

DEDICATED OUTSIDE AIR SYSTEM - TO ZONES

1. INTRODUCTION

This sample functional performance test (FPT) procedure is for a hypothetical dedicated outside air system directly serving zones.

The following system diagram is intended to communicate information about this hypothetical system and is not required to be included as part of any FPT.

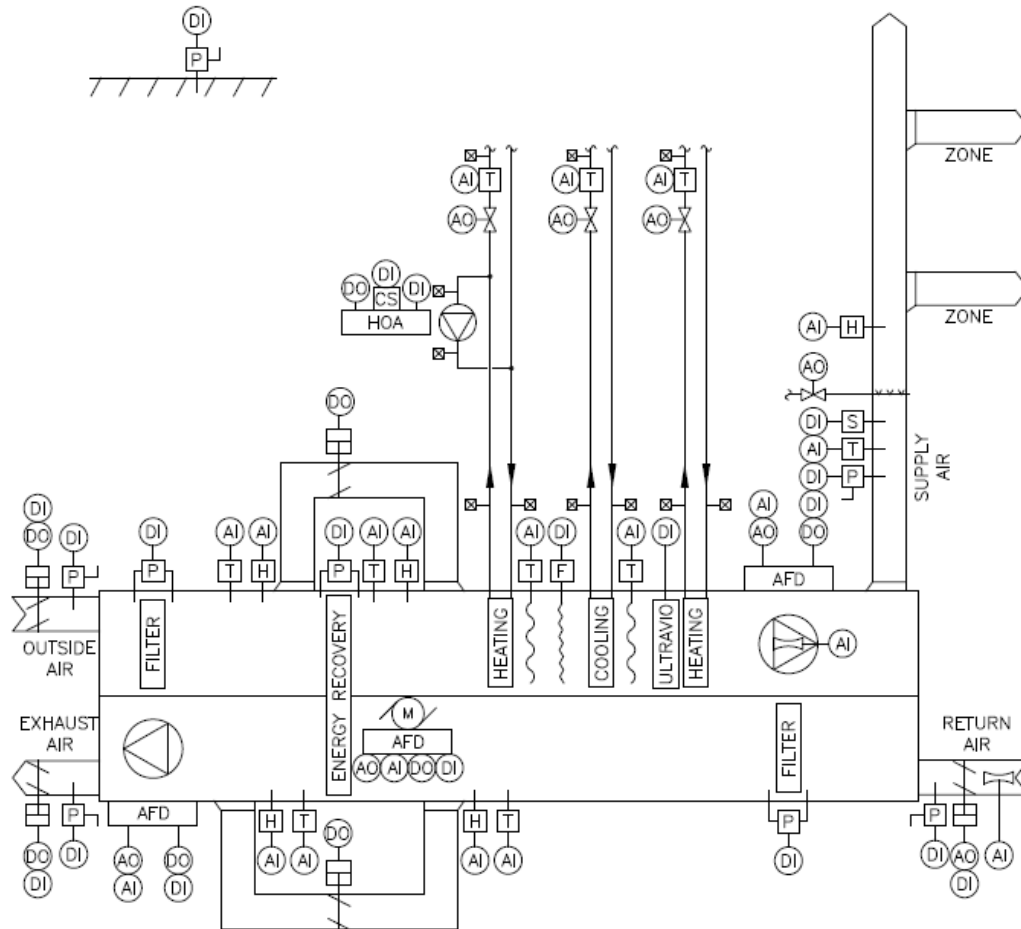


DIAGRAM SYMBOLOGY			
BCS INPUTS/OUTPUTS		SENSORS	
(AI) ANALOG INPUT	~ AVERAGING TYPE	— INSERTION TYPE	[P] HIGH/LOW PRESS LIMIT
(AO) ANALOG OUTPUT	[C] CARBON DIOXIDE	[F] LOW TEMP LIMIT	[Q] AIRFLOW
(DI) DISCRETE INPUT	[CS] CURRENT	[P] PRESSURE /POSITION	[M] CARBON MONOXIDE
(DO) DISCRETE OUTPUT	[H] HUMIDITY	~ SECTIONAL TYPE	[S] SMOKE DETECTOR
			[T] TEMPERATURE
DEVICES			
[AFD] ADJUSTABLE FREQUENCY DRIVE	[HOA] HAND-OFF-AUTO SWITCH	[FAN/PUMP] FAN/PUMP	[TERMINAL HEATING COIL] TERMINAL HEATING COIL
[AIRFLOW METER AIR VALVE] AIRFLOW METER AIR VALVE		[HUMIDIFIER] HUMIDIFIER	[MOTORIZED DAMPER] MOTORIZED DAMPER
			[SMOKE DAMPER] SMOKE DAMPER

2. NOTABLE SYSTEM FEATURES

The purpose of this section is to identify notable system features to facilitate an understanding of system operation.

Notable system features include:

- a. This system is designed to provide outside air into the minimum outside air intakes of multiple variable-air-volume air handling units.
- b. Supply air fan is selected to meet 100-percent of system requirements.
- c. Exhaust air fan is selected to meet 100-percent of system requirements.
- d. Pre-heat coil is selected to meet 100-percent of requirements without credit for energy recovery device.
- e. Cooling coil is selected to meet 100-percent of requirements without credit for energy recovery device.
- f. Reheat coil is selected to meet 100-percent of requirements.
- g. [Supply air fan](#) control algorithm includes varying supply air fan speed to obtain / maintain setpoint airflow.
- h. Exhaust air fan control is accomplished by either of two Operator selectable modes of control:
 - [Exhaust air fan \(volumetric offset mode\)](#) [Default]
 - [Exhaust air fan \(facility pressure mode\)](#)
- i. [Exhaust air fan \(volumetric offset mode\)](#) [Default] control algorithm includes speed modulation of exhaust air fan in conjunction with modulation of return air control damper to maintain return air / exhaust air airflow equivalent to outside air airflow minus a predetermined volumetric offset for facility pressurization relative to the outside.
- j. [Exhaust air fan \(facility pressure mode\)](#) control algorithm includes speed modulation of exhaust air fan in conjunction with modulation of return air control damper to maintain facility pressure relative to the outside. The control algorithm includes exhaust air fan enable, exhaust air fan disable, and return air control damper minimum position to address conditions that prevent facility pressurization relative to the outside and to prevent no flow condition.
- k. [Energy recovery device](#) control algorithm includes device activation / deactivation based on dry-bulb temperature comparisons of return air and outside air using dry-bulb temperature sensors. This approach avoids reliance on relative humidity sensors possessing poorer long-term reliability than dry-bulb temperature sensors. Effectiveness of energy recovery device is not considered for cooling or heating activation / deactivation of energy recovery device.
- l. [Cooling coil](#) control algorithm includes a constant coil discharge air setpoint temperature equivalent to 55.0 °F which supports a 0.81 space sensible heat ratio for spaces at 78.0 °F dry-bulb / 58.0 °F dewpoint / 50.2-percent relative humidity. Space conditions conflict with [UFC 3-410-01 - Oct 2015](#) page 8, section 3-4.3.1.
- m. [Reheat coil](#) control algorithm includes a constant unit discharge air setpoint temperature equivalent to 73.0 °F which is the average of conditions for comfort cooling and comfort heating required by [UFC 3-410-01 - Oct 2015](#) page 8, sections 3-4.3.1 and 3-4.3.3 respectively.

- n. Pre-heat coil brine temperature, cooling coil brine temperature, and reheat coil brine temperature alarm conditions include visual indication of coils whose water-side temperature change is significantly less than design thus negatively impacting central plant efficiency.
- o. Low limit temperature (freezestat) alarm condition includes disabling associated air handling units upon activation of algorithm to prevent low temperature air being introduced into this equipment.
- p. Fire alarm condition includes disabling associated air handling units upon activation of algorithm to prevent oxygen from being introduced into this equipment and to meet requirements of life safety codes.
- q. Occupied operation mode includes enabling this system. Other operation modes such as unoccupied, timed override, and pre-occupied include this system remaining disabled.

3. CONCLUSIONS AND RECOMMENDATIONS

The purpose of this section is to identify conclusions and recommendations based on control system feature observations, point-to-point observations, actuator observations, and system operation observations.

It is concluded that this system [does / does not perform] in accordance with contract requirements.

It is recommended that this system [be / not be] accepted by the government.

The following system control enhancements are recommended:

4. TEST CONDITIONS

The purpose of this section is to identify conditions occurring at time of testing.

Test date:	_____
Test begin time:	_____
Test end time:	_____
Test begin outside air temp:	_____
Test end outside air temp:	_____

5. EQUIPMENT IDENTIFICATION

The purpose of this section is to identify equipment included in this system.

Dedicated outside air unit: _____

Pre-heat coil circ. pump: _____

6. ATTENDEES

The purpose of this section is to identify persons present during system functional performance testing.

ATTENDEES			
REPRESENTING	NAME	COMPANY	TELEPHONE NUMBER
Mechanical Commissioning Specialist:			
Owner's Representative:			
Mechanical Contractor:			
Controls Contractor:			
Test & Balance Contractor:			

7. CONTROL SYSTEM FEATURE OBSERVATIONS

The purpose of this section is to identify control system features including control point description, imbedded / visible type, adjustable / monitoring type, actual value, setpoint value / alarm range.

