ASHRAE SSPC 300 EXAMPLE CONSTRUCTION CHECKLISTS

This appendix provides an example of how to implement part of various ASHRAE SSPC 300 commissioning documents. It is not intended to be a comprehensive representation or a best practice example. Practitioners applying the Commissioning Process should carefully follow Guideline 0, Guideline 1.1, and other applicable commissioning technical guidelines tailored to their specific projects.

This informative document provides examples of checklists for the HVAC&R project requirements during Pre-Design, Design, Construction, and Occupancy and Operations Phases of project delivery that can be used for guidance for the Cx practitioners applying the Cx.

Following is a listing by topic of the example checklists provided in this appendix.

Index of Example Checklists

1. Pre-Design Checklist: Mechanical Second Review
(As part of the Programming Architect's Second Review Submittal)
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Location of Information in the Programming Document	Response	
1		**Owner's Project Requirements**			
A		**Key Owner's Project Requirements**		Complete	
	1	Project documentation requirements		Yes	No
	2	Owner directives		Yes	No
	3	Appropriate heating and cooling		Yes	No
	4	Sustainability		Yes	No
	5	Do the general requirements match OPR the original requirements? If not, has the OPR been revised? Justification document?		Yes	No
	6	Has information been provided to the CxP Team to update the Cx plan? What is the current revision number?		Yes	No
B		**Owner's Objectives**			
	1	Is the final control plan, results of control workshop, and inter-operability report included with this review?		Yes	No
	2	System accessibility and maintainability		Yes	No
	3	Heating and cooling		Yes	No
	4	Allowable tolerance in facility system operations		Yes	No
	5	Energy efficiency goals		Yes	No
	6	Environmental and sustainability goals		Yes	No
C		**Owner's General Needs**			
	1	Adaptability for future changes without changing HVAC system and within initial budget		Yes	No
	2	Mechanical room space and location coordinated with shops		Yes	No
	3	Electrical/Communications		Yes	No
	4	Benchmark Established for HVAC&R systems established		Yes	No
	5	Constructability defined		Yes	No

"No" Responses

Item	Date	Reason for "No" Response

2. Design Checklist for the Mechanical Engineer's First Design Submittal
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Location of Information in the Programming Document	Response	
1		**Owner's Project Requirements**			
A		**Key Owner's Project Requirements**		Complete	
	1	Cx Plan Updated, provide date and enclose with this submittal		Yes	No
	2	Basis of Design for controls completed		Yes	No
	3	Basis of Design for accessibility completed		Yes	No
	4	Sustainability and LEED issues coordination addressed		Yes	No
	5	Do the general HVAC&R requirements the current OPR requirements? Has justification been documented and approved by owner's Project Manager?		Yes	No
	6	Control format, BACnet requirements complete and documented		Yes	No
B		**Owner's Objectives**			
	1	Preliminary mechanical room layout complete		Yes	No
	2	Energy analysis meeting goal of 30% less than ASHRAE 90?		Yes	No
	3	Single line diagrams developed for controls and systems		Yes	No
	4	Report on safety factors and tolerance for facility system operations		Yes	No
	5	Have chillers been sized and pre-ordered to meet occupancy goal?		Yes	No
	6	Environmental and sustainability initial design complete		Yes	No
C		**Owner's General Needs**			
	1	Is current HVAC and control systems budget enclosed and within initial budget		Yes	No
	2	Mechanical rooms space and location coordinated with shops		Yes	No
	3	Has Electrical, Plumbing, Lighting and Communications coordination been completed?		Yes	No
	4	Does the initial design meet all Benchmark Established for HVAC&R? Document?		Yes	No
	5	Constructability and maintainability analysis completed		Yes	No

"No" Responses

Item	Date	Reason for "No" Response

3. Air Handling Unit, CW & HW: AHU-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Cooling Capacity (MBH/gpm)	/	/
	5	Heating Capacity (MBH/gpm)	/	/
	6	Supply Air flow, Design / Minimum (cfm)	/	/
	7	Supply Fan Motor Power / Speed (hp / rpm)	/	/
	8	Return Air flow, Design / Minimum (cfm)		
	9	Return Fan Motor Power / Speed (hp / rpm)		
	10	Voltage / Phase / Frequency (V / - / Hz)	/ /	/ /
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	Coil surface areas are free of damage	Yes	No
	3	The air openings are sealed with plastic	Yes	No
	4	The water openings are sealed with plastic plugs	Yes	No
	5	All components present and in proper order	Yes	No
	6	All access doors are operable	Yes	No
	7	Installation and startup manual provided	Yes	No
	8	Unit tags affixed	Yes	No
2		**Construction Checklist**		
A		**Installation of AHU**		
	1	Unit secured as required by manufacturer and specifications	Yes	No
	2	Adequate clearance around unit for service	Yes	No
	3	All components accessible for maintenance	Yes	No
	4	Unit can be removed from the building	Yes	No
	5	Cooling coil drain pan slopes correctly	Yes	No
	6	Internal vibration isolators in good condition and shipping bolts are removed	Yes	No
	7	Belts are tight	Yes	No
	8	Unit labeled and is easy to see	Yes	No
B		**Chilled Water Piping**		
	1	All piping components have been installed (in the correct order) as required by detail drawing	Yes	No
	2	Piping arranged for ease of unit/coil removal	Yes	No
	3	Piping supported as required by specification	Yes	No

3. Air Handling Unit, CW & HW: AHU-1

ASHRAE Guideline 1.1 Example Checklist *(Continued)*

	4	Piping is clean	Yes	No
	5	Piping insulation is complete and installed as per specifications	Yes	No
	6	All valves and test ports are easily accessible	Yes	No
	7	Valve tags attached	Yes	No
C		**Hot Water Piping**		
	1	All piping components have been installed (in the correct order) as required by detail drawing	Yes	No
	2	Piping arranged for ease of unit/coil removal	Yes	No
	3	Piping supported as required by specifications	Yes	No
	4	Piping is clean	Yes	No
	5	Piping insulation is complete and installed per specifications	Yes	No
	6	All valves and test ports are easily accessible	Yes	No
	7	Valve tags attached	Yes	No
D		**Ductwork**		
	1	Adequate locations available for testing and balancing of unit	Yes	No
	2	All dampers and sensors are accessible (access panels)	Yes	No
	3	Outdoor and return air arrangement will not freeze coils, i.e. outdoor air and return air is adequately mixed before reaching coils	Yes	No
	4	Vibration isolators installed	Yes	No
	5	All dampers close tightly and stroke fully and easily	Yes	No
	6	Ductwork is clean and free of debris	Yes	No
E		**Electrical**		
	1	Local disconnect installed in accessible location	Yes	No
	2	Motor rotation in the proper direction	Yes	No
	3	All electrical connections are tight	Yes	No
	4	All electrical components are grounded	Yes	No
	5	VFD installed (if applicable)	Yes	No
F		**Controls - Installation**		
	1	Control panel accessible and labeled properly	Yes	No
	2	Temperature, humidity, pressure, and CO_2 sensors (as applicable) are installed and calibrated	Yes	No
	3	All electrical connections are tight	Yes	No
	4	All electrical components are grounded	Yes	No
	5	VFD installed (if applicable)	Yes	No
G		**Mechanical - Startup**		
	1	Unit is clean	Yes	No
	2	Internal isolators free to move	Yes	No
	3	Fans and motors lubricated and aligned	Yes	No
	4	Fan belts have proper tension and are in good condition	Yes	No
	5	Protective shrouds for fans and belts in place and secure	Yes	No
	6	Terminal unit dampers manually opened	Yes	No
	7	Filters installed properly (no bypass air) and are clean	Yes	No

3. Air Handling Unit, CW & HW: AHU-1

ASHRAE Guideline 1.1 Example Checklist *(Continued)*

	8	System starts and runs without any unusual noise or vibration	Yes	No
	9	Manufacturer's startup checklist completed and attached	Yes	No
H		**Controls - Startup**		
	1	Cooling sequence of control verified	Yes	No
	2	Heating sequence of control verified	Yes	No
	3	Warm-up sequence of control verified	Yes	No
	4	Cool-down sequence of control verified	Yes	No
	5	Economizer sequence of control verified	Yes	No
	6	Unoccupied sequence of control verified	Yes	No
I		**TAB**		
	1	Filters and coils are clean	Yes	No
	2	Motor rotation verified – each motor	Yes	No
	3	Motor voltage and amps verified – each phase of each motor	Yes	No
	4	Fan RPM verified – each fan	Yes	No
	5	Entering and leaving cooling coil air temperatures (°F)	/	/
	6	Entering and leaving heating coil temperatures (°F)	/	/
	7	Entering and leaving chilled water temperatures (°F)	/	/
	8	Entering and leaving hot water temperatures (°F)	/	/
	9	Coil flow and air/water pressure drops verified – each coil	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

