Flush for success

Tarquin Purdie, managing director at Powerflush Ltd looks at the economic and environmental benefits of using power flushing, the main techniques involved and explains how Powerflush tackles an open system with an accessible pump.

Introduction

Power flushing is a technique to clean corrosion and scale debris out of radiators, pipes and boilers as thoroughly as possible. There is a lot of confusion about power flushing. Heating engineers often refer to chemical flushing, hot flushing, back flushing and we still come across engineers who even take radiators outside and merely flush them out with a hose.

Power flushing is often described as a 'green' and money-saving service from the perspective of reduced energy bills. However, this point of view considerably understates its value. True, power flushing does save fuel and therefore cost, but it is also its ability to extend the life of pipe systems, thereby reducing the need to replace copper pipework, and repair damage to floors and walls (not to mention the subsequent redecorating and floor fixing) which needs to be considered in the overall environmental and financial benefits.

Power flushing

The tools required for power flushing always include a power flush machine, power flushing magnetic filter, chemicals, heat, surface temperature readings, vibration, TDS (total dissolved solids) and pH readings and corrosion inhibitors. This equipment must then be used with a thorough and methodical approach to maximise the result in the time frame available to carry out the job. Often, it will also include checking for and clearing blockages (eg, cold feed), attempting to clean the hot water side of combination boiler plate heat exchangers, divertor valves, thermistors and trying to reduce boiler kettling.

The single biggest factor why power flushing is growing so quickly as a vital part of boiler installation and maintenance is the high risk of blockages in low water content plate heat exchangers, and other sensitive components in combination boilers, such as divertor valves and thermistors.

Some large service companies and boiler manufacturer engineers prefer to fit strainers or magnetic filters on return pipework to protect their boilers, and while there are benefits from these devices, they complement and do not replace having a system thoroughly cleansed. Put simply, without halting the corrosion process, the boiler will still become contaminated. Even large power flushing magnets do not pick up all corrosion debris in one pass (the clear chambers in our equipment allow operators to see that some rust does indeed get past). And, of course, filters do not stop the rest of the system becoming blocked by rust, air-locked from corrosion by-product gases, or simply corroding away. Replacing system pipework is one of the most expensive and disruptive central heating projects a home owner faces, so avoiding this where possible is essential.

How it's done – power flushing open systems with an accessible pump

The initial set up involves removing the circulatory pump, connecting a magnetic filter and then the power flush equipment. It is very important to connect at the pump because successful power flushing is about having maximum control over flow – connecting at a radiator reduces flow and control of that flow.

Power flushing often involves clearing blockages, and the most common power flush blockage is the cold feed. To tackle this, first the feed and expansion (F&E) cistern mains supply is stopped by turning off valves or tying up ballcocks, and then the air vent is capped off. Next, check to see if there is a blockage by opening the pump valve in the cold feed direction, and if all is clear the feed tank contents drop into the empty power flush container. If they do not, then cut the feed pipe 20cm above where it joins the system pipework, with bucket and towels handy, and manually clear the blockage. Sometimes cutting out and renewing this area is a good idea, but this does depend on how far a customer wants to go. Now, reconnect the cold feed with a full-bore ball valve and turn it off so that there is a closed system. Open the other pump valve and start circulating the system water so that it leaves the pipework and radiators carrying loose corrosion debris to the powerful magnetic filter. The rust (which is magnetic iron oxide) sticks to the magnet and is largely removed at this point. (Always try to keep the power flush machine clean and filter the water before it enters the boiler heat exchanger.)

