ATTACHMENT C

Hearth, Patio & Barbecue Association

Suite 600, 1901 North Moore Street
Arlington, VA 22209 USA
Phone: (703) 522-0086 • Fax: (703) 522-0548 Email:
hpbamail@hpba.org
Web Site: www.hpba.org

Ms. Brenda Edwards
U.S. Department of Energy
Building Technologies Program
Room 1J-018
1000 Independence Avenue, SW
Washington, DC 20585-0121

November 15, 2010

Re: Docket number EERE-2009-BT-TP-0013, RIN 1904-AB95

Dear Ms. Edwards:

The Hearth, Patio & Barbecue Association (HPBA), which represents manufacturers, retailers and installers of wood and gas fired appliances, has reviewed the notice of proposed rulemaking (NOPR) at 75 Fed. Reg. 52892 (August 30, 2010) (10 CFR Part 430). Attached are the comments of HPBA. Please contact me if you have any questions regarding this submission.

Thank you for considering HPBA's comments.

Sincerely yours,

Thomas Stroud
Senior Manager, Codes and Standards

The Hearth, Patio & Barbecue Association (HPBA), based in Arlington, VA, is the North American industry association for manufacturers, retailers, distributors, representatives, service firms and allied associates for all types of hearth, barbecue and patio appliances, fuels and accessories. The association provides professional member services and industry support in education, statistics, government relations, marketing, advertising, and consumer education. There are more than 2,600 members in the HPBA.

Please find attached:

Comments of the Hearth, Patio & Barbecue Association

*Residential Decorative Gas Fireplace Usage Characteristics, James Houck, PhD.*

**Comments of the Hearth, Patio & Barbecue Association on the U.S. Department of Energy's Request for Comment on Annual Fuel Utilization Efficiency Testing (75 Fed. Reg. 52,892 (August 30, 2010))**

The U.S. Department of Energy ("DOE") has promulgated regulations that appear to subject essentially all vented gas fireplaces – including decorative gas fireplaces certified to the American National Standards Institute ("ANSI") Z21.50 standard – to heating efficiency standards, 75 Fed. Reg. 20112 (April 16, 2010). The Hearth, Patio & Barbecue Association ("HPBA") believes that this final rule was ill-considered and unlawful in a number of respects. While DOE's request for comment on Annual Fuel Utilization Efficiency ("AFUE") published at 75 Fed. Reg. 52892 (August 30, 2010), does not provide an appropriate forum for HPBA to outline all of its substantive objections to the April 16, 2010, final rule; it does raise certain testing-related issues that warrant comment here. Specifically, one of the serious problems with the April 16, 2010 final rule is that it purported to impose energy efficiency standards on an entire class of products – decorative gas fireplaces certified to the ANSI Z21.50 standard – for which there is no applicable compliance test method.

42 U.S.C. 6295(o)(3)(A) expressly provides that DOE may not prescribe an efficiency standard for any type or class of covered product unless a test procedure has been prescribed under 42 U.S.C. 6293 for that type or class of product. Under 42 U.S.C. 6293, "[a]ny test procedures prescribed or amended under this section shall be reasonably designed to produce test results which measure energy efficiency, energy use, water use (in the case of showerheads, faucets, water closets and urinals), or estimated annual operating cost of a covered product during a representative average use cycle or period of use . . .." 42 U.S.C. 6293(b)(3).

For purposes of its April 16, 2010 final rule, it is clear that DOE intends that decorative gas fireplaces certified to the ANSI Z21.50 standard be tested in accordance with the "uniform test method for vented home heating equipment" specified in Appendix O to Subpart B of 10 C.F.R. Part 430 ("the Appendix O test method"). For several reasons, however, it is clear that this test method is not "reasonably designed to produce test results which measure [the] energy efficiency" of decorative gas fireplaces "during a representative average use cycle or period of" their use. There being no prescribed test method appropriate to these products, the efficiency standards prescribed for them are contrary to law under the express terms of 42 U.S.C. 6296(o)(3)(A).

## A. The Appendix O Test Method Is Inapplicable to ANSI Z21.50-Certified Hearth Products Because Heating Efficiency Is Not the Appropriate Measure of the Performance of These Products.

The most fundamental reason why the Appendix O test method is inapplicable to Z21.50-certified decorative gas fireplaces is that the test method was designed for direct heating equipment, including vented wall furnaces, vented floor furnaces, and vented room heaters. At the time, these were well-defined categories of products for which specific ANSI standards existed (the Z21.44 and Z21.49 standards applied to vented wall furnaces, and the Z21.48 and

Z21.11.1 standards applied to vented floor furnaces and vented room heaters, respectively). Decorative gas fireplaces were an entirely different category of products for which a different ANSI standard existed (the Z21.50 standard). These products are not direct heating equipment and were not even considered in the development of the Appendix O test method. As a result, the Appendix O test method measures product performance solely on the basis of heating efficiency, an approach that is reasonable for utilitarian heating appliances such as vented wall furnaces, vented floor furnaces, and vented room heaters, but that is clearly inappropriate for Z21.50-certified decorative gas fireplaces, which – by definition – are not heating appliances.

Decorative gas fireplaces are designed as a substitute for traditional wood-burning fireplaces, which are not utilitarian heating appliances and generally are not used as such. Instead, traditional wood-burning fireplaces are used primarily for cultural and aesthetic purposes, to be enjoyed during family or social gatherings, romantic evenings, and during quiet leisure time. Decorative gas fireplaces are designed and used for precisely these same purposes: their reason for being is to provide the same aesthetic and cultural appeal as a traditional wood-burning fireplace, not to serve as utilitarian heating appliances. In short, heating utility is not the function with respect to these products, and heating efficiency therefore is not a reasonable measure of their performance. In this regard, the Appendix O test method is scarcely more appropriate for Z21.50 decorative gas fireplaces than it would be for gas lights.

