

Compliance Forms— HVAC Systems

The following compliance form is provided to assist in understanding and documenting compliance with the HVAC requirements of ASHRAE/IES Standard 90.1-2019. An electronic version is also available for download from ASHRAE's website. The HVAC system forms are organized into three parts on seven pages.

- Part I is used with the simplified approach (Section 6.3). This is the only form required with this compliance option.
- Part II, HVAC Mandatory Provisions, consists of three pages and should be used with the Prescriptive Path (Section 6.5), the Energy Cost Budget Method (Section 11), or the Performance Rating Method (Appendix G) of compliance. Pages 1 and 2 contain header information, tables for entering equipment efficiencies for heating and cooling equipment, and checklists of general and special mandatory requirements. Page 3 contains the HVAC System Worksheet. Multiple copies of each page may be required to list all central heating and cooling equipment and all HVAC systems.
- Part III should only be used for the Prescriptive Path (Section 6.5) compliance method. Page 1 is a checklist of the prescriptive requirements and needs to be completed only once for each building. Page 2 contains the HVAC System Worksheet. Page 3 addresses the fan power requirements.

Part I: Simplified Approach

This compliance approach may be used for small buildings less than 25,000 ft² (2,300 m²) *gross floor* area with two or fewer floors and single-zone systems. HVAC systems must have air or evaporatively cooled direct-expansion (DX) cooling.

Header Information

Project Name: Enter the name of the project. This should agree with the name that is used on the plans and specifications or the common name used to refer to the project.

Project Address: Enter the street address of the project, for instance, "142 First Street."

Date: Enter the date when the compliance documentation was completed.

City: Enter the name of the city and the state or province where the project is located, for instance, "Riverside, CA."

Zip/Postal Code: Enter the zip or postal code of the project site.

HVAC Designer of Record/Telephone: Enter the name and the telephone number of the designer of record for the project. This will generally be the mechanical engineer or contractor.

Contact Person/Telephone: Enter the name and telephone number of the person who should be contacted if there are questions about the compliance documentation.

Checklist Qualification

Only small buildings less than 25,000 ft² (2,300 m²) and with two or fewer stories may use the simplified approach. The HVAC systems must meet all of the criteria of Section 6.3.2, which are listed on page 1.

Requirements

This section of the form summarizes the simplified approach requirements. The form is separated into two sections.

The upper part of the form contains a list of the requirements. Check each box to indicate that the requirement applies to the HVAC system and that the system complies with the requirement. If the requirement is not applicable, then check the N/A box.

The lower part of the form contains a table for entering HVAC unit heating and cooling data for comparison against the Standard's requirements. The rated capacity and efficiency for heating and cooling should be taken from manufacturers' specifications.

The minimum efficiency for heating should be taken from Table 6.8.1-2 for heat pumps, Table 6.8.1-4 for packaged terminal heat pump units, Table 6.8.1-5 for air-conditioning units with furnaces, and Table 6.8.1-6 for systems with hydronic heating. Note that hydronic heating is limited to a single zone in the simplified approach. For units with electric resistance heaters, enter 100%.

The cooling minimum efficiency columns should include values taken from Table 6.8.1-1 for air-conditioning units, Table 6.8.1-2 for heat pump units, or Table 6.8.1-4 for packaged terminal air-conditioning or packaged terminal heat pump units. In the column “Air-Side Econ?” enter “Y” if the unit has an air-side economizer that complies with Section 6.5.1, enter “N/A” if an economizer is not required per Table 6.5.1-1 or 6.5.1-2, or enter the exception number from the exceptions to Section 6.5.1 that is being applied. The last column, Econ. Min. Efficiency, need only be completed if an exception to the economizer requirement is being taken per Exception 10 to Section 6.5.1. If that exception is being used, fill in the minimum efficiency from Table 6.5.1-2 in this column.

Part II: Mandatory Provisions

This section of the compliance documentation summarizes the Mandatory Provisions. These apply with the Prescriptive Path, the Energy Cost Budget Method, or the Performance Rating Method of compliance. The three pages of mandatory requirements are organized into three sections:

- The efficiency tables on pages 1 and 2 document that heating and cooling equipment meets or exceeds the efficiency requirements.
- The checkboxes in the lower part of page 1 demonstrate compliance with the general and special requirements of the mandatory provisions.
- The Systems Worksheet on page 3 summarizes the requirements specific to air-handling systems.

Equipment Efficiency Tables

Enter the requested data for each piece of mechanical heating or cooling equipment using one entry per row. Identical pieces of equipment can be entered as a group on a single line. For each row, enter data from the mechanical equipment schedules and Tables 6.8.1-1 through 6.8.1-20 and tables F1-F5 for DOE regulated products. Where there are multiple requirements for a piece of equipment (e.g., full- and part-load ratings for heating or cooling), enter all of the applicable requirements for each piece of equipment.

