

Circulating Domestic Water Heater Functional Performance Test

Equipment ID	[Equipment ID]
Building	[Building]
Location	[Room]

System Description

<p>Description:</p>
<p>Operational Assumptions:</p> <p>Domestic water make up valve is open.</p> <p>System hot water circulation pump is on.</p> <p>The control valve is modulating to maintain set point temperature.</p> <p>Domestic water heating unit is assumed to begin the test in the Idle Mode, with no load conditions and the water temperature at set point.</p> <p>Associated Building Automated System (BAS) has been tested and is operating correctly.</p>

Initial Test	Start Date	End Date	Initials
<p>Results (Check one)</p> <p><input type="checkbox"/> Pass</p> <p><input type="checkbox"/> Fail</p> <p><input type="checkbox"/> Partial Test w/Corrective Actions</p> <p><input type="checkbox"/> Complete Test w/Corrective Actions</p> <p><input type="checkbox"/> Other</p>	Explanation:		

Re-Test 1	Start Date	End Date	Initials
<p>Results (Check one)</p> <p><input type="checkbox"/> Pass</p> <p><input type="checkbox"/> Fail</p> <p><input type="checkbox"/> Partial Test w/Corrective Actions</p> <p><input type="checkbox"/> Complete Test w/Corrective Actions</p> <p><input type="checkbox"/> Other</p>	Explanation:		

Re-Test 2	Start Date	End Date	Initials
<p>Results (Check one)</p>	Explanation:		

[Project Title Template]
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<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	
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Deferred/Seasonal Test		Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:			

Test Participants

Organization	Required	Optional
General Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Electrical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
TAB Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Controls Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Owner's O&M Personnel	<input type="checkbox"/>	<input type="checkbox"/>

Supplies Required for Testing (To be provided by the contractor)

Tools / Supplies	
Laptop with TC Program	Infrared Thermometer Gun
PID Loop Tuning Software	Humidity Tester
Aerosol for Smoke and Freeze stat Test	Basic Tool Pouch
Radio Communications	Flashlight

System Readiness Summary Checklist

Description	Yes	No	Date
System Ready for Test	<input type="checkbox"/>	<input type="checkbox"/>	
Required Personnel Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Tools/Test Equipment/Supplies Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Safety Equipment Available	<input type="checkbox"/>	<input type="checkbox"/>	

Set-Points, Limits, and Schedules

- AHU can be assigned a schedule. Schedule can be programmed daily.
 If system runs 24 hours a day, check here. If not, fill in the occupied mode schedule below.

Day	AM											PM												
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
Sun																								
Mon																								
Tues																								
Wed																								
Thurs																								
Fri																								
Sat																								
Holi																								

Parameter	Setpoint		Adjustable Range	
	Design	Actual	Design	Actual
Outside Air Temperature (°F)				
Preheat valve full open outside air temperature (°F)				
Discharge Air Temperature (°F)				
Night Setback Temperature (°F)				
Night Setback Differential				
Mixed Air Temperature (°F)				
Minimum Start-up Fan Speed (%)				
Time at Minimum Fan Speed for Start-up (min)				
Average Zone Humidity (%RH)				
Maximum supply air humidity (%RH)				
Discharge Air Static Pressure (in H ₂ O)				
High Static Alarm (in H ₂ O)				
Low Static Alarm (in H ₂ O)				
System Shutdown High Static Limit (in H ₂ O)				
Damper Position				

Initial Ambient Conditions

Ambient Conditions			
Outside Air Temp		Outside Air RH %	
Observations			

Trend Data Required To Support Testing

Check if trend point chart(s) and Frequency Graph(s) are provided per trend requirements shown below.

Trend Log Setup #1 – Temperature					
Pre-Testing	Post Testing	Point	Frequency	Duration	Provided
<input type="checkbox"/>	<input type="checkbox"/>	System Flow Rate			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Flow Rate Set Point			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Water Quality			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Damper Position			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	System Pressure			<input type="checkbox"/> Yes <input type="checkbox"/> No

Trend Log Setup #1 – Temperature					
Pre-Testing	Post Testing	Point	Frequency	Duration	Provided
<input type="checkbox"/>	<input type="checkbox"/>	Pressure Set Point			<input type="checkbox"/> Yes <input type="checkbox"/> No
Record Issues				Issue Log Item Number:	

Functional Performance Test -- (Verify all components are ready before energizing or operating the system.)

The Commissioning Authority will make and document any changes/addition/deletions to this test procedure required by current system conditions (i.e. weather, system load, utility availability, etc.).

R = Retest (Check (✓) retest required)

Y= Checked and Passed

C = Corrected (Check (✓) when correction verified)

N = Not Passed

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
PRE-TEST VISUAL MECHANICAL INSPECTION						
1. Record the start time	Recorded.	<input type="checkbox"/>	<input type="checkbox"/>	Time: (am / pm)	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
2. Observe initial operating conditions	The fan is on and the discharge damper is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The HOA switch is in the auto position.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
HEATING OPERATION						
3. Record initial position of each immersion thermostat and hot water temperature at sink.	Record temperature dial positions & temperature.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
4. Adjust thermostat to be just shy of the high setting.	Record temperature leaving at adjacent sink.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Change in temperature is accurate based on direction of change in thermostat.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
5. Adjust thermostat to be just shy of the low setting.	Record temperature leaving at adjacent sink.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Change in temperature is accurate based on direction of change in thermostat.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
6. Override the discharge water temperature set point to 10°F higher than the current discharge temperature.	The control valve is to modulate open to maintain set point temp.	<input type="checkbox"/>	<input type="checkbox"/>	Water temp. at start of test: _____°F New water temp. set point: _____°F	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
7. Return thermostat to its original settings.	System returns to normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
IDLING CONTROL						
8. Override the unit discharge temperature set point to 10°F lower than the current discharge water temperature.	The control valve modulates closed to maintain the unit discharge temperature.	<input type="checkbox"/>	<input type="checkbox"/>	Discharge water temp at start of action: _____°F New DWT set point: _____°F	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

[Project Title Template]
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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
9. Override the discharge water temperature set point to a value equal to the design water temperature. Measure entering and leaving water temperatures.	Control valve modulates opens to maintain the set point temperature.	<input type="checkbox"/>	<input type="checkbox"/>	Entering water temperature: _____°F Leaving water temperature: _____°F Percent schedule capacity: _____%	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
10. Release the discharge water temperature set point overrides.	Control valve modulates to maintain their respective discharge water temperature set points.	<input type="checkbox"/>	<input type="checkbox"/>	Note: Wait until discharge water temperatures are satisfied, before proceeding.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
HEATER STATUS ALARM AT BAS						
11. Close the supply valve.	Alarm is received at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Control valve closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return pump stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
12. Open the Supply Valve	Alarm is cleared at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	All components resume normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
13. Close the makeup water valve.	Alarm is received at central control station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Control valve closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return pump stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
14. Open the makeup water valve	Alarm is cleared.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	All components resume normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
HEATER STATUS ALARM AT BAS						
15. Open the hot water faucets to service sinks and toilet room sinks.	Control valve modulates to maintain set point temp.	<input type="checkbox"/>	<input type="checkbox"/>	Water temp. at start of test: _____°F	<input type="checkbox"/>	<input type="checkbox"/>
	Return pump is on.	<input type="checkbox"/>	<input type="checkbox"/>	Time portion of test is started: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Make-up valve is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
16. Verify flow at test sinks.	Estimate total flow.	<input type="checkbox"/>	<input type="checkbox"/>	Estimated flow (GPM.) _____	<input type="checkbox"/>	<input type="checkbox"/>
	Measure leaving water temp. at remote test sink.	<input type="checkbox"/>	<input type="checkbox"/>	Water temp. : _____°F	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
17. Run hot water until discharge water	Alarm is received at BAS.	<input type="checkbox"/>	<input type="checkbox"/>	Leaving Water temp.: _____°F	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
temp. starts to drop.	Control valve closes.	<input type="checkbox"/>	<input type="checkbox"/>	Time duration from when test was started: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Return pump stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
18. Close hot water valves at test sinks and return to normal operating condition.	Alarm is cleared.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	All components resume normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
HIGH PRESSURE CUTOFF						
19. Override pressure sensor to 10% higher than high pressure alarm set point.	High status alarm is received at the BAS control station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The return pump stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The control valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Domestic makeup water goes to 100%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
20. Re-set the discharge high pressure cutout back to original set point.	Alarm is cleared.	<input type="checkbox"/>	<input type="checkbox"/>	Note: Need to verify which type of control set point will be adjustable from control panel.	<input type="checkbox"/>	<input type="checkbox"/>
	The system resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
RETURN TO INITIAL CONDITIONS						

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ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
21.	Reset all set-points and overrides to the initial values.	The system resumes initial operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
22.	Record End Time	Recorded.	<input type="checkbox"/>	<input type="checkbox"/>	Time: (am / pm)	<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	

Final Sign-Off

Commissioning Agent	Printed Name	Initials	Date
CONTRACTOR	PRINTED NAME	INITIALS	DATE
General Contractor (GC)			
Mechanical Contractor (MC)			
Electrical Contractor (EC)			
TAB Contractor (TAB)			
Controls Contractor (CC)			
Owner's O&M Personnel			

VAV with Reheat Functional Performance Test

Equipment ID	[Equipment ID]
Building	[Building]
Location	[Room]

System Description

Description:

Operational Assumptions:

All fans are operating.

Outside temperature is above 50°F.

The system is in occupied mode operation.

All of the terminal unit zones used for Unoccupied Mode heating/cooling control is maintaining their occupied space temperature set points within 5°F.

Associated Building Automated System (BAS) has been tested and is operating correctly.

Trend logging has been initiated.

Initial Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 1	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 2	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation: 		

Deferred/Seasonal Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation: 		

Test Participants

Organization	Required	Optional
General Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Electrical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
TAB Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Controls Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Owner's O&M Personnel	<input type="checkbox"/>	<input type="checkbox"/>

Supplies Required for Testing (To be provided by the contractor)

Tools / Supplies	
Laptop with TC Program	Infrared Thermometer Gun
PID Loop Tuning Software	Humidity Tester
Aerosol for Smoke and Freeze stat Test	Basic Tool Pouch
Radio Communications	Flashlight

System Readiness Summary Checklist

Description	Yes	No	Date
System Ready for Test	<input type="checkbox"/>	<input type="checkbox"/>	
Required Personnel Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Tools/Test Equipment/Supplies Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Safety Equipment Available	<input type="checkbox"/>	<input type="checkbox"/>	

Set-Points, Limits, and Schedules

- AHU can be assigned a schedule. Schedule can be programmed daily.
 If system runs 24 hours a day, check here. If not, fill in the occupied mode schedule below.

	AM											PM												
Day	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
Sun																								
Mon																								
Tues																								
Wed																								
Thurs																								
Fri																								
Sat																								
Holi																								

Parameter	Setpoint		Adjustable Range	
	Design	Actual	Design	Actual
Outside Air Temperature (°F)				
Preheat valve full open outside air temperature (°F)				
Discharge Air Temperature (°F)				
Night Setback Temperature (°F)				
Night Setback Differential				
Mixed Air Temperature (°F)				
Minimum Start-up Fan Speed (%)				
Time at Minimum Fan Speed for Start-up (min)				
Average Zone Humidity (%RH)				
Maximum supply air humidity (%RH)				
Discharge Air Static Pressure (in H ₂ O)				
High Static Alarm (in H ₂ O)				
Low Static Alarm (in H ₂ O)				
System Shutdown High Static Limit (in H ₂ O)				
Damper Position				

Initial Ambient Conditions

Ambient Conditions			
Outside Air Temp		Outside Air RH %	
Observations			

Trend Data Required To Support Testing

Check if trend point chart(s) and Frequency Graph(s) are provided per trend requirements shown below.

Trend Log Setup #1 - Temperature					
Pre-Testing	Post Testing	Point	Frequency	Duration	Provided
<input type="checkbox"/>	<input type="checkbox"/>	System Flow Rate			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Flow Rate Set Point			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Water Quality			<input type="checkbox"/> Yes <input type="checkbox"/> No

Trend Log Setup #1 - Temperature					
Pre-Testing	Post Testing	Point	Frequency	Duration	Provided
<input type="checkbox"/>	<input type="checkbox"/>	Damper Position			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	System Pressure			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Pressure Set Point			<input type="checkbox"/> Yes <input type="checkbox"/> No
Record Issues				Issue Log Item Number:	

Functional Performance Test -- (Verify all components are ready before energizing or operating the system.)

The Commissioning Authority will make and document any changes/addition/deletions to this test procedure required by current system conditions (i.e. weather, system load, utility availability, etc.).

R = Retest (Check (✓) retest required)

Y = Checked and Passed

C = Corrected (Check (✓) when correction verified)

N = Not Passed

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
PRE-TEST VISUAL MECHANICAL INSPECTION						
23. Ensure all trend information is setup by the controls contractor Record setup values for each VAV box indicate TAB CFME's	Trend OK.	<input type="checkbox"/>	<input type="checkbox"/>	Time: _____ (am/pm)	<input type="checkbox"/>	<input type="checkbox"/>
	Space temperature.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Space temp set point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CFM Max Heating.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CFM Min Heating.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
24. Check the operating conditions at the BAS front end and confirm the system is operating automatically under specified sequence.	Occupancy setting corresponds to the occupancy table above.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	There are no operator overrides currently on.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	No alarm conditions exist.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
VERIFICATION OF TEMPERATURE AIRFLOW CONTROL – OCCUPIED						
25. Adjust thermostat set point to equal current space temperature	Damper goes to minimum position.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Heating valve closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Record CFM.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CFM is at minimum per TAB set point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
26. Adjust the local thermostat set point to be 5°F higher than the current space temperature Wait 3 minutes to record final values	The unit damper remains @ its minimum position (or heating max, if Dual VAV box).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The heating coil control valve modulates open to maintain space temperature set point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Initial discharge temp.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Final discharge temp.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Heating max CFM.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CFM is at maximum per TAB set point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
27. Adjust the local thermostat set point to be 5°F lower than the current space temperature	Unit damper opens fully to max cooling set point (or cooling max if Dual VAV box).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The heating coil control valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Wait 3 minutes to record final value	Initial CFM.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Final CFM.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CFM is at maximum per TAB set point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
28. Reset the space temperature set point to original value	The unit damper should be in its minimum / normal position.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
VERIFICATION OF UNOCCUPIED MODE						
29. Put the unit into unoccupied mode	Damper position closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Reheat valve closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
VERIFICATION OF WARM UP AND COOL DOWN MODE						
30. Put the unit into warm-up mode	Damper position 100% open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Temperature set point 71°F.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Reheat valve modulating for heating.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Record CFM.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CFM is at maximum per TAB set point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Initial discharge temp.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Final discharge temp.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
31. Put the unit into cool down mode	Reheat valve closed.	<input type="checkbox"/>	<input type="checkbox"/>	*Per controls, 30% is equated with minimum, 100% with maximum	<input type="checkbox"/>	<input type="checkbox"/>
	Temperature set point 71°F.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CFM between 30%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	And 100%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Record CFM.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Initial discharge temp.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Final discharge temp.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
32. Reset the unit into its original settings	Unit returns to its original conditions.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
VERIFICATION OF OCCUPIED MODE						
33. Put the unit into occupied heating mode	Damper position modulating to maintain temperature.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Temperature set point 71°F.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	CFM minimum 30%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CFM maximum 100%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Reheat valve modulating for heating when box has reached minimum CFM position.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Reheat valve 100% open box modulating from minimum position to 100% open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Record CFM Max.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Record CFM set pt.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Record night set pt.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
34. Reset the unit into its original default settings.	System returns to its original default settings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
BYPASS MODE						
35. Put AHU/RTU-___ into VFD bypass mode	VAV damper is fully open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
36. Return AHU/RTU-___ to normal operation	System operates normally.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
RETURN TO INITIAL CONDITIONS						
37. Reset the space temperature set-point to the original value	System returns to initial conditions.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Record CFM set pt.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Record temperature set pt.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial		
38. Record test stop time	Recorded.	<input type="checkbox"/>	<input type="checkbox"/>	Time: (am / pm)	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	

Final Sign-Off

Commissioning Agent	Printed Name	Initials	Date
CONTRACTOR	PRINTED NAME	INITIALS	DATE
General Contractor (GC)			
Mechanical Contractor (MC)			
Electrical Contractor (EC)			
TAB Contractor (TAB)			
Controls Contractor (CC)			
Owner's O&M Personnel			

Fire Tube Boiler (Low Pressure Steam) System Functional Performance Test

Equipment ID	[Equipment ID]
Building	[Building]
Location	[Room]

System Description

Description:

Two boilers in penthouse of addition share equipment room with chiller plant addition.

The system includes, boilers #7, 8 that expand the capacity of the campus but are not interconnected, Two duplex condensate pumps in boiler room and Mezzanine CRP 3, 4; feed water heat exchanger HX-7; storage tank and feed water pumps BFP 1, 2, 3; and chemical treatment. Low pressure steam is used for humidifiers that are tested with the related air handling equipment, and two heating hot water heat exchangers.

The Boilers include various safety sensors, valves, fire controls, and fuel oil pumps considered integral to the boiler operation and tested as part of the boiler.

Make up air handling unit 10 provides combustion air and runs when boilers are ON. AHU-10 is tested in a separate FPT. The Fuel Oil Pumps with associated leak detection are tested in a separate FPT. Heat Exchangers HX5, 6 building heating water; and humidifiers are tested on separate FPT's.

Operational Assumptions:

Initial Test	Start Date	End Date	Initials				
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation: <table border="1" style="width: 100%; height: 100%; margin-top: 5px;"> <tr> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>						

Re-Test 1	Start Date	End Date	Initials				
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation: <table border="1" style="width: 100%; height: 100%; margin-top: 5px;"> <tr> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> </tr> </table>						

[Project Title Template]
[Project Location Template]

Re-Test 2		Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:			

Deferred/Seasonal Test		Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:			

Test Participants

Organization	Required	Optional
General Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Electrical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
TAB Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Controls Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Owner's O&M Personnel	<input type="checkbox"/>	<input type="checkbox"/>

Supplies Required for Testing (To be provided by the contractor)

Tools / Supplies	
Laptop with TC Program	Infrared Thermometer Gun
PID Loop Tuning Software	Basic Tool Pouch
Radio Communications	Flashlight

System Readiness Summary Checklist

Description	Yes	No	Date
System readiness checklist completed, approved	<input type="checkbox"/>	<input type="checkbox"/>	
All control system functions for this and all interlocking systems are programmed and operable per contract documents, including final set-points and schedules with debugging, loop tuning and sensor calibrations completed	<input type="checkbox"/>	<input type="checkbox"/>	
Punch list items corrected	<input type="checkbox"/>	<input type="checkbox"/>	
Spot-check system readiness checklist	<input type="checkbox"/>	<input type="checkbox"/>	
Installation Per Design Documentation & Latest Approved Change Orders	<input type="checkbox"/>	<input type="checkbox"/>	
O&M Manuals Delivered <u>and</u> Available on Site	<input type="checkbox"/>	<input type="checkbox"/>	
Field-Marked Copy of As-Built System Schematics Available	<input type="checkbox"/>	<input type="checkbox"/>	

[Project Title Template]
[Project Location Template]

Description	Yes	No	Date
Specified Contractor's Test Reports (CTR) Completed	<input type="checkbox"/>	<input type="checkbox"/>	
Specified Contractor Training of Owner's Employees Completed	<input type="checkbox"/>	<input type="checkbox"/>	
Components/Subsystems Clear and Correctly Identified	<input type="checkbox"/>	<input type="checkbox"/>	
Pumps and piping are properly installed.	<input type="checkbox"/>	<input type="checkbox"/>	

Set-Points, Limits, and Schedules

- AHU can be assigned a schedule. Schedule can be programmed daily.
 If system runs 24 hours a day, check here. If not, fill in the occupied mode schedule below.

Day	AM											PM												
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
Sun																								
Mon																								
Tues																								
Wed																								
Thurs																								
Fri																								
Sat																								
Holi																								

Parameter	Setpoint		Adjustable Range	
	Design	Actual	Design	Actual
Boiler Room Space Temp				
Feed Water Temp				
Boiler Steam Pressure St Pt				
Boiler flame purge Delay				
Boiler Pressure Build-up Delay				
Boiler Low Fire De-energize Delay				
Max fire to call for Lag boiler				
Controller High Pressure Limit				
Boiler Lead Lag Schedule				
Exhaust Fan ON Space Temp Exceeds				
Condensate Pump Flow Rate/Pressure				
Feed Water Conductivity St Pt; Hi Limit				
Feed Water Conductivity St Pt; Hi Limit				
Minimum fire rate low load				

Initial Ambient Conditions

Ambient Conditions			
Outside Air Temp		Outside Air RH %	
Observations			

Trend Data Required To Support Testing

Check if trend point chart(s) and Frequency Graph(s) are provided per trend requirements shown below.

Trend Log Setup #1 - Temperature					
Pre-Testing	Post Testing	Point	Frequency	Duration	Provided
<input type="checkbox"/>	<input type="checkbox"/>	Boiler #1 On/Off STATUS			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Boiler #2 On/Off STATUS			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Boiler #1 ALARM STATUS			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Boiler #2 ALARM STATUS			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Boiler #1 Gas / Oil Fuel Selection STATUS			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Boiler #2 Gas / Oil Fuel Selection STATUS			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Boiler #1 Supply Pressure or Temp.			<input type="checkbox"/> Yes <input type="checkbox"/> No
Record Issues				Issue Log Item Number:	

Trend Log Setup #2 - Temperature					
Pre-Testing	Post Testing	Point	Frequency	Duration	Provided
<input type="checkbox"/>	<input type="checkbox"/>	Make-Up Water Supply Temperature			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Boiler #2 Supply Pressure or Temp.			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Common Header Pressure / Temperature			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Outside Air Temp.			<input type="checkbox"/> Yes <input type="checkbox"/> No
Record Issues				Issue Log Item Number:	

Functional Performance Test -- (Verify all components are ready before energizing or operating the system.)

The Commissioning Authority will make and document any changes/addition/deletions to this test procedure required by current system conditions (i.e. weather, system load, utility availability, etc.).

R = Retest (Check (✓) retest required)

Y= Checked and Passed

C = Corrected (Check (✓) when correction verified)

N = Not Passed

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
PREPARE FOR VERIFICATION TESTING						
39. Confirm equipment is operating as expected. If not make adjustments with the BAS, Building Automation System.	System is ON and will always have call for heating (includes recovery from loss of power).	<input type="checkbox"/>	<input type="checkbox"/>	Steam Pressure Common Header _____psi	<input type="checkbox"/>	<input type="checkbox"/>
	System has stable operation.	<input type="checkbox"/>	<input type="checkbox"/>	Boiler 7 _____	<input type="checkbox"/>	<input type="checkbox"/>
	Record common header P.	<input type="checkbox"/>	<input type="checkbox"/>	Boiler 8 _____	<input type="checkbox"/>	<input type="checkbox"/>
	AHU-10 has been commissioned and is operating.	<input type="checkbox"/>	<input type="checkbox"/>	AHU-10 is tested in another test procedure. Boilers don't run if AHU10 OFF	<input type="checkbox"/>	<input type="checkbox"/>
	AHU-10 is expected to run continuously during normal operation.	<input type="checkbox"/>	<input type="checkbox"/>	Boiler Feedwater Pumps Only run when level is Low and Boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>
	Only one Boiler is required for existing load.	<input type="checkbox"/>	<input type="checkbox"/>	They do not run continuously when boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>
	At least one pump of the secondary hot water selection PHWP-4, 5, and 6 is ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The fuel oil pumps, FOP are OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
40. Confirm that there is always a call for the boilers to run	System is ON and will always have call for heating (includes recovery from loss of power).	<input type="checkbox"/>	<input type="checkbox"/>	Steam Pressure Common Header _____psi	<input type="checkbox"/>	<input type="checkbox"/>
	System has stable operation.	<input type="checkbox"/>	<input type="checkbox"/>	Boiler 7 _____	<input type="checkbox"/>	<input type="checkbox"/>
	Record common header P.	<input type="checkbox"/>	<input type="checkbox"/>	Boiler 8 _____	<input type="checkbox"/>	<input type="checkbox"/>
	AHU-10 has been commissioned and is operating.	<input type="checkbox"/>	<input type="checkbox"/>	AHU-10 is tested in another test procedure. Boilers don't run if	<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	AHU-10 is expected to run continuously during normal operation.	<input type="checkbox"/>	<input type="checkbox"/>	AHU10 OFF	<input type="checkbox"/>	<input type="checkbox"/>
	Only one Boiler is required for existing load.	<input type="checkbox"/>	<input type="checkbox"/>	Boiler Feedwater Pumps Only run when level is Low and Boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>
	At least one pump of the secondary hot water selection PHWP-4, 5, and 6 is ON.	<input type="checkbox"/>	<input type="checkbox"/>	They do not run continuously when boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>
	The fuel oil pumps, FOP are OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
41. If there is actually a very high or low load then adjust RTU outside air or fan VSD CFM so get required loads.	System is ON and will always have call for heating (includes recovery from loss of power).	<input type="checkbox"/>	<input type="checkbox"/>	Steam Pressure Common Header _____psi	<input type="checkbox"/>	<input type="checkbox"/>
	System has stable operation.	<input type="checkbox"/>	<input type="checkbox"/>	Boiler 7 _____	<input type="checkbox"/>	<input type="checkbox"/>
	Record common header P.	<input type="checkbox"/>	<input type="checkbox"/>	Boiler 8 _____	<input type="checkbox"/>	<input type="checkbox"/>
	AHU-10 has been commissioned and is operating.	<input type="checkbox"/>	<input type="checkbox"/>	AHU-10 is tested in another test procedure. Boilers don't run if AHU10 OFF	<input type="checkbox"/>	<input type="checkbox"/>
	AHU-10 is expected to run continuously during normal operation.	<input type="checkbox"/>	<input type="checkbox"/>	Boiler Feedwater Pumps Only run when level is Low and Boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>
	Only one Boiler is required for existing load.	<input type="checkbox"/>	<input type="checkbox"/>	They do not run continuously when boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>
	At least one pump of the secondary hot water selection PHWP-4, 5, and 6 is ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The fuel oil pumps, FOP are OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
42. Set fuel selector switch to GAS	System is ON and will always have call for heating (includes recovery from loss of power).		<input type="checkbox"/>	<input type="checkbox"/>	Steam Pressure Common Header _____psi Boiler 7 _____ Boiler 8 _____ AHU-10 is tested in another test procedure. Boilers don't run if AHU10 OFF Boiler Feedwater Pumps Only run when level is Low and Boiler is ON. They do not run continuously when boiler is ON. Only one Boiler is required for existing load. At least one pump of the secondary hot water selection PHWP-4, 5, and 6 is ON. The fuel oil pumps, FOP are OFF.	<input type="checkbox"/>	<input type="checkbox"/>
	System has stable operation.		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Record common header P.		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	AHU-10 has been commissioned and is operating.		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	AHU-10 is expected to run continuously during normal operation.		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Only one Boiler is required for existing load.		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	At least one pump of the secondary hot water selection PHWP-4, 5, and 6 is ON.		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The fuel oil pumps, FOP are OFF.		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
43. Confirm equipment is operating as assumed above. If not make adjustments within the Building Automation System (BAS)	Confirmed.		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
VERIFICATION OF BOILER LEAD/LAG OPERATION							
44. If Lead Lag have a	Lead LAG selection changes.		<input type="checkbox"/>	<input type="checkbox"/>	The boilers have	<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
schedule then set it to switch 1 minute from current time	There may be a Message sent to the Operator workstation, OWS to request manual alternating of Boiler LEAD per preset run-time.	<input type="checkbox"/>	<input type="checkbox"/>	microprocessor controls, but only a manual switch is indicated for lead lag selection. Determine if lead/lag is based only on the manual selection switch or if there is a weekly schedule or runtime hours that could be used? Lead Boiler: B-____ Lag Boiler: B-____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
45. If Lead is made by switch on local panel use it to rotate Lead	Lead LAG selection changes.	<input type="checkbox"/>	<input type="checkbox"/>	The boilers have microprocessor controls, but only a manual switch is indicated for lead lag selection.	<input type="checkbox"/>	<input type="checkbox"/>
	There may be a Message sent to the Operator workstation, OWS to request manual alternating of Boiler LEAD per preset run-time.	<input type="checkbox"/>	<input type="checkbox"/>	Determine if lead/lag is based only on the manual selection switch or if there is a weekly schedule or runtime hours that could be used? Lead Boiler: B-____ Lag Boiler: B-____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

[Project Title Template]
[Project Location Template]

