

INTRODUCTION TO CERTIFIED FURNACE EFFICIENCY RATINGS

Effective January 1, 2008, the Gas Appliance Manufacturers Association (GAMA) and the Air-Conditioning and Refrigeration Institute (ARI) merged to become the Air-Conditioning, Heating, and Refrigeration Institute (AHRI). AHRI is one of the largest associations in the nation, representing 350+ member companies accounting for more than 90% of the residential and commercial air-conditioning, space heating, water heating, and commercial refrigeration equipment manufactured and sold in North America.

Regulators increasingly depend on AHRI for accurate and unbiased evaluation of the energy performance of heating and air conditioning equipment and water heaters. Our certification programs demonstrate to government, building owners and homeowners that equipment performance claims have been independently measured and verified in accordance with federally mandated test procedures, instilling consumer confidence and enabling fair product comparisons.

Four former GAMA product divisions, which are now product sections of AHRI, have developed separate efficiency certification programs continuing to operate under the GAMA Efficiency Rating Certified label: the Furnace, Hydronics Institute, Direct Heating and Water Heater Sections.

Following are listings of gas and oil central heating equipment manufactured by companies participating in AHRI's furnace efficiency certification program. Each participant in this program is entitled to display the GAMA Certification Symbol (Seal), Figure 1, on units of models covered by the program. The seal may be affixed to the unit only at the time and place of manufacture. The seal may also be displayed on specification sheets, advertising and on other literature that either specifies ratings or claims participation in the program. The seal and listing in this Directory are an indication that the equipment's efficiency rating as well as output heating capacity have been determined and are accurately stated in accordance with the applicable efficiency test method; no other warranty, representation, endorsement or other statement, expressed or implied, is made.



Figure 1. GAMA Certification Seal

CHAPTER I GAS AND OIL CENTRAL FURNACE EQUIPMENT CONTENTS

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INTRODUCTION

Description of Residential Furnace Efficiency Certification Program

Chapter I is a product of the Residential Furnace Certification Program sponsored by AHRI in cooperation with its industry members. The program uses an independent laboratory to verify the furnace manufacturers' stated Annual Fuel Utilization Efficiency (AFUE) and output heating capacity as determined by testing in accordance with the Department of Energy's Uniform Test Method of Measuring the Energy Consumption of Furnaces. Gas and oil furnaces with input ratings less than 225,000 Btu/hour are currently included in the program.

Administration of the program includes the "Directory of Certified Product Performance" (Directory), which identifies certified products enrolled in the certification program and lists the input rating, certified output heating capacity and Annual Fuel Utilization Efficiency (AFUE) for each.

Central Heating Equipment Defined

Central Heating equipment listed in this chapter is gas or oil burning furnaces. Furnaces supply heat to space remote from the furnace location through a system of ducts with air as the heating medium.

Chapter I Format

This chapter is divided into two (2) separate sections described as follows:

Section 1 - Residential Gas Central Furnaces

Section 2 - Residential Oil Central Furnaces

USE OF CHAPTER I

Each section provides a listing of the models of each of the companies participating in this program along with information on the

configuration of the model, its size, output heating capacity and efficiency rating (AFUE). Participating companies are listed in the Directory alphabetically.

In order for a potential purchaser of central heating equipment to get the optimum use from this chapter, there are two requirements:

- 1) an understanding of the information and terminology that it contains, and
- 2) (for purposes of selecting heating equipment) the information in the chapter must be supplemented with information concerning the type of installation and heat loss of the home to be heated. (See Step 2 on Page 4).

Information Contained in Chapter I

Following is an excerpt from a typical listing in the chapter along with an explanation of the information that is presented. Models with higher Annual Fuel Utilization Efficiency (AFUE) ratings use less fuel. To calculate how much less fuel, a procedure is provided in the next part of this introduction that will allow comparison of models of different AFUE ratings.

SAMPLE LISTING

(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Model Number	Configuration	Footnotes	Input Rating MBTUH	Output Heating Capacity MBTUH	PE Watts	Eae kWh/yr	Ef MMBTU/yr	AFUE %
(2) ABA HEATING, INC. Trade Name(s): AABA								
<u>Steel</u>								
(1) <u>NATURAL OR PROPANE GAS</u>							<u>NON-WEATHERIZED</u>	
GH60DM	U H		60.0	46.0	80	600	55.2	78.5
GHE60DM-2	U H		60.0	45.0	80	600	64.5	78.1
GHE60DM-3	U D H		60.0	45.0	80	750	54.2	78.0
GH80DM	D H		80.0	62.0	80	750	77.0	79.5
GH80DM-3	D H		80.0	61.0	80	750	77.2	79.0

