Functional Test Procedure
Variable Air Volume Air Handler Unit
AHU-8

1. Participants

Name / Representing		Participation (Testing, Witness, etc.)
Brian Toevs	7group	Witness

Party filling out this form and witnessing testing _Brian Toevs___________________________
Date of test ___ __________10/12/10_____________

2. Prerequisite Checklist

a. ☐ The following have been started up and startup reports and construction checklists submitted and approved ready for functional testing:

- ✓ Air Handling Unit – 83 [1]
- ✓ Boiler [1]
- ✓ Chiller [1]
- ✓ Testing and Balancing [2]
- ✓ DDC system w/ Graphics [1]
- ✓ Steam [1]
- ✓ Hot Water pumps [1]
- ✓ Chilled Water Pumps [1]
- ✓ VAV Boxes [2]

b. ☐ All control system functions for this and all interlocking systems are programmed and operable per contract documents, including final setpoints and schedules with debugging, loop tuning and sensor calibrations completed.

____ Controls Contractor _________ _____5/27/10__________

Controls Contractor Signature or Verbal   Date

c. ☐ Vibration control report approved (if required).

d. ☐ Test and balance (TAB) completed and approved for the hydronic systems and terminal units connected.

e. ☐ All A/E punch list items for this equipment corrected.

f. ☐ These functional test procedures reviewed and approved by installing contractor.

g. ☐ Safeties and operating ranges reviewed.

h. ☐ False loading equipment, system and procedures ready (control loops, over-ride on OSA dampers, etc.)

i. ☐ Have all energy savings control strategies, setpoints and schedules been incorporated that this equipment and control system is capable of? If not, list recommendations below.

j. ☐ **DDC Program Review.** Review the DDC software control program(s) for this equipment. Parameters, setpoints and logic sequences appear to follow the specified written sequences.

k. ☐ Record of All Values for Current Setpoints, Control Parameters, Limits, Delays, Lockouts, Schedules, Etc. Changed to Accommodate Testing:

Parameter	Pre-Test Values	Returned to Pre-Test Values √
Outside Air Temperature	54	✓
Exhaust Damper Position D-3	C	✓
Return Air Damper Position D-2	O	✓
Occupied Space Heating temperature Set point	70°F	✓
Unoccupied Space Heating temperature Set point	65°F	✓
SA Diff. Pressure Set point. SP-1	0 – 10” w.c	✓
2/3 Diff. Pressure Set point. SP-2	5” w.c	✓
RA Diff. Pressure Set point. SP-3	-0.10 – +0.10” w.c	✓
Pre-filter Diff. Pressure Set point. DPS-1	1”w.c	✓
Mixed Air Temp. T-1	72.5	
HW Coil Low limit temp. LLT-1-4	N	✓
SA Humidity Set Point H-1	35- 85%	✓
SA Temperature T-4	48°F	✓
SA Flow Meter	32,500	✓

Parameter	Pre-Test Values	Returned to Pre-Test Values √
Outside Air Damper Position D-1	C	✓
Occupied Cooling Space temperature Set point	75°F	✓
Unoccupied Cooling Space temperature Set point	85°F	✓
OA Ambient CO_2 Sensor Reading CO_2-4	350 ppm	✓
Zone CO_2 Sensor Set point	750	
RA CO_2 Sensor Reading CO_2	340	
SA Static High Limit Cutout SHL-2	5” w.c [1]	✓
Static Low Limit Cutout SLL-1	- 5.0”	✓
Final filter Diff. Pressure Set point. DPS-2	1” w.c [1]	✓
SA Temp. Leaving HW Coil T-2	72.4⁰F	✓
SA Temp. Leaving CW Coil T-3	55⁰F	✓
SA High Humidity Set Point HHL-1	85%	✓
RA Temp. T-5	68.9	✓
RA Flow Meter	21,600	✓

3. **Sensor Calibration Checks.** Check the sensors listed below for calibration and adequate location. This is a sampling check of calibrations done during Construction check listing. Test the packaged controls and DDC readings.

“In calibration” means making a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage, packaged control panel (DDC) or building automation system (BAS)) compared to the test instrument-measured value is within the tolerances specified in the Construction checklist requirements (__________________________________). If not, install offset in (DDC), (BAS), calibrate or replace sensor. Use the same test instruments as used for the original calibration, if possible.