ACTION		REQUIRED REACTION		Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
						Initial	Date	
46. Note the runtime hours of the lead and lag boiler feed water pumps (BFP)	BFP 1 will run with Boiler 7 and Pump 2 with boiler 8.	<input type="checkbox"/>	<input type="checkbox"/>			Lead Boiler # __7/ BFP-1 Run time: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Observe in software that the designation of lead and lag, accumulated runtime assignment and association of pumps are accessible, and modifiable from OWS. This was not clear in specs so an acceptable observation will be NA.	<input type="checkbox"/>	<input type="checkbox"/>			Lag Boiler # __8/ BFP-2 Run Time: _____ Load: _____MBH The Lead Lag schedule will change during the duration of the following test steps. But the actual firing order of Lead and Lag is expected to remain the same until Both Boilers are OFF.	<input type="checkbox"/>	<input type="checkbox"/>
	Skip any portion of this step not included in the application.	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>
Record issues						Issue Log Item:		
						Initial	Date	
47. Set the lead Boiler to have 0.5 hours more time than the lag boiler. (or set the Lead Lag scheduler to .5 hours in the future)	BFP 1 will run with Boiler 7 and Pump 2 with boiler 8.	<input type="checkbox"/>	<input type="checkbox"/>			Lead Boiler # __7/ BFP-1 Run time: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Observe in software that the designation of lead and lag, accumulated runtime assignment and association of pumps are accessible, and modifiable from OWS. This was not clear in specs so an acceptable observation will be NA.	<input type="checkbox"/>	<input type="checkbox"/>			Lag Boiler # __8/ BFP-2 Run Time: _____ Load: _____MBH The Lead Lag schedule will change during the duration of the following test steps. But the actual firing order of Lead and Lag is expected to remain the same until Both Boilers are OFF.	<input type="checkbox"/>	<input type="checkbox"/>
	Skip any portion of this step not included in the application.	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>
Record issues						Issue Log Item:		

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
48. Reduce the settling time and start and stop delay to two minutes.	BFP 1 will run with Boiler 7 and Pump 2 with boiler 8.	<input type="checkbox"/>	<input type="checkbox"/>	Lead Boiler # __7/ BFP-1 Run time: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Observe in software that the designation of lead and lag, accumulated runtime assignment and association of pumps are accessible, and modifiable from OWS. This was not clear in specs so an acceptable observation will be NA.	<input type="checkbox"/>	<input type="checkbox"/>	Lag Boiler # __8/ BFP-2 Run Time: _____ Load: _____MBH The Lead Lag schedule will change during the duration of the following test steps. But the actual firing order of Lead and Lag is expected to remain the same until Both Boilers are OFF.	<input type="checkbox"/>	<input type="checkbox"/>
	Skip any portion of this step not included in the application.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
49. Prepare testing to combine both real loads and flows to provide operational requirements	RTU's are on and heating valves are open so heat has someplace to go.	<input type="checkbox"/>	<input type="checkbox"/>	Need to confirm there are no other demands from the other WEAVER LAKE Boilers 1-6 that may call for second boiler to start. This test should only involve B7, 8 lead lag Record temperatures: OAT: _____, Boiler Feed water T _____ Common Supply Steam T____,	<input type="checkbox"/>	<input type="checkbox"/>
	Outside air dampers are modulated as needed to create loads approximately as required for the various tests steps.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Adjust flow to attain loads required for each step.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	During testing space thermal conditions may not be maintained and AHU/RTU control may need to be modified to allow heating and cooling.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

[Project Title Template]
[Project Location Template]

ACTION		REQUIRED REACTION		Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
						Initial	Date	
50. All existing system boilers B-1 to 6 are ON or "available" but staging is at the B-7, 8 level	RTU's are on and heating valves are open so heat has someplace to go.	<input type="checkbox"/>	<input type="checkbox"/>	Need to confirm there are no other demands from the other WEAVER LAKE Boilers 1-6 that may call for second boiler to start. This test should only involve B7, 8 lead lag	<input type="checkbox"/>	<input type="checkbox"/>		
	Outside air dampers are modulated as needed to create loads approximately as required for the various tests steps.	<input type="checkbox"/>	<input type="checkbox"/>		Record temperatures: OAT: _____,	<input type="checkbox"/>	<input type="checkbox"/>	
	Adjust flow to attain loads required for each step.	<input type="checkbox"/>	<input type="checkbox"/>		Boiler Feed water T _____ Common Supply Steam T____,	<input type="checkbox"/>	<input type="checkbox"/>	
	During testing space thermal conditions may not be maintained and AHU/RTU control may need to be modified to allow heating and cooling.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
Record issues						Issue Log Item:		
						Initial	Date	
51. Operator to command to "OFF" existing boilers if needed to assure the test boilers are the next to operate.	RTU's are on and heating valves are open so heat has someplace to go.	<input type="checkbox"/>	<input type="checkbox"/>	Need to confirm there are no other demands from the other WEAVER LAKE Boilers 1-6 that may call for second boiler to start. This test should only involve B7, 8 lead lag	<input type="checkbox"/>	<input type="checkbox"/>		
	Outside air dampers are modulated as needed to create loads approximately as required for the various tests steps.	<input type="checkbox"/>	<input type="checkbox"/>		Record temperatures: OAT: _____,	<input type="checkbox"/>	<input type="checkbox"/>	
	Adjust flow to attain loads required for each step.	<input type="checkbox"/>	<input type="checkbox"/>		Boiler Feed water T _____ Common Supply Steam T____,	<input type="checkbox"/>	<input type="checkbox"/>	
	During testing space thermal conditions may not be maintained and AHU/RTU control may need to be modified to allow heating and cooling.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
Record issues						Issue Log Item:		

[Project Title Template]
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ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
					Initial	Date	
52. Set delay limits and settling time to 1 minute	RTU's are on and heating valves are open so heat has someplace to go.	<input type="checkbox"/>	<input type="checkbox"/>	Need to confirm there are no other demands from the other WEAVER LAKE Boilers 1-6 that may call for second boiler to start. This test should only involve B7, 8 lead lag	<input type="checkbox"/>	<input type="checkbox"/>	
	Outside air dampers are modulated as needed to create loads approximately as required for the various tests steps.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
	Adjust flow to attain loads required for each step.	<input type="checkbox"/>	<input type="checkbox"/>		Record temperatures: OAT: _____,	<input type="checkbox"/>	<input type="checkbox"/>
	During testing space thermal conditions may not be maintained and AHU/RTU control may need to be modified to allow heating and cooling.	<input type="checkbox"/>	<input type="checkbox"/>		Boiler Feed water T _____ Common Supply Steam T____,	<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
53. Reduce the load slowly	The Lead boiler lowers its firing rate.	<input type="checkbox"/>	<input type="checkbox"/>	Boiler fire rate is based on rising and falling header pressure. The boiler fails this step if the fire rate cannot turn down to 17%, and remain stable operation.	<input type="checkbox"/>	<input type="checkbox"/>	
	When the fire rate drops to about 17% the boiler steam pressure starts to rise.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Record issues					Issue Log Item:		
					Initial	Date	
54. Note progressive observations	The Lead boiler lowers its firing rate.	<input type="checkbox"/>	<input type="checkbox"/>	Boiler fire rate is based on rising and falling header pressure. The boiler fails this step if the fire rate cannot turn down to 17%, and remain stable operation.	<input type="checkbox"/>	<input type="checkbox"/>	
	When the fire rate drops to about 17% the boiler steam pressure starts to rise.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Record issues					Issue Log Item:		
					Initial	Date	

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ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
55.	Continue to lower load	When boiler pressure reaches the high safety limit the boiler remains enabled, but stops firing.	<input type="checkbox"/>	<input type="checkbox"/>	If the run time or scheduler has timed out expect the Lead to change on restart.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
56.	Raise load to original level	Boiler responds to load increase and initiates fire cycle after minimum off delay.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Blower purge.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Ignition cycle.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Fire rate adjustment to load.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
57.	Continue to increase Load	Fire rate increases to full fire.	<input type="checkbox"/>	<input type="checkbox"/>	Pressure in Header when the fire rate increases: _____psi	<input type="checkbox"/>	<input type="checkbox"/>
		Lag boiler starts with purge, ignition and low fire rate.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Lag boiler fire rate increases.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
58.	Decrease LOAD	Lag fire rate decreases.	<input type="checkbox"/>	<input type="checkbox"/>	The boiler fails this step if the fire rate cannot turn down to 17%.	<input type="checkbox"/>	<input type="checkbox"/>
		Fire rate decreases to 17%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
59.	Decrease the load	Lag boiler shuts down.	<input type="checkbox"/>	<input type="checkbox"/>	Indicate the time required	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	below upper limit for unload	After the Lag boiler proves it is OFF (after 60 seconds) the appropriate Lag feed water pump stops.	<input type="checkbox"/>	<input type="checkbox"/>	from loss of load to Pump shut down. ____:____ ____:____ ____:____ Boiler off/ Pump Off :/: Delay If liquid level remains high enough the pump will not cycle ON	<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
60.	Note the time from when the load drops until the boiler pump stops.	Lag boiler shuts down.	<input type="checkbox"/>	<input type="checkbox"/>	Indicate the time required from loss of load to Pump shut down. ____:____ ____:____ ____:____ Boiler off/ Pump Off :/: Delay If liquid level remains high enough the pump will not cycle ON	<input type="checkbox"/>	<input type="checkbox"/>
		After the Lag boiler proves it is OFF (after 60 seconds) the appropriate Lag feed water pump stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
61.	Continue decreasing the load to see that the boiler does shut down. Leave the fire rate at that level.	Lead boiler fire rate decreases.	<input type="checkbox"/>	<input type="checkbox"/>	Pressure in Header when the fire rate decreases: _____psi The boiler fails this step if the fire rate cannot turn down to 17% and remain stable operation.	<input type="checkbox"/>	<input type="checkbox"/>
		Lead boiler is enabled but OFF on high steam safety.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Lead Boiler changes to Lag if automatic scheduler or runtime Lead alternator is active.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Lead Boiler modulates to 17% fire rate.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
62.	Create a boiler fault on the lead boiler	The lead boiler stops.	<input type="checkbox"/>	<input type="checkbox"/>	Pressure in Header when the lag starts:	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	An alarm is reported, to the OWS.	<input type="checkbox"/>	<input type="checkbox"/>	_____psi	<input type="checkbox"/>	<input type="checkbox"/>
	The lag boiler starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
63. Note reaction.	The lead boiler stops.	<input type="checkbox"/>	<input type="checkbox"/>	Pressure in Header when the lag starts:	<input type="checkbox"/>	<input type="checkbox"/>
	An alarm is reported, to the OWS.	<input type="checkbox"/>	<input type="checkbox"/>	_____psi	<input type="checkbox"/>	<input type="checkbox"/>
	The lag boiler starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
64. Restore alarms or faults created in lead boiler.	The Lead boiler restarts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Because the load is low the lag boiler stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
65. SKIP these steps if no auto lead function	The lead boiler (7) changes status to be the "new lag" boiler.	<input type="checkbox"/>	<input type="checkbox"/>	The specifications do not indicate any other requirement except runtime for the transfer, but if there are others (e.g. both must be off for the run time transfer to be enacted) create those conditions to see the automatic transfer.	<input type="checkbox"/>	<input type="checkbox"/>
	Boiler (7) shuts down.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Boiler (8) starts as the "new lead".	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The runtime for the old lead boiler (7) is set to 00:00.	<input type="checkbox"/>	<input type="checkbox"/>	Hours for switching Lead _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
					Initial	Date	
66. Wait for the lead boiler run time to exceed switch over hours	The lead boiler (7) changes status to be the "new lag" boiler.	<input type="checkbox"/>	<input type="checkbox"/>	The specifications do not indicate any other requirement except runtime for the transfer, but if there are others (e.g. both must be off for the run time transfer to be enacted) create those conditions to see the automatic transfer. Hours for switching Lead _____	<input type="checkbox"/>	<input type="checkbox"/>	
	Boiler (7) shuts down.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
	Boiler (8) starts as the "new lead".	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
	The runtime for the old lead boiler (7) is set to 00:00.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Record issues					Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
					Initial	Date	
67. Note the automatic transfer of LEAD to become the LAG. This must be verified to be automatic and not a direct command.	The lead boiler (7) changes status to be the "new lag" boiler.	<input type="checkbox"/>	<input type="checkbox"/>	The specifications do not indicate any other requirement except runtime for the transfer, but if there are others (e.g. both must be off for the run time transfer to be enacted) create those conditions to see the automatic transfer. Hours for switching Lead _____	<input type="checkbox"/>	<input type="checkbox"/>	
	Boiler (7) shuts down.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
	Boiler (8) starts as the "new lead".	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
	The runtime for the old lead boiler (7) is set to 00:00.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Record issues					Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
					Initial	Date	
68. Wait for stable operation of new lead	Alarm Lag boiler ON reports to OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Record issues					Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
69. Manually turn on the new lag boiler	Alarm Lag boiler ON reports to OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
70. Restore "auto" operation to lag boiler	Lag boiler goes OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
71. Note the conditions after 5 minutes	The system transition is complete and has become stable.	<input type="checkbox"/>	<input type="checkbox"/>	Record runtimes	<input type="checkbox"/>	<input type="checkbox"/>
				Boiler # _8 _____ Boiler # _7 _____ Load: _____MBH		
Record issues				Issue Log Item:		
				Initial	Date	
72. Adjust the load for one boiler required	The system transition is complete and has become stable.	<input type="checkbox"/>	<input type="checkbox"/>	Record runtimes	<input type="checkbox"/>	<input type="checkbox"/>
				Boiler # _8 _____ Boiler # _7 _____ Load: _____MBH		
Record issues				Issue Log Item:		
				Initial	Date	
VERIFICATION OF BOILER PRESSURE CONTROL						
73. Adjust the low fire shutoff delay set point to 1 minute.	Only the Lead boiler remains on.	<input type="checkbox"/>	<input type="checkbox"/>	Steam pressure set point _____psi	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
(Wait 5 minutes for steam pressure to stabilize)	Lag boiler is OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
74. Adjust the steam pressure set point to 5psi higher than the current steam pressure (Wait 5 minutes for steam pressure to stabilize)	The Lead boiler modulates toward full fire.	<input type="checkbox"/>	<input type="checkbox"/>	Steam pressure set point _____psi	<input type="checkbox"/>	<input type="checkbox"/>
	The Lag boiler may Start if lead can not provide for load.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
75. Adjust the steam pressure set point to 5psi higher than the current steam pressure set point (Wait 5 minutes for steam pressure to stabilize)	The Lag boiler is enabled.	<input type="checkbox"/>	<input type="checkbox"/>	Steam pressure set point _____psi	<input type="checkbox"/>	<input type="checkbox"/>
	After 5 minutes, Lag boiler goes to low fire.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
76. Adjust the steam pressure set point to 5psi* lower than the current set point (Wait 5 minutes for steam pressure to stabilize)	LAG boiler goes to low fire.	<input type="checkbox"/>	<input type="checkbox"/>	Steam pressure set point _____psi	<input type="checkbox"/>	<input type="checkbox"/>
	After 3 minutes at low fire, LAG boiler is de-energized.	<input type="checkbox"/>	<input type="checkbox"/>	*May need to adjust set point lower in 2 psi increments until low fire is achieved.	<input type="checkbox"/>	<input type="checkbox"/>
	Lead boiler Reduces from full fire.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
77. Set the Pressuretrol® controller high pressure limit to be 5psi lower than the current pressure	The lead boiler is OFF due to high pressure limit.	<input type="checkbox"/>	<input type="checkbox"/>	Controller high pressure limit set point ____psi	<input type="checkbox"/>	<input type="checkbox"/>
	The Lag boiler is enabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
78. Reset the steam pressure set point to the original value (10-15 psi)	The boilers resume “normal” operational conditions.	<input type="checkbox"/>	<input type="checkbox"/>	Steam pressure set point _____psi	<input type="checkbox"/>	<input type="checkbox"/>
	Wait 5 minutes for steam pressure to stabilize.	<input type="checkbox"/>	<input type="checkbox"/>	Low fire time delay set point ____min Controller high pressure limit set point ____psi	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
79. Reset the low fire delay to the original setting	The boilers resume “normal” operational conditions.	<input type="checkbox"/>	<input type="checkbox"/>	Steam pressure set point _____psi	<input type="checkbox"/>	<input type="checkbox"/>
	Wait 5 minutes for steam pressure to stabilize.	<input type="checkbox"/>	<input type="checkbox"/>	Low fire time delay set point ____min Controller high pressure limit set point ____psi	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
80. Reset the pressure controller limit to the original value	The boilers resume “normal” operational conditions.	<input type="checkbox"/>	<input type="checkbox"/>	Steam pressure set point _____psi	<input type="checkbox"/>	<input type="checkbox"/>
	Wait 5 minutes for steam pressure to stabilize.	<input type="checkbox"/>	<input type="checkbox"/>	Low fire time delay set point ____min Controller high pressure limit set point ____psi	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
VERIFICATION OF BOILER FAILURE SEQUENCE						
31. Turn the Lead boiler off locally to simulate failure	The Lead boiler is OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Lag boiler is enabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	After 5 minutes, the Lag boiler begins fire and adjusts to load.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	An alarm registers at the BAS for lead boiler failure.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
32. Turn the Lag boiler off locally to simulate dual boiler failure	The Lead boiler is OFF.	<input type="checkbox"/>	<input type="checkbox"/>	Even when there is a call for heating the secondary pumps stop if no boilers are ON.	<input type="checkbox"/>	<input type="checkbox"/>
	The Lag boiler is OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	An alarm registers at the BAS for Lag boiler failure.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The secondary pumps PHWP 4, 5, 6 stop with second boiler failure.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Low header pressure alarm reports to BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
33. Wait for header pressure to drop	The Lead boiler is OFF.	<input type="checkbox"/>	<input type="checkbox"/>	Even when there is a call for heating the secondary pumps stop if no boilers are ON.	<input type="checkbox"/>	<input type="checkbox"/>
	The Lag boiler is OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	An alarm registers at the BAS for Lag boiler failure.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The secondary pumps PHWP 4, 5, 6 stop with second boiler failure.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Low header pressure alarm reports to BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
34. Restore the Lead boiler fault	The Lead boiler is enabled.	<input type="checkbox"/>	<input type="checkbox"/>	Verify that when the Lead boiler is brought back on, it resumes Lead role. Is there a time delay before the steam control valve closes on a de-energized boiler?	<input type="checkbox"/>	<input type="checkbox"/>
	After purge and ignition Lead boiler adjusts fire to meet load.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Lag boiler is OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Lead Boiler failure alarm clears at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
35. Turn the Lag boiler back to ON state	The Lead boiler remains energized.	<input type="checkbox"/>	<input type="checkbox"/>	Lag Boiler may start if actual line pressure is still low and lead boiler is at full fire.	<input type="checkbox"/>	<input type="checkbox"/>
	The Lag boiler remains OFF (provided steam pressure set point is met).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Lag Boiler failure alarm clears at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	System resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
VERIFICATION OF BOILER FEED WATER PUMPS, SAFETY CIRCUIT AND ALARMS						
36. Boiler Feedwater Pump Observe during normal operation low water level on Lead Boiler 7	Boiler feed water pump BFP-1 starts for B-7.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Make up water solenoid valve opens as feed water tank water level falls.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Steam valve for HX-7 opens to maintain feed water temperature.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues					Issue Log Item:		
					Initial	Date	
37. Change Lead boiler to boiler 8	Boiler fed water pump BFP-2 starts for B-8.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	Make up water solenoid valve opens as feed water tank water level falls.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	Steam valve for HX-8 opens to maintain feed water temperature.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
38. Observe during normal operation low water level on Lead Boiler 8	Boiler fed water pump BFP-2 starts for B-8.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	Make up water solenoid valve opens as feed water tank water level falls.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	Steam valve for HX-8 opens to maintain feed water temperature.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
39. Manually stop BFP 2	Boiler fed water pump BFP-3 starts for B-8 low water call for make up.	<input type="checkbox"/>	<input type="checkbox"/>		Confirm that valve setup would allow BFP-3 to also serve Boiler 7.	<input type="checkbox"/>	<input type="checkbox"/>
	Boiler B-8 is served with water and fills for normal operation.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
90. Manually enable BFP3 to run with boiler	Boiler fed water pump BFP-3 starts for B-8 low water call for make up.	<input type="checkbox"/>	<input type="checkbox"/>	Confirm that valve setup would allow BFP-3 to also serve Boiler 7.	<input type="checkbox"/>	<input type="checkbox"/>
	Boiler B-8 is served with water and fills for normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
91. Manually adjust valves so BFP 3 delivers water to Boiler-8	Boiler fed water pump BFP-3 starts for B-8 low water call for make up.	<input type="checkbox"/>	<input type="checkbox"/>	Confirm that valve setup would allow BFP-3 to also serve Boiler 7.	<input type="checkbox"/>	<input type="checkbox"/>
	Boiler B-8 is served with water and fills for normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
92. Observe action on low water on Boiler 8	Boiler fed water pump BFP-3 starts for B-8 low water call for make up.	<input type="checkbox"/>	<input type="checkbox"/>	Confirm that valve setup would allow BFP-3 to also serve Boiler 7.	<input type="checkbox"/>	<input type="checkbox"/>
	Boiler B-8 is served with water and fills for normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
93. Return BFP-3 to standby and valve BFP-2 as service for B-8	BFP-2 provides makeup water for boiler 8.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
94. Return BFP-2 to serve B-8.	BFP-2 provides makeup water for boiler 8.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