4. Boiler, Hot Water: B-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Total Heating Capacity (MBH)		
	5	Voltage / Phase / Frequency (V / - / Hz)	/ /	/ /
	6	Entering / Leaving Hot Water Temperature (°F)	/	/
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	The water openings are sealed with plastic plugs	Yes	No
	3	All components present	Yes	No
	4	Installation and startup manual provided	Yes	No
	5	Unit tags affixed	Yes	No
2		**Construction Checklist**		
A		**Installation of Boiler**		
	1	Unit secured as required by manufacturer and specifications	Yes	No
	2	Adequate clearance around unit for service	Yes	No
	3	All components accessible for maintenance	Yes	No
	4	Unit can be removed from the building	Yes	No
	5	Flue completely installed and properly sloped	Yes	No
	6	Unit labeled and is easy to see	Yes	No
B		**Piping**		
	1	All piping components have been installed (in the correct order) as required by detail drawing	Yes	No
	2	Piping arranged for ease of unit removal	Yes	No
	3	Piping supported as required by specification	Yes	No
	4	Piping is clean	Yes	No
	5	Piping insulation is complete and installed as per specifications	Yes	No
	6	Thermometers and pressure gauges on supply and return lines	Yes	No
	7	All valves and test ports are easily accessible	Yes	No
	8	Valve tags attached	Yes	No
C		**Electrical**		
	1	Local disconnect installed in accessible location	Yes	No
	2	All electrical connections are tight	Yes	No
	3	All electrical components are grounded	Yes	No

4. Boiler, Hot Water: B-1

ASHRAE Guideline 1.1 Example Checklist *(Continued)*

D		**Controls - Installation**		
	1	Control panel accessible and labeled properly	Yes	No
	2	Remote start and stop verified	Yes	No
	3	Hot water temperature reset signal verified (if applicable)	Yes	No
	4	Test ports installed near all control sensors	Yes	No
	5	Actuators installed and calibration verified	Yes	No
E		**Mechanical - Startup**		
	1	System flushed, filled, and air purged	Yes	No
	2	Burner adjusted to proper settings	Yes	No
	3	System starts and runs without any unusual noise or vibration	Yes	No
	4	Manufacturer's startup checklist completed and attached	Yes	No
	5	CO_2 and CO values from burner adjustment (ppm/ppm)	Yes	No
F		**Controls - Startup**		
	1	Low water switch operational	Yes	No
	2	Temperature sensors operational and calibrated	Yes	No
	3	Flow switch operational	Yes	No
	4	High pressure / temperature cut out operational	Yes	No
	5	Unit operating sequence verified and correct	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

5. Centrifugal Chiller: C-1

ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
	A	**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Capacity (tons)		
	5	Condenser Fluid Type		
	6	Condenser Fluid Flow Rate (gpm)		
	7	Chilled Fluid Type		
	8	Chilled Fluid Flow Rate (gpm)		

5. Centrifugal Chiller: C-1

ASHRAE Guideline 1.1 Example Checklist *(Continued)*

	9	Refrigerant Type		
	10	Compressor Motor Power (kW)		
	11	Compressor Motor Voltage / Phase / Frequency (V / - / Hz)	/ /	/ /
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	Openings are sealed with plastic	Yes	No
	3	All components present (cooler, condenser, compressor, motor, etc.)	Yes	No
	4	Motor bearings are double sealed and permanently lubricated	Yes	No
	5	Electrical disconnect is provided	Yes	No
	6	Installation and startup manual provided	Yes	No
	7	Unit tags affixed	Yes	No
2		**Construction Checklist**		
A		**Installation of Chiller**		
	1	Unit secured as required by manufacturer and specifications	Yes	No
	2	There is a minimum of 36 inches of clearance around entire unit	Yes	No
	3	There is a minimum of 48 inches of clearance in front of starter or VFD	Yes	No
	4	There is a minimum clearance of one unit length for tube pull space	Yes	No
	5	All components are accessible for maintenance	Yes	No
	6	Unit labeled and is easy to see	Yes	No
B		**Refrigerant**		
	1	Full operating charge of refrigerant and oil	Yes	No
	2	Unit factory leak tested and report is attached	Yes	No
	3	Relief piped to outdoors	Yes	No
	4	Refrigerant monitor installed and operational before refrigerant loaded	Yes	No
	5	Drip leg and flex connector at unit connection to relief piping	Yes	No
C		**Electrical**		
	1	Lugs tightened by chiller startup technician	Yes	No
	2	Safety disconnect switch installed in an accessible location	Yes	No
	3	Lug sizing matches wire size requirement	Yes	No
	4	Primary and secondary fused control power transformer provided	Yes	No
	5	Star-delta starter provided	Yes	No
	6	AIC and Withstand ratings exceed available fault shown on electrical drawings	Yes	No
	7	VFD installed (if applicable)	Yes	No
D		**Controls - Installation**		
	1	Control panel accessible and labeled properly	Yes	No
	2	All sensors installed and calibrated	Yes	No
	3	Safety items installed and verified	Yes	No
E		**Controls - Startup**		
	1	Unit voltage and amps verified	Yes	No
	2	Remote start and stop signal verified	Yes	No

5. Centrifugal Chiller: C-1

ASHRAE Guideline 1.1 Example Checklist *(Continued)*

	3	Chilled water reset signal verified	Yes	No
	4	Demand limiting signal verified	Yes	No
	5	Unit "run" sequences verified	Yes	No
	6	Unit "alarm" sequences verified	Yes	No
F		**Mechanical - Startup**		
	1	Manufacturer's startup checklist completed and attached	Yes	No
	2	The following safety controls are operational and have been verified:		
	3	Low chilled water temperature	Yes	No
	4	High refrigerant pressure	Yes	No
	5	Low oil flow protection	Yes	No
	6	Loss of chilled water flow	Yes	No
	7	Loss of condenser flow	Yes	No
	8	Loss of refrigerant protection	Yes	No
	9	Motor current overload	Yes	No
	10	Phase reversal/unbalance/single phasing	Yes	No
	11	Over/under voltage	Yes	No
	12	Failure of water temperature sensor used by controller	Yes	No
	13	Full load test to verify load limiting	Yes	No
	14	System starts and runs without any unusual noise or vibration	Yes	No
G		**TAB**		
	1	Chilled water strainer is clean	Yes	No
	2	Evaporator pressure drop (ft)		
	3	Chilled water flow rate (gpm)		
	4	Condenser water strainer is clean	Yes	No
	5	Condenser water pressure drop (ft)		
	6	Condenser water flow rate (gpm)		

"No" Responses

Item	Date	Reason for "No" Response

6. Cooling Tower: CT-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Cooling Capacity (MBH/gpm)	/	
	5	Fan Speed / power (rpm / hp)	/	
	6	Motor Power and Speed (hp / rpm)		
	7	Motor Voltage / Phase / Frequency (V / - / Hz)	/ /	/ /
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	The air openings are sealed with plastic	Yes	No
	3	The water openings are sealed with plastic plugs	Yes	No
	4	All components present (fans, pumps, fill, etc.)	Yes	No
	5	All access doors are operable	Yes	No
	6	Installation and startup manual provided	Yes	No
	7	Unit tags affixed	Yes	No
2		**Construction Checklist**		
A		**Installation of Cooling Tower**		
	1	Unit secured as required by manufacturer and specifications	Yes	No
	2	Adequate clearance around unit for service	Yes	No
	3	All components accessible for maintenance	Yes	No
	4	Unit location is clear of trees, rubbish, dust, etc. to prevent fouling	Yes	No
	5	Vibration isolators installed and in good condition	Yes	No
	6	Ladder reaches grade level	Yes	No
	7	Unit labeled and is easy to see	Yes	No
B		**Piping**		
	1	All piping components have been installed (in the correct order) as required by detail drawings	Yes	No
	2	Piping arranged for ease of unit removal	Yes	No
	3	Piping supported as required by specifications	Yes	No
	4	Piping is clean	Yes	No
	5	Makeup water supply provided	Yes	No
	6	All valves and test ports are easily accessible	Yes	No
	7	Valve tags attached	Yes	No
	8	Piping insulation complete and installed as per specifications	Yes	No

