

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 90.1-2016. 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) with two or fewer floors and single-zone systems. HVAC systems must have 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 leave the box unchecked.

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 resistant 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 6.8.1-16. 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 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 leave the box unchecked.

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 leave the box unchecked. 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_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_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.