Getting hot water under control

Eric Winter of HWA member Reliance Water Controls examines how unvented hot water systems and controls have evolved since the early 1980s

Since the introduction of mains-pressure hot water heaters into the UK market, everyone concerned with their manufacture and supply has been on a steep learning curve to make products that suit the specific requirements of the UK water systems and construction industry.

In the early days, the control valves supplied with water heaters were standard off-the-shelf products. Some of these worked well, while others were not as suitable.

As the market grew, manufacturers concentrated on making unvented systems easy to install, and this led to combining the cold water control requirements into multi-function valves.

At this time, during the mid-1980s, low-pressure systems used large diaphragm pressure-reducing valves, and high pressure systems used piston-type pressure-limiting valves, both of which could result in problems.

A two-piece inlet control group

The large diaphragm valve gave reasonable flow rates but, while it was very stable, it was also expensive. The requirement for very low pressure settings, which required a large diaphragm, was reducing rapidly.

Piston-type pressure-limiting valves were reacting badly to the increased use of modern fluxes and the increased amount of particles in the water. This gave rise to valves sticking in the closed position, prompting the creation of a new generation of multifunction valves. These incorporated a balanced spring and diaphragm-type pressure-reducing valve, a check valve and a pressure-relief valve. These new valves appeared on water heaters for both high- and low-pressure markets in the UK, and these bespoke valves are still the industry standard.

EXPANSION VESSELS

Expansion vessels also had their own problems. The original expansion vessels had a zinc-plated flange and a natural rubber membrane, but WRc testing found that the rubber was unsuitable and the material was changed to EPDM.

A further problem was experienced with the zinc-plated flange, which was prone to corrosion if the zinc plating was damaged during installation. This resulted in the flange being changed to an epoxy-coated version.

Further changes occurred when more suitable stainless steel flanges and butyl membranes were tested and approved by the WRc. The UK led the way in these developments, with stainless steel flanges and EPDM and butyl membranes now used as standard around the world.

The single check valve is now incorporated in one of the other valves.

Expansion valves have changed considerably, from large units which were difficult to service, to the smaller, modern valve that has a cartridge construction and contains a long-life stainless steel seat.

The most important valve in an unvented system is the temperature and pressure relief valve (T&P valve). As a safety valve, it is not a serviceable item.

A one-piece inlet control group

The original low-pressure valves had an inbuilt anti-vacuum or air inlet valve to prevent implosion, but as cylinders and water heaters have increased in strength this is no longer necessary. Anti-vacuum valves are still used on tall units which can be imploded under rare conditions, but they are the exception rather than the rule.

The temperature probe has altered from a solid-filled unit to a wax-filled unit for more accurate temperature response.

The traditional lever to open the valve is giving way to a twist-top knob, but essentially the function is still the same.

A twist-top pressure and temperature-relief valve

It has long been recognised that water temperature, water stagnation and water treatment have a great influence on the proliferation of legionella.

Water temperatures of 60°C or above are required to disinfect any infestation of legionella. The hotter the water that is distributed, the greater the possible heat loss – to say nothing of the risk of someone being scalded.

The scalding risk can be minimised, and the outlet temperature controlled, by fitting a tempering valve. This is a thermostatic mixing valve that controls the water in a distribution system to a selectable or preset temperature.

It is common on many thermal store and solar systems because of the high temperatures these systems can potentially create. In terms of heat loss, imminent legislation will change the allowable heat loss considerably, and manufacturers of unvented equipment will be hard pressed both to comply with the directive and also keep cylinder sizes within a reasonable limit.

In this case, a tempering valve can fulfill a dual role – allowing increased storage temperatures and helping to reduce cylinder size, and by stabilising the outlet temperature to the hot water distribution system.

Since the 1980s, unvented systems have seen ongoing innovation and development to make equipment safer, and easier to install and service.

The future will not bring change for the sake of it, but HWA members will continue to improve and innovate, reducing installation and maintenance times with improved field performance. HVP reader enquiry 236