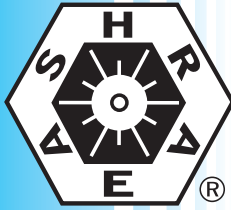


ANSI/ASHRAE Standard 103-2007
(Supersedes ANSI/ASHRAE Standard 103-1993)



ASHRAE STANDARD

Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers

Approved by the ASHRAE Standards Committee on June 23, 2007; by the ASHRAE Board of Directors on June 27, 2007; and by the American National Standards Institute on March 25, 2008.

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ISSN 1041-2336



www.ansi.org

**American Society of Heating, Refrigerating
and Air-Conditioning Engineers, Inc.**

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NOTE

When addenda, interpretations, or errata to this standard have been approved, they can be downloaded free of charge from the ASHRAE Web site at <http://www.ashrae.org>.

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FOREWORD

This standard is an industry standard specifying the method of testing for determining the Annual Fuel Utilization Efficiency of residential and light commercial furnaces and boilers. The last significant update of the standard was in 1993 when the content of the standard was aligned with the United States Department of Energy test procedures for rating furnaces and boilers. This revision and update of the standard reflects improvements and changes in equipment design that were not adequately covered by the previous version of the standard. In particular, attention was given to the modern classes of two-stage and modulating equipment that have come out on the market, and equipment whose performance is affected by post purge of the combustion chamber. Also, greater understanding and clarity regarding losses from equipment were incorporated into the standard. Finally, changes in nomenclature and definitions were included to clarify meaning within the standard as reflected by questions and issues handled by the committee members over the past 10 years. Also, editorially, the errata from the previous version were incorporated into this version.

The project committee is grateful to David Bixby, Cyril Fowble, Esher Kweiler, John Talbott, and John Woodworth for their help in revising this standard.

1. PURPOSE

The purpose of this standard is to provide procedures for determining the annual fuel utilization efficiency of residential central furnaces and boilers.

2. SCOPE

2.1 This standard includes

- a. a test method for cyclic and part-load performance,
- b. methods for interpolating and extrapolating test data, and
- c. calculation procedures for establishing seasonal performance.

2.2 This standard applies to central furnaces with inputs less than 225,000 Btu/h and boilers with inputs less than 300,000 Btu/h, having gas, oil, or electric input, intended for use in residential applications. This standard also applies to furnaces contained within the same cabinet with central air conditioners that have rated cooling capacities of 65,000 Btu/h or less.

2.2.1 This standard applies to equipment that utilizes single-phase electric current or low-voltage DC current.

2.2.2 This standard covers the effectiveness of electrical/mechanical stack dampers only.

2.3 The procedures are intended to be used to compare energy consumption measures of various furnace and boiler models. They are not intended to provide an absolute measure

of performance in any specific installation configuration since the effects of heating system installation variables are not fully taken into account.

3. DEFINITIONS

annual fuel utilization efficiency (AFUE): the ratio of annual output energy to annual input energy, which includes any non-heating-season pilot input loss and, for gas or oil-fired furnaces or boilers, does not include electric energy.

air intake terminal: a device that is located on the outside of a building and is connected to a furnace or boiler by a system of conduits through which air for combustion is taken from the outside environment.

air shutter: an adjustable device for varying the amount of primary air entering the burner (atmospheric and power types).

atmospheric burner: a device for the final conveyance of the gas, or a mixture of gas and air at atmospheric pressure, to the combustion zone.

automatic vent damper: an electrically operated or thermally actuated device installed downstream of the draft hood (see *stack damper*).

barometric draft regulator or barometric damper: a device designed to maintain a constant draft in a furnace or boiler.

boiler: a self-contained fuel-burning or electrically heated appliance for supplying low-pressure steam or hot water for space-heating application.

boiler, finned-tube: a boiler whose heat exchanger consists of only finned tubes.

boiler, low-pressure steam or hot water: an electric, gas, or oil-burning boiler designed to supply low-pressure steam or hot water for space-heating applications. A low-pressure steam boiler operates at or below 15 psig steam pressure; a hot water boiler operates at or below 160 psig water pressure and 250°F water temperature.

boiler outlet: the opening provided in a boiler for the exhaust of the flue gases from the combustion chamber.

condensing furnace or boiler: a unit that will, during the laboratory tests prescribed in this standard, condense part of the water vapor in the flue gases and is equipped with a means of collecting and draining this condensate.

control: a device used to regulate the operation of a piece of equipment; the device regulates the gas, air, water or electrical supplies.

control, single-stage: a control that cycles a burner between the maximum heat input rate and OFF.

control, modulating: a manual control, an automatic step modulating control, or a "two-stage control."

control, two-stage: a modulating control that both cycles a burner between reduced heat input rate and OFF and between the maximum heat input rate and OFF. It may also switch from OFF to reduced fire to high fire to OFF under certain load conditions.