



# **HVAC Design Implications OF ASHRAE Standard 90.1 (Simplified Approach)**

**An Online Continuing Education Course for Engineers**

**Course Number: HV-5021**

**Credit: 5 Hours / 5 PDH / 5 CPD**

# ASHRAE 90.1 Simplified Options

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## HVAC DESIGN IMPLICATIONS OF ASHRAE STANDARD 90.1

### (SIMPLIFIED APPROACH)

Energy conservation is important to everyone. It reduces the consumption of natural resources, reduces pollution in the environment, and saves building owners and homeowners money. As a result, energy conservation standards and codes were developed to ensure energy conservation is a priority for new and existing buildings. The most widely used of these standards is ASHRAE 90.1, which outlines the minimum requirements for energy-efficient designs for buildings.

For HVAC systems, ASHRAE 90.1 allows for multiple compliance paths. These paths include the "simplified approach" or "mandatory approach." The simplified approach provides a list of required compliance items. The mandatory approach compliance may be accomplished through either selection of equipment meeting minimum efficiencies in the tables and other criteria, or the energy may complete an "energy cost budget" calculation to prove compliance.

The 5-hour course provides an overview of the ASHRAE Standard 90.1, 2019, and covers the nineteen (19) prerequisites for the HVAC system design. The course provides a brief explanation of the technology as applicable to each option as well as whole-building compliance options.

The course also covers key mandatory and prescriptive requirements applicable to each system, as well as whole-building compliance options.

### Learning Objectives:

- Fundamentals of ASHRAE Standard 90.1 (Energy Efficient Design)
- What types of building projects can use a simplified approach?
- Nineteen (19) simplified requirements for HVAC equipment and systems
- The concept of thermal zoning, temperature control, and variable flow equipment
- Understand the HVAC rating metrics and the minimum efficiencies.
- Design strategies and recommendations for the use of economizers and exhaust air recovery
- Design strategies to prevent simultaneous heating and cooling
- Design strategies for thermostatic controls, timeclock control
- Suggested piping and ducting insulation products based on material properties and thermal performance.
- Suggested documents submittals, balancing and commissioning scope
- Understand the concept of demand control ventilation

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## CHAPTER 1: OVERVIEW OF ASHRAE STANDARD 90.1

ANSI/ASHRAE/IESNA Standard 90.1 sets forth the minimum requirements for energy-efficient designs for buildings. The standard addresses every aspect of a building, including the building envelope, HVAC system, service water heating, power distribution systems, electric motors, and lighting.

Although ASHRAE 90.1 is a standard and not a law or enforceable, it has a lot of indirect influence on the design. Most jurisdictions adopt a version of IECC (International Energy Conservation code) as their energy code. A codified version of ASHRAE 90.1 mandates a certain degree/level of sustainability through programs like LEED™, BREEAM, Al Safat, Estidama, and so on: mostly requiring compliance to ASHRAE 90.1 as a pre-requisite or achievement of the certain percentage improvement in energy performance.

### 1 Applications of Standard 90.1

Standard 90.1 applies to the building envelope that has a heating system with an output capacity  $\geq$  to 3.4 Btu/h·ft<sup>2</sup> (10 W/m<sup>2</sup>) of floor area or where the cooling system has a sensible output capacity  $\geq$  to 5 Btu/h·ft<sup>2</sup> (15 W/m<sup>2</sup>) of floor area. The standard also applies to systems and equipment used in conjunction with buildings, including systems for heating, ventilating, and air conditioning (HVAC), service water heating, electric power distribution, electric motors, and lighting.

This standard applies to all new and renovated buildings, except low-rise residential buildings.

### 2 Exclusions

The standard does not apply to

- a) single-family houses, multifamily structures of three stories or fewer above grade, manufactured houses (modular or mobile homes), or
- b) buildings that do not use either electricity or fossil fuel.

Certain other buildings or building components may be exempt by specific notations in the technical sections of the standard. The standard shall not be used to circumvent any safety, health, or environmental requirements. If there is a conflict between the requirements of this standard and safety, health, or environmental codes, interpretation should be requested from the local AHJ.

### 3 ASHRAE 90.1 Outline

ASHRAE 90.1 is comprised of 12 sections and 7 appendices.

<b>Section 1</b>	Purpose:	Broad scope description of raison d'être for the standard and what aspects of the design of buildings are covered.
<b>Section 2</b>	Scope:	Provides a detailed description of what is and what is not covered by the standard.
<b>Section 3</b>	Definitions, Abbreviations, and Acronyms:	Includes definitions, abbreviations, and acronyms.
<b>Section 4</b>	ASHRAE 90.1-2010 Addendum 1:	ASHRAE 90.1-2010 Addendum 1, as required by ASHRAE
<b>Section 5</b>	ASHRAE 90.1-2010 Addendum 2:	ASHRAE 90.1-2010 Addendum 2, as required by ASHRAE. Requirements for envelope
<b>Section 6</b>	ASHRAE 90.1-2010 Addendum 3:	ASHRAE 90.1-2010 Addendum 3, as required by ASHRAE. Procedures for conditioning
<b>Section 7</b>	ASHRAE 90.1-2010 Addendum 4:	ASHRAE 90.1-2010 Addendum 4, as required by ASHRAE. Procedures for water heating
<b>Section 8</b>	ASHRAE 90.1-2010 Addendum 5:	ASHRAE 90.1-2010 Addendum 5, as required by ASHRAE. Requirements in the
<b>Section 9</b>	ASHRAE 90.1-2010 Addendum 6:	ASHRAE 90.1-2010 Addendum 6, as required by ASHRAE. Requirements in the
<b>Section 10</b>	Other Equipment:	The energy efficiency design requirements for electric motors, booster pumps, and elevators.
<b>Section 11</b>	Energy Cost Budget Method (ECBM):	The requirements for energy modeling are stipulated in this section. The ECBM is an alternative to the prescriptive provisions of the standard and may be used to evaluate compliance of proposed designs.
<b>Section 12</b>	Normative References:	References within this Section are necessary parts of the standard not unlike OBC Division B, Part 3, Section 1.3. Referenced Documents and Organizations.

*To view the remainder of the course material and to take the quiz for PDH credit, you must purchase the course.*

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