**B. The Appendix O Test Method Is Inapplicable as a Means to Measure the Heating Efficiency of ANSI Z21.50-Certified Hearth Products.**

Even if heating efficiency were the right thing to measure, the Appendix O test method would not be the right method for measuring the heating efficiency of Z21.50-certified decorative gas fireplaces. The problem – as already indicated – is that the test method simply was not designed with decorative gas fireplaces in mind; it was designed strictly for heating appliances. As a result, there are a number of technical respects in which the Appendix O test method is not "reasonably designed to produce test results" measuring the efficiency of decorative gas fireplaces "during a representative . . . period of" their use.

Under the Appendix O method, measured data from a heating appliance is taken and a number of assumptions concerning the use of the product are applied in order to calculate an AFUE rating for the appliance in question. Because the Appendix O method was designed for utilitarian heating appliances, the assumptions built into the method proceed from the premise that the products being tested are used as utilitarian heating appliances in response to heating needs. For this purpose, heating needs are assumed to be 2,950 Heating Degree Days per year (based on a nationwide average), and on this basis the method assumes product use of 1416 burner operating hours ("BOH") per year, the equivalent of ten hours of operation per day for 141.6 days during the year. See 10 C.F.R. Part 430 Appendix O at Section 4.6.1. The method further assumes that appliances will be turned up and down during use in response to heating needs, so that it is appropriate to determine a "weighted-average steady-state efficiency" based on measurements taken when an appliance is operating at a relatively low (and hence relatively inefficient) fuel input rate. Specifically, the method generally requires manually-operated appliances (the category into which Z21.50-certified gas fireplaces would fall) to be tested during steady-state

operation at 50% of their maximum fuel input rate. See 10 C.F.R. Part 430 Appendix O at Section 4.2.4.1.

The assumptions underlying the Appendix O method may be reasonable for the utilitarian heating appliances for which the method was designed, but they are grossly inapplicable to Z21.50-certified decorative gas fireplaces. As already indicated, decorative gas fireplaces are not utilitarian heating appliances; rather than being turned on and off in response to heating needs, they are used for cultural and aesthetic purposes, and are generally turned on only when there is someone in the room to enjoy their aesthetic effect. As a result, the pattern and manner of use of these products is completely unlike that of the utilitarian heating products for which the Appendix O test method was designed. In particular, decorative gas fireplaces are operated very infrequently as compared to utilitarian heating appliances, and for a considerably shorter period of time per use. Indeed, decorative gas fireplaces are typically operated for less than 100 hours per year, not more than 1,400 hours per year as the Appendix O test method assumes. See J. Houck, *Residential Decorative Gas Fireplace Usage Characteristics* at pp. 10-14 (Attached and made a part of these comments). Similarly, decorative gas fireplaces are not turned up and down during use in response to heating needs; instead they are generally turned on to produce an aesthetically pleasing fire, and the aesthetic appeal of these products depends primarily on attractive visible flames that are typically designed to be displayed while the product is operating at or near the high end of its maximum fuel input rate. As a result, these products are generally operating on a relatively high setting to produce attractive flames or are not operating at all. It is therefore unreasonable to require such products to be tested at 50% of their maximum fuel input rate, as this rate is far below any fuel input rate that would be reasonably representative of actual product use.

## C. Conclusions

Because the assumptions built into the Appendix O test method are so clearly inapplicable to decorative gas fireplaces, the method simply is not capable of producing test results that would provide any reasonable measure of the performance of these products. Annual energy consumption numbers calculated under Section 4.6 of the method would be skewed by more than an order of magnitude just by the gross inaccuracy of the method's assumptions regarding total operating hours. Efficiency results would be biased low by the effect of the unreasonable assumption that measurements taken at 50% of a decorative gas fireplace's maximum fuel input rate would be representative of actual product use. These relatively obvious problems are likely just the tip of the iceberg, because they are products of a systemic problem: the Appendix O test method simply isn't "reasonably designed" to measure the energy efficiency of Z21.50-certified decorative gas fireplaces and it conspicuously fails to evaluate them "during a representative average use cycle or period of" their use. In short, the Appendix O method simply does not apply to these products. Accordingly, the April 16, 2010 final rule – to the extent it prescribed standards with respect to these products – is contrary to law.

# Residential Decorative Gas Fireplace Usage Characteristics

**Prepared by**

**James E. Houck, Ph.D.**
**7494 SW 48th Ave.**
**Portland, OR 97219-1404**
**(503) 244-8534**
**jbchouck@comcast.net**

**Prepared for**

**Allan Cagnoli**
**Hearth, Patio & Barbecue Association**
**901 North Moore Street, Suite 600**
**Arlington, VA 22209**

**November 3, 2010**

## Executive Summary

Decorative gas fireplaces are products that primarily serve an aesthetic function. They are not utilitarian heaters and are rarely used as such. Three independent lines of evidence corroborate the conclusion that their primary use is for aesthetics not for heating. They are: (1) Fireplace ownership is not correlated with heating demand. Fireplace ownership in households located in 47 U.S. metropolitan areas does not correlate with 30-year normal heating degree days from representative weather stations within the respective metropolitan areas. (2) Based on survey results for the 2007 base year, only 20% of all gas fireplaces in all housing units are reported to be used for heating. Similarly, for newly constructed housing units completed between 2004 and 2007, survey results show that only 24% of all gas fireplaces are used for heating. Hearth industry shipment records collected by the Hearth, Patio and Barbecue Association (the industry's trade organization) combined with fireplace manufacturers' estimates of decorative fireplace units support that approximately 24% of gas fireplaces that were shipped between 2004 and 2007 were designed for heating. (To be exact, 23% was calculated from the Hearth, Patio and Barbecue Association and manufacturer's data.) The close correlation between "bottom-up" survey-based estimates and "top down" industry shipment records suggest that the attribution between the number of decorative gas and heating gas fireplaces is accurate. In other words, gas fireplaces designed for heating are generally used for heating and decorative gas fireplaces are generally used for aesthetics. (3) Again based on surveys, it can be documented that fireplaces are used less frequently and have shorter fire durations than common unducted secondary space heaters such as woodstoves and fireplace inserts. Further the fact that decorative gas fireplaces are not permitted by the ANSI Z21.50 safety standard to have thermostats in the United States suggests that vented decorative gas fireplaces are not well suited as utilitarian heaters as they must be turned on and off manually not thermostatically in response to heating demand. Additional survey results show that many fireplaces are not used as space heaters in that many fireplaces are rarely (~18%) or never used (~32%) and that the average annual hours of use per heating season for gas fireplaces of all kinds, including fireplaces designed for heating, is very small as compared to the total heating season duration (1.7% of total hours). The total average annual hours of use for all gas fireplaces is on the order of 75 hours per year; for decorative gas fireplaces it is about half that number.