1. Type of Fuel: Sections 1 and 3 of Chapter 1 will be listed for natural gas, propane gas, or both. In Sections 2 and 4, this designation will be omitted since the models in these sections are listed for oil.
2. Name of Company: This may also be accompanied by a trade name or mark.
3. Model Number: Lists the model number of the units in the program. Certain furnaces listed in this chapter have the same ratings for efficiency related parameters such as input, capacity, and AFUE even though they have different model numbers. These units may be listed on the same line with interchangeable portions of the model numbers listed with an asterisk. For example, if the two models GF100-1 and GF100-2 have the same efficiency ratings they could be listed as GF100-*
4. Configuration: Configuration of the model and installation location used for ratings. Configurations and installation locations are further described at the beginning of each section.
5. Footnote: This column is for referencing footnotes.
6. Input, Mbtuh: This figure represent the amount of fuel that the model consumes in one hour. It is defined as the rate of energy supplied in a fuel to a furnace when operating under continuous burning (steady-state) conditions:
 - a) "Mbtuh" stands for thousands of British Thermal Units (Btu's) used in one hour and is a term used to measure energy; for example, a few hundred Btu's provide enough energy to make a pot of coffee. Some larger homes may require as much as 80,000-90,000 Btu's an hour for heating on very cold days.
 - b) "Steady-State Conditions" are conditions of continuous burner operation during which fuel consumption of the furnace is measured, somewhat like measuring your car's gasoline mileage under steady highway driving conditions.
7. Output Heating Capacity, Mbtuh: This figure tells how much heat the model can produce in one hour operating under steady-state conditions expressed in thousands of Btu's per hour. For isolated combustion or outdoor units the Heating Capacity is determined by multiplying the specified input by the steady-state efficiency, as tested, and subtracting an additional term to account for jacket losses which would go into an unheated environment.
8. PE, Watts: The electrical energy input rate supplied to the power burner (combustion air blower, fuel pump, damper motor) of a furnace operating under continuous burning (steady-state) conditions.
9. Eae, kWh/yr: The average annual auxiliary electrical energy consumption for a gas furnace in kilowatt-hours per year. It is a

measure of the total electrical energy supplied to a furnace during a one-year period.

- 10. Ef, MMBtu/yr: The average annual fuel energy consumption for a gas furnace in millions of Btu's per year.
- 11. AFUE, %: Annual Fuel Utilization Efficiency and is the efficiency rating of the model shown. Unlike steady-state conditions, this rating is based on average usage, including on and off cycling, as set out in the standardized Department of Energy test procedures.

REMEMBER: The higher the AFUE rating, the more efficient the model will be.

- 12. Electrically Efficient Furnaces (*e*) - The bold, italicized "e" designates furnaces that meet GAMA's guideline for electrical efficiency. The guideline applies to furnaces whose electricity consumption is 2% or less of the furnaces total energy use, according to the Department of energy's official test procedure, and is determined according to the following formula:

$$(Eae \times 3413) / [(Eae \times 3413) + (Ef \times 1,000,000)] \leq 2\%$$

Such furnaces typically employ a more efficient motor on the circulation fan and can significantly reduce electricity use during the heating season compared to models of the same AFUE and capacity that do not meet the guideline, especially when the circulating fan is operated on its own for ventilation, air circulation, or filtration. The electricity saved during each heating cycle is offset, on a site energy basis, by an equivalent increase in fuel use.

The guideline does not ensure electricity savings during the cooling season. For cooling season electricity savings, specify a furnace-air conditioner combination with a Seasonal Energy Efficiency Rating (SEER) that exceeds the federal minimum.

- Notes:
- a) Items 7 and 11 are certified values, while items 8, 9, and 10 are provided for application use.
 - b) Eae and Ef are based on national averages. For the purpose of comparison, use the calculation procedure in this section.

Procedure for Estimating the Annual Heating Requirements and Comparing the Costs of Operation of Different Models

To estimate the amount of energy a home will use to provide comfort heating for a year, it is necessary to use both a) information specific to the particular home's need for heat, and b) the size and efficiency information on models listed in this Directory.

Outlined below is a method (based on the Department of Energy efficiency test procedure for furnaces) for first estimating the annual amount of energy used for heating a specific installation and then making a comparison of the estimated annual operating costs of models of essentially the same size but different efficiencies. Because of the number of variables involved in the procedure, the method shown here is only for the purpose of 1) estimating the amount of energy that will be consumed in one year for the specific installation and 2) comparing models of various Annual Fuel Utilization Efficiencies (AFUE) to assist in making a purchasing decision. The method outlined below can be used for comparing models using the same fuel (gas to gas) or different fuels (gas to oil). When selecting models for comparison, make sure units are of the same configuration needed for a particular installation, i.e., upflow models, etc. A "Worksheet" is provided at the end of the section for ease in compiling and calculating the necessary information. The steps required to complete the "Worksheet" are:

- Step 1 - Determine the Heating Load Hours (HLH) for your area. To find an approximate number of Heating Load Hours for your specific area, use the map illustrated in Figure 1.

Heating Load Hours, HLH _____ hours

The procedure outlined above is based upon the Department of Energy test procedure for estimating the annual operating cost of gas or oil-fired furnaces. It includes the cost of annual fuel usage (natural gas, propane gas, or No. 2 heating oil), in addition to the annual electrical cost to operate furnace circulating blowers, pumps, and power burners.