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ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
					Initial	Date	
95. Boiler Safety Water Level With Boiler 7 as lead boiler and with a load for one boiler complete the following section for Boiler B-7.	The controller starts low water level sequence.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	The feed water pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	As water level drops further the LOW alarm trips.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	The burner circuit is open and the burners shut OFF.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	A local alarm is sounded.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	A general alarm is registered at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
96. Boiler Safety Water Level Blow down the boiler column to a point that trips the low-level switch.	The controller starts low water level sequence.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	The feed water pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	As water level drops further the LOW alarm trips.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	The burner circuit is open and the burners shut OFF.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	A local alarm is sounded.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	A general alarm is registered at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
97. Boiler Safety Water Level Limit boiler feed water to assure it	The controller starts low water level sequence.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	The feed water pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
does not fill faster than blow down	As water level drops further the LOW alarm trips.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The burner circuit is open and the burners shut OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A local alarm is sounded.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A general alarm is registered at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
98. Water fills the boiler back to acceptable level	The boiler resumes "normal" operating sequence.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local alarm is cleared.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The general alarm clears at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
99. Fuel oil Set fuel mode switch to "oil"	FOP-1 starts when the selector is set to oil.	<input type="checkbox"/>	<input type="checkbox"/>	There may be a report sent to BAS that the system in OIL mode, and that FOP1 is ON.	<input type="checkbox"/>	<input type="checkbox"/>
	FO is delivered to the boiler by FOP1.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Local control shows FOP-1 ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Boiler fires.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
00. Fuel oil Set FOP-1 to Lead	FOP-1 starts when the selector is set to oil.	<input type="checkbox"/>	<input type="checkbox"/>	There may be a report sent to BAS that the system in OIL mode, and that FOP1 is ON.	<input type="checkbox"/>	<input type="checkbox"/>
	FO is delivered to the boiler by FOP1.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Local control shows FOP-1 ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Boiler fires.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
01. Fuel oil Allow ether boiler to start	FOP-1 starts when the selector is set to oil.	<input type="checkbox"/>	<input type="checkbox"/>	There may be a report sent to BAS that the system in OIL mode, and that FOP1 is ON.	<input type="checkbox"/>	<input type="checkbox"/>
	FO is delivered to the boiler by FOP1.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Local control shows FOP-1 ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Boiler fires.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
02. Simulate a fault in FOP-1	FOP-1 stops.	<input type="checkbox"/>	<input type="checkbox"/>	If possible trip a pump overload, to trigger alarm and shutdown.	<input type="checkbox"/>	<input type="checkbox"/>
	An alarm reports locally.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	An alarm FOP 1 Failure reports to BAS.	<input type="checkbox"/>	<input type="checkbox"/>	The thermal overload is a unique alarm and reports locally and to BAS There may be a 30 second delay before the Lag pump starts.	<input type="checkbox"/>	<input type="checkbox"/>
	FOP-2 starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The boiler continues to run.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
03. Simulate a fault in FOP-2	FOP-2 stops.	<input type="checkbox"/>	<input type="checkbox"/>	Boiler may need a manual reset if SO record procedure here:	<input type="checkbox"/>	<input type="checkbox"/>
	An alarm reports locally.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	An alarm FOP 2 Failure reports to BAS.	<input type="checkbox"/>	<input type="checkbox"/>	The loss of flow alarm is a unique alarm that reports locally and at BAS.	<input type="checkbox"/>	<input type="checkbox"/>
	Boiler shuts down.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Low FO Flow Alarm reports to BAS after 30 seconds.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
04. Shut off circuit to controller for 10 seconds to simulate a loss of power, then turn back ON	Controller recovers from loss of power and automatically restarts.	<input type="checkbox"/>	<input type="checkbox"/>	The controller may report a return from loss of power alarm.	<input type="checkbox"/>	<input type="checkbox"/>
	FOP-1 starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Local and BAS alarms for FOP-1 clear.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Boiler starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	FO Flow Alarm Clears at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
05. Correct Simulated fault in FOP-1	Controller recovers from loss of power and automatically restarts.	<input type="checkbox"/>	<input type="checkbox"/>	The controller may report a return from loss of power alarm.	<input type="checkbox"/>	<input type="checkbox"/>
	FOP-1 starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Local and BAS alarms for FOP-1 clear.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Boiler starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	FO Flow Alarm Clears at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
06. Manually acknowledge alarm by depressing "reset" button	Controller recovers from loss of power and automatically restarts.	<input type="checkbox"/>	<input type="checkbox"/>	The controller may report a return from loss of power alarm.	<input type="checkbox"/>	<input type="checkbox"/>
	FOP-1 starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Local and BAS alarms for FOP-1 clear.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Boiler starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	FO Flow Alarm Clears at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
07. Correct Simulated fault in FOP-2	FOP-2 remains OFF as LAG.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Local and BAS alarms for FOP-2 clear.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Boiler remains ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	After Lead selection is changed FOP 2 Starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	FOP-1 Stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
08. Manually acknowledge alarm by depressing "reset" button	FOP-2 remains OFF as LAG.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Local and BAS alarms for FOP-2 clear.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Boiler remains ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	After Lead selection is changed FOP 2 Starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	FOP-1 Stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
09. Use a small amount of fuel to bridge the contacts on the leak detector (or lift float if that is the sensor type) in the outer fuel tank.	Alarm sounds locally.	<input type="checkbox"/>	<input type="checkbox"/>	This is a unique pump set leak alarm that reports locally and at BAS.	<input type="checkbox"/>	<input type="checkbox"/>
	BAS reports Alarm.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	In addition a pipe leak stops the system and Both Pumps are OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
10. Use water or fuel to close contact on pipe leak detector.	Alarm sounds locally.	<input type="checkbox"/>	<input type="checkbox"/>	This is a unique pump set leak alarm that reports locally and at BAS.	<input type="checkbox"/>	<input type="checkbox"/>
	BAS reports Alarm.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	In addition a pipe leak stops the system and Both Pumps are OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
11. Change fuel Mode switch to "GAS"	FOP-2 Stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The BAS and Local control show System in GAS fuel mode.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Boiler remains ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
12. Boiler Safety Flame Detection Disconnect the lead to the flame sensor from the control board	The controller senses no flame.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The gas valve closes as a safety.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local control alarms.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A general alarm registers at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
13. Reconnect the lead to the flame sensor	The boiler begins startup sequence.	<input type="checkbox"/>	<input type="checkbox"/>	On restart the boiler lead lag may reverse. Report actual reaction.	<input type="checkbox"/>	<input type="checkbox"/>
	The boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	The general alarm at the BAS clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
14. Reset the boiler if not recycling be itself	The boiler begins startup sequence.	<input type="checkbox"/>	<input type="checkbox"/>	On restart the boiler lead lag may reverse. Report actual reaction.	<input type="checkbox"/>	<input type="checkbox"/>
	The boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The general alarm at the BAS clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
15. Boiler Safety Water Level Change boiler 8 to Lead	The controller starts low water level sequence.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The feed water pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	As water level drops further the LOW alarm trips.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The burner circuit is open and the burners shut OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A local alarm is sounded.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A general alarm is registered at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
16. Boiler Safety Water Level With Boiler 8 as lead boiler and with a load for one	The controller starts low water level sequence.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The feed water pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
boiler complete the following section for Boiler B-8.	As water level drops further the LOW alarm trips.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The burner circuit is open and the burners shut OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A local alarm is sounded.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A general alarm is registered at the BAS	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
17. Boiler Safety Water Level Blow down the boiler column to a point that trips the low-level switch.	The controller starts low water level sequence.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The feed water pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	As water level drops further the LOW alarm trips.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The burner circuit is open and the burners shut OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A local alarm is sounded.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A general alarm is registered at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
18. Boiler Safety Water Level Limit boiler feed water to assure it does not fill faster than blow down	The controller starts low water level sequence.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The feed water pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	As water level drops further the LOW alarm trips.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The burner circuit is open and the burners shut OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	A local alarm is sounded.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A general alarm is registered at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
19. (Self Acting) Water fills the boiler back to acceptable level	The boiler resume "normal" operating sequence.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local alarm is cleared.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The general alarm clears at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
20. Boiler Safety Flame Detection Disconnect the lead to the flame sensor from the control board	The controller senses no flame.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The gas valve closes as a safety.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local control alarms.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A general alarm registers at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
21. Reconnect the lead to the flame sensor	The boiler begins startup sequence.	<input type="checkbox"/>	<input type="checkbox"/>	On restart the boiler lead lag may reverse. Report actual reaction.	<input type="checkbox"/>	<input type="checkbox"/>
	The boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The general alarm at the BAS clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
22. Reset the boiler if not recycling be itself	The boiler begins startup sequence.	<input type="checkbox"/>	<input type="checkbox"/>	On restart the boiler lead lag may reverse. Report actual reaction.	<input type="checkbox"/>	<input type="checkbox"/>
	The boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The general alarm at the BAS clears	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
23. Set-up Complete the following section that applies to both boilers.	Common safety circuits apply to both boilers regardless of LEAD.	<input type="checkbox"/>	<input type="checkbox"/>	Confirm in software that the common shut down safeties, alarm reporting and restart apply to both boilers.	<input type="checkbox"/>	<input type="checkbox"/>
	Neither boiler runs when a common safety is energized.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
24. Boiler Safety – Boiler Emergency Shut OFF Activate the Emergency Shut OFF Switch	The controller loses all power.	<input type="checkbox"/>	<input type="checkbox"/>	It was not clear on loss of power to boiler control if any staged or planned shutdown would apply. Without a controller there is not timer to delay any shut down action. Without power the alarm identification may be loss of communications, and after time a low boiler system pressure. Record observed or expected results per Software.	<input type="checkbox"/>	<input type="checkbox"/>
	The gas valve closes as a safety.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Boiler begins shut down cycle.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local control alarms.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A loss of power alarm registers at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
25. Restore the Emergency Shut OFF switch	The boiler begins startup sequence.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	The local alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The general alarm at the BAS clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
26. Reset the boiler if not recycling be itself	The boiler begins startup sequence.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The general alarm at the BAS clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
27. Boiler Safety – Combustion Air Failure Manipulate the AHU-10 damper end switch to indicate damper is not fully opened	The controller senses Damper Failed to OPEN.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	AHU-10 Stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Loss of AHU Flow Reports.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The gas valve closes as a safety.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Boiler begins shut down cycle.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Boiler system control alarms.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A general alarm reports at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
28. Restore the end switch	The boiler begins startup sequence.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	The boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The general alarm at the BAS clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
29. Reset the boiler if not recycling be itself	The boiler begins startup sequence.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The general alarm at the BAS clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
30. Manipulate the AHU-10 differential pressure proof-of-flow switch to indicate fan is OFF	The controller senses loss of AHU-10 FLOW.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The gas valve closes as a safety.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Boiler begins shut down cycle.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local control alarms.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A general alarm registers at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
31. Restore the flow switch	The boiler begins startup sequence.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	The boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The general alarm at the BAS clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The boiler system operates normally.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
32. Reset the boiler if not recycling be itself	The boiler begins startup sequence.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The boiler is ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The local alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The general alarm at the BAS clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The boiler system operates normally.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
CONDENSATE PUMP OPERATION						
33. Briefly bump each pump ON with HOA	Momentary start proves HOA ON works but does not drain too much condensate.	<input type="checkbox"/>	<input type="checkbox"/>	Use "Hand Off Auto" to turn pumps OFF in the following steps	<input type="checkbox"/>	<input type="checkbox"/>
	Lead condensate pump starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Record level pump starts.	<input type="checkbox"/>	<input type="checkbox"/>	Height of condensate above finished floor when Lead pump starts.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
34. At condensate receiver tank, allow level to rise until pump starts.	Momentary start proves HOA ON works but does not drain too much condensate.	<input type="checkbox"/>	<input type="checkbox"/>	Use "Hand Off Auto" to turn pumps OFF in the following steps	<input type="checkbox"/>	<input type="checkbox"/>
	Lead condensate pump starts.	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/>	<input type="checkbox"/>
	Record level pump starts.	<input type="checkbox"/>	<input type="checkbox"/>	Height of condensate above finished floor when Lead pump starts.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
35. Pump only 5 seconds then execute next step.	Momentary start proves HOA ON works but does not drain too much condensate.	<input type="checkbox"/>	<input type="checkbox"/>	Use "Hand Off Auto" to turn pumps OFF in the following steps	<input type="checkbox"/>	<input type="checkbox"/>
	Lead condensate pump starts.	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/>	<input type="checkbox"/>
	Record level pump starts.	<input type="checkbox"/>	<input type="checkbox"/>	Height of condensate above finished floor when Lead pump starts.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
36. Disconnect power to or turn off the Lead condensate pump.	Lead condensate pump stops.	<input type="checkbox"/>	<input type="checkbox"/>	Note if any alarms: _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
37. Allow condensate level to rise until lag condensate pump starts	Back-up condensate pump starts.	<input type="checkbox"/>	<input type="checkbox"/>	_____ " Height of condensate above finished floor when Lead pump starts.	<input type="checkbox"/>	<input type="checkbox"/>
	Record level pump starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
38. Pump only 5 seconds then execute next step.	Back-up condensate pump starts.	<input type="checkbox"/>	<input type="checkbox"/>	_____ " Height of condensate above finished floor when Lead	<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Record level pump starts.	<input type="checkbox"/>	<input type="checkbox"/>	pump starts.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
39. Disconnect power to or turn off the Lag condensate pump.	Lag condensate pump stops.	<input type="checkbox"/>	<input type="checkbox"/>	Alarm Message should be clear what has failed.	<input type="checkbox"/>	<input type="checkbox"/>
	Alarm Reports to BAS.	<input type="checkbox"/>	<input type="checkbox"/>		The piping and drain should be arranged to limit hot condensate from causing injury.	<input type="checkbox"/>
	There is a drain for condensate to overflow tank.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Watch boiler feed water tank for low level if it goes low and calls for water note this at end of test section G.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
40. Wait if needed for Highest level to report Condensate pump failure alarm	Lag condensate pump stops.	<input type="checkbox"/>	<input type="checkbox"/>	Alarm Message should be clear what has failed.	<input type="checkbox"/>	<input type="checkbox"/>
	Alarm Reports to BAS.	<input type="checkbox"/>	<input type="checkbox"/>		The piping and drain should be arranged to limit hot condensate from causing injury.	<input type="checkbox"/>
	There is a drain for condensate to overflow tank.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
	Watch boiler feed water tank for low level if it goes low and calls for water note this at end of test section G.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
41. Restore power to or turn on the Lead then Lag condensate pump	Lead pump starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	As level drops Alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Condensate flows freely and without leakage to boiler system receiver tank.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	When tank gets to low level the lead pump stops and switches to old lag pump.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
42. Allow pump to run to its automatic shut off point.	Lead pump starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	As level drops Alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Condensate flows freely and without leakage to boiler system receiver tank.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	When tank gets to low level the lead pump stops and switches to old lag pump.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
43. Allow condensate to fill to start level	Lead pump has alternated to the old Lag pump.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	New Lead pump starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Condensate flows freely and without leakage to boiler system receiver tank.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	When tank gets to low level the lead pump stops and switches to old lag pump.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
BOILER FEED WATER & CHEMICAL TREATMENT						
44. Let Boiler 7 liquid level drop below demand level	Feed water pump 1 starts.	<input type="checkbox"/>	<input type="checkbox"/>	Feed water pumps 1, 2, 3 may have different assignments but one will be to one boiler and one as standby.	<input type="checkbox"/>	<input type="checkbox"/>
	Feed water pump 2 and standby pump 3 remain OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Water flows fast enough to replace boiler water before low limit safety shuts off boiler.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	When water level goes high pump stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
45. Let Boiler 8 liquid level drop below demand level	Feed water pump 2 starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Feed water pump 1 and standby pump 3 remain OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Water flows fast enough to replace boiler water before low limit safety shuts off boiler.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	When water level goes high pump stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
46. Transfer Assignment for Boiler 7 to the standby pump.	Feed water pump 3 starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Feed water pump 1 and 2 remain OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Water flows fast enough to replace boiler water before low limit safety shuts off boiler.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	When water level rises pump stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
47. Allow Boiler 7 level to rise above switch level	Feed water pump 3 starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Feed water pump 1 and 2 remain OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Water flows fast enough to replace boiler water before low limit safety shuts off boiler.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	When water level rises pump stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
48. Adjust the conductivity set pt on controller to 1000 µS/cm less than the current system conductivity level or set scheduled blow down for 2 minutes.	The blow down valve is opened and the system is discharging to maintain the required conductivity level or timed release.	<input type="checkbox"/>	<input type="checkbox"/>	Submittals were not clear on what initiates blow down. Record Conductivity setting ____ Record Schedule _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
49. Reset the conductivity set point or timer to the original value.	The converter blow down valve is closed to maintain the new conductivity requirements.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
50. Allow or drain Feed water tank to below make up level	The cold water valve opens to add water through HX-7 into the feed water tank.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Observe reaction in test section H HX-7.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
51. Allow Feed water tank to rise	The cold water valve Closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
HEAT EXCHANGER HX-7 MAKE UP WATER HEATER						
52. With make up water OFF the heating control valve is closed	Even with low temperature in make up water line there is no heating with make up water OFF.	<input type="checkbox"/>	<input type="checkbox"/>	If a call for make up is not observed during normal operation create a call by draining the feed water tank. Record level when make up opens_____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
53. Supply water temperature drops without circulation	Even with low temperature in make up water line there is no heating with make up water OFF.	<input type="checkbox"/>	<input type="checkbox"/>	If a call for make up is not observed during normal operation create a call by draining the feed water tank. Record level when make up opens_____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
54. Call for make up water so HX7 control is ON	Steam control valve modulates to maintain supply water temperature.	<input type="checkbox"/>	<input type="checkbox"/>	With only a short time for make up water flow the supply water may go from several degrees below set point to several above and not stabilize before make up tank is filled.	<input type="checkbox"/>	<input type="checkbox"/>
	As temperature increases above set point valve modulates closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
55. Supply water temp drops with flow	Steam control valve modulates to maintain supply water temperature.	<input type="checkbox"/>	<input type="checkbox"/>	With only a short time for make up water flow the supply water may go from several degrees below set point to several above and not stabilize before make up tank is filled.	<input type="checkbox"/>	<input type="checkbox"/>
	As temperature increases above set point valve modulates closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y	N	COMMENTS	R	C
		(✓)	(✓)		(✓)	(✓)
				Initial	Date	
56. Lower High temperature alarm set point below existing supply Temp	Local high temp limit alarm sounds.	<input type="checkbox"/>	<input type="checkbox"/>	Record high limit setpoint _____	<input type="checkbox"/>	<input type="checkbox"/>
	Cold water solenoid valve opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Over heated water is dumped from shell.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	BAS Alarm reports.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Steam Valve closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
57. Clear High temperature alarm	Alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	HX-7 returns to normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
58. Reset alarm setpoint	Alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	HX-7 returns to normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
59. Simulate power loss	Steam valve closes in 10 seconds.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Controller is OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
60. Restore power	Controller returns to normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
61. Feed water tank ends call for make up water	When cold water valve closes heating valve closes.	<input type="checkbox"/>	<input type="checkbox"/>	Record level when make up closes_____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
62. Restore to normal any special action required to initiate operation	System is running normally.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
RETURN TO INITIAL CONDITIONS						
63. Record test stop time	Recorded.	<input type="checkbox"/>	<input type="checkbox"/>	Time: (am/pm)_____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

Final Sign-Off

Commissioning Agent	Printed Name	Initials	Date
CONTRACTOR	PRINTED NAME	INITIALS	DATE
General Contractor (GC)			
Mechanical Contractor (MC)			
Electrical Contractor (EC)			
TAB Contractor (TAB)			
Controls Contractor (CC)			
Owner's O&M Personnel			

Centrifugal Water Chiller Functional Performance Test

Equipment ID	[Equipment ID]
Building	[Building]
Location	[Room]

System Description

Description:

Operational Assumptions:

Associated air handling equipment and ducts has been tested and is operating correctly.

The test begins while the room is in the occupied mode.

Initial Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 1	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 2	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Deferred/Seasonal Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Test Participants

Organization	Required	Optional
General Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Electrical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
TAB Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Controls Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Owner's O&M Personnel	<input type="checkbox"/>	<input type="checkbox"/>

Supplies Required for Testing (To be provided by the contractor)

Tools / Supplies	
Laptop with TC Program	Infrared Thermometer Gun
PID Loop Tuning Software	Humidity Tester
Aerosol for Smoke and Freeze stat Test	Basic Tool Pouch
Radio Communications	Flashlight

System Readiness Summary Checklist

Description	Yes	No	Date
System Ready for Test	<input type="checkbox"/>	<input type="checkbox"/>	
Required Personnel Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Tools/Test Equipment/Supplies Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Safety Equipment Available	<input type="checkbox"/>	<input type="checkbox"/>	

Set-Points, Limits, and Schedules

- AHU can be assigned a schedule. Schedule can be programmed daily.
 If system runs 24 hours a day, check here. If not, fill in the occupied mode schedule below.

Day	AM											PM												
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
Sun																								
Mon																								
Tues																								
Wed																								
Thurs																								
Fri																								
Sat																								
Holi																								

Parameter	Setpoint		Adjustable Range	
	Design	Actual	Design	Actual
Outside Air Temperature (°F)				
Preheat valve full open outside air temperature (°F)				
Discharge Air Temperature (°F)				
Night Setback Temperature (°F)				
Night Setback Differential				
Mixed Air Temperature (°F)				
Minimum Start-up Fan Speed (%)				
Time at Minimum Fan Speed for Start-up (min)				
Average Zone Humidity (%RH)				
Maximum supply air humidity (%RH)				
Discharge Air Static Pressure (in H ₂ O)				
High Static Alarm (in H ₂ O)				
Low Static Alarm (in H ₂ O)				
System Shutdown High Static Limit (in H ₂ O)				
Damper Position				

Initial Ambient Conditions

Ambient Conditions			
Outside Air Temp		Outside Air RH %	
Observations			

Trend Data Required To Support Testing

Check if trend point chart(s) and Frequency Graph(s) are provided per trend requirements shown below.

Trend Log Setup #1 – Temperature					
Pre-Testing	Post Testing	Point	Frequency	Duration	Provided
<input type="checkbox"/>	<input type="checkbox"/>	System Flow Rate			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Flow Rate Set Point			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Water Quality			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Damper Position			<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	System Pressure			<input type="checkbox"/> Yes <input type="checkbox"/> No

Trend Log Setup #1 – Temperature					
Pre-Testing	Post Testing	Point	Frequency	Duration	Provided
<input type="checkbox"/>	<input type="checkbox"/>	Pressure Set Point			<input type="checkbox"/> Yes <input type="checkbox"/> No
Record Issues				Issue Log Item Number:	

Functional Performance Test -- (Verify all components are ready before energizing or operating the system.)

The Commissioning Authority will make and document any changes/addition/deletions to this test procedure required by current system conditions (i.e. weather, system load, utility availability, etc.).

R = Retest (Check (✓) retest required)

Y= Checked and Passed

C = Corrected (Check (✓) when correction verified)

N = Not Passed

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
PRE-TEST VISUAL MECHANICAL INSPECTION						
64. Record the starting conditions	Recorded.	<input type="checkbox"/>	<input type="checkbox"/>	Lead Chiller CH-_____ Lead Chiller Status_____ Lag Chiller CH- _____ Lag Chiller Status_____ Primary Pump Status_____ Lead Secondary Pump P-_____ Lead Secondary Pump Status_____ Stand-by Secondary Pump P-_____ Stand-by Secondary Pump Status _____ Time: (am / pm)	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
65. Confirm equipment is operating as assumed above. If not make adjustments within the Building Automation System (BAS)	Confirmed	<input type="checkbox"/>	<input type="checkbox"/>	Time: (am / pm)	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

VERIFICATION OF MANUAL CHILLER CONTROL

66. Via the CSM's Control Mode, set the chilled water system to Manual control.	Chiller 1 is disabled.	<input type="checkbox"/>	<input type="checkbox"/>	The specifications do not describe the relationship between pump status and chiller status. Please record any differences from the Expected Results noted during test. Starting Max Chiller Stop-to-Start Cycle Timer setpoint _____ min New Max Chiller Stop-to-Start Cycle Timer set-point _____ min Starting Wait for Evaporator Flow Timer set-point _____ min New Wait for Evaporator Flow Timer set-point _____ min Primary Pump P-3 ON delay _____ min Primary Pump P-4 ON delay _____ min Lead Secondary pump status _____ Stand-by Secondary pump status _____	<input type="checkbox"/>	<input type="checkbox"/>
	Chiller 2 is disabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P-3 remains ON for (insert time delay).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P-4 remains ON for (insert time delay).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary chilled water pump STOPS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Stand-by secondary chilled water pump remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
67. Command both chillers CH-1 and CH-2 to OFF.	Chiller 1 is disabled.	<input type="checkbox"/>	<input type="checkbox"/>	The specifications do not describe the relationship between pump status and chiller status. Please record any differences from the Expected Results noted during test. Starting Max Chiller Stop-to-Start Cycle Timer setpoint _____ min New Max Chiller Stop-to-Start Cycle Timer set-point _____ min Starting Wait for Evaporator Flow Timer set-point _____ min New Wait for Evaporator Flow Timer set-point _____ min Primary Pump P-3 ON delay _____ min Primary Pump P-4 ON delay _____ min Lead Secondary pump status _____ Stand-by Secondary pump status _____	<input type="checkbox"/>	<input type="checkbox"/>
	Chiller 2 is disabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P-3 remains ON for (insert time delay).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P-4 remains ON for (insert time delay).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary chilled water pump STOPS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Stand-by secondary chilled water pump remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
68. Adjust the Max Chiller Stop-to-Start	Chiller 1 is disabled.	<input type="checkbox"/>	<input type="checkbox"/>	The specifications do not describe the relationship	<input type="checkbox"/>	<input type="checkbox"/>
	Chiller 2 is disabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Cycle Timer to 3 minutes.	Primary pump P-3 remains ON for (insert time delay).	<input type="checkbox"/>	<input type="checkbox"/>	between pump status and chiller status. Please record any differences from the Expected Results noted during test.	<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P-4 remains ON for (insert time delay).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary chilled water pump STOPS.	<input type="checkbox"/>	<input type="checkbox"/>	Starting Max Chiller Stop-to-Start Cycle Timer setpoint _____ min	<input type="checkbox"/>	<input type="checkbox"/>
	The Stand-by secondary chilled water pump remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>	New Max Chiller Stop-to-Start Cycle Timer set-point _____ min Starting Wait for Evaporator Flow Timer set-point _____ min New Wait for Evaporator Flow Timer set-point _____ min Primary Pump P-3 ON delay _____ min Primary Pump P-4 ON delay _____ min Lead Secondary pump status _____ Stand-by Secondary pump status _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
69. Reset the Wait for Evaporator Flow Timer set-point to be 2 minutes.	Chiller 1 is disabled.	<input type="checkbox"/>	<input type="checkbox"/>	The specifications do not describe the relationship between pump status and chiller status. Please record any differences from the Expected Results noted during test.	<input type="checkbox"/>	<input type="checkbox"/>
	Chiller 2 is disabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P-3 remains ON for (insert time delay).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P-4 remains ON for (insert time delay).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary chilled water pump STOPS.	<input type="checkbox"/>	<input type="checkbox"/>	Starting Max Chiller Stop-to-Start Cycle Timer setpoint _____ min	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	The Stand-by secondary chilled water pump remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>	New Max Chiller Stop-to-Start Cycle Timer set-point _____ min Starting Wait for Evaporator Flow Timer set-point _____ min New Wait for Evaporator Flow Timer set-point _____ min Primary Pump P-3 ON delay _____ min Primary Pump P-4 ON delay _____ min Lead Secondary pump status _____ Stand-by Secondary pump status _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
70. Switch the Secondary pumps to Auto Lead Designation option.	Chiller 1 is disabled.	<input type="checkbox"/>	<input type="checkbox"/>	The specifications do not describe the relationship between pump status and chiller status. Please record any differences from the Expected Results noted during test. Starting Max Chiller Stop-to-Start Cycle Timer setpoint _____ min	<input type="checkbox"/>	<input type="checkbox"/>
	Chiller 2 is disabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P-3 remains ON for (insert time delay).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P-4 remains ON for (insert time delay).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary chilled water pump STOPS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	The Stand-by secondary chilled water pump remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>	New Max Chiller Stop-to-Start Cycle Timer set-point _____ min Starting Wait for Evaporator Flow Timer set-point _____ min New Wait for Evaporator Flow Timer set-point _____ min Primary Pump P-3 ON delay _____ min Primary Pump P-4 ON delay _____ min Lead Secondary pump status _____ Stand-by Secondary pump status _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
71. Assign the Lead chiller to CH-1 and Lag to CH-2.	Primary pump P-3 STARTS.	<input type="checkbox"/>	<input type="checkbox"/>	Runtime for P-6 _____ hours	<input type="checkbox"/>	<input type="checkbox"/>
	After the Wait for Evaporator Flow Timer expires, Chiller CH-1 STARTS.	<input type="checkbox"/>	<input type="checkbox"/>	Runtime for P-7 _____ hours	<input type="checkbox"/>	<input type="checkbox"/>
	The secondary pump with the least amount of runtime is designated Lead and STARTS.	<input type="checkbox"/>	<input type="checkbox"/>	Lead Secondary Pump P- _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
72. Manually command the Lead chiller to run.	Primary pump P-3 STARTS.	<input type="checkbox"/>	<input type="checkbox"/>	Runtime for P-6 _____ hours	<input type="checkbox"/>	<input type="checkbox"/>
	After the Wait for Evaporator Flow Timer expires, Chiller CH-1 STARTS.	<input type="checkbox"/>	<input type="checkbox"/>	Runtime for P-7 _____	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	The secondary pump with the least amount of runtime is designated Lead and STARTS.	<input type="checkbox"/>	<input type="checkbox"/>	hours Lead Secondary Pump P-_____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
73. Manually command the Lag chiller to run.	Primary pump P-4 starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	After Wait For Evaporator Flow Timer expires, Chiller CH-2 starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary chilled water pump continues to modulate.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
74. Manually command the Lead chiller to stop.	Chiller CH-1 is de-energized.	<input type="checkbox"/>	<input type="checkbox"/>	Primary Pump P-3 ON delay _____ min	<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P-3 remains ON for (insert time delay).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Chiller CH-2 remains ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P-4 remains ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
75. Manually command the Lag chiller to stop.	Chiller CH-2 is de-energized.	<input type="checkbox"/>	<input type="checkbox"/>	It is not clear whether the Lead secondary pump stops when no chillers are ON or not until the chilled water system has officially been disabled. Please record any variations witnessed in the field. Primary Pump P-4 ON delay _____ min	<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P-4 remains ON for (insert time delay).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary chilled water pump STOPS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
VERIFICATION OF AUTOMATIC CHILLER CONTROL						
76. Via the CSM's Control Mode, set the chilled water system to Automatic Control.	After 2 minutes, the chilled water system is enabled.	<input type="checkbox"/>	<input type="checkbox"/>	CH-1 Runtime_____	<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary chilled water pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>	CH-2 Runtime_____	<input type="checkbox"/>	<input type="checkbox"/>
	The chiller with the least amount of run-time is enabled and labeled as Lead.	<input type="checkbox"/>	<input type="checkbox"/>	Lead Chiller CH-_____	<input type="checkbox"/>	<input type="checkbox"/>
	The primary pump associated with the Lead chiller starts.	<input type="checkbox"/>	<input type="checkbox"/>	Primary Pump P-_____ is ON.	<input type="checkbox"/>	<input type="checkbox"/>
	After the Wait for Evaporator Flow Timer, the Lead chiller is energized.	<input type="checkbox"/>	<input type="checkbox"/>	Lead Secondary Pump P-_____ is ON.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
77. Set chiller sequencing to be according to runtime.	After 2 minutes, the chilled water system is enabled.	<input type="checkbox"/>	<input type="checkbox"/>	CH-1 Runtime_____	<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary chilled water pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>	CH-2 Runtime_____	<input type="checkbox"/>	<input type="checkbox"/>
	The chiller with the least amount of run-time is enabled and labeled as Lead.	<input type="checkbox"/>	<input type="checkbox"/>	Lead Chiller CH-_____	<input type="checkbox"/>	<input type="checkbox"/>
	The primary pump associated with the Lead chiller starts.	<input type="checkbox"/>	<input type="checkbox"/>	Primary Pump P-_____ is ON.	<input type="checkbox"/>	<input type="checkbox"/>
	After the Wait for Evaporator Flow Timer, the Lead chiller is energized.	<input type="checkbox"/>	<input type="checkbox"/>	Lead Secondary Pump P-_____ is ON.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
78. Set the chilled water schedule to enable system in 2 minutes at the BAS.	After 2 minutes, the chilled water system is enabled.	<input type="checkbox"/>	<input type="checkbox"/>	CH-1 Runtime_____	<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary chilled water pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>	CH-2 Runtime_____	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	The chiller with the least amount of run-time is enabled and labeled as Lead.	<input type="checkbox"/>	<input type="checkbox"/>	Lead Chiller CH-_____ Primary Pump P-_____ is ON. Lead Secondary Pump P-_____ is ON.	<input type="checkbox"/>	<input type="checkbox"/>
	The primary pump associated with the Lead chiller starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	After the Wait for Evaporator Flow Timer, the Lead chiller is energized.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
79. Simulate a Lead chiller failure.	Lead chiller de-energizes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Lead chiller failure alarm generated at the CSM panel.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Lead chiller failure alarm generated at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Lag chiller is enabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The primary pump for the Lead chiller STOPS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The primary pump for the Lag chiller STARTS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Lag chiller is energized.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
80. Simulate a Lag chiller failure.	Lag chiller de-energizes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Lag chiller failure alarm generated at the CSM panel.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Lag chiller failure alarm generated at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The primary pump for the Lag chiller STOPS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary pump STOPS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
81. Reset the Lead chiller failure condition.	The Lead secondary pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>	Lead chiller CH-_____	<input type="checkbox"/>	<input type="checkbox"/>
	The Lead chiller is enabled.	<input type="checkbox"/>	<input type="checkbox"/>	Lead Secondary Pump P-_____	<input type="checkbox"/>	<input type="checkbox"/>
	The primary pump for the Lead chiller STARTS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	After the Wait for Evaporator Flow Timer expires, the Lead chiller energizes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Chiller failure alarm clears at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
82. Manually reset the Lead chiller failure alarm at the CSM panel.	The Lead secondary pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>	Lead chiller CH-_____	<input type="checkbox"/>	<input type="checkbox"/>
	The Lead chiller is enabled.	<input type="checkbox"/>	<input type="checkbox"/>	Lead Secondary Pump P-_____	<input type="checkbox"/>	<input type="checkbox"/>
	The primary pump for the Lead chiller STARTS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	After the Wait for Evaporator Flow Timer expires, the Lead chiller energizes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Chiller failure alarm clears at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
83. Reset the Lag chiller failure condition.	Chiller failure alarm clears at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
84.	Manually reset the Lag chiller failure alarm at the CSM panel.	Chiller failure alarm clears at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
85.	Set the chiller sequencing time of day schedule to disable chilled water system in 2 minutes at the BAS.	After 2 minutes, the Lead chiller de-energizes and is disabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		After a delay, the primary pump for the Lead chiller stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		The Lead secondary pump STOPS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		The Lag chiller and its primary pump remain OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
86.	Switch the Secondary Lead Pump Designation back to its original selection criteria (Manual/Auto)		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
VERIFICATION OF CHILLER CAPACITY STAGING CONTROL							
87.	Designate chiller CH-2 to be the "First on" chiller through the Chiller Sequencing feature.	The chilled water system is enabled.	<input type="checkbox"/>	<input type="checkbox"/>	Steps 24-?? assume that the (Decoupler Line Temperature) < (Chilled Water Supply Temperature + Decoupler Stage-Up Temperature Differential)	<input type="checkbox"/>	<input type="checkbox"/>
		The Lead secondary pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Chiller CH-2 is enabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Primary pump P-4 starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
					Lead Secondary Pump P-	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	After the Wait for Evaporator Flow Timer, Chiller CH-2 is energized.	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
88. Via the "Operator Scheduled Override" option, enable the chilled water system.	The chilled water system is enabled.	<input type="checkbox"/>	<input type="checkbox"/>	Steps 24-?? assume that the (Decoupler Line Temperature) < (Chilled Water Supply Temperature + Decoupler Stage-Up Temperature Differential) Lead Secondary Pump P-_____	<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Chiller CH-2 is enabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P-4 starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	After the Wait for Evaporator Flow Timer, Chiller CH-2 is energized.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
89. Reset the Chiller Stage-up Differential to be 30F.	Primary pump P-4 is ON.	<input type="checkbox"/>	<input type="checkbox"/>	Starting Chilled Water Supply Temperature set-point _____ F	<input type="checkbox"/>	<input type="checkbox"/>
	CH-2 is at full load.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CH-1 remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>	Ending Chilled Water Supply Temperature set-point _____ F	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
90. Reset the Chiller Stage Delay Time variable to be 60 minutes.	Primary pump P-4 is ON.	<input type="checkbox"/>	<input type="checkbox"/>	Starting Chilled Water Supply Temperature set-point _____ F	<input type="checkbox"/>	<input type="checkbox"/>
	CH-2 is at full load.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CH-1 remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>	Ending Chilled Water Supply Temperature set-point _____ F	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
					Initial	Date	
91. Decrease the Chilled Water Supply Temperature set-point in 1F increments below the current chilled water supply temperature until Lead chiller is at full load.	Primary pump P-4 is ON.	<input type="checkbox"/>	<input type="checkbox"/>	Starting Chilled Water Supply Temperature set-point _____ F	<input type="checkbox"/>	<input type="checkbox"/>	
	Primary pump P-4 is ON.	<input type="checkbox"/>	<input type="checkbox"/>	Ending Chilled Water Supply Temperature set-point _____ F	<input type="checkbox"/>	<input type="checkbox"/>	
	CH-1 remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Record issues					Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
					Initial	Date	
92. Adjust the Chiller Stage-up Differential to be 2F.	Chiller CH-2 remains at full load.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
	Lag chiller CH-1 remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Record issues					Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
					Initial	Date	
93. Adjust the Chilled Water Supply Temperature set-point to be 5F below the current chilled water supply temperature.	Chiller CH-2 remains at full load.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
	Lag chiller CH-1 remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Record issues					Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
					Initial	Date	
94. Reset the Chiller Stage Delay Time variable to be 2 minutes.	After 2 minutes, the Lag chiller CH.	<input type="checkbox"/>	<input type="checkbox"/>	New Chilled Water Supply Temperature set-point _____ F	<input type="checkbox"/>	<input type="checkbox"/>	
	Primary pump P.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
	After the Wait for Evaporator Flow Timer expires, CH.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
Record issues					Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
95. Reset the Chiller Stage Delay Time variable to be 60 minutes.	Chillers CH-1 and CH-2 remain ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
96. Adjust the Active Capacity set-point to be less than (Spare Capacity Factor * Sum of All Spare Capacity of All Running Chillers).	Chillers CH-1 and CH-2 remain ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
97. Reset the Chiller Stage Delay Time variable to be 2 minutes.	After 2 minutes, Chiller CH.	<input type="checkbox"/>	<input type="checkbox"/>	New Active Capacity set-point _____	<input type="checkbox"/>	<input type="checkbox"/>
	After a time delay, primary pump P.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
VERIFICATION OF CHILLER FLOW STAGING CONTROL						
98. Adjust the Chilled Water Supply Temperature set-point to be 1F above the current chilled water supply temperature.	CH-2 is not at full load.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CH-1 remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
99. Reset the Chiller Stage Delay Time variable to be 60 minutes.	CH-2 is not at full load.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CH-1 remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
00. Adjust the Decoupler Stage-Up Temperature Differential Set-Point so the following is true: (Current Decoupler Line Temperature + Decoupler Stage-Up Temperature Differential Set-Point) > Current chilled water supply temperature	CH-2 is not at full load.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CH-1 remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
01. Reset the Chiller Stage Delay Time variable to be 2 minutes.	After 2 minutes, the Lag chiller CH.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Primary pump P.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	After the Wait for Evaporator Flow Timer expires, chiller CH.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
02. Override the Active Capacity input on CH-1 to be less than (Spare Capacity Factor*Sum of All Spare Capacity of All Remaining Chillers)	After 2 minutes, the Lag chiller remains ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
03. Adjust the Chiller Stage Delay Time variable to be 60 minutes.	Both the Lead and Lag chillers remain ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
04. Adjust the Decoupler Stage-Down Flow Rate Factor set-point to be greater than (the Current Decoupler Flow Rate/Current Lag Chiller Flow Rate).	Both the Lead and Lag chillers remain ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
05. Adjust the Chiller Stage Delay Time variable to be 2 minutes.	After 2 minutes, the Lag Chiller CH.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	After a time delay, primary pump P.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
06. Return the Chiller Stage Delay Time variable to its original value.	System resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
07. Return the Decoupler Stage-Down Flow Rate Factor set-point back to its original value.	System resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
08. Release the Active Capacity input override for CH-1.	System resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
09. Return the Decoupler Stage-Up Temperature Differential set-point back to its original value.	System resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
10. Return the chilled water supply temperature set-point back to its original value.	System resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
11. Return the Chiller Stage-Up Differential Temperature set-point back to its original value.	System resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
12. Return the Chiller Sequencing option back to original selection.	System resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
VERIFICATION OF AUTOMATIC PUMP SPEED CONTROL						
13. Decrease the differential pressure set-point by 20%.	The Lead secondary chilled water pump speed decreases.	<input type="checkbox"/>	<input type="checkbox"/>	It is the understanding of the test writer that there are two secondary pumps each sized at 100% of the load. The test is written around a Lead/Stand-by configuration. If in the field it is determined that this is not the correct operation, the test steps will need to be field modified . Starting Differential Pressure setpoint_____psi Adjusted Differential Pressure Setpoint:_____psi	<input type="checkbox"/>	<input type="checkbox"/>
	The Stand-by secondary chilled water pump is OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
14. Increase the differential pressure set-point by 20%.	The Lead secondary chilled water pump speed increases.	<input type="checkbox"/>	<input type="checkbox"/>	New Differential Pressure Set-Point:_____	<input type="checkbox"/>	<input type="checkbox"/>
	The Stand-by pump remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
15. Manually reassign secondary pump designations, Lead and Stand-by.	No changes are noted. The old Lead pump remains ON. The old Stand-by pump remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>	The sequence states the only under certain conditions will the system implement the new Lead pump if the chilled water system is already enabled. This step is to show that this is not one of those conditions.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
16. Switch the pumps back to their original designation.	No changes are noted.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
17. Reset the Pump Status Check Delay Time variable to 30 seconds.	The Lead secondary pump stops	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	After 30 seconds, the Stand-by secondary pump starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A Pump Failure alarm sounds at the CSM panel.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A Pump Failure alarm sounds at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
18. Simulate a loss of power pump failure at the Lead secondary chilled water pump.	The Lead secondary pump stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	After 30 seconds, the Stand-by secondary pump starts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A Pump Failure alarm sounds at the CSM panel.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A Pump Failure alarm sounds at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
19. Decrease the differential pressure set-point by 20%	The Stand-by secondary chilled water pump speed decreases.	<input type="checkbox"/>	<input type="checkbox"/>	New Differential Pressure set-point _____ psi.	<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary chilled water pump remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
20. Increase the differential pressure set-point by 20%	The Stand-by secondary chilled water pump speed increases.	<input type="checkbox"/>	<input type="checkbox"/>	New Differential Pressure set-point _____ psi.	<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary chilled water pump remains OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
21. Simulate a loss of power pump failure at the Stand-by secondary chilled water pump.	The Stand-by secondary pump STOPS.	<input type="checkbox"/>	<input type="checkbox"/>	Intent is to show that in cases with failure of both secondary chilled water pumps, the entire chilled water system is disabled.	<input type="checkbox"/>	<input type="checkbox"/>
	The Lead secondary pump is OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A "No Chilled Water Flow" alarm sounds at the CSM panel.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A Pump Failure alarm sounds at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Both chillers de-energize.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The primary pumps STOP.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
22. Restore power to the Stand-by secondary chilled water pump.	The system remains disabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
23. Manually reset Standby Pump Failure alarm at the CSM panel.	The Stand-by Pump Failure alarm is cleared at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The chilled water system is enabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Stand-by secondary pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
24. Restore power to the Lead secondary chilled water pump.	The Lead secondary chilled water pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>	The sequence is unclear if this is a condition where the previously stopped Lead pump would be brought back into service automatically. Please note variations seen in the field.	<input type="checkbox"/>	<input type="checkbox"/>
	The Stand-by secondary chilled water pump STOPS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Pump Failure alarm clears at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
25. Manually reset the Lead Pump Failure alarm at the CSM panel.	The Lead secondary chilled water pump STARTS.	<input type="checkbox"/>	<input type="checkbox"/>	The sequence is unclear if this is a condition where the previously stopped Lead pump would be brought back into service automatically. Please note variations seen in the field.	<input type="checkbox"/>	<input type="checkbox"/>
	The Stand-by secondary chilled water pump STOPS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The Pump Failure alarm clears at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	

