



4. If there is a drain valve on calorifier, use this as pump connection point, in preference to the water feed 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 a calorifier.

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

6. The pump connection to the lower point of the calorifier should always be through a valve, as a prudent precaution. Power failure to the pump would result in the head of water in the calorifier overflowing the pump tank, unless prevented by closing the valve. (Scalebreaker FWF models have integral valves suitable for this.)

7. Hose connections should be made so that there is a closed circuit between the pump flow hose, through the calorifier, to the return hose. Venting of the carbon dioxide gas evolved is achieved through the descaling pump tank filler cap 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 at the same time reduces fumes and prevents splashes.

8. Connect the pump to a suitable earthed power supply. As the pump will be used in a damp location, a residual current circuit breaker plug should be used.

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

10. Prior to adding descaling chemical

### CHOICE OF DESCALING CHEMICAL AND QUANTITY REQUIRED:

SCALEBREAKER HD may be used with mild steel, welded steel, or copper calorifiers.

For galvanised steel calorifiers, then SCALEBREAKER SR, together with ZnI booster inhibitor, should be used.

For stainless steel calorifiers, use SCALEBREAKER FX. Do not use SCALEBREAKER HD with stainless steel.

1. Calculate the amount of descaling chemical required. As a guide, for a 1,000 litre calorifier, use 4 x 25 litres descaling chemical (i.e. 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 through the coil, if practicable, to a maximum of 50°C, and this will speed up descaling.

2. In the above example, a descaling pump of 100+ 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 calorifier. A descaling

pump with a smaller tank would require some water to be run from the calorifier before commencing. The pump tank would need to be filled with descaling chemical several times, each time operating the pump briefly to transfer the chemical into the calorifier, before commencing normal circulation. The chemical will rapidly dilute to working strength on commencing circulation.

3. A chart to calculate the volume of a calorifier from its height and diameter is available from Kamco.

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

### PROCEDURE

1. Disconnect / isolate cold water make-up pipe.
2. Disconnect / isolate hot water outlet pipe, and seal off any secondary hot water return pipe.
3. Remove any sacrificial corrosion anodes, and blank off aperture.

to pump tank, first 'prove' the circuit with fresh water alone. Add water to pump tank to approx. 4" (10cm) above minimum liquid level, switch on descaling pump, and immediately open the calorifier drain valve to allow circulation to commence. If water level drops initially, add more water to pump tank, and check that all connections are tight.

11. To commence descaling, slowly add descaling chemical into pump tank. Once liquid is returning into the descaling pump tank from the water heater, check to see if there is a rapid build up of foam on top of the liquid in the descaling pump tank. This may happen when there is a large build up of reactive limescale in the base of the calorifier. If this is excessive, add FOAMBREAKER carefully to the pump tank to reduce the foaming.
12. As circulation commences, bubbles will be seen in the return hose to the pump, indicating that limescale is being dissolved.
13. Continue circulation through the calorifier and descaling pump, briefly reversing the direction of flow periodically.
14. Check all connections regularly for tightness and leaks, and if foaming is excessive, carefully remove descaling pump tank cap and add more FOAMBREAKER to the descaling pump tank.
15. 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.
16. 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.
17. 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.

18. 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 FOAMBREAKER antifoam.
19. After draining off the spent descaling chemical, flush the calorifier 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 calorifier for 15 minutes, drain, and then flush with clean water once more.

If you have a Scalebreaker FWF type descaling pump, this has an integral fresh water flushing facility:

When descaling is complete, the spent descaling solution may be pumped to waste along the dump hose as follows:

If the flow reverser lever is to the left, twist the right-hand dump valve through 180° to show the word 'dump', ensuring that the left-hand valve remains in the 'circulation' position.

(If the flow reverser lever is to the right, twist the left-hand dump valve through 180° to show the word 'dump', ensuring that the right-hand valve remains in the 'circulation' position.)

When 'dumping', the water level in the pump tank will fall by the same volume as is being dumped. Open the mains water supply valve and adjust to allow fresh water to enter the tank at the same rate as water is exiting the dump hose. Make sure that the tank water level remains at least 10 cm (4") above

