STANDARD

ANSI/ASHRAE/IESNA Standard 100-2006
(Supersedes ANSI/ASHRAE/IESNA Standard 100-1995)

Energy Conservation in Existing Buildings

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Energy Conservation in Existing Buildings

NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE Web site at www.ashrae.org/technology.

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

This revision of ANSI/ASHRAE/IESNA Standard 100-1995 *is part of ASHRAE's continuing program of updating its standards. The cognizant technical committee recognized that the standard needed revising to bring it in line with other published ASHRAE documents, specifically* ANSI/ASHRAE/IESNA Standard 90.1-2004, Energy Standard for Buildings Except Low-Rise Residential Buildings*, and the* 2003 ASHRAE Handbook—HVAC Applications*. While these revisions were being made, other less extensive improvements were also made to the standard.*

1. PURPOSE

1.1 This standard provides criteria that will result in the conservation of energy resources in existing buildings.

1.2 This standard is directed toward

a. providing procedures and programs essential to energy-conserving operation, maintenance, and monitoring,
b. increasing the energy efficiency of the energy-using systems and components, and
c. upgrading the thermal performance of the building envelope.

2. SCOPE

This standard applies to existing buildings, portions of buildings, and complexes, including the envelope and all energy systems in the building, except process systems.

3. DEFINITIONS

brightness controls: restriction or redirection of light from windows and task lighting luminaires to maintain satisfactory illumination levels for productive use of the lighted areas.

building: a facility having one or more uses within continuous boundaries under one contiguous roof system, including mobile homes, manufactured homes, and other factory-built buildings.

complex: multiple individual or interconnected buildings on contiguous property.

conditioned area: an area that is provided with a positive supply of heating and/or cooling capable of maintaining the temperature of the area between 10°C (50°F) and 30°C (86°F).

conditioned floor area: the sum of the conditioned floor areas of all of the floors of the building, including basements, mezzanine and intermediate-floor tiers, and penthouses with at least 2.29 m (7.5 ft) of headroom height. The floor area is measured from the exterior faces of exterior walls or from the centerline of walls separating buildings.

efficient use of nonrenewable energy: the use of nonrenewable energy in a manner that is—or is nearly—the most economical and least wasteful manner as determined by economic and engineering measurement.

energy manager: the individual responsible for the energy consumption in the building. Note that, in a given building, the functions of the energy manager may be the responsibility of multiple individuals since these functions include policy, management, engineering, operations and maintenance, and accounting.

nonrenewable energy: energy other than renewable or recovered energy.

process system: a system used in support of a manufacturing, industrial, or commercial process other than conditioning spaces and maintaining comfort and amenities for the occupants of a building.

recovered energy: energy reclaimed for useful purposes that would otherwise be wasted.

renewable energy: energy obtained from sunlight, wind, earth, geothermal sources, or bodies of water.

zone: a space or group of spaces within a building for which the heating, cooling, or lighting requirements are sufficiently similar that desired conditions can be maintained throughout by a single controlling device.

4. COMPLIANCE REQUIREMENTS

4.1 A building or complex of buildings complies with this standard if the requirements of Sections 4.2, 4.3, and 4.4 have been met and so recorded on Form A.

4.2 A person or persons determining compliance shall conduct an energy survey according to Section 5.

4.3 The person or persons determining compliance shall state in writing that the operating and maintenance requirements of Section 6 have been met.

4.4 The person or persons determining compliance shall state in writing that the building and equipment modification requirements of Section 7 have been met.

Exception: No individual requirement need be met that would compromise the historical integrity of a building or part of a building designated by a government body for long-term preservation in its existing state (such as "historical monuments").

5. ENERGY SURVEY REQUIREMENTS

This section establishes requirements for the survey of energy use in existing buildings for which compliance with this standard is claimed.

5.1 Building Type Classification

Each building shall be classified by type according to Form B.

Form A—Compliance with Standard 100

Name of Project					
Street Address					
City		State		Zip Code	
Name of Person Requesting Compliance					
Street Address					
City		State		Zip Code	
Telephone No.					
Name of Any Additional Person or Persons Establishing Compliance					
Street Address					
City		State		Zip Code	
Telephone No.					
List the building type as defined in **Form B** of this standard.					
This compliance is being established for which of the following? (check one)				[ ] Building [ ] Complex	
Have the survey requirements of **Section 5** been met? [ ] Yes [ ] No					
Have the operation and maintenance requirements of **Section 6** been met? [ ] Yes [ ] No					
Have the building & equipment modification requirements of **Section 7** been met? [ ] Yes [ ] No					

We state that this building complies with ANSI/ASHRAE/IESNA Standard 100:

Signature of person for whom compliance was determined:

_____ Date:_____

Signature of person or persons determining compliance:

_____ Date:_____

Form B—Building Description

Building ID _____

City _____ Zip Code _____ Latitude _____ Longitude _____

Conditioned Floor Area _____ (square metres) _____ (square feet)

Number of Conditioned Floors:

Above grade _____ Below grade _____

Year of construction for at least 51% of the conditioned space _____

Building type as characterized by at least 51% of the conditioned space (check one of the types listed below).