Abbreviations used in the matrix below include:

a. Unit:

Unit of measure for control point.

b. Imbedded / Visible:

I - Imbedded such that control point is not observable by Operator.

V - Visible such that control point is observable by Operator.

c. Type:

A1 - Both setpoint and minimum / maximum alarm or alarm range are adjustable by Operator.

A2 - Only minimum / maximum alarm or alarm range is adjustable by Operator.

A3 - Only setpoint is adjustable by Operator.

M - Control point is visible, but not adjustable by Operator.

d. Value / Status:

As-found imbedded or visible value or status of control point observed prior to control point(s) manipulation.

A - Status of control point is in alarm.

N - Status of control point is normal operation.

e. Setpt / Alarm Range:

Alarm Min - Alarm activated when actual value is equal to or less than alarm activation setpoint.

Setpt - Setpoint.

Alarm Max - Alarm activated when actual value is equal to or greater than alarm activation setpoint.

CONTROL SYSTEM FEATURES								
POINT DESCRIPTION	UNIT	VISIBLE / IMBEDDED	TYPE	VALUE / STATUS	SETPT / ALARM			NOTES
					ALARM MIN	SETPT	ALARM MAX	
Outside air ductwork:								
Damper position	% Open				-	-	-	
Damper position confirmation					-			
High limit static pressure					-			
Outside air section upstream of energy recovery:								
Filter differential pressure					-			
Dry-bulb temp					-	-	-	
Relative humidity					-	-	-	
Outside air section energy recovery bypass:								
Damper position	% Open				-	-	-	
Energy recovery device:								
Differential pressure					-			
Status						-		
Speed					-	-	-	
Outside air section downstream of energy recovery:								
Dry-bulb temp					-	-	-	
Relative humidity					-	-	-	
Pre-heat coil:								
Dry-bulb temp								
Low limit temp					-	-	-	
Valve position	% Open				-	-	-	
Leaving water / brine temp					-			

CONTROL SYSTEM FEATURES								
POINT DESCRIPTION	UNIT	VISIBLE / IMBEDDED	TYPE	VALUE / STATUS	SETPT / ALARM			NOTES
					ALARM MIN	SETPT	ALARM MAX	
Cooling coil:								
Dry-bulb temp					-			
Valve position	% Open				-	-	-	
Leaving water / brine temp							-	
Ultraviolet light					-	-	-	
Reheat coil:								
Valve position	% Open				-	-	-	
Leaving water / brine temp						-		
Supply air fan:								
Status					-	-	-	
Speed					-	-	-	
Airflow					-	-	-	
Discharge air ductwork:								
High limit static pressure					-			
Dry-bulb temp					-			
Smoke damper position confirmation					-			
Relative humidity					-		-	
Return air ductwork:								
Airflow					-	-	-	
Damper position	% Open				-	-	-	
Damper position confirmation					-			
High limit static pressure					-			
Return air section upstream of energy recovery:								
Filter differential pressure					-			
Dry-bulb temp					-	-	-	
Relative humidity					-			
Return air section energy recovery bypass:								
Damper position	% Open				-	-	-	
Exhaust air section downstream of energy recovery:								
Dry-bulb temp					-	-	-	
Relative humidity					-	-	-	

CONTROL SYSTEM FEATURES								
POINT DESCRIPTION	UNIT	VISIBLE / IMBEDDED	TYPE	VALUE / STATUS	SETPT / ALARM			NOTES
					ALARM MIN	SETPT	ALARM MAX	
Exhaust air fan:								
Status					-	-	-	
Speed					-	-	-	
Exhaust air ductwork:								
High limit static pressure					-			
Damper position	% Open				-	-	-	
Damper position confirmation					-			
Pre-heat coil circulating pump:								
Status						-		
Facility:								
Facility pressure								

8. POINT-TO-POINT OBSERVATIONS

The purpose of this section is to identify system meters and sensors have been calibrated.

Abbreviations used in the matrix below include:

a. Display:

As-found imbedded or visible value of control point documented at Operator workstation at same time measurement or observation occurred and prior to control point(s) manipulation.

Value / status is recorded for both locations when control point is displayed locally at equipment Operator workstation.

b. Measured / Observed:

As-found imbedded or visible value of control point measured or observed at same time documentation of value at Operator workstation occurred and prior to control point(s) manipulation.

POINT-TO-POINT			
POINT DESCRIPTION	DISPLAY (LOCAL / CONTROL SYSTEM)	MEASURED / OBSERVED	NOTES
Outside air ductwork:			
High limit static pressure			
Outside air section upstream of energy recovery:			
Filter differential pressure			
Dry-bulb temp			
Relative humidity			
Energy recovery device:			
Differential pressure			

POINT-TO-POINT			
POINT DESCRIPTION	DISPLAY (LOCAL / CONTROL SYSTEM)	MEASURED / OBSERVED	NOTES
Outside air section downstream of energy recovery:			
Dry-bulb temp			
Relative humidity			
Pre-heat coil:			
Dry-bulb temp			
Low limit temp			
Leaving water / brine temp			
Cooling coil:			
Dry-bulb temp			
Leaving water / brine temp			
Reheat coil:			
Leaving water / brine temp			
Supply air fan:			
Airflow			
Discharge air ductwork:			
High limit static pressure			
Dry-bulb temp			
Relative humidity			
Return air ductwork:			
Airflow	/		
High limit static pressure			
Return air section upstream of energy recovery:			
Filter differential pressure			
Dry-bulb temp			
Relative humidity			
Exhaust air section downstream of energy recovery:			
Dry-bulb temp			
Relative humidity			
Exhaust air ductwork:			
High limit static pressure			
Facility:			
Facility pressure			

9. ACTUATOR AND MOTOR OBSERVATIONS

The purpose of this section is to identify actuator responses to commands from the control system.

Abbreviations used in the matrix below include:

a. Type:

A - Actuator / controlled device is controlled by an analog control signal.

D - Actuator / controlled device is controlled by a discrete (binary) control signal.

b. Maximum Command:

Control system command resulting in actuator moving controlled device to its full open position with maximum / full flow across device.

c. Minimum Command:

Control system command resulting in actuator moving controlled device to its full closed position with minimum / no flow across device.

d. Signal:

Output from control system measured in units of 0 to 100 percent, 0 to 10 volts, etc.

e. Position:

Position of controlled device (not actuator) physically observed that corresponds to control system signal observed in units of 0-percent open (minimum / no flow across device) and 100-percent open (maximum / full flow across device).

ACTUATORS AND MOTORS						
ACTUATOR DESCRIPTION	TYPE	MAXIMUM COMMAND		MINIMUM COMMAND		NOTES
		SIGNAL	POSITION / SPEED	SIGNAL	POSITION / SPEED	
Outside air control damper						
Outside air bypass control damper						
Pre-heat coil control valve						
Cooling coil Control valve						
Reheat coil control valve						
Supply air fan speed						
Return air control damper						
Exhaust air bypass control damper						
Exhaust air fan speed						

ACTUATORS AND MOTORS						
ACTUATOR DESCRIPTION	TYPE	MAXIMUM COMMAND		MINIMUM COMMAND		NOTES
		SIGNAL	POSITION / SPEED	SIGNAL	POSITION / SPEED	
Exhaust air control damper						

10. VARIABLE FREQUENCY DRIVE OBSERVATIONS

The purpose of this section is to identify characteristics of variable frequency drives (VFD's).

Procedure for obtaining characteristics included:

a. Procedure for documenting maximum motor speed allowed by VFD included:

- Record served motor's nameplate full load current
- Confirm / manually set VFD's maximum allowed speed of 60 Hz
- Manually set VFD hand-off-auto switch to "hand" position
- Manually set VFD to maximum allowed speed of 60 Hz
- Record served motor's running load current at motor conductors

b. Procedure for documenting minimum safe motor speed allowed by VFD included:

- Manually set VFD speed to 24 Hz
- Repeatedly decreased VFD speed by 3 Hz and recorded served motor's running load amperes until running load amperes increases
- Set VFD's minimum allowed speed equivalent to speed at which running load amperes increased plus 3 Hz
- Manually set VFD speed to VFD's minimum allowed speed
- Record served motor's running load amperes at motor conductors

VARIABLE FREQUENCY DRIVE INFORMATION														
PARAMETER DESCRIPTION	SERVED EQUIPMENT													
Data for maximum motor speed allowed by VFD:														
Motor nameplate full load current														
VFD maximum allowed speed (Hz)														
Running load current with VFD at 60 Hz														
Data for minimum safe motor speed allowed by VFD:														
Current at 24 Hz														
Current at 21 Hz														
Current at 18 Hz														
Current at 15 Hz														
Current at 12 Hz														

VARIABLE FREQUENCY DRIVE INFORMATION														
PARAMETER DESCRIPTION	SERVED EQUIPMENT													
Current at 9 Hz														
Current at 6 Hz														
Minimum allowed speed (Hz)														
Current at minimum allowed speed (Amps)														

11. SYSTEM OPERATION OBSERVATIONS

The purpose of this section is to document results from system-based testing of responses for each control algorithm, operation mode, and alarm condition resulting from manipulated control point(s).

