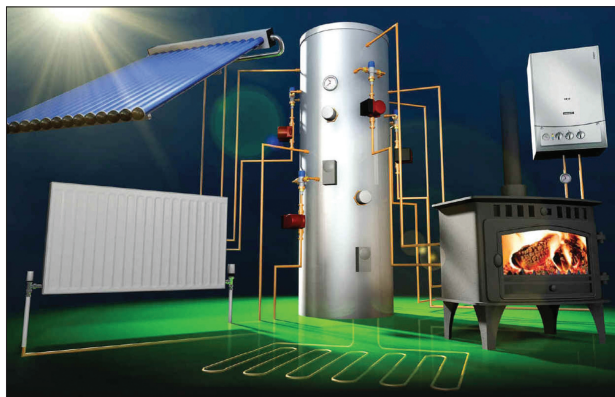


Wood Burners for the provision of central heating and pressurised hot water

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At DPS we have been designing thermal storage systems to run using multiple fuel sources for over fifteen years and in the last year we have seen the popularity of wood systems go through the roof. Most customers are now asking that their hot water systems are supplied with suitable connections for wood burning stoves or cookers, even if only for 'future-proofing' their systems.



With the growing demand we are also seeing a rise in the number of systems that have been installed dangerously, without the extra caution that is required when designing for a boiler that cannot simply be turned off.

To ensure that you are fully aware of what type of wood burner you have and what precautions must be taken, the following questions should be put to the manufacturer of the heater you intend to use:

1. What is the maximum output to water (in kW) from the heater when fully loaded?
2. What is the maximum output to the room (in kW) from the heater when fully loaded?
3. Does the heater automatically shut down its rate of burn at higher temperatures?

If yes then what is the output (in kW) to water that needs to be dumped at this lower burn rate?

When selecting a wood burner it is also important to ensure that the room output is matched to the heating requirements of the room in which it is placed, and not oversized. This is important in boiler models as the room can get uncomfortably hot while insufficient heat is provided to water for use in heating the rest of the property.

On thermostatic models one may find that if they are oversized for the room they are in, the heater will shut down the burn rate and again provide insufficient heat to water for the rest of the property.

To overcome these problems make sure that the output to water is relatively high when compared to the room output. One can always have a radiator in the same room as the wood burner to top up the heat in that room if required. Another solution is to install ducting for circulation of warm air around the property, and to move heat from the primary room into adjacent rooms.

Circulation and Pipework

- A wood burner must be part of a vented water system, with an uninterrupted path to atmosphere.
- The system must ensure all heat generated to water is removed from the heater (and system) without reliance upon electrical power, the operation of pumps or human intervention i.e. the system water

must not reach 100°C under any circumstances.

Making sure there is suitable circulation of water to prevent it from boiling in a wood burning system is probably the greatest challenge to the system designer. Armed with a figure for how much energy is generated to water by your chosen heater, one can then proceed to plan out the pipework layout that will be the key to making things work, and the first principle that needs to be understood is that of gravity circulation. Quite simply this is the way that heat rises relative to cold, and is the only way to ensure circulation of hot water without the use of pumps.

The forces generated by gravity are small, nothing like the power of a pump, so it is important to size pipework larger than one would for a typical boiler installation in order to reduce the resistance to flow. 28mm pipework is fairly standard, however, larger sizes may be necessary for higher output heaters. Pipework should also rise (and fall) continuously, with air locks to be avoided at all costs, and horizontal runs kept to a minimum as they will reduce the output that can be transferred.

Thermal Storage

The traditional method of a vented hot water cylinder, and vented central heating, both fed using gravity circulation from the wood burner is fine for many instances, but are limited by the lower water pressures and the inability to store up heat for central heating provision via a pumped system.

As such there is a growing use of thermal storage systems that can provide both mains pressure hot water and store up heat from an overnight burn and deliver timed central heating in the morning. With a modern multi-fuel thermal store the wood burner can be combined with a gas or oil boiler, electric elements, heat pump, solar panels and other biomass boiler or wood burner to form a true multi-fuel heating system.

As the thermal store is used to store and distribute heat energy, the size of store used is dependent upon

how much heat you want to store. There are a few factors that influence this:

1. Total amount of heat (in kWh) that the wood burner generates in a full load.
2. Central heating load (in kW).
3. Peak hot water demand.
4. Number of solar panels connected to the store.

Overheat Protection on Thermal Stores

There are two levels of protection that we use on Heat Bank thermal stores to remove heat. The first requires power to be present and works by turning on the central heating pump to get rid of heat when a thermostat on the store reaches a preset temperature, typically 90°C.

The second uses a coil fitted inside the Heat Bank, through which we pass cold mains water that then heats up (and cools the store as it does so) before being discharged to drain. A mechanical valve (approved for this purpose) initiates the flow of mains water when the store reaches 95°C, and requires no power to be present.

The two forms of protection are typically used together so that the central heating is used as an automatic dump under normal circumstances, but in the event of a power cut or pump failure the discharge to drain comes into play. (Please see diagram above).

Connecting a Wood Burner to a Sealed Heating System

Something that is often asked is, how do you connect a vented wood burner to drive a pressurised central heating circuit? This is easily achievable with a thermal store using a plate heat exchanger to transfer heat from the vented store into the pressurised heating circuit. The diagram on the right shows this, and also shows how a system boiler can be brought into the equation. Running a pressurised heating circuit from the store also allows radiators to be sited higher than the feed and expansion tank, and this is sometimes necessary if the feed and expansion tank cannot be sited at the highest point in the system.

There are a number of other schematics and details regarding the use of wood burners on the DPS website at www.heatweb.com/wood

