Method statement for powerflushing existing domestic central heating systems

Using Fernox Powerflow Machine MKIII

Introductory Notes

This method statement has been written as a guide for cleaning existing domestic central heating systems using a **Fernox Powerflow Flushing Machine MKIII** in conjunction with **Fernox Cleaners**. System cleanliness is checked using a **Fernox TDS Meter**.

Fernox are unable to comment on system cleaning using chemicals supplied by other manufacturers, nor the accuracy of alternative rinse test equipment.

Boiler Change

In the event that a boiler upgrade is necessary but the existing boiler is still operational, Fernox recommend that the powerflush is undertaken before replacement of the boiler. If however the existing boiler is dysfunctional, the boiler should be changed before powerflushing. If it is necessary to powerflush through a new boiler, a **Fernox Powerflushing Filter** should be used. This will help the new boilers by removing magnetite before it circulates.

Condition of an Existing System

It is important to note that powerflushing is not appropriate for all existing domestic central heating systems. Care should be taken with older installations, particularly if there is evidence of previous corrosion on radiators or pipework. Powerflushing can accelerate leaks in radiators, simply through the removal of corrosion debris if insufficient base metal remains. The installer should therefore always ensure that the customer is aware of the risk of accelerating leakage in ageing or corroded systems due to powerflushing.

Fernox cannot accept responsibility for damage caused to ageing and corroded systems as a result of powerflushing, or for the inappropriate use of Fernox products within single feed, indirectly heated storage systems.

Choice of Cleaning Product

Fernox have four cleaning products suitable for use when powerflushing

- **Fernox Cleaner F3 500ml**
- **Fernox Cleaner F5 280ml Express**
- **Fernox Powerflushing Cleaner F5 1 Litre**
- **Fernox DS40 System Cleaner**

Fernox Cleaners are suitable to pre-commission new systems and also to clean existing systems to help restore the efficiency and efficacy of a central heating system.

Fernox Cleaner F3 500ml
Formulated to provide a mild clean and is applicable for use in most situations where the system is known to be free of severe fouling or scaling. **Cleaner F3** can be used to pre-commission new systems or after repair work to clean the system of flux debris which if left in the system, can cause pump or boiler failure or damage pipework due to erosion and corrosion.

Fernox Cleaner F5 280ml
Cleaner F5 is available as an Express product which is able to dose a system in 30 seconds.

Fernox Powerflushing Cleaner F5
Powerflushing Cleaner F5 is more concentrated than **Cleaner F3** and is used when a more vigorous clean is necessary. This product is particularly useful when powerflushing using the **Fernox Powerflow Flushing Machine MKIII**. Additionally it can be used for pre-commission cleaning and mild cleaning in central heating systems in larger properties with between 10 and 15 radiators.

Fernox DS40 System Cleaner
DS40 System Cleaner is designed specifically for use with the **Powerflow Machine MKIII**, this product is a citric acid based, free-flowing powder, which is used for the rapid removal of limescale from boilers and central heating systems. Black sludge (magnetite) and other deposits are equally well removed by **Fernox DS40 System Cleaner**.

The product is designed to be used in conjunction with **Fernox System Neutraliser** to ensure conditioning of the system after cleaning and also to ensure that acids are not discharged to drain.

Fernox recommend that **Fernox DS40 System Cleaner** is not used on central heating systems which are over 10 years old. **Fernox Powerflushing Cleaner F5** should be used as an alternative.

Method statement for Fernox powerflushing of existing domestic central heating systems

Powerflushing using the Fernox Powerflow Flushing Machine MKIII

With the exception of some boiler changes (see notes above) powerflushing with the **Fernox Powerflow Flushing Machine MKIII** should be undertaken after completion of any installation or repair work.

Preliminary Checks

1. Fill the system, vent all high points, pumps and radiators (sealed systems should be filled to their normal working pressure).
2. Check for leaks and repair as necessary.

System Preparation

3. Turn off all electrical controls and electrically isolate the system.
4. Note the setting of each valve before opening them, so that the system can be re-instated after flushing.
5. Open all radiator valves to their maximum setting and remove TRV heads to ensure maximum flow through the valve.
6. Set diverter or zone valves to manual.
7. Anti-gravity valves (non-return valves) if fitted should be bridged, by-passed or temporarily removed.

Set-up and Connection of the Powerflow Flushing Machine MKIII

8. Always employ best practice when protecting customer's property for wet works.
9. Connect up the 1/2" clear mains water inlet hose, 3/4" clear dump and overflow hoses and 3/4" yellow rubber flow and return hoses to the Powerflow by their Camlock connectors. Connect the **Powerflushing Filter** between the flow/return valve and the hose.
10. Ensure that the isolating valves on the flow and return hoses, mains fill and dump valve are all in the closed position, and that the waste hose and overflow both terminate in a foul drain.
11. Ensure that the dump hose and overflow hose both drain to a point below the dump valve on the **Powerflow Flushing Machine MKIII**. Failure to do so will prevent the waste water flowing to drain and may result in overflow of the Powerflow tank. If necessary, the machine can be elevated to increase the fall on these hoses. Care should be taken to ensure the machine is well supported and stable.
12. Isolate the circulator pump and, if a Fernox **Powerflow Pump Head Adapter** is available, remove the pump head and connect the adapter to the in-situ pump body. Alternatively remove the system circulator and connect the adapter elbows supplied with the **Fernox Powerflow Flushing Machine MKIII** across the pump connectors. Couple the pump head adapter, or the adapter elbows to the yellow flow/return hoses. For combination boilers where a pump head adapter is not available, connect by fitting the ¾" Powerflow flow/return hoses directly to the main system flow and return or across a radiator. Connecting across a radiator will reduce flow rate and may affect the efficacy of the powerflush.
13. Isolate the electricity supply to the system circulator. If in doubt, seek the advice of a qualified electrician.
14. Connect the power lead on the **Fernox Powerflow Flushing Machine MKIII** to the electricity supply via an RCD.