Office [ ]

Lodging
- [ ] Hotel
- [ ] Motel
- [ ] Single family home, site built
- [ ] Mobile home
- [ ] Manufactured home
- [ ] Multifamily up to five units

Apartment
- [ ] Seniors
- [ ] Family
- [ ] Retirement home
- [ ] Other - define

Education
- [ ] Primary
- [ ] Secondary
- [ ] University

Food Service
- [ ] Full service restaurant
- [ ] Fast food
- [ ] Take out
- [ ] Lounge

Health Care
- [ ] Nursing home
- [ ] Psychiatric
- [ ] Clinic
- [ ] Active treatment hospital

Retail
- [ ] Drycleaning
- [ ] Supermarket
- [ ] General Merchandise
- [ ] Shopping mall without tenant loads
- [ ] Shopping mall without tenant lighting loads
- [ ] Shopping mall
- [ ] Other (define)

Industrial
- [ ] Laboratory
- [ ] Manufacturing
- [ ] Warehouse
- [ ] Refrigerated warehouse

Assembly
- [ ] Theater
- [ ] Museum gallery
- [ ] Church/synagogue/mosque
- [ ] Arena/gymnasium
- [ ] Arena/rink
- [ ] Other assembly (define)

Other
- [ ] Jail
- [ ] Transport terminal
- [ ] Multi-building complex
- [ ] Other type (define)

5.2 Energy Management Planning and Resource Evaluation

5.2.1 Organizing for Energy Management. Energy management shall be given the same emphasis as the management of any other cost/profit center. The actions required to provide this emphasis are as follows:

- Establish an energy cost/profit center
- Assign management responsibility for the program
- Hire or assign an energy manager
- Allocate resources
- Clearly communicate energy program to all departments
- Monitor program's cost-effectiveness
- Set clear program goals
- Encourage ownership at all levels, from the lowest to the highest level in the organization
- Set up an ongoing reporting and analysis procedure to monitor the program
- Develop a feedback mechanism to allow for revisions to the energy program in a timely manner

For further details, see the *2003 ASHRAE Handbook—HVAC Applications*,[1] chapter 35, "Energy Use and Management."

5.2.2 Exploring Financing and Other Resource Options. When proposed energy management projects are evaluated, particularly those with significant capital costs, life-cycle cost analysis shall be included. Chapter 36 of the *2003 ASHRAE Handbook—HVAC Applications*,[1] "Owning and Operating Costs," provides details on several life-cycle procedures and other factors that shall be considered in the analysis. Capital funds for energy-efficiency improvements are available from various public and private sources. The five general mechanisms for financing investments in energy efficiency are as follows:

- Internal funds, or direct allocation from an organization's internal capital or operating budget
- Debt financing, with capital borrowed directly by an organization from private lenders
- Lease or lease purchase agreements in which equipment is acquired through an operating or finance lease whereby payments are made over five to ten years
- Energy performance contracts in which improvements are financed, installed, and maintained by a third party
- Utility (or other) incentives, such as rebates grants or other financial assistance offered by an energy utility for design and purchase of energy-efficient systems and equipment

5.3 Building Area. The conditioned floor area of each building or complex claiming compliance shall be determined in square meters (square feet). The gross conditioned floor area of a complex shall consist of the sum of the floor areas of all buildings within that complex.

5.4 Building Energy Use and Electric Demand Data. The energy manager shall understand how energy is used in the building in order to manage energy use and costs effectively. There are opportunities for savings in reducing the consumption of energy. Systems shall be maintained and monitored to ensure that there is no degradation in performance efficiency over time. Energy purchasing shall be periodically reviewed to ensure that the building is on the proper energy tariffs and that the energy prices that are paid are competitive with the existing market.

5.4.1 The energy manager shall analyze energy-usage data and electric demand data for each building or complex for which compliance is claimed. The energy manager shall establish and maintain an energy accounting system to track energy consumption and costs. A system shall be established to provide data to the building occupants to help them realize the results of their efforts and support their continued efforts and to confirm savings from energy-savings-related projects. The accounting system shall also permit early identification of unanticipated increases in energy consumption. Data sources include the following:

- Invoices from utilities and fuel suppliers
- Detailed printouts from time-of-use meters
- Combustion efficiency, eddy current, and water quality tests
- Recording of temperature and relative humidity
- Interviews with building owners, managers, and operators
- Submetered data
- Data from building pressurization/depressurization
- Event recording
- Climatic recordings
- Sets of data from similar buildings in similar climates
- Computer modeling
- Production records
- Infrared scans

5.4.2 The energy manager shall utilize energy-use benchmarking to compare the annual energy usage of a building to that of similar buildings with similar usage and climates. Sources for data are the US Department of Energy's Energy Information Administration (DOE/EIA), Building Owners and Managers International (BOMA), National Restaurant Association (NRA), American Hotel and Lodging Association (AH&LA), and *ANSI/ASHRAE Standard 105*, *Standard Methods of Measuring and Expressing Building Energy Performance*. (See Informative Appendix A.)

5.4.3 The overall energy use and demand data for a complex of buildings shall be the sum of the energy use and measured electric demand data for all buildings of the complex.

5.4.3.1 For each form of energy purchased from utilities, valid information from at least 12 consecutive months of utility invoices shall be used to establish the annual energy use and annual energy cost.

5.4.3.2 For all forms of energy that are delivered by entities other than utilities, the amount of energy received and the cost of delivered energy at each delivery within the same 12 consecutive months period shall be recorded together with the date of delivery.

5.4.3.3 For any utility bills with a record of demand, such demand shall be recorded together with the energy use. Unit costs for demand and consumption shall be examined to determine whether demand peaks are contributing inordinately to energy costs and to accurately determine savings from conservation measures.