# Table of Contents


| | Page |
|---|---|
| Executive Summary | ii |
| List of Tables | iv |
| List of Figures | v |
| 1. Introduction | 1 |
| 2. Heating Demand and Fireplaces | 1 |
| 3. Heating Versus Decorative Use of Gas Fireplaces Determined from Surveys | 5 |
| 4 Fireplace Usage Characteristics in Contrast to Space Heaters | 10 |
| 5. References | 17 |

## List of Tables


| Table | | Page |
|---|---|---|
| 1 | Metropolitan Statistical Areas Surveyed, Year of Most Recent AHS Survey, Heating Demand (30-Year Mean Heating Degree Days), and Percent of Occupied Households with a Usable Fireplace. | 4 |
| 2 | Percent of In-Home Fireplaces without Inserts That Are Gas Fireplaces and Used for Heat 2007 Base Year | 7 |
| 3 | Percent of Fireplaces without Inserts That Are Gas Fireplaces Used for Heat, Bottom-Up Analysis – Survey Data, New Construction (Completed 2004, 2005, 2006, and 2007) | 8 |
| 4 | Percent of New Fireplaces That Are Vented Heating Fireplaces, Top-Down Analysis, HPBA Shipment Records and Mason's Estimates, 2004 – 2007 | 9 |
| 5 | Percent of Fireplaces Seldom or Never Used Based on Survey Responses | 13 |
| 6 | Average Hours of Use – All Gas Fireplaces – October through March Heating Season | 15 |

# List of Figures


| Figure | | Page |
|---|---|---|
| 1 | Plot of the Percent of Occupied Households with Usable Fireplaces Versus Annual Heating Degree Day (HDD) Means for 47 Metropolitian Statisticial Areas (MSA's). | 3 |
| 2 | Average U.S. Gas Fireplace Use (Days) by Season (HPBA Surveys) | 5 |
| 3 | Comparison of Unducted Space Heater (Woodstoves and Fireplace Inserts) Usage Characteristics with Those of Gas Fireplaces | 11 |
| 4 | Comparisons of Frequency of Use between Fireplaces and True Unducted Space Heaters (Woodstoves) | 12 |

## 1. Introduction

In response to the U.S Department of Energy's Energy Conservation Program Final Rule[1], the Hearth, Patio and Barbecue Association (HPBA) requested an evaluation of the usage of decorative gas fireplaces in the United States. Specifically, their use as heating appliances versus their use for aesthetics was evaluated. Public and private sector surveys, HPBA trade association shipment records, site-built fireplace mason's estimates, and metrological data were reviewed in the conduct of the evaluation. Three independent results are provided here. They are: 1. The relationship between heating demand and fireplaces, 2. The heating versus decorative use of gas fireplaces determined from surveys, and 3. The usage characteristics of fireplaces in contrast to common utilitarian space heaters. Sources of all data are noted and provided in a references section.

## 2. Heating Demand and Fireplaces

Comparison of heating demand, as indexed by Heating Degree Days (HDD), to fireplace ownership illustrates that there is no correlation between fireplace ownership and household heating needs. Survey data also illustrate that while there is no correlation with the "coldness" of the climate neither are fireplaces used often during periods of hot ambient temperatures such as occur in the summer or in semi-tropical climates such as characteristic of southern Florida

The U.S. Census Bureau conducts surveys referred to as American Housing Surveys (AHS) to obtain up-to-date housing statistics for the Department of Housing and Urban Development (HUD). Title 12, Section 1701Z-10 of the U.S. Code mandates the collection of the data for the AHS.

Both national and metropolitan area American Housing Surveys are conducted. Data on housing, including apartments, single-family homes, mobile homes, vacant housing units, household characteristics, income, housing and neighborhood quality, housing costs, equipment and fuels, size of housing unit, etc., are collected. Fireplace ownership ("selected amenities – usable fireplace") is among the many categories for which data are collected. For the metropolitan area surveys, data are gathered for about 14 metropolitan areas in even-numbered years until a total of 47 specific metropolitan areas have been covered. Since 1984, each metropolitan area has been represented by a sample of at least 3,200 designated housing units. The units are divided between the central city and the rest of the metropolitan area. Data from all 47 metropolitan statistical areas (MSA's) collected since 1998 have been analyzed here[2-48]. When more than one survey in a given MSA was conducted since 1998, data from the most recent survey were included as part of this evaluation.

Every ten years, the National Oceanic and Atmospheric Administration's (NOAA's) National Climatic Data Center (NCDC) computes thirty-year climate normals for selected temperature and precipitation elements for a large number of U.S. climate and weather stations. The average value of a meteorological element over 30 years is defined as a climatological normal. Heating degree days (HDD) are one of the meteorological elements computed in the normals compilations. HDD are quantitative indices designed to reflect the demand for energy needed to heat a home or business. These indices are derived from daily temperature observations. The heating requirements for a given structure at a specific location are considered directly proportional to the number of HDD at that location.

More specifically, HDD are a measure of how cold a location is over a period of time relative to a base temperature, most commonly specified as 65 degrees Fahrenheit. The measure is computed for each day by subtracting the average of the day's high and low temperatures from the base temperature (65 degrees), with negative values set equal to zero. Each day's heating degree days are summed to create a heating degree–day measure for a specified reference period. Heating degree days are used in energy analysis as an indicator of space heating energy requirements or use. The most current 30 year normals (1971-2000) have been used in the evaluation provided here[49].

The Hearth, Patio and Barbecue Association (HPBA) has conducted consumer research surveys every two years since 2002[50-53]. Questions regarding use practices for such products as fireplaces are part of the surveys.