Testing is sequentially grouped based on similar functions to maximize testing efficiency and is categorized as follows:

- a. As-found conditions.
- b. Control algorithms.
- c. Operation modes.
- d. Alarm conditions.

Control algorithms initiated by operation modes are tested prior to testing operation modes.

Operation modes initiated by alarm conditions are tested prior to testing alarm conditions.

Because point-to-point and actuator observations were physically made, system responses are observed from Operator workstation unless indicated otherwise.

Some equipment / component responses may be combined in a single test.

The following control algorithm testing is provided in the matrix below:

- a. Supply air fan.
- b. Exhaust air fan (volumetric offset mode) [Default].
- c. Exhaust air fan (facility pressure mode).
- d. Energy recovery device.
- e. Pre-heat coil / cooling coil.
- f. Pre-heat coil circulating pump.
- g. Reheat coil.
- h. Humidifier.

The following operation mode testing is provided in the matrix below:

- a. Unoccupied.
- b. Timed override.
- c. Pre-occupied.
- d. Occupied.

The following alarm condition testing is provided in the matrix below:

- | | |
|---|---|
| a. Outside air filter high static pressure. | r. Exhaust air fan failure. |
| b. Energy recovery device high static pressure. | s. High return air ductwork static pressure. |
| c. Energy recovery device effectiveness. | t. High exhaust air ductwork static pressure. |
| d. Energy recovery device general fault. | u. Facility relative pressure. |
| e. Energy recovery device failure. | v. Supply air fan general fault. |
| f. Energy recovery device frost. | w. Supply air fan failure. |
| g. Pre-heat coil brine temperature. | x. High outdoor air ductwork static pressure. |
| h. Pre-heat coil air temperature. | y. High supply air ductwork static pressure. |
| i. Pre-heat coil circulating pump failure. | z. Low limit temperature (freezestat). |
| j. Cooling coil brine temperature. | aa. Fire. |
| k. Cooling coil air temperature. | bb. Emergency air distribution shutoff. |
| l. Reheat coil brine temperature. | cc. Energy recovery device opposite status. |
| m. Discharge air temperature. | dd. Pre-heat coil circulating pump opposite status. |
| n. Return air relative humidity. | ee. Supply air fan opposite status. |
| o. Return air filter high static pressure. | ff. Exhaust air fan opposite status. |
| p. Outside air / return air volumetric offset. | |
| q. Exhaust air fan general fault. | |

Abbreviations used in the matrix below include:

- a. Test Method:
Manipulated parameter(s) necessary to produce expected system response.
- b. Expected Response:
Anticipated system reaction to manipulated parameter(s).
- c. Comments:
Commissioning specialist's issues related to observations.
- d. Pass / Fail:
P - Expected response is observed without issues of concern.
F - Expected response is not observed resulting in noted issues of concern.
- e. Miscellaneous:
CS - Control signal.

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
As-Found Conditions				
01	To observe as-found conditions: • Confirm / initiate dedicated outside air handling unit's active status • Record observations in expected response / comments columns prior to manipulating parameters	Outside air control damper position	CS of _____	
02		Energy recovery device status	CS of _____	
03		Pre-heat coil control valve position	CS of _____	
04		Cooling coil control valve position	CS of _____	
05		Reheat coil control valve position	CS of _____	
06		Supply air fan speed	CS of _____	
07		Return air control damper position	CS of _____	
08		Exhaust air fan speed	CS of _____	
09		Exhaust air control damper position	CS of _____	
10		Pre-heat coil circulating pump status	CS of _____	
11		Facility setpoint pressure relative to the outside maintained	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
Supply Air Fan Control Algorithm Design Control Sequence: Upon detection of this algorithm having been activated, the control system shall: <ul style="list-style-type: none"> • Set supply air fan setpoint airflow equivalent to 7,500 cfm • Monitor supply air fan airflow measuring station • Enable and command supply air fan to its minimum allowed motor speed upon detection of this control algorithm having been activated • Command supply air fan towards its maximum allowed motor speed upon detection of actual airflow being less than setpoint • Command supply air fan towards its minimum allowed motor speed upon detection of actual airflow being greater than setpoint • Command supply air fan to its inactive status upon detection of this control algorithm having been deactivated 				
12	To prepare for system response:	Setpoint supply air airflow set	CS of _____	
13	<ul style="list-style-type: none"> • Initiate this control algorithm • Observe system status 	Supply air fan commanded to its minimum allowed motor speed	CS of _____	
14	To observe system response to deficient airflow: <ul style="list-style-type: none"> • Override supply air setpoint airflow to significantly greater than actual airflow 	Supply air fan commanded towards its maximum allowed motor speed	CS of _____	
15	To observe system response to excessive airflow: <ul style="list-style-type: none"> • Override supply air setpoint airflow to significantly less than actual airflow 	Supply air fan commanded towards its minimum allowed motor speed	CS of _____	
16	Release all overrides	System returns to pre-test conditions		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
<p>Exhaust Air Fan (Volumetric Offset Mode) [Default] Control Algorithm</p> <p>Design Control Sequence:</p> <p>Upon detection of this algorithm having been activated and Operator having selected "Volumetric Offset Mode", the control system shall:</p> <ul style="list-style-type: none"> Continuously set activation / deactivation setpoint airflow equivalent to outside air actual airflow of 500 cfm Continuously set volumetric offset control setpoint airflow equivalent to outside air actual airflow minus 450 cfm Monitor outside air airflow measuring station Monitor return air airflow measuring station Maintain exhaust air control damper to its 100-percent open position and command return air control damper to its 10-percent open position upon detection of outside air actual airflow being equal to or greater than activation setpoint for a five-minute period Command return air control damper towards its 100-percent open position upon detection of return air actual airflow being equal to or less than volumetric offset control setpoint Maintain return air control damper in its 100-percent open position, enable exhaust air fan, and command exhaust air fan towards its maximum allowed motor speed upon detection of return air control damper having been commanded to its 100-percent open position and return air actual airflow being equal to or less than volumetric offset control setpoint Maintain return air control damper in its 100-percent open position and command exhaust air fan towards its minimum allowed motor speed upon detection of return air actual airflow being greater than volumetric offset control setpoint Maintain exhaust air fan at its minimum allowed motor speed and command return air control damper towards its 10-percent open position upon detection of return air actual airflow being greater than volumetric offset control setpoint Disable exhaust air fan, command exhaust air control damper to its 0-percent open position, and command return air control damper to its 0-percent open position upon detection of outside air actual airflow being less than deactivation setpoint for a 15-minute period Disable exhaust air fan, command exhaust air control damper to its 0-percent open position, and command return air control damper to its 0-percent open position upon detection of this control algorithm having been deactivated 				
17	To prepare for system response:	Activation / deactivation setpoint set	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
18	• Observe system status	Volumetric offset control setpoint set	CS of _____	
19		Outside air airflow monitored	CS of _____	
20		Return air airflow monitored	CS of _____	
21	To observe system response to activation: • Initiate outside air airflow to greater than activation setpoint	Five-minute period passes without control system action		
22		Exhaust air control damper maintained in its 100-percent open position	CS of _____	
23		Return air control damper commanded to its 10-percent open position	CS of _____	
24		Exhaust air fan disabled status maintained	CS of _____	
25	To observe system response to deficient exhaust air airflow: • Override volumetric offset control setpoint to significantly greater than current setpoint	Return air control damper commanded to its 100-percent open position, then	CS of _____	
26		Exhaust air fan commanded to its maximum allowed motor speed	CS of _____	
27	To observe system response to excessive exhaust air airflow: • Override volumetric offset control setpoint to significantly less than current setpoint	Return air control damper maintained in its 100-percent open position	CS of _____	
28		Exhaust air fan commanded to its minimum allowed motor speed, then	CS of _____	
29		Exhaust air fan maintained at its minimum allowed motor speed	CS of _____	
30		Return air control damper commanded to its 10-percent open position	CS of _____	
31	To observe system response to deactivation: • Initiate outside air airflow to less than activation setpoint	Exhaust air fan disabled	CS of _____	
32		Exhaust air control damper commanded to its 0-percent open position	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
33		Return air control damper commanded to its 0-percent open position	CS of _____	
34	Release all overrides	System returns to pre-test conditions		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
<p>Exhaust Air Fan (Facility Pressure Mode) Control Algorithm</p> <p>Design Control Sequence:</p> <p>Upon detection of this algorithm having been activated and Operator having selected "Facility Pressure Mode", the control system shall:</p> <ul style="list-style-type: none"> • Set activation / deactivation setpoint relative pressure equivalent to 0.01 INWG • Continuously set facility relative pressure control setpoint equivalent to 0.02 INWG • Monitor facility relative pressure sensor located across facility envelope • Maintain exhaust air control damper to its 100-percent open position and command return air control damper to its 10-percent open position upon detection of facility actual relative pressure being equal to or greater than activation setpoint for a five-minute period • Command return air control damper towards its 100-percent open position upon detection of facility actual relative pressure being equal to or greater than facility relative pressure control setpoint • Maintain return air control damper in its 100-percent open position, enable exhaust air fan, and command exhaust air fan towards its maximum allowed motor speed upon detection of return air control damper having been commanded to its 100-percent open position and facility actual relative pressure being equal to or greater than facility relative pressure control setpoint • Maintain return air control damper in its 100-percent open position and command exhaust air fan towards its minimum allowed motor speed upon detection of facility actual relative pressure being less than facility relative pressure control setpoint • Maintain exhaust air fan at its minimum allowed motor speed and command return air control damper towards its 10-percent open position upon detection of facility actual relative pressure being less than facility relative pressure control setpoint • Disable exhaust air fan, command exhaust air control damper to its 0-percent open position, and command return air control damper to its 0-percent open position upon detection of facility actual relative pressure being less than deactivation setpoint for a 15-minute period • Disable exhaust air fan, command exhaust air control damper to its 0-percent open position, and command return air control damper to its 0-percent open position upon detection of this control algorithm having been deactivated 				
35	<p>To prepare for system response:</p> <ul style="list-style-type: none"> • Observe system status 	Activation / deactivation setpoint set	CS of _____	
36		Facility pressure control setpoint set	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
37		Facility relative pressure monitored	CS of _____	
38	To observe system response to activation: • Confirm / override facility actual relative pressure to greater than activation setpoint and less than control setpoint	Five-minute period passes without control system action		
39		Exhaust air control damper maintained in its 100-percent open position	CS of _____	
40		Return air control damper commanded to its 10-percent open position	CS of _____	
41		Exhaust air fan disabled status maintained	CS of _____	
42	To observe system response to excessive relative pressure: • Override outside airflow to maximum demand • Override facility setpoint relative pressure to slightly less than actual pressure	Return air control damper commanded to its 100-percent open position, then	CS of _____	
43		Exhaust air fan commanded to its maximum allowed motor speed	CS of _____	
44	To observe system response to deficient relative pressure: • Override outside airflow to minimum demand • Override facility setpoint relative pressure to slightly greater than actual pressure	Return air control damper maintained in its 100-percent open position	CS of _____	
45		Exhaust air fan commanded to its minimum allowed motor speed, then	CS of _____	
46		Exhaust air fan maintained at its minimum allowed motor speed	CS of _____	
47		Return air control damper commanded to its 10-percent open position	CS of _____	
48	To observe system response to continued deficient relative pressure: • Override facility actual relative pressure to less than deactivation setpoint	Exhaust air fan disabled	CS of _____	
49		Exhaust air control damper commanded to its 0-percent open position	CS of _____	
50		Return air control damper commanded to its 0-percent open position	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
51	Release all overrides	System returns to pre-test conditions		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
<p>Energy Recovery Device Control Algorithm</p> <p>Design Control Sequence:</p> <p>Upon detection of this algorithm having been activated and exhaust air fan being active, the control system shall:</p> <ul style="list-style-type: none"> Continuously set energy recovery device cooling mode activation / deactivation temperature equivalent to return air dry-bulb actual temperature Set energy recovery device heating mode activation / deactivation temperature equivalent to pre-heat coil discharge air setpoint temperature minus 10.0 °F Set energy recovery device control setpoint temperature equivalent to pre-heat coil setpoint temperature Monitor outside temperature sensor located in outdoor air section immediately upstream of energy recovery device Monitor return air dry-bulb temperature sensor located in return air section immediately upstream of energy recovery device Monitor energy recovery device discharge temperature sensor located in supply air section immediately downstream of recovery device Command outside air bypass damper to its 0-percent open position, command exhaust air bypass damper to its 0-percent open position, and enable energy recovery device upon detection of outside air dry-bulb temperature being equal to or greater than device cooling activation setpoint temperature for a five-minute period or being equal to or less than device heating activation setpoint temperature for a five-minute period Command energy recovery device towards its maximum allowed speed upon detection of device being enabled in cooling mode and device actual discharge air temperature being greater than control setpoint Command energy recovery device towards its minimum allowed speed upon detection of device being enabled in cooling mode and device actual discharge air temperature being less than control setpoint Command energy recovery device towards its maximum allowed speed upon detection of device being enabled in heating mode and device actual discharge air temperature being less than control setpoint Command energy recovery device towards its minimum allowed speed upon detection of device being enabled in heating mode and device actual discharge air temperature being greater than control setpoint Command outside air bypass damper to its 100-percent open position, command exhaust air bypass damper to its 100-percent open position, and disable energy recovery device upon detection of outside air dry-bulb temperature being less than device cooling deactivation setpoint temperature for a five-minute period and being greater than device heating deactivation setpoint temperature for a five-minute period Command outside air bypass damper to its 0-percent open position, command exhaust air bypass damper to its 0-percent open position, and disable energy recovery device upon detection of this control algorithm having been deactivated 				

