

DESCALING DIRECT-FIRED WATER HEATERS

Guidance notes

CHOICE OF DESCALING CHEMICAL AND QUANTITY REQUIRED:

SCALEBREAKER HD may be used with mild steel, glass lined or copper cylinders. If galvanised steel is present, then

SCALEBREAKER SR, together with **ZnI booster inhibitor**, must be used.

For stainless steel water heaters, use

SCALEBREAKER FX. Do not use **SCALEBREAKER HD** with stainless steel.

1. Calculate the amount of descaling chemical required.

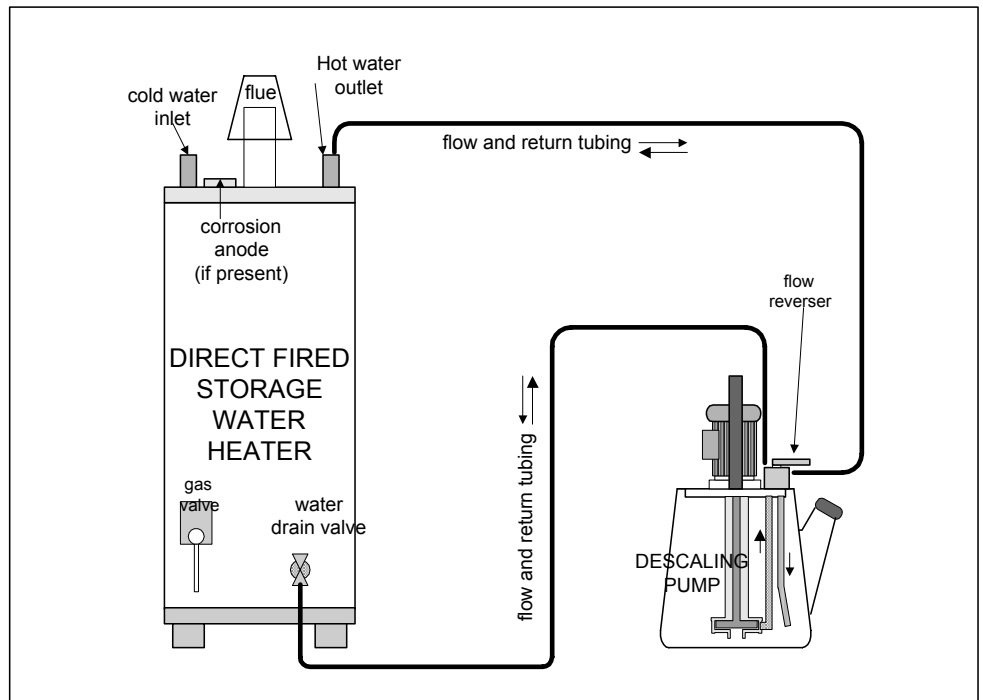
As a guide, for a 250 litre heater, use 25 litres descaling chemical (ie. a 10% solution by volume). A weaker solution may be used, but will take longer to remove a given amount of scale. Heat may be applied briefly, if practicable, to a maximum of 45oC, and this will speed up descaling.

2. In the above example, a C30 descaling pump of 35 litres tank capacity will allow all the descaling chemical to be placed directly in the pump tank, without any need to first drain out a corresponding volume of water from the heater.

3. A C15 descaling pump, with 15 litre tank, would require some water to be run out of the heater before commencing, and the tank of the pump would need to be filled with descaling chemical several times, each time operating the pump briefly to transfer the chemical into the heater before commencing normal circulation. The chemical will rapidly dilute to the working strength on commencing circulation.

4. If possible, always use a descaling pump with a larger tank capacity. With heavily scaled water heaters there can be a rapid build up of foam, and a larger tank gives the operator more reaction time to add **FOAMBREAKER** before the foam reaches the tank filling neck and overflows.

5. A chart to calculate volume of a cylinder from height and diameter is available from Kamco.



NB. When descaling with any acid, some hydrogen gas may be evolved. Hydrogen is flammable, and the working area should be well ventilated. Avoid smoking nearby, or any other means of ignition.

PROCEDURE:

1. Disconnect / isolate cold water supply pipe and hot water outlet piping.

2. Remove any sacrificial corrosion anode, and blank off aperture.

3. If there is a drain valve on water heater, use this as pump connection point, in preference to the cold water inlet. Check that valve is clear and will pass water through at a reasonable rate. If necessary clear a passage through any blockage - there may be several inches of scale accumulation on the base of the heater.