Figure 1 is a plot of the percentage of occupied housing units that have a usable fireplace in each of the 47 MSA's versus the thirty-year normal HDD from a representative weather station within the MSA. Table 1 is a compilation of the MSA's, the year of the most recent survey, the percent of households with a usable fireplace, and the thirty-year normal HDD from a weather station within each MSA. As can be seen from reviewing the data there is no correlation between fireplace ownership and heating demand.

It should be noted that the Miami – Ft. Lauderdale MSA has the markedly lowest percentage of occupied households with a usable fireplace among all the MSA's. This is not a conflict with the general observation that there is no correlation between heating demand and fireplace ownership but it is because the Miami – Ft. Lauderdale MSA has an extremely mild climate (149 HDD as compared to 4524 for the population weighted average for the conterminous U.S.). The perception of radiant heat is part of the fireplace "experience" and fireplaces are seldom used during hot ambient temperature conditions. Seasonal use of fireplaces on a national basis is consistent with the Miami – Ft. Lauderdale results in that fireplaces are seldom used in the heat of the summer. (See Figure 2.)

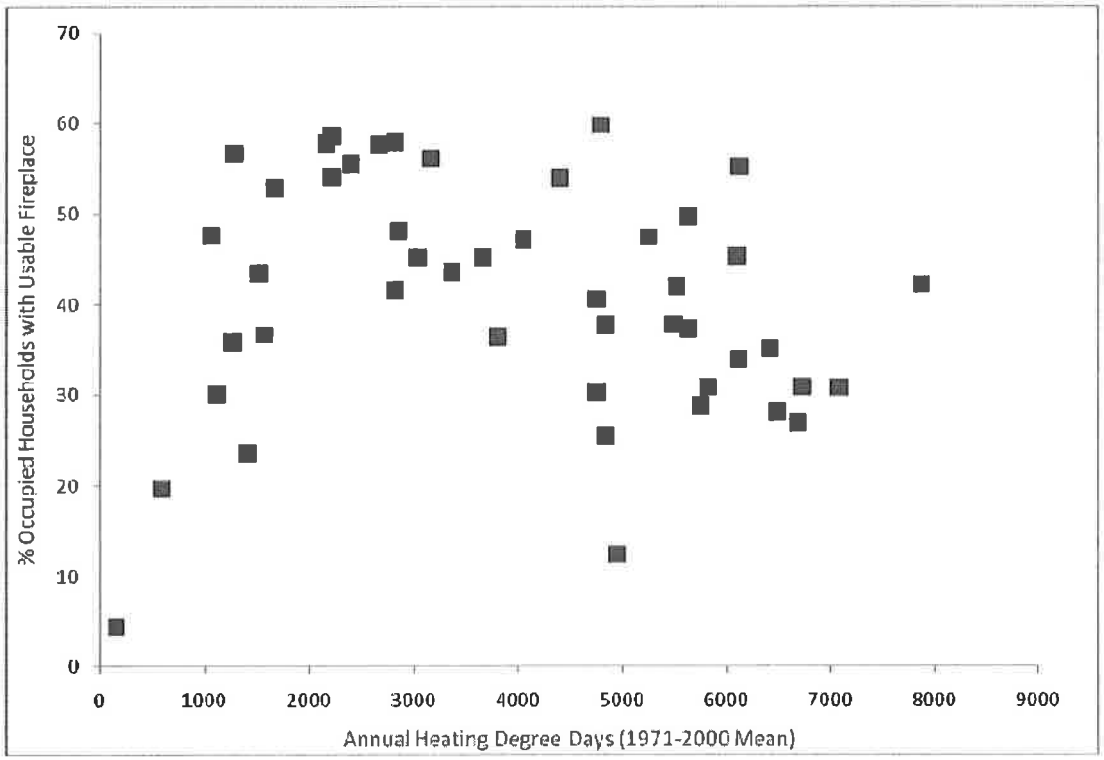



**Figure 1. Plot of the Percent of Occupied Households with Usable Fireplaces Versus Annual Heating Degree Day (HDD) Means for 47 Metropolitian Statisticial Areas (MSA's).**

**Table 1**
**Metropolitan Statistical Areas Surveyed, Year of Most Recent AHS Survey, Percent of Occupied Households with a Usable Fireplace, and Heating Demand (30-Year Mean Heating Degree Days)[a]**

| MSA | Year | HDD | %[b] | MSA | Year | HDD | %[b] |
|---|---|---|---|---|---|---|---|
| Anaheim-Santa Ana | 2002 | 1286 | 56.7 | New Orleans | 2004 | 1417 | 23.6 |
| Atlanta | 2004 | 2877 | 57.9 | New York-Nassau-Suffolk-Orange Co. | 2003 | 4947 | 12.4 |
| Baltimore | 2007 | 3807 | 36.4 | Norfolk-Virginia Beach-Newport News | 1998 | 3368 | 43.6 |
| Birmingham | 1998 | 2823 | 41.6 | Northern New Jersey | 2003 | 4843 | 25.5 |
| Boston | 2007 | 5630 | 37.4 | Oakland | 1998 | 2400 | 55.6 |
| Buffalo | 2002 | 6692 | 27.0 | Okalahoma City | 2004 | 3663 | 45.2 |
| Charlotte | 2002 | 3162 | 56.1 | Philadelphia | 2003 | 4759 | 30.2 |
| Chicago | 2003 | 6498 | 28.1 | Phoenix | 2002 | 1125 | 30.1 |
| Cincinnati | 1998 | 4841 | 37.7 | Pittsburgh | 2004 | 5829 | 30.9 |
| Cleveland | 2004 | 6121 | 34.0 | Portland, OR | 2002 | 4400 | 54.0 |
| Columbus | 2002 | 5492 | 37.8 | Providence | 1998 | 5754 | 28.7 |
| Dallas | 2002 | 2219 | 58.7 | Riverside-San Bernardino-Ontario | 2002 | 1674 | 52.8 |
| Denver | 2004 | 6198 | 55.2 | Rochester | 1998 | 6728 | 30.9 |
| Detroit | 2003 | 6422 | 35.1 | Sacramento | 2004 | 2666 | 57.6 |
| Ft. Worth-Arlington | 2002 | 2219 | 54.1 | St. Louis | 2004 | 4758 | 40.6 |
| Hartford | 2004 | 6104 | 45.3 | Salt Lake City | 1998 | 5631 | 49.7 |
| Houston | 2997 | 1525 | 43.4 | San Antonio | 2004 | 1573 | 36.6 |
| Indianapolis | 2004 | 5521 | 42.0 | San Diego | 2002 | 1063 | 47.6 |
| Kansas City | 2002 | 5249 | 47.4 | San Francisco | 1998 | 2862 | 48.1 |
| Los Angeles-Long Beach | 2003 | 1274 | 35.8 | San Jose | 1998 | 2171 | 57.8 |
| Memphis | 2004 | 3041 | 45.2 | Seattle-Everett | 2004 | 4797 | 59.8 |
| Miami-Ft. Lauderdale | 2007 | 149 | 4.3 | Tampa-St. Petersburg | 2007 | 591 | 19.7 |
| Milwaukee | 2002 | 7087 | 30.7 | Washington, DC | 2007 | 4055 | 47.1 |
| Minneapolis-St. Paul | 2007 | 7876 | 42.2 | | | | |