Nonstandard chillers are water-cooled centrifugal chillers that cannot operate at the ARI 550/590 (ARI 551/591) test conditions of 44°F (7°C) chilled-water supply and 85°F (30°C) condenser-water supply. Use the second worksheet on page 1 for these chillers (if any exist in the building). For each chiller, provide data for both the full- and part-load ratings.

Use the worksheets on page 2 for walk-in coolers and freezers and for refrigerated display cases. Enter an ID tag for each cooler, freezer, or case and note whether it complies with the requirements listed.

General and Specific Mandatory Provisions

The lower part of page 1 contains the general and special system requirements. Check the box to indicate that the requirement applies to the HVAC system and that the system complies with the requirement. If the requirement is not applicable, then check the N/A box.

Systems Worksheet

Page 3 contains the mandatory requirements for HVAC systems. Data for each system or group of identical systems should be entered in the columns. The first five rows are data that can be obtained from the mechanical equipment schedules (system tag, supply airflow, supply external static pressure, supply fan motor rated power, and outdoor airflow). The remaining 11 rows contain the mandatory requirements. For each requirement enter the appropriate code from the notes below the table. For example, the user should enter the code “C1” when a complying time switch with manual override is provided on the system per the automatic shutdown requirement (Section 6.4.3.3.1).

Part III: Prescriptive Requirements

Part III of the compliance documentation summarizes the prescriptive requirements.

Prescriptive Checklist

Page 1 has a checklist of the prescriptive requirements. On this page, check all of the boxes that apply to the HVAC systems in this project. If a requirement is not applicable, then check the N/A box. If none of the requirements are applicable, the form may be omitted.

Systems Worksheet

Page 2 contains the prescriptive requirements for HVAC systems. Data for each system or group of identical systems should be entered in the columns. For each requirement enter the appropriate code from the notes below the table.

Fan Power Limitations

Fill out the worksheet on Page 3 for each fan system with nameplate-rated horsepower greater than 5 (3.7 kW). Identical fan systems may be combined into a single worksheet.

There are two options for showing compliance with the fan power limitation. Option 1 is shown at the top of the page. Option 2 is shown at the bottom. For each fan system only the top or the bottom part of the table will be completed.

Option 1—Nameplate Power: With this option, each of the fans in the system are listed in the table on the left. The option buttons are used to indicate the type of fan. Tag is a reference to a schedule on the mechanical drawings. For each, the nameplate power is listed in the last column and summed at the bottom of the table.

This value shall be less than the allowed nameplate power calculated in the table on the right. The allowed nameplate power is calculated by multiplying the design supply airflow rate (CFMs or L/s) times the allowance from Table 6.5.3.1-1. A value of 0.0011 hp/cfm (0.0017 kW/L/s) is used for constant-volume systems and 0.0015 hp/cfm (0.0024 kW/L/s) is used for variable-volume systems.

Option 2—Input Power: With Option 2, the allowed input power for the fan system is calculated in the top left table of this section. The base allowance is calculated by multiplying the design supply airflow rate (CFMs or L/s) times the Option 2 allowance from Table 6.5.3.1-1. A value of 0.00094 hp/cfm (0.0015 kW/L/s) is used for constant-volume systems and 0.0013 hp/cfm (0.0021 kW/L/s) is used for variable-volume systems.

Additional brake horsepower is allowed for devices listed in Table 6.5.3.1-2. Each device is listed in the right-side table along with the CFM through the device and the pressure drop allowance from Table 6.5.3.1-2. The additional brake horsepower is calculated using the equation below. The additional allowances are summed and added to the base brake horsepower allowance in the left-side table.

$$bhp_{addition} = \frac{CFM_i \times PD_i}{4,131} \quad kW_{addition} = \frac{L/s_i \times PD_i}{650,000}$$

With Option 2, it is necessary to calculate the installed input power for the fan system. The installed input power table at the bottom of the form provides a means for making this calculation.

Each fan in the system is listed along with the Tag, which keys the fan to the mechanical schedules. A brief description of each fan is provided, and the type of fan is indicated by choosing one of the option boxes.

The input power for each fan is calculated based on the CFM of each fan, the pressure drop across the fan, and the efficiency of the fan and the drive (if applicable). Input power is given by the following equation:

$$bhp_i = \frac{CFM_i \times PD_i}{6,356 \times \eta_{fan}} \quad kW_i = \frac{L/s_i \times PD_i}{101,999 \times \eta_{fan}}$$

The total input power from this worksheet shall be less than the total allowed input power.