- Step 2 - Estimate the Design Heating Requirement (DHR) for the specific installation. Because the Design Heating Requirement is dependent upon a number of variables, such as the size of the house, building materials, insulation, architectural features, specific climatic conditions, etc., this determination must usually be performed by a knowledgeable heating contractor or other qualified source.

Design Heating Requirement, DHR _____ Btu/hr

- Step 3 - Refer to the Directory to identify the size of the model needed to satisfy the Design Heating Requirement determined in Step 2. Models listed in the Directory of essentially the same heating capacity can now be evaluated for estimated annual operating costs. Models of the same fuel type (gas versus gas) as well as different fuel types (gas versus oil) can be compared using this procedure.

	Input	_____	Btu/hr
	Heating Capacity	_____	Btu/hr
	AFUE	_____	%
	Average Annual Fuel Consumption, Ef	_____	MMBtu
	Average Annual Electrical Consumption, Eae	_____	KW-hr

Step 4 - Determine the Rated Design Heating Requirement, RDHR, for the selected model. The RDHR for an appliance is the DHR value that was used to calculate the Ef and Eae ratings included in this Directory. Using the Heating Capacity from Step 3, read the RDHR from Table 1.

TABLE 1

Unit Heating Capacity, Btu/hr	RDHR, Btu/hr
5,000 - 10,000	5,000
11,000 - 16,000	10,000
17,000 - 25,000	15,000
26,000 - 42,000	20,000
43,000 - 59,000	30,000
60,000 - 76,000	40,000
77,000 - 93,000	50,000
94,000 - 110,000	60,000
111,000 - 127,000	70,000
128,000 - 144,000	80,000
145,000 - 161,000	90,000
162,000 - 178,000	100,000
179,000 - 195,000	110,000
196,000 and Over	130,000

Rated Design Heating Requirement, RDHR _____ Btu/hr

Step 5 - Calculate the adjustment factor, AF, which is required to correct the energy usage figures from the Directory for your specific installation.

$$AF = \frac{HLH \times DHR}{2080 \times RDHR}$$

where,

- HLH = Heating Load Hours from Step 1.
- DHR = Design Heating Requirements from Step 2.
- 2080 = Average Annual Heating Load hours.
- RDHR = Rated Design Heating Requirement from Step 4.

AF =

Step 6 - Calculate the Estimated Annual Fuel Usage, EAFU, for your specific installation.

$$EAFU = AF \times Ef$$

where,

- AF = Adjustment Factor from Step 5.
- Ef = Average Annual Fuel Consumption from Step 3.

EAFU _____ MMBtu

Step 7 - Calculate the Estimated Annual Electrical Usage, EAEU, for your specific installation.

$$EAEU = AF \times Eae$$

where,

- AF = Adjustment Factor from Step 5.
- Eae = Average Annual Electrical Consumption from Step 3.

EAEU _____ kWh

Step 8 - Calculate the Estimated Annual Operating Cost, EAO, for your specific installation and selected model.

$$EAO = [(EAFU \times 1,000,000 \times \text{Fuel Cost}) / \text{Btu Content}] + (EAEU \times \text{Electrical Cost})$$

where,

- EAFU = Estimated Annual Fuel Usage in MMBtu from Step 6.
- 1,000,000 = Conversion factor for MMBtu to BTU.
- Fuel Cost = Cost of fuel for your area in:
\$ per therm for Natural Gas

\$ per gallon for Propane Gas.
 \$ per gallon for Heating Oil.
 Btu Content:
 100,000 Btu per therm for Natural Gas.
 91,333 Btu per gallon for Propane Gas.
 138,700 Btu per gallon for Heating Oil.
 EAUE = Estimated Annual Electrical Usage in kW-hr from Step 7.
 Electrical Cost = Cost of electricity in your area in \$ per kW-hr.

EAOC, \$ _____ per year

This procedure can be repeated for other models of essentially the same size with different efficiencies to compare their Estimated Annual Operating Costs. Models with higher efficiency (AFUE) ratings will consume less fuel and cost less to operate, but generally have a higher purchase price and may have a higher installation cost. Therefore, there is a period of time, referred to as a "Payback Period", before the savings that result from the lower operating costs of a more efficient model makes up the difference in price of that furnace as compared to a less efficient model.

EXAMPLE: Assume you are intending to buy a new gas furnace and have calculated the Estimated Annual Operating Cost (EAOC) using the procedure outlined above for two models of essentially the same size to meet your heating requirements but with different efficiency (AFUE) ratings.