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
52	To prepare for system response: • Observe system status	Energy recovery device cooling mode activation / deactivation temperature	CS of _____	
53		Energy recovery device heating mode activation / deactivation temperature	CS of _____	
54		Energy recovery device control setpoint temperature	CS of _____	
55		Outside air dry-bulb temperature monitored	CS of _____	
56		Return air dry-bulb temperature monitored	CS of _____	
57		Energy recovery device discharge air temperature monitored	CS of _____	
58		Energy recovery device status monitored	CS of _____	
59	To observe system response to deficient cooling: • Override energy recovery device cooling mode activation / deactivation setpoint temperature to significantly less than return air actual temperature • Override energy recovery device control setpoint temperature to significantly less than outdoor air actual temperature	Outside air bypass damper commanded to its 0-percent open position	CS of _____	
60		Exhaust air bypass damper commanded to its 0-percent open position	CS of _____	
61		Energy recovery device enabled	CS of _____	
62		Energy recovery device commanded towards its maximum allowed speed	CS of _____	
63	To observe system response to excessive cooling: • Override energy recovery device control setpoint temperature to significantly greater than outdoor air actual temperature	Outside air bypass damper maintained in its 0-percent open position	CS of _____	
64		Exhaust air bypass damper maintained in its 0-percent open position	CS of _____	
65		Energy recovery device commanded towards its minimum allowed speed	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
66	To observe system response to deficient heating: • Override energy recovery device heating mode activation / deactivation setpoint temperature to significantly greater than return air actual temperature • Override energy recovery device control setpoint temperature to significantly greater than outdoor air actual temperature	Outside air bypass damper maintained in its 0-percent open position	CS of _____	
67		Exhaust air bypass damper maintained in its 0-percent open position	CS of _____	
68		Energy recovery device active status maintained	CS of _____	
69		Energy recovery device commanded towards its maximum allowed speed	CS of _____	
70	To observe system response to excessive heating: • Override energy recovery device control setpoint temperature to significantly less than outdoor air actual temperature	Outside air bypass damper maintained in its 0-percent open position	CS of _____	
71		Exhaust air bypass damper maintained in its 0-percent open position	CS of _____	
72		Energy recovery device active status maintained	CS of _____	
73		Energy recovery device commanded towards its minimum allowed speed	CS of _____	
74	To observe system response to no energy recovery demand: • Override energy recovery device cooling mode and heating mode activation / deactivation setpoint temperatures equivalent to return air actual temperature	Outside air bypass damper commanded to its 100-percent open position	CS of _____	
75		Exhaust air bypass damper commanded to its 100-percent open position	CS of _____	
76		Energy recovery device disabled	CS of _____	
77	To observe system response to inactive exhaust air fan: • Override exhaust air fan status to inactive	Outside air bypass damper commanded to its 100-percent open position	CS of _____	
78		Exhaust air bypass damper commanded to its 100-percent open position	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
79		Energy recovery device disabled	CS of _____	
80	To observe system response to control algorithm being disabled: <ul style="list-style-type: none"> • Override exhaust air fan status to active and wait for energy recovery device to become active, then • Deactivate this control algorithm 	Outside air bypass damper commanded to its 0-percent open position	CS of _____	
81		Exhaust air bypass damper commanded to its 0-percent open position	CS of _____	
82		Energy recovery device status maintained disabled	CS of _____	
83	Release all overrides	System returns to pre-test conditions		
<p>Pre-Heat Coil Control Algorithm</p> <p>Design Control Sequence:</p> <p>Upon detection of this algorithm having been activated, the control system shall:</p> <ul style="list-style-type: none"> • Set pre-heat coil discharge setpoint temperature equivalent to cooling coil discharge air setpoint temperature minus 2.0 °F • Monitor temperature sensor located immediately downstream of this coil • Command control valve towards its 100-percent open position upon detection of pre-heat coil discharge air temperature being less than setpoint • Command control valve towards its 0-percent open position upon detection of pre-heat coil discharge air temperature being greater than setpoint 				
<p>Cooling Coil Control Algorithm</p> <p>Design Control Sequence:</p> <p>Upon detection of this algorithm having been activated, the control system shall:</p> <ul style="list-style-type: none"> • Monitor temperature sensor located immediately downstream of this coil • Command control valve towards its 100-percent open position upon detection of cooling coil discharge air temperature being greater than setpoint of 55.0 °F • Command control valve towards its 0-percent open position upon detection of cooling coil discharge air temperature being less than setpoint of 55.0 °F 				
84	To prepare for system response: <ul style="list-style-type: none"> • Observe system status 	Pre-heat coil discharge setpoint temperature	CS of _____	
85		Cooling coil discharge setpoint temperature	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
86	To observe system response to deficient heating / excessive cooling capacities: • Override cooling coil discharge air setpoint temperature to a significantly greater value such that pre-heat setpoint temperature is slightly greater than actual temperature	Pre-heat coil discharge setpoint temperature set	CS of _____	
87		Cooling coil discharge setpoint temperature set	CS of _____	
88		Pre-heat coil control valve commanded towards its 100-percent open position	CS of _____	
89		Cooling coil control valve commanded towards its 0-percent open position	CS of _____	
90	To observe system response to excessive heating / deficient cooling capacities: • Override cooling coil discharge air setpoint temperature to a significantly lesser value such that pre-heat setpoint temperature is slightly less than actual temperature	Pre-heat coil discharge setpoint temperature set	CS of _____	
91		Cooling coil discharge setpoint temperature set	CS of _____	
92		Pre-heat coil control valve commanded towards its 0-percent open position	CS of _____	
93		Cooling coil control valve commanded towards its 100-percent open position	CS of _____	
94	Release all overrides	System returns to pre-test conditions		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
Reheat Coil Control Algorithm Design Control Sequence: Upon detection of this algorithm having been activated, the control system shall: <ul style="list-style-type: none"> • Monitor temperature sensor located in supply air ductwork • Command control valve towards its 0-percent open position upon detection of unit discharge air temperature being less than setpoint of 73.0 °F • Command control valve towards its 100-percent open position upon detection of unit discharge air temperature being greater than setpoint of 73.0 °F 				
95	To observe system response to deficient heating capacity: <ul style="list-style-type: none"> • Override unit discharge air setpoint temperature to significantly greater than actual temperature 	Reheat coil control valve commanded towards its 100-percent open position	CS of _____	
96	To observe system response to excessive heating capacity: <ul style="list-style-type: none"> • Override unit discharge air setpoint temperature to significantly less than actual temperature 	Reheat coil control valve commanded towards its 0-percent open position	CS of _____	
97	Release all overrides	System returns to pre-test conditions		
Pre-Heat Coil Circulating Pump Control Algorithm Design Control Sequence: Upon detection of this algorithm having been activated, the control system shall: <ul style="list-style-type: none"> • Command pre-heat coil circulating pump to operate at constant speed upon detection of outside air temperature being equal to or less than activation setpoint of 38.0 °F • Command pre-heat coil circulating pump to its inactive status upon detection of outside air temperature being greater than deactivation setpoint of 38.0 °F 				
98	To observe system response to activation: <ul style="list-style-type: none"> • Override activation setpoint temperature to significantly less than actual outside air temperature 	Pre-heat coil circulating pump control algorithm initiated		
99		Pre-heat coil circulating pump commanded to active status	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
100	To observe system response to deactivation: <ul style="list-style-type: none"> • Override activation setpoint temperature to significantly greater than actual outside air temperature 	Pre-heat coil circulating pump commanded to inactive status	CS of _____	
101	Release all overrides	System returns to pre-test conditions		
<p>Humidifier Control Algorithm</p> <p>Design Control Sequence:</p> <p>Upon detection of this algorithm having been activated, the control system shall:</p> <ul style="list-style-type: none"> • Monitor return air relative humidity sensor located in return air section immediately upstream of energy recovery device • Monitor supply air relative humidity sensor located downstream of humidifier distribution manifold • Enable humidifier upon detection of return air relative humidity being equal to or less than enable setpoint of 25-percent • Command humidifier control valve towards its 100-percent open position upon detection of supply air actual relative humidity being equal to or less than control setpoint of 80-percent • Command humidifier control valve towards its 0-percent open position upon detection of supply air actual relative humidity being greater than control setpoint of 80-percent • Disable humidifier upon detection of supply air relative humidity being equal to or greater than high-limit setpoint of 90-percent • Disable humidifier upon detection of return air relative humidity being greater than disable setpoint of 30-percent 				
102	To observe system response to being enabled: <ul style="list-style-type: none"> • Override humidifier enable setpoint to significantly less than return air actual relative humidity 	Humidifier enabled	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
103	To observe system response to deficient capacity: <ul style="list-style-type: none"> • Override control setpoint relative humidity to slightly greater than actual relative humidity 	Humidifier coil control valve commanded towards its 100-percent open position	CS of _____	
104	To observe system response to excessive capacity: <ul style="list-style-type: none"> • Override control setpoint relative humidity to slightly less than actual relative humidity 	Humidifier coil control valve commanded towards its 0-percent open position	CS of _____	
105	To observe system response to capacity in excess of high-limit: <ul style="list-style-type: none"> • Override humidifier high-limit setpoint to significantly less than supply air actual relative humidity 	Humidifier disabled	CS of _____	
106	To prepare to observe system response to being disabled: <ul style="list-style-type: none"> • Release humidifier high-limit setpoint override 	Humidifier enabled	CS of _____	
107	To observe system response to being disabled: <ul style="list-style-type: none"> • Release humidifier enable setpoint override • Override humidifier disable setpoint to significantly greater than return air actual relative humidity 	Humidifier disabled	CS of _____	
108	Release all overrides	System returns to pre-test conditions		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
Unoccupied Operation Mode Design Control Sequence: Upon detection of unoccupied time having occurred, the control system shall: <ul style="list-style-type: none"> Deactivate supply air fan control algorithm Deactivate exhaust air fan control algorithm Deactivate energy recovery device control algorithm Command outside air control damper to its 0-percent open position Command exhaust air control damper to its 0-percent open position Deactivate pre-heat coil control algorithm Deactivate cooling coil control algorithm Deactivate reheat coil control algorithm Deactivate pre-heat coil circulating pump control algorithm Deactivate humidifier control algorithm 				
109	To observe system response: <ul style="list-style-type: none"> Override scheduled unoccupied time to be slightly after actual time 	Supply air fan control algorithm deactivated	CS of _____	
110		Exhaust air fan control algorithm deactivated	CS of _____	
111		Energy recovery device control algorithm deactivated	CS of _____	
112		Outside air control damper commanded to its 0-percent open position	CS of _____	
113		Exhaust air control damper commanded to its 0-percent open position	CS of _____	
114		Pre-heat coil control algorithm deactivated	CS of _____	
115		Cooling coil control algorithm deactivated	CS of _____	
116		Reheat coil control algorithm deactivated	CS of _____	
117		Pre-heat coil circulating pump control algorithm deactivated	CS of _____	
118		Humidifier control algorithm deactivated	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
119	Release selected overrides	Selected components return to pre-test conditions		
<p>Timed Override Operation Mode</p> <p>Design Control Sequence:</p> <p>Upon detection of any single timed override switch associated with any air handling unit having been activated, the control system shall:</p> <ul style="list-style-type: none"> • Maintain supply air fan control algorithm inactive status • Maintain exhaust air fan control algorithm inactive status • Maintain energy recovery device control algorithm inactive status • Maintain outside air control damper in its 0-percent open position • Maintain exhaust air control damper in its 0-percent open position • Maintain pre-heat coil control algorithm inactive status • Maintain cooling coil control algorithm inactive status • Maintain reheat coil control algorithm inactive status • Maintain pre-heat coil circulating pump control algorithm • Maintain humidifier control algorithm inactive status 				
