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Noisy Combination Boilers

Combi boilers may start to make a noise after a period of operation. This noise usually occurs just after the hot tap or shower has been switched off and it sounds like a juddering groan. It is not a continuous noise and may only last for 5 - 10 seconds. The noise does not affect the operation or safety of the boiler, however it is good practice to resolve the problem as it will get louder and persist longer and it does reduce the boiler's energy efficiency. A correctly installed and maintained central heating system WILL NOT cause a noisy boiler.

Cause

The main cause of noise in a combination boiler is an undesirable coating that forms on the copper tubing inside the primary heat exchanger. This coating is a good insulator and restricts heat passing from the burner flames, through the copper heat exchanger into the heating fluid. The best comparison is that of an old kettle where the heating element is covered in scale. This kettle will make a lot more noise than a newer kettle with no scale.

You may wonder why the problem mainly occurs when the boiler is heating water for a shower or hot tap and yet the source of the problem is the central heating circuit. This is because when the boiler is being asked for hot water the heating fluid passes through the primary heat exchanger to collect the heat and then transfers this heat to the mains water in a secondary heat exchanger lower down in the boiler.

There are two sources of the undesirable coating:

1. Chemicals (naturally occurring and those added by the water companies) within the water that forms a proportion of the heating fluid
2. Fine particles of rust that have formed inside the steel radiators and been transported to the heat exchanger.

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The heating fluid is in a sealed circuit which includes the primary heat exchanger, the central heating pipes and radiators. This fluid should contain at least 25% of a combined corrosion inhibitor and antifreeze. The remaining 75% is water. If at any stage in the heating system's life it has been filled with fresh water only or a water/corrosion inhibitor mix of less than 75/25 for EVEN A FEW HOURS, the boiler is likely to become noisy. The inside of radiators is bare mild steel and even a few hours exposure to water will cause fine particles of rust. Think of how quickly a nail will rust in a jar of water. Operating the boiler for only a few hours without corrosion inhibitor also allows the chemicals within the water to coat the heat exchanger with scale.

How a Central Heating System is installed at the Factory

The combi boiler, pipes and radiators are all installed into the holiday home and are usually pressure tested using compressed air. If the system is leak free then a premixed corrosion inhibitor/antifreeze is used to fill the system. This means that the system has never been exposed to fresh water and as such it is very unlikely to create a noisy boiler.

Measuring the Inhibitor Level

This can be done in a couple of seconds using a refractometer (see below). This device is inexpensive and all good boiler engineers should carry one. The minimum level of 25% should be observed and a level in excess of 40% can also cause noisy boilers for different reasons. Remember that a correct level of corrosion inhibitor NOW does not mean that this has always been the case.



Reasons for Current or Historic Low Corrosion Inhibitor Levels

- The sealed heating circuit has leaked at some point since manufacture and been topped up with fresh water by using the filling loop beneath the boiler.
- The sealed heating circuit has been accidentally drained down as part of a winterisation procedure and then re-filled using fresh water.
- A radiator or towel rail has been replaced in the home and the system has been refilled using fresh water.
- An engineer has correctly identified a system without corrosion inhibitor but does not know the system capacity and hence does not know how much inhibitor to add to achieve a minimum of 25%. Most sealed systems in holiday homes have a total capacity of 20 litres so a single 5 litre tub mixed with 15 litres of water and then added to the system will suffice.

Solution to a Noisy Boiler

Due to the complexity of the procedure and the need for specialist equipment this can only be carried out by a good heating engineer. The solution involves:

- Dosing the heating fluid with a descaler/cleaning fluid - we recommend Fernox F5 Express or in more severe cases Fernox DS40
- Running the system in heating mode for 1 hours minimum or as per cleaning product instructions
- Running the system in hot water mode for 10-20 minutes
- Draining the sealed system complete using the brass drain cocks under the boiler and the plastic drain tap under the boiler pump (the pressure relief valve should NOT be used for this purpose). The heating fluid will probably be dirty and contain dark particles
- Flushing the system very briefly with fresh water and draining completely
- Filling the system with a PRE-MIXED 25 or 30% solution of Fernox Alphi 11 corrosion inhibitor/antifreeze. The solution must be pre-mixed or there is a danger that by filling the system partially with fresh water and then adding 5 litres of Alphi 11, insufficient mixing of the corrosion inhibitor will occur.

The table below shows estimates of the volumes in the sealed system

Size of Holiday Home	Approx. total volume of sealed system	Volume of 100% antifreeze/inhibitor needed for 30% or -17°C**
28 x 10 2 bed	15 litres	4.5 litres
35 x 12 2 bed	17.5 litres	5.25 litres
36 x 12 3 bed	20 litres	6.67 litres
Twin units*	25 -100 litres	8.33-30 litres

* Contact unit manufacturer for total volume

**Based on the use of Fernox Alphi 11

In some cases the descaler/cleaner will be unable to restore the primary heat exchanger to a working condition. In this case the noise will remain until the heat exchanger is replaced. If the level of corrosion inside the radiators is extreme then even the replacement of a heat exchanger may not solve the problem. If significant corrosion is suspected or the discolouration of the heating fluid when removed is extreme then a filtration system such as Fernox Boiler Buddy or the Fernox TF1 should be installed.