	<u>Price of Furnace</u>	<u>AFUE</u>	<u>Estimated Annual Operating Cost</u>
Model A	\$600 Installed	78%	\$425.00
Model B	\$775 Installed	91%	\$365.00

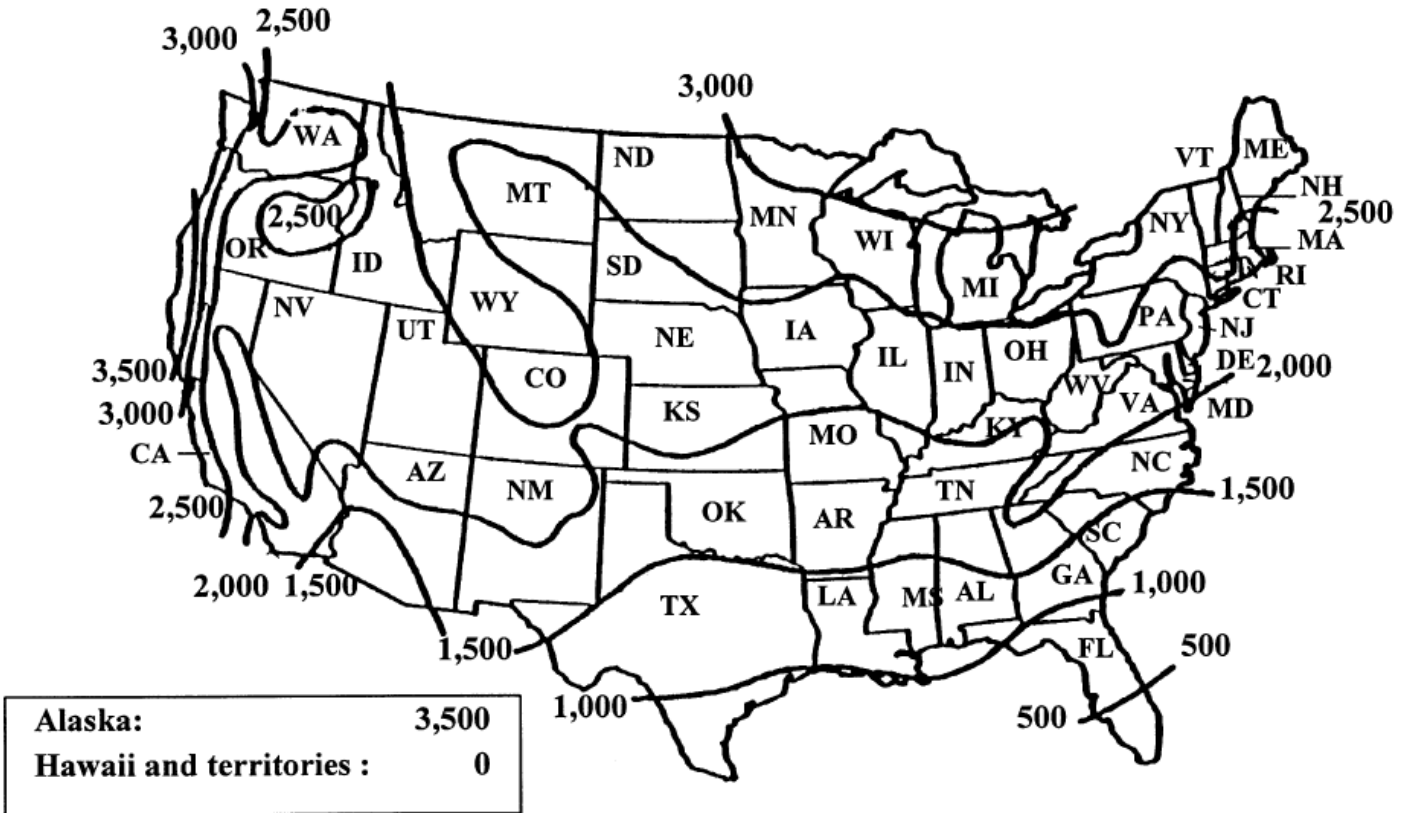
The additional cost of more efficient model (Model B) is: $\$775 - \$600 = \$175$ higher installation cost.

The estimated Annual Savings in Operating Costs for Model B, as compared to Model A is:

$\$425 - \$365 = \$60$ lower operating cost per year.

The payback period is:

$\$175 / \$60 \text{ per year} = 2.92 \text{ years} = 35 \text{ months}$



This map is reasonably accurate for most parts of the United States but is necessarily generalized, and consequently not too accurate in mountainous regions, particularly in the rockies.

FIGURE 1

WORKSHEET

General instructions: After determining the size of the unit needed, refer to the listing of models of essentially the same size (heating capacity) and select models for comparison. Fill in the blocks with the listing information and perform the calculations required to determine the Estimated Annual Operating Costs.