120	<p>To observe system response:</p> <ul style="list-style-type: none"> • Activate one timed override switch to active 	Supply air fan control algorithm maintained inactive	CS of _____	
121		Exhaust air fan control algorithm maintained inactive	CS of _____	
122		Energy recovery device control algorithm maintained inactive	CS of _____	
123		Outside air control damper maintained in its 0-percent open position	CS of _____	
124		Exhaust air control damper maintained in its 0-percent open position	CS of _____	
125		Pre-heat coil control algorithm maintained inactive	CS of _____	
126		Cooling coil control algorithm maintained inactive	CS of _____	
127		Reheat coil control algorithm maintained inactive	CS of _____	
128		Pre-heat coil circulating pump control algorithm maintained inactive	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
129		Humidifier control algorithm maintained inactive	CS of _____	
130	Release selected overrides	Selected components return to pre-test conditions		
<p>Pre-Occupied Operation Mode</p> <p>Design Control Sequence:</p> <p>Upon detection of learned system start-up time in advance of occupied time having occurred, the control system shall:</p> <ul style="list-style-type: none"> • Maintain supply air fan control algorithm inactive status • Maintain exhaust air fan control algorithm inactive status • Maintain energy recovery device control algorithm inactive status • Maintain outside air control damper in its 0-percent open position • Maintain exhaust air control damper in its 0-percent open position • Maintain pre-heat coil control algorithm inactive status • Maintain cooling coil control algorithm inactive status • Maintain reheat coil control algorithm inactive status • Maintain pre-heat coil circulating pump control algorithm • Maintain humidifier control algorithm inactive status 				
131	<p>To observe system response:</p> <ul style="list-style-type: none"> • Override learned system start-up time to slightly after actual time • Wait for overridden system start-up time to occur 	Supply air fan control algorithm maintained inactive	CS of _____	
132		Exhaust air fan control algorithm maintained inactive	CS of _____	
133		Energy recovery device control algorithm maintained inactive	CS of _____	
134		Outside air control damper maintained in its 0-percent open position	CS of _____	
135		Exhaust air control damper maintained in its 0-percent open position	CS of _____	
136		Pre-heat coil control algorithm maintained inactive	CS of _____	
137		Cooling coil control algorithm maintained inactive	CS of _____	
138		Reheat coil control algorithm maintained inactive	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
139		Pre-heat coil circulating pump control algorithm maintained inactive	CS of _____	
140		Humidifier control algorithm maintained inactive	CS of _____	
Occupied Operation Mode Design Control Sequence: Upon detection of completion of pre-occupied operation mode, the control system shall: <ul style="list-style-type: none">• Command outside air control damper to its 100-percent open position• Confirm outside air control damper in its 100-percent open position• Command exhaust air control damper to its 100-percent open position• Confirm exhaust air control damper in its 100-percent open position• Command return air control damper to its 10-percent open position• Confirm return air control damper in its 10-percent open position• Activate supply air fan control algorithm• Activate exhaust air fan control algorithm• Activate energy recovery device control algorithm• Activate pre-heat coil control algorithm• Activate cooling coil control algorithm• Activate reheat coil control algorithm• Activate pre-heat coil circulating pump control algorithm• Activate humidifier control algorithm				
141	To observe system response: <ul style="list-style-type: none">• Override scheduled unoccupied time to be slightly after actual time	Outside air control damper commanded to its 100-percent open position	CS of _____	
142		Outside air control damper confirmed in its 100-percent open position	CS of _____	
143		Exhaust air control damper commanded to its 100-percent open position	CS of _____	
144		Exhaust air control damper confirmed in its 100-percent open position	CS of _____	
145		Return air control damper commanded to its 10-percent open position	CS of _____	
146		Return air control damper confirmed in its 10-percent open position	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
147		Supply air fan control algorithm deactivated	CS of _____	
148		Exhaust air fan control algorithm activated	CS of _____	
149		Energy recovery device control algorithm activated	CS of _____	
150		Pre-heat coil control algorithm activated	CS of _____	
151		Cooling coil control algorithm activated	CS of _____	
152		Reheat coil control algorithm activated	CS of _____	
153		Pre-heat coil circulating pump control algorithm activated	CS of _____	
154		Humidifier control algorithm activated	CS of _____	
155	Release all overrides	System returns to pre-test conditions		
<p>Outside Air Filter High Static Pressure Alarm Condition</p> <p>Design Control Sequence:</p> <p>Upon detection of receiving enable command and outside air filter actual static pressure being equal to or greater than alarm setpoint of 1.0 INWG, the control system shall:</p> <ul style="list-style-type: none"> • Initiate visual alarm at Operator workstation • Maintain system active status 				
156	To observe system response:	Visual alarm initiated at Operator workstation		
157	• Force air pressure on high pressure side of differential pressure switch sampling tube	System active status maintained	CS of _____	
158	Release air pressure and return sampling tube to its original position	System returns to pre-test conditions		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
Energy Recovery Device High Static Pressure Alarm Condition Design Control Sequence: Upon detection of receiving enable command, the control system shall: <ul style="list-style-type: none"> • Set energy recovery device high setpoint static pressure equivalent to 1.5 INWG • Set outside air high static alarm setpoint temperature equivalent to 35.0 °F • Monitor differential pressure sensor located across energy recovery device • Monitor outside temperature sensor located in outdoor air section immediately upstream of energy recovery device • Initiate audible alarm at Operator workstation upon detection of energy recovery device actual static pressure being equal to or greater than alarm setpoint for a five-minute period and actual outside air temperature being equal to or greater than high static alarm setpoint temperature for a five-minute period • Maintain system active status 				
159	To observe system response:	Visual alarm initiated at Operator workstation		
160	<ul style="list-style-type: none"> • Force air pressure on high pressure side of differential pressure switch sampling tube 	System active status maintained	CS of _____	
161	Release air pressure and return sampling tube to its original position	System returns to pre-test conditions		
Energy Recovery Device Effectiveness Alarm Condition Design Control Sequence: Upon detection of receiving enable command, the control system shall: <ul style="list-style-type: none"> • Monitor return air upstream dry-bulb temperature sensor located immediately upstream of energy recovery device • Monitor outdoor air upstream dry-bulb temperature sensor located immediately upstream of energy recovery device • Monitor outdoor air downstream dry-bulb temperature sensor located immediately downstream of energy recovery device • Initiate visual alarm at Operator workstation upon detection of: <ul style="list-style-type: none"> - Energy recovery device commanded to maximum allowed motor speed - Outside air upstream actual temperature being equal to or greater than return air upstream actual temperature plus 10.0 °F - Outdoor air downstream temperature being equal to or greater than outdoor air upstream temperature minus 7.0 °F • Maintain system active status 				
162	To prepare for system response:	Return air upstream dry-bulb temperature monitored	CS of _____	
163	<ul style="list-style-type: none"> • Observe system status 	Outdoor air upstream dry-bulb temperature monitored	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
164		Outdoor air downstream dry-bulb temperature monitored	CS of _____	
165	To observe system response to deficient efficiency:	Visual alarm initiated at Operator workstation		
166	<ul style="list-style-type: none"> Confirm / override outside air / return air upstream temperature difference to significantly greater than 10.0 °F Override outdoor air downstream temperature to slightly greater than outdoor air upstream temperature minus 7.0 °F 	System active status maintained	CS of _____	
167	Release all overrides	System returns to pre-test conditions		
Energy Recovery Device General Fault Alarm Condition Design Control Sequence: Upon detection of receiving enable command and energy recovery device general fault alarm, the control system shall: <ul style="list-style-type: none"> Initiate visual alarm at Operator workstation Maintain system active status 				
168	To observe system response:	Visual alarm initiated at Operator workstation		
169	<ul style="list-style-type: none"> Initiate general fault at adjustable frequency drive 	System active status maintained	CS of _____	
170	Release all overrides	System returns to pre-test conditions		
Energy Recovery Device Failure Alarm Condition Design Control Sequence: Upon detection of receiving enable command and energy recovery device failure alarm status, the control system shall: <ul style="list-style-type: none"> Initiate visual alarm at Operator workstation Maintain system active status 				
171	To observe system response:	Visual alarm initiated at Operator workstation		
172	<ul style="list-style-type: none"> Initiate failure condition at adjustable frequency drive 	System active status maintained	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
173	Release all overrides	System returns to pre-test conditions		
Energy Recovery Device Frost Alarm Condition Design Control Sequence: Upon detection of receiving enable command, the control system shall: <ul style="list-style-type: none"> • Set energy recovery device frost alarm setpoint static pressure equivalent to 2.0 INWG • Set outside air frost alarm setpoint temperature equivalent to 5.0 °F • Monitor differential pressure sensor located across energy recovery device • Monitor outside temperature sensor located in outdoor air section immediately upstream of energy recovery device • Initiate visual alarm at Operator workstation and activate system alarm response upon detection of energy recovery device actual static pressure being equal to or greater than alarm setpoint for a five-minute period and actual outside air temperature being less than frost alarm setpoint temperature for a five-minute period • Maintain system active status and command energy recovery device to its minimum allowed speed upon detection of system alarm response being activated • Initiate audible alarm and maintain visual alarm at Operator workstation and maintain system alarm response upon detection of energy recovery device actual static pressure being equal to or greater than alarm setpoint for a 120-minute period and actual outside air temperature being less than frost alarm setpoint temperature for a 120-minute period • Cancel audible and visual alarms at Operator workstation and deactivate system alarm response upon detection of energy recovery device actual static pressure being less than alarm setpoint for a five-minute period or actual outside air temperature being equal to or greater than frost alarm setpoint temperature for a 120-minute period 				
174	To prepare for system response: <ul style="list-style-type: none"> • Maintain audible alarm period • Override audible and visual alarms period to audible alarm period plus one-minute 	Audible and visual alarms period setpoint set	CS of _____	
175	To observe system response: <ul style="list-style-type: none"> • Override energy recovery device frost alarm setpoint static pressure to significantly less than actual static 	One-minute period passes without control system action		
176		Visual alarm initiated at Operator workstation		
177		System active status maintained	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
178	pressure • Override outside air frost alarm setpoint temperature to significantly greater than actual outdoor air temperature	Energy recovery device commanded to its minimum allowed speed	CS of _____	
179		One-minute period passes without control system action		
180		Visual alarm maintained at Operator workstation		
181		Audible alarm initiated at Operator workstation		
182	To observe system response to increased outside air temperature: • Override audible and visual alarms cancellation period to two-minutes • Override outside air frost alarm setpoint temperature to significantly less than actual outdoor air temperature	Two-minute period passes without control system action		
183		Audible and visual alarms cancelled at Operator workstation		
184	Release all overrides	System returns to pre-test conditions		
Pre-Heat Coil Brine Temperature Alarm Condition Design Control Sequence: Upon detection of receiving enable command, the control system shall: <ul style="list-style-type: none"> • Set pre-heat coil high limit alarm setpoint temperature equivalent to plant actual supply temperature minus 10.0 °F • Monitor temperature sensor located in this coil's return piping • Initiate visual alarm at Operator workstation upon detection of control valve having been commanded towards its 100-percent open position and temperature in this coil's return piping being equal to or greater than high limit alarm setpoint temperature for a five-minute period • Maintain system active status 				