6. Centrifugal Chiller: C-1

ASHRAE Guideline 1.1 Example Checklist *(Continued)*

C		**Electrical**		
	1	Local disconnect installed in an accessible location	Yes	No
	2	Fan motor rotation in the proper direction	Yes	No
	3	All electrical connections are tight	Yes	No
	4	All electrical components grounded	Yes	No
	5	VFD installed (if applicable)	Yes	No
D		**Controls - Installation**		
	1	Control panel accessible and labeled properly	Yes	No
	2	All sensors (temperature, pressure, etc.) are installed and calibrated verified	Yes	No
	3	Valve actuators installed and calibration verified	Yes	No
	4	Safety items installed and verified (low water, high water, etc.)	Yes	No
E		**Mechanical - Startup**		
	1	Tower basin filled	Yes	No
	2	Sump strainers and nozzles are clean	Yes	No
	3	Motors and gear box lubricated	Yes	No
	4	Fan pitch adjusted	Yes	No
	5	Critical frequencies identified, recorded, and programmed out of VFD	Yes	No
	6	System starts and runs without an unusual noise or vibration	Yes	No
	7	Manufacturer's startup checklist completed and attached	Yes	No
F		**Controls - Startup**		
	1	Sequence of control verified	Yes	No
	2	High / low water alarms operational	Yes	No
	3	VFD operational	Yes	No
	4	Float switch, motorized valves, makeup water are operational	Yes	No
G		**Water Treatment – Startup**		
	1	Galvanized surfaces passivated (if applicable)	Yes	No
	2	Conductivity and pH controls operational	Yes	No
	3	Makeup flow meter signal operational	Yes	No
	4	Blow-down control operational	Yes	No
	5	No-flow injection interlock operational	Yes	No
H		**TAB**		
	1	Unit is free of unusual noise or vibration	Yes	No
	2	Motor overloads verified	Yes	No
	3	Motor rotation verified – each motor	Yes	No
	4	Motor voltage and amps verified – each phase of each motor	Yes	No
	5	Flow rate through tower verified	Yes	No
	6	Water distributed evenly in hot water basin with flow of 50% - no dumping	Yes	No
	7	Water distributed evenly in hot water basin with flow at 100%	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

7. Coil, HW Heat: HWC-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Equipment or Area Served		
	5	Heating Capacity (MBH/gpm)	/	/
	6	Piping Inlet/Outlet Diameter (in.)	/	/
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	The water openings are sealed	Yes	No
	3	Installation and startup manual provided	Yes	No
	4	Unit tags affixed	Yes	No
	5	Manufacturer's ratings readable/accurate	Yes	No
2		**Construction Checklist**		
A		**Installation of Reheat Coil**		
	1	Unit secured as required by specifications	Yes	No
	2	Adequate clearance around unit for service	Yes	No
	3	All components accessible for maintenance	Yes	No
	4	Unit can be removed from building	Yes	No
	5	Unit labeled and is easy to see	Yes	No
B		**Piping**		
	1	All piping components have been installed (in the correct order) as required by detail drawings	Yes	No
	2	Piping arranged for ease of unit removal	Yes	No
	3	Piping supported as required by specifications	Yes	No
	4	Piping is clean	Yes	No
	5	Piping insulation complete and installed as per specifications	Yes	No
	6	All valves and test ports are easily accessible	Yes	No
	7	Valve tags attached	Yes	No
C		**Controls**		
	1	Temperature sensor calibration verified	Yes	No
	2	Hot water actuator verified	Yes	No
	3	Point-to-point connections of control wiring verified	Yes	No
	4	Central system accurately represents conditions of unit	Yes	No
	5	Heating sequence of control verified	Yes	No

7. Coil, HW Heat: HWC-1
ASHRAE Guideline 1.1 Example Checklist *(Continued)*

D		**TAB**		
	1	Entering and leaving coil air temperatures (°F)	Yes	No
	2	Entering and leaving coil water temperatures	Yes	No
	3	Coil flow and air/water pressure drops verified	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

8A. HVAC Piping: Insulation
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.
Step 3: Samples of installed piping will be periodically reviewed to verify compliance.

General Overall (Total Job) HVAC Piping Insulation Requirement

Item		Task Description	Response	
1		**System Checks**		
	A	**Installation Checks**	Submitted	Delivered
	1	Piping is clean, dry and free of damage prior to installation.	Yes	No
	2	Pressure and leakage tests performed and reports have been submitted prior to installation.	Yes	No
	3	All chilled water piping is insulated with 1 ½ inch thick fiberglass pipe insulation with vapor barrier except runouts to radiant cooling panels located beyond 1'-0" within room being served.	Yes	No
	4	Secondary chilled water, low temperature chilled water (2 ½ inch thick), fan coil drain piping (1/2" thick), and piping with electric trace freeze protection is insulated in the same manner as the chilled water pipes.	Yes	No
	5	All chilled water pumps are insulated with a 1 ½ inch thick rectangular box made of Manville 817 rigid fiberglass board having a density of 6 lb/ft^3 with a rated vinyl coated and embossed laminate vapor seal (ASJ) jacket.	Yes	No
	6	The insulation box for the pump is open at top and bottom with a removable top to effect a complete insulation for each base mounted pump.	Yes	No
	7	The pipe insulation sections are firmly butted together and the longitudinal seam of the vapor barrier is cemented with Foster No. 85-75.	Yes	No
	8	End joints are sealed with a minimum of 3 inch wide factory furnished vapor barrier strips cemented with Foster No. 85-75	Yes	No
	9	All fittings, valves, strainers, etc. are insulated as described in the specifications.	Yes	No
	10	Exterior piping has a 0.016 inch aluminum jacket with moisture barrier lock seam and Gasco of equal factory applied fitting in lieu of glass cloth jackets. A sample is submitted.	Yes	No

"No" Responses		
Item	**Date**	**Reason for "No" Response**

8B. HVAC Piping: Insulation – Daily Checklist
ASHRAE Guideline 1.1 Example Checklist

Checklist for Daily Progress

Instructions: Step 1: This form is completed daily by each work crew at the end of their shift, indicate crew/shift designation.

Step 2: Date and describe work completed in the appropriate section (1 for pre-installation and 2 for installation).

Step 3: Verify achievement of quality requirements by circling "Yes" or "No". For negative responses, complete Section 3.

1. Pre-insulation Inspection by Installer

Date	Description of Work Performed (relate to drawings and number)	Checklist Items			Percent Complete	Initial
		A. Clean	B. Valves	C. Material		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		

A. Piping clean or cleaned before insulation installed.

B. Valves and other accessory surfaces were clean.

C. Insulation material inspected to assure it had not been damaged.

2. Installation of Insulation Checklist by Installer

Date	Description of Work Performed (relate to drawings and drawing numbers)	Checklist Items			Percent Complete	Initial
		A. Clean	B. Valves	C. Material		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		

A. Insulation thickness checked against project manual and is correct.

B. The pipe insulation sections are firmly butted together and the longitudinal seam of the vapor barrier is cemented with Foster No. 85-75.

C. All vapor barriers installed.

3. Conflicts (Attach sketches or other documentation, including resolutions support: all items in sections 1 and 2 to be noted in this section. In addition, any conflicts or non-compliance of any items on the general checklist (Checklist Number 8A) or items not on the checklist should be noted in this section. If Cx Team determines it is significant issues, items will be added to the daily checklist.)

Date	Description of Conflict	Resolution or Suggested Resolution	Resolved
			Yes/No
			Yes/No
			Yes/No
			Yes/No
			Yes/No
			Yes/No
			Yes/No

9A. Ductwork: Installation
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.
Step 3: Samples of installed ductwork will be periodically reviewed to verify compliance.