	Model 1	Model 2	Model 3
Brand:			
Model:			
STEP 1. Heating Load Hours, HLH (Figure 1)			
STEP 2. Design Heating Requirements, DHR, in Btu/hr			
STEP 3. Record the following information from the Directory: Input, Btu/hr Heating Capacity, Btu/hr AFUE, % Ef, MMBtu Eae, kW-hr	Input _____ Heating Capacity _____ AFUE _____ Ef _____ Eae _____	Input _____ Heating Capacity _____ AFUE _____ Ef _____ Eae _____	Input _____ Heating Capacity _____ AFUE _____ Ef _____ Eae _____
STEP 4. Rated Design Heating Requirement, RDHR, from Table 1.			
STEP 5. Calculate the value AF: $AF = \frac{HLH \times DHR}{2080 \times RDHR}$			
STEP 6. Calculate Estimated Annual Fuel Usage, EAFU, in MMBtu's: $EAFU = AF \times Ef$			
STEP 7. Calculate Estimated Annual Electrical Usage, EAEU, in kW-hrs: $EAEU = AF \times Eae$			
STEP 8. Calculate Estimated Annual Operating Cost, EAO, in \$: $EAO = \frac{(EAFU \times 1,000,000 \times \text{Fuel Cost})}{\text{Btu Content}} + (EAEU \times \text{Electrical Cost})$ Natural Gas \$1.194 / therm @ 100,000 Btu / therm Propane \$2.22 / gallon @ 91,333 Btu / gal #2 Heating Oil \$2.88/ gallon @ 138,690 Btu / gal Electricity \$0.1150 / kWh @ 3,412 Btu / kWh Costs Based on FTC Representative Average Unit Costs of Energy (16 CFR Part 305, Appendix K). Use Local Energy Costs When Available			

INFORMATION ABOUT THE FURNACE EFFICIENCY CERTIFICATION PROGRAM**Testing Laboratory and Test Procedures**

Intertek Testing Services of Cortland, New York, has been retained as the program's designated independent testing laboratory responsible for conducting efficiency verification tests on furnaces. Randomly selected units of gas and oil furnaces are tested in accordance with the U. S. Department of Energy Test Procedures for Furnaces as published in the May 12, 1997 Federal Register Notice and amended in the October 14, 1997 Federal Register Notice.

Scope of the Program

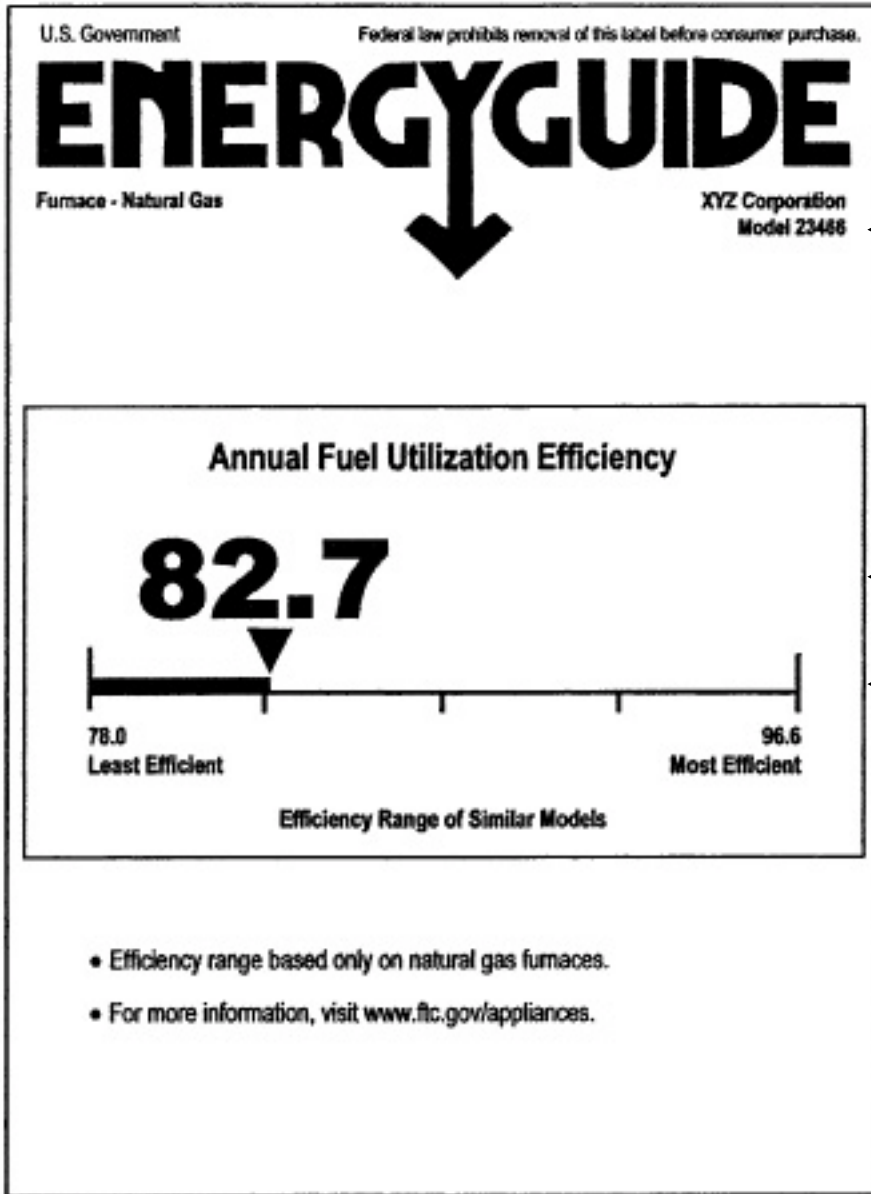
The program is open to all manufacturers of furnaces and to all firms that market private brand models. Participation in the program is voluntary, but all models of furnaces sold by a participant in the United States must be included in the Efficiency Certification Program. The furnaces covered by this program are defined by the following parameters:

- a) All furnaces, including manufactured housing (mobile home) furnaces, with input ratings less than 225,000 Btu/hr that use single-phase electric current or DC

The Directory and the Federal Trade Commission Energy Guide Label Program

The Federal Trade Commission (FTC) requires that furnaces be labeled to show how the efficiency of these models compare to other comparable models. This FTC required EnergyGuide label also directs the consumer to a fact sheet or directory containing specific energy efficiency and operating cost information. This is the directory to which that statement refers. The sample FTC EnergyGuide label on the following page has explanations as to how the listings in this directory complement the information provided on the label.

CORRELATION OF CHAPTER 1 LISTINGS TO FTC “ENERGY GUIDE” LABEL



← The model number(s) for all models to which the label applies are listed. The model numbers is given in the first column of the listing.

← This is the measured AFUE of this model.

← This section shows how this model compares to all other similar models that use gas.

Note: the sample FTC “Energy Guide” label is shown for a gas furnace. A similar label is required for oil furnaces. Also, some furnaces can be installed in one of the three positions (i.e. upflow, horizontal, or downflow). The number of positions that a particular furnace model can be installed will determine whether its label may have one, two, or three range bars.

SECTION 1 – RESIDENTIAL GAS CENTRAL FURNACES

The gas furnaces listed in this section are available in four different configurations to accommodate differences in construction requirements: they are: 1) upflow, 2) downflow, 3) lowboy, and 4) horizontal. Additionally, they are listed by installation location; 1) non-weatherized isolated combustion system or 2) outdoor. Each model listed in Section 1 of the Directory has an indication of its configuration and its location.

Configuration

Upflow - a model with the airflow discharge vertically upward at or near the top of the furnace, with the blower mounted below the heating element.

Lowboy - a model generally with a shorter cabinet in which the airflow discharge is vertically upward at or near the top of the furnace with the blower mounted beside the heating element.

Downflow - a model with the airflow discharge vertically downward at or near the bottom of the furnace, with the blower mounted above the heating element.

Horizontal - a model designed for low headroom installation with airflow across the heating element in a horizontal path.

Location

Non-Weatherized - Isolated Combustion System - a model installed indoors with all combustion and ventilation air admitted through grilles or ducts from outdoors, although this air does not communicate with the air in the conditioned space.

Outdoor - a weatherized model intended for installation out-of-doors.

Ranges of Comparability

The charts below show the lowest and highest efficiency ratings (i.e., ranges of comparability) for all models of gas furnaces and mobile home furnaces. The ranges of comparability are specified by the Federal Trade Commission to be used on the EnergyGuide labels for gas furnaces and mobile home furnaces.

GAS FURNACES

Heating Capacity (Btu per hour)	Range of Energy Efficiency Ratings (AFUE)	
	Low	High
All capacities	78.0	96.7

MOBILE HOME FURNACES

Heating Capacity (Btu per hour)	Range of Energy Efficiency Ratings (AFUE)	
	Low	High
All capacities	75.0	92.1

The charts on the subsequent pages provide more detailed information on the lowest and highest efficiency rating for various heating capacity ranges for each category of gas furnace listed in the Directory.

To use the charts, first go to the listing for the furnace configuration of interest, e.g., upflow. Then refer to the "Heating Capacity" column to the size required, i.e., 77,000 to 93,000 Btu per hour. The low and high rating of energy efficiency ratings of models in this size category are provided. Note that the specific model number is not listed, but can be determined by perusing the listings.

SECTION 1 - GAS FURNACES

RANGES OF COMPARABILITY FOR GAS FORCED-AIR CENTRAL FURNACES

TYPE: UPFLOW, NON-WEATHERIZED
(ISOLATED COMBUSTION) (UN)

Heating Capacity Comparability (Btu per hour)	Ranges of Energy Efficiency Ratings (AFUE)	
	Low	High
5,000 TO 10,000		*
11,000 TO 16,000	81.4	81.4
17,000 TO 25,000	80.0	80.0
26,000 TO 42,000	80.0	96.6
43,000 TO 59,000	80.0	96.7
60,000 TO 76,000	80.0	95.5
77,000 TO 93,000	80.0	95.7
94,000 TO 110,000	80.0	95.8
111,000 TO 127,000	78.0	95.5
128,000 TO 144,000	92.6	92.6
145,000 TO 161,000		*
162,000 TO 178,000		*
179,000 TO 195,000		*
196,000 AND OVER		*

TYPE: UPFLOW, OUTDOOR (UO)

Ranges of Energy Efficiency Ratings (AFUE)	
Low	High
	*
	*
	*
81.0	81.0
80.5	81.0
81.0	92.1
80.0	81.0
80.0	81.0
	*
	*
	*
	*
	*

TYPE: DOWNFLOW, NON-WEATHERIZED
(ISOLATED COMBUSTION) (DN)

