

UPGRADING SEMI-GRAVITY CENTRAL HEATING SYSTEMS

In the UK, there are still many homes with semi-gravity heating system. Generally speaking, these tend to be the least energy efficient systems and therefore the most expensive to run. This can be simply because the system and its components are old and only limited controls are installed, or due to the inherent inefficiencies of this type of system.

Part L of the Building Regulations, which covers fuel conservation, makes it a requirement that when a boiler is replaced and the system is of the semi-gravity type, it must be converted to a fully-pumped system. There may be a few instances when this is impractical but, in most cases, this conversion is a statutory obligation.

Of course, the additional work required to upgrade the system as well as to change the boiler can act as a disincentive to both the householder and the installer. This could well result in a decision being made to repair the existing boiler, no matter how old, inefficient or unreliable it may be, rather than carrying out the replacement.

Such a scenario is obviously undesirable. The aim of this article is to show the simple key steps required to convert such systems and how these tie in with the requirements in the Building Regulations for controls. To provide the best advice in such circumstances, it is important for installers to be aware of the relevant considerations and to be able to explain them to the customers.

Semi-gravity systems

A semi-gravity central heating system is normally a two-pipe small-bore or mini-bore system with a pump, fitted either in the boiler flow or return, which circulates heating water from the boiler through the radiators (*see Fig. 1*). Delivery of heated water from the boiler to the storage cylinder is by gravity, i.e the hotter boiler water rises and the colder return water sinks.

A semi-gravity system is the next step up from the original one-pipe gravity systems that had no pump and very little in the way of controls. The introduction of a pump and basic controls made the heating system more responsive and improved comfort levels but such systems still have a number of disadvantages:

- They typically run with back boilers or older floor standing boilers which run at far lower efficiencies than modern condensing boilers.
- The hot water systems take far longer to recover temperature than fully pumped, thus requiring these less efficient boilers to run for longer to do the same job.
- There tends not to be a cylinder thermostat so the hot water can get hotter than required, which is bad from a safety viewpoint as well as an efficiency one.

Converting semi-gravity system to fully-pumped

The conversion, obviously, entails the alteration of certain pipework, the installation of the correct controls and consideration of the overall hydraulics of the system related to a) the pump

position, b) the siting of the cold feed and expansion vent - plus the replacement of the hot water cylinder in certain cases.

Pump position

It is recommended that the pump should be installed in the cylinder/radiator flow. In this position, there will be a negative (pulling) pressure due to the pump across both the boiler and the expansion vent. Provided that the vent is of a reasonable height (say 2-3 metres) this will not create any problems of corrosion within the system due to pump-overs creating aeration.

The complete cylinder and radiator section of the system will be under positive (pushing) pressure and consequently will assist the professional installer to quickly locate any leaks and repair any poorly made pipe joints or bad valve packing glands.

Cylinder replacement

Where the original system uses a direct-acting or self-priming type of cylinder this should be replaced with an indirect cylinder. Care should be taken to ensure that, where necessary, the cold feed and expansion vent are re-positioned to ensure that the system functions correctly.

Heating controls required

As with all boiler replacements, the Building Regulations require that the heating controls are upgraded to include a *boiler interlock arrangement, temperature control by a room thermostat, and time control through a programmer or a programmable room thermostat. This should provide separate time control for the heating and hot water circuits, and hot water control should also be provided by a cylinder thermostat and a zone valve or three-port valve.*

Upgrading alternative

In situations where conversion of the system to fully-pumped is not feasible, it would still be advantageous to the customer to improve the heating and hot water controls. Also, fitting TRVs to all or selected radiators (at least on all radiators in the bedrooms) will provide individual room temperature control.

Opportunities

The Heating trade should view this statutory need to upgrade systems as both a duty and an opportunity. The user's outlay on these mandatory improvements can be reasonably quickly recovered through savings on fuel bills arising from the system's improved efficiency. The consequent reduction in CO₂ emissions, is also likely to improve the dwelling's 'green' rating and raise its sell-on value.