Item		Task Description	Response	
1		**System Checks**		
A		**Sheet Metal Ductwork Installation Checks**	Submitted	Delivered
	1	Ductwork is clean and free of damage prior to installation	Yes	No
	2	Ductwork is installed in accordance with SMACNA HVAC Duct Construction Standards	Yes	No
	3	All hat sections and standoff brackets are at the same height as the duct lining	Yes	No
	4	Access doors are installed in all casing, plenums, ductwork adjacent to fire dampers, automatic dampers, smoke dampers, and reheat coils, and as indicated on drawings	Yes	No
	5	The access doors on casings or housings open to the inside on the discharge side and to the outside on the suction side	Yes	No
	6	All galvanized sheet metal is separated from aluminum and copper with lead or felt gaskets	Yes	No
	7	Ductwork is structurally sound to prevent drumming and sagging	Yes	No
	8	All transverse and longitudinal joints are sealed	Yes	No
	9	All branch and tee connections are 45 degree	Yes	No
	10	All medium pressure branch and tee connections are expanded 30 degrees on at least three sides	Yes	No
	11	Ductwork meets static pressure requirements specified below and leakage class A for these pressures as defined by SMACNA HVAC Duct Construction Standards	Yes	No
	12	All ductwork except as noted in the specification is leak tested	Yes	No
	13	Elbows have an inside radius equal to a minimum of ¾ of the width of the duct	Yes	No

	14	All square elbows and radius elbows larger than 18 inches have turning vanes	Yes	No
	15	All wall and floor penetrations are sealed	Yes	No
	16	Volume dampers are at minimum provided for each horizontal branch from vertical risers serving two or more floors and branches serving two or more outlets	Yes	No
	17	All equipment requiring maintenance is accessible (valves, junction boxes, etc.)	Yes	No
	18	All duct openings temporary sealed to maintain duct system cleanliness	Yes	No
	19	Record drawings have been updated to reflect any changes made	Yes	No
B		**Flexible Ductwork Installation Checks**		
	1	Flexible ductwork is clean and free from damage prior to installation	Yes	No
	2	Flexible ductwork is free of sags and kinks	Yes	No
	3	Flexible ductwork is installed using extra heavy flexible duct straps	Yes	No
	4	The maximum length of flexible ductwork is 5 feet	Yes	No
	5	Flexible ductwork does not penetrate walls	Yes	No
	6	Flexible ductwork does not have 90 degree bends	Yes	No
C		**Ductwork Type Static Pressure Classification Installation Checks**		
	1	From fan discharge to and including vertical risers, +6 in. static pressure	Yes	No
	2	Branch supply ductwork, +4 in. static pressure	Yes	No
	3	Branch supply ductwork from terminal to room outlet, +1 in. static pressure	Yes	No
	4	Exhaust/return ductwork, ± 1 in. static pressure	Yes	No
	5	All other ductwork, ± 2 in. static pressure	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

9B. Ductwork: Installation – Daily Checklist
ASHRAE Guideline 1.1 Example Checklist

Checklist for Daily Progress

Instructions: Step 1: This form is completed daily by each work crew at the end of their shift, indicate crew/shift designation.

Step 2: Date and describe work completed in the appropriate section (1 for pre-installation and 2 for installation).

Step 3: Verify achievement of quality requirements by circling "Yes" or "No". For negative responses, complete Section 3.

1. Pre-insulation Inspection by Installer

Date	Description of Work Performed (relate to drawings and drawing numbers)	Checklist Items			Percent Complete	Initial
		A. Clean	B. Flex	C. Less 5'		
		Yes/No	Yes/No	Yes/No		

		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		

A. Ductwork is clean and free of damage prior to installation.

B. Flexible ductwork is clean and free of damage prior to installation.

C. The maximum length of flexible ductwork is 5'.

2. Installation of Insulation Checklist by Installer

Date	Description of Work Performed (relate to drawings and number)	Checklist Items A. SMACNA	B. Drumming	C. Access Doors	Percent Complete	Initial
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		

A. Ductwork is installed in accordance with SMACNA HVAC Duct Construction Standards, 2005.

B. Ductwork is structurally sound to prevent drumming and sagging.

C. All required access doors installed.

3. Conflicts (Attach sketches or other documentation, including resolutions support: all items in sections 1 and 2 to be noted in this section. In addition, any conflicts or non-compliance of any items on the general checklist (Checklist Number 9A) or items not on the checklist should be noted in this section. If Cx Team determines it is significant issues, items will be added to the daily checklist.)

Date	Description of Conflict	Resolution or Suggested Resolution	Resolved
			Yes/No
			Yes/No
			Yes/No
			Yes/No
			Yes/No
			Yes/No
			Yes/No

10A. Ductwork: Insulation
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.
Step 3: Samples of installed ductwork will be periodically reviewed to verify compliance.

Item	Task Description	Response

1		**System Checks**		
	A	**Installation Checks**	Submitted	Delivered
	1	Ductwork is clean, dry and free of damage prior to insulation installation	Yes	No
	2	Insulation is clean and dry during installation and application of any finish	Yes	No
	3	Pressure and leakage tests performed and reports have been submitted prior to insulation installation	Yes	No
	4	All equipment requiring maintenance is accessible (valves, junction boxes, etc)	Yes	No
	5	Insulation is continuous through openings and sleeves in non-rated construction, and is butted tightly against the fire stop with butt joints taped in rated construction	Yes	No
	6	All insulation edges temporary sealed to maintain duct insulation cleanliness	Yes	No
	7	Insulation is removable at access panels with metal corner beads	Yes	No
	8	Insulation is omitted at all equipment name plates and/or data plates	Yes	No
	9	All outdoor intakes, housing, plenums from point of entry into the building to the fan or supply discharge and to exhaust duct from damper to outside and elsewhere be indicated on drawings are insulated with 1 ½ inch rigid insulation board with vapor barrier	Yes	No
	10	All exposed conditioned supply ductwork within the building is insulated with 1 inch thick rigid insulation board with vapor barrier	Yes	No
	11	All nonflexible ductwork insulation is fastened by applying Foster No. 85-20 adhesive in 4-inch wide continuous bands on 12-inch centers and further secured by welded mechanical pins applied on 12-inch centers as specified	Yes	No
	12	All concealed flexible and round ductwork is insulated with 1 ½ inch thick insulation and secured by the means of metal staples using the stitching methods of application and as detailed in the specifications	Yes	No
	13	All exterior corners are sealed with a 5-inch wide tape	Yes	No
	B	**Installation Checks - Flexible Ductwork**		
	1	Flexible ductwork is clean and free from damage prior to installation	Yes	No
	2	Flexible ductwork is free of sags and kinks	Yes	No
	3	Flexible ductwork is installed using extra heavy flexible duct straps	Yes	No
	4	The maximum length of flexible ductwork is 5 feet	Yes	No
	5	Flexible ductwork does not penetrate walls	Yes	No
	6	Flexible ductwork does not have 90 degree bends	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

10B. Ductwork: Insulation – Daily Checklist
ASHRAE Guideline 1.1 Example Checklist

Checklist for Daily Progress

Instructions: Step 1: This form is completed daily by each work crew at the end of their shift, indicate crew/shift designation.

Step 2: Date and describe work completed in the appropriate section (1 for pre-installation and 2 for installation).

Step 3: Verify achievement of quality requirements by circling "Yes" or "No". For negative responses, complete Section 3.

1. Pre-insulation Inspection by Installer

Date	Description of Work Performed (relate to drawings and drawing numbers)	Checklist Items			Percent Complete	Initial
		A. Clean	B. Leak Tested	C. Material		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		

A. Ductwork clean or cleaned before insulation installed.

B. All sections leak tested prior to applying insulation.

C. Insulation material inspected to assure it had not been damaged.

2. Installation of Insulation Checklist by Installer

Date	Description of Work Performed (relate to drawings and number)	Checklist Items			Percent Complete	Initial
		A. Thickness	B. Sealed	C. Vapor Barrier		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		
		Yes/No	Yes/No	Yes/No		

A. Insulation thickness checked against project manual and is correct.

B. All flex duct installed per drawing and no runs more than five feet.

C. All vapor barriers installed.

3. Conflicts (Attach sketches or other documentation, including resolutions support: all items in sections 1 and 2 to be noted in this section. In addition, any conflicts or non-compliance of any items on the general checklist (Checklist Number 10A) or items not on the checklist should be noted in this section. If Cx Team determines it is significant issues, items will be added to the daily checklist.)