Heating Capacity Comparability (Btu per hour)	Ranges of Energy Efficiency Ratings (AFUE)	
	Low	High
5,000 TO 10,000		*
11,000 TO 16,000		*
17,000 TO 25,000		*
26,000 TO 42,000	78.0	95.0
43,000 TO 59,000	80.0	95.0
60,000 TO 76,000	80.0	95.0
77,000 TO 93,000	80.0	95.0
94,000 TO 110,000	80.0	95.0
111,000 TO 127,000	80.0	95.0
128,000 TO 144,000	91.2	91.2
145,000 TO 161,000		*
162,000 TO 178,000		*
179,000 TO 195,000		*
196,000 AND OVER		*

TYPE: DOWNFLOW, OUTDOOR (DO)

Ranges of Energy Efficiency Ratings (AFUE)	
Low	High
	*
	*
	*
78.0	80.9
78.0	81.0
78.0	81.0
78.0	81.1
78.0	80.7
79.2	80.4
	*
	*
	*
	*
	*

* No models of this type listed in this edition.

SECTION 1 - GAS FURNACES

RANGES OF COMPARABILITY FOR GAS FORCED-AIR CENTRAL FURNACES

TYPE: LOWBOY, NON-WEATHERIZED
(ISOLATED COMBUSTION) (LN)

TYPE: LOWBOY, OUTDOOR (LO)

Heating Capacity Comparability (Btu per hour)	<u>Ranges of Energy Efficiency Ratings (AFUE)</u>		<u>Ranges of Energy Efficiency Ratings (AFUE)</u>	
	<u>Low</u>	<u>High</u>	<u>Low</u>	<u>High</u>
5,000 TO 10,000		*		*
11,000 TO 16,000		*		*
17,000 TO 25,000		*		*
26,000 TO 42,000		*		*
43,000 TO 59,000		*		*
60,000 TO 76,000		*		*
77,000 TO 93,000		*		*
94,000 TO 110,000		*		*
111,000 TO 127,000	79.2	82.7		*
128,000 TO 144,000		*		*
145,000 TO 161,000		*		*
162,000 TO 178,000		*		*
179,000 TO 195,000		*		*
196,000 AND OVER		*		*

TYPE: HORIZONTAL, NON-WEATHERIZED
(ISOLATED COMBUSTION) (HN)

TYPE: HORIZONTAL, OUTDOOR (HO)

Heating Capacity Comparability (Btu per hour)	<u>Ranges of Energy Efficiency Ratings (AFUE)</u>		<u>Ranges of Energy Efficiency Ratings (AFUE)</u>	
	<u>Low</u>	<u>High</u>	<u>Low</u>	<u>High</u>
5,000 TO 10,000		*		*
11,000 TO 16,000		*		*
17,000 TO 25,000		*		*
26,000 TO 42,000	80.0	96.1		*
43,000 TO 59,000	90.0	94.8		*
60,000 TO 76,000	80.0	94.7		*
77,000 TO 93,000	80.0	95.0		*
94,000 TO 110,000	80.0	94.4		*
111,000 TO 127,000	80.0	93.8	80.0	80.0
128,000 TO 144,000	92.0	92.0		*
145,000 TO 161,000		*		*
162,000 TO 178,000		*		*
179,000 TO 195,000		*		*
196,000 AND OVER		*		*

* No models of this type listed in this edition.

SECTION 2 – RESIDENTIAL OIL CENTRAL FURNACES

The oil furnaces listed in this section are available in four different configurations to accommodate differences in construction requirements: they are: 1) upflow, 2) downflow, 3) lowboy, and 4) horizontal. Additionally, they are listed by installation location; 1) non-weatherized isolated combustion system or 2) outdoor. Each model listed in Section 2 of the Directory has an indication of its configuration and its location.

Configuration

Upflow - a model with the airflow discharge vertically upward at or near the top of the furnace, with the blower mounted below the heating element.

Lowboy - a model generally with a shorter cabinet in which the airflow discharge is vertically upward at or near the top of the furnace with the blower mounted beside the heating element.

Downflow - a model with the airflow discharge vertically downward at or near the bottom of the furnace, with the blower mounted above the heating element.

Horizontal - a model designed for low headroom installation with airflow across the heating element in a horizontal path.

Location

Non-Weatherized - Isolated Combustion System - a model installed indoors with all combustion and ventilation air admitted through grilles or ducts from outdoors, although this air does not communicate with the air in the conditioned space.

Outdoor - a weatherized model intended for installation out-of-doors.

Ranges of Comparability

The charts below show the lowest and highest efficiency ratings (i.e., ranges of comparability) for all models of oil furnaces and mobile home furnaces. The ranges of comparability are specified by the Federal Trade Commission to be used on the EnergyGuide labels for oil furnaces and mobile home furnaces.