Sensor & Location	Location OK[1]	**1st** Gage or Pkg & BAS Values	Instru. Meas'd Value	**Final** Gage or Pkg & BAS Values	Pass Y/N?
Discharge Air Temperature Supply air ductwork **T-4**	✓	**91**	**90**	**91**	**Y**
Return Air Temperature Return Air Ductwork **T-5**	✓	**68.9**	**70**	**68.9**	**Y**
Mixed Air Temperature After pre-filter **T-1**	✓	**54**	**54**	**54**	**Y**
SA temp. Lvg. HW coil **T-2**	✓	**94**	**94.5**	**94**	**Y**
SA temp. Lvg. CW coil **T-3**	✓	**55**	**55**	**55**	**Y**
Low Limit Temp. sensor **LLT-1-4**	✓	**38°F /N**	**N**	**N**	**Y**
Alarm Co_2 Sensor **VOC-2** North Wall	✓	**750/1000 alarm**	**1100**	**Y**	**Y**
Return Air CO_2 Sensor CO_{2-9}	✓	**390**			**Y**
Outside Air Humidity **OAH** North Wall	✓	**56%**			**Y**
Outside Air Temperature North Wall **OAT-**	✓	**54**	**54**	**54**	**Y**
Pre-filter Differential Pressure Sensor **DPS-1A**	✓	**0.1"w.c**	**0.1"**	**0.1"**	**Y**
Final filter Differential Pressure Sensor **DPS-2A**	✓	**0.4"w.c**	**0.39**		**Y**
Supply Static Pressure **SP-1**	✓	**3.5"w.c**	**3.5**	**3.5"w.c**	**Y**
Hot water Control valve **HCV-C**	✓	**C**	**C**	**C**	**Y**
Chilled water Control valve **CCV-C**	✓	**C**	**C**	**C**	**Y**
Humidifier Valve Command **SAHMV-C**	✓	**C**	**C**	**C**	**Y**
UV Light Status **UV-S**	✓	**O**	**O**	**O**	**Y**
SA Smoke detector Status **SD-1**	✓	**N**	**N**	**N**	**Y**
RA Smoke detector Status **SD-2**	✓	**N**	**N**	**N**	**Y**
Supply Fan [SFN-A] Command **SFNA-C**	✓	**E**	**E**	**E**	**Y**
Supply Fan [SFN-A] Status **SFNA-S**	✓	**O**	**O**	**O**	**Y**
Return Fan [RFN] Command **RFN-C**	✓	**E**	**E**	**E**	**Y**

Sensor & Location	Location OK[1]	**1st** Gage or Pkg & BAS Values	Instru. Meas'd Value	**Final** Gage or Pkg & BAS Values	Pass Y/N?
Return Fan [RFN] Status **RFN-S**		**ON**	**ON**	**ON**	**Y**
* Return High Suction Sensor SLL-2		**-2.75"**	**-2.76"**	**-2.75"**	**Y**
Low Pressure Switch **SLL-1**		**N**	**N**	**N**	**Y**
Outside Air damper Control **OAD-1-C**		**E**	**E**	**E**	**Y**
Outside Air damper Status **OAD-1-S**		**O**	**O**	**O**	**Y**
Exhaust Air damper Control **EAD-3-C**		**E**	**E**	**E**	**Y**
Exhaust Air damper Status **EAD-3-S**		**O**	**O**	**O**	**Y**
Mechanical Room Return Air damper Control **RAD-2-C**		**E**	**E**	**E**	**Y**
Mechanical Room Return Air damper Status **RAD-2-S**		**C**	**C**	**C**	**Y**
Mechanical Room Ventilation Air damper Control **RAD-4-C**		**E**	**E**	**E**	**Y**
Mechanical Room Ventilation Air damper Status **RAD-4-S**		**C**	**C**	**C**	**Y**
Mechanical Room Ventilation Air damper Control **RAD-5-C**		**E**	**E**	**E**	**Y**
Mechanical Room Ventilation Air damper Status **RAD-5-S**		**C**	**C**	**C**	**Y**

[1]Sensor location is appropriate and away from causes of erratic operation.

4. Device Calibration Checks. The actuators or devices listed below checked for calibration. This is a spot check on a sample of the calibrations done during Construction check listing and startup.

"In calibration" means observing readout in the BAS and going to the actuator or controlled device and verifying that the BAS reading is correct. For items out of calibration or adjustment, fix now if easy, via an offset in the BAS, or a mechanical fix.

