



## **ADDITIONAL INDUSTRY ISSUES REGARDING RESIDENTIAL WATER HEATERS**

### **Background:**

The North American water heater market is supplied by water heater manufacturers that must consider multiple facets when providing hot water products. These include safety, reliability and energy efficiency regulations that must be integrated into a single package while providing a value equation to consumers. Thus there are often competing factors in the product development process.

The energy efficiency water heater program that the province of BC is considering is directionally correct and we believe we can provide the background, experience and support that will ensure that the province interprets the current market technology as it moves forward with its energy efficiency mandate.

Global manufacturing provides many potential products for the Canadian market; however each manufacturer must consider Canadian conditions and requirements prior to entering the market. CIPH is aware that some water heaters sold in Canada by Canadian suppliers are produced in the United States. There are some issues that set the Canadian market apart from that in the U.S. which is manifested by the fact that water heaters manufactured in the U.S. for the Canadian market are different from those manufactured in the U.S. for the U.S. market. The reasons for this include:

1. A more diverse range of climates that present unusual operational issues, particularly for gas water heaters in Canada;
2. Predominantly lower Canadian inlet water temperatures from municipal or groundwater sources;
3. A generally lower cost for energy; includes electricity, natural gas and propane that causes Canadian consumers to change purchasing behaviours as energy costs change;
4. Greater use of rental and leasing programs in Canada that provide immediate performance feedback on new designs and products;
5. Lower Canadian population densities and long distances for shipping products from manufacturers' warehouses to local wholesalers and contractors;
6. More extensive Canadian experience with water heater add-ons such as heat traps;
7. All of the above issues confirm the need for manufacturers to undertake extensive field-testing across all climate zones and local water conditions to ensure new or revised products will perform appropriately.

### **Additional Industry Issues:**

#### **1.0 Climate Diversity**

##### **Indoor Installations**

Canadian climate conditions universally require that hot water heaters of all types be installed within the conditioned space of a dwelling unit, or in a heated closet or storage area, to prevent freezing. This means that during the heating season, all of the heat lost from the water heater and associated piping contributes to reducing the energy required for space heating. On an annual basis, the amount of such losses that are recovered is determined by the length of the heating season.



If the source of space heating is at an equivalent efficiency, the energy input to the hot water heater and the furnace or boiler is on a one-to-one basis. For those dwelling units that have air conditioning, these losses must be removed by the space cooling system during the summer, although at a ratio of about 0.3 units of energy per unit of heat removed.

### **Venting Combustion By-Products**

Venting of gas water heaters in severe winter conditions can result in unintended moisture condensation and freezing of the vent, regardless of the type or design of water heater. These conditions can cause nuisance operational problems up to and including product damage.

As combustion efficiencies increase, the physical flue gas properties must be considered as they are conducted outdoors. More efficient atmospheric vents will have less buoyancy, while power vents may require higher velocity of the gases that cause a drop in temperature as they leave the vent hood, which can lead to freezing.

### **2.0 Lower Water Supply Temperature**

With lower inlet water supply temperatures, water heaters in Canada must raise the temperature through a higher temperature gradient. This can cause temperature stratification to occur in the tank which doesn't occur with higher inlet water temperatures. Lower water temperatures in the base of the tank cause condensation to occur in the internal flue, which may affect burner operation and pose other operational problems.

Generally, gas storage-type water heaters have a baffle to slow the combustion gases and allow more heat to be absorbed by the water through the wall of the tank. Many heaters have a "deflector" or "shield" situated on the burner to guide the condensate away from the burner. Condensation build-up under cold water start-up and/or extreme cold water intake conditions is often interpreted as tank failure causing unwarranted heater replacement.

Increasing the efficiency levels of the current design of gas water heaters will compound this condensation problem and may ultimately force full introduction of much more costly condensing water heaters. This change will result in a significant cost increase to consumers, where upfront purchase and installation costs will drive the market more towards electric products.

### **3.0 Lower Cost for Energy**

The lower cost for energy paid by most Canadians has the effect of extending the simple payback for any improvement in water heater efficiency. This is driven by the cost of both the water heater and the installation, causing the consumer to choose the least expensive option. In the replacement market, this is usually a water heater of the same dimensions and type as the existing unit. In new construction, the builder generally makes the decision on a least-cost basis.

### **4.0 Rental and Leasing Programs**

Many energy utilities and other companies offer water heaters on a rental or lease basis, thereby combining the cost of ownership including service repairs in a single monthly payment. Homeowners view the cost of owning and operating their water heater including fuel charges as a single monthly cost. If the overall cost of one payment rises significantly without an equal drop in the other payment, they do not view this as a satisfactory result.



During the phase-in of FVIR technology and more recently, a national gas installation code change to require ULCS636 approved vent pipe, both the product and installation cost of gas water heaters has increased significantly. Rental and leasing companies are now charging the consumer the increased product cost on replacement applications, adding significant upfront costs to homeowners, in addition to increased monthly costs.

#### **5.0 Longer Shipping Distances**

The lower population density of the Canadian market has resulted in greater shipping distances and costs for CIPH water heater members. These costs can be affected quite significantly by the physical size of the tanks, and the shipping containers and trucks used to transport the products to markets across the country. Any increase in freight costs as a result of product dimension increase will result in a disproportionate increase in product costs, especially in locations some distance from the main warehouses.

#### **6.0 Heat Traps**

CIPH water heater members have extensive experience with incorporating heat traps as part of the product design, as have many contractors. When a heat trap causes field problems such as noise or blockage of water control valves, the manufacturer or distributor is obliged to cover replacement as part of their warranty. Where a heat trap must be replaced out of warranty, experience has shown that the contractor or homeowner removes the heat traps.

CIPH water heater members would be prepared to support field installation of heat trap devices at the time of water heater installation. Ensuring that these are actually installed would be the responsibility of the contractor.

#### **7.0 Field Testing**

As a result of extensive experience in the Canadian market, CIPH water heater members have learned that extensive field-testing of any new product or feature across all climate zones and specific regional conditions such as water quality is required before a product is released to the market.