185	To observe system response to excessive heating:	Five-minute period passes without control system action		
186	• Override high limit alarm setpoint temperature to significantly less than actual temperature	Visual alarm initiated at Operator workstation		
187		System active status maintained	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
188	Release all overrides	System returns to pre-test conditions		
<p>Pre-Heat Coil Air Temperature Alarm Condition</p> <p>Design Control Sequence:</p> <p>Upon detection of receiving enable command, the control system shall:</p> <ul style="list-style-type: none"> • Set pre-heat coil low limit alarm setpoint temperature equivalent to pre-heat coil setpoint temperature minus 8.0 °F • Set pre-heat coil high limit alarm setpoint temperature equivalent to pre-heat coil setpoint temperature plus 15.0 °F • Monitor temperature sensor located immediately downstream of this coil • Initiate visual alarm at Operator workstation upon detection of temperature immediately downstream of this coil being equal to or less than low limit alarm setpoint temperature for a five-minute period • Maintain system active status • Initiate visual alarm at Operator workstation upon detection of temperature immediately downstream of this coil being equal to or greater than high limit alarm setpoint temperature for a five-minute period • Maintain system active status 				
189	To observe system response to deficient heating:	Five-minute period passes without control system action		
190	• Override low limit alarm setpoint temperature to significantly greater than actual temperature	Visual alarm initiated at Operator workstation		
191		System active status maintained	CS of _____	
192	To observe system response to excessive heating:	Five-minute period passes without control system action		
193	• Override high limit alarm setpoint temperature to significantly less than actual temperature	Visual alarm initiated at Operator workstation		
194		System active status maintained	CS of _____	
195	Release all overrides	System returns to pre-test conditions		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
Pre-Heat Coil Circulating Pump Failure Alarm Condition Design Control Sequence: Upon detection of control algorithm being activated, pre-heat coil circulating pump active status being initiated, and pre-heat coil circulating pump status being inactive, the control system shall: <ul style="list-style-type: none"> • Initiate visual alarm at Operator workstation • Command pre-heat coil circulating pump to inactive status • Maintain system active status 				
196	To observe system response: <ul style="list-style-type: none"> • Manually set pump disconnect switch to "off" position • Override pump activation setpoint temperature to significantly less than actual outside air temperature 	Visual alarm initiated at Operator workstation		
197		Pre-heat coil circulating pump commanded to inactive status	CS of _____	
198		System active status maintained	CS of _____	
199	Release all overrides	System returns to pre-test conditions		
Cooling Coil Brine Temperature Alarm Condition Design Control Sequence: Upon detection of receiving enable command, the control system shall: <ul style="list-style-type: none"> • Set cooling coil low limit alarm setpoint temperature equivalent to plant actual supply temperature plus 8.0 °F • Monitor temperature sensor located in this coil's return piping • Initiate visual alarm at Operator workstation upon detection of control valve having been commanded towards its 100-percent open position and temperature in this coil's return piping being equal to or less than high limit alarm setpoint temperature for a five-minute period • Maintain system active status 				
200	To observe system response to excessive heating: <ul style="list-style-type: none"> • Override low limit alarm setpoint temperature to significantly greater than actual temperature 	Five-minute period passes without control system action		
201		Visual alarm initiated at Operator workstation		
202		System active status maintained	CS of _____	
203	Release all overrides	System returns to pre-test conditions		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
Cooling Coil Air Temperature Alarm Condition Design Control Sequence: Upon detection of receiving enable command, the control system shall: <ul style="list-style-type: none"> • Set cooling coil high limit alarm setpoint temperature equivalent to cooling coil setpoint temperature plus 5.0 °F • Monitor temperature sensor located immediately downstream of this coil • Initiate visual alarm at Operator workstation upon detection of temperature immediately downstream of this coil being equal to or greater than high limit alarm setpoint temperature for a five-minute period • Maintain system active status 				
204	To observe system response to excessive heating:	Five-minute period passes without control system action		
205	• Override high limit alarm setpoint temperature to significantly less than actual temperature	Visual alarm initiated at Operator workstation		
206		System active status maintained	CS of _____	
207	Release all overrides	System returns to pre-test conditions		
Reheat Coil Brine Temperature Alarm Condition Design Control Sequence: Upon detection of receiving enable command, the control system shall: <ul style="list-style-type: none"> • Set reheat coil high limit alarm setpoint temperature equivalent to plant actual supply temperature minus 10.0 °F • Monitor temperature sensor located in this coil's return piping • Initiate visual alarm at Operator workstation upon detection of control valve having been commanded towards its 100-percent open position and temperature in this coil's return piping being equal to or greater than high limit alarm setpoint temperature for a five-minute period • Maintain system active status 				
208	To observe system response to excessive heating:	Five-minute period passes without control system action		
209	• Override high limit alarm setpoint temperature to significantly less than actual temperature	Visual alarm initiated at Operator workstation		
210		System active status maintained	CS of _____	
211	Release all overrides	System returns to pre-test conditions		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
Discharge Air Temperature Alarm Condition Design Control Sequence: Upon detection of receiving enable command, the control system shall: <ul style="list-style-type: none"> • Set discharge high limit alarm setpoint temperature equivalent to discharge air setpoint temperature plus 15.0 °F • Monitor temperature sensor located in supply air ductwork • Initiate visual alarm at Operator workstation upon detection of temperature immediately downstream of this coil being equal to or greater than high limit alarm setpoint temperature for a five-minute period • Maintain system active status 				
212	To observe system response to deficient heating:	Five-minute period passes without control system action		
213	• Override high limit alarm setpoint temperature to significantly less than actual temperature	Visual alarm initiated at Operator workstation		
214		System active status maintained	CS of _____	
215	To observe system response to excessive heating:	Five-minute period passes without control system action		
216	• Override high limit alarm setpoint temperature to significantly less than actual temperature	Visual alarm initiated at Operator workstation		
217		System active status maintained	CS of _____	
218	Release all overrides	System returns to pre-test conditions		
Return Air Relative Humidity Alarm Condition Design Control Sequence: Upon detection of receiving enable command, the control system shall: <ul style="list-style-type: none"> • Set return air high limit alarm setpoint relative humidity equivalent to return air setpoint relative humidity plus 15-percent • Monitor relative humidity sensor located in return air ductwork • Initiate visual alarm at Operator workstation upon detection of relative humidity in return air ductwork being equal to or greater than high limit alarm setpoint temperature for a five-minute period • Maintain system active status 				
219	To observe system response to excessive heating:	Five-minute period passes without control system action		
220	• Override high limit alarm setpoint temperature to	Visual alarm initiated at Operator workstation		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
221	significantly less than actual temperature	System active status maintained	CS of _____	
222	Release all overrides	System returns to pre-test conditions		
Return Air Filter High Static Pressure Alarm Condition Design Control Sequence: Upon detection of receiving enable command and return air filter actual static pressure being equal to or greater than alarm setpoint of 1.5 INWG, the control system shall: <ul style="list-style-type: none"> Initiate visual alarm at Operator workstation Maintain system active status 				
223	To observe system response:	Visual alarm initiated at Operator workstation		
224	<ul style="list-style-type: none"> Force air pressure on high pressure side of differential pressure switch sampling tube 	System active status maintained	CS of _____	
225	Release air pressure and return sampling tube to its original position	System returns to pre-test conditions		
Return Air / Outside Air Volumetric Offset Alarm Condition Design Control Sequence: Upon detection of receiving enable command and volumetric offset mode having been activated, the control system shall: <ul style="list-style-type: none"> Initiate visual alarm at Operator workstation upon detection of difference between return air and outside air airflows being equal to or greater than volumetric control setpoint for a five-minute period Maintain system active status 				
226	To observe system response:	Five-minute period passes without control system action		
227	<ul style="list-style-type: none"> Override return air control damper to maintain current position and exhaust air fan to constant speed 	Visual alarm initiated at Operator workstation		
228	<ul style="list-style-type: none"> Override volumetric control setpoint to greater than current offset 	System active status maintained	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
229	Release all overrides	System returns to pre-test conditions		
Exhaust Air Fan General Fault Alarm Condition Design Control Sequence: Upon detection of receiving enable command and exhaust air fan general fault alarm, the control system shall: <ul style="list-style-type: none"> Initiate visual alarm at Operator workstation Maintain system active status 				
230	To observe system response: • Initiate general fault	Visual alarm initiated at Operator workstation		
231	at adjustable frequency drive	System active status maintained	CS of _____	
232	Release all overrides	System returns to pre-test conditions		
Exhaust Air Fan Failure Alarm Condition Design Control Sequence: Upon detection of receiving enable command and exhaust air failure alarm status, the control system shall: <ul style="list-style-type: none"> Initiate visual alarm at Operator workstation Disable exhaust air fan Maintain system active status 				
233	To observe system response: • Initiate failure	Visual alarm initiated at Operator workstation		
234	condition at adjustable frequency drive	Exhaust air fan disabled	CS of _____	
235		System active status maintained	CS of _____	
236	Release all overrides	System returns to pre-test conditions		
High Return Air Ductwork Static Pressure Alarm Condition Design Control Sequence: Upon detection of receiving enable command and return air ductwork actual static pressure being equal to or greater than alarm setpoint of absolute 2.0 INWG, the control system shall: <ul style="list-style-type: none"> Initiate audible and visual alarms at Operator workstation Disable exhaust air fan Maintain system active status 				
237	To observe system response:	Audible and visual alarms initiated at Operator workstation		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
238	<ul style="list-style-type: none"> Override alarm setpoint static pressure to slightly less than actual pressure 	Exhaust air fan disabled	CS of _____	
239		System active status maintained	CS of _____	
240	Release all overrides	System returns to pre-test conditions		
High Exhaust Air Ductwork Static Pressure Alarm Condition Design Control Sequence: Upon detection of receiving enable command and return air ductwork actual static pressure being equal to or greater than alarm setpoint of absolute 2.0 INWG, the control system shall: <ul style="list-style-type: none"> Initiate audible and visual alarms at Operator workstation Disable exhaust air fan Maintain system active status 				
241	To observe system response: <ul style="list-style-type: none"> Override alarm setpoint static pressure to slightly less than actual pressure 	Audible and visual alarms initiated at Operator workstation		
242		Exhaust air fan disabled	CS of _____	
243		System active status maintained	CS of _____	
244	Release all overrides	System returns to pre-test conditions		
Facility Relative Pressure Alarm Condition Design Control Sequence: Upon detection of receiving enable command, the control system shall: <ul style="list-style-type: none"> Initiate visual alarm at Operator workstation upon detection of facility actual pressure relative to the outside being greater than high alarm setpoint of 0.05 INWG for a five-minute period Initiate visual alarm at Operator workstation upon detection of facility actual pressure relative to the outside being less than low alarm setpoint of 0.01 INWG for a five-minute period Maintain system active status 				
245	To observe system response: <ul style="list-style-type: none"> Override high alarm setpoint to slightly less than actual facility actual pressure 	Five-minute period passes without control system action		
246		Visual alarm initiated at Operator workstation		
247		System active status maintained	CS of _____	

