

# BUILDER INSIGHT

## #4 Changes to BC's Provincial Energy Efficiency Regulations: Impact for Residential Builders

*BUILDER INSIGHT* is a series of bulletins designed to provide practical information on new technologies, research results, good building practices and emerging technical issues in residential construction to Licensed Residential Builders and others in the industry.



Homeowner  
Protection Office

### Overview



Achieving greater energy efficiency in new homes built by British Columbia's residential construction industry is becoming increasingly important. Creating more energy efficient homes not only helps the environment, consumers save money associated with the operation of their homes. This bulletin describes changes to B.C.'s *Energy Efficiency Act*, the rationale for the changes to the energy regulations as they apply to the home building sector and the benefits for industry and consumers.

### B.C.'s Energy Efficient Buildings Strategy and Energy Efficiency Act

In September 2005 the provincial government released the "Energy Efficient Buildings Strategy" which sets out specific targets to achieve energy efficiency improvements in new and existing buildings across B.C. by 2010. This strategy also calls for a comprehensive review of the province's existing *Energy Efficiency Act*, resulting in a number of regulation changes that were approved in July 2006. *The Energy Efficiency Act* establishes minimum energy performance standards for energy-using equipment and applies to products that are manufactured, sold or leased in B.C., whether they are manufactured in B.C. or elsewhere. Changes made to these regulations, as described in this bulletin, were based on industry supported national standards developed by, for example, the Canadian Standards Association (CSA) and the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

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This bulletin is co-funded by the Homeowner Protection Office (HPO) and the Ministry of Energy, Mines and Petroleum Resources, and was prepared by Richard Kadulski Architect.

## Energy Efficiency Act

**Thermostat droop** can cause the thermostat to turn the heat off before the temperature setting is reached. The colder the weather, the more severe the droop. Thermostat droop is caused by the heat of the electricity running through the thermostat, making the thermostat think the room is warmer than it actually is.



Programmable thermostat for use with 240V baseboard heating applications.



## Line Voltage Thermostats

Effective January 1, 2008 all line voltage thermostats used with line voltage (120-240V) electric heaters will have to meet a maximum differential setting. This applies to electric baseboards and fan forced unit heaters. Thermostat types include wall-mounted, built-in and two-component thermostats. These thermostats must control the room temperature within a maximum differential of 0.5°C and a maximum droop of 2.0°C, as per CSA Standard C828-06.

Low voltage thermostats for furnaces and hydronic heating systems are not affected. Older style line voltage thermostats, primarily bi-metallic, were affected by the heat within the wiring itself, thus making them less accurate. More efficient thermostats could save between 5% and 9% on electricity.

This change will reduce the energy use of individual room heaters, and improve the comfort of occupants by reducing the variation in temperature. Electronic type thermostats are more sensitive and operate with temperature fluctuations of less than 0.5°C (conventional thermostats can have fluctuations of ±2°C). They ensure that the heater stays as close as possible to the set temperature, switching the heater on and off more frequently to maintain the temperature within ±0.5°C of the set point.

## Gas Fireplaces

Effective January 1, 2007 all gas fireplaces must be tested and rated in accordance with CSA 4.1-02 and the current EnerGuide program from Natural Resources Canada. A label indicating the fireplace efficiency rating (FE) must be affixed to the unit so that it is readily visible. The FE rating is the only recognized measurement of vented gas fireplace energy efficiency in Canada. Other ratings, such as steady-state measurements (the maximum efficiency the fireplace could achieve operating under controlled laboratory conditions and after running at equilibrium for a long period of time), often mislead consumers as to the annual fuel efficiency of a fireplace

because they exclude pilot light usage and off-cycle flue losses.

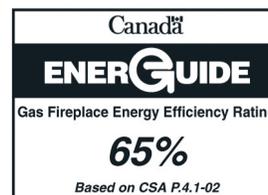
In showrooms (retailer and showhomes or suites) with operating display models, the labeling requirement will be met by mounting the EnerGuide FE rating adjacent to the fireplace, either wall-mounted or in a suitable holder on the mantle. This harmonizes testing requirements to an existing federal standard and will help builders and consumers to choose more energy efficient models.