OIL FURNACES

Heating Capacity (Btu per hour)	Range of Energy Efficiency Ratings (AFUE)	
	Low	High
All capacities	78.0	87.0

MOBILE HOME FURNACES

Heating Capacity (Btu per hour)	Range of Energy Efficiency Ratings (AFUE)	
	Low	High
All capacities	80.0	80.0

The charts on the subsequent pages provide more detailed information on the lowest and highest efficiency rating for various heating capacity ranges for each category of oil furnace listed in the Directory.

To use the charts, first go to the listing for the furnace configuration of interest, i.e., upflow. Then refer to the "Heating Capacity" column to the size required, i.e., 77,000 to 93,000 Btu per hour. The low and high rating of energy efficiency ratings of models in this size category are provided. Note that the specific model number is not listed, but can be determined by perusing the listings.

SECTION 2 - OIL FURNACES

RANGES OF COMPARABILITY FOR OIL FORCED-AIR CENTRAL FURNACES

TYPE: UPFLOW, NON-WEATHERIZED
(ISOLATED COMBUSTION) (UN)

TYPE: UPFLOW, OUTDOOR (UO)

Heating Capacity Comparability (Btu per hour)	Ranges of Energy Efficiency Ratings (AFUE)	
	Low	High
5,000 TO 10,000		*
11,000 TO 16,000		*
17,000 TO 25,000		*
26,000 TO 42,000		*
43,000 TO 59,000	80.0	84.5
60,000 TO 76,000	80.0	87.0
77,000 TO 93,000	80.0	86.4
94,000 TO 110,000	80.0	85.1
111,000 TO 127,000	79.9	84.2
128,000 TO 144,000	79.6	84.7
145,000 TO 161,000	81.5	85.9
162,000 TO 178,000	81.9	83.4
179,000 TO 195,000		*
196,000 AND OVER		*

Ranges of Energy Efficiency Ratings (AFUE)	
Low	High
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*

TYPE: DOWNFLOW, NON-WEATHERIZED
(ISOLATED COMBUSTION) (DN)

TYPE: DOWNFLOW, OUTDOOR (DO)

Heating Capacity Comparability (Btu per hour)	Ranges of Energy Efficiency Ratings (AFUE)	
	Low	High
5,000 TO 10,000		*
11,000 TO 16,000		*
17,000 TO 25,000		*
26,000 TO 42,000		*
43,000 TO 59,000	80.0	82.0
60,000 TO 76,000	80.0	84.6
77,000 TO 93,000	80.3	85.4
94,000 TO 110,000	80.0	85.0
111,000 TO 127,000	80.0	85.0
128,000 TO 144,000	80.0	84.2
145,000 TO 161,000		*
162,000 TO 178,000		*
179,000 TO 195,000		*
196,000 AND OVER		*

Ranges of Energy Efficiency Ratings (AFUE)	
Low	High
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*

* No models of this type listed in this edition.

SECTION 2 - OIL FURNACES

RANGES OF COMPARABILITY FOR OIL FORCED-AIR CENTRAL FURNACES

TYPE: LOWBOY, NON-WEATHERIZED
(ISOLATED COMBUSTION) (LN)

TYPE: LOWBOY, OUTDOOR (LO)

Heating Capacity Comparability (Btu per hour)	Ranges of Energy Efficiency Ratings (AFUE)	
	<u>Low</u>	<u>High</u>
5,000 TO 10,000		*
11,000 TO 16,000		*
17,000 TO 25,000		*
26,000 TO 42,000		*
43,000 TO 59,000	80.5	85.0
60,000 TO 76,000	80.0	86.0
77,000 TO 93,000	80.0	86.0
94,000 TO 110,000	80.0	85.3
111,000 TO 127,000	80.0	85.9
128,000 TO 144,000	80.0	85.4
145,000 TO 161,000	81.1	85.8
162,000 TO 178,000	78.9	83.3
179,000 TO 195,000	78.0	78.0
196,000 AND OVER		*

Ranges of Energy Efficiency Ratings (AFUE)	
<u>Low</u>	<u>High</u>
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*
	*

TYPE: HORIZONTAL, NON-WEATHERIZED
(ISOLATED COMBUSTION) (HN)

TYPE: HORIZONTAL, OUTDOOR (HO)

Heating Capacity Comparability (Btu per hour)	Ranges of Energy Efficiency Ratings (AFUE)	
	<u>Low</u>	<u>High</u>
5,000 TO 10,000		*
11,000 TO 16,000		*
17,000 TO 25,000		*
26,000 TO 42,000		*
43,000 TO 59,000	81.5	82.0
60,000 TO 76,000	81.0	82.0
77,000 TO 93,000	78.8	83.5
94,000 TO 110,000	78.2	83.0
111,000 TO 127,000	78.0	82.5
128,000 TO 144,000	78.5	84.3
145,000 TO 161,000	83.6	83.6
162,000 TO 178,000	80.0	82.9
179,000 TO 195,000		*
196,000 AND OVER		*

Ranges of Energy Efficiency Ratings (AFUE)	
<u>Low</u>	<u>High</u>
	*
	*
	*
	*
	*
82.0	82.0
81.2	81.1
	*
	*
	*
	*
	*
	*
	*
	*

* No models of this type listed in this edition.