[Project Title Template]
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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
26. Return the differential pressure set-point back to its original value.	System resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>	Ending Differential Pressure Set-Point:_____ Ending Pump Status Check Delay Time variable _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
27. Reset the Pump Status Check Delay Time variable back to its original value.	System resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>	Ending Differential Pressure Set-Point:_____ Ending Pump Status Check Delay Time variable _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
28. Switch Secondary Lead/Stand-by pump designation selection back to its original method (Auto/Manual)	System resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>	Ending Differential Pressure Set-Point:_____ Ending Pump Status Check Delay Time variable _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
29. Ensure all control points are set to original values and/or conditions.	System resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>	Ending Differential Pressure Set-Point:_____ Ending Pump Status Check Delay Time variable _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	

[Project Title Template]
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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
RETURN TO INITIAL CONDITIONS						
30. Record test stop time	Recorded.	<input type="checkbox"/>	<input type="checkbox"/>	Time: (am / pm)	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	

Final Sign-Off

Commissioning Agent	Printed Name	Initials	Date
CONTRACTOR	PRINTED NAME	INITIALS	DATE
General Contractor (GC)			
Mechanical Contractor (MC)			
Electrical Contractor (EC)			
TAB Contractor (TAB)			
Controls Contractor (CC)			
Owner's O&M Personnel			

Air Handling Unit Functional Performance Test

Equipment ID	[Equipment ID]
Building	[Building]
Location	[Room]

System Description

Description:

Operational Assumptions:

Associated air handling equipment and ducts has been tested and is operating correctly.

The test begins while the room is in the occupied mode.

Initial Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 1	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 2	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

[Project Title Template]
[Project Location Template]

Deferred/Seasonal Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Test Participants

Organization	Required	Optional
General Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Electrical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
TAB Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Controls Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Owner's O&M Personnel	<input type="checkbox"/>	<input type="checkbox"/>

Supplies Required for Testing (To be provided by the contractor)

Tools / Supplies	
Laptop with TC Program	Infrared Thermometer Gun
PID Loop Tuning Software	Humidity Tester
Aerosol for Smoke and Freeze stat Test	Basic Tool Pouch
Radio Communications	Flashlight

System Readiness Summary Checklist

Description	Yes	No	Date
System Readiness Checklist has been completed (SRC)	<input type="checkbox"/>	<input type="checkbox"/>	
System Ready for Test	<input type="checkbox"/>	<input type="checkbox"/>	
Required Personnel Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Tools/Test Equipment/Supplies Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Safety Equipment Available	<input type="checkbox"/>	<input type="checkbox"/>	

Set-Points, Limits, and Schedules

- AHU can be assigned a schedule. Schedule can be programmed daily.
 If system runs 24 hours a day, check here. If not, fill in the occupied mode schedule below.

	AM											PM												
Day	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
Sun																								
Mon																								
Tues																								
Wed																								
Thurs																								
Fri																								
Sat																								
Holi																								

Parameter	Setpoint		Adjustable Range	
	Design	Actual	Design	Actual
Outside Air Temperature (°F)				
Preheat valve full open outside air temperature (°F)				
Discharge Air Temperature (°F)				
Night Setback Temperature (°F)				
Night Setback Differential				
Mixed Air Temperature (°F)				
Minimum Start-up Fan Speed (%)				
Time at Minimum Fan Speed for Start-up (min)				
Average Zone Humidity (%RH)				
Maximum supply air humidity (%RH)				
Discharge Air Static Pressure (in H ₂ O)				
High Static Alarm (in H ₂ O)				
Low Static Alarm (in H ₂ O)				
System Shutdown High Static Limit (in H ₂ O)				
Damper Position				

Initial Ambient Conditions

Ambient Conditions			
Outside Air Temp		Outside Air RH %	
Precipitation			

Trend Data Required To Support Testing

Check if trend point chart(s) and Frequency Graph(s) are provided per trend requirements shown below.

Trend Log Setup #1 – Temperature						
Pre-Testing	Post Testing	Point	Frequency	Duration	Initial Value	Provided
<input type="checkbox"/>	<input type="checkbox"/>	Outside Air Temperature (°F)				<input type="checkbox"/> Yes <input type="checkbox"/> No

Trend Log Setup #1 – Temperature						
Pre-Testing	Post Testing	Point	Frequency	Duration	Initial Value	Provided
<input type="checkbox"/>	<input type="checkbox"/>	Preheat valve full open outside air temperature (°F)				<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Discharge Air Temperature (°F)				<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Night Setback Temperature (°F)				<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Night Setback Differential				<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Mixed Air Temperature (°F)				<input type="checkbox"/> Yes <input type="checkbox"/> No
Record Issues				Issue Log Item Number:		

Check if trend point chart(s) and Frequency Graph(s) are provided per trend requirements shown below.

Trend Log Setup #2 – Global						
Pre-Testing	Post Testing	Point	Frequency	Duration	Initial Value	Provided
<input type="checkbox"/>	<input type="checkbox"/>	System Flow Rate				<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Flow Rate Set Point				<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Water Quality				<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Damper Position				<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	System Pressure				<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Pressure Set Point				<input type="checkbox"/> Yes <input type="checkbox"/> No
Record Issues				Issue Log Item Number:		

Functional Performance Test -- (Verify all components are ready before energizing or operating the system.)

The Commissioning Authority will make and document any changes/addition/deletions to this test procedure required by current system conditions (i.e. weather, system load, utility availability, etc.).

R = Retest (Check (✓) retest required)

Y= Checked and Passed

C = Corrected (Check (✓) when correction verified)

N = Not Passed

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
PRE-TEST VISUAL PRELIMINARY DATA AND INSPECTION						
1. Record the current values for all the required trending points in Trend Log table above.	Recorded.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
2. Confirm equipment is operating normally as assumed above. If not make adjustments within the Building Automation System (BAS)	Confirmed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
RETURN / EXHAUST FAN SECTION						
3. Command the Return / Exhaust Fan to stop "OFF"	Return / Exhaust Fan is off.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return / Exhaust Fan VFD commanded to 0%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return / Exhaust Fan Status device indicates fan is OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Fan isolation damper closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Outside air damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return air damper is 100% open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Exhaust air damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier is off and commanded to 0%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Face & bypass remain under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Preheat valve remains under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	R.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>	R.A. Quantity Observed _____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
	E.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>	E.A. Quantity Observed _____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
4. Command the Return / Exhaust Fan "ON"	Outside air damper opens.	<input type="checkbox"/>	<input type="checkbox"/>	Minimum Return / Exhaust Fan VFD minimum speed: _____ Ramp Up time to achieve minimum speed: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Wall mounted outside, return, and exhaust air unit mounted dampers open fully.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return / Exhaust damper opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return / Exhaust Fan VFD shall be commanded to run at minimum speed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return / Exhaust Fan Status device indicates the unit is ON while operating at a minimum speed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Return / Exhaust Fan speed modulates to maintain return / exhaust differential pressure set-point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Preheat valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face and bypass dampers is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
ECONOMIZER SECTION (3-DAMPER SECTION)						
5. Minimum O.A. damper (2-position) commanded closed	Damper closes tightly without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>	O.A. Quantity Observed _____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates minimum O.A. damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Minimum O.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
6. Minimum O.A. damper (2-position) commanded open	Damper opens fully without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Status device indicates minimum O.A. damper is open.	<input type="checkbox"/>	<input type="checkbox"/>	O.A. Quantity Observed _____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
	Minimum O.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
7. O.A. damper (modulating) commanded closed	Damper closes tightly without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>	O.A. Quantity Observed _____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates O.A. damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	O.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
8. O.A. damper (modulating) commanded to 100% open	Damper opens fully without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>	O.A. Quantity Observed _____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates minimum O.A. damper is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	O.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
9. O.A. damper (modulating) commanded to 50% open	Damper opens half way without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Status device indicates minimum O.A. damper is open.	<input type="checkbox"/>	<input type="checkbox"/>	O.A. Quantity Observed _____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
	O.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
10. R.A. damper (modulating) commanded closed	Damper closes tightly without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>	O.A. Quantity Observed _____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates R.A. damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	R.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
11. R.A. damper (modulating) commanded to 100% open	Damper opens fully without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>	O.A. Quantity Observed _____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates minimum R.A. damper is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	R.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
12. R.A. damper (modulating) commanded to 50% open	Damper opens half way without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Status device indicates minimum R.A. damper is open.	<input type="checkbox"/>	<input type="checkbox"/>	O.A. Quantity Observed _____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
	R.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
13. M.A. damper (modulating) commanded closed	Damper closes tightly without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>	O.A. Quantity Observed _____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates M.A. damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	M.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
14. M.A. damper (modulating) commanded to 100% open	Damper opens fully without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>	O.A. Quantity Observed _____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates minimum M.A. damper is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	M.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
15. M.A. damper (modulating) commanded to 50% open	Damper opens half way without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Status device indicates minimum M.A. damper is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	M.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
16. Release all damper overrides.	Dampers return to normal operating positions.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
MIXING BOX SECTION (2-DAMPER SECTION)						
17. O.A. damper commanded fully closed	Damper closes tightly without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates O.A. damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	O.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		O.A. Quantity Observed _____ CFM	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
18. O.A. damper commanded fully open	Damper opens fully without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates minimum O.A. damper is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	O.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		O.A. Quantity Observed _____ CFM	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
19. O.A. damper commanded 50% open	Damper opens fully without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates minimum O.A. damper is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	O.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		O.A. Quantity Observed _____ CFM	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
20. R.A. damper commanded fully closed	Damper closes tightly without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates R.A. damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	R.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		R.A. Quantity Observed _____ CFM	<input type="checkbox"/>
Record Issues				Issue Log Item:		
				Initial	Date	
21. R.A. damper commanded fully open	Damper opens fully without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates minimum O.A. damper is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	O.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>		R.A. Quantity Observed _____ CFM	<input type="checkbox"/>
Record issues				Issue Log Item:		

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ACTION		REQUIRED REACTION		Y (✓)	N (✓)	COMMENTS		R (✓)	C (✓)
						Initial	Date		
22. R.A. damper commanded 50% open	Damper opens fully without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>	R.A. Quantity Observed _____ CFM		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates minimum O.A. damper is open.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		
	O.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		
Record issues						Issue Log Item:			
						Initial	Date		
23. Release all damper overrides.	Dampers return to normal operating positions.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Record issues						Issue Log Item:			
						Initial	Date		
PRE-FILTER SECTION									
24. Activate the filter high pressure differential switch by applying pressure to the high side of the switch.	Dirty filter alarm indicated at BAS.	<input type="checkbox"/>	<input type="checkbox"/>	Filter Pressure at alarm _____ in. WC		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Record issues						Issue Log Item:			
						Initial	Date		
25. Release pressure from high side of switch and return to its normal condition.	Dirty filter alarm cleared at BAS.	<input type="checkbox"/>	<input type="checkbox"/>	Filter Pressure at alarm _____ in. WC		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Record issues						Issue Log Item:			
						Initial	Date		

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
ENTHALPY WHEEL						
26. Command enthalpy wheel to stop.	Enthalpy wheel rotation stops.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
27. Command enthalpy wheel rotate at its maximum speed.	Enthalpy wheel rotation begins, and in the correct direction.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
28. Command enthalpy wheel rotate at 50% of its maximum speed.	Enthalpy wheel rotation slows to 50% of its maximum speed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
FACE AND BYPASS DAMPERS						
29. Face and bypass dampers commanded fully open.	Face damper opens fully without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates face damper is fully open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Bypass damper opens fully without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates bypass damper is fully open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
30. Face damper commanded to fully closed	Damper closes tightly without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates face damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
31. Face damper commanded to 50% open	Damper opens half way without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates damper is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
32. Face damper commanded fully open. Bypass damper commanded fully closed.	Face damper opens fully.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates face damper is fully open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Bypass damper opens fully without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
33. Bypass damper commanded to 50% open	Damper opens half way without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates damper is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
34. Release all damper overrides.	Dampers return to normal operating positions.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
DRAW-THRU COIL SECTION						
35. Command preheat coil control valve to 100% open.	Preheat coil valve fully opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
36. Command preheat coil control valve to close fully.	Preheat coil valve fully closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
37. Command preheat coil control valve to 50% open.	Preheat coil control valve opens to 50%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
38. Remove power from the preheat control valve actuator.	Preheat coil control valve moves to its fail safe position (fully open).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
39. Release overrides on preheat coil valve.	Preheat coil control valve returns to normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
40. Command chilled water coil control valve to 100% open.	Chilled water coil valve fully opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
41. Command chilled water coil control valve to close fully.	Chilled water coil valve fully closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
42. Command chilled water coil control valve to 50% open.	Chilled water coil control valve opens to 50%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
43. Remove power from the chilled water control valve actuator.	Chilled water coil control valve moves to its fail safe position (fully closed).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
44. Release override on chilled water coil valve.	Chilled water coil control valve returns to normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
45. Coil Pump		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
HORIZONTAL COIL SECTION						

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
46. Command preheat coil control valve to 100% open.	Preheat coil valve fully opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
47. Command preheat coil control valve to close fully.	Preheat coil valve fully closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
48. Command preheat coil control valve to 50% open.	Preheat coil control valve opens to 50%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
49. Remove power from the preheat control valve actuator.	Preheat coil control valve moves to its fail safe position (fully open).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
50. Release overrides on preheat coil valve.	Preheat coil control valve returns to normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
51. Command chilled water coil control valve to 100% open.	Chilled water coil valve fully opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
52. Command chilled water coil control valve to close fully.	Chilled water coil valve fully closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
53. Command chilled water coil control valve to 50% open.	Chilled water coil control valve opens to 50%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
54. Remove power from the chilled water control valve actuator.	Chilled water coil control valve moves to its fail safe position (fully closed).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
55. Release override on chilled water coil valve.	Chilled water coil control valve returns to normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
56. Coil Pump		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
SUPPLY FAN SECTION						
57. Command the Supply Fan to stop "OFF"	Supply Fan is off.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Supply Fan VFD commanded to 0%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Supply Fan Status device indicates fan is OFF.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Fan isolation damper closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Outside air damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return air damper is 100% open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Exhaust air damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier is off and commanded to 0%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face & bypass remain under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Preheat valve remains under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	S.A. quantity confirmed by airflow measuring station.	<input type="checkbox"/>	<input type="checkbox"/>	S.A. Quantity Observed _____ CFM	<input type="checkbox"/>	<input type="checkbox"/>
Record issue				Issue Log Item:		
				Initial	Date	
58. Command the Supply Fan "ON"	Outside air damper opens.	<input type="checkbox"/>	<input type="checkbox"/>	Minimum Return / Exhaust Fan VFD minimum speed: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Wall mounted outside, return, and exhaust air unit mounted dampers open fully.	<input type="checkbox"/>	<input type="checkbox"/>	Ramp Up time to achieve minimum speed: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Supply damper opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Supply Fan VFD shall be commanded to run at minimum speed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Supply Fan Status device indicates the unit is ON while operating at a minimum speed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Supply Fan speed modulates to maintain supply duct pressure set-point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Preheat valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face and bypass dampers is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
BLOW-THRU COIL SECTION						
59. Command reheat coil control valve to 100% open.	Reheat coil valve fully opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
60. Command reheat coil control valve to close fully.	Reheat coil valve fully closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
61. Command reheat coil control valve to 50% open.	Reheat coil control valve opens to 50%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
62. Remove power from the reheat control valve actuator.	Reheat coil control valve moves to its fail safe position (fully open).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
63. Release overrides on reheat coil valve.	Preheat coil control valve returns to normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
64. Command chilled water coil control valve to 100% open.	Chilled water coil valve fully opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
65. Command chilled water coil control valve to close fully.	Chilled water coil valve fully closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
66. Command chilled water coil control valve to 50% open.	Chilled water coil control valve opens to 50%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
67. Remove power from the chilled water control valve actuator.	Chilled water coil control valve moves to its fail safe position (fully closed).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
68. Release override on chilled water coil valve.	Chilled water coil control valve returns to normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
69. Coil Pump		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
FINAL FILTER SECTION						
70. Activate the filter high pressure differential switch by applying pressure to the high side of the switch.	Dirty filter alarm indicated at BAS.	<input type="checkbox"/>	<input type="checkbox"/>	Filter Pressure at alarm _____ in. WC	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
71. Release pressure from high side of switch and return to its normal condition.	Dirty filter alarm cleared at BAS.	<input type="checkbox"/>	<input type="checkbox"/>	Filter Pressure at alarm _____ in. WC	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
HUMIDIFIER VALVES						

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
72. Command humidifier isolation valve to fully close. Command humidifier control valve fully open.	Isolation valve closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier control valve fully opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	No steam enters supply air stream.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
73. Command humidifier control valve fully closed.	Humidifier control valve fully closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Record issues				Issue Log Item:	
				Initial	Date	
74. Command humidifier isolation valve fully open.	Humidifier isolation valve fully opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	No steam is enters supply air stream.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
75. Command humidifier control valve 50% open.	Humidifier control valve opens 50%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Steam begins entering supply air stream.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
76. Command humidifier control valve 100% open.	Humidifier control valve opens 100%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Steam flow into supply air stream increases.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
77. Remove power from the humidifier control valve and isolation valve.	Humidifier isolation valve moves to its fail safe position (fully closed).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier control valve moves to its fail safe position (fully closed).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
78. Release override on humidifier valves.	Humidifier valves return to normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
MULTIZONE COIL SECTION						
79. Command hot deck heating coil control valve to 100% open.	Heating coil valve fully opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
80. Command hot deck heating coil control valve to close fully.	Heating coil valve fully closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
81. Command hot deck heating coil control valve to 50% open.	Heating coil control valve opens to 50%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
82. Remove power from the hot deck heating coil control valve actuator.	Heating coil control valve moves to its fail safe position (fully open).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
83. Release overrides on hot deck heating coil valve.	Preheat coil control valve returns to normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
84. Command cold deck coil control valve to 100% open.	Chilled water coil valve fully opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
85. Command cold deck coil control valve to close fully.	Chilled water coil valve fully closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
86. Command cold deck coil control valve to 50% open.	Chilled water coil control valve opens to 50%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
87. Remove power from the cold deck control valve actuator.	Chilled water coil control valve moves to its fail safe position (fully closed).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
88. Release override on cold deck coil valve.	Chilled water coil control valve returns to normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
89. Coil Pump		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
MULTIZONE DAMPERS						
90. Command hot and cold deck multizone dampers fully open.	Hot deck damper opens fully without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>	Number of Zones: _____ (Complete steps for each set of zones)	<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates hot deck damper is fully open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cold deck damper opens fully without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates cold deck damper is fully open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
91. Cold deck damper commanded to fully closed	Damper closes tightly without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
92. Cold deck damper commanded to 50% open	Damper opens half way without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates damper is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
93. Cold deck damper commanded fully open. After face damper confirmed open, bypass damper commanded fully closed.	Cold deck damper opens fully.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Hot deck damper closes tightly without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates hot deck damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
94. Hot deck damper commanded to 50% open	Damper opens half way without binding for complete travel distance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Status device indicates damper is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
95. Release all damper overrides.	Dampers return to normal operating positions.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
SAFETIES AND INTERLOCKS						