[a]Data from references 2-49.
[b]Percent occupied households with usable fireplace.

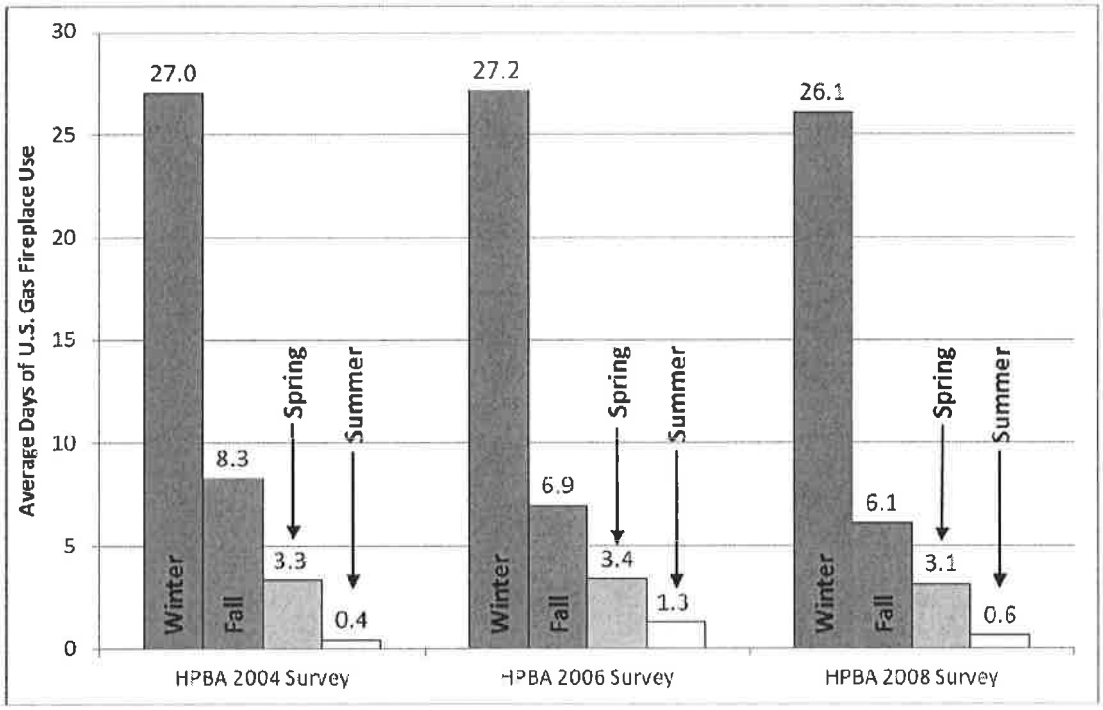



**Figure 2. Average U.S. Gas Fireplace Use (Days) by Season (HPBA Surveys, references 51-53).**

## 3. Heating Versus Decorative Use Reported in Surveys for Gas Fireplaces

Combined data from a number of surveys allow for the calculation of the percentage of gas fireplaces used for any heating purpose and for main heating alone to be calculated for the 2007 base year. The National American Housing Survey (2007)[54] conducted for the Department of Housing and Urban Development provides the primary source of data and when combined with HPBA 2006 and 2008 consumer surveys[52-53], the Simmons Marketing Research Survey (2003)[55], the U. S Department of Energy Information Administration's Residential Energy Consumption Survey (2005)[56], earlier AHS surveys[57-61], U.S. Census Bureau data[62], and various local surveys[63-71] allows for credible estimates of the percent of gas fireplaces that are used for heat. Table 2 provides the step by step calculations for the 2007 base year.

As can be seen from Table 2, only 8% of all fireplaces (all fuel types and designs) currently in homes (2007 data) are gas fireplaces reported to be used for heating. Only 0.08% are reported to be used for main heating. Among gas fireplaces alone as the basis, 20% of gas fireplaces are used for heating and 0.2% are used for main heating.

Calculations similar to those for fireplaces in existing houses as of 2007 shown in Table 2 can be conducted for fireplaces put into new housing units completed between 2004 and 2007 (Table 3). The new housing calculations provide additional valuable insight beyond the 2007 existing home data for two reasons: (1) A comparison between the "bottom up" calculation from survey data and a "top-down" calculation by using HPBA manufacturers shipment records[72] (and mason's estimate of news site-built fireplaces[73]) for the same time period is possible (Table 4). (2) The patterns in fireplace use and particularly fuel types is different in new construction than the population of existing housing units as a whole shown in Table 2. Arguably the characteristics seen in new construction will more closely match near future patterns.