Date	Description of Conflict	Resolution or Suggested Resolution	Resolved
			Yes/No
			Yes/No
			Yes/No
			Yes/No
			Yes/No

Yes/No
Yes/No

11. Energy Recovery Wheel: ERW-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Exhaust air flow (cfm)		
	5	Supply air flow (cfm)		
	6	Voltage / Phase / Frequency (V / - / Hz)	/ /	/ /
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	The air openings are sealed with plastic	Yes	No
	3	All components present in proper order	Yes	No
	4	All access doors are operable	Yes	No
	5	Installation and startup manual provided	Yes	No
	6	Unit identification attached and visible	Yes	No
2		**Construction Checklist**		
A		**Installation of Energy Recovery Wheel**		
	1	Unit secured as required by manufacturer and specifications	Yes	No
	2	Purge section in correct direction	Yes	No
	3	Adequate clearance around unit for service	Yes	No
	4	All components accessible for maintenance	Yes	No
	5	Unit can be removed from building	Yes	No
	6	Unit identification attached and visible	Yes	No
B		**Electrical**		
	1	Local disconnect installed in an accessible location	Yes	No
	2	Wheel rotation in the proper direction	Yes	No
	3	All electrical connections are tight	Yes	No
	4	All electrical components are grounded	Yes	No
	5	VFD installed (if applicable)	Yes	No
C		**Ductwork**		
	1	Duct work is attached according to manufacturer recommendations	Yes	No
	2	Inlets and outlets of energy recovery wheel are free of ductwork blockage	Yes	No
	3	Structural support for ductwork is independent of wheel unit	Yes	No

	4	Ductwork placement allows unrestricted airflow and clear view of rotation labeling	Yes	No
	5	Access doors have been supplied in each duct near the unit	Yes	No
	6	Adequate locations for testing and balancing of unit	Yes	No
	7	All dampers and sensors are accessible (access doors)	Yes	No
	8	Ductwork is clean and free of debris	Yes	No
D		**Controls - Installation**		
	1	Control panel accessible and labeled properly	Yes	No
	2	Temperature, pressure, and CO_2 sensors (as applicable) are installed and calibrated	Yes	No
	3	Safety items installed and verified (freezestat, high pressure, motor overload, etc.)	Yes	No
E		**Mechanical - Startup**		
	1	System clean	Yes	No
	2	Wheel lubricated and aligned	Yes	No
	3	Wheel belts have proper tension and are in good condition	Yes	No
	4	Seals have been adjusted according to manufacturer specifications	Yes	No
	5	Duct installation conforms to airflow labeling	Yes	No
	6	System starts and runs without any unusual noise or vibration	Yes	No
	7	Manufacturer's startup checklist completed and attached	Yes	No
F		**Controls – Startup**		
	1	Warm-up sequence of control verified	Yes	No
	2	Cool-down sequence of control verified	Yes	No
	3	Economizer sequence of control verified	Yes	No
	4	Unoccupied sequence of control verified	Yes	No
G		**TAB**		
	1	Motor voltage and amps verified	Yes	No
	2	Wheel speed, design/actual (rpm)	/	/
	3	Pressure drop between outside air and return air is large enough	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

12. Exhaust Fan: EF-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
	A	**Model Verification**	Submitted	Delivered

	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Fan Type		
	5	Capacity / Static Pressure (cfm / in. wg)	/	/
	6	Motor Power / Speed (hp / rpm)	/	/
	7	Motor Voltage / Phase / Frequency (V / - / Hz)	/ /	/ /
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	The air openings are sealed with plastic	Yes	No
	3	All components present (belt guard, motor, damper, spring isolators, etc.)	Yes	No
	4	Installation and startup manual provided	Yes	No
	5	Unit tags affixed	Yes	No
2		**Construction Checklist**		
A		**Installation of Exhaust Fan**		
	1	Unit secured as required by manufacturer and specifications	Yes	No
	2	Adequate clearance around unit for service	Yes	No
	3	All components accessible for maintenance	Yes	No
	4	Unit can be removed from building	Yes	No
	5	Shipping bolts have been removed (if applicable)	Yes	No
	6	Belts are tight (if applicable)	Yes	No
	7	Back draft damper installed and moves freely	Yes	No
	8	Protective shrouds for fan and belts in place and secure	Yes	No
	9	Unit labeled and is easy to see	Yes	No
B		**Ductwork**		
	1	Adequate locations available for testing and balancing unit	Yes	No
	2	All dampers and sensors are accessible (access panels)	Yes	No
	3	Vibration isolators installed	Yes	No
	4	All dampers close tightly and stroke fully and easily	Yes	No
	5	Ductwork is clean and free of debris	Yes	No
C		**Electrical**		
	1	Local disconnect installed in an accessible location	Yes	No
	2	Motor rotation in the proper direction	Yes	No
	3	All electrical connections are tight	Yes	No
	4	All electrical components are grounded	Yes	No
D		**Controls - Installation**		
	1	Control panel accessible and labeled properly	Yes	No
	2	Dampers actuators installed and calibration verified	Yes	No
	3	Safety items installed and verified (high pressure, motor overload, etc.)	Yes	No
E		**Mechanical - Startup**		
	1	Unit is clean	Yes	No
	2	Internal isolators free to move	Yes	No
	3	Fan and motor lubricated and aligned	Yes	No
	4	Fan belts have proper tension and are in good condition (if applicable)	Yes	No

	5	System starts and runs without any unusual noise or vibration	Yes	No
	6	Manufacturer's startup checklist completed and attached	Yes	No
F		**Controls – Startup**		
	1	Remote start/stop from central system verified	Yes	No
	2	Sequence of control is correct (e.g., interlock)	Yes	No
G		**TAB**		
	1	Air flow, design / actual (cfm)	/	/
	2	Pressure drop, design / actual (in. wg)	/	/
	3	Fan rotation is in the proper direction	Yes	No
	4	Motor overloads verified	Yes	No
	5	Motor voltage and amps verified – each phase	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

13. Fan Coil Unit, CW & HW: FCU-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Capacity / Static Pressure (cfm / in. wg)	/	/
	5	Fan Motor Power (hp)		
	6	Fan Motor Voltage / Phase / Frequency (V / - / Hz)	/ /	/ /
	7	Total / Sensible Cooling Capacity (MBH)	/	/
	8	Cooling Fluid Flow / Pressure Drop (gpm / ft wg)	/	/
	9	Total Heating Capacity (MBH)		
	10	Heating Fluid Flow / Pressure Drop (gpm / ft wg)	/	/
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	Coil surface areas are free of damage	Yes	No
	3	The water openings are sealed with plastic plugs	Yes	No
	4	All components present	Yes	No
	5	Installation and startup manual provided	Yes	No
	6	Unit tags affixed	Yes	No

2		**Construction Checklist**		
A		**Installation of Fan Coil Unit**		
	1	Unit supported using adequately sized mounting anchors	Yes	No
	2	Metal-to-metal connections eliminated to prevent noise problems	Yes	No
	3	Adequate clearance around unit for service	Yes	No
	4	All components are accessible for maintenance	Yes	No
	5	Unit can be removed from building	Yes	No
	6	Unit labeled and is easy to see	Yes	No
B		**Chilled Water Piping**		
	1	Condensate piping properly installed (trapped and run to a drain)	Yes	No
	2	P/T ports installed across the cooling coil	Yes	No
	3	All piping components have been installed (in the correct order) as required by detail drawing	Yes	No
	4	Piping arranged for ease of unit/coil removal	Yes	No
	5	Piping supported as required by specifications	Yes	No
	6	Piping is clean	Yes	No
	7	Piping insulation complete and installed as per specifications	Yes	No
	8	All valves and test ports are easily accessible	Yes	No
	9	Valve tags attached	Yes	No
C		**Hot Water Piping**		
	1	All piping components have been installed (in the correct order) as required by detail drawing	Yes	No
	2	Piping arranged for ease of unit/coil removal	Yes	No
	3	Piping supported as required by specifications	Yes	No
	4	Piping is clean	Yes	No
	5	Piping insulation complete and installed as per specifications	Yes	No
	6	All valves and test ports are easily accessible	Yes	No
	7	Valve tags attached	Yes	No
D		**Ductwork**		
	1	Adequate locations available for testing and balancing of unit	Yes	No
	2	All dampers and sensors are accessible (access doors)	Yes	No
	3	All dampers close tightly and stroke fully and easily	Yes	No
	4	Filter is clean	Yes	No
	5	Filter is properly installed (air bypassing the filter is prevented)	Yes	No
	6	Ductwork is clean and free of debris	Yes	No
E		**Electrical**		
	1	Local disconnect installed in an accessible location	Yes	No
	2	Motor rotation in the proper direction	Yes	No
	3	All electrical connections are tight	Yes	No
	4	All electrical components are grounded	Yes	No
F		**Controls - Installation**		
	1	Control panel accessible and labeled properly	Yes	No
	2	Room thermostat installed and calibration verified	Yes	No
	3	Chilled and hot water actuators installed and calibration verified	Yes	No