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
FREEZESTAT AND SYSTEM STARTUP						
96. Apply aerosol spray to the serpentine temperature sensor (Freezestat).	Low temperature limit trips.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Supply fan VFD commanded to 0%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Supply fan shuts down.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Outside air damper fully closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Fire smoke dampers close.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier is off and commanded to 0%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face and bypass damper modulates.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Preheat valve fully opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling valve closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Low limit temperature alarm generated at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
97. Command the system Off	The system remains in the shutdown sequence.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
98. Disconnect the power to the local control panel	Control panel is off.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
99. After 2-5 minutes reconnect power to the control panel (Control Panel Power Loss)	Control panel becomes operational upon restoration of power.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
100. Command the system back ON (System Startup)	System remains shut down.	<input type="checkbox"/>	<input type="checkbox"/>	System requires manual reset of tripped device before air handling unit is restarted.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
101. Manually reset the Freezestat (System startup)	Outside air damper opens.	<input type="checkbox"/>	<input type="checkbox"/>	Minimum supply fan speed: _____ Duration fan at minimum speed: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Return air damper modulate as normal.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Supply fan VFD shall be commanded to run.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Supply fan turns ON at minimum speed for specified length of time.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Supply fan speed modulates to maintain differential pressure set-point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Preheat valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face and bypass dampers is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Low limit temperature alarm clears at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
SUPPLY FAN FAILURE						
102. At the local power disconnect or HOA switch, open the power loop to stop the fan. (Supply Fan Failure)	The supply fan turns off.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Supply fan failure alarm is generated at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Fan isolation damper closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Outside air damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling coil valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Preheat valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face & Bypass damper is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return/Exhaust Fan shuts down.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Wall mounted supply, return air isolation, unit mounted outdoor air dampers close fully.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Unit mounted return air dampers open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
103. At the local power panel reconnect the disconnect or HOA switch, close the power loop to start the fan/fans. (Supply Fan Failure)	Outside air damper is open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Wall mounted supply, return air isolation, unit mounted outdoor air dampers open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Unit mounted return air dampers remain open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The supply fan turns ON.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Supply fan failure alarm clears at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling coil valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Preheat valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face & Bypass damper is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
RETURN/EXHAUST FAN FAILURE						
104. At the local power disconnect or HOA switch, open the power loop to stop	The return/exhaust fan turns off.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Fan isolation damper closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
the return/exhaust fan.	Current sensing relay indicates a loss of current from the component.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return/Exhaust fan failure alarm generated at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
105. At the local power disconnect or HOA switch, close the power loop to stop the return/exhaust fan.	The return/exhaust fan turns on.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Current sensing relay senses current from the component.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return/Exhaust fan failure alarm cleared at the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
HIGH DUCT STATIC PRESSURE LIMIT SWITCH						
106. Adjust the system shutdown high limit discharge air static pressure limit switch set-point to be just below the current discharge air static pressure or use a pump bulb and gauge to simulate high static conditions and record the setting. (High Pressure System Shutdown Alarm)	High static limit switch alarm is generated at BAS.	<input type="checkbox"/>	<input type="checkbox"/>	System Shutdown High Limit Switch Set-point: _____	<input type="checkbox"/>	<input type="checkbox"/>
	The supply fan turns off.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Unit is indexed to Unoccupied Mode.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Smoke dampers are closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Outside air damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling coil valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Preheat valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face & Bypass damper is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
107. Return the system shutdown high pressure limit switch set-point back to its original value or release the pump bulb pressure simulation	High pressure alarm is cleared at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	System does not restart.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
108. Manually reset the high pressure limit switch.	System restarts and resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
LOW DUCT STATIC PRESSURE LIMIT SWITCH						
109. Adjust the system shutdown low limit discharge air static pressure limit switch set-point to be just below the suction side static pressure or use a pump bulb and gauge to simulate low static conditions and record the setting. (Low Pressure System Shutdown Alarm)	Low static limit switch alarm is generated at BAS.	<input type="checkbox"/>	<input type="checkbox"/>	System Shutdown Low Limit Switch Set-point: _____	<input type="checkbox"/>	<input type="checkbox"/>
	The supply fan turns off.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Unit is indexed to Unoccupied Mode.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Smoke dampers are closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Outside air damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Humidifier valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling coil valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Preheat valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face & Bypass damper is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
110. Return the system shutdown low pressure limit switch set-point back to its original value or release the pump bulb pressure simulation	Low pressure alarm is cleared at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	System does not restart.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
111. Manually reset the low pressure limit switch.	System restarts and resumes normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
DUCT SMOKE DETECTION						
112. Apply aerosol smoke to the duct smoke detectors (Smoke Detection)	Smoke detection alarm is sent to the BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The supply fan turns off.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Wall mounted supply, return air isolation, unit mounted outdoor air dampers close fully.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Unit mounted return air dampers open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Outside air damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling coil valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Preheat valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face & Bypass damper is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
113. Manually reset the smoke detector. (Smoke Detection)	Smoke detection alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Wall mounted supply, return air isolation, unit mounted outdoor air dampers open fully.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Unit mounted return air dampers remain open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Outside air damper opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Supply fan VFD shall be commanded to run.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Supply fan turns ON at minimum speed for a specified length of time.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Supply fan speed modulates to maintain differential pressure set-point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling coil valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Preheat valve is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face & Bypass damper is under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
FUNCTIONAL TESTS – UNOCCUPIED NIGHT SETBACK – SETUP MODE						
114. Modulate the outside air temperature for AHU # to be below 80°F	Return air damper closes to 10% minimum position.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Outside air damper opens to 90% maximum position.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
115. Modulate the outside air temperature for AHU # to be above 80°F	Outside air damper closes to 10% minimum position.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return air damper opens to 90% maximum position.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
116. Adjust the discharge air temperature set-point to be 5°F lower than the current discharge air temperature for AHU # (Temperature Control Cooling)	(If the outside air temp is between 40°F and 80°F and the boiler room space temp is above 90°F).	<input type="checkbox"/>	<input type="checkbox"/>	Chiller room temperature set point: ___°F	<input type="checkbox"/>	<input type="checkbox"/>
	Return air dampers and outside air dampers modulate in opposition to one another to maintain the 60°F set point.	<input type="checkbox"/>	<input type="checkbox"/>	Discharge air temperature set-point: _____°F	<input type="checkbox"/>	<input type="checkbox"/>
	Barometric relief dampers will relieve excess air from the boiler room.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Heating coil valves open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
117. Adjust the discharge air temperature set-point to be 10°F lower than the current discharge air temperature for AHU # (Temperature Control Cooling)	(If the outside air temp is below 90°F and the boiler room space temp is above 90°F).	<input type="checkbox"/>	<input type="checkbox"/>	Discharge air temperature set-point _____°F.	<input type="checkbox"/>	<input type="checkbox"/>
	Return air dampers modulate open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Outside air dampers modulate closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Barometric relief dampers will relieve excess air from the boiler room.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Heating coil valve closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
118. If the outside air temperature is	Preheat valve is fully open.	<input type="checkbox"/>	<input type="checkbox"/>	This would indicate a situation where we could	<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
above 40°F, override the outside air temperature reading to be 35°F for AHU #. Otherwise, skip this step. (At the end of this step, release the outside air temperature override)	Cooling valve is open.	<input type="checkbox"/>	<input type="checkbox"/>	potentially simultaneously heat and cool. Please clarify the sequence that protects the system from simultaneously heating and cooling.	<input type="checkbox"/>	<input type="checkbox"/>
	Face & bypass is modulated to maintain minimum air temperature set-point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
119. Reset the discharge air temperature set-point to the original value for AHU #. (Temperature Control Cooling)	The system resumes "normal" operations.	<input type="checkbox"/>	<input type="checkbox"/>	Ending discharge air temperature set-point _____°F	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
120. Adjust the discharge air temperature, for AHU # set-point to be 5°F lower than the current discharge air temperature (Temperature Control Cooling)	(If the outside air temp is below 90°F and the boiler room space temp is above 90°F).	<input type="checkbox"/>	<input type="checkbox"/>	Boiler space temperature set point: ___°F	<input type="checkbox"/>	<input type="checkbox"/>
	Return air dampers modulate closed.	<input type="checkbox"/>	<input type="checkbox"/>	Discharge air temperature set-point _____°F	<input type="checkbox"/>	<input type="checkbox"/>
	Outside air dampers modulate open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Barometric relief dampers will relieve excess air from the boiler room.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Heating coil valves open	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
121. Adjust the discharge air temperature set-point to be 10°F lower than the current discharge air temperature for AHU # (Temperature Control Cooling)	(If the outside air temp is below 90°F and the boiler room space temp is above 90°F).	<input type="checkbox"/>	<input type="checkbox"/>	Discharge air temperature set-point _____°F	<input type="checkbox"/>	<input type="checkbox"/>
	Return air dampers modulate open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Outside air dampers modulate closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Barometric relief dampers will relieve excess air from the boiler room.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Heating coil valve closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
122. If the outside air temperature is above 40°F, override the outside air temperature reading to be 35°F for AHU #. Otherwise, skip this step. (At the end of this step, release the outside air temperature override)	Preheat valve is fully open.	<input type="checkbox"/>	<input type="checkbox"/>	This would indicate a situation where we could potentially simultaneously heat and cool. Please clarify the sequence that protects the system from simultaneously heating and cooling.	<input type="checkbox"/>	<input type="checkbox"/>
	Cooling valve is open	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face & bypass is modulated to maintain minimum air temperature set-point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
123. Reset the discharge air temperature set-point to the original value for AHU #. (Temperature Control Cooling)	The system resumes "normal" operations.	<input type="checkbox"/>	<input type="checkbox"/>	Ending discharge air temperature set-point _____F	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
FUNCTIONAL TESTS – UNOCCUPIED NIGHT SETBACK – SETUP MODE						
124. Set discharge air temperature to less than 35°F.	Supply fan stops.	<input type="checkbox"/>	<input type="checkbox"/>	Initial Space Temp: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Outside air damper closes.	<input type="checkbox"/>	<input type="checkbox"/>	Space set point: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Return air damper opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Alarm sent to BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
125. Reset discharge air temperature to original settings	Supply fan starts up.	<input type="checkbox"/>	<input type="checkbox"/>	New space temperature set point: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Outside air damper opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return air damper modulates as normal.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Alarm cleared from BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
126. Adjust the discharge air static pressure above the 0.02" w.c. set point in comparison to the outdoors --or-- Increase the discharge air static pressure set-point just under the high limit alarm discharge air static pressure set-point **Choose whichever results in a lower adjusted set-point and prevents high static alarm from sounding (Pressure Control)	The supply fan VFD increases the frequency and speeds up the fan to meet the new discharge air static pressure set-point.	<input type="checkbox"/>	<input type="checkbox"/>	Pressure of Outside: _____ Static Pressure of Space: _____ New Static Set-point: _____ Frequency @ New Set-point: _____%	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
127. Adjust the high limit alarm discharge air static pressure set-point to be just below the current discharge air static pressure (High Pressure Alarm)	High static pressure alarm is generated.	<input type="checkbox"/>	<input type="checkbox"/>	New High Limit Static Alarm Set-point: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Air handling system continues to run under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
128. Adjust the discharge air static pressure below the 0.02" w.c. set point in comparison to the outdoors --or-- Decrease the discharge air static pressure set-point just under the high limit alarm discharge air static pressure set-point **Choose whichever results in a higher adjusted set-point and prevents low static alarm from sounding (Pressure Control)	The supply fan VFD decreases the frequency and slows the fan to meet the new discharge air static pressure set-point.	<input type="checkbox"/>	<input type="checkbox"/>	Pressure of Outside: _____ Static Pressure of Space: _____ New Static Set-point:_____ Frequency @ New Set-point:_____ %	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
129. Adjust the low limit discharge air static pressure set-point to be just above the current discharge air static pressure (Low Pressure Alarm)	Low static pressure alarm is generated.	<input type="checkbox"/>	<input type="checkbox"/>	New Low Limit Static Set-point:_____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
130. Return the low limit pressure alarm set-point back to its original value	The system resumes "normal" operation.	<input type="checkbox"/>	<input type="checkbox"/>	Low limit pressure alarm set-point:_____ Discharge air static pressure set-point:_____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
131. Return the discharge air static pressure set-point back to its original value	The system resumes "normal" operation.	<input type="checkbox"/>	<input type="checkbox"/>	Low limit pressure alarm set-point: _____ Discharge air static pressure set-point: _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
VERIFICATION OF UNOCCUPIED OPERATION						
132. Override the occupancy to unoccupied	The supply fan is off.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The outside air damper is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return air damper opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The cooling coil valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The preheat valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face and bypass damper is at full bypass.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The humidifier valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
133. Adjust the zone temperature set-point to 5F greater than the current temperature	The outside air damper is open.	<input type="checkbox"/>	<input type="checkbox"/>	Zone temperature set-point _____F	<input type="checkbox"/>	<input type="checkbox"/>
	Return air dampers are open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Supply fan VFD shall be commanded to run.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The supply fan turns on at minimum speed for a specified length of time.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Supply fan speed modulates to maintain differential pressure set-point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The preheat valve modulates to meet the new set-point.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face and bypass dampers are at full face.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling coil valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidifier valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
134. Adjust the zone temperature set-point to equal the current temperature	The supply fan turns off.	<input type="checkbox"/>	<input type="checkbox"/>	Zone temperature set-point _____F	<input type="checkbox"/>	<input type="checkbox"/>
	The outside air damper closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Face and bypass dampers remain under BAS control.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The cooling coil valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The humidifier valve is closed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Unit is indexed back to the Unoccupied Mode.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
135. Reset the schedule to occupied	The system resumes "normal" operation.	<input type="checkbox"/>	<input type="checkbox"/>	Ending zone temperature set-point _____F	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
136. Reset the zone temperature set-point back to the original value	The system resumes "normal" operation.	<input type="checkbox"/>	<input type="checkbox"/>	Ending zone temperature set-point _____F	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
VERIFICATION OF EXHAUST FAN						
137. Set the airflow set point below the current air flow CFM	Alarm is sent to BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Fan shuts off.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The discharge damper closes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
138. Reset the air flow set point to original set point through the BAS	Alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The discharge damper opens.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The fan starts only when the damper is proved fully open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
139. Set static pressure set point above current static pressure	Low suction alarm is sent to BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Fan shuts off.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Damper modulates open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
140. Reset the air flow set point to original set point though the BAS	Alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The discharge damper stays open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The fan starts only when the damper is proved fully open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
141. Reset the air flow set point to original set point though the BAS	Alarm clears.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The discharge damper stays open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The fan starts only when the damper is proved fully open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
RETURN TO INITIAL CONDITIONS						
142. Record test stop time	Recorded.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	

Final Sign-Off

Commissioning Agent	Printed Name	Initials	Date
CONTRACTOR	PRINTED NAME	INITIALS	DATE
General Contractor (GC)			
Mechanical Contractor (MC)			
Electrical Contractor (EC)			
TAB Contractor (TAB)			
Controls Contractor (CC)			
Owner's O&M Personnel			

Direct Digital Control System for HVAC Functional Performance Test

Equipment ID	[Equipment ID]
Building	[Building]
Location	[Room]

System Description

Description:

The Direct Digital Control System (DDC) will interface with all other major items of mechanical electrical and plumbing equipment. This is a test of the overall DDC and its network. A person with full administrative access to the DDC is required to be present. Individual controllers are expected to be networked to the operator work station, but also have local portals for programming and field maintenance. This is a test of the overall DDC as a network and not the individual points of control. A corrective action report will be developed, and the step will be tested again after the problem has been fixed. No deferred or retesting is neither expected nor scheduled. NOTE: DDC, Operator work station, OWS, network server, and WEB server, are intended to represent the system challenged in this FPT.

Specific testing of individual HVAC or Electrical systems is done within functional test procedures (FPT's) appropriately focused on those systems. Those equipment tests confirm field devices, components and specific subsystems are responsive and values are correct for the specific MEP systems that the DDC controls. This Test does not include those aspects of control.

Operational Assumptions:

All HVAC and Electrical systems controlled and monitored by the DDC are operating normally at the beginning of the test, using their normal electric power source. Individual controllers, input and output objects and related devices and applications like loop control have been fully tested at each controller.

Associated major mechanical systems, wiring and piping have been tested and are operating correctly.

There are no unusual or critical system alarms.

AHU's, RTU's, exhaust fans and hood exhausts have been operating normally for an hour.

Heating system is on.

Chilled water is circulating. Seasonal exception possible.

Initial Test	Start Date	End Date	Initials
<p>Results (Check one)</p> <p><input type="checkbox"/> Pass</p> <p><input type="checkbox"/> Fail</p> <p><input type="checkbox"/> Partial Test w/Corrective Actions</p> <p><input type="checkbox"/> Complete Test w/Corrective Actions</p> <p><input type="checkbox"/> Other</p>	<p>Explanation:</p>		

Re-Test 1	Start Date	End Date	Initials
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[Project Title Template]
[Project Location Template]

Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:			

Re-Test 2		Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:			

Deferred/Seasonal Test		Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:			

Test Participants

Organization	Required	Optional
General Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Electrical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
TAB Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Controls Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Owner's O&M Personnel	<input type="checkbox"/>	<input type="checkbox"/>

Supplies Required for Testing (To be provided by the contractor)

Tools / Supplies	
Canned smoke for smoke detector testing	Calibrated temperature sensing devise
Aerosol Freeze Spray If OA is above 30°F	manometer/magnahelic 0.1" gage for duct P/filter dP
manometer w/ 0.001"wc/ 0.25 Pa gage for space dP	Calibrated humidity sensing devise

DDC Network Information

Manufacturer		Model Number	
Serial Number		Other Features	
Notes:			

DDC Controller Information

Manufacturer		OWS Model Number	
Building Network Controller Model		Advanced Application Model	
Application Specific Controller Model		Gateways or other protocol translation	
Notes:			

System Readiness Summary Checklist

Description	Yes	No	Date
System is ready for testing.	<input type="checkbox"/>	<input type="checkbox"/>	
All control system functions and interlocking systems are programmed and operable per contract documents, including final set-points and schedules with debugging, loop tuning and sensor calibrations completed.	<input type="checkbox"/>	<input type="checkbox"/>	
Punch list items, loop tuning and calibration complete.	<input type="checkbox"/>	<input type="checkbox"/>	
DDC-operator work station (OWS), display and communication are operational (Optional printer temporarily added for record copy).	<input type="checkbox"/>	<input type="checkbox"/>	
Installation per design documents & change orders.	<input type="checkbox"/>	<input type="checkbox"/>	
O&M manuals delivered <u>and</u> available on site	<input type="checkbox"/>	<input type="checkbox"/>	
Field-marked As-Built system schematics available.	<input type="checkbox"/>	<input type="checkbox"/>	
Network devices and physical connections are operating.	<input type="checkbox"/>	<input type="checkbox"/>	
Specified contractor training completed.	<input type="checkbox"/>	<input type="checkbox"/>	
Components/subsystems clearly and correctly Identified.	<input type="checkbox"/>	<input type="checkbox"/>	
Mechanical systems that interface with DDC are connected and operational.	<input type="checkbox"/>	<input type="checkbox"/>	
System is ready for testing.	<input type="checkbox"/>	<input type="checkbox"/>	
All control system functions and interlocking systems are programmed and operable per contract documents, including final set-points and schedules with debugging, loop tuning and sensor calibrations completed.	<input type="checkbox"/>	<input type="checkbox"/>	
Punch list items, loop tuning and calibration complete.	<input type="checkbox"/>	<input type="checkbox"/>	
DDC-operator work station (OWS), display and communication are operational (Optional printer temporarily added for record copy).	<input type="checkbox"/>	<input type="checkbox"/>	
Installation per design documents & change orders.	<input type="checkbox"/>	<input type="checkbox"/>	
O&M manuals delivered <u>and</u> available on site.	<input type="checkbox"/>	<input type="checkbox"/>	
Field-marked As-Built system schematics available.	<input type="checkbox"/>	<input type="checkbox"/>	

Required Instrument Accuracy and Calibration Tolerances:

<u>Initial/Date</u>	<u>Sensor</u>	<u>Calibrating Instrument Accuracy (+/-)</u>	<u>Required Calibration Tolerance (+/-)</u>
	Cooling coil, chilled and condenser water temps	0.25F	0.4F
	AHU wet bulb or dew point	1.0F	2.0F
	Hot water coil and boiler water temp	1.0F	1.5F
	Outside air, space air, duct air temps	0.25F	0.4F
	Relative humidity	2% RH	5% RH
	Watt-hour, voltage & amperage	2% of reading	1% of design
	Pressures, air, water and gas	2% of reading	3% of design
	Building differential pressure	1% of full span	0.01 in. WC
	Variable frequency drive	2 Hz	2 Hz
	Flow rates, water	4% of reading	4% of design
	Flow rates, air	3% of reading	10% of design ¹
	Air velocity rates	3% of reading	10% of design

Set-Points, Limits, and Schedules

- AHU can be assigned a schedule. Schedule can be programmed daily.
 If system runs 24 hours a day, check here. If not, fill in the occupied mode schedule below.

	AM											PM												
Day	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
Sun																								
Mon																								
Tues																								
Wed																								
Thurs																								
Fri																								
Sat																								
Holi																								

Parameter	Setpoint		Adjustable Range	
	Design	Actual	Design	Actual
Outside Air Temperature (°F)				
Preheat valve full open outside air temperature (°F)				
Discharge Air Temperature (°F)				
Night Setback Temperature (°F)				
Night Setback Differential				
Mixed Air Temperature (°F)				
Minimum Start-up Fan Speed (%)				
Time at Minimum Fan Speed for Start-up (min)				
Average Zone Humidity (%RH)				
Maximum supply air humidity (%RH)				
Discharge Air Static Pressure (in H ₂ O)				
High Static Alarm (in H ₂ O)				
Low Static Alarm (in H ₂ O)				
System Shutdown High Static Limit (in H ₂ O)				

Parameter	Setpoint		Adjustable Range	
	Design	Actual	Design	Actual
Damper Position				

Initial Ambient Conditions

Ambient Conditions			
Outside Air Temp		Outside Air RH %	
Observations			

Trend Data Required To Support Testing

Check if trend point chart(s) and Frequency Graph(s) are provided per trend requirements shown below.

Trend Log Setup #1 - Temperature					
Pre-Testing	Post Testing	Point	Frequency	Duration	Provided
<input type="checkbox"/>	<input type="checkbox"/>	Data Collection Frequency	Minimum 10 minute		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Trend Log Duration	Minimum one week		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Trend Log Start Date/Time	Minimum two days before		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Trend Log Format	Distinct color/symbol/point		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Point #1	Any point in any panel		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Point #2	Any point in any panel		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Point #3	Any point in any panel		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Point #4	Any point in any panel		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Point #5	Any point in any panel		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Point #6	Any point in any panel		<input type="checkbox"/> Yes <input type="checkbox"/> No
Record Issues				Issue Log Item Number:	

Trend Log Setup #2 - Temperature					
Pre-Testing	Post Testing	Point	Frequency	Duration	Provided
<input type="checkbox"/>	<input type="checkbox"/>	Data Collection Frequency	Minimum 10 minute		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Trend Log Duration	Minimum one week		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Trend Log Start Date/Time	Minimum two days before		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Trend Log Format	Distinct color/symbol/point		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Point #1	Any point in any panel		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Point #2	Any point in any panel		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Point #3	Any point in any panel		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Point #4	Any point in any panel		<input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/>	<input type="checkbox"/>	Point #5	Any point in any panel		<input type="checkbox"/> Yes <input type="checkbox"/> No

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Trend Log Setup #2 - Temperature					
Pre-Testing	Post Testing	Point	Frequency	Duration	Provided
<input type="checkbox"/>	<input type="checkbox"/>	Point #6	Any point in any panel		<input type="checkbox"/> Yes <input type="checkbox"/> No
Record Issues				Issue Log Item Number:	

Functional Performance Test -- (Verify all components are ready before energizing or operating the system.)

The Commissioning Authority will make and document any changes/addition/deletions to this test procedure required by current system conditions (i.e. weather, system load, utility availability, etc.).

R = Retest (Check (✓) retest required)

Y= Checked and Passed

C = Corrected (Check (✓) when correction verified)

N = Not Passed

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
PREPARE FOR DDC PERFORMANCE TESTING						
31. Record start time NOTE: a printer is not specified so if none is available "print" means "display" indicated report.	Recorded	<input type="checkbox"/>	<input type="checkbox"/>	Start Time: ____ (am/pm)	<input type="checkbox"/>	<input type="checkbox"/>
	DDC, OWS, Web Server are alternate names for the hardware and software					
Record issues				Issue Log Item:		
				Initial	Date	
32. Observe that the DDC existing data groups represent various rooms and required data is represented	Sensor / status values are represented on various group displays.	<input type="checkbox"/>	<input type="checkbox"/>	Point by Point conformance, end to end continuity, proper action and calibration have been completed in the SRC and startup. This step is only to verify that the basic system is operational at test with no obvious problems.	<input type="checkbox"/>	<input type="checkbox"/>
	Temperature.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Humidity.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Light intensity.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Air flow dP analog.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Air flow dP status.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
33. Demonstrate data updating at least once a minute	Data is updated on DDC every 60 seconds or sooner.	<input type="checkbox"/>	<input type="checkbox"/>	<p>**The DDC workstation and operation is not given, need more information on how DDC works or how it is setup.**</p> <p>Expect to see various values like temperature or pressure changing on screen due to normal operation.</p>	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
34. Demonstrate method to calibrate sensors.	Single Sensor value can be changed after entering PIN at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Calibration report of all sensors is presented at BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
35. Create and print (display) a report of temp, and room dP in one minute intervals.	Report prints (displays if printer not provided) with data logged at one minute intervals.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
36. Initiate an alarm.	Alarm is presented on the Graphic it relates	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	An alarm message pops up or provides notification	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A record of the event is listed in a history log.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
VERIFICATION OF OPERATION WITH POWER INTERRUPTION						
37. Turn off power circuit to BAS Wait 10 seconds	Verify OWS and related equipment shuts down as if during a power failure.	<input type="checkbox"/>	<input type="checkbox"/>	Indicate the date and time that power was disconnected: _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
38. Restore normal Power	System reboots.	<input type="checkbox"/>	<input type="checkbox"/>	Indicate the time that power was re-connected: _____ The operator has the option to add notes while acknowledging an alarm.	<input type="checkbox"/>	<input type="checkbox"/>
	Network connections are established.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Time stamps are correct.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Outage alarms report.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Alarms return to normal.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Acknowledged alarms are recorded with time stamp of ACK and user ID.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Notes can be included with acknowledge action.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
39. Acknowledge Alarms	System reboots.	<input type="checkbox"/>	<input type="checkbox"/>	Indicate the time that power was re-connected: _____ The operator has the option to add notes while acknowledging an alarm.	<input type="checkbox"/>	<input type="checkbox"/>
	Network connections are established.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Time stamps are correct.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Outage alarms report.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Alarms return to normal.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Acknowledged alarms are recorded with time stamp of ACK and user ID.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Notes can be included with acknowledge action.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
40. Verify networked controllers (building, Advanced App, App specific) continued to operate in simulated outage OWS DDC	Each controller reports normal when DDC is restored to normal power.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Each controller has continued to operate with programmed values not default values.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
INSTALLATION INTEGRITY						
41. Present on the Operator Work Station (OWS) Monitor a list of devices connected to the network.	The data management system network interface module and server monitor (and printer) are ON.	<input type="checkbox"/>	<input type="checkbox"/>	Note the printer is not required.	<input type="checkbox"/>	<input type="checkbox"/>
	Each field interface device, intelligent controller or special application processor reports it is connected and in normal operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
42. Change presentation to display the details of any HVAC system.	The graphic is displayed within 5 seconds.	<input type="checkbox"/>	<input type="checkbox"/>	Normal condition may not show a specific label, but alarms should have a clear differentiation. Indicate the time required from initiating the request until the values are displayed: _____ Seconds	<input type="checkbox"/>	<input type="checkbox"/>
	Every data point, object displays its name, set point value, and current condition within 10 seconds of the request.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
43. Initiate any historic trend report for presentation on the display.	A graphic representation of the data value history is presented on the monitor.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
44. Print this report.	The printer works.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
45. Use a Laptop computer to connect to system by various methods.	Display is similar to OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Basic monitoring and control are similar to OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Connects by wall stat.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Connects by controller port.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Connects by Ethernet network port.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
46. Log off laptop access.	User is identified as a device while logged into system.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Log off is recorded.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
VERIFICATION OF WORKSTATION COMPONENTS						
47. Verify minimum hardware /software requirements of the operator	Support 64 client devices.	<input type="checkbox"/>	<input type="checkbox"/>	Provide a general description of the BACnet conformance, and Record exceptions of the actual system provided in	<input type="checkbox"/>	<input type="checkbox"/>
	10-100 MBPS 802.3 LAN.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	BACnet Controller Protocol.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
workstation. Note original spec was not clear about desktop so spec reflects expectation of the Laptop	Operating system is Windows NT Workstation 4, 2000 or later.	<input type="checkbox"/>	<input type="checkbox"/>	the following space:	<input type="checkbox"/>	<input type="checkbox"/>
	Processor speed is 600Mhz or higher.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Processor is at least Intel Pentium III class.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Hard drive capacity is 60 gigabytes or greater.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	System memory is 256 Meg or greater.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Indicate number of serial parallel and USB ports available.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Monitor is 17" diagonal, .28 dot pitch, and 740x1024 resolution.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Indicate CD or CD/RW capability or better.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Mouse and Keyboard.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	56kb v.90 Modem.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
PASSWORD AND ACCESS CONTROL						
48. An individual with administrator authority will demonstrate multiple levels of password protection.	Create 1 new user and 3 new passwords.	<input type="checkbox"/>	<input type="checkbox"/>	The three levels need to provide 1 - Monitoring only, 2 - Command and control adjustment, 3 - Program development and password assignment.	<input type="checkbox"/>	<input type="checkbox"/>
	Verify there are at least 3 levels of access for different passwords assigned.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
49. Administrator shall demonstrate ability to delete two of the new Users.	Verify that the deleted User and PW's no longer have access.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	Verify the one still works.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
50. Simultaneously logon to the system using 4 different users.	System allows simultaneous access to 4 individual users.	<input type="checkbox"/>	<input type="checkbox"/>		Number of network devices on network during user test _____.	<input type="checkbox"/>	<input type="checkbox"/>
	Record the number of devices in operation during the instance of 4 users.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
VERIFICATION OF GRAPHIC PRINTOUT							
51. Display the building exterior graphic on the OWS.	Verify the graphic depicts architectural components that resemble the building.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	Verify the graphic shows the building title.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
52. Print this graphic screen and attach to this test.	Printer provides graphic with dynamic values.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
53. Penetrate the building graphic to display building section graphic.	Verify the building graphic accurately depicts the floors of the building.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
54. Print this graphic screen and attach to this test.	Key elements like AHU locations and their status should be displayed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
55. Penetrate the building section graphic to display a system level graphic. A real time linked to the value presented in text is required at some point in the penetration from building view to individual device detail.	Verify that there are heating/cooling zones identified.	<input type="checkbox"/>	<input type="checkbox"/>	Presentation of error-from-setpoint by color gradation, alarm messages, or similar displays should be noted below as useful visual presentation of system operation.	<input type="checkbox"/>	<input type="checkbox"/>
	Verify there are temperatures shown in association with each zone.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Verify that all controlled variables are shown on the graphic.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Verify that graphic includes system components (i.e. Pumps, fans, coils, dampers, sensors, etc.)	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
56. Print a representative graphic screen and attach to this test.	Printer provides graphic with dynamic values.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
57. Display each mechanical system graphic.	Verify that each graphic system resembles the control submittal diagrams.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Verify that each graphic is schematic and not simple line diagrams.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Verify that each graphic consists of a system.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Verify the each graphic depicts sensors and instruments in their correct location.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Verify that each graphics point values update dynamically.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	There is an indication the display is active and real time, or non responsive.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
58. Attach one graphic printout to this test.	Printer provides graphic with dynamic values.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
RUNTIME ACCUMULATION (TOTALIZATION)						
59. From the OWS, Display the supply Fan runtime for several types of digitally controlled equipment expected to run during the test. AHU, Pumps, and Chillers are examples.	Verify they all go to zero hours run time.	<input type="checkbox"/>	<input type="checkbox"/>	Current runtime hours = _____ (note any exceptions)	<input type="checkbox"/>	<input type="checkbox"/>
	Record the time of day.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
60. Set runtimes to zero.	Display changes to show 0.0.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title Template]
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ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
61.	Verify the selected equipment is running. Start the equipment, if any are not.	All units are running.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
62.	Wait 30 minutes.	Record the time of day.	<input type="checkbox"/>	<input type="checkbox"/>	Current runtime hours = _____	<input type="checkbox"/>	<input type="checkbox"/>
		Selected device is stopped.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
63.	Stop one of the controlled equipment types started above.	Record the time of day.	<input type="checkbox"/>	<input type="checkbox"/>	Current runtime hours = _____	<input type="checkbox"/>	<input type="checkbox"/>
		Selected device is stopped.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
64.	Wait two hours.	Record the current runtime hours.	<input type="checkbox"/>	<input type="checkbox"/>	Current runtime hours = _____	<input type="checkbox"/>	<input type="checkbox"/>
		Record the time of day.	<input type="checkbox"/>	<input type="checkbox"/>	(note any exceptions)	<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
65.	Return to this step at the end of the test.	Record the current runtime hours.	<input type="checkbox"/>	<input type="checkbox"/>	Current runtime hours = _____	<input type="checkbox"/>	<input type="checkbox"/>
		Record the time of day.	<input type="checkbox"/>	<input type="checkbox"/>	(note any exceptions)	<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
66.	Display the runtime for equipment selected above.	Record the current runtime hours.	<input type="checkbox"/>	<input type="checkbox"/>	Current runtime hours = _____	<input type="checkbox"/>	<input type="checkbox"/>
		Record the time of day.	<input type="checkbox"/>	<input type="checkbox"/>	(note any exceptions)	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
67. Compare the results of beginning and end of test run time values.	Did the runtime increment by indicated time of day?	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
68. Note the runtime value for the equipment stopped during the test.	Did the runtime value freeze at the last running value?	<input type="checkbox"/>	<input type="checkbox"/>	Total runtime hours = _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
VERIFICATION OF TRENDING						
69. Program a trend of outdoor air temperature, and supply air temps from two AHU's in two different controllers.	Set trend interval to 1 minute.	<input type="checkbox"/>	<input type="checkbox"/>	Record the AHU's used for this test AHU- _____ AHU- _____	<input type="checkbox"/>	<input type="checkbox"/>
	Set samples stored to 360.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Start trending.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
70. Wait for 30 minutes. *(While waiting other test steps can be executed.)*	30 minutes of trend data is stored in the field controller.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
71. Display logged values as they	30 minutes of numerical data is sent to the printer.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
would be exported to Excel file.	Attach hardcopy to test.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
72. Display trend data graphically.	30 minutes of graphical data is sent to the printer.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Attach hardcopy to test.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
73. Upload trend data to workstation file.	Controller data is stored on OWS hard drive.	<input type="checkbox"/>	<input type="checkbox"/>	Record trend file name _____	<input type="checkbox"/>	<input type="checkbox"/>
	Controller continues to accumulate trend data.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
74. Transfer all trend data to Microsoft Excel / Text file. Print file and attach to this test.	Trends are successfully transferred to a Microsoft Excel / Text file.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
DAYLIGHT SAVINGS TIME & LEAP YEAR ADJUSTMENT						
75. Change the time of day to 23:58.	At midnight the date becomes February 29th.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
76. Change date to February 28, 2008.	At midnight the date becomes February 29th.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

