

ERRATA SHEET FOR
ASHRAE STANDARD 103-1993

October 24, 1996

Introduction

The corrections listed in this errata sheet apply to copies of ANSI/ASHRAE Standard 103-1993 coded "GG 11/93" on the outside back cover.

Errata

1. Page 6, Figure 1, Note 2, change the units:

From: Btu/hr/ft²·in.·°F
To: Btu·in/(hr·ft²°F)

2. Page 19, last sentence of subclause 8.8.5, change the referenced subclause number:

From: 11.6
To: 11.8

3. Page 27, Table 7:

- (a) in equation in the heading cell that defines $L_{s,ss}$ change variable subscript:

From: $T_{s,ss,x}$
To: $T_{a,ss,x}$

- (b) Following the equation in the heading cell of Table 7, add definitions for $R_{T,a}$ and $T_{a,ss,x}$ worded as follows:

$R_{T,a}$ = $R_{T,F}$ if flue gas is measured, as defined in 11.2.2
= $R_{T,s}$ if stack gas is measured, as defined in 11.2.3

$T_{a,ss,x}$ = $T_{F,ss}$ if flue gas temperature is measured
= $T_{s,ss,x}$ if stack gas temperature is measured

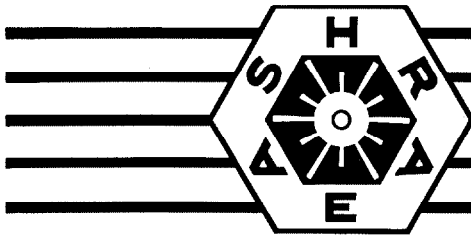
- (c) Just above the last row in Table 7 (for air) and below the horizontal table-splitting line, insert a title line for the existing air values of CA and show seven significant figures for the value of CA(1) as follows:

	<u>CA (1)</u>	<u>CA (2)</u>	<u>CA (3)</u>	<u>CA (4)</u>	<u>CA (5)</u>
Air	<u>2.5462121x10⁻¹</u>	<u>-3.0260126x10⁻⁶</u>	<u>2.7608571x10⁻⁸</u>	<u>-7.4253321x10⁻¹²</u>	<u>6.4307377x10⁻¹⁶</u>

4. Page 44, subclause 11.2.9.6 in two places (in main body and in "where"); page 47, subclause 11.2.9.19 "where"; page 49, subclause 11.2.10.6 "where" in two places; and page 49, subclause 11.2.10.8 "where" in two places; change the referenced subclause number that defines t_p for boilers:

From: 9.5.1.2
To: 9.5.2.1

ANSI/ASHRAE 103-1993
(Supersedes ANSI/ASHRAE Standard 103-1988)



ASHRAE[®] STANDARD

AN AMERICAN NATIONAL STANDARD

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

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by the ASHRAE Board of Directors July 1, 1993; and by the
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**AMERICAN SOCIETY OF HEATING,
REFRIGERATING AND
AIR-CONDITIONING ENGINEERS, INC.**

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CONTENTS

Section	Page
1. Purpose	2
2. Scope	2
3. Definitions	2
4. Classifications	4
5. Requirements	5
6. Instruments	5
7. Apparatus	6
8. Methods of Testing	11
9. Test Procedure	19
10. Nomenclature	24
11. Calculations of Derived Results from Test Measurements	26
12. References	62
Appendix A	63
Appendix B	64
Appendix C	64
Appendix D	68
Appendix E	70

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 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.

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.

or oil-burning boiler designed to supply low-pressure steam or hot water for space-heating application. 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.

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

control, modulating: a manual or automatic step modulating 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.

control, step modulating: a modulating control that cycles a burner between the reduced input rate and OFF if the heating load is light. If a higher heating load is encountered that cannot be met with the reduced input rate, the control goes into a modulating mode where it either gradually or incrementally increases the input rate to meet the higher heating load. At that point, if a lower heating load is encountered, the control either gradually or incrementally decreases to the reduced input rate.

(a) **automatic modulating control:** a step modulating control that is capable of controlling burner fuel input rate between the maximum and the minimum adjustable input rate in response to varying heating load.

(b) **manually adjusted modulating control:** a step modulating control adjusted for reduced input at the time of installation of the furnace or boiler, set by the installer.

direct exhaust system: a mechanical venting system supplied or recommended by the manufacturer through which the products of combustion pass directly from the furnace or boiler to the outside and that does not employ a means of draft relief. This includes units that have small air passages in the flue that have an opening area that is not in excess of 10% of the cross-sectional area of the stack.

direct vent system: a system consisting of (a) a central furnace or boiler for indoor installation; (b) combustion air connections between the furnace or boiler and the outdoor atmosphere; (c) flue gas connections between the furnace or boiler and the vent cap; and (d) vent cap for installation outdoors, supplied by the manufacturer and constructed so all air for combustion is obtained from the outdoor atmosphere and all flue gases are discharged to the outdoor atmosphere.