Products that are covered by this requirement are gas fireplaces including zero-clearance units, inserts and free-standing stoves that use propane or natural gas. Log-sets and sand-pans are exempt from these requirements, since they are not covered by the CSA standard.

There are no prescribed minimum efficiency requirements at this time because fireplaces are typically used as decorative appliances. However, they can provide heat, and in some cases are used as supplementary heaters. Requiring all units to be labeled should encourage purchasers to select more efficient units, especially if used as supplementary heaters.

### Fireplace Efficiency Rating (FE)

reflects the overall operation of the fireplace, taking into account its use and performance throughout the entire heating season. The FE rating is expressed as a percentage, therefore, the higher the rating, the more efficient the unit.



Sample label for EnerGuide Fireplace Efficiency (FE) rating.



Sample of EnerChoice label reserved for fireplaces considered most heat efficient in their category.

## Gas-Fired Boilers

Effective January 1, 2007 gas-fired (and propane) hot water and low-pressure steam boilers with an input rating of 88 kW (300,000 BTU/hr) or greater must achieve a combustion efficiency of not less than 80% at the boiler's maximum rated input firing rate. This regulation codifies standard practice and matches the ASHRAE 90.1 building design code that is required in the City of Vancouver. These units are not typically found in low-rise houses which have a much lower heat requirement. However, this may affect larger custom homes and multi-family buildings with common heating or hot water systems.

## Gas-Fired Forced Air Furnaces

Effective January 1, 2008 gas-fired forced air furnaces (natural gas and propane) with a rated input of not more than 66 kW (225,000 BTU/hr) must have an Annual Fuel Utilization Efficiency (AFUE) of at least 90%, as tested under CGA P.2-91. This regulation applies to all new building construction into which such furnaces are installed. Furnaces installed in recreational vehicles and replacement furnaces in older houses are exempt from this requirement. This change is intended to reduce the energy usage of gas furnaces used to heat new houses and small commercial buildings.

Perhaps the most significant impact for new construction is that the higher efficiency furnaces have different venting requirements. In the past, gas-fired appli-

ances that were atmospherically vented required a B-vent, which is an insulated metal chimney. The higher efficiency furnaces have cooler flue gases and typically use plastic pipes for venting. Usually a second sealed pipe is connected to the furnace to supply fresh combustion air for the furnace. This sealed combustion and venting system is more efficient and reduces the likelihood of combustion gas spillage into the house. These vents can be placed through the wall of the house.

New higher efficiency furnaces can be fitted with a variable speed blower motor for the fan, thus reducing the electrical energy used to run the blower. These fans are also much quieter than older furnace fans.

Builders need to be aware that airflows required to deliver heat from high efficiency furnaces are typically higher than in older furnaces, and therefore duct sizes may be different. In all cases, the builder should ensure that a heat loss calculation and proper furnace sizing has been carried out to ensure proper system layout. This especially applies to furnaces used to replace old furnaces in existing houses.

## Windows

Commencing January 1, 2009 a new regulation will take effect for the maximum heat loss coefficient, which is also known as the heat transfer coefficient, or U-value (the reciprocal of the R-value). The U-value for windows must not exceed a value of 2.0 W/m<sup>2</sup>·K as tested to CSA A440.2-04 or NFRC 100-2004. The U-value will have to be marked on a temporary window label provided by the manufacturer on units delivered to the customer, that are sold and installed within British Columbia. This is equivalent to the

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# Energy Efficiency



High-efficiency gas-fired forced air furnace.

## Energy Use and Windows

Windows are a significant portion of the building envelope, and a major source of heat loss or heat gain – often the single largest source of heat loss. In an average new home, the energy consumption can be reduced by about 11% to 14% with the higher performance windows compared to regular clear glass.

**U-value** determines the rate of heat transfer from a warm area to a cold area. Low-emissivity glass (low-E) reduces the U-value because the glass surface is coated with a low-E material that reflects a significant amount of radiant heat, thus lowering the total heat flow through the glass.

## Venting

Although the venting can be directed through the sidewall of the house, it is advisable wherever feasible, to run the exhaust vent pipe up through the roof. This will help dissipate the moisture in the flue gases, keeping it away from the house structure. Manufacturers' instructions for vent pipe length must be verified to ensure proper venting is maintained.



requirement to comply with NRCan's EnergyStar Zone "A", which is also the standard for the Provincial Sales Tax exemption. Effectively, this means all windows will have to have low emissivity glass. Products covered by this regulation include manufactured window units, sliding glass doors and entry doors.