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ACTION		REQUIRED REACTION		Y (✓)	N (✓)	COMMENTS		R (✓)	C (✓)
						Initial	Date		
77. Change the time of day to 01:58. Change the date to March 8, 2008.	At 2:00am the time jumps ahead to 3:00am.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		
Record issues						Issue Log Item:			
						Initial	Date		
78. Change the time of day and date to current values.	Time and date are accurate.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		
Record issues						Issue Log Item:			
						Initial	Date		
VERIFICATION OF POINT OVERRIDE									
79. Override an analog output point.	Override command is accepted.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		
	Override value is displayed at OWS.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		
Record issues						Issue Log Item:			
						Initial	Date		
80. Override an analog input point.	Override command is accepted.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		
	Override value is displayed at OWS.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		
Record issues						Issue Log Item:			
						Initial	Date		
81. Override a binary input point.	Override command is accepted.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		
	Override value is displayed at OWS.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		
Record issues						Issue Log Item:			
						Initial	Date		
82. Override a binary	Override command is accepted.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
output point.	Override value is displayed at OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
83. Override a virtual point.	Override command is accepted.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Override value is displayed at OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
84. Release all overrides.	Points return to normal state.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
85. Return to Run Time Accumulation from earlier in FPT.	Earlier test step that required a delay is now executed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
VERIFICATION OF ALARMS						
86. Ensure the printer programmed to receive system alarms is online.	Printer is powered.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Printer is online to OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
87. Send an alarm limit summary to	Verify that analog points have high and low limits programmed per specification.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
the printer. NOTE: If no limits are installed create three in different controllers for test purpose.	Attach hardcopy to this test.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
88. Override an AHU discharge air temperature (DAT) above its high limit value.	High limit alarm is displayed on screen at the OWS and printed within 5 minutes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Graphic DAT symbol on OWS changes color to indicate alarm value.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
89. Clear AHU discharge air temperature override.	High limit alarm returns to normal and is printed within 5 minutes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Graphic display of point returns to original color.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
90. Notify Fire department of planned test.	AHU stops AHU Smoke alarm is reported to the OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	AHU Smoke alarm and AHU OFF is reported to the OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	AHU Smoke alarm and AHU OFF is reported to Fire Systems DDC display in Lobby.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Alarm is printed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
91. Silence building wide horn alarm system for this test.	AHU stops AHU Smoke alarm is reported to the OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	AHU Smoke alarm and AHU OFF is reported to the OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	AHU Smoke alarm and AHU OFF is reported to Fire Systems DDC display in Lobby.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Alarm is printed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
92. Initiate a duct smoke detector alarm.	AHU stops AHU Smoke alarm is reported to the OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	AHU Smoke alarm and AHU OFF is reported to the OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	AHU Smoke alarm and AHU OFF is reported to Fire Systems DDC display in Lobby.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Alarm is printed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
93. Clear smoke alarm.	AHU remains off.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return to normal message is received at the OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return to normal message is received at the DDC fire alarm panel.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Return to normal message is printed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
94. Restart AHU.	Return to normal ON is reported at OWS and Fire Alarm Display.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Change of status is printed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
95. Reconnect building fire alarm annunciation.	System operates normally.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Record issues				Issue Log Item:
				Initial	Date	
96. Notify fire department, owner, and O&M staff that test is over.	System operates normally.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Record issues				Issue Log Item:
				Initial	Date	
97. Attach hardcopy of alarms.	Printer records / verifies results of alarm test.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Record issues				Issue Log Item:
				Initial	Date	
START / STOP FEEDBACK DELAY						
98. Override the chilled water pump status input to OFF from the OWS.	Display or graphic of the chilled water system shows override status of pump feedback point.	<input type="checkbox"/>	<input type="checkbox"/>	Note the normal cycle time before values are updated on the display _____ sec/min	<input type="checkbox"/>	<input type="checkbox"/>
		Record issues				Issue Log Item:
				Initial	Date	
99. Manually start the chilled water pump from the OWS.	Verify that a status alarm is received and record the delay in seconds.	<input type="checkbox"/>	<input type="checkbox"/>	Alarm delay time = _____	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
00. Manually stop the chilled water pump from the OWS.	Verify the status alarm automatically resets and record the delay.	<input type="checkbox"/>	<input type="checkbox"/>	Alarm reset delay = _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
SCHEDULING						
01. Display a schedule summary of all equipment at the OWS.	Display shows that equipment like Supply Fans have a schedule as defined in the sequence of operation.	<input type="checkbox"/>	<input type="checkbox"/>	The schedule may call for start and stop or Day and Night transitions If the owner has not defined a specific schedule then this test succeeds if only the ability to schedule is proven.	<input type="checkbox"/>	<input type="checkbox"/>
	Schedule has provisions for seven-days a week.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Schedule has provisions for holiday entry one full year in advance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Schedule information is displayed in "spreadsheet" format.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
02. Display an optimized start stop schedule showing OAT, space temperatures and equation for start advance.	Program and initiator exists.	<input type="checkbox"/>	<input type="checkbox"/>	The intent of this test step is to verify how the system will "anticipate" occupancy schedules in order to reach occupied space conditions no later than the scheduled time. At time of test record the: Outside air temperature: _____'F Critical Space temperature: _____'F Optimum start time range: _____min	<input type="checkbox"/>	<input type="checkbox"/>
	Fans and related sensors are assigned to the program.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
03. Select any fan scheduled to be running.	Fan stops on loss of power.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Alarm reports to BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	When power is restored fan is restarted automatically because it is still in the scheduled run time.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
04. Disconnect power simulating an outage.	Fan stops on loss of power.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Alarm reports to BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	When power is restored fan is restarted automatically because it is still in the scheduled run time.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
05. After one minute restore power.	Fan stops on loss of power.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Alarm reports to BAS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	When power is restored fan is restarted automatically because it is still in the scheduled run time.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
06. Print a hardcopy of the listed summary reports.	Attach hard copy to this test form.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Record issues				Issue Log Item:
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
SOFTWARE COMMUNICATIONS						
07. Disconnect power from any controller. This is the "first" controller for this test. NOTE: If controllers are on local UPS only the loss of power will be reported. If so then turn off the power to communication device.	Loss of communication is reported to the OWS.	<input type="checkbox"/>	<input type="checkbox"/>	Controller Address = _____	<input type="checkbox"/>	<input type="checkbox"/>
	Loss of communication is printed at OWS.	<input type="checkbox"/>	<input type="checkbox"/>	Controller Location = _____	<input type="checkbox"/>	<input type="checkbox"/>
	Time delay for report does not exceed 1 minute.	<input type="checkbox"/>	<input type="checkbox"/>	Controller Model = _____ Time delay before reported _____ Sec	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
08. Verify other controllers continue to operate normally.	Access to data values and execution of commands is not affected by loss of one network controller.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
09. Program a scheduled event (a fan starts) to happen in the immediate future in the controller second on the network from the first.	Loss of communication is reported to the OWS.	<input type="checkbox"/>	<input type="checkbox"/>	The panels may be in the same physical location or far apart, it is the location on the network cable that is important. If a Hub style network they should be on the same Hub. Controller Address = _____ Controller Location = _____ Controller Model = _____	<input type="checkbox"/>	<input type="checkbox"/>
	Loss of communication is printed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The controller between two failed controllers continues to operate.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
10. Disconnect power from the "second" controller before the scheduled event.	Loss of communication is reported to the OWS.	<input type="checkbox"/>	<input type="checkbox"/>	The panels may be in the same physical location or far apart, it is the location on the network cable that is important. If a Hub style network they should be on the same Hub. Controller Address = _____ Controller Location = _____ Controller Model = _____	<input type="checkbox"/>	<input type="checkbox"/>
	Loss of communication is printed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The controller between two failed controllers continues to operate.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
11. Wait for the time of the scheduled event to pass by at least two minutes.	Communication normal message is received at the OWS.	<input type="checkbox"/>	<input type="checkbox"/>	Note time power restored to controllers First Controller _____	<input type="checkbox"/>	<input type="checkbox"/>
	Communication normal message is printed.	<input type="checkbox"/>	<input type="checkbox"/>	Second Controller _____	<input type="checkbox"/>	<input type="checkbox"/>
	DDC monitor.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Both controllers recover and operate on the network as before the outage.	<input type="checkbox"/>	<input type="checkbox"/>	Note time stamp controllers report Return to DDC system	<input type="checkbox"/>	<input type="checkbox"/>
	Data exchanged to synchronize clocks.	<input type="checkbox"/>	<input type="checkbox"/>	First Controller _____	<input type="checkbox"/>	<input type="checkbox"/>
	Update changes will include execution of the event scheduled during outage, and report the analog alarm.	<input type="checkbox"/>	<input type="checkbox"/>	Second Controller _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
12. Reconnect the network wiring to both controllers. (note record the time each one is powered on)	Communication normal message is received at the OWS.	<input type="checkbox"/>	<input type="checkbox"/>	Note time power restored to controllers First Controller	<input type="checkbox"/>	<input type="checkbox"/>
	Communication normal message is printed.	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/>	<input type="checkbox"/>
	DDC monitor.	<input type="checkbox"/>	<input type="checkbox"/>	_____	<input type="checkbox"/>	<input type="checkbox"/>
	Both controllers recover and operate on the network as before the outage.	<input type="checkbox"/>	<input type="checkbox"/>	Note time stamp controllers report Return to DDC system	<input type="checkbox"/>	<input type="checkbox"/>
	Data exchanged to synchronize clocks.	<input type="checkbox"/>	<input type="checkbox"/>	First Controller _____	<input type="checkbox"/>	<input type="checkbox"/>
	Update changes will include execution of the event scheduled during outage, and report the analog alarm.	<input type="checkbox"/>	<input type="checkbox"/>	Second Controller _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
13. Attach hardcopy of alarms.	Printer record verifies results of alarm test.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
14. Verify operations are restored as normal.	Operations are normal.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
GLOBAL PARAMETER MODIFICATION						
15. From the OWS sample control	All controllers are reporting normally.	<input type="checkbox"/>	<input type="checkbox"/>	All controllers should be on line and should	<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
points to identify that required control parameters (line code variables) exist for each controller. This is not an all point review, but does require validation of each controller.	Each controller includes a list of control parameters including set points, PID gains and delays, dead band range, schedules, and alarm limits are available for the points associated with the controller.	<input type="checkbox"/>	<input type="checkbox"/>	update their clock time to be synchronous to the master clock.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
16. Change the time value of the central clock and the temperature value of the common Outside Air.	All Controller Equipment Programs show the revised time.	<input type="checkbox"/>	<input type="checkbox"/>	Not all controllers will use a central OAT. If they do not show the revised value verify they are using some other specific measured value as an exception to the universal OAT.	<input type="checkbox"/>	<input type="checkbox"/>
	All Controller Equipment Programs show changed OAT.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
17. Restore correct values for time and OAT.	System returns to normal operation within 5 minutes.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Controller parameters match OWS.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
DISTRIBUTED PARAMETER MODIFICATION MANUAL AND AUTOMATIC REST						
18. Connect directly by laptop or other handheld communication device to a field controller.	Normal operation continues.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A list of values including set points, PID gains and delays, dead band range, schedules, and alarm limits are available for evaluation and modification.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
19. From the direct connect field interface provide a list of control parameters for all controlled equipment connected to this panel.	Normal operation continues.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	A list of values including set points, PID gains and delays, dead band range, schedules, and alarm limits are available for evaluation and modification.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
20. List the Boiler System Reset input parameters.	The hot water supply set point is reduced.	<input type="checkbox"/>	<input type="checkbox"/>	The intent of this step is to verify that the DDC system can be modified globally from a local field control panel.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
21. Change the listed Outside Air Temp values above actual.	The hot water supply set point is reduced.	<input type="checkbox"/>	<input type="checkbox"/>	The intent of this step is to verify that the DDC system can be modified globally from a local field control panel.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
22. Restore normal control values.	Boiler water returns to value before the test.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
23. Disconnect the network cable from the field controller.	Panel continues to operate, an alarm "loss of panel" reports to OWS.	<input type="checkbox"/>	<input type="checkbox"/>	Check passwords, default set points and schedules on loss of network.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
24. The previous 6 steps can be repeated for a sample controller in other zones.	The sample controller selected represents all controllers on network.	<input type="checkbox"/>	<input type="checkbox"/>	IF there is some reason to suspect differences in communication from different areas to DDC then repetition of the preceding 12 steps for each of those areas would be useful.	<input type="checkbox"/>	<input type="checkbox"/>
	OR Additional controllers were tested and each controller succeeded as described above.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
PROGRAM TRANSFER						
25. Change a parameter to create a unique file and Initiate an upload of the application program from any controller from OWS.	Verify the program is successfully uploaded and stored at the OWS.	<input type="checkbox"/>	<input type="checkbox"/>	Controller Address _____ Controller Location _____ Controller Model _____ PC file name _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
26. Correct the parameter changed and Initiate a download of the application program file uploaded in the previous step.	Verify the program is successfully downloaded to the controller.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Verify the controller is properly functioning after the download.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
27. Restore physical set point or other logical changes to pre test conditions.	System operates normally.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

[Project Title Template]
[Project Location Template]

ACTION		REQUIRED REACTION		Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
						Initial	Date	
28. Return to Run Time Accumulation earlier in FPT.	Earlier test step that required a delay is now executed.	<input type="checkbox"/>	<input type="checkbox"/>	This is a reminder for closure of steps initiated in Run Time Accumulation.		<input type="checkbox"/>	<input type="checkbox"/>	
	Record runtime in test step above.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	
Record issues						Issue Log Item:		
						Initial	Date	
29. Restore normal power to DDC from UPS test, if not already done.	Record action results in steps above.	<input type="checkbox"/>	<input type="checkbox"/>	This is a reminder for closure of steps initiated in "Installation Integrity" and "Trending" sections above.		<input type="checkbox"/>	<input type="checkbox"/>	
Record issues						Issue Log Item:		
						Initial	Date	
30. Stop Trend log and print files when done.	Record action results in steps above.	<input type="checkbox"/>	<input type="checkbox"/>	This is a reminder for closure of steps initiated in "Installation Integrity" and "Trending" sections above.		<input type="checkbox"/>	<input type="checkbox"/>	
Record issues						Issue Log Item:		
						Initial	Date	
RETURN TO NORMAL CONDITIONS								
31. Record test stop time	Recorded	<input type="checkbox"/>	<input type="checkbox"/>	Time _____ (am/pm)		<input type="checkbox"/>	<input type="checkbox"/>	
Record issues						Issue Log Item:		
						Initial	Date	

Sensor Verification

All field-installed sensors and gages on this piece of equipment shall be observed for appropriate readings during the execution of the HVAC systems FPT.

Confirm the following devices and values are provided in the DDC graphics

Device	parameter	Presents on graphic	Trend Log	Limit Alarm / failure
Electric Meter		Yes /NO	Yes /NO	Yes /NO fault

[Project Title Template]
[Project Location Template]

	kW (demand level)	Yes /NO value& level 1 alarm	Yes /NO value	Yes /NO level 1
		Yes /NO alarm L2		Yes /NO level 2
		Yes /NO alarm L3	Peak history	Yes /NO level 3
	kWh (use history)	Yes /NO	Yes /NO daily	Yes /NO
			Yes /NO monthly	Yes /NO
			Yes /NO annual	Yes /NO
Water		Yes /NO	Yes /NO	Yes /NO fault
	100 Gallons	Yes /NO	Yes /NO daily	Yes /NO peak high
			Yes /NO monthly	Yes /NO peak low
			Yes /NO annual	
Gas		Yes /NO	Yes /NO	Yes /NO fault
	100 CCF	Yes /NO	Yes /NO daily	Yes /NO peak high
			Yes /NO monthly	Yes /NO peak low
			Yes /NO annual	
OUTSIDE Air T		Yes /NO	Yes /NO daily	Yes /NO fault
			Yes /NO monthly	
			Yes /NO annual	

Device Verification

The actuators or devices listed equipment shall be observed for appropriate action during the execution of the HVAC systems FPT.

Final Sign-Off

Commissioning Agent	Printed Name	Initials	Date
CONTRACTOR	PRINTED NAME	INITIALS	DATE
General Contractor (GC)			
Mechanical Contractor (MC)			
Electrical Contractor (EC)			
TAB Contractor (TAB)			
Controls Contractor (CC)			
Owner's O&M Personnel			

Grounding & Bonding for Electrical Systems Functional Performance Test

Equipment ID	[Equipment ID]
Building	{Building}
Location	[Room]

System Description

Description:

Operational Assumptions:

Initial Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 1	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 2	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

[Project Title Template]
[Project Location Template]

Deferred/Seasonal Test		Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:			

Test Participants

Organization	Required	Optional
General Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Electrical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
TAB Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Controls Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Owner's O&M Personnel	<input type="checkbox"/>	<input type="checkbox"/>

Test Equipment Required (to be provided by the Contractor)

Test Name	Equipment Description
Bolt Torque	Calibrated torque wrench
Contact Resistance	Four-probe Digital Low Resistance Ohmmeter (DLRO)
Voltage/Continuity	DVM
Fall of Potential	Fall-of-Potential Ground Resistance Tester

Functional Performance Test -- (Verify all components are ready before energizing or operating the system.)

The Commissioning Authority will make and document any changes/addition/deletions to this test procedure required by current system conditions (i.e. weather, system load, utility availability, etc.).

R = Retest (Check (✓) retest required)

Y= Checked and Passed

C = Corrected (Check (✓) when correction verified)

N = Not Passed

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
PRE-TEST VISUAL MECHANICAL INSPECTION						
32. Verify equipment identification.	Equipment identification and plan location matches shop drawings and specifications.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Field wiring terminations match record drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
33. Confirm that system is installed per contract documents with indicated connections to each unit of electrical equipment	Connections to equipment ground buses per drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Connections to equipment enclosures/cases per drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Connections to wire mesh fence per drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Gate grounding jumper installed per drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Connections to main cold water pipes per drawings and specs.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Connections to dry type transformers per drawings and specs.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Measured diameter of bare copper conductor corresponds to diameter of specified conductors.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Conduits with grounding bushings and full-size bonding conductors.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
All busses mounted on standoff neoprene insulators.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Record issues				Issue Log Item:		
				Initial	Date	
34. Observe condition of ground ring before backfill and/or cover applied.	No visible damage to cable.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cable depth a minimum of 3'0".	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Ground rod configuration and depth as shown on drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
35. Observe main ground wall mounted grounding bar.	Dimensions as specified _____ long, 4" x 1/4".	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Standoff distance 5" from wall as shown on drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Connections are welded or bolted as per the approved submittals and construction drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
36. Observe electrical closet ground buses	Buses: Copper, 1/4" x 2" x 10" minimum, length as shown on drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Buses mounted on standoff neoprene insulator - standoff distance 1" from wall as shown on drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Bus length to accommodate 100% spare.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Connections are welded or bolted as per the approved submittals and construction drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
37. Observe telecom closet ground buses	Buses: Copper, 1/4" x 2" x 8" provided by each telecom backboard.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
38. Inspect compression type and exothermically welded connections	Cables do not rotate with respect to each other or to steel column, etc. (All connections are solid).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
39. Inspect grounding connection at service entrance	Connection point is per (not beyond service disconnect) NEC 250-23.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Neutral is solidly grounded at service disconnect, and at no point beyond.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
40. Verify equipment grounding conductor termination.	Grounding connections are made with non-reversible connections.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Record issues				Issue Log Item:	
				Initial	Date	
41. Verify tightness of accessible bolted electrical connections with calibrated torque wrench.	Bolted torque should comply with NETA Table 100.12 unless manufacturer specified values are listed on the equipment.	<input type="checkbox"/>	<input type="checkbox"/>	Record data in Contact Integrity Table Bolt Torque	<input type="checkbox"/>	<input type="checkbox"/>
	If Contractor's Test Reports are received and used in lieu of 100% testing, perform random checks of tightness of bolted electrical connections. Randomly Test 10% of connections. If any are not tight, test 100%.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
GROUNDING ELECTRICAL INTEGRITY						
42. Perform resistance test of <u>non-</u>	Resistance shall be less than 500 micro-ohms.	<input type="checkbox"/>	<input type="checkbox"/>	Note: For connections that are inaccessible or	<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
<p><u>accessible</u> bolted electrical system connections using a Digital Low Resistance Ohmmeter (DLRO) and non-bolted electrical system connections using a DVM.</p>	<p>Compare connection resistance to values of similar connections. Values should be within 10% of each other.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<p>unable to be verified by torque (ex: welded connections), conduct a DLRO measurement of connection resistance across connection from closest accessible point on each side.</p> <p>Record Data in Contact Integrity Table – DLRO/DVM</p>	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
43. Verify the ground system is complete (connections to building steel, water main etc.) and tested prior to performing the final “system” fall of potential.		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
44. Perform and evaluate a Fall-of-Potential test on the grounding system.	The curve should be “flat” between Y ₁ and Y ₂	<input type="checkbox"/>	<input type="checkbox"/>	The fall of potential test consists of plotting the ratio of V/I-R as a function of probe spacing. A value of impedance is obtained at Y, Y ₁ and Y ₂ . This impedance is plotted as a function of distance, and	<input type="checkbox"/>	<input type="checkbox"/>
	The resistance value at distance Y is effective resistance of the electrode or system.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Results are less than or equal to 10 ohms.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
		<input type="checkbox"/>	<input type="checkbox"/>	<p>the value in ohms at which this plotted curve appears to level out is taken as the impedance value of the ground under test.</p> <p>If the curve is not flat between Y_1 and Y_2 additional impedance measurements must be taken. Position the potential probe at several additional distances between the electrode and current probe Z. Record distances and plots the impedance to obtain the flat area of the curve.</p> <p>Attach a copy of the Fall-of-Potential contractor's test report on all individual ground rods.</p> <p>Record values in Fall of Potential Table.</p>	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

Test Equipment Used:

Test Name	Manufacturer	Model Number	Serial Number	Calibration (Date)

Fall of Potential

Electrode ID	Distance (Y ₁)	Distance Y	Distance (Y ₂)	Distance (Z)	Resistance	AT	RH	Date

AT=Ambient Temperature

RH = Relative Humidity

Final Sign-Off

Commissioning Agent	Printed Name	Initials	Date
CONTRACTOR	PRINTED NAME	INITIALS	DATE
General Contractor (GC)			
Mechanical Contractor (MC)			
Electrical Contractor (EC)			
TAB Contractor (TAB)			
Controls Contractor (CC)			
Owner's O&M Personnel			

TABLE 100.12.1
Bolt-Torque Values for Electrical Connections

US Standard Fasteners ^a
Heat-Treated Steel – Cadmium or Zinc Plated ^b

Grade	SAE 1&2	SAE 5	SAE 7	SAE 8
Head Marking				
Minimum Tensile (Strength) (lbf/in ²)	64K	105K	133K	150K
Bolt Diameter (Inches)	Torque (Pound-Feet)			
1/4	4	6	8	8
5/16	7	11	15	18
3/8	12	20	27	30
7/16	19	32	44	48
1/2	30	48	68	74
9/16	42	70	96	105
5/8	59	96	135	145
3/4	96	160	225	235
7/8	150	240	350	380
1.0	225	370	530	570

- a. Consult manufacturer for equipment supplied with metric fasteners.
- b. Table is based on national coarse thread pitch.

Low-Voltage Switchgear Functional Performance Test

Equipment ID	[Equipment ID]
Building	[Building]
Location	[Room]

System Description

Description:

Operational Assumptions:

Initial Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 1	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 2	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

[Project Title Template]
[Project Location Template]

Deferred/Seasonal Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation: <div style="height: 80px;"></div>		

Test Participants

Organization	Required	Optional
General Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Electrical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
TAB Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Controls Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Owner's O&M Personnel	<input type="checkbox"/>	<input type="checkbox"/>

Test Instruments (To Be Provided By the Contractor)

Recommended Test Equipment (or Equivalent):

Test	Equipment Description
Bolt Torque	Calibrated torque wrench
Wiring Impedance	Low impedance ac millammeter
Sound Level	Calibrated decibel meter

System Readiness Summary Checklist

Description	Yes	No	Date
System Ready for Test	<input type="checkbox"/>	<input type="checkbox"/>	
Required Personnel Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Tools/Test Equipment/Supplies Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Safety Equipment Available	<input type="checkbox"/>	<input type="checkbox"/>	

Functional Performance Test -- (Verify all components are ready before energizing or operating the system.)

