN PLENUM HIGH PRESSURE SAFETY SWITCH (IF APPLICABLE):

- 49 Is the high pressure safety switch calibrated properly in order to not trip early?
- 50 Is the high pressure safety switch installed after the return fan and between the return and relief air dampers?

## WHEN THE RETURN PLENUM HIGH PRESSURE SAFETY SWITCH IS TRIPPED...

- 51 Do the safety device(s) automatically shutdown the unit fans through a hardwired interlock independent of the BAS?
- 52 Are the supply and return fan VFD's prohibited from running in hand or bypass?
- 53 Do the minimum outdoor air, economizer outdoor air, and relief air dampers close, and the return air dampers open?

#### FAN EQUIPMENT VERIFICATION:

#### SUPPLY FAN:

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54 Does the supply fan start and stop when commanded by the BAS?

55 Does the supply fan VFD (if applicable) respond to the speed signal from the BAS?

#### **RETURN FAN: (IF APPLICABLE)**

56 Does the return fan start and stop when commanded by the BAS?

57 Does the return fan VFD (if applicable) respond to the speed signal from the BAS?

## MINIMUM OA, ECONOMIZER, RELIEF AIR, AND FACE/BYPASS DAMPER VERIFICATION:

#### NORMAL OPERATION VERIFICATION:

58	Do the face/bypass damper actuators fully open and close when commanded by the BAS?
59	Do the relief air damper actuators fully open and close when commanded by the BAS?
60	Do the return and outdoor air (economizer) dampers open and close inverse of each other when commanded by the BAS?

- 61 Do the return and outdoor air (economizer) dampers open and close fully when commanded by the BAS?
- 62 Do the minimum outdoor air dampers open and close fully when commanded by the BAS?

#### HEATING AND COOLING COILS VERIFICATION:

- 63 Does the AHU Heating Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)
- 64 Does the AHU Cooling Coil Valve Open and Close Fully when commanded by the BAS? (If Applicable)

#### HUMIDIFIER VERIFICATION (IF APPLICABLE):

- 65 Is the humidifier valve actuator a fail safe actuator and does it fail closed?
- 66 When humidifier valve is opened, is there steam discharging from the humidifier tubes?

## HUMIDISTAT AND AIRFLOW SWITCH SAFETY VERIFICATION (IF APPLICABLE):

HUMIDISTAT AND AIRFLOW SWITCH ARE USED TO SHUT THE HUMIDIFIER VALVE IF HUMIDITY IS ABOVE HUMIDISTAT SETPOINT OR AIR FLOW SWITCH IS NOT CLOSED.

67 Is the humidistat located between the humidity sensor and the smoke detector on the AHU?

68 Is the airflow switch plumbed in to the AHU supply air plenum?

69 Does the humidifier valve close when either the air flow switch or humidistat switch open?

#### **TEST COMPLETION VERIFICATION:**

70 Have all overrides on the AHU been released?