HVAC Simplified Approach Option

Project Name:	
Project Address:	Date:
City:	Zip:
HVAC System Designer of Record:	Telephone:
Contact Person:	Telephone:

Qualifications

- Yes N/A The building is two stories or less in height and has a gross floor area is less than 25,000 ft² (22,300 m²), and
- Yes N/A All HVAC systems comply with Section 6.3.2.

Requirements

- Yes N/A (a) All systems serve a single HVAC zone.
- Yes N/A (b) The equipment meets the variable airflow requirements of Section 6.5.3.2.1.
- Yes N/A (c) Cooling (if any) is provided by a unitary packaged or split-system air conditioner that is either air-cooled or evaporatively cooled and meets the efficiency requirements shown in Table 6.8.1. List equipment in the table below.
- Yes N/A (d) All HVAC systems meet the economizer requirements of Section 6.5.1.
- Yes N/A (e) Heating (if any) is provided by a unitary packaged or split-system heat pump, a fuel-fired furnace, an electric resistance heater, or a baseboard system connected to a boiler. Hydronic heating, if used, serves a single zone. All heating equipment meets the efficiency requirements of the Standard. List equipment in the table below.
- Yes N/A (f) The HVAC systems meet the exhaust air energy recovery requirements of Section 6.5.6.1.
- Yes N/A (g) All HVAC equipment is controlled by a manual changeover or dual-setpoint thermostat.
- Yes N/A (h) Heat pumps equipped with auxiliary internal electric resistance heaters (if any) either have controls to prevent supplemental heater operation when the heating load can be met by the heat pump alone and the outdoor air temperature is above 40°F (4.4°C) or are regulated by NAECA and meet the requirements of Table 6.8.1-2.
- Yes N/A (i) The system controls do not permit reheat or any other form of simultaneous heating and cooling for humidity control.
- Yes N/A (j) Systems are provided with a time switch that (1) can start and stop the system under different schedules for seven different day types per week, (2) is capable of retaining programming and time setting during a loss of power for a period of at least 10 hours, (3) includes an accessible manual override that allows temporary operation of the system for up to 2 hours, (4) is capable of temperature setback down to 55°F (13°C) during off hours, and (5) is capable of temperature setup to 90°F (32°C) during off hours.
 - Yes N/A Exception: System serves hotel/motel guest rooms.
 - Yes N/A Exception: System operates continuously.
 - Yes N/A Exception: System has both a cooling or heating capacity less than 15,000 Btu/h (4.4 kW) and a supply fan motor power greater than 0.75 hp (0.56 kW).
- Yes N/A (k) Systems serving hotel/motel guest rooms shall comply with the requirements of Section 6.4.3.3.5, Automatic Control of HVAC in Hotel/Motel Guest Rooms.
- Yes N/A (l) Piping is insulated in accordance with Tables 6.8.3-1 and 6.8.3-2. Insulation exposed to weather is suitable for outdoor service. Cellular foam insulation is protected from water and solar radiation.
 - Yes N/A Exception: Piping is located within manufactured HVAC units.
- Yes N/A (m) Ductwork and plenums are insulated in accordance with Tables 6.8.2-1 and 6.8.2-2 and sealed in accordance with Section 6.4.4.2.1
- Yes N/A (n) Construction documents require air systems to be balanced in accordance with industry-accepted procedures.

- Yes N/A (o) Outdoor air intake and exhaust systems meet the requirements of Section 6.4.3.4.
- Yes N/A (p) Where separate heating and cooling equipment serve the same temperature zone, thermostats are interlocked to prevent simultaneous heating and cooling.
- Yes N/A (q) Systems with a design supply airflow greater than 10,000 cfm (5,000 L/s) have optimum start controls.
- Yes N/A (r) The systems comply with the demand control ventilation requirements in Section 6.4.3.8 and the occupied standby controls in Section 6.5.3.8.
- Yes N/A (s) The systems comply with the door switch requirements of Section 6.5.10.

HVAC Mandatory Provisions

Part II, 1 of 3

Project Name:			
Project Address:		Date:	
HVAC System Designer of Record:		Telephone:	
Contact Person:		Telephone:	
City:	Climate Zone:		
Zip:	Cooling Design DB Temp:	Cooling Design WB Temp:	Heating Design Temp:

Mandatory Equipment Efficiency Worksheet (Section 6.4.1.1)

System Tag	Equipment Type (Tables 6.8.1-1 through 6.8.1-20 and F1-F5)	Size Category (Tables 6.8.1-1 through 6.8.1-20 and F1-F5)	Subcategory or Rating Condition (Tables 6.8.1-1 through 6.8.1-20 and F1-F5)	Units of Efficiency (Tables 6.8.1-1 through 6.8.1-20 and F1-F5)	Minimum Efficiency (Tables 6.8.1-1 through 6.8.1-20 and F1-F5) Rated ≥ Required
					≥
					≥
					≥
					≥
					≥
					≥