The Commissioning Authority will make and document any changes/addition/deletions to this test procedure required by current system conditions (i.e. weather, system load, utility availability, etc.).

R = Retest (Check (✓) retest required)

Y= Checked and Passed

C = Corrected (Check (✓) when correction verified)

N = Not Passed

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
PRE-TEST VISUAL MECHANICAL INSPECTION						
45. Safe conditions (protective gear in-place, available & procedures observed)		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
46. Verify panelboard installations	Isolation transformer installed with electrostatic shield between primary and secondary winding and connected to ground.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Completed panelboard schedules.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Appropriate anchorage.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Required area clearances. 3 ft in front and 30 in wide.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	No physical damage.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Breaker casing does not have cracks.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Correct alignment.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
47. Inspect panelboard doors, panels, and sections	Free of Corrosion, dents, scratches, fit.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	No missing screws.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	No open unused knockouts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	No missing hardware.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
48. Verify panelboard configuration and nameplate data matches shop drawings, one-line diagram and specification	Volts:_____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Bus Amps: _____A.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	3ph, 4W.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Frequency: 60hZ.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Enclosure: _____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Transformer _____KVA.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Transformer _____V.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Transformer class _____ insulation rating.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Transformer 60Hz.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Main Breaker Max. Rating. _____ Amp.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Panelboard arrangement _____ # of circuits.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	_____ Percent Spares.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	_____ Space.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Neutral size _____.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	LIM installed provides continuous monitoring of impedance of each phase to ground.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	LIM combined analog and digital display.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	LIM capable of detecting all combinations of capacitive, resistive, balanced, unbalanced and hybrid faults.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	LIM contains audible alarm and alarm silence button.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	LIM contains Indication LEDs.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	LIM contains Test Button.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	LIM contains remote terminal connections.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
49. Verify panelboard equipment grounding	Solid neutral mounted in main circuit breaker compartment with main lugs, is insulated.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Neutral is bonded to ground.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Frame and enclosure connected to ground bus.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Breaker and feeder equipment grounding conductors/conduit are connected to ground bus.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
50. After testing is performed on the panelboard, verify tightness of main connections	Primary feeder cable connections properly torqued and marked.	<input type="checkbox"/>	<input type="checkbox"/>	Bolted torque should comply with NETA Table 100.12 unless manufacturer specified values are listed on the equipment. Test Name: Feeder Termination Torque Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
CAUTION: Before performing the next step, verify that all "Lock-Out / Tag-Out" safety precautions have been adhered to.						
51. Operate each circuit breaker (5) times to ensure smooth operation	Breaker opens and closes in a smooth motion without binding.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
ELECTRICAL INTEGRITY						
52. Measure sound level of isolation transformer	25dB for 5kVA or less transformer.	<input type="checkbox"/>	<input type="checkbox"/>	Test Name: Sound level Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
	30dB for 7.5 kVA transformer.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	35dB for 10 and 15kVA transformers.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	40dBfor 20 and 25kVA transformers.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
53. Perform continuity check on each branch circuit	Correct continuity is verified.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title Template]
[Project Location Template]

ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues					Issue Log Item:		
					Initial	Date	
54. Measure each isolated wiring impedance to ground	Impedance shall exceed 200,000 ohms.	<input type="checkbox"/>	<input type="checkbox"/>	Test Name: Wire Impedance Reference Equip. Table Record results as a reference for subsequent line-impedance evaluation. Record results in Data Table	<input type="checkbox"/>	<input type="checkbox"/>	
Record issues					Issue Log Item:		
					Initial	Date	
LINE ISOLATION MONITOR							
55. Isolation power panel is in normal operation	Green signaling lamp is indicated on the panel.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	Green signal shall be indicated at the remote monitoring station.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
56. Ground each line of the energized distribution system through a resistor 200 times the measured line voltage	Red signaling lamp is illuminated and local alarm is annunciated.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table		<input type="checkbox"/>	<input type="checkbox"/>
	Green signal shall be indicated at the remote monitoring station.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
	Alarm resets automatically after ground is removed.	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
57. During each line grounding test	Local and Remote Audible alarm silences.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table	<input type="checkbox"/>	<input type="checkbox"/>	

[Project Title Template]
[Project Location Template]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
press the audible alarm silence button	Local and Remote Red indicating light remains illuminated.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
58. Activate test switch	Red signaling lamp is illuminated and local alarm is annunciated.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Red signal shall be indicated at the remote monitoring station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Alarm resets automatically after release of test switch.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
FINAL INSPECTION						
59. At the conclusion of testing, inspect interior hardware and electrical terminations	All hardware in place and properly torqued.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Compartments clear of tools and hardware.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

Test Equipment Used:

Test Name	Manufacturer	Model Number	Serial Number	Calibration (Date)

Panel Data

Parameter	Data
Equipment ID:	
Manufacturer:	
Model Number:	
Serial Number:	
Mfgr. Date:	
Bus Amps:	
Volts:	
Phase/Wire/Frequency:	
Enclosure NEMA Rating:	
Short Circuit Rating:	
Isolation Transformer KVA	
Isolation Transformer Voltage	
LIM Manufacturer	

Feeder Termination Torque (Newton Meters or Foot-Pounds)

Bolt or Lug	A	B	C	N	G
Feeder Lugs					
Feeder Lugs					

Sound Level

Transformer	KVA	Sound Level (Decibel)

Wire Impedance (200,000 OHMS)

Conductor		Torque Verified		DLRO/DVM		Continuity Verified	Date
From (A)	To (B)	(A)	(B)	(A)	(B)		

Final Sign-Off

Commissioning Agent	Printed Name	Initials	Date
CONTRACTOR	PRINTED NAME	INITIALS	DATE
General Contractor (GC)			
Mechanical Contractor (MC)			
Electrical Contractor (EC)			
TAB Contractor (TAB)			
Controls Contractor (CC)			
Owner's O&M Personnel			

Switchboards Functional Performance Test

Equipment ID	[Equipment ID]
Building	[Building]
Location	[Room]

System Description

Description:

Operational Assumptions:

Initial Test		Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:			

Re-Test 1		Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:			

Re-Test 2		Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:			

[Project Title]
[Project Location]

Deferred/Seasonal Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Test Participants

Organization	Required	Optional
General Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Electrical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
TAB Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Controls Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Owner's O&M Personnel	<input type="checkbox"/>	<input type="checkbox"/>

Pre-Functional Performance Test Summary

Description	Yes	No	Date
System ready for test	<input type="checkbox"/>	<input type="checkbox"/>	
Required personnel available	<input type="checkbox"/>	<input type="checkbox"/>	
Required tools/test equipment/supplies available	<input type="checkbox"/>	<input type="checkbox"/>	
Required safety equipment available	<input type="checkbox"/>	<input type="checkbox"/>	

TEST INSTRUMENTS (to be provided by the Contractor)

Test Equipment Required:

Test Name	Equipment Description
Contact Resistance	Four-probe Digital Low Resistance Ohmmeter (DLRO)
Insulation Resistance	Megger-battery or line-powered (Hand-crank not acceptable)
DI Electric Withstand	High Potential Tester
Bolt Torque	Calibrated torque wrench
Relay Operation	Variable AC Voltage source
Voltage/Continuity	DVM

Functional Performance Test -- (Verify all components are ready before energizing or operating the system.)

The Commissioning Authority will make and document any changes/addition/deletions to this test procedure required by current system conditions (i.e. weather, system load, utility availability, etc.).

R = Retest (Check (✓) retest required)

Y= Checked and Passed

C = Corrected (Check (✓) when correction verified)

N = Not Passed

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
PRE-TEST VISUAL MECHANICAL INSPECTION						
60. Safe conditions (protective gear in-place, available & procedures observed)		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
61. Inspect the exterior of the switchgear	No evidence of damage.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Surfaces are clean.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	All doors, panels, and hardware present.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	All doors swing freely, latch in open and closed positions.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Feeder cable/bus routing doesn't obstruct access for operation or maintenance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
62. Verify anchoring	Anchor bolts are provided in locations shown on manufacturer's drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title]
[Project Location]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
63. Verify ratings and configuration. Nameplate data match shop drawings and specifications	Volts: 480/277V.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Amps: 4000A.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	3ph, 4W.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Frequency: 60hZ.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Interrupting Rating: 65kAIC.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Enclosure: NEMA 1.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
64. Verify permanent labels are installed	Equipment labeled with name plates which are black engraved surface on white core for normal power circuits and red engraved surface on white core for emergency power circuits.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Labels include unit number, voltage, and origin of service.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
65. TVSS provided as required by drawings	Conductor length is as short as possible.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Conductor bends are minimized.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Conductors are no longer than 24 inches.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Installed on load side of main circuit breaker.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Indicator lights are functional.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title]
[Project Location]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Surge event operation counter reads zero.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	TVSS is equipped with remote monitoring contacts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
66. Inspect the control wiring for proper support, routing, protection	Control wires are supported well clear of the path of movement of breakers and auxiliary device trays.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	All wires labeled both ends.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Control wire termination connections tight and cannot be pulled from connection.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The wire bundle at the door is supported clear of the hinge.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
67. Verify rating of all control circuit protective devices match shop drawings	Fuse and circuit breaker ratings match drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Device labels match drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
68. Verify control power transformer installation	Control power transformer installation per the schematic drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title]
[Project Location]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
69. Verify grounding	Connection from station ground grid to equipment ground bus. (possibly at multiple locations).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Frames and enclosures bolted to ground buss.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Breaker and feeder equipment grounding conductor/conduit are connected to the ground buss.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Measured diameter of bare copper conductor corresponds to diameter of specified conductors.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Neutral is bonded to ground at switchgear, not transformer.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
70. Verify provision and proper operation of integral rail mounted, breaker lifting device	Remove circuit breaker using device and confirm full operation.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Confirm that lifter travels entire length of switchgear smoothly to the end of travel.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
71. Operate each circuit breaker (5) times to ensure smooth operation	Breaker opens and closes in a smooth motion without binding.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title]
[Project Location]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
ELECTRICAL INTEGRITY						
72. Disconnect PTs, CPTs, surge arrestors, and circuit breakers		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
73. Disconnect the main bonding jumpers at the switchgear		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
74. Perform an insulation resistance test at 1000VDC on each bus section, phase-to-phase and phase to ground with the circuit breakers connected in the closed position	Minimum insulation resistance shall be 100 Megohms.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Insulation Resistance Data Table. Test with all circuit breakers in the closed position Test for one minute in accordance with NETA Table 100.1. Feeder conductors should not be terminated	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
75. Perform an insulation resistance test at 1000 VDC on the neutral bus section to ground	Minimum insulation resistance shall be 100 Megohms.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Insulation Resistance Data Table Test for one minute in accordance with NETA Table 100.1.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

[Project Title]
[Project Location]

ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
					Initial	Date	
76.	With the breaker in the closed position, measure the contact resistance of each phase of circuit breakers rated 400A and greater	Readings are within 50% of the average value.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Contact Resistance Data Table.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
77.	Re-connect the main bonding jumpers and verify tightness with a calibrated torque wrench		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
78.	Reconnect surge, arrestors, TVSS, CPT's, and PTs		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
79.	Reconnect CT grounds		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
80.	After testing is performed on the switchboard, verify tightness of field	Primary connections properly torqued and marked.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Feeder Termination Torque Data Table.	<input type="checkbox"/>	<input type="checkbox"/>
		Bus-to-bus connections properly torqued and marked.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title]
[Project Location]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
landed feeder terminations and bus-to-bus connections	TVSS connections are properly torqued and marked.	<input type="checkbox"/>	<input type="checkbox"/>	Bolted torque should comply with NETA Table 100.12 unless manufacturer specified values are listed on the equipment. Secondary distribution feeder connections are not included in the test. Black marker marked across the head of the bolt and bus.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
FUNCTIONAL TRIP TESTS						
81. Test the long time delay (seconds) and long time pickup current (amperes) setting on device breakers rated 400A and greater, by using primary current injection.	Long delay current pick up and time delay per coordination study.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Current Injection Data Table.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
82. Test the short time delay (seconds) and short time pickup current (amperes) setting on device breakers rated 400A and greater, by using primary current injection	Short delay current pick up and time delay per coordination study.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Current Injection Data Table.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

[Project Title]
[Project Location]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
83. Test the instantaneous time delay (seconds) and instantaneous time pickup current (amperes) setting on device breakers rated 400A and greater, by using primary current injection	Instantaneous pick up per coordination study.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Current Injection Data Table.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
84. Test the ground fault time delay (seconds) and ground fault time pickup current (amperes) setting on device breakers rated 400A and greater, by using primary current injection.	Ground fault pick up per coordination study.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Current Injection Data Table.	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
METERING						
85. Verify the nameplate matches the shop drawings	Model Number: ____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Meter supply voltage matches the AC control power supply.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title]
[Project Location]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
86. Verify all metering circuits	Components and wire labels match the drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Verify control power wiring to the meter.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CT and PT locations, polarity, fusing, and wiring match the drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	CT poles shall have shorting auxiliary contacts. Screws removed from CT shorting blocks.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Confirm tightness of all (100%) CT wiring with screwdriver.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
87. Verify the correct parameters have been programmed into the meter	3ph, 4w, 1000:5 CT, 480:277V PT configuration has been entered into the meter.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The correct PT ratio of 480:277 has been entered into the meter.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The correct secondary L-N voltage 120V has been entered into the meter.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The current transformer ratio 1000:5 has been correctly entered into the meter.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Phase rotation is ____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	The correct frequency 60 Hz has been entered into the meter.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Password is ____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title]
[Project Location]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
FINAL INSPECTION						
88. At the conclusion of testing, inspect interior hardware and electrical terminations	All hardware in place and properly torqued.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Compartments clear of tools and hardware.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

Test Equipment Used:

Test Name	Manufacturer	Model Number	Serial Number	Calibration (Date)

Temperature: _____ Relative Humidity: _____

Insulation Resistance (1000 VDC)

Circuit Breaker (Closed)	A-B	B-C	C-A	A-G	B-G	C-G	N
1 Minute (Meg Ohms)							
Circuit Breaker (open)	A-A	B-B	C-C				
1 Minute (Meg Ohms)							

Circuit Breaker Contact Resistance

Phase	A	B	C
(Micro Ohms)			

Feeder Termination Torque (Newton Meters or Foot-Pounds)

Bolt or Lug	A	B	C	N	G
Feeder Lugs					
Feeder Lugs					

Current Injection

Function	Actual Set.	Test Setting	Test Point	Nominal Val.	A	B	C
LTD							
LDPU							
STD							
SDPU							
INSTPU							
GFD							
GFPU							

Final Sign-Off

Commissioning Agent	Printed Name	Initials	Date
CONTRACTOR	PRINTED NAME	INITIALS	DATE
General Contractor (GC)			
Mechanical Contractor (MC)			
Electrical Contractor (EC)			
TAB Contractor (TAB)			
Controls Contractor (CC)			
Owner's O&M Personnel			

TABLE 100.1

**Insulation Resistance Test Values
Electrical Apparatus and Systems**

Nominal Rating Of Equipment in Volts	Minimum Test Voltage, DC	Recommended Minimum Insulation Resistance in Megohms
250	500	25
600	1,000	100
1,000	1,000	100
2,500	1,000	500
5,000	2,500	1,000
8,000	2,500	2,000
15,000	2,500	5,000
25,000	5,000	20,000
34,500 and above	15,000	100,000

In the absence of consensus standards dealing with insulation-resistance tests, the Standards Review Council suggests the above representative values.

See Table 100.10 for temperature correction factors.

Test results are dependent on the temperature of the insulating material and the humidity of the surrounding environment at the time of the test.

Insulation-resistance test data may be used to establish a trending pattern. Deviations from the baseline information permit evaluation of the insulation.

TABLE 100.12.1
Bolt-Torque Values for Electrical Connections

US Standard Fasteners ^a
Heat-Treated Steel – Cadmium or Zinc Plated ^b

Grade	SAE 1&2	SAE 5	SAE 7	SAE 8
Head Marking				
Minimum Tensile (Strength) (lbf/in ²)	64K	105K	133K	150K
Bolt Diameter (Inches)	Torque (Pound-Feet)			
1/4	4	6	8	8
5/16	7	11	15	18
3/8	12	20	27	30
7/16	19	32	44	48
1/2	30	48	68	74
9/16	42	70	96	105
5/8	59	96	135	145
3/4	96	160	225	235
7/8	150	240	350	380
1.0	225	370	530	570

- c. Consult manufacturer for equipment supplied with metric fasteners.
- d. Table is based on national coarse thread pitch.

Panelboards Functional Performance Test

Equipment ID	[Equipment ID]
Building	[Building]
Location	[Room]

System Description

Description:
Operational Assumptions:

Initial Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 1	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 2	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

[Project Title]
[Project Location]

Deferred/Seasonal Test		Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:			

Test Equipment Required (to be provided by the Contractor)

Test Name	Equipment Description
Bolt Torque	Calibrated torque wrench
Voltage/Continuity	DVM
Insulation Resistance	Battery or line-powered (Hand-crank not acceptable).
Variable Voltage Source	3-Phase variable voltage source

Test Participants

Organization	Required	Optional
General Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Electrical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
TAB Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Controls Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Owner's O&M Personnel	<input type="checkbox"/>	<input type="checkbox"/>

Functional Performance Test -- (Verify all components are ready before energizing or operating the system.)

The Commissioning Authority will make and document any changes/addition/deletions to this test procedure required by current system conditions (i.e. weather, system load, utility availability, etc.).

R = Retest (Check (✓) retest required)

Y= Checked and Passed

C = Corrected (Check (✓) when correction verified)

N = Not Passed

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
PRE-TEST VISUAL MECHANICAL INSPECTION						
89. Safe conditions (protective gear in-place, available & procedures observed)		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
90. Verify panelboard installations	Completed panelboard schedules.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Appropriate anchorage.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Required area clearances. 3 ft in front and 30 in wide.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	No physical damage.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Breaker casing does not have cracks.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Correct alignment.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Feeder color-coding is: 480/277 V System as follows: Phase A: Brown Phase B: Orange Phase C: Yellow Neutral: Gray Ground: Green	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
91. Inspect panelboard doors, panels, and	Free of Corrosion, dents, scratches, fit.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title]
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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
sections	No missing hardware.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	No missing screws.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	No open unused knockouts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
92. Verify panelboard configuration and nameplate data matches shop drawings, one-line diagram and specification	Volts: 480/277V.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Bus Amps: ____A.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	3ph, 4W.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Frequency: 60hZ.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Enclosure: NEMA 1.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Main Breaker Max. Rating. ____ Amp.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Isolated Equipment Ground Bus if applicable.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Panelboard arrangement - # of circuits.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Neutral bus size (100%).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Extra Gutter space as applicable.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Shunt trip as indicated.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
TVSS as indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

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ACTION		REQUIRED REACTION		Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues						Issue Log Item:		
						Initial	Date	
93. Verify panelboard equipment grounding	Solid neutral mounted in main circuit breaker compartment with main lugs, is insulated.	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>
	Neutral is not bonded to ground.	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>
	Frame and enclosure connected to ground bus.	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>
	Breaker and feeder equipment grounding conductors/conduit are connected to ground bus.	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>
Record issues						Issue Log Item:		
						Initial	Date	
94. Operate each circuit breaker (5) times to ensure smooth operation	Breaker opens and closes in a smooth motion without binding.	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>
Record issues						Issue Log Item:		
						Initial	Date	
ELECTRICAL INTEGRITY								
95. Perform an insulation resistance test at 1000VDC, phase-to-phase and phase to ground, in accordance with NETA Table 100.1	Minimum insulation resistance shall be 100 Megohms.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Insulation Resistance Table. Perform the test on each bus section. Test for one minute in accordance with NETA Table 100.1.			<input type="checkbox"/>	<input type="checkbox"/>
	Results temperature corrected in accordance with NETA Table 100.14.	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>
Record issues						Issue Log Item:		
						Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
96. Perform an insulation resistance test at 1000VDC on main breaker, phase-to-phase and phase to ground, connected to the bus in the CLOSED position, in accordance with NETA Table 100.1. Perform insulation resistance test (pole to pole) on main breaker with breaker in the open position	Minimum insulation resistance shall be 100 Megohms.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Insulation Resistance Table. Perform the test on each bus section. Test for one minute in accordance with NETA Table 100.1. Test Name: Insulation Resistance Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
97. At the conclusion of testing, inspect interior hardware and electrical terminations	All hardware in place and properly torqued.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Compartments clear of tools and hardware.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
FUNCTIONAL TRIP TESTS						
98. Test the Long Time Delay (seconds) and Long Time Pickup current (amperes) setting on device breakers rated 400A and greater, by using primary current injection	Long delay current pick up and time delay per coordination study.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Test Name: Primary Current Inject. Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
99. Test the Short Time Delay (seconds) and Short Time Pickup current (amperes) setting on device breakers rated 400A and greater, by using primary current injection	Short delay current pick up and time delay per coordination study.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in the Circuit Breaker Current Injection Table. Test Name: Primary Current Inject. Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
00. Test the Instantaneous Time Delay (seconds) and Instantaneous Time Pickup current (amperes) setting on device breakers rated 400A and greater, by using primary current injection	Instantaneous pick up per coordination study.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in the Circuit Breaker Current Injection Table. Test Name: Primary Current Inject. Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
01. Test the Ground Fault Time Delay (seconds) and Ground Fault Time Pickup current (amperes) setting on device breakers rated 400A and greater, by using primary current injection.	Ground fault pick up per coordination study.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in the Circuit Breaker Current Injection Table. Test Name: Primary Current Inject. Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
02. After testing is performed on the panelboard, verify tightness of main connections.	Primary feeder cable connections properly torqued and marked.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in the Termination Torque Table. Bolted torque should comply with NETA Table 100.12 unless manufacturer specified values are listed on the equipment. Test Name: Bolt Torque Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

Test Equipment Used:

Test Name	Manufacturer	Model Number	Serial Number	Calibration (Date)

Data Tables

Temperature: _____ Relative Humidity: _____

Insulation Resistance (1000 VDC)

Circuit Breaker (Closed)	A-B	B-C	C-A	A-G	B-G	C-G	N
1 Minute (Meg Ohms)							
Circuit Breaker (open)	A-A	B-B	C-C				
1 Minute (Meg Ohms)							

Current Injection

Function	Actual Set.	Test Setting	Test Point	Nominal Val.	A	B	C	Trip Setting (Sec.)
LTD								
LDPU								
STD								
SDPU								
INSTPU								
GFD								
GFPU								

Termination Torque (Newton Meters or Foot Pounds)

Bolt/Lug	A	B	C	N	G
Primary Feeder					
Feeder Lugs					

Final Sign-Off

Commissioning Agent	Printed Name	Initials	Date
CONTRACTOR	PRINTED NAME	INITIALS	DATE
General Contractor (GC)			
Mechanical Contractor (MC)			
Electrical Contractor (EC)			
TAB Contractor (TAB)			
Controls Contractor (CC)			
Owner's O&M Personnel			

Table 100.1
Insulation Resistance Test Values
Electrical Apparatus and Systems

Nominal Rating of Equipment in Volts	Minimum Test Voltage, DC	Recommended Minimum Insulation Resistance in Megohms
250	500	25
600	1,000	100
1,000	1,000	100
2,500	1,000	500
5,000	2,500	1,000
8,000	2,500	2,000
15,000	2,500	5,000
25,000	5,000	20,000
34,500 and above	15,000	100,000

See Table 100.14 for temperature correction.

In the absence of consensus standards dealing with insulation-resistance tests, the Standards Review Council suggests the above representative values.

Test results are dependent on the temperature of the insulating material and the humidity of the surrounding environment at the time of the test.

Insulation-resistance test data may be used to establish a trending pattern. Deviations from the baseline information permit evaluation of the insulation.

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Table 100.12

US Standard
Bolt Torques for Bus Connection
Heat-Treated Steel – Cadmium or Zinc Plated

Grade	SAE 1&2	SAE 5	SAE 7	SAE 8
Head Markings				
Minimum Tensile (P.S.I.)	64K	105K	133K	150K
Bolt Diameter in Inches	Torque (Foot Pounds)			
1/4	4.0	5.6	8.0	8.4
5/16	7.2	11.2	15.2	17.6
3/8	12.0	20.0	27.2	29.6
7/16	19.2	32.0	44.0	48.0
1/2	29.6	48.0	68.0	73.6
9/16	42.4	70.4	96.0	105.6
5/8	59.2	96.0	133.6	144.0
3/4	96.0	160.0	224.0	236.8
7/8	152.0	241.6	352.0	378.4
1.0	225.6	372.8	528.0	571.2

Reference: International Electrical Testing Association (NETA) ATS-1999, Table 100.12, page 202.

Table 100.12 (Cont.)

Bolt Torques for Bus Connections
Silicon Bronze Fasteners¹
Torque (Foot Pounds)

Bolt Diameter in Inches	Nonlubricated	Lubricated
5/16	15	10
3/8	20	14
1/2	40	25
5/8	55	40
3/4	70	60

Reference: International Electrical Testing Association (NETA) ATS-1999, Table 100.12, page 203.

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Table 100.12 (Cont.)
Bolt Torques for Bus Connections
Aluminum Alloy Fasteners²
Torque (Foot Pounds)

Bolt Diameter in Inches	Nonlubricated	Lubricated
5/16	15	8.0
3/8	20	11.2
1/2	40	20.0
5/8	55	32.0
3/4	70	48.0

Reference: International Electrical Testing Association (NETA) ATS-1999, Table 100.12, page 203.

Table 100.12 (Cont.)
Bolt Torques for Bus Connections
Stainless Steel Fasteners³
Torque (Foot Pounds)

Bolt Diameter in Inches	Uncoated
5/16	14
3/8	25
1/2	45
5/8	60
3/4	90

Reference: International Electrical Testing Association (NETA) ATS-1999, Table 100.12, page 204.

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Table 100.14

Insulation Resistance
Correction Factors

For Conversion of Test Temperature to 20°C

Temperature		Multiplier	
°C	°F	Apparatus Containing Immersed Oil Insulations	Apparatus Containing Solid Insulators
0	32	0.25	0.40
5	41	0.36	0.45
10	50	0.50	0.50
15	59	0.75	0.75
20	68	1.00	1.00
25	77	1.40	1.30
30	86	1.98	1.60
35	95	2.80	2.05
40	104	3.95	2.50
45	113	5.60	3.25
50	122	7.85	4.00
55	131	11.20	5.20
60	140	15.85	6.40
65	149	22.40	8.70
70	158	31.75	10.00
75	167	44.70	13.00
80	176	63.50	16.00

Reference: International Electrical Testing Association (NETA) ATS-1999, Table 100.14, page 206.

Engine Generators Functional Performance Test

Equipment ID	[Equipment ID]
Building	[Building]
Location	[Room]

System Description

Description:

Operational Assumptions:

Breaker Coordination study is available and includes the generator output breaker(s).

Initial Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 1	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 2	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

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Deferred/Seasonal Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Test Participants

Organization	Required	Optional
General Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Electrical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
TAB Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Controls Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Owner's O&M Personnel	<input type="checkbox"/>	<input type="checkbox"/>

Test Equipment Required (to be provided by the Contractor)

Test Name	Equipment Description
Voltage/Continuity	DVM
Bolted Connection or Contact Resistance	Four-probe Digital Low Resistance Ohmmeter (DLRO)
Insulation Resistance	Battery or line-powered (Hand-crank not acceptable).
Primary Current Injection	Current Injection Test Device rated for 2X the ground fault pickup setting of the breaker
2 and 4 Hour Load Bank Test	Resistive load bank with capacity equal to or greater than rated load. Rated at 2% accuracy for voltage, current and KW.
Phase Rotation	Verify proper phasing
Volt. & Freq. Regulation	Computer to record voltage and frequency from the output of the generator control panel.
Decibel	Measure sound pressure
Back Pressure	Manometer with a scale of greater than 40" water
Bolt Torque	Calibrated torque wrench

System Readiness Summary Checklist

Description	Yes	No	Date
System Ready for Test	<input type="checkbox"/>	<input type="checkbox"/>	
Required Personnel Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Tools/Test Equipment/Supplies Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Safety Equipment Available	<input type="checkbox"/>	<input type="checkbox"/>	

Functional Performance Test -- (Verify all components are ready before energizing or operating the system.)

The Commissioning Authority will make and document any changes/addition/deletions to this test procedure required by current system conditions (i.e. weather, system load, utility availability, etc.).