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
248	To observe system response: • Override low alarm setpoint to slightly greater than actual facility actual pressure	Five-minute period passes without control system action		
249		Visual alarm initiated at Operator workstation		
250		System active status maintained	CS of _____	
251	Release all overrides	System returns to pre-test conditions		
Supply Air Fan General Fault Alarm Condition Design Control Sequence: Upon detection of receiving enable command and supply air fan general fault alarm, the control system shall: • Initiate visual alarm at Operator workstation • Maintain system active status				
252	To observe system response: • Initiate general fault at adjustable frequency drive	Visual alarm initiated at Operator workstation		
253		System active status maintained	CS of _____	
254	Release all overrides	System returns to pre-test conditions		
Supply Air Fan Failure Alarm Condition Design Control Sequence: Upon detection of receiving enable command and supply air failure alarm status, the control system shall: • Initiate audible and visual alarms at Operator workstation • Disable system				
255	To observe system response: • Initiate failure condition at adjustable frequency drive	Audible and visual alarms initiated at Operator workstation		
256		System disabled	CS of _____	
257	Release all overrides	System returns to pre-test conditions		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
High Outside Air Ductwork Static Pressure Alarm Condition Design Control Sequence: Upon detection of receiving enable command and return air ductwork actual static pressure being equal to or greater than alarm setpoint of absolute 2.0 INWG, the control system shall: <ul style="list-style-type: none"> • Initiate audible and visual alarms at Operator workstation • Disable system 				
258	To observe system response:	Audible and visual alarms initiated at Operator workstation		
259	• Override alarm setpoint static pressure to slightly less than actual pressure	System disabled	CS of _____	
260	Release all overrides	System returns to pre-test conditions		
High Supply Air Ductwork Static Pressure Alarm Condition Design Control Sequence: Upon detection of receiving enable command and supply air ductwork actual static pressure being equal to or greater than alarm setpoint of absolute 4.0 INWG, the control system shall: <ul style="list-style-type: none"> • Initiate audible and visual alarms at Operator workstation • Disable system 				
261	To observe system response:	Audible and visual alarms initiated at Operator workstation		
262	• Override alarm setpoint static pressure to slightly less than actual pressure	System disabled	CS of _____	
263	Release all overrides	System returns to pre-test conditions		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
Low Limit Temperature (Freezestat) Alarm Condition Design Control Sequence: Upon detection of receiving enable command and temperature downstream of pre-heat coil being equal to or less than alarm setpoint of 36.0 °F, the control system shall: <ul style="list-style-type: none"> • Initiate audible and visual alarms at Operator workstation • Disable dedicated outside air system • Command pre-heat coil control valve to its 100-percent open position • Command cooling coil control valve to its 100-percent open position • Command reheat coil control valve to its 100-percent open position • Activate pre-heat coil circulating pump control algorithm • Disable associated air handling units 				
264	To observe system response: • Manually place sensing element of low limit temperature sensor in ice water	Audible and visual alarms initiated at Operator workstation		
265		Dedicated outside air system disabled	CS of _____	
266		Pre-heat coil control valve commanded to its 100-percent open position	CS of _____	
267		Cooling coil control valve commanded to its 100-percent open position	CS of _____	
268		Reheat coil control valve commanded to its 100-percent open position	CS of _____	
269		Pre-heat coil circulating pump control algorithm activated	CS of _____	
270		Associated air handling units disabled	CS of _____	
271	Remove sensing element of low limit temperature sensor from ice water and return to its original location	System returns to pre-test conditions		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
Fire Alarm Condition Design Control Sequence: Upon detection of receiving enable command and supply air ductwork smoke detector sensing products of combustion, the fire alarm and control systems shall: <ul style="list-style-type: none"> • Initiate audible and visual alarms at Operator workstation • Disable associated air handling units • Disable dedicated outside air system 				
272	To observe system response:	Audible and visual alarms initiated at Operator workstation		
273	<ul style="list-style-type: none"> • Manually force artificial smoke through ductwork smoke detector sampling tube 	Dedicated outside air system disabled	CS of _____	
274		Associated air handling units disabled	CS of _____	
275	Clear smoke from ductwork smoke detector sampling tube	System returns to pre-test conditions		
Emergency Air Distribution Shutoff Alarm Condition Design Control Sequence: Upon detection of activation of emergency air distribution shutoff switch, the control system shall: <ul style="list-style-type: none"> • Initiate audible and visual alarms at Operator workstation • Disable dedicated outside air system 				
276	To observe system response:	Audible and visual alarms initiated at Operator workstation		
277	<ul style="list-style-type: none"> • Activate emergency air distribution shutoff switch 	Dedicated outside air system disabled	CS of _____	
278	Deactivate emergency air distribution shutoff switch	System returns to pre-test conditions		
Energy Recovery Device Opposite Status Alarm Condition Design Control Sequence: Upon detection of receiving enable command and status being opposite command, the control system shall: <ul style="list-style-type: none"> • Initiate visual alarm at Operator workstation • Maintain system active status 				
279	To observe system response to equipment off status:	Visual alarm initiated at Operator workstation		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
280	• Enable / confirm system active status and manually set hand-off-auto switch at adjustable frequency drive to "off" position	Equipment and system status maintained	CS of _____	
281	To observe system response to equipment on status:	Visual alarm initiated at Operator workstation		
282	• Disable system and manually set hand-off-auto switch at adjustable frequency drive to "on" position	Equipment and system status maintained	CS of _____	
283	Release all overrides	System returns to pre-test conditions		
Pre-Heat Coil Circulating Pump Opposite Status Alarm Condition Design Control Sequence: Upon detection of receiving activation command and status being opposite command, the control system shall: <ul style="list-style-type: none"> • Initiate visual alarm at Operator workstation • Maintain system active status 				
284	To observe system response to equipment off status:	Visual alarm initiated at Operator workstation		
285	• Enable / confirm system active status and manually set pump disconnect switch to "off" position	System active status maintained	CS of _____	
286	Release all overrides	System returns to pre-test conditions		
Supply Air Fan Opposite Status Alarm Condition Design Control Sequence: Upon detection of receiving enable command and status being opposite command, the control system shall: <ul style="list-style-type: none"> • Initiate audible and visual alarms at Operator workstation • Maintain system active status 				
287	To observe system response to equipment off status:	Audible and visual alarms initiated at Operator workstation		