For new housing units completed between 2004 and 2007 the "bottom up" calculation of fireplaces used as heaters from surveys correlates well with "top down" fireplace shipment records and mason's building estimates and hence substantiates estimates of fireplaces used for aesthetic purposes. The "bottom up" calculation shows that 24% of gas fireplaces are used for heat. The "top down" shows that 23% of gas fireplaces are heating fireplaces. In other words, fireplaces designed for heating are generally used for heating and decorative gas fireplace are generally used for aesthetics

**Table 2**
**Percent of In-Home Fireplaces without Inserts That Are Gas Fireplaces and Used for Heat**
**2007 Base Year**

| Description | Value |
|---|---|
| Occupied housing units with useable fireplaces | 38,189,000 |
| Occupied housing units with useable fireplaces without inserts<br><br>Method 1 10.2% have inserts based on HPBA, Simmons and AHS surveys<br>(38,189,000) X (1-0.102) = 34,293,722 occupied housing units with fireplaces without inserts<br><br>Method 2 4,920,000 occupied households have fireplaces with inserts used for heat (AHS 2007), 0.82 of total inserts are used (HPBA, 2006), therefore 38,189,000 – (4,920,000/.82) = 32,189,000 occupied housing units with fireplace without inserts<br><br>Average of methods 1 and 2 is 33,242,361 | 33,242,361 |
| Useable fireplaces without inserts in occupied housing units (33,242,361) X (1.2 multiple ownership factor) | 39,890,833 |
| Occupied housing units with a fireplace without an insert that is used for heat (AHS, 2007) | 5,308,000 |
| Fireplaces without inserts used for heat (5,308,000) X (1.2 multiple ownership factor) | 6,369,600 |
| Gas fireplaces are used 1.2 times more frequently than solid-fueled fireplaces due to the ease and convenience of their use. According to EIA and HPBA surveys it can be estimated that 40% of fireplaces in use in 2007 were gas-fueled.<br>Percent of fireplaces without inserts that are gas fireplaces used for heat = [(6,369,600 X 1.2 X 0.40)/39,890,833] X 100% = 8% | **8%** |
| The ratio of fireplaces used for main heating to total heating is 51,000/5,359,000 = 0.00952<br>The percent of total fireplaces without inserts that are gas fireplaces used for main heating is 0.00952 X 8% = | **0.08%** |
| The percent of gas fireplaces used for heating are of total gas fireplaces = 8%/0.40 = | **20%** |
| The percent of gas fireplaces used for main heating are of total gas fireplace = 0.08%/0.40 = | **0.2%** |

**Table 3**
**Percent of Fireplaces without Inserts That Are Gas Fireplaces Used For Heat**
**Bottom-Up Analysis – Survey Data**
**New Construction (Completed 2004, 2005, 2006, and 2007)**

| Description | Value |
|---|---|
| Occupied new housing units with useable fireplaces | 2,920,000 |
| Occupied housing units with useable fireplaces without Inserts<br>518,000 occupied households have fireplaces with inserts used for heat (AHS 2007), 0.81 of total inserts are used (HPBA, 2006, 2008), therefore 2,920,000 – (518,000/.81) = 2,280,494 occupied housing units with fireplace without inserts | 2,280,494 |
| Useable fireplaces without insert in occupied housing units (2,280,494) X (1.2 multiple ownership factor) | 2,736,593 |
| Occupied housing units with a fireplace without an insert that is used for heat (AHS, 2007) | 443,000 |
| Fireplaces without inserts used for heat (443,000) X (1.2 multiple ownership factor) | 531,600 |
| Gas fireplaces are used 1.2 times more frequently than solid-fueled fireplaces due to the ease and convenience of their use. According to EIA and HPBA surveys it can be estimated that 59% of new fireplaces introduced during 2004 through 2007 were gas-fueled. Percent of all fireplaces without inserts that are gas fireplaces used for heat = [(531,600 X 1.2 X 0.59)/2,736,593] X 100% = 14% | **14%** |
| The percent of gas fireplaces that are used for heating of total gas fireplaces = 14%/0.59 = 24% (note this includes vent-free units as well as vented and converted units with gas log sets installed) | **24%** |

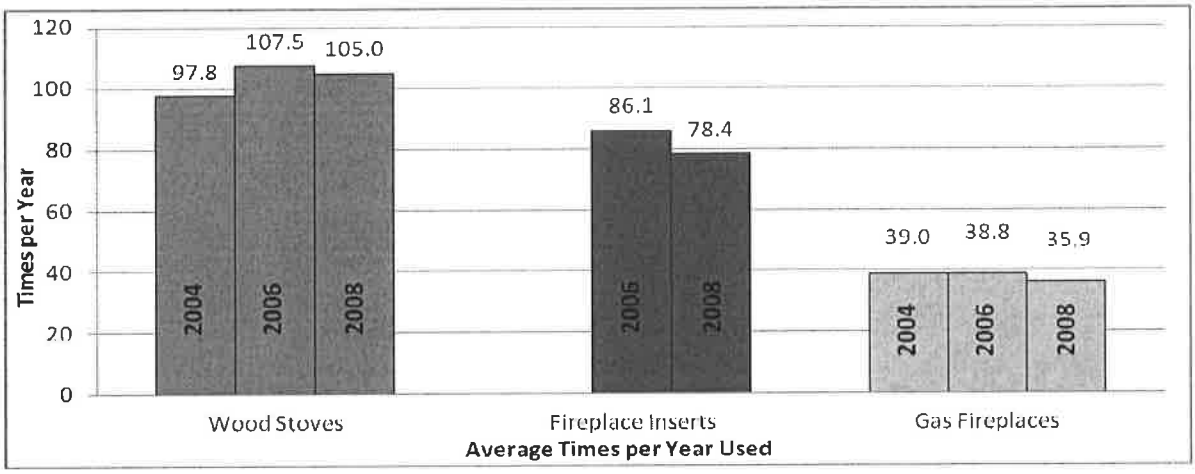
**Table 4**
**Percent of New Fireplaces That Are Vented Heating Fireplaces**
**Top-Down Analysis**
**HPBA Shipment Records and Mason's Estimates 2004 – 2007**

| Description | Value |
|---|---|
| Vented gas fireplaces shipped (464,155 B vent + 2,401,038 direct vent) | 2,865,193 |
| Fraction of vented gas fireplaces that are heating fireplaces 0.3 (the remaining 0.7 are decorative) | 859,558 |
| Total new fireplaces of all types (5,332,020 factory built + 296,000 site built) | 5,628,020 |
| Percent of vented gas heating fireplaces are of total new fireplaces (859,558/5,628,020) X 100% | **15%** |
| Percent of vented gas heating fireplaces are of total new gas fireplaces (859,558)/(2,865,193 vented + 868,170 vent free ) | **23%** |
| Note: 868,170 gas-fueled vent free fireplaces (2404 catalytic + 288,703 non-catalytic + 577,063 fireboxes) were also shipped. Many of these units are used as heaters. Conversely, 1,136,520 gas log sets in excess of vent free fire boxes were shipped in the same time period. These represent the conversion of solid-fueled fireplaces into gas-fueled units. Most are not used as heaters. Consequently, the shipment of gas-fueled vent free fireplaces and the installation of gas log sets will tend to cancel each other out in the calculation of the percentage of gas fireplaces that are used for heat. | |

