



## ***Sludge***

Sludge is the black (mud like) deposit resulting from the reaction between the water in your system and the steel in the radiators (Iron Oxide) which can build up over a period of time in a badly designed or untreated central heating system that will cause circulation problems.

- It will damage the radiators causing pin holing and leaks.
- It will damage the boiler unit and can cause the main heat exchanger to crack or block.
- It can block pipe work.
- It will block up the secondary DHW heat exchanger on a combination boiler making the boiler unable to supply a constant flow of hot water (going from hot to cold) and/or boiler lockout.
- It will cause the pump to fail and thermostatic radiator valves to stick
- If you have had a new boiler fitted and the system was not cleaned out the manufactures warranty would most likely be void (making very costly repairs).
- Can be seen as black "ink like" water when removing or bleeding air from a radiator.
- Causes radiators to fill up with Hydrogen making people think that its air that needs bleeding on a regular basis.

## ***Why systems corrode***

When a new central heating system is installed the whole system should be flushed as part of the commissioning process. This removes any debris or chemical deposits from the system. After flushing corrosion inhibitor is added to the system to protect the system.

If a system is designed and installed correctly and was flushed out correctly and inhibited, the water in the system will stay clean providing you do not have a water leak. However If your system has been drained and corrosion inhibitor was not added when refilling your system; your system is open to corrosion problems.

Open vented fully pumped systems are more susceptible to corrosion problems than sealed systems, though we have flushed sealed systems of what looked like used engine oil. Typically on a sealed system the original inhibitor will have been lost due to a slow leak through the pressure relief valve, frequent topping up of the system resulting in complete loss of the inhibitor and the introduction of dissolved air.

We have also been called to flush sealed systems where the radiators were rotting because acidic cleaner had been left in the system on installation.

Generally corrosion and sludge build up will be due to one of the following:

### ***The Corrosion Process***

1. The oxygen content of air dissolved in the system water will react with the iron content in steel radiators to produce rust and hydrogen as by-products. Often when venting a radiator you will be releasing hydrogen and not air.
2. The rust, hydrogen and heat can produce further chemical reactions within the system. The end product, commonly seen, is magnetite or black sludge.
3. Electrolytic action may cause dezincification of brass leading to carbonate deposits in the system.
4. If your system was not flushed thoroughly on installation there may be further chemical components which enter the reaction.

### ***The Consequences***

1. Sludge and rust deposits form (these are actually chemically changed parts of what was once your central heating system).
2. In hard water areas lime scale may also form on the boiler heat exchanger leading to “kettling” and boiler overheat problems.
3. The narrow water channels of plate heat exchangers become blocked leading to hot water problems on combination boilers
4. Radiators will corrode from the inside leading to leaks and requiring replacement of radiator.
5. Aggressive water content may attack rubber diaphragms and seals within the boiler.
6. Your boiler may contain sophisticated sensors, switches and capillaries which will block leading to boiler failure and expensive boiler repairs or replacement.
7. The abrasive nature of the sludge may lead to premature pump failure and motorised valve failure.

Boiler manufacturers now insist on system flushing to validate guarantees on new installations or replacement boiler installations. If your installer did not flush and inhibit your system when your boiler was installed, the boiler manufacturer will probably not honour any guarantee that you think you may have.

### ***Corrosion Inhibitors***

As the name suggests, a corrosion inhibitor decreases the corrosion rate within a system.

A typical central heating system will include a various metallic components, copper, brass, iron, steel; aluminium which when combined with contaminated water can lead to electrolytic action. This process is more aggressive when the system is heated.

The best corrosion inhibitors react with the metallic inner surfaces of the system to produce a protective film coating.