Device or Actuator & Location	**Procedure / State**	**1st** Pkg'd Value	Site Observation	**Final** Pkg'd Reading	Pass Y/N
Outside air damper position ** **OAD-1** **FC**	1. Closed	**C**	**C**		**Y**
	2. Full open	**O**	**O**		**Y**
	3. Intermediate position	**60%**	**60%**	60%	**Y**
	4. Remove power (closed)	**C**	**C**		**Y**
Return air damper position ** **RAD-2** **FO**	1. Closed	**C**	**C**		**Y**
	2. Full open	**O**	**O**		**Y**

Device or Actuator & Location	**Procedure / State**	**1st** Pkg'd Value	Site Observation	**Final** Pkg'd Reading	Pass Y/N
	3. Intermediate position	**40%**	**40%**	40%	**Y**
	4. Remove power (open)	**O**	**O**		**Y**
Exhaust/Relief air damper position ** **EAD-3** **FC**	1. Closed	**C**	**C**		**Y**
	2. Full open	**O**	**O**		**Y**
	3. Intermediate position	**50%**	**50%**	50%	**Y**
	4. Remove power (closed)	**C**	**C**		**Y**
Mech. Rm. Return air damper position ** **MRAD-4a** **FO**	1. Closed	**C**	**C**		**Y**
	2. Full open	**O**	**O**	O	**Y**
	4. Remove power (open)	**O**	**O**		**Y**
Mech. Rm. Return air damper position ** **MRAD-4b** **FC**	1. Closed	**C**	**C**	C	**Y**
	2. Full open	**O**	**O**		**Y**
	4. Remove power (closed)	**C**	**C**		**Y**
Mech. Rm Ventilation air damper position ** **MRVAD-5** **FC**	1. Closed	**C**	**C**	C	**Y**
	2. Full open	**O**	**O**		**Y**
	4. Remove power (closed)	**C**	**C**		**Y**
Mech. Rm Ventilation air damper position ** **MRVAD-6** **FC**	1. Closed	**C**	**C**	C	**Y**
	2. Full open	**O**	**O**		**Y**
	4. Remove power (closed)	**C**	**C**		**Y**
Coiling coil valve position or command and Stroke * (**CCV-1**) **FLP**	3. Full closed	C	**C**	C	**Y**
	2. Intermediate position	50%	**50%**		**Y**
	1. Full open	O	**O**		**Y**
	4. Remove power (last position)	O	O		**Y**
Heating coil valve position or command and Stroke * (**HCV-1**) **FO**	3. Full closed	C	C		**Y**
	2. Intermediate position	50%	50%	50%	**Y**
	1. Full open	O	O		**Y**
	4. Remove power (open)	O	O		**Y**
Humidifier valve position or command and Stroke * (**HMV-V**) **FC**	3. Full closed	C	C	C	**Y**
	2. Intermediate position	50%	50%		**Y**
	1. Full open	O	O		**Y**
	4. Remove power (closed)	C	C		**Y**

* Valve Operation:

Procedure 1. Command the valve to the full open position. Verify that reading at the BAS reasonably corresponds to the actual valve position.

Procedure 2. Command the valve to an intermediate position like 50%. Verify the readings at the BAS reasonably correspond to the actual position.

Procedure 3. Command the valve to the full closed position. Verify the reading at the BAS reasonably corresponds to the actual position.

Procedure 4. Remove control power to the valve. Verify the valve either springs closed or open. Refer to the table above for the correct position.

** Damper Operation:

1. Command damper closed or shut unit off and verify that damper is shut and BAS reads shut.
2. Do the same, commanding damper fully open.

Device or Actuator & Location	**Procedure / State**	**1st** Pkg'd Value	Site Observation	**Final** Pkg'd Reading	Pass Y/N
3. Command damper to intermediate position and verify that damper is partially shut and BAS reads same. 4. Remove power and verify the damper springs closed or open.					

