

*Basic model* means all units of a given type of covered product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency.

*Commercial warm air furnace* means a warm air furnace that is industrial equipment, and that has a capacity (rated maximum input) of 225,000 Btu per hour or more.

*Thermal efficiency* for a commercial warm air furnace equals 100 percent minus percent flue loss determined using test procedures prescribed under § 431.76.

*Warm air furnace* means a self-contained oil-fired or gas-fired furnace designed to supply heated air through ducts to spaces that require it and includes combination warm air furnace/electric air conditioning units but does not include unit heaters and duct furnaces.

[69 FR 61939, Oct. 21, 2004, as amended at 76 FR 12503, Mar. 7, 2011]

#### TEST PROCEDURES

#### § 431.75 Materials incorporated by reference.

(a) *General*. DOE incorporates by reference the following test procedures into subpart D of part 431. The materials listed have been approved for incorporation by reference by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to the listed materials by the standard-setting organization will not affect the DOE regulations unless and until such regulations are amended by DOE. Materials are incorporated as they exist on the date of the approval, and a notice of any changes in the materials will be published in the FEDERAL REGISTER. All approved materials are available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030 or go to: [http://www.archives.gov/federal\\_register/code\\_of\\_federalregulations/](http://www.archives.gov/federal_register/code_of_federalregulations/)

[ibr\\_locations.html](#). Also, these materials are available for inspection at U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza SW., Washington, DC 20024, (202) 586-2945, or go to: [http://www1.eere.energy.gov/buildings/appliance\\_standards/](http://www1.eere.energy.gov/buildings/appliance_standards/). The referenced test procedure standards are listed below by relevant standard-setting organization, along with information on how to obtain copies from those sources.

(b) *ANSI*. American National Standards Institute. 25 W. 43rd Street, 4th Floor, New York, NY 10036, (212) 642-4900, or go to: <http://www.ansi.org>.

(1) ANSI Z21.47-1998, (“ANSI Z21.47-1998”), “*Gas-Fired Central Furnaces*,” approved by ANSI on June 9, 1998, IBR approved for § 431.76.

(2) ANSI Z21.47-2006, (“ANSI Z21.47-2006”), “*Gas-Fired Central Furnaces*,” approved on July 27, 2006, IBR approved for § 431.76.

(3) Reserved.

(c) *ASHRAE*. American Society of Heating, Refrigerating and Air-Conditioning Engineers Inc., 1791 Tullie Circle, NE., Atlanta, Georgia 30329, (404) 636-8400, or go to: <http://www.ashrae.org>.

(1) ASHRAE Standard 103-1993, sections 7.2.2.4, 7.8, 9.2, and 11.3.7, “*Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers*,” approved on June 26, 1993, IBR approved for § 431.76.

(2) [Reserved].

(d) *HI*. Hydronics Institute Division of AHRI, 35 Russo Place, P.O. Box 218, Berkeley Heights, NJ 07922, (703) 600-0350, or go to: <http://www.ahrinet.org/hydronics+institute+section.aspx>.

(1) HI BTS-2000, sections 8.2.2, 11.1.4, 11.1.5, and 11.1.6.2, “*Method to Determine Efficiency of Commercial Space Heating Boilers*,” published January 2001, IBR approved for § 431.76.

(2) [Reserved].

(e) *UL*. Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062, (847) 272-8800, or go to: <http://www.ul.com>.

(1) UL 727 (UL 727-1994), “*Standard for Safety Oil-Fired Central Furnaces*,” published on August 1, 1994, IBR approved for § 431.76.

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(2) UL 727 (UL 727–2006), “*Standard for Safety Oil-Fired Central Furnaces*,” approved April 7, 2006, IBR approved for § 431.76.

(3) [Reserved].