The purpose of this regulation is to improve the minimum energy efficiency of windows used in new construction, and should have minimal impact on builders.

The modest incremental cost for the higher performance glazing has decreased significantly over the past few years as the market penetration has increased. For the occupants, this change will lower heating costs and will improve comfort. The higher insulating value of the glass will mean warmer interior window surface temperatures. The higher surface temperature also means that there will be less condensation on the interior surface compared to what would be the case with regular clear glass.



Sample of Energy Star label for windows.

## Information:

### For More Information:

#### Ministry of Energy, Mines, and Petroleum Resources

For more information on B.C.'s Energy Efficient Buildings Strategy and the changes to the *Energy Efficiency Act*, regulations and applicable standards, visit:

- [www.empr.gov.bc.ca/energyefficiency](http://www.empr.gov.bc.ca/energyefficiency)

#### Homeowner Protection Office

HPO's Research & Education webpage has numerous links related to energy efficiency as well as green building programs and rating systems.

- [www.hpo.bc.ca](http://www.hpo.bc.ca)

#### Energy Efficiency Incentive Programs

There are a number of programs in place to encourage more efficient energy use and to assist builders with the cost of constructing energy efficient homes. These programs and incentives may be subject to change at any time. Visit the following Websites for more information.

- BUILTGREEN BC
  - [www.builtgreencanada.ca](http://www.builtgreencanada.ca)
- NATURAL RESOURCES CANADA – ENERGY PROGRAMS FOR NEW HOMES, INCLUDING ENERGUIDE
  - [www.oeec.nrcan.gc.ca](http://www.oeec.nrcan.gc.ca)
- BC HYDRO POWER SMART NEW HOME PROGRAM
  - [www.bchydro.com](http://www.bchydro.com)
- TERASEN GAS
  - [www.terasengas.com](http://www.terasengas.com)
- GOVERNMENT OF BRITISH COLUMBIA'S PST exemption on materials and equipment used to conserve energy
  - [www.rev.gov.bc.ca/ctb](http://www.rev.gov.bc.ca/ctb)

#### Standards Organizations

- CANADIAN STANDARDS ORGANIZATION (CSA)
  - [www.csa.ca](http://www.csa.ca)
- AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
  - [www.ansi.org](http://www.ansi.org)
- AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)
  - [www.ashrae.org](http://www.ashrae.org)
- AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM)
  - [www.astm.org](http://www.astm.org)

### Summary of Changes to the Efficiency Standards Regulation

Appliance or Product	Standard	Efficiency Target	Effective Date
Thermostats used for line-voltage (120-240V) switching of a controlled resistive heating load including wall-mounted, built-in and two component thermostats.	CSA C828-06 Performance Requirements for Thermostats Used with Individual Room Electric Space Heating Devices	Maximum differential=0.5°C	Jan 1, 2008
Gas fireplaces including inserts and free-standing stoves, for use with propane and natural gas.	CAN/CSA P.4.1-02 Testing Method for Measuring Annual Fireplace Efficiency		Jan 1, 2007
Natural gas and propane fired boilers having input rating greater than 88 kW (300,000 BTU/h).	ANSI Z21.13-2004/CSA 4.9-2004 Gas-fired Low Pressure Steam and Hot Water Boilers	Combustion efficiency=80%	Jan 1, 2007
Gas-fired forced air furnaces, other than furnaces for recreational vehicles and replacement furnaces in pre-existing residential dwellings, for use with propane and natural gas having input rating less than 66 kW (225,000 BTU/h).	CGA P.2-91 Testing Method for Measuring Annual Fuel Utilization Efficiencies of Residential Furnaces and Boilers	Annual Fuel Utilization Efficiency (AFUE)=90%	Jan 1, 2008
Manufactured fenestration products including windows, skylights and doors.	CSA A440.2-04 Energy Performance of Windows and Other Fenestration Systems or NFRC 100-2004 Procedure for Determining Fenestration Product U-Factors	Maximum U-value=2.0 W/m <sup>2</sup> ·K	Jan 1, 2009



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