Mandatory Nonstandard Centrifugal Chiller Worksheet (Section 6.4.1.1)

Chiller Tag	Leaving Evaporator Temp. (°F or °C)	Entering Condenser Temp. (°F or °C)	Centrifugal Chiller K_{adj} Factor (Section 6.4.1.2) A/B	Type and Size Category (Table 6.8.1-3)	Path (A or B)	Table 6.8.1-3 Minimum Efficiency and Adjusted Efficiency* Table 6.8.1-3 Value/Adjusted Value	Actual Efficiency Rated ≥ Required
			/			/	≥
			/			/	≥
			/			/	≥
			/			/	≥

* Adjustment applies only to water-cooled centrifugal chillers.

General Mandatory Requirements

- Yes N/A All heating and cooling equipment meet minimum efficiencies as required in Tables 6.8.1-1 through 6.8.1-20.
- Yes N/A Load calculations are provided for selection of all equipment and systems (Section 6.4.2.1).
- Yes N/A Pump head calculations are provided for selection of all pumps (Section 6.4.2.2).
- Yes N/A Zone control complies with the requirements of Section 6.4.3.1.
- Yes N/A Off hour controls comply with the requirements of Section 6.4.3.3.
- Yes N/A Stair and elevator shaft vents are provided with motorized dampers (Section 6.4.3.4.1)
- Yes N/A Ventilation fans with motors greater than 0.75 hp (0.56 kW) have automatic controls complying with Section 6.4.3.4.4.
- Yes N/A Enclosed parking garage ventilation systems meet the requirements of Section 6.4.3.4.5.
- Yes N/A Direct digital controls (DDC) are installed to comply with the requirements of Section 6.4.3.10.

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- Yes N/A Air-cooled DX units with economizers have fault detection and diagnostic (FDD) systems which comply with Section 6.4.3.12.
- Yes N/A Piping insulation meets or exceeds the requirements of Section 6.4.4.1.3.
- Yes N/A Construction documents require record documents, manuals and system balancing (Sections 6.7.3.1, 6.7.3.2 and 6.7.3.3).
- Yes N/A Verification and testing performed and documented (Section 6.9.1).
- Yes N/A Commissioning performed and documented (Section 6.9.2).

Special Mandatory Requirements

- Yes N/A Freeze protection or snow/ice-melting systems (if any) have controls to prevent operation in warm weather (Section 6.4.3.7).
- Yes N/A High occupancy density areas are equipped with demand control ventilation (Section 6.4.3.8).
- Yes N/A HVAC systems serving vestibules have thermostats limiting heating and cooling (Section 6.4.3.9).
- Yes N/A Independent perimeter heating systems (if any) comply with the control requirements of Section 6.4.3.1.1.
- Yes N/A Independent heating and cooling thermostatic controls (if any) are interlocked to prevent crossover of setpoints (Section 6.4.3.2).
- Yes N/A Sensible heating panels are insulated per Section 6.4.4.1.4.
- Yes N/A Radiant floor heating is insulated per Section 6.4.4.1.5.
- Yes N/A Walk-in coolers and walk-in freezers comply with 6.4.5.

HVAC Mandatory Provisions

Part II, 2 of 3

Project Name:	
Contact Person:	Telephone:

Walk-In Coolers and Freezers Worksheet (Section 6.4.5)

Walk-in Freezer/Cooler Tag						
Doors are provided with closers (Section 6.4.5(a))						
Doorways have a means to reduce infiltration when door is open (Section 6.4.5(b))						
Walk-in cooler wall, ceiling, and door insulation is R-25 (R-4.4) or greater (Section 6.4.5(c))						
Walk-in freezer wall, ceiling, and door insulation is R-32 (R-5.6) or greater (Section 6.4.5(c))						
Walk-in freezer floor insulation is R-28 (R-4.9) or greater (Section 6.4.5(d))						
Evaporator fan motors are electronically commutated or three-phase (Section 6.4.5(e))						
Lights meet the minimum efficacy requirement (Section 6.4.5(f))						
Minimum insulation properties for windows and transparent reach-in door in freezers are met (Section 6.4.5(g))						
Minimum insulation properties for windows and transparent reach-in door in coolers are met (Section 6.4.5(h))						
Antisweat heaters meet the maximum power limitation or the controls requirement (Section 6.4.5(i) and Section 6.4.5(j))						
Condenser fan motors are electronically commutated, permanent split capacitor, or three-phase (Section 6.4.5(k))						
Freezer includes temperature-based defrost termination control (Section 6.4.5(l))						