Operation of the Powerflow Flushing Machine MKIII

15. Turn on the mains supply and fill the vessel to between the maximum and minimum marks.
16. Open the flow and return valves and allow the unit to run for 15 minutes with all radiator valves open, reversing the flow regularly.
17. Dump the dirty water to drain whilst adding clean water to the reservoir tank until the TDS of the dump water is within 20% of the incoming mains water.

Method statement for Fernox powerflushing of existing domestic central heating systems

18. Refill the system and add a Fernox Cleaner of choice to the Powerflow Flushing Machine via the chemical addition port. Open the mains water inlet valve and fill with water to approximately half way between the maximum and minimum liquid level markers on the reservoir. Close the mains water inlet valve.
19. Open the system pump isolating valves and the flow/return isolating valves on the Powerflow flushing unit. Ensure that the dump valve on the Powerflow remains closed.
20. Switch on the machine.
21. As necessary, control the water level in the reservoir via use of the mains water inlet valve. Ensure that the liquid level in the reservoir remains between the minimum and maximum liquid level markers.
22. Switch on the boiler and allow the central heating system to reach operating temperature.
23. Allow the unit to run for one hour, reversing the flow regularly. Identify any cold spots on radiators, or blockages during this time.
24. If the system has an indirect cylinder, divert the flow to the cylinder coil and circulate for ten minutes, reversing the flow regularly. Divert the water back to the heating circuit.
25. Close off all the radiator valves except for the radiator furthest from the **Powerflow Flushing Machine MKIII**.
26. Allow the machine to pump through this radiator for a minimum of five minutes or until even heat is achieved over the radiator surface. Reverse the flow regularly during this time. Cleaning time will vary depending on the extent of debris and sludge within the radiator. Tapping the radiator with a rubber hammer may help to dislodge any debris.
27. Close the flow and return on the radiator and then move to the next radiator. Open the valves and repeat radiator clean. Continue until all of the radiators have been cleaned. When all the radiators have been flushed, open up the valves on all radiators.

Draining the Powerflow Flushing Machine MKIII

28. Switch off the boiler.
29. If **Fernox DS40 System Cleaner** has been used, add the **Fernox System Neutraliser** via the chemical addition port and circulate for a further five minutes. The system water should be green in colour. If the water is still red, more neutraliser will need to be added.
30. Open the dump valve on the **Powerflow Flushing Machine MKIII** to send the water to the foul drain.
31. Open the cold water supply to the unit and regulate to ensure the water level stays above the minimum mark, this is to ensure that the flow of water entering the unit is equal to that leaving the unit. If the mains water pressure is low, the dump valve should be partially closed to compensate for the reduced flow rate of the mains water.
32. From a convenient supply point, take a sample of the mains water and measure the total dissolved solids using the **Fernox TDS meter**. Note the reading on the Fernox powerflushing monitoring sheet.
33. Flush the system and allow the water to run to waste until it appears clean. Turn off all radiator valves except for the last radiator to be cleaned, and continue flushing until the wastewater appears clean.
34. Take a sample of the wastewater and measure with the **Fernox TDS meter**. Compare the meter reading from the wastewater with the previous mains water reading. Continue flushing and sampling the wastewater until the reading obtained with the TDS meter is within 10% of the mains water sample.
35. Note the TDS reading from the radiator on the Fernox powerflushing monitoring sheet.
36. Close-off the radiator, move to the next and flush to within 10% of the mains. Record the TDS reading on the powerflushing monitoring sheet. Radiators should be flushed in the reverse order to which they were cleaned. Repeat until all of the radiators have been individually flushed.

Method statement for Fernox powerflushing of existing domestic central heating systems

37. When all the radiators have been cleaned, divert all the flow to the indirect cylinder coil (if present) and flush until the TDS of the dump water is within 10% of mains.
38. Open all of the radiator valves and continue to flush until the wastewater is within 10% of the mains.
39. Verify that the system has been adequately cleaned and flushed by undertaking the chloride and copper tests within the **Fernox Water Test Kit**.

Protecting and Re-commissioning the System

40. After the system water has been confirmed as being within 10% of the mains, close the mains water supply and switch off the **Powerflow Flushing Machine MKIII**. Close the system circulator isolation valves and disconnect the unit from the heating system. The **Powerflushing Filter** can be cleaned ready for re-use, by rinsing under flowing water.
41. The system should be immediately protected by adding **Fernox Protector F1**. If the installer chooses to add the **Fernox Protector F1** via the chemical addition port of the machine, care must be taken to ensure that the **Fernox Protector F1** is fully dispersed before disconnecting the machine. This will take a minimum of 15 minutes.
42. Re-connect the system circulator and restore the electrical supply to it. Remove any temporary connections or caps and reset the valves to their operational positions.
43. Install the replacement boiler if necessary (see notes on boiler change).
44. **Fernox Protector F1** is supplied with a retreatment sticker to indicate the date of treatment and the product used. This should be completed and placed on the boiler casing in a convenient location to allow future engineers to identify the treatment regime used.
45. Verify Protector levels are adequate using the **Fernox Protector Test Kit**. Underdosing of an inhibitor can lead to a reduction in the protection of the heating system. Overdosing of an inhibitor will not have any adverse effects on the heating system. If necessary, add additional **Fernox Protector F1**.
46. Fernox Protector level should be checked on an annual basis. This can be undertaken as part of an annual service using a **Fernox Protector Test Kit** or **System Health Check**.
47. Fit a **Fernox Total Filter** for continued long-term efficiency.