G		**Controls – Startup**		
	1	Unit operation accurately represented on main system	Yes	No
	2	Cooling sequence of control verified	Yes	No
	3	Heating sequence of control verified	Yes	No
H		**TAB**		
	1	Filters and coils are clean	Yes	No
	2	Motor rotation verified	Yes	No
	3	Motor overloads verified	Yes	No
	4	Motor voltage and amps verified – each phase	Yes	No
	5	Entering and leaving cooling coil air temperature (°F)	/	/
	6	Entering and leaving heating coil air temperature (°F)	/	/
	7	Entering and leaving chilled water temperature (°F)	/	/
	8	Entering and leaving hot water temperature (°F)	/	/
	9	Coil flow and air/water pressure drops verified – each coil	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

14. Fire Damper: FD-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Style		
	4	Width (in.)		
	5	Height (in.)		
	6	Orientation		
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	All components/accessories present	Yes	No
	3	Installation manual provided	Yes	No
2		**Construction Checklist**		
A		**Installation of Fire Damper**		
	1	Unit secured as required by manufacturer and specifications	Yes	No
	2	Adequate clearance around unit for maintenance	Yes	No

	3	Unit mounted in correct orientation	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

15. Grilles, Registers & Diffusers: Diffusers
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Frame		
	4	Color		
	5	Neck Width (in.)		
	6	Neck Height (in.)		
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	All components/accessories present	Yes	No
	3	Installation manual provided	Yes	No
2		**Construction Checklist**		
A		**Installation of Grille/Register**		
	1	Unit secured as required by manufacturer and specifications	Yes	No
	2	Any surface blemishes have been touched up	Yes	No
	3	Design CFM confirmed	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

16. Humidifier, Steam: SH-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Steam Output Capacity (lb/hr)		
	5	Steam Input Capacity (lb/hr)		
	6	Inlet Steam Maximum Pressure (psig)		
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	All components/accessories present	Yes	No
	3	Installation manual provided	Yes	No
2		**Construction Checklist**		
A		**Installation of Humidifier**		
	1	Unit secured as required by manufacturer and specifications	Yes	No
	2	Adequate clearance around unit for service	Yes	No
	3	All components are accessible for maintenance	Yes	No
	4	Unit can be removed from building	Yes	No
	5	Unit located below duct level for good drainage	Yes	No
	6	Dispersion tube located as per manufacturer's recommendations	Yes	No
	7	Unit labeled and is easy to see	Yes	No
B		**Piping**		
	1	All piping components have been installed (in the correct order) as required by detail drawing	Yes	No
	2	Piping arranged for ease of unit removal	Yes	No
	3	Piping sloped for complete drainage	Yes	No
	4	Piping supported as required by specifications	Yes	No
	5	Piping is clean and free from leaks	Yes	No
	6	All valves and test ports are easily accessible	Yes	No
	7	Valve tags attached	Yes	No
C		**Controls - Installation**		
	1		Yes	No
	2		Yes	No
D		**Controls – Startup**		
	1	Sequence of control verified	Yes	No
	2	Unit operation accurately represented on main system	Yes	No
	3	Airflow sensor operation verified	Yes	No
	4	Duct high limit humidistat operation verified	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

17. HVAC Piping: Installation
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.
Step 3: Samples of installed piping will be periodically reviewed to verify compliance.

Item		Task Description	Response	
1		**System Checks**		
A		**Installation Checks**	Submitted	Delivered
	1	Piping is clean and free of damage prior to installation.	Yes	No
	2	Piping is free to expand and contract without noise or damage to hangers, joints, or the building.	Yes	No
	3	Piping is installed with sufficient pitch and arranged in a manner to ensure drainage and venting of the entire system.	Yes	No
	4	Manual air vents are provided at high points in closed water systems.	Yes	No
	5	Changes in pipe sizes are made with the proper size reducing fittings, reducing elbows or reducing tees. Bushings are not allowed.	Yes	No
	6	All piping supports and hangers meet criteria set in Section 15140 of the specifications.	Yes	No
	7	All fittings meet specification requirements.	Yes	No
	8	All equipment requiring maintenance is accessible (valves, junction boxes, etc.)	Yes	No
	9	Piping does not block access to equipment that is part of this system or another system (e.g., air terminal units).	Yes	No
	10	Piping is installed in a manner to ensure that insulation will not contact adjacent surfaces.	Yes	No
	11	All pipe openings are temporarily sealed to maintain piping system cleanliness.	Yes	No
	12	Record drawings have been updated to reflect any changes made.	Yes	No
	13	Nipples are made of the same material as the pipe.	Yes	No
	14	Connections between copper and steel pipes are made with dielectric fittings.	Yes	No
	15	A union is provided ahead of each screwed valve, trap, or strainer, and on each side of each piece of equipment and whatever needed to dismantle piping.	Yes	No
	16	Mechanical coupling if used is only used for piping and locations as described in the specifications section 15060.	Yes	No
	17	The chilled water system is installed with high pressure fittings, flanges and unions.	Yes	No
	18	Auxiliary drain valves are provided at all low points in hose bib piping to facilitate seasonal draining.	Yes	No
	19	A clearance of 8 ft 2 in. is maintained throughout the parking structure. Walker's drawings have been consulted for exact location of pipe spaces,	Yes	No

ceiling heights, and other details before installing piping

"No" Responses		
Item	**Date**	**Reason for "No" Response**

18. VAV Box, Non Fan Powered w/HW Heat: VAV-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Size (in)		
	5	Max/Min Airflow (cfm)		
	6	Heating Capacity (MBH/gpm)	/	/
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	The air openings are sealed with plastic	Yes	No
	3	The water openings are sealed with plastic plugs	Yes	No
	4	The airflow sensing tubing is plugged	Yes	No
	5	The grommets for the airflow sensing tubing are secure	Yes	No
	6	The enclosure for the DDC control panel is in the proper location	Yes	No
	7	Installation and startup manual provided	Yes	No
	8	Unit tags affixed	Yes	No
	9	Manufacturer's ratings readable/accurate	Yes	No
2		**Construction Checklist**		
A		**Hanging**		
	1	Unit is supported as required by manufacturer and specifications	Yes	No
	2	Metal to metal connections eliminated to prevent noise problems	Yes	No
	3	Adequate clearance around control panel for maintenance	Yes	No
	4	Clear access below unit for easy maintenance	Yes	No
	5	Unit labeled and is easy to see	Yes	No
	6	Box openings temporarily sealed to maintain system cleanliness	Yes	No
B		**Ductwork**		
	1	Balancing damper present on inlet duct	Yes	No
	2	Sufficient length of straight ductwork installed upstream of unit	Yes	No

	3	Downstream ductwork free of transitions for sufficient length	Yes	No
	4	All components are accessible for maintenance	Yes	No
	5	Flexible connector (vibration isolator) installed on inlet duct to avoid noise problems from metal-to-metal contact	Yes	No
	6	Flex duct (if used) is installed in a way that avoids forming kinks on both inlet and outlet ductwork	Yes	No
C		**Piping**		
	1	All piping components have been installed (in the correct order) as required by detail drawing	Yes	No
	2	Piping is arranged for ease of unit/coil removal	Yes	No
	3	Piping supported as required by specifications	Yes	No
	4	Piping is clean	Yes	No
	5	Piping insulation is complete and installed as per specifications	Yes	No
	6	All valves and test ports are easily accessible	Yes	No
	7	Valve tags attached	Yes	No
D		**Controls - Installation**		
	1	Temperature sensor calibration verified	Yes	No
	2	Airflow sensor calibration verified	Yes	No
	3	Point-to-point connections of control wiring verified	Yes	No
	4	Central system accurately represents conditions of unit	Yes	No
E		**Controls – Startup**		
	1	Cooling/heating sequence of control verified	Yes	No
	2	Warm-up/cool-down sequence of control verified	Yes	No
	3	Unoccupied sequence of control verified	Yes	No
F		**TAB**		
	1	Minimum airflow (cfm) (design/measured)	/	/
	2	Maximum airflow (cfm) (design/measured)	/	/
	3	Entering and leaving coil air temperatures (°F)	/	/
	4	Entering and leaving coil water temperatures (°F)	/	/
	5	Coil flow and air/water pressure drops verified	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