Refrigerated Display Case Worksheet (Section 6.4.6)

Refrigerated Display Case Tag						
Meets the requirements of Section 6.4.1.1 and the performance requirements of Table 6.8.1-11 (Section 6.4.6(a))						
The lighting is automatically controlled by time clock or motion (Section 6.4.6(b))						
Low-temperature display cases include temperature-based defrost termination control (Section 6.4.6(c))						
Antisweat heater power is reduced in response to %RH outside the case (Section 6.4.6(d))						

HVAC Mandatory Provisions

Project Name:	
Contact Person:	Telephone:

Systems Worksheet (Section 6.4)

System Tag						
Supply Airflow						
Direct-Expansion Cooling Capacity						
Supply Motor Power						
Outdoor Airflow						
Deadband (Section 6.4.3.1.2)						
Automatic Shutdown (Section 6.4.3.3.1)						
Setback Controls (Section 6.4.3.3.2)						
Setup Controls (Section 6.4.3.3.2)						
Optimum Start (Section 6.4.3.3.3)						
Zone Isolation (Section 6.4.3.3.4)						
Hotel/Motel Guest Room Controls (Section 6.4.3.3.5)						
Outdoor Air Shutoff Dampers (Section 6.4.3.4.2)						
Exhaust/Relief Shutoff Dampers (Section 6.4.3.4.2)						
Damper Leakage (Section 6.4.3.4.3)						
Heat Pump Auxiliary Heat (Section 6.4.3.5)						
Humidification/Dehumidification Deadband (Section 6.4.3.6)						
Ventilation Control for High Occupancy Areas (Section						
Duct/Plenum Insulation (Section 6.4.4.1.2)						
Duct Sealing Levels Supply/Return (Section 6.4.4.2.1)						
Duct Leakage Test (Section 6.4.4.2.2)						

In the table above, enter the appropriate codes from this list:

Deadband (Section 6.4.3.1.2)

- C1 Dual-setpoint control
- C2 Manual changeover control
- N1 N/A special occupancy (requires approval)
- N2 N/A heating or cooling only

Automatic Shutdown (Section 6.4.3.3.1)

- C1 Complying seven-day time clock with override
- C2 Complying occupant sensor
- C3 Complying manually operated time switch
- C4 Complying security system interlock
- C5 Complying residential system with two-day time clock
- N1 N/A continuous operation
- N2 N/A heating and cooling ≤ 15 kBtu/h (4.4 kW) and manual on/off

Setback Controls (Section 6.4.3.3.2)

- C1 Setback provided
- N1 N/A continuous operation
- N2 N/A heating and cooling ≤ 15 kBtu/h (4.4 kW) and manual on/off

• N3 N/A radiant heating

Setup Controls (Section 6.4.3.3.2)

- C1 Setup provided
- N1 N/A continuous operation
- N2 N/A heating and cooling ≤ 15 kBtu/h (4.4 kW) and manual on/off

Optimum Start (Section 6.4.3.3.3)

- C1 Optimum start provided
- N1 N/A continuous operation
- N2 N/A heating and cooling ≤ 15 kBtu/h (4.4 kW) and manual on/off

Zone Isolation (Section 6.4.3.3.4)

- C1 Isolation areas provided
- N1 N/A Continuous operation
- N2 N/A ≤ 15 kBtu/h (4.4 kW) or ≤ 3/4 hp (0.56 kW)
- N3 N/A All zones on same schedule
- N4 N/A Outdoor air/exhaust air ≤ 5,000 cfm (2,400 L/s)
- N5 N/A Exhaust flow < 10%

Hotel/Motel Guest Room Controls (Section 6.4.3.3.5)

- C1 Setpoint control provided
- C2 Ventilation control provided
- N1 N/A Continuous operation
- N2 N/A heating and cooling ≤ 15 kBtu/h (4.4 kW) and manual on/off
- N3 N/A 50 guest rooms or less

OSA Shutoff Dampers (Section 6.4.3.4.2)

- C1 Motorized shutoff dampers
- C2 Gravity shutoff dampers on outdoor air and building in Climate Zone 0, 1, 2, or 3
- N1 N/A Outdoor air ≤ 300 cfm (140 L/s)

Exhaust/Relief Shutoff Dampers (Section 6.4.3.4.2)

- C1 Motorized shutoff dampers on exhaust and relief
- C2 Gravity shutoff dampers on exhaust and relief and the building is less than three stories in height

Damper Leakage (Section 6.4.3.4.3)

- *C1 Outdoor air, exhaust, and relief dampers comply with Table 6.4.3.4.3*

Heat Pump Auxiliary Heat (Section 6.4.3.5)

