Heat Exchangers for Domestic Use

This online resource paper provides information about what heat exchangers are and how they can contribute to the good design of new homes

Definition and Purpose

Heat exchangers are used to transfer heat between two sources. The heat is transferred from one fluid to another, hence the name. In the case of a boiler, this means transferring heat from gas to the water that will be circulating around the user's home to the radiators and the water tank. More information on exactly what a heat exchanger is and how they work is available using the website: **www.boilerguide.co.uk**.

Key Points to Consider

How a heat exchanger works in a dwelling

1. When a resident turns the heating on, water circulates around the radiators in the dwelling, but it will only be able to heat the space if it is hot. This is where a heat exchanger comes in;
2. Gas boilers burn gas, which then heats up and rises towards the heat exchanger that cold water passes through. As the water circulates, the heat is transferred from the gas to the water, which then heats up to effectively warm the radiators or provide hot water for a tank;
3. The process begins with hot gas and cold water, but because of the heat exchanger, the process ends up with cooler gas and hotter water without the two fluids even having to meet.

Non-condensing boilers are fitted with just one heat exchanger, whereas modern condensing units have two. The presence of two heat exchangers maximises their efficiency, hence saving energy and then helping the user to save money on energy bills. There are differences in how these boilers operate.

1. Non-condensing: these units have one heat exchanger, which cold water enters to be heated up and then circulates around the home to radiators and the hot water tank. Waste gases are sent outdoors via a flue, which can reach temperatures of up to 250oC, showing just how much heat is being wasted. This is not a very efficient process;
2. Condensing: By law, all new boilers must be condensing as they are much more efficient than non-condensing units. Condensing boilers are fitted with two main heat exchangers, meaning that they are able to recycle the heat from waste gases, increasing their efficiency.

A condensing flue can be 200oC cooler than a non-condensing flue, all of which is being transferred to the water rather than going out into the atmosphere.

Guidance on installing boiler and other combustion appliances, and the building provisions that are necessary to safely accommodate them (air supplies, hearths, fireplaces, flues and chimneys) can be found in Approved Document J of the Building Regulations **www.gov.uk/government/publications/combustion-appliances-and-fuel-storage-systems-approved-document-j**

Common boiler heat exchanger problems

Heat exchangers are an important part of any boiler, so in the unlikely event that there is an issue with an exchanger, it is good to be able to identify it early so that it can quickly resolved. Two of the most common boiler heat exchanger problems are explained below:

- Kettling: caused when there is a build-up of sludge or limescale on the heat exchanger, restricting the flow of water;
- Leaking: any leaking or dripping from a heat exchanger is most commonly caused by a broken internal component.

More information on the issues of kettling and leaking is available on the website **www.boilerguide.co.uk**.

The Practical Implications for Planning Officers, Building Regulators and Applicants

If a heating system or hot water system is to be replaced, then a planning application may not be required. If it is required (e.g., work in a listed building might require an application), it may not be necessary to apply in advance of carrying out the work. If a new system is to be installed, then the installer should proceed as if the work is being carried out in a new building.

If an existing system has been altered or replaced, then the person who last worked on the system is responsible for the safe running of that system and should issue a certificate to show that the necessary checks have been carried out.

Building Regulations approval is required in order to install a new boiler because of the safety issues and the need for energy efficiency. This is generally achieved by employing an installer who is registered under an approved scheme.

SEDBUK stands for Seasonal Efficiency of Domestic Boilers in the UK. For condensing boilers, one with a SEDBUK rating of A or B should be installed unless an assessment carried out by a Gas Safe Registered installer suggests that it is not viable to install one. In this case less efficient boilers with SEDBUK Ratings of C or D can be installed providing they have met the minimum efficiency standard. A further explanation of SEDBUK and boiler efficiency can be found here: **www.homeheatingguide.co.uk/central-heating/sedbuk-seasonal-efficiency-domestic-boilers-uk-rating**

Each boiler must have a minimum efficiency of 86% for gas and 85% for oil. Gas boilers are required to be replaced with a condensing boiler unless there is sufficient reason why one cannot be installed. An assessment can be carried out by a registered installer on the type of boiler the property owner will be required to have. The assessment is described in the Ministry of Housing, Communities and Local Government publication:
www.designingbuildings.co.uk/wiki/Domestic_building_services_compliance_guide

Relevant Craven local plan policies and guidance

- Policies **ENV3: Good Design**, **ENV8: Renewable and Low Carbon Energy**

March 2023. This webpage provides general information about relevant planning topics and we hope you find it helpful. Please be aware that it is not a statement of Council policy and does not provide formal policy guidance. For those things, please refer to the Craven Local Plan and supplementary planning documents.