19. Pump, HVAC: P-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item	Task Description	Response

1		**Delivery Book**		
	A	**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Pump Type		
	5	Impeller diameter (in.)		
	6	Inlet / Outlet Sizes (in.)	/	/
	7	Capacity / Head (gpm / ft wg)	/	/
	8	Motor Speed / Power (rpm / hp)	/	/
	9	Motor Voltage / Phase / Frequency (V / - /Hz)	/ /	/ /
	B	**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	All components present	Yes	No
	3	The water openings are sealed with plastic plugs	Yes	No
	4	Unit tags affixed	Yes	No
	5	Installation and startup manual provided	Yes	No
	6	Manufacturer's rating readable/accurate	Yes	No
2		**Construction Checklist**		
	A	**Installation of Pump**		
	1	Unit is supported as required by manufacturer and specifications	Yes	No
	2	Adequate clearance around unit for service	Yes	No
	3	All components accessible for maintenance	Yes	No
	4	Unit can be removed from building	Yes	No
	5	Unit labeled and is easy to see	Yes	No
	B	**Piping**		
	1	All piping components have been installed (in the correct order) as required by detail drawing	Yes	No
	2	Piping arranged for ease of unit removal	Yes	No
	3	Shut-off valves and unions installed on inlet and outlet of pump	Yes	No
	4	Pressure gauges installed on inlet and outlet of pump	Yes	No
	5	Piping supported as required by specifications	Yes	No
	6	Piping is clean	Yes	No
	7	Piping insulation complete and installed as per specifications	Yes	No
	8	All valves and test ports are easily accessible	Yes	No
	9	Valve tags attached	Yes	No
	C	**Electrical**		
	1	Local disconnect installed in an accessible location	Yes	No
	2	Motor rotation in the proper direction	Yes	No
	3	All electrical connections are tight	Yes	No
	4	All electrical components are grounded	Yes	No
	D	**Mechanical - Startup**		
	1	Unit check, aligned, and certified prior to startup and report submitted	Yes	No
	2	Unit and motor lubricated before startup	Yes	No

	3	Pump shaft rotates easily with power turned off	Yes	No
	4	System starts and runs without any unusual noise or vibration	Yes	No
	5	Manufacturer's startup checklist completed and attached	Yes	No
E		**TAB**		
	1	Flow Rate, gpm		
	2	Inlet pressure (ft) / Outlet pressure (ft)	/	/
	3	Motor rotation in the proper direction	Yes	No
	4	Motor overload verified	Yes	No
	5	Motor voltage and amps verified – each phase	Yes	No
	6	Start-up strainer removed (after 24 hours)	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

20. Split System A/C Unit (coil portion): ACE-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Airflow (CFM)		
	5	Fan Motor Power (hp)		
	6	Fan Motor Voltage / Phase / Frequency (V / - /Hz)	/ /	/ /
	7	Total Cooling Capacity (MBH)		
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	All components present	Yes	No
	3	The refrigerant line openings are sealed	Yes	No
	4	Installation and startup manual provided	Yes	No
	5	Unit tags affixed	Yes	No
2		**Construction Checklist**		
A		**Installation of Split System Coil**		
	1	Unit supported using adequately sized mounting anchors	Yes	No

	2	Adequate clearance around unit for service	Yes	No
	3	All components are accessible for maintenance	Yes	No
	4	Unit can be removed from building	Yes	No
	5	Condensate drain piping un-trapped and runs to open sight drain	Yes	No
	6	Unit labeled and is easy to see	Yes	No
B		**Piping**		
	1	All piping components have been installed (in the correct order) as required by detail drawing	Yes	No
	2	Piping arranged for ease of unit removal	Yes	No
	3	Piping supported as required by specifications	Yes	No
	4	Refrigerant lines connected to indoor and outdoor units	Yes	No
	5	Piping is clean and free from leaks	Yes	No
	6	Piping insulation is complete and installed as per specifications	Yes	No
	7	All valves and test ports are easily accessible	Yes	No
	8	Valve tags attached	Yes	No
	9	Unit filled with correct refrigerant	Yes	No
C		**Electrical**		
	1	Local disconnect installed in an accessible location	Yes	No
	2	Fan motor rotation in the proper direction	Yes	No
	3	All electrical connections are tight	Yes	No
	4	All electrical components are grounded	Yes	No
D		**Controls - Installation**		
	1	Room thermostat installed and calibration verified	Yes	No
	2	Control wiring provided to outdoor (compressor) unit	Yes	No
	3	Communication with outdoor unit verified	Yes	No
E		**Controls - Startup**		
	1	Cooling sequence of control verified	Yes	No
	2	System starts and runs with no unusual noise or vibration	Yes	No
	3	Manufacturer's startup checklist completed and attached	Yes	No
F		**TAB**		
	1	Filters installed and are clean		
	2	Entering and leaving air temperatures (°F)	/	/
	3	Airflow (cfm)	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

21. Split System A/C Unit (compressor portion): ACC-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Airflow (CFM)		
	5	Ambient Temperature (°F)		
	6	Fan Motor Power (hp)		
	7	Fan Motor Voltage / Phase / Frequency (V / - /Hz)	/ /	/ /
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	All components present	Yes	No
	3	The refrigerant line openings are sealed	Yes	No
	4	Installation and startup manual provided	Yes	No
	5	Unit tags affixed	Yes	No
2		**Construction Checklist**		
A		**Installation of Split System Compressor**		
	1	Unit secured as required by manufacturer and specifications	Yes	No
	2	Adequate clearance around unit for service	Yes	No
	3	All components are accessible for maintenance	Yes	No
	4	Unit labeled and easy to see	Yes	No
B		**Piping**		
	1	All piping components have been installed (in the correct order) as required by detail drawing	Yes	No
	2	Piping arranged for ease of unit removal	Yes	No
	3	Piping supported as required by specifications	Yes	No
	4	Refrigerant lines connected to indoor and outdoor units	Yes	No
	5	Piping is clean and free from leaks	Yes	No
	6	Piping insulation is complete and installed as per specifications	Yes	No
	7	All valves and test ports are easily accessible	Yes	No
	8	Valve tags attached	Yes	No
	9	Unit filled with correct refrigerant	Yes	No
C		**Electrical**		
	1	Local disconnect installed in an accessible location	Yes	No
	2	Fan motor rotation in the proper direction	Yes	No
	3	All electrical connections are tight	Yes	No
	4	All electrical components are grounded	Yes	No
D		**Controls - Installation**		
	1	Control wiring provided to indoor (coil) unit	Yes	No
	2	Communication with indoor unit verified	Yes	No

E		**Controls - Startup**		
	1	Safety items operational (high pres., low pres., discharge temp. switch)	Yes	No
	2	System starts and runs with no unusual noise or vibration	Yes	No
	3	Manufacturer's startup checklist completed and attached	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

22. Unit Heater, HW: UH-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Fan Motor Power (hp)		
	5	Fan Motor Voltage / Phase / Frequency (V / - /Hz)	/ /	/ /
	6	Total Heating Capacity (MBH)		
	7	Heating Fluid Flow / Pressure Drop (gpm / ft wg)		
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	All components present	Yes	No
	3	The water openings are sealed with plastic plugs	Yes	No
	4	Manufacturer's data readable/accurate	Yes	No
	5	Unit identification attached and visible	Yes	No
2		**Construction Checklist**		
A		**Installation of Unit Heater**		
	1	Unit supported using adequately sized mounting anchors	Yes	No
	2	Adequate clearance around unit for service	Yes	No
	3	All components are accessible for maintenance	Yes	No
	4	Unit can be removed from building	Yes	No
	5	Unit identification attached and visible	Yes	No
B		**Piping**		
	1	All piping components have been installed (in the correct order) as required	Yes	No

		by detail drawing		
	2	Piping arranged for ease of unit removal	Yes	No
	3	Piping supported as required by specifications	Yes	No
	4	Piping is clean	Yes	No
	5	Piping insulation is complete and installed as per specifications	Yes	No
	6	All valves and test ports are easily accessible	Yes	No
C		**Electrical**		
	1	Local disconnect installed in an accessible location	Yes	No
	2	Motor rotation in the proper direction	Yes	No
	3	All electrical connections are tight	Yes	No
	4	All electrical components are grounded	Yes	No
D		**Controls**		
	1	Room thermostat installed and calibration verified	Yes	No
	2	Hot water actuator calibration verified	Yes	No
	3	Heating sequence of control verified	Yes	No
	4	Valve tags are attached	Yes	No
E		**TAB**		
	1	Motor rotation in the proper direction	Yes	No
	2	Motor overloads verified	Yes	No
	3	Motor voltage and amps verified – each phase	Yes	No
	4	Entering and leaving air temperature (°F)	/	/
	5	Flow and air/water pressure drops verified	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