- *C1 Complying controls provided*
- *N1 N/A system is not a heat pump*
- *N2 N/A auxiliary is not electric or is not provided*
- *N3 N/A heat pump covered by NAECA*

Humidification/Dehumidification Deadband (Section 6.4.3.6)

- *C1 Complying controls provided*
- *N1 N/A no humidification and/or dehumidification*

- *N2 N/A Desiccant with direct evap. cooling*
- *N3 N/A Specific humidity levels or precision control required*

Ventilation Control for High-Occupancy Areas (Section 6.4.3.8)

- *C1 All zones comply with Section 6.4.3.8*
- *N1 N/A Space $\leq 500 \text{ ft}^2$ (50 m^2) or < 25 people/ 1000 ft^2 (25 people/ 10m^2)*
- *N2 N/A System does not qualify*
- *N3 N/A exhaust air energy recovery complies with Section 6.5.6.1*
- *N4 N/A system is multiple zone and has pneumatic controls*

- *N5 N/A design outdoor air $< 750 \text{ cfm}$ (375 L/s)*
- *N6 N/A Transfer (or makeup air) $> 75\%$ of design outdoor air*

Duct/Plenum Insulation (Section 6.4.4.1.2)

- *C1 Complying insulation provided*
- *N1 N/A all ducts located in conditioned space*

Duct Sealing (Section 6.4.4.2.1)

- *Enter highest seal level (A, B, or C) for supply and return*

Duct Leakage Test (Section 6.4.4.2.2)

- *Y Ducts will be tested for leakage*
- *N Ducts will not be tested for leakage*

HVAC Prescriptive Requirements

Part III, 1 of 3

Project Name:	
Contact Person:	Telephone:

Prescriptive Checklist

Prescriptive Air-System Requirements

- Yes N/A All systems comply with simultaneous heating and cooling limitations (Section 6.5.2).

Prescriptive Hydronic System Requirements

- Yes N/A Boiler plant is capable of the minimum turndown specified in Table 6.5.4.1 (Section 6.5.4.1).
- Yes N/A Hydronic systems meet the variable flow requirements of Section 6.5.4.2.
- Yes N/A Chillers and boilers in parallel have isolation controls per Section 6.5.4.3.
- Yes N/A Chilled-water and hot-water systems meet the temperature reset requirements of Section 6.5.4.4.
- Yes N/A Hydronic heat pump systems and water-cooled air-conditioning units comply with the hydronic isolation requirements of Section 6.5.4.5.
- Yes N/A Chilled-water and condenser-water piping systems are sized in compliance with Section 6.5.4.6.

Prescriptive Special System Requirements

- Yes N/A Heat rejection systems comply with Section 6.5.5.
- Yes N/A Heat recovery for service water heating is provided for facilities that operate continuously, have a total water-cooled heat rejection capacity exceeding 6,000,000 Btu/h (1,800 kW), and have a design service water heating load exceeding 1,000,000 Btu/h (293 kW). The heat recovery system (if any) complies with Section 6.5.6.2.
- Yes N/A Kitchen exhaust systems comply with Section 6.5.7.2.
- Yes N/A Laboratory exhaust systems comply with Section 6.5.7.3.
- Yes N/A Radiant heating systems comply with Section 6.5.8.
- Yes N/A The cooling equipment with hot-gas bypass controls (if any) meets the unloading requirements of Section 6.5.9.
- Yes N/A Conditioned spaces with a door to the outdoors (including doors that are more than one-half glass) must have door switches per Section 6.5.10.

Commercial Refrigeration Equipment Requirements

- Yes N/A Fan-powered condensers serving walk-in coolers, walk-in freezers, or refrigerated display cases must meet the design and performance requirements of Section 6.5.11.1.
- Yes N/A Walk-in coolers, walk-in freezers, and refrigerated display cases include control logic that resets the suction pressure setpoint per Section 6.5.11.2.

HVAC Prescriptive Requirements

Project Name:	
Contact Person:	Telephone:

Systems Worksheet (Section 6.5)

System Tag						
Supply Airflow						
Cooling Capacity						
Heating Capacity						
Outdoor Airflow						
Economizer (Section 6.5.1)						
Humidification (Section 6.5.1.6)						
Dehumidification (Section 6.5.2.3)						
VAV Fan Control (Section 6.5.3.2.1)						
VAV Fan Static Pressure Control (Sections 6.5.3.2.2 and						
Multiple-Zone VAV System Ventilation Control (Section 6.5.3.3)						
Supply Air Temperature Reset Control (Section 6.5.3.4)						
Exhaust Air Energy Recovery (Section 6.5.6.1)						

In the table above, enter the appropriate codes from this list:

Economizer (Section 6.5.1)