5. Verification of Misc. Construction Checks.

Misc. site checks of the Construction checklist and startup reports completed successfully.
Pass? Y / N ___Y____

General Conditions of Test

Time of Day / Duration: 8:00 AM

Weather Conditions: 54.6^{o}F Overcast / Sunny & Warm

Unusual Conditions: ____________________

Notes: ____________________

6. Functional Testing Record

Test	Mode ID	Test Procedure (including special conditions)	Expected and Actual Response [Write ACTUAL response in brackets or circle]	Pass Y/N	Notes
1.	UNIT SHUT DOWN	1) Index the unit off.	1) Verify by visual inspection that:		
			a) The supply fan [**SF-A**] is off?	Y	
			b) The return fan [**RF-A**] is off?	Y	
			c) OA-Damper [**OAD**] [**D-1**] is closed?	Y	
			d) RA-Damper [**RAD**] [**D-2**] is open?	Y	
			e) Exhaust/Relief air damper [**EAD**] [**D-3**] is closed?	Y	
			f) Mech. RM. RA-Damper [**MRAD**] [**D-4**] is closed?	Y	
			g) Mech. RM. Ventilation Damper [**MRVAD**] [**D-5**] is closed?	Y	
			h) Mech. RM. Ventilation Damper [**MRVAD**] [**D-6**] is closed?	Y	
			i) Humidifier valve (**HMV**) is closed?	Y	
			j) Cooling coil valve [**CCV-1**] is closed?	Y	
			k) Heating coil valve [**HCV-1**] is closed?	Y	
			l) UV light is de-activated?	Y	
2.	UNIT OCCUPIED CYCLE COOLING	1) Unit indexed to the occupied mode. Outside Air above 60° F. Economizer is disabled.	1) Verify by visual inspection that:		
			a) The OA-Damper [**D-1**] modulates with the RA-Damper [**D-2**] to maintain discharge air temperature of [55° F]?	Y	
			b) Exhaust/Relief Damper [**EA/RD**] [**D-3**] is closed?	Y	
			c) Mech. RM. RA Damper [**MRAD**] [**D-4a**] is closed?	Y	
			d) Mech. RM. RA Damper [**MRAD**] [**D-4b**] is closed?	Y	
			e) Mech. RM. Ventilation Damper [**MRVAD**] [**D-5**] is closed?	Y	
			f) Mech. RM. Ventilation Damper	Y	

Test	Mode ID	Test Procedure (including special conditions)	Expected and Actual Response [Write ACTUAL response in brackets or circle]	Pass Y/N	Notes
			[**MRVAD**] [**D-6**] is closed?		
			g) Humidifier valve (**HMV**) is closed?	Y	
			h) The supply fan [**SF-A**] will be enabled?	Y	
			i) The return fan [**RF-1**] shall be enabled?	Y	
			j) The cooling coil valve [**CCV-1]** will modulate to maintain discharge air temperature of [55° F]? [___________F].	Y	
			k) Heating valve [**HCV-1**] is disabled?	Y	
		2) Adjust the discharge air temperature [**T-4]** up to call for cooling. Adjusted Setpoint [_________].	2) Verify by visual inspection that:		
			a) The OA-Damper [**D-1**] moves to minimum position?	Y	
			b) RA-Damper [**D-2**] modulates to reverse match the OA-Damper [**D-1**]?	Y	
			c) Exhaust/Relief Damper [**D-3**] is at minimum?	Y	
			d) The supply fan [**SF-A**] is energized?	Y	
			e) SA flow is established?	Y	
			f) The return fan [**RF-1**] is energized?	Y	
			g) The cooling coil valve [**CCV-1]** will modulate to maintain discharge air temperature of [55° F]? [___57________F].	Y	
		3) Cause the low limit sensor [**LLT-1-4**] to register below setpoint [38° F] discharge temperature.	3) Verify by visual inspection that:		
			a) The cooling coil valve [**CCV-1]** will modulate to 50%?	Y	
		4) Cause the supply air temperature [**T-4**] to be 5° F below the set point.	4) Verify by visual inspection that:		
			a) An alarm is generated?	Y	
		5) Cause the SA fan [**SF-A**] proof	5) Verify by visual inspection that:		