23. Variable Speed Drive: VSD-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Service Area		
	5	Maximum Capacity (amps)		

	6	Voltage / Phase / Frequency (V / - /Hz)	/ /	/ /
	B	**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	All components present	Yes	No
	3	Installation and startup manual provided	Yes	No
	4	Wiring schematics (electrical & controls) for this application attached	Yes	No
	5	Unit tags affixed	Yes	No
	6	Manufacturer's ratings readable/accurate	Yes	No
2		**Construction Checklist**		
	A	**Installation of VSD**		
	1	Unit secured as required by manufacturer and specifications	Yes	No
	2	Adequate clearance around unit for service	Yes	No
	3	All components are accessible for maintenance	Yes	No
	4	Unit can be removed from building	Yes	No
	5	Unit labeled and is easy to see	Yes	No
	6	Wiring schematic inside enclosure and includes bypass section	Yes	No
	B	**Electrical**		
	1	Drive to motor leads are in grounded metal conduit	Yes	No
	2	All electrical connections are tight	Yes	No
	3	All electrical components are grounded	Yes	No
	C	**Controls - Installation**		
	1	Control panel assessable and labeled properly	Yes	No
	2	Low voltage control signals are shielded and in own conduit	Yes	No
	3	Auxiliary safeties (F/A shutdown, etc.) are installed and operational	Yes	No
	4	Analog output to control unit is "isolated" type	Yes	No
	D	**Electrical – Pre-Startup Checks**		
	1	Motor full load amps less than max rating, design / actual	/	/
	2	Input voltage, design / actual (within 10% of rating)	/	/
	3	All grounds verified	Yes	No
	4	All fuses verified	Yes	No
	E	**Electrical – Startup**		
	1	VSD properly powers up	Yes	No
	2	Stop button works	Yes	No
	3	Motor rotation is in the proper direction	Yes	No
	4	Minimum and maximum speeds reached using remote command	Yes	No
	5	"Accel" and "Decel" adjustments are made within the drive and do not depend on ramping signal from the DDC controls	Yes	No
	6	VSD restarts automatically	Yes	No
	7	No disconnect on load side of VSD	Yes	No
	8	Critical frequencies have been programmed out of VSD (if applicable)	Yes	No
	9	Motor runs in bypass mode while servicing or removing unit	Yes	No
	10	Motor overload protection and phase loss protection provided during bypass mode	Yes	No
	11	System starts and runs without any unusual noise or vibration	Yes	No

	12	Manufacturer's startup checklist completed and attached	Yes	No

"No" Responses

Item	Date	Reason for "No" Response

24. VAV Box, Fan Powered w/Elect Heat: FPVAV-1
ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Item		Task Description	Response	
1		**Delivery Book**		
A		**Model Verification**	Submitted	Delivered
	1	Manufacturer		
	2	Model		
	3	Serial Number	N/A	
	4	Size (in)		
	5	Max/Min Airflow (CFM)	/	/
	6	Heating Capacity (MBH/kW)	/	/
	7	Total Static Pressure (in. w.g.)		
	8	Fan Power / Speed (hp / rpm)	/	/
	9	Voltage / Phase / Frequency (V / - /Hz)	/ /	/ /
B		**Physical Checks**		
	1	Unit is free from physical damage	Yes	No
	2	The air openings are sealed with plastic	Yes	No
	3	The airflow sensing tubing is plugged	Yes	No
	4	The grommets for the airflow sensing tubing are secure	Yes	No
	5	The enclosure for the DDC control panel is in the proper location	Yes	No
	6	Installation and startup manual provided	Yes	No
	7	Unit tags affixed	Yes	No
	8	Manufacturer's ratings readable/accurate	Yes	No
2		**Construction Checklist**		
A		**Hanging**		
	1	Unit is supported as required by manufacturer and specifications	Yes	No
	2	Metal to metal connections eliminated to prevent noise problems	Yes	No
	3	Adequate clearance around control panel for maintenance	Yes	No
	4	Clear access below unit for easy maintenance	Yes	No
	5	Unit labeled and is easy to see	Yes	No

	6	Box openings temporarily sealed to maintain system cleanliness	Yes	No
B		**Ductwork**		
	1	Balancing damper present on inlet duct	Yes	No
	2	Sufficient length of straight ductwork installed upstream of unit	Yes	No
	3	Downstream ductwork free on transitions for sufficient length	Yes	No
	4	All components are accessible for maintenance	Yes	No
	5	Flexible connector (vibration isolator) installed on inlet duct to avoid noise problems from metal to metal contact	Yes	No
	6	Flex duct (if used) is installed in a way that avoids forming kinks on both inlet and outlet ductwork	Yes	No
C		**Electric Heating Coil**		
	1	Heating coil inspected for damage prior to apply power	Yes	No
	2	Wiring is properly sized	Yes	No
	3	All electrical connections are properly grounded	Yes	No
	4	All electrical connections are tight	Yes	No
D		**Electrical**		
	1	Local disconnect switch installed in an accessible location	Yes	No
	2	Motor rotation is in the proper direction	Yes	No
	3	All electrical connections are tight	Yes	No
	4	All electrical components are grounded	Yes	No
	5	Variable speed selector is operational	Yes	No
	6	P.E. switch is operational	Yes	No
E		**Controls - Installation**		
	1	Temperature sensor calibration verified	Yes	No
	2	Airflow sensor calibration verified	Yes	No
	3	Point-to-point connections of control wiring verified	Yes	No
	4	Central system accurately represents conditions of unit	Yes	No
F		**Controls - Startup**		
	1	Cooling/heating sequence of control verified	Yes	No
	2	Warm-up/cool-down sequence of control verified	Yes	No
	3	Unoccupied sequence of control verified	Yes	No
G		**TAB**		
	1	Motor rotation is in the proper direction	Yes	No
	2	Motor overloads verified	Yes	No
	3	Motor voltage and amps verified – each phase	Yes	No
	4	Minimum airflow (cfm) (design/measured)	/	/
	5	Maximum airflow (cfm) (design/measured)	/	/
	6	Entering and leaving coil air temperatures (°F)	/	/

"No" Responses

Item	Date	Reason for "No" Response

25.

26. Operations and Maintenance: Energy Efficiency Checklist

(A copy is to be completed on the 18th of each month beginning in [Month][Year] through [Month][Year], the end of the initial commissioning process implementation for this building)

ASHRAE Guideline 1.1 Example Checklist

Instructions: Step 1: Circle Yes or No and fill in with requested information.
Step 2: Explain all "No" responses at the bottom of the checklist.

Name of Person who completed this checklist	Month	Date Completed

Item		Task Description		Response	
1		**Owner's Project Requirements**			
A		**Energy Efficiency Goal: Less than 20,000 kWh/month, 35 kW, and 120 therms**	Record Actual Usage	Was OPR Achieved?	
	1	Actual kWh		Yes	No
	2	Actual kW		Yes	No
	3	Actual therms		Yes	No
B		**Systems Manual and Building Documentation**	Provide Appropriate Documentation	Do the system operations meet OPR?	
	1	Have changes been made to the energy control hardware this month?		Yes	No
	2	Have software changes been made, such as schedule or sequences?		Yes	No
	3	Has the Systems Manual been updated?		Yes	No
	4	Have changes been made to the drawings and schedules?		Yes	No
	5	Has the commissioning team or commissioning authority been involved?		Yes	No
	6	Has the optimization in section 24 of the Systems Manual been implemented this month?		Yes	No
C		**General Owner's Needs**			
	1	Are there any unresolved punchlist items related to energy efficiency open? If so, list the numbers		Yes	No
	2	Was Elementary Control Services required to resolve any energy efficiency related issues this month?		Yes	No
	3	Were the seasonal control checks in Section 88 of the Systems Manual implemented?		Yes	No
	4	Are there any conflicts with the user's needs and energy efficiency?		Yes	No
	5	Was a commissioning optimization workshop held this month?		Yes	No

"Yes" and "No" Responses

Item	Date	Explain all Yes Responses and Provide Reasons for "No" Response