4. Connect one pump hose to hot water outlet, and one to drain outlet (or alternative).

5. The pump connection to the drain point should be through a valve, as a precaution. Power failure to the pump may result in the head of water in the heater overflowing the pump tank, unless prevented by closing the valve.

6. Hose connections should be made so that there is a closed circuit between the pump flow hose, through the heater, to the return hose. Venting of the carbon dioxide gas evolved is achieved through the tank filling

aperture. The filler cap should be screwed on by no more than one quarter of a turn. This is sufficient to vent the gas, but will reduce fumes and prevent splashes.

7. Connect the pump to a suitable earthed power supply (220 or 110 volt, according to model). As the pump will be used in a damp location, we recommend that a residual current circuit breaker plug top be used.

8. The flow reverser handle points in the direction of flow of the liquid. Operate the handle so that initially it points towards the hose connected to the drain valve. The hose from the top of the water heater will then be the return to the pump tank.

9. Prior to adding descaling chemical to pump tank, first 'prove' the circuit with fresh water alone. Add water to pump tank to approx. 8cm. above minimum liquid level, switch on pump, and immediately open the water heater drain valve to allow circulation to commence. If water level drops initially, add more water to tank, and check that all connections are tight.

10. To commence descaling, slowly add descaling chemical in to pump tank, waiting until liquid is returning into the descaling pump tank from the water heater, and check to see if there is a rapid build up of foam on top of the liquid in the pump. This may happen when there is a large build up of reactive limescale in the base of the heater. If this is excessive, add a little **FOAMBREAKER** carefully to the tank to reduce the foaming. If the heater is heavily scaled, add 25cc of **FOAMBREAKER** before adding the descaling chemical.

11. As the pumping commences, bubbles will be seen in the return hose, indicating that limescale is being dissolved.

12. Allow circulation through the water heater and descaling pump to continue, briefly reversing the direction of flow periodically.

13. Check all connections regularly for tightness, and absence of leaks, and if foaming is excessive, carefully remove descaling pump tank cap and add more **FOAMBREAKER** to the descaling pump tank.

14. Scale removal can be considered complete when bubbles are no longer seen in the return pipe, and the descaling solution is still sufficiently strong to remove hard water deposits. **SCALEBREAKER** descaling chemicals contain a built-in colour change to monitor strength. A simple check may be made by dropping a sample of limescale into

the solution, and observing if there is any effervescence.

15. Alternatively a pH meter, or pH indicator paper, may be used to check the pH of the descaling solution. Once the pH has risen to 3.5 to 4, its ability to dissolve limescale is effectively spent, and more descaling chemical or a fresh solution will be required.

16. If, after descaling has ceased, the pH of the descaling solution is still below 5, then the remaining solution must be neutralised to bring the pH level above 5, and as close to 7 as practicable. This may be done by slowly adding **NEUTRALISING CRYSTALS** to the tank of the descaling pump until there is no more effervescence as the crystals are added. If foaming is a problem during this operation, add a few ml. of **FOAMBREAKER** antifoam.

17. After draining off the spent / neutralised descaling chemical, flush the water heater with fresh water. Many natural waters are slightly alkaline, and water flushing may be all that is required. Alternatively, circulate a 1% solution of **NEUTRALISING CRYSTALS** through the heater for 15 minutes, drain, and then flush with clean water once more.

18. Finally, it is prudent to draw a sample of water from the nearest tap to the water heater, and check that the pH is comparable with a sample taken before descaling was commenced. If necessary, flush the system further with fresh water.

IMPORTANT: WHEN WORKING WITH ACIDIC DESCALING CHEMICALS, ALWAYS WEAR SUITABLE PROTECTIVE CLOTHING AND GOGGLES, AND CHECK AND OBSERVE INSTRUCTIONS WITH DESCALING CHEMICALS.

Caps should be kept securely on all chemical containers whilst not in use. As a matter of prudence, and to avoid splashes, operators should avoid standing directly over the open neck of either chemical containers or the filling neck of the descaling pump whilst pouring or adding chemicals.

Legal disclaimer: It is stressed that these are guidance notes only, and the above information is based on the present state of our knowledge of direct fired water heaters in general. It is given in good faith, but due to the diverse and varied nature of such equipment, the user must satisfy himself that the above procedure is viable in the prevailing situation.