SYSTEM OPERATION				
STEP	TEST METHOD	EXPECTED RESPONSE	COMMENTS	PASS/ FAIL
288	• Enable / confirm system active status and manually set hand-off-auto switch at adjustable frequency drive to "off" position	Equipment and system status maintained	CS of _____	
289	To observe system response to equipment on status:	Audible and visual alarms initiated at Operator workstation		
290	• Disable system and manually set hand-off-auto switch at adjustable frequency drive to "on" position	Equipment and system status maintained	CS of _____	
291	Release all overrides	System returns to pre-test conditions		
Exhaust Air Fan Opposite Status Alarm Condition Design Control Sequence: Upon detection of receiving enable command and status being opposite command, the control system shall: <ul style="list-style-type: none"> • Initiate visual alarm at Operator workstation • Maintain system active status 				
292	To observe system response to equipment off status:	Visual alarm initiated at Operator workstation		
293	• Enable / confirm system active status and manually set hand-off-auto switch at adjustable frequency drive to "off" position	Equipment and system status maintained	CS of _____	
294	To observe system response to equipment on status:	Visual alarm initiated at Operator workstation		
295	• Disable system and manually set hand-off-auto switch at adjustable frequency drive to "on" position	Equipment and system status maintained	CS of _____	
296	Release all overrides	System returns to pre-test conditions		

-- End of Test --