## 4. Fireplace Usage Characteristics in Contrast to Space Heaters

Fireplaces are used less frequently and have a shorter fire duration than common unducted secondary space heaters such as woodstoves and fireplace inserts. (See Figures 3 and 4.) The fact that vented decorative gas fireplaces are not permitted by the ANSI Z21.50 safety standard[74] to have thermostats in the United States further corroborates the fact that vented decorative gas fireplaces are well suited for use as utilitarian heaters as they must be turned on and off manually not thermostatically in response to heating demand.

Many fireplaces are rarely (~18%) or never used (~32%). (See Table 5.) Average annual hours of use per heating season for gas fireplaces of all kinds, including fireplaces used for heating, is very small as compared to a typical heating season duration (1.7% of total hours). By comparing the average annual number of hours that fireplace inserts, which are true heaters and by their very nature are located physically in the same location in homes as fireplaces, with the average number of hours that fireplaces are used allowed for an estimate of the hours of use of decorative fireplaces alone to be made. It was approximately one-half that of that for all fireplaces.



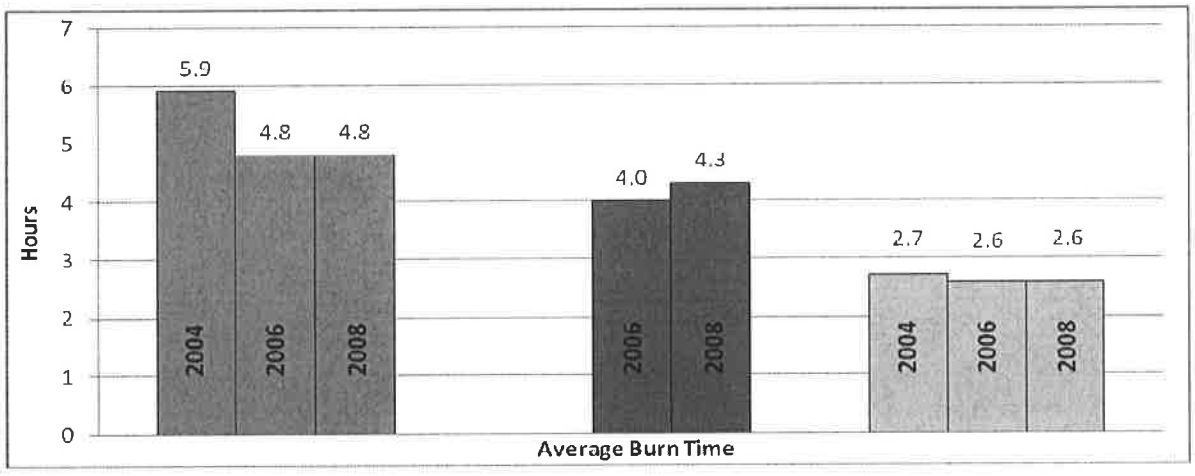
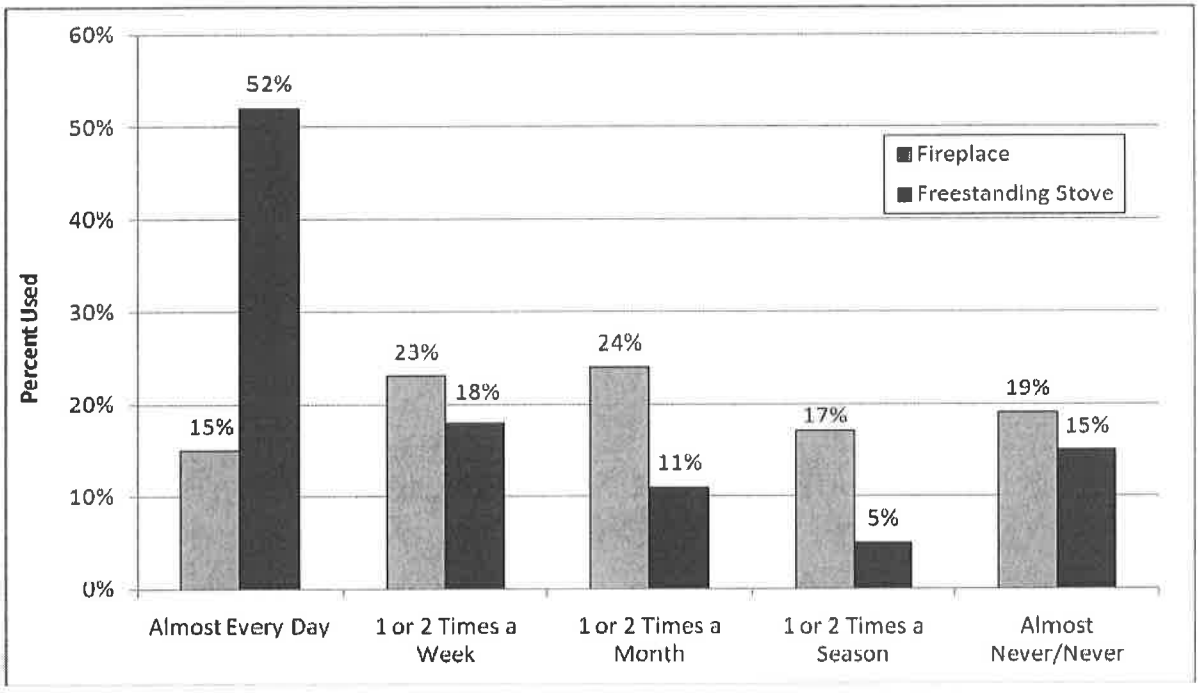