[77 FR 28987, May 16, 2012]

### § 431.76 Uniform test method for the measurement of energy efficiency of commercial warm air furnaces.

(a) This section covers the test procedures you must follow if, pursuant to EPCA, you are measuring the steady-state thermal efficiency of a gas-fired or oil-fired commercial warm air furnace with a rated maximum input of 225,000 Btu per hour or more. Where this section prescribes use of ANSI Z21.47 or UL 727, (incorporated by reference, see § 431.75), perform only the procedures pertinent to the measurement of the steady-state efficiency. Before May 13, 2013, where you see instructions to use ANSI Z21.47–2006 or UL 727–2006 in this section, you may use the relevant procedures in ANSI Z21.47–1998 or UL 727–1994. On or after May 13, 2013, you must use the relevant procedures in ANSI Z21.47–2006 or UL 727–2006.

(b) *Test setup*—(1) *Test setup for gas-fired commercial warm air furnaces*. The test setup, including flue requirement, instrumentation, test conditions, and measurements for determining thermal efficiency is as specified in sections 1.1 (Scope), 2.1 (General), 2.2 (Basic Test Arrangements), 2.3 (Test Ducts and Plenums), 2.4 (Test Gases), 2.5 (Test Pressures and Burner Adjustments), 2.6 (Static Pressure and Air Flow Adjustments), 2.39 (Thermal Efficiency) (note, this is 2.38 in ANSI Z21.47–1998 (incorporated by reference, see § 431.75)), and 4.2.1 (Basic Test Arrangements for Direct Vent Control Furnaces) of ANSI Z21.47–2006 (incorporated by reference, see § 431.75). The thermal efficiency test must be conducted only at the normal inlet test pressure, as specified in section 2.5.1 of ANSI Z21.47–2006, and at the maximum hourly Btu input rating specified by the manufacturer for the product being tested.

(2) *Test setup for oil-fired commercial warm air furnaces*. The test setup, including flue requirement, instrumentation, test conditions, and measurement for measuring thermal efficiency is as

specified in sections 1 (Scope), 2 (Units of Measurement), 3 (Glossary), 37 (General), 38 and 39 (Test Installation), 40 (Instrumentation, except 40.4 and 40.6.2 through 40.6.7, which are not required for the thermal efficiency test), 41 (Initial Test Conditions), 42 (Combustion Test—Burner and Furnace), 43.2 (Operation Tests), 44 (Limit Control Cutout Test), 45 (Continuity of Operation Test), and 46 (Air Flow, Downflow or Horizontal Furnace Test), of UL 727–2006 (incorporated by reference, see § 431.75). You must conduct a fuel oil analysis for heating value, hydrogen content, carbon content, pounds per gallon, and American Petroleum Institute (API) gravity as specified in section 8.2.2 of HI BTS–2000 (incorporated by reference, see § 431.75). The steady-state combustion conditions, specified in Section 42.1 of UL 727–2006, are attained when variations of not more than 5 °F in the measured flue gas temperature occur for three consecutive readings taken 15 minutes apart.

(c) *Additional test measurements*—(1) *Measurement of flue CO<sub>2</sub> (carbon dioxide) for oil-fired commercial warm air furnaces*. In addition to the flue temperature measurement specified in section 40.6.8 of UL 727–2006, (incorporated by reference, see § 431.75) you must locate one or two sampling tubes within six inches downstream from the flue temperature probe (as indicated on Figure 40.3 of UL 727–2006). If you use an open end tube, it must project into the flue one-third of the chimney connector diameter. If you use other methods of sampling CO<sub>2</sub>, you must place the sampling tube so as to obtain an average sample. There must be no air leak between the temperature probe and the sampling tube location. You must collect the flue gas sample at the same time the flue gas temperature is recorded. The CO<sub>2</sub> concentration of the flue gas must be as specified by the manufacturer for the product being tested, with a tolerance of ±0.1 percent. You must determine the flue CO<sub>2</sub> using an instrument with a reading error no greater than ±0.1 percent.

(2) *Procedure for the measurement of condensate for a gas-fired condensing commercial warm air furnace*. The test procedure for the measurement of the condensate from the flue gas under