- C1 System employs air economizer complying with Sections 6.5.1.1, 6.5.1.3, 6.5.1.4, and 6.5.1.5
- C2 System employs fluid economizer complying with Sections 6.5.1.2, 6.5.1.3, 6.5.1.4, and 6.5.1.5
- N1 N/A size exception from Table 6.5.1-1
- N2 N/A nonparticulate air treatment per Section 6.2.1 of Standard 62.1
- N3 N/A per Exception 4 to Section 6.5.1
- N4 N/A system employs heat recovery complying with Section 6.5.6.2.2
- N5 N/A system serves residential spaces with a system capacity less than five times that in Table 6.5.1-1
- N6 N/A per Exception 7 to Section 6.5.1
- N7 N/A system expected to operate < 20 h/wk
- N8 N/A system serves space with open refrigerated casework systems
- N9 N/A cooling efficiency exceeds the requirements of Table 6.5.1-2
- N10 N/A serves computer rooms and meets Exception 11 to Section 6.5.1
- N11 N/A serves computer rooms and meets Exception 12 to Section 6.5.1

Humidification (Section 6.5.1.6)

- C1 System humidifies and has a water-side economizer
- N1 N/A System humidifies to a dew point <35°F (<2°C)
- N2 N/A System humidifies and an economizer is not required per Section 6.5.1
- N3 N/A System does not have hydronic cooling
- N4 N/A System does not have humidifier controls

Dehumidification (Section 6.5.2.3)

- C1 System dehumidifies without employing reheating or recooling
- N1 N/A system does not have humidistatic controls
- N2 N/A system meets Exception 1 to Section 6.5.2.3
- N3 N/A system meets Exception 2 to Section 6.5.2.3
- N4 N/A system meets Exception 3 to Section 6.5.2.3
- N5 N/A system meets Exception 4 to Section 6.5.2.3
- N6 N/A system meets Exception 5 to Section 6.5.2.3
- N7 N/A system meets Exception 6 to Section 6.5.2.3

VAV Fan Control (Section 6.5.3.2.1)

- C1 System has a two-speed motor and control compliant with Sections 6.5.3.2.1(a) and 5.6.3.2.1(c).
- C2 System has a variable-speed motor and control compliant with Sections 6.5.3.2.1(b) and 5.6.3.2.1(c).
- N1 N/A system is constant volume

VAV Fan Static Pressure Control (Sections 6.5.3.2.2 and 6.5.3.2.3)

- C1 Static pressure setpoint is <1.2 in. w.c.(300 pa) (note installation of multiple pressure sensors)
- C2 Static pressure setpoint is reset by zone demand per Section 6.5.3.2.3.
- N1 N/A system is constant volume and is below the Table 6.5.3.2.1 threshold

Multiple-Zone VAV System Ventilation Control (Section 6.5.3.3)

- C1 System complies with Section 6.5.3.3
- N1 N/A system has zonal transfer fans that recirculate air directly from other zones.
- N2 N/A system design exhaust rate is more than 70% of the design ventilation rate

Supply Air Temperature Reset Control (Section 6.5.3.5)

- C1 System employs supply air temperature reset per Section 6.5.3.5
- N2 N/A system is located in Climate Zone 0A, 1A, 2A, or 3A
- N3 N/A system has no reheating, recooling, or mixing of heated and cooled supply air
- N4 N/A system has >75% of the energy for reheat from site-recovered or site solar energy sources

Exhaust Air Energy Recovery (Section 6.5.6.1)

- C1 System employs an exhaust air energy recovery device that exceeds 50% enthalpy recovery ratio
- N1 N/A system operates less than 8,000 h/yr and is exempt per Table 6.5.6.1-1
- N2 N/A system operates 8,000 h/yr or more and is exempt per Table 6.5.6.1-2
- N3 N/A system serves a laboratory meeting Section 6.5.7.3
- N4 N/A system is heating only and the spaces are heated to <60°F (<16°C)
- N5 N/A >60% of the heating energy is from site-recovered or site solar energy
- N6 N/A heating energy recovery is exempt in Climate Zones 0, 1 and 2
- N7 N/A cooling energy recovery is exempt in Climate Zones 3C, 4C, 5B, 5C, 6B, 7, and 8
- N8 N/A Exhaust air is used for another energy recovery system
- N8 N/A Exhaust air is Class 4 per Std. 62.1 or not allowed by Std. 170 for use in energy recovery systems with leakage potential
- N9 N/A where the sum of airflow rates exhausted and relieved within 20 ft. (6m) of each other is less than 75% of the ventilation rate
- N10 N/A dehumidifying systems with energy recovery in series with the cooling coil
- N11 N/A system operates less than 20 h/wk above the Table 6.5.6.1-1 threshold