Add chemicals, loosen and filter rust

The filtered water goes on to the power flush pump, where a chemical cleaner is

Student update

These pages are aimed at students, and provide a quick, easily digested summary of concepts that all those working in the plumbing and heating sector should know and understand. However, we also hope that other, more experienced readers will benefit from a little 'knowledge refresh'.

added. Whether an acid-based chemical or a milder non-acid chemical is used is based on the engineer's experience. Either way, someone may claim you made the 'wrong' choice. Those responsible for the boiler heat exchanger do not want an acidic flushing chemical to be used when there is an aluminium heat exchanger, but the person paying for the power flush wants a guarantee that their system is thoroughly clean. The water and cleaning chemicals then pass through the boiler and get hot. It is very important that the chemicals get hot for two reasons:

1. Chemical reactions double in reaction speed when the temperature increases by 10°C. Therefore, by increasing the temperature by 50°C the cleaning efficiency is increased many times.
2. As the hot chemicals pass through the radiators, infrared thermometers can be used to measure the radiator surface temperature. Where there is good flow, high temperature readings will be taken, but where there is corrosion debris build-up, cold spots will be detected. The heat contrast enables the engineer to see where the debris lies, and then vibrate these areas, reverse the flow, and add more chemical until the whole surface reaches a uniform temperature. There will still be a layer of rust on the inner radiator surface, so now the radiator valve is closed and the hot chemicals are left to soak in. This process is repeated one by one for each radiator and the hot water coil until everything has soaked.

While waiting for the system to heat up there is a good opportunity to clean out the feed tank, either in situ or outside, depending on the risk of causing other problems. After the last radiator is hot, close it and open the hot water cylinder circuit, which is rarely blocked but can occasionally have surprises of its own – for example, a blown hot water coil. Now, close off the hot water coil.

Purging

Once everything is soaking, open the mains water connection into the power flush machine and open the valves on the radiator that has been soaking for the longest. The clean water is now sent along the system flow pipes, through this open radiator and back along the return pipes. At this point, isolate the magnet filter so that the water condition can be assessed, and then dump the water down a drain or a toilet. After a while, the water will start to run clear. Next, vibrate the bottom of the radiator to loosen stubborn adherent debris, which is then carried out of the radiator by the flow. This ensures that as much rust and corrosion debris is removed as possible. Continue purging and taking dump water TDS and pH readings (if using an acid-based cleaner) until clean, pH-neutral readings are reached, and then close off the radiator. Changing flow direction is useful here, but vibration is even more effective. One by one, this process is repeated for each radiator, and then the hot water coil, until all are clean and pH neutral.

Finishing off...

Neutralise, inhibit, disconnect and balance the water system. Although pH readings are taken until the system water is neutral, it is a good idea at this point to add a small amount of alkali neutraliser to the system in case any acidic cleaner is hiding on radiator surfaces. Then purge this from the system, and add a DWTA-approved corrosion inhibitor. Lastly, disconnect the equipment, replace the circulator pump and balance the system.

Referral system

Many heating engineers choose not to power flush because;

- They do not have time to allocate from their busy work schedule
- They find power flushing boring!
- They do not have or want lots more equipment (pumps, magnet filters, SDS vibration)
- They have had poor results and customer call backs when power flushing.

Powerflush Ltd sends cheques for £50 for each job referred to us by heating engineers. We only do power flushing, so there is no worry that we might poach other work. In fact when we come across boiler installs or repairs we pass them to our partners for free. Any secondary work from a specific job is always referred back to the introducing engineer if it is wanted.

For further information, visit our website or contact Tarquin Purdie at Powerflush Ltd on:

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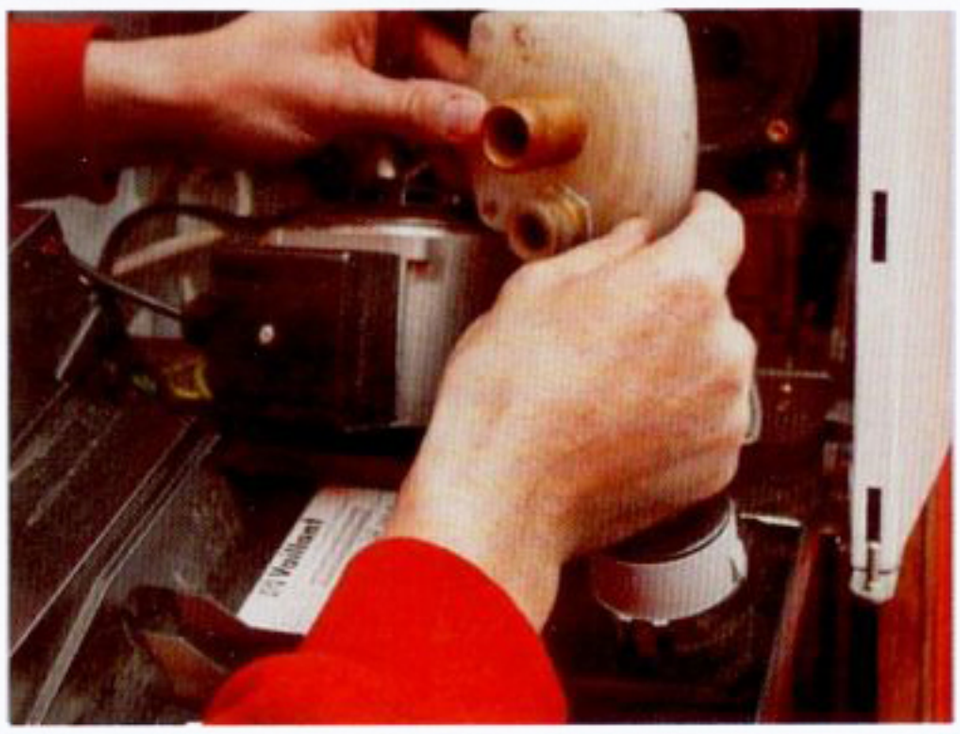
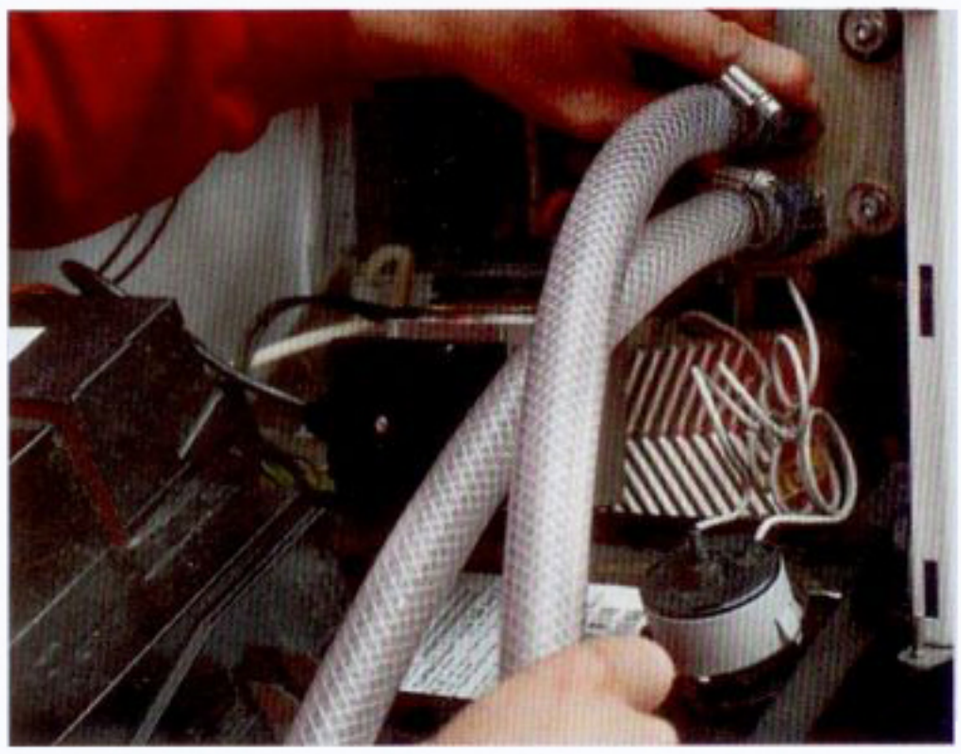
▲ Removing a boiler system's pump face



▲ Attaching a power flush adaptor



▲ Attaching flushing hoses to the power flush adaptor

Key points

All employers must ensure that:

1. Power flushing cleans corrosion and scale debris out of radiators.
2. It is a combination of water flushing, magnetic filtration, chemicals, heating and vibration.
3. Power flushing not only makes a system more efficient, but extends its operational life.
4. It is often performed by specialist plumbers and engineers.