Test	Mode ID	Test Procedure (including special conditions)	Expected and Actual Response [Write ACTUAL response in brackets or circle]	Pass Y/N	Notes
		and the fan status to indicate they do not match for 30 sec.	a) An alarm is generated? b) OA-Damper [**OAD**] [**D-1**] is closed? c) RA-Damper [**RAD**] [**D-2**] is open? d) Exhaust/Relief air damper [**EAD**] [**D-3**] is closed?	Y N N Y	Dampers not sequenced to fail.
		6) Cause the SA fan [**SF-A**] to be in hand and the fan status on and commanded off for 30 sec.	6) Verify by visual inspection that: a) An alarm is generated?	Y	
		7) Cause the SA fan [**SF-A**] runtime to exceed the users limit. [10000 Hrs]	7) Verify by visual inspection that: a) An alarm is generated?\	Y	
		8) Cause the duct static pressure to decrease by adding zones calling for cooling. [1.5” w.c.]	8) Verify by visual inspection that: a) The supply fan [**SF-A**] VFD will increase the fan speed to maintain the setpoint? [1.8”w.c.] b) The return fan [**RF-1**] VFD will increase the fan speed to maintain the setpoint?	Y Y	
		9) Cause the duct static pressure to increase by dropping zones calling for cooling. [1.5” w.c.]	9) Verify by visual inspection that: a) The supply fan [**SF-A**] VFD will decrease the fan speed to maintain the setpoint? [1.3”w.c.] b) The return fan [**RF-1**] VFD will decrease the fan speed to maintain the setpoint?	Y Y	
		10) Cause the Supply Fan [**SF-A**] VFD to fault.	10) Verify by visual inspection that: a) An alarm is generated?	Y	
		11) Cause the RA fan [**RF-A**] proof and the fan status to indicate they do not match for 30 sec.	11) Verify by visual inspection that: a) An alarm is generated?	Y	
		12) Cause the RA fan [**RF-A**] to be in hand and the fan status on and commanded off.	12) Verify by visual inspection that: a) An alarm is generated?	Y	
		13) Cause the RA fan [**RF-A**]	13) Verify by visual inspection that:		

Test	Mode ID	Test Procedure (including special conditions)	Expected and Actual Response [Write ACTUAL response in brackets or circle]	Pass Y/N	Notes
		runtime to exceed the users limit [10000 Hrs.]. 14) Cause the Return Fan [**RF-A**] VFD to fault.	a) An alarm is generated? 14) Verify by visual inspection that: a) An alarm is generated?	Y Y	
3.	UNIT OCCUPIED CYCLE HEATING	1) Outside air temperature below 65° F. Adjusted OA Setpoint [_________]. 2) Cause the discharge air temperature to call for heat Adjusted SA Setpoint [_________]. 3) Cause the discharge temperature to be 5° F less than set point for 1 minute. 4) Cause the zone static pressure to increase by deleting zones calling for heating. 5) Cause the return fan signal to be off and the fan status to indicate the fan is running.	1) Verify by visual inspection that: a) Supply Fan [**SF-A**] is enabled? b) The Return fan [**RF-1**] is enabled? c) The **OA-Damper** [**D-2**] is set to minimum outside air position? d) The **RA-Damper** [**D-1**] moves to intermediate position? [Reverse Tracks the **OA-D**amper] e) Exhaust/Relief Damper [**EA/RD**] [**D-3**] is closed? f) Heating coil valve [**HCV-1**] is enabled? g) UV light is activated? h) Cooling [**CCV-1**] is disabled? 2) Verify by visual inspection that: a) Heating coil valve [**HCV-1**] modulates to maintain discharge temperature? 3) Verify by visual inspection that: a) An alarm is registered? 4) Verify by visual inspection that: a) The supply fan [**SF-A**] VFD will decrease the fan speed to maintain the setpoint? b) The return fan [**RF-1**] VFD will decrease the fan speed to maintain the setpoint? 5) Verify by visual inspection that: a) An alarm is generated?	Y Y Y Y Y Y Y Y Y Y Y Y Y	
4.	ECONOMIZER	1) Outside air temperature below 65° F.	1) Verify by visual inspection that:		

