

# Meeting the combination challenge

*Installers have to be careful when fitting combination boilers into systems with unvented cylinders, according to Christian Engelke of HWA member Viessmann*

In recent years, the heating industry has seen further growth in the sales of combination boilers.

It has become the installer's choice for providing combined central heating and hot water in one compact unit, for smaller households who are prepared to live with the lower flow rates and slower response time when compared to a hot water storage system.

There are still many households which need a higher performance hot water supply that can serve a mix of showers and baths at the same time.

Since the introduction of the amended Building Regulations Part L, energy-efficient condensing boilers have risen dramatically in popularity to become the norm for installations.

In addition, the most recent amendment to the National House-Building Council (NHBC) installation requirements for multiple-bathroom properties also advises the fitting of storage systems.

To comply with UK Building Regulation G3, unvented cylinders must be supplied with a package of safety controls.

Controls are either factory fitted, or supplied as an unvented kit which usually comprises a dual thermostat, two-port zone valve, energy cut-out device and temperature- and pressure-relief valve.

The issue for householders and installers is how to operate their boiler in condensing mode, without compromising their need for a decent hot cylinder.

Traditionally, hot water cylinders are, in the majority of cases, connected to Y- or S-plan

two-pipe installations using either an open-vent boiler or, for an unvented cylinder, a sealed-system boiler.

There is still, however, the problem of efficient operation on a traditionally-controlled two-pipe system.

## EFFICIENT OPERATION

Condensing boilers are more efficient when operating at lower flow/return temperatures,

Lowering the cylinder temperature to less than 50°C introduces the risk of legionella bacteria forming.

## SOLUTIONS

One solution to this problem is to use a four-pipe system. This technically works like a combination boiler and is very easy to install.

Flow and return pipes from the cylinder's heating coil are

system calls for heat or the hot water cylinder.

If the cylinder calls for heat (cylinder thermostat and programmer closed contact), the diverter valve will change over and the pump circulates the primary water to the cylinder's heating coil.

The maximum flow temperature is fixed and cannot be adjusted, regardless of the temperature settings on the control fascia.

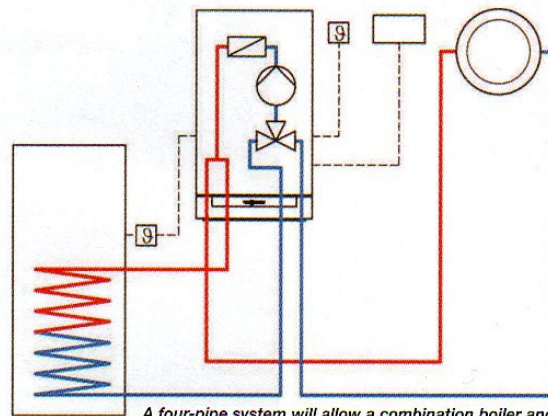
As soon as the cylinder is satisfied (either the cylinder thermostat or programmer with open contact), the diverter valve moves back to central heating mode.

Other solutions are available using more traditional two-pipe systems, in conjunction with intelligent control systems. These provide a signal to the boiler to increase the flow temperature on a temporary basis when there is a demand from the domestic hot water thermostat.

Another possible solution is to use a twin-coil cylinder where the water in the base of the cylinder is pre-heated using the lower space heating flow temperature. The top portion is then heated up to a higher temperature using a separate coil with a higher flow temperature.

As dwellings become more energy efficient, the proportion of the boiler output used for water heating, as opposed to space heating, will increase.

We will then undoubtedly see manufacturers of boilers, hot water systems and controls developing alternative strategies to meet the challenge of maximising efficiency.



*A four-pipe system will allow a combination boiler and an unvented cylinder to work together correctly*

but with a traditional Y- or S-plan two-pipe system, the boiler has to operate at high flow temperatures of between 72°C and 80°C to ensure the hot water cylinder is satisfied.

This is because the boiler and the domestic hot water (DHW) system are electrically interlocked with each other, so the boiler only receives a switch-life demand from the main junction box or programmer. This means the boiler doesn't know which system it is serving.

If the householder lowers the CH temperature setting on the condensing boiler, in accordance with many condensing boiler guide booklets, they may well find it takes a long time to heat up the cylinder, if at all.

connected directly to the boiler's secondary flow/return connection.

Boilers designed for this type of system have a built-in diverter valve and a separate flow/return connection for the DHW circuit.

An integrated DHW temperature control function controls the cylinder temperature using the boiler control, and protects the cylinder from overheating.

Weather-compensated controls save the householder additional money and improve their comfort levels without room temperature fluctuations or scalding hot radiators.

The boiler is wired to detect whether the central heating