R = Retest (Check (✓) retest required)

Y= Checked and Passed

C = Corrected (Check (✓) when correction verified)

N = Not Passed

ACTION	REQUIRED REACTION	Y	N	COMMENTS	R	C
		(✓)	(✓)		(✓)	(✓)
PRE-TEST VISUAL MECHANICAL INSPECTION						
03. Safe conditions (protective gear in-place, available & procedures observed)		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
04. Verify that the Engine, Generator, Battery, and Battery Charger nameplate data matches shop drawings and construction documents.	kW: _____.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in data table.	<input type="checkbox"/>	<input type="checkbox"/>
	Rating: _____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Freq.: _____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Phase/Wire: _____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Power Factor: _____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Voltage Output: _____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
05. Verify generator circuit breaker settings.	Circuit breaker size and phase: _____.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Ground fault indication and alarm is recommended	<input type="checkbox"/>	<input type="checkbox"/>
	Ground fault protection is disabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Circuit breaker is set per the coordination study.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
06. Inspect physical and mechanical condition.	No visible damage to generator or enclosure.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Engine generator exterior is clean and dry.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Generator control panel interior is clean and dry.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Generator control panel mounted at an accessible height.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Vibration isolation is installed at engine and at radiator.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	All external connections are made with flexible connections.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Verify remote monitoring wiring is connected and labeled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Verify control wiring is connected and labeled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Feeder cable/bus routing doesn't obstruct access for operation or maintenance.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Control wiring harness(es) does not rub against vibrating or moving parts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title]
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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
07. Verify anchoring	Anchor bolts are provided in locations shown on manufacturer's drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
08. Verify equipment grounding	Verify ground rod is installed with connection to engine generator frame.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Generator neutral bonded to ground with conductor sized per NEC 250-20.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Measured diameter of bare copper conductor corresponds to diameter of specified conductors.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Ground strap from engine to frame.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Ground strap from generator enclosure to frame.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Ground bus provided in termination cabinet with properly terminated ground conductors.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
09. Verify lube oil levels are within manufacturer's recommended limits	Lube oil level is filled to proper level.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
10. Verify fuel system installation and integrity	Day tank is full of fuel (90% for diesel).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Fuel level in day tank matches fuel gauge.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Remote fueling station is installed and operating properly.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	There are not clearance issues with the remote fueling station.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	All alarms are operating properly from remote fueling station to Building Automation System (BAS).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Fuel system is free of leaks.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Flexible fuel lines are installed at engine.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
11. Verify cooling system installation and integrity	Coolant level is filled to proper level.	<input type="checkbox"/>	<input type="checkbox"/>	Record radiator name plate date in data table.	<input type="checkbox"/>	<input type="checkbox"/>
	Verify coolant system freeze protection level.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cooling system is free from leaks.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Flexible coolant lines are installed between engine and radiator.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
12. Verify exhaust system installation and integrity	Exhaust system, silencer and flexible connector installed and supported.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Exhaust system expansion is not transferred to engine components such as turbocharger.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Silencer is equipped with condensate drain plug and turn valve.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Exhaust system is equipped with rain cap.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Exhaust system is properly insulated within building.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Exhaust system has at least 9" clearance from combustible materials.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
ELECTRICAL INTEGRITY						
13. Verify operation of coolant line heater.	Verify that valves to the water jacket heater are open.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table.	<input type="checkbox"/>	<input type="checkbox"/>
	Verify thermostats switch at their setpoint temperatures (110°F).	<input type="checkbox"/>	<input type="checkbox"/>		Record supply voltages and amperage with	<input type="checkbox"/>

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[Project Location]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Verify pump runs continuously independent of heater operation.	<input type="checkbox"/>	<input type="checkbox"/>	heaters and pump in operation. Calculate heater and pump wattage based on line voltage and current. Verify wattage calculated is same as shop drawing data. Manufacturer's Specifications: Heater: Watts _____ Volts _____ Phase _____ Pump: Watts _____ Volts _____ Phase _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
14. Verify operation of battery and starting system.	Loss of Power Alarm is operable.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Record cell voltages for all cells with terminals available, total battery charging voltage and charging current. Manufacturer's	<input type="checkbox"/>	<input type="checkbox"/>
	Low Battery Volt Alarms at: 18.6V-25.7V.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	High Battery Volt Alarms at: 26.9V-36.3V.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Power On led in on.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

[Project Title]
[Project Location]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Battery Heater Pad: 120VAC input.	<input type="checkbox"/>	<input type="checkbox"/>	Specifications: Nom. Batt. Voltage: _____ Rec. Float Charge Voltage: _____ Float Voltage: _____ Equalize Voltage: _____ Max over float Ampere Taper (Max to Min): _____ Nominal Output Voltage: _____ Input Voltage: _____ Ambient Temp: -40°F to 122°F	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
15. Verify operation of generator space heaters	Space heaters operate when generator is not running and not operating while generator is running.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Record supply voltages and amperage with heater in operation. Calculate heater wattage based on line voltage and current. Verify wattage calculated is same as shop drawing data. Manufacturer's Specifications: Heater: Watts _____ Volts _____ Phase _____	<input type="checkbox"/>	<input type="checkbox"/>

[Project Title]
[Project Location]

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
16. Perform an insulation resistance test at 1000 VDC on generator windings.	Minimum insulation resistance value is 100 Megohms.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Take reading at 1 minute. Take reading at 10 minutes. Record ambient temperature and relative humidity. Test Name: Insulation Resistance. Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
17. With the breaker in the closed position, measure the contact resistance of each phase of the primary circuit.	Readings are within 50% of the lowest value.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Test Name: Contact Resistance Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
18. Perform an insulation resistance test on the Generator Circuit Breaker at 1000VDC, phase-to-phase and phase to ground, connected to the bus in the closed position, in accordance with NETA Table 100.1.	Minimum insulation resistance shall be 100 Megohms.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Test for one minute in accordance with NETA Table 100.1. Test Name: Insulation Resistance Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

[Project Title]
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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
19. Test the Long Time Delay (LTD) (seconds) and Long Time Pickup current (LDPU) (amperes) setting of the breaker, by using primary current injection.	Long delay current pick up and time delay per coordination study.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Test Name: Primary Current Inject. Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
20. Test the Short Time Delay (STD) (seconds) and Short Time Pickup current (SDPU) (amperes) setting of the breaker, by using primary current injection.	Short delay current pick up and time delay per coordination study.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Test Name: Primary Current Inject. Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
21. Test the Instantaneous Time Delay (ITD) (seconds) and Instantaneous Time Pickup current (INSTPU) (amperes) setting of the breaker, by using primary current injection.	Instantaneous pick up per coordination study.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Test Name: Primary Current Inject. Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

[Project Title]
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ACTION		REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
22.	Test the Ground Fault Delay (GFD) (seconds) and Ground Fault Pickup current (GFPU) (amperes) setting of the breaker, by using primary current injection.	Instantaneous pick up per coordination study.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Test Name: Primary Current Inject. Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
ALARMS AND CONTROL PANEL TEST							
23.	Verify control wiring between generator and ATS are correctly terminated.	Terminations match shop drawings.	<input type="checkbox"/>	<input type="checkbox"/>	Note: this step applies to field land terminations only	<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
24.	Record all setpoints at Engine Generator Control Panel.		<input type="checkbox"/>	<input type="checkbox"/>	Manufacturer's checklist can be attached to this form in lieu of recording	<input type="checkbox"/>	<input type="checkbox"/>
Record issues					Issue Log Item:		
					Initial	Date	
25.	Verify all warning/pre-alarms per manufacturer's instructions and verify operation and local annunciation at Engine Generator Control Panel.	Overcrank.	<input type="checkbox"/>	<input type="checkbox"/>	1-13 NFPA 110 Spec Section 16231	<input type="checkbox"/>	<input type="checkbox"/>
		Low Water Temp.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		High Water Temp.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Low Oil Pressure.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Overspeed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
		Low Coolant Level.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	EPS Supplying Load.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Control switch not in Auto.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	High Battery Voltage.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Low Battery Voltage.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Battery Charger AC Failure.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Lamp Test.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Contacts for local and remote common alarm.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
26. Verify all shutdown conditions per manufacturer's instructions and verify operation and local annunciation at Engine Generator Control Panel.	Overcrank.	<input type="checkbox"/>	<input type="checkbox"/>	1-5 NFPA 110 Spec Section 16231	<input type="checkbox"/>	<input type="checkbox"/>
	High Water Temp.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Low Oil Pressure.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Overspeed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Low Coolant Level.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
27. Verify remote audible annunciation of all status, warning/pre-alarm, and shutdown conditions per manufacturer's instructions.	Overcrank.	<input type="checkbox"/>	<input type="checkbox"/>	1-9 NFPA 110 Spec Section 16231	<input type="checkbox"/>	<input type="checkbox"/>
	Low Water Temp.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	High Water Temp.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Low Oil Pressure.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Overspeed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Low Coolant Level.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Control switch not in Auto.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Contacts for local and remote common alarm.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Audible alarm silencing switch.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
28. Verify installation of remote E-Stop	Located outside of generator room door.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Near each exit/entrance to genset room.					
	Located locally on the genset package.					
	Cover not damaged, scratched, or broken.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
29. Verify remote annunciation of engine conditions at building automation system	Annunciator panel lights & alarms function by initiating test switch.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
30. With generator in a "cold start" condition, conduct a load performance test, by initiating a NORMAL failure and transfer of ATS's for time specified in the remarks column.	Engine starts and runs.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table.	<input type="checkbox"/>	<input type="checkbox"/>
	Air intake louvers open fully.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Exhaust damper opens fully.	<input type="checkbox"/>	<input type="checkbox"/>	Load generator for a maximum of 2 hrs using available building load and/or a load bank	<input type="checkbox"/>	<input type="checkbox"/>
	Fuel is not leaking.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Coolant is not leaking.	<input type="checkbox"/>	<input type="checkbox"/>	During test, verify exhaust, coolant, and fuel system is functioning	<input type="checkbox"/>	<input type="checkbox"/>
	Lube oil is not leaking.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Exhaust system expansion is not transferred to engine system components.	<input type="checkbox"/>	<input type="checkbox"/>	properly. Test Name: 2 Hour Load Bank Test Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
	Exhaust system is not leaking.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
31. Restore normal sources to ATS's (or turn off load bank) and transfer ALL load off of generator and allow to cool down for 5 minutes	Generator runs in cool down mode for 5 min.	<input type="checkbox"/>	<input type="checkbox"/>	Test Name: 2 Hour Load Bank Test Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
32. Disconnect emergency feeders to ATS and connect load bank directly to load side of generator		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
33. With a load bank connected to the load side terminals of the generator,	Engine starts and runs.	<input type="checkbox"/>	<input type="checkbox"/>	Test Name: 4 Hour Load Bank Test Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
	Air intake louvers open fully.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Exhaust damper opens fully.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
start generator at local control panel with engine control switch	Fuel is not leaking.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Coolant is not leaking.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Lube oil is not leaking.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Exhaust system expansion is not transferred to engine system components.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Exhaust system is not leaking.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
34. Conduct a load performance test utilizing a load bank to achieve 100% rated load of generator for time specified in the remarks column.		<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Load generator at 50% for 15 min. Load generator at 75% for 15 min. Load generator at 100% for 3.5 hrs During test, verify exhaust, coolant, and fuel system is functioning properly. Test Name: 4 Hour Load Bank Test Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
35. In conjunction with load performance test, verify voltage regulation by recording RMS voltage while increasing load on generator.	Voltage regulation is $\pm 1\%$.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table Record voltage at no load. Record voltage at 50% load. Record voltage at 75% load. Record voltage at 100% load. Calculate voltage regulation percentage. Test Name: Volt. & Freq. Regulation Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
36. In conjunction with load performance test, verify frequency regulation by recording frequency while increasing load on generator.	Frequency regulation is $\pm 1\%$	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table Record frequency at no load. Record frequency at 50% load. Record frequency at 75% load. Record frequency at 100% load. Calculate voltage regulation percentage. Test Name: Volt. & Freq. Regulation Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
37. During load performance test, verify engine operation is within normal operating limits.		<input type="checkbox"/>	<input type="checkbox"/>	Manufacturer's Specifications: RPM @ 60Hz: 1800 RPM Coolant Amb. Temp: 190°F	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
38. During load performance test, verify correct phase rotation.	Phase rotation at generator matches NORMAL power source.	<input type="checkbox"/>	<input type="checkbox"/>	A(U), B(V), C(W) Test Name: Phase Rotation Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
39. During step 3, while generator is running at 100% load, measure sound level.	Measured sound pressure level in rooms directly adjoining the generator room, as well as above and below, if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Test Name: Sound Level Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
40. While generator is running at 100% load, conduct Exhaust-System Back Pressure Test	Maximum backpressure at full-rated load is within manufacturer's written maximum allowable limits of 6.7 kPa or 26.9" H2O for the engine.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Connect test instrumentation to exhaust line close to engine exhaust manifold. Test Name: Back Pressure Test Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
41. Decrease load to 0% and allow the generator to cool down for 5 minutes	Generator cools down.	<input type="checkbox"/>	<input type="checkbox"/>	Test Name: 4 Hour Load Bank Test	<input type="checkbox"/>	<input type="checkbox"/>
	No leaks from any system are found.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
42. After the cool down, once the prime mover has reached rated voltage and frequency, transfer full rated load onto the engine generator in a single block.	Engine continues to run without shutdown or overspeed trip and recovers to steady state voltage and frequency ranges within 5 seconds.	<input type="checkbox"/>	<input type="checkbox"/>	Test Name: Block Load Test	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
43. Decrease load to 0% and shutdown generator with local E-Stop.	Generator shuts down.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Remote annunciator alarms with E-Stop.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
44. Disconnect fuel solenoid and simulate start to engine.	Engine cycle cranks a minimum of three 15-second cranking cycles with 15 seconds between cycles.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	At completion of third cycle engine stops cranking and "overcrank" shutdown alarm is annunciated locally and remotely.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
FINAL INSPECTION						
45. After testing is performed on the generator, verify tightness of field landed feeder terminations.	Primary feeder cable connections properly torqued and marked.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Bolted torque should comply with NETA Table 100.12 unless manufacturer specified values are listed on the equipment. Secondary distribution feeder connections are not included in the test. Test Name: Bolt Torque Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
46. Refill fuel tanks and verify 90% fuel levels	Fuel level indicator verifies 90% fuel level in day tank.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Fuel level indicator verifies 90% fuel level in storage tank.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

NAMEPLATE DATA

Engine Nameplate (May be found in multiple nameplate locations)

Parameter	Data
Equipment ID	
Manufacturer	
Serial Number	
Model Number	
Date Manufactured	
Horsepower	
kW	

Generator Nameplate

Parameter	Data
Manufacturer	
Serial Number	
Model Number	
Date Manufactured	
Volts	
Amps	
KVA	
Frequency	
RPM	
KW	
PF	
Insulation Class:	

Battery Nameplate

Parameter	Data
Manufacturer	
Serial Number	
Model Number	
Quantity	
Volts	
Cold Cranking Amps	

Battery Charger Nameplate

Parameter	Data
Manufacturer	
Serial Number	
Model Number	
Input Amps	
Input Volts	
Output Amps	
Output Volts	

Circuit Breaker Name Plate Data

Parameter	Data
Manufacturer:	
Type/Model:	
Serial Number:	
Frame Size/Rating	
Interrupting Rating	
Voltage Rating	

Radiator Nameplate

Parameter	Data
Manufacturer	
Serial Number	
Model Number	
Date Manufactured	

Coolant Pump(s) & Heater(s)

Designation	Volts	Amps	Watts

Battery System

Cell Volts	Charging Volts	Charging Amps

Space Heater(s)

Designation	Voltage	Amperage	Wattage

Current Injection

Function	Actual Set.	Test Setting	Test Point	Nominal Val.	A	B	C
LTD							
LDPU							
STD							
SDPU							
INSTPU							
GFD							
GFPU							

2 Hour Load Bank Test

Crank Time Until Prime Mover Start and Runs	
Time Required for Prime Mover to Come Up to Operating Speed	
Voltage Overshoot	
Frequency Overshoot	
Time Required to Achieve Steady State Operation	

Time	Load	RPM	Freq.	Amps	Volts	kW	Oil Press	Oil Temp	Exhaust Temp	Cool. Temp	Fuel Level	Batt. Chrg Rate
0 min	100%											
5 min	100%											
10 min	100%											
15 min	100%											
30 min	100%											
45 min	100%											
1 hour	100%											
1 hour 15 min	100%											
1 hour 30 min	100%											
1 hour 45 min	100%											

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2 hour		100%											
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4 Hour Load Bank Test

Time	Load	RPM	Freq.	Amps	Volts	kW	Oil Press	Oil Temp	Exhaust Temp	Cool. Temp	Fuel Level	Batt. Chrg Rate
0 min	50%											
5 min	50%											
10 min	50%											
15 min	75%											
30 min	75%											
45 min	100%											
1 hour	100%											
1 hour 15 min	100%											
1 hour 30 min	100%											
1 hour 45 min	100%											
2 hour	100%											
2 hour 15 min	100%											
2 hour 30 min	100%											
2 hour 45 min	100%											
3 hour	100%											
3 hour 15 min	100%											
3 hour 30 min	100%											
3 hour 45 min	100%											
4 hour	100%											

Voltage & Frequency Regulation

Function	50% Load	75% Load	100% Load
Voltage (V)			
Frequency (hz)			

Phase Rotation – (Circle Phase Rotation)

Normal Power	A B C	A C B
Emergency Power	A B C	A C B

Sound Level

Location	Decibel (DB)

Back Pressure Test

System Exhaust Pressure	Location

Block Load Test

Recovery Time: _____

Bolt Torque (Newton Meters or Foot Pounds)

Bolt/Lug	A	B	C	N	G
Normal					
Emergency Lugs					

Final Sign-Off

Commissioning Agent	Printed Name	Initials	Date
CONTRACTOR	PRINTED NAME	INITIALS	DATE
General Contractor (GC)			
Mechanical Contractor (MC)			
Electrical Contractor (EC)			
TAB Contractor (TAB)			
Controls Contractor (CC)			
Owner's O&M Personnel			

Automatic Transfer Switches Functional Performance Test

Equipment ID	[Equipment ID]
Building	[Building]
Location	[Room]

System Description

Description:
Operational Assumptions:

Initial Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 1	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Re-Test 2	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

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Deferred/Seasonal Test	Start Date	End Date	Initials
Results (Check one) <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> Partial Test w/Corrective Actions <input type="checkbox"/> Complete Test w/Corrective Actions <input type="checkbox"/> Other	Explanation:		

Test Participants

Organization	Required	Optional
General Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Electrical Contractor	<input type="checkbox"/>	<input type="checkbox"/>
TAB Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Controls Contractor	<input type="checkbox"/>	<input type="checkbox"/>
Owner's O&M Personnel	<input type="checkbox"/>	<input type="checkbox"/>

Test Equipment Required (to be provided by the Contractor)

Test Name	Equipment Description
Bolt Torque	Calibrated torque wrench
Bolted Connection or Contact Resistance	Four-probe Digital Low Resistance Ohmmeter (DLRO)
Voltage/Continuity	DVM
Insulation Resistance	Battery or line-powered (Hand-crank not acceptable).
Relay Operation	Variable AC Voltage source

System Readiness Summary Checklist

Description	Yes	No	Date
System Ready for Test	<input type="checkbox"/>	<input type="checkbox"/>	
Required Personnel Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Tools/Test Equipment/Supplies Available	<input type="checkbox"/>	<input type="checkbox"/>	
Required Safety Equipment Available	<input type="checkbox"/>	<input type="checkbox"/>	

Functional Performance Test -- (Verify all components are ready before energizing or operating the system.)

The Commissioning Authority will make and document any changes/addition/deletions to this test procedure required by current system conditions (i.e. weather, system load, utility availability, etc.).

R = Retest (Check (✓) retest required)

Y= Checked and Passed

C = Corrected (Check (✓) when correction verified)

N = Not Passed

ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
PRE-TEST VISUAL MECHANICAL INSPECTION						
47. Safe conditions (protective gear in-place, available & procedures observed)		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
48. Confirm that NORMAL and EMERGENCY sources match final design drawings.	Normal: MDS.	<input type="checkbox"/>	<input type="checkbox"/>	Source: Normal: _____	<input type="checkbox"/>	<input type="checkbox"/>
	Emergency: EDP.	<input type="checkbox"/>	<input type="checkbox"/>	Emergency: _____	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
49. Verify equipment nameplate data matches one-line drawings, specifications, and/or shop drawings and record date on attached table.	Volts: _____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Amps: _____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	4 pole, 4W.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Frequency: 60hZ.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Interrupting Rating: _____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Enclosure: _____.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
50. Verify permanent labels for transfer switch is installed.	Melamine plastic laminate, minimum 1/16" thick.	<input type="checkbox"/>	<input type="checkbox"/>	Spec Section 16075	<input type="checkbox"/>	<input type="checkbox"/>
	Black letters on white face.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Secured with self tapping, stainless-steel (SS) screws or SS machine screws with nuts and flat and lock washers.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
51. Verify accessibility for maintenance.	Door opens freely and swings fully open.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	3'-6" minimum clearance in front of switch.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cables do not block access to indicators or adjustable components.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Cables do not block access to manual transfer switch operator.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
52. Inspect physical and mechanical conditions.	No visible signs of damage.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	No visible dirt, metal chips or contamination.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Appropriate source indicating lights are illuminated.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
53. Verify anchoring.	Anchor bolts are provided in locations shown on manufacturer's drawings.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
54. Verify the barriers and arc chutes are properly installed around contacts.	Barriers partially surround ATS contacts and are insulated.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Arc chutes are installed around the contacts.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
55. Verify ATS is properly grounded.	Enclosure bonded to ground bus.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Incoming (normal and emergency) and outgoing (load) feeder grounding conductors bonded to ground bus.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Neutral bus/pole isolated from ground.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
56. Confirm that components of control system including terminal block, wiring, and Ni-Cad batteries are complete.		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
57. Perform manual transfer operation with both NORMAL and EMERGENCY sources de-energized. Use detachable manual operator to transfer from NORMAL to EMERGENCY and back.	Switch should transfer smoothly and with full contact travel speed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Mechanical interlocking should prevent simultaneous closure of NORMAL and EMERGENCY sources.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
58. Perform manual bypass operation to each source.	Switch should transfer smoothly and with full contact travel speed.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
ELECTRICAL INTEGRITY						
59. Measure contact resistance on all poles in both closed positions.	Readings are within 50% of the average value, including the neutral pole.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Spec Section 16415	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
60. Perform an insulation resistance test at 1000VDC on each bus section, phase-to-phase and phase to ground.	Minimum insulation resistance shall be 100 megohms.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Test for one minute in accordance with NETA Table 100.1. Isolate ALL control wiring and electronic devices prior to testing. Test across open contacts for both NORMAL and EMERGENCY sources. Test phase-to-ground with all other phases grounded for both NORMAL and EMERGENCY sources. Spec Section 16415 Test Name: Insulation Resistance, Reference Equipment Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
61. Perform insulation resistance test at 1000 VDC to verify Automatic Transfer Switch is isolated from load when bypassed.	Insulation resistance shall equal or exceed 100 Megohms.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Test for one minute in accordance with NETA Table 100.1. Isolate ALL control wiring and electronic devices prior to testing Test Name: Insulation Resistance, Reference Equipment Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
				Initial	Date	
62. Verify the operation of four-line LCD display and character keyboard.	All data displays operate.	<input type="checkbox"/>	<input type="checkbox"/>	Record Password: _____	<input type="checkbox"/>	<input type="checkbox"/>
	All program parameters accessible.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
63. Verify "In Phase Monitoring" setting.	In phase monitoring is enabled.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
64. Verify all voltage, frequency, and time delay settings.	Use ATS microprocessor control system.	<input type="checkbox"/>	<input type="checkbox"/>	Record values in the "Actual Setpoint" column in the ATS Parameters and Setpoints table Spec Section 16415	<input type="checkbox"/>	<input type="checkbox"/>
	Device pick-up (PU) and drop-out (DO).	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
65. Verify all applicable local and remote annunciation by the monitoring system for various operating conditions.	Operating Conditions: NORMAL power available	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	EMERGENCY power avail.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	ATS in NORMAL position.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	ATS in EMERGENCY position.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	LED indicating lights are operating.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
Record issues				Issue Log Item:		
				Initial	Date	
66. Verify proper phase rotation	Emergency source matches utility source.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
TRANSFER OPERATION TESTS						
67. Disconnect NORMAL power source to transfer switch.	Time delay on engine start equals setpoint.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Spec Section 16231	<input type="checkbox"/>	<input type="checkbox"/>
	Start signal sent to engine generator.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Transfer time delay equals setpoint.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Time delay in neutral equals setpoint.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	ATS transfers to Emergency source position.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Total time to connect to Emergency source is no more than 10-seconds.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
68. Restore Normal power source to Automatic Transfer Switch to verify setpoints.	Re-transfer time delay equals setpoint.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Spec Section 16231	<input type="checkbox"/>	<input type="checkbox"/>
	ATS transfers to Normal source position.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Time delay in neutral equal setpoint.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Engine cool down time delay equals setpoint.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
	Engine shuts off after cool down delay times out.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
69. Repeat steps #21 and #22, except manually disconnect. EMERGENCY source, to simulate failure of the engine, after restoration of NORMAL power and before the re-transfer delay has expired.	Switch should re-transfer to Normal without delay on engine shutdown.	<input type="checkbox"/>	<input type="checkbox"/>	Spec Section 16231	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
70. Verify operation of ATS TEST switch.	Simulates failure of normal source.	<input type="checkbox"/>	<input type="checkbox"/>	Spec Section 16231	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
BYPASS AND ISOLATION SWITCH OPERATION						
71. Verify Automatic Transfer Switch manual bypass and isolation switch operation with NORMAL source energized and load on ATS.	ATS mechanism is de-energized and power passes through the bypass/isolation switch path.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	

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ACTION	REQUIRED REACTION	Y (✓)	N (✓)	COMMENTS	R (✓)	C (✓)
72. Restore the Automatic Transfer Switch to its automatic mode by manually reversing the bypass and isolation switch operation.	ATS mechanism is energized and the bypass/isolation switch path is de-energized.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:	<input type="checkbox"/>	<input type="checkbox"/>
				Initial	Date	
FINAL INSPECTION						
73. After testing is performed on the ATS, verify tightness of field landed feeder terminations (NORMAL, EMERGENCY, and LOAD feeders).	Feeder cable connections properly torqued and marked.	<input type="checkbox"/>	<input type="checkbox"/>	Record results in Data Table. Bolted torque should comply with NETA Table 100.12 unless manufacturer specified values are listed on the equipment. Test Name: Bolt Torque Reference Equip. Table	<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	
74. Prior to energization, inspect interior hardware.	All hardware in place and properly torqued.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	Compartments clear of tools and hardware.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
Record issues				Issue Log Item:		
				Initial	Date	

Test Equipment Used:

Test Name	Manufacturer	Model Number	Serial Number	Calibration(Date)

ATS NAMEPLATE DATA

Parameter	Data
Equipment ID	
Manufacturer	
Model	
Serial No.	
Catalog No	
Mfg. Date	
Current Rating	
Voltage Rating	
Poles:	
Closing & Withstand Amps	
NEMA Enclosure	

Contact Resistance

Contacts	A	B	C	N
Normal				
Emergency				

Insulation Resistance

Phase to Phase	A – B	B - C	C – A
Normal			
Emergency			
Phase to Ground	A - G	B - G	C – G
Normal			
Emergency			
To Load (ATS in Bypass)	A – LOAD	B – LOAD	C - LOAD
Normal			
Emergency			

PARAMETERS AND SETPOINTS

Voltage

Parameter	Actual Setpoint	Specification Setpoint	Range	Factory Default
Normal Over-Voltage Dropout				
Normal Over -Voltage Pickup				
Emergency Over-Voltage Dropout				
Emergency Over -Voltage Pickup				
Normal Under-Voltage Dropout				
Normal Under-Voltage Pickup				
Emergency Under-Voltage Dropout				
Emergency Under-Voltage Pickup				

Frequency

Parameter	Actual Setpoint	Specification Setpoint	Range	Factory Default
Normal Over-Frequency Dropout				
Normal Over -Frequency Pickup				
Emergency Over-Frequency Dropout				
Emergency Over -Frequency Pickup				
Normal Under-Frequency Dropout				
Normal Under-Frequency Pickup				

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Parameter	Actual Setpoint	Specification Setpoint	Range	Factory Default
Emergency Under-Frequency Dropout				
Emergency Under-Frequency Pickup				

Time Delay

Parameter	Actual Setpoint	Specification Setpoint	Range	Factory Default
Neutral Position Time Delay				
Normal Failure Time Delay (Gen Start)				
Emergency Failure Time Delay				
Transfer to Emergency Time Delay				
Return to Normal Time Delay				
Engine Cool Down				

Note: The "Actual Setpoint" column in the above table should be filled in during step 0

Feeder Termination Torque (Newton Meters or Foot-Pounds)

TORQUE FEEDERS	A	B	C	N	G
NORMAL					
EMERGENCY					
LOAD					

Final Sign-Off

Commissioning Agent	Printed Name	Initials	Date
CONTRACTOR	PRINTED NAME	INITIALS	DATE
General Contractor (GC)			
Mechanical Contractor (MC)			
Electrical Contractor (EC)			
TAB Contractor (TAB)			
Controls Contractor (CC)			
Owner's O&M Personnel			