Test	Mode ID	Test Procedure (including special conditions)	Expected and Actual Response [Write ACTUAL response in brackets or circle]	Pass Y/N	Notes
		a. OA Enthalpy calculation is below 22 btu/lb. b. OA temp < RA temp. c. OA Enthalpy < RA Enthalpy. d. SA fans have flow. Adjusted OA Setpoint [60].	a) Supply Fan [**SF-A**] is enabled? b) The Return fan [**RF-1**] is enabled? c) The **OA-Damper** [**D-2**] is set to minimum outside air position? d) The **RA-Damper** [**D-1**] moves to intermediate position? [Reverse Tracks the **OA-D**amper] e) Exhaust/Relief Damper [**EA/RD**] [**D-3**] is at minimum? f) Mixed air temp set point 2° F less than discharge air set point? g) Heating coil valve [**HCV-1**] is enabled? h) UV light is activated? i) Cooling is disabled?	Y Y Y Y Y Y Y Y Y	
		2) Cause the discharge temp to be 40° F.	2) Verify by visual inspection that: a) Exhaust/Relief Damper [**EA/RD**] will modulate closed?	Y	
		3) Cause the economizer damper to be greater than 90%.	3) Verify by visual inspection that: a) The cooling coil valve [**CCV-1]** will modulate to maintain discharge air temperature of [55° F]? [55°F].	Y	
		4) Cause the mixed air temperature to be below 45° F for 1 min.	4) Verify by visual inspection that: a) An alarm is generated?	Y	
		5) Cause the mixed air temperature to be above 90° F for 1 min.	5) Verify by visual inspection that: a) An alarm is generated?	Y	
5.	HUMIDIFICATION	1) With flow proven through the supply fan [SF-A] adjust the return air relative humidity set point to below the stpt. [50%]. Valve at 25%	1) Verify by visual inspection that: a) The supply air humidification steam valve modulates open to maintain the exhaust air relative humidity.	Y	
		2) With the humidifier still activated, adjust the supply air humidity	2) Verify by visual inspection that: a) The supply air humidification		

Test	Mode ID	Test Procedure (including special conditions)	Expected and Actual Response [Write ACTUAL response in brackets or circle]	Pass Y/N	Notes
		setpoint to be [75% adj.]. 3) With the humidifier still activated, adjust the supply air humidity setpoint to be [80% adj.] humidity. 4) With the humidifier still activated, and the supply fan running for [30 min. adj.] adjust the supply air humidity setpoint to be [90%] adj. or less than 35% humidity adj. for 5 min.] 5) Return all setting to normal.	steam valve modulates toward closed? 3) Verify by visual inspection that: a) The supply air humidification steam valve is closed? 4) Verify by visual inspection that: a) An alarm is generated for the supply air humidification. [91%] 5) Verify by visual inspection that: a) All valves and alarms are returned to normal.	Y Y Y Y	
6.	CO_2 Monitoring [350 - 450 ppm] normal [750 ppm] adj. normal	1) Cause return air sensor to go to [850 ppm]. CO_2 Level indicated [_350__] 2) Cause return air sensor to go to [1100 ppm] for 1 minute.	1) Verify through visual inspection: a) The OA-Damper [**D-2**] shall modulate open and Return Damper [D-1] shall modulate closed to maintain the return air level to 750 ppm? 2) Verify the following through visual inspection: a) An alarm is registered? (a) Yes (b) No	Y Y	385ppm / 350PPM
7.	SAFTIES / ALARMS	1) Cause the low limit temperature to be below setting. [38° F]. Adjusted Setting [____________].	1) Verify by visual inspection that: a) Supply Fan [**SF-A**] shall be disabled? b) OA-Damper [**OAD**] [**D-1**] is closed? c) RA-Damper [**RAD**] [**D-2**] is open? d) Exhaust/Relief air damper [**EAD**] [**D-3**] is closed? e) The cooling coil valve [**CCV-1]** will modulate to 50%? f) Heating coil valve [**HCV-1**] is in	Y Y Y Y Y Y	

Test	Mode ID	Test Procedure (including special conditions)	Expected and Actual Response [Write ACTUAL response in brackets or circle]	Pass Y/N	Notes
			open?		
			g) An alarm is received at the DDC system?	Y	
		2) Cause the SA [High] static pressure switch [SHL-1] to trip for [1] one minute. [25% greater than setpoint] Note: Supply fan has to be running for at least 30 minutes.	2) Verify by visual inspection that:		
			a) Supply Fan [**SF-A**] shall be disabled?	Y	
			b) The Return fan [**RF-1**] shall be disabled?	Y	
			c) An alarm is received at the DDC system?	Y	
		3) Cause the RA [Low] static pressure switch [SLL-1] to trip for [1] one minute. [25% less than setpoint]. Note: Supply fan has to be running for at least 30 minutes.	3) Verify by visual inspection that:		
			a) Supply Fan [**SF-A**] shall be disabled?	Y	
			b) The Return fan [**RF-1**] shall be disabled?	Y	
			c) An alarm is received at the DDC system?	Y	
		4) Cause the RA [High Negative] static pressure switch [SLL-2] to trip for [1] one minute. [25% less than setpoint]. Note: Supply fan has to be running for at least 30 minutes.	4) Verify by visual inspection that:		
			a) Supply Fan [**SF-A**] shall be disabled?	Y	
			b) The Return fan [**RF-1**] shall be disabled?	Y	
			c) An alarm is received at the DDC system?	Y	
		5) Reset switches.	5) Verify by visual inspection that:		
			a) Switch is reset?	Y	
		6) Cause the [High] humidity sensor to trip. [Safety set at 90%]	6) Verify by visual inspection that:		
			a) Humidity Valve actuator shall close?	Y	
			b) An alarm is received at the DDC system ONLY IF THE COOLING COIL IS NOT OPERATING?	Y	
		7) Cause the [Low] humidity sensor to trip. [Safety set at 30%]	7) Verify by visual inspection that:		
			a) An alarm is received at the DDC system?	Y	
			8) Verify by visual inspection that:		
			a) Switch is reset?	Y	