**Figure 3. Comparison of Unducted Space Heater (Woodstoves and Fireplace Inserts) Usage Characteristics with Those of Gas Fireplaces (HPBA surveys, references 51-53).**



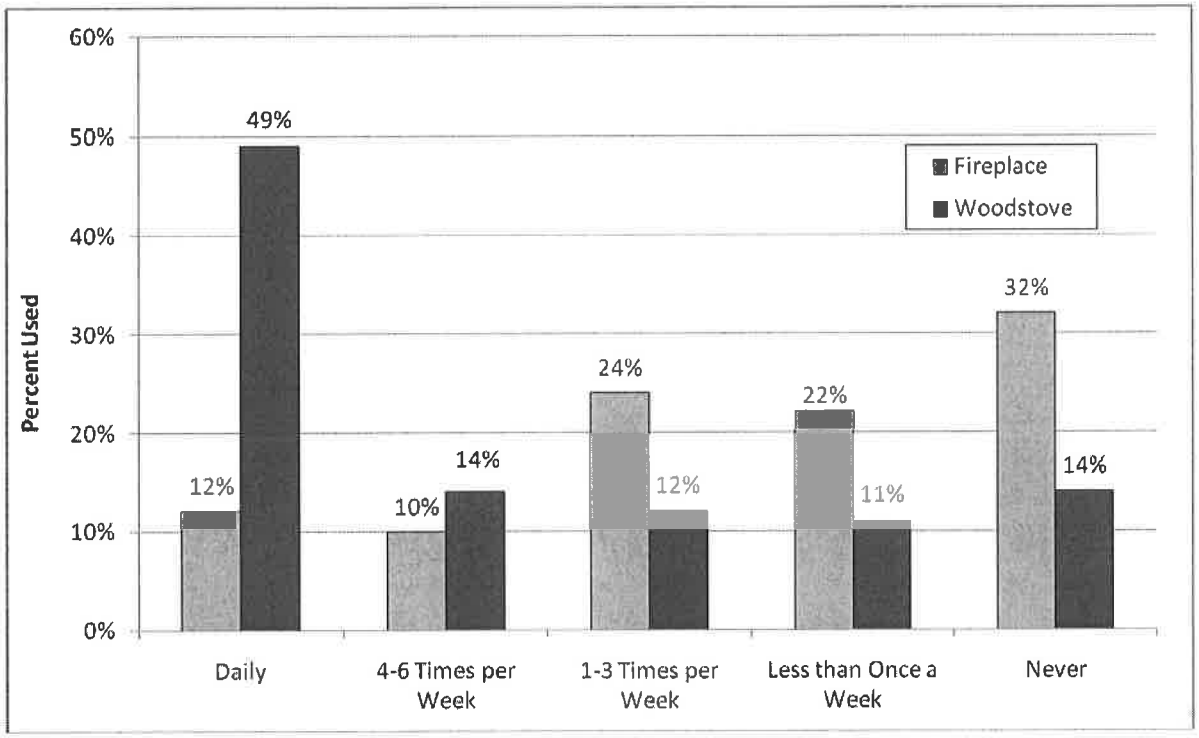




**Figure 4. Comparisons of Frequency of Use between Fireplaces and True Unducted Space Heaters (Woodstoves) (top HPBA 2002 Oct-March data, reference 50, bottom SJVUAPCD "winter"1999 data, reference 70).**

**Table 5**
**Percent of Fireplaces Seldom or Never Used Based on Survey Responses**

| Fireplace Category | Survey | Rarely Used Category | | Never Used Category | |
|---|---|---|---|---|---|
| All | HPBA 2002,ref. 50 | 1-2 Times a season | 15% | Never | 13% |
| All | HPBA 2002 follow up, ref. 50 | 1-2 Times a season | 17% | Never | 19% |
| Wood | HPBA 2004, ref. 51 | 1-2 Times a season | 17% | Almost never/never | 31% |
| Gas | HPBA 2004, ref. 51 | 1-2 Times a season | 17% | Almost never/never | 20% |
| All | Vista 1994/1995, ref. 68 | 1-2 Times per season | 17% | Don't Use | 31% |
| All | SJVUAPCD 1999, ref. 70 | - | - | Never | 32% |
| All | McGuire 2002, ref. 69 | Rarely | 28% | Never | 22% |
| Wood | UC 2002, ref. 66 | - | - | Used last year? – No | 33% |
| Wood | BAAQMD 2007, ref. 64 | - | - | Not used in Winter | 42.8% |
| Gas | BAAQMD 2007, ref. 64 | - | - | Not used in Winter | 29.1% |
| Wood | BAAQMD 2006, ref. 64 | - | - | Not used in Winter | 42.6% |
| Gas | BAAQMD2006, ref. 64 | - | - | Not used in Winter | 26.6% |
| Wood | BAAQMD 2005, ref. 64 | - | - | Not used in Winter | 37.6% |
| Wood | BAAQMD 2004, ref. 64 | - | - | Not used in Winter | 42.5% |
| Wood | PSCAA 2007, refs. 66 & 67 | - | - | Used in last 12 mos.? No | 57% |
| Non-Statistical Average | | **18%** | | **32%** | |

Note: The percentages of fireplaces reported not to be used from surveys are believed to be an underestimate due to the high fraction of non-responsiveness among survey participants. It is speculated that a higher fraction of non-users would be less motivated to participate in a residential fireplace/heater study than the population on average

**Table 6**
**Average Hours of Use – All Gas Fireplaces – October through March Heating Season**

| Description | Value |
|---|---|
| Average gas fireplace fire duration = | 2.6 hours/fire |
| Average number of gas fireplace fires per heating season = | 29.0 fires |
| Average number of hours per heating season that a gas fireplace (of any kind) is in use = (2.6 hours/fires) X (29.0 fires/heating season) = | 75.4 hours |
| Hours in six month heating season (Oct.-March) = (182 days) X (24 hours/day) = | 4368 hours |
| Fraction of heating season that, on average, a gas fireplace (of any kind) is in use = 75.4 hours/4368hours = | **0.017 (1.7%)** |

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