Comparison of LPG Fired Continuous Flow Water Heaters and Electric Storage Water Heaters in Tank Water Applications

The Gas

Continuous flow (CF) installations are generally supplied by twin 45kg cylinders with an automatic changeover regulator, thus only one 45kg cylinder is supplying gas at any one time. It is generally accepted to allow that a 45kg cylinder can evaporate 50mJ of gas per hour however, under ideal conditions and on pure Propane, 80mJ may be available. A 20 litre/min CF heater is rated at 160mJ and thus requires the evaporation off two 45kg cylinders under ideal conditions. Larger heaters require even more cylinders to achieve correct evaporation. It follows therefore, that a CF heater running on a single cylinder will be significantly under gassed at full fire, even under ideal conditions. Note that having more than 90kg (ie. 2 x 45kg cylinders) of LPG on a property requires a Dangerous Goods Licence and special closures for the cylinders.

“Standard” NZ LPG is a mixture of Propane and Butane, and can be anywhere in proportion from 60% Propane/40% Butane (quite common) right through to 100% Propane (most unusual). In cold conditions and under heavy draw-off the propane tends to evaporate first leaving some residual butane in the cylinder. In extreme conditions, the Butane will not evaporate at all and the regulator will automatically change to the other cylinder leaving the remainder of the gas in the “empty” cylinder. The customer has paid for that residual gas that will go back to the gas supplier.

The Water

Most CF suppliers talk about the performance of their heater as maximum delivery in litres per minute at 40°C delivery (normal shower) temperature. However this figure assumes an incoming water temperate of 15°C – in other words a 25°C temperature rise. Therefore the lower the water temperature, the greater the temperature rise, the less the flow rate – eg. at 5°C incoming temperature the flow rate of a 20 litre CF heater will decrease to around 14 litres/min to achieve 40°C delivery temperature, and even then only provided it is getting its full gas rate from evaporation. 14 l/min is adequate for a shower, but if another outlet is used (ie. a washing machine or sink faucet), that flow rate has to be shared. Mains pressure electric water heaters have few constraints regarding full flow rate from every outlet.

CF heaters are also becoming renowned as water wasters.

Running Costs

Depending on the area and supplier, LPG is generally on a par with, or slightly more expensive than electricity.

The chief argument for CF as opposed to electric storage hot water cylinders is that you only heat the water as you use it, thus avoiding the wasteful losses off a storage tank. Since the imposition of Minimum Energy Performance Standards (MEPS) for electric hot water cylinders in 2003, typically only 1.6 – 2 kW/day heat loss is allowed from these heaters, equating to around 20c/day. Accordingly this argument no longer has the validity it used to for new installations. As any water lost through expansion should be cold, via the cold water expansion valve required by the Building Act, the balance of the energy used in an electric heater is only what is used to heat the water as it is used. Compare that with energy wasted by a CF during heat up as described in the water wastage release, and significant additional cost incurred by the customer having to return unevaporated butane in their LPG cylinder.

There is normally a rental charge associated with LPG cylinders, or they have to purchased, which must be taken into account when comparing costs between LPG and electricity. It is the responsibility of the owner to ensure that the LPG is ordered as the cylinder becomes empty – electricity just keeps coming on demand, without any involvement by the consumer.

Energy Usage

A recent NZ Government study, the Home Energy End-use Project (The HEEP report), has determined that CF owners use almost double the amount of energy per day for generating hot water as do users of electric storage water heaters. The suggested rationale is that the very description “continuous flow” implies infinite hot water, a fact hugely promoted by CF heater suppliers, whereas a storage water heater has a finite deliverable quantity and extended recovery time. Accordingly, users of electric heaters are far more frugal with their water usage (and therefore energy consumption) than CF users. The same study was instrumental in encouraging Government to introduce MEPS to lessen wastage due to heat loss from electric heaters, as 42% of energy used by them was being lost.

Installation

A benefit promoted for most CF heaters is that they are usually positioned outdoors, saving on valuable space taken by the “hot water cupboard’. Certain brands of electric storage water heaters are also able to be installed outdoors. Installed price of a typical CF water heater and electric storage water heater should be very similar. Some electric heaters can also be upgraded to run with Solar collectors either at installation time, or later.

Power Failure

In the event of power failure, the majority of modern CF units will not operate as they are largely an “electronic appliance that uses gas as a fuel”. An electric storage water heater has a stored supply of hot water to deliver, even though power may not be available (provided the water supply is not reliant on a pumped system).

Maintenance

Modern CF heaters contain significant electronic componentry – printed circuit control boards, flow meters, electronic sensors etc. Like most electronic devices, these are constantly being updated as new models are released, and suffer the same problems as other electronic devices such as computers, VCR’s and TV’s. As they become older, parts become more expensive and harder (or impossible) to get. Generally they require specialist technical service from trained service people.

Electric water heaters are a tank element and a thermostat and generally these components have not needed to be improved for 20 years. Quality Plumbing Services can service any electric hot water cylinder.