Test	Mode ID	Test Procedure (including special conditions)	Expected and Actual Response [Write ACTUAL response in brackets or circle]	Pass Y/N	Notes
		8) Reset switches.			
		9) Cause the return air flow to be higher than setpoint for [1] one minute. [25% higher than setpoint] Note: Supply fan has to be running for at least 2 minutes.	9) Verify by visual inspection that: a) An alarm is received at the DDC system?	Y	
		10) Cause the return air flow to be less than setpoint for [1] one minute. [25% less than setpoint] Note: Supply fan has to be running for at least 2 minutes.	10) Verify by visual inspection that: a) An alarm is received at the DDC system?	Y	
		11) Cause the supply air temperature to be 5^{0}F above setpoint.	11) Verify by visual inspection that: a) An alarm is received at the DDC system?	Y	
		12) Cause the supply air temperature to be 5^{0}F below setpoint.	12) Verify by visual inspection that: a) An alarm is received at the DDC system?	Y	
		13) Cause the supply air smoke detector to detect products of combustion.	13) Verify by visual inspection that: a) Supply Fan [**SF-A**] is disabled? b) The Return fan [**RF-1**] shall be disabled? c) OA-Damper [**OAD**] [**D-1**] is closed? d) RA-Damper [**RAD**] [**D-2**] is open? e) Exhaust/Relief air damper [**EAD**] [**D-3**] is closed? f) An alarm is received at the DDC system?	Y Y Y Y Y Y	
		14) Cause the return air smoke detector to detect products of combustion.	14) Verify by visual inspection that: a) Supply Fan [**SF-A**] is disabled? b) The Return fan [**RF-1**] shall be disabled? c) OA-Damper [**OAD**] [**D-1**] is closed?	Y Y Y	

Test	Mode ID	Test Procedure (including special conditions)	Expected and Actual Response [Write ACTUAL response in brackets or circle]	Pass Y/N	Notes
		15) Cause the pre-filter differential pressure to exceed setpoint. 16) Cause the final filter differential pressure to exceed setpoint. 17) Cause the return air temperature to be greater than setpoint. [90^{0}F] 18) Cause the return air temperature to be less than setpoint. [45^{0}F] 19) Cause the supply air temperature to be greater than setpoint. [120^{0}F] 20) Cause the supply air temperature to be less than setpoint. [45^{0}F]	d) RA-Damper [**RAD**] [**D-2**] is open? e) Exhaust/Relief air damper [**EAD**] [**D-3**] is closed? f) An alarm is received at the DDC system? 15) Verify by visual inspection that: a) An alarm is received at the DDC system? 16) Verify by visual inspection that: a) An alarm is received at the DDC system? 17) Verify by visual inspection that: a) An alarm is received at the DDC system? 18) Verify by visual inspection that: a) An alarm is received at the DDC system? 19) Verify by visual inspection that: a) An alarm is received at the DDC system? 20) Verify by visual inspection that: a) An alarm is received at the DDC system?	Y Y Y Y Y Y Y Y	

Record Foot Notes

[1]Sequences of operation specified in Contract Documents (attached).
[2]Mode or function ID being tested, per testing requirements section of the project Specifications.
[3]Step-by-step procedures for manual testing, trend logging or data-logger monitoring.
[4]Include any test tolerances that would constitute a passing condition.
[5]Record any permanently changed parameter values and submit to Owner.

-- END OF TEST --