HVAC Prescriptive Requirements

Fan System Option 1 – Nameplate Power

Installed Nameplate Power

Tag	Description	Supply	Return	Exhaust	Series FPB	Other	Nameplate Power (hp [kW])
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

Allowed Nameplate Power

Design Supply Airflow Rate (CFM _s [L/s _s])	
Fan Nameplate Power Allowance from Table 6.5.3.1-1	
Total Allowed Nameplate Power	

Fan System Option 2 – Input Power

Allowed Fan Input Power

Design Supply Airflow Rate (CFM _s [L/s _s])	
Fan Input Power Allowance from Table 6.5.3.1-1	
Base Allowance (Line1 x Line 2)	
Additional Input Power Allowance	
Total Allowed Input Power	

Pressure Drop Adjustments for Qualifying Devices

Tag	Device Description	Pressure Drop from Table 6.5.3.1-2	Airflow through Device	Additional Input Power Allowance

Installed Input Power

Tag	Description	Supply	Return	Exhaust	Series FPB	Other	Airflow	Pressure Drop	η_{Fan}	η_{Drive}	η_{Motor}	Input Power
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						

Fan Efficiency

All fans subject to the minimum efficiency requirements (primarily stand-alone building fans - see Users guide for the numerous exceptions must show compliance with the fan energy index (FEI) at system design conditions. Compliance information for the fan efficiency requirement is on Page X. For each covered fan and fan array, document the fan system design condition (fan pressure, fan air flow, and fan air density), the manufacturer-certified Fan Energy Index value, and whether or not the fan or fan array is for a variable-air-volume system that meets the requirements of Section 6.5.3.2.1.

FEI must be at least 0.95 for such variable-air-volume systems. All other fans or fan arrays in air distribution systems must meet an FEI of at least 1.00, unless an exception (1) to (10) applies.

Fan Efficiency (Section 6.5.3.1.3)

Tag	Description	Application	FEI target	Fan Pressure	Fan Air Flow	Fan Air Density <i>Default is 0.075</i>	Actual FEI
				(in. WG)	(cfm)	(lbm/ft ³)	-. - -
1	Fan or Fan Array Identification	<input type="radio"/> VAV	0.95				-. - -
		<input type="radio"/> CAV	1.00				-. - -
		<input type="radio"/> exempt	Exception to 6.5.3.1.3 <i>Select (1) to (10)</i>				<input type="checkbox"/>
...	Fan or Fan Array Identification	<input type="radio"/> VAV	0.95				-. - -
		<input type="radio"/> CAV	1.00				-. - -
		<input type="radio"/> exempt	Exception to 6.5.3.1.3 <i>Select (1) to (10)</i>				<input type="checkbox"/>
x	Fan or Fan Array Identification	<input type="radio"/> VAV	0.95				-. - -
		<input type="radio"/> CAV	1.00				-. - -
		<input type="radio"/> exempt	Exception to 6.5.3.1.3 <i>Select (1) to (10)</i>				<input type="checkbox"/>

Exceptions to 6.5.3.1.3

1. Fans that are not embedded fans with a motor nameplate horsepower of less than 1.0 hp or with a fan nameplate electrical input power of less than 0.89 kW.
2. Embedded fans and fan arrays with a combined motor nameplate horsepower of 5 hp or less or with a fan system electrical input power of 4.1 kW or less.
3. Embedded fans that are part of equipment listed under Section 6.4.1.1.
4. Embedded fans included in equipment bearing a third-party-certified seal for air or energy performance of the equipment package.
5. Ceiling fans.
6. Fans used for moving gases at temperatures above 482°F.
7. Fans used for operation in explosive atmospheres.
8. Reversible fans used for tunnel ventilation.
9. Fans outside the scope of AMCA 208.
10. Fans that are intended to only operate during emergency conditions.

Ceiling Fans

Large-diameter ceiling fans (LDCFs) are defined 10 CFR 430 Appendix U as having a blade span (tip diameter) greater than seven feet. For each LDCF, document the following in the worksheet below.

- Blade span (blade tip diameter)
- Rated airflow and power consumption at the maximum speed

The data provided shall meet one of the following requirements:

- It is determined by an independent laboratory.
- It is included in a database published by USDOE.
- It is certified under a program meeting the requirements of Section 6.4.1.5.

Ceiling Fans (Section 6.4.1.3)

Large Diameter Ceiling Fan (LDCF) Identification	Blade Span (in.)	Air Flow (cfm) at maximum speed	Power consumption at maximum speed (W)	Data Source
LDCF 1	240.0	160,000	950	USDOE & AMCA CRP
LDCF 2	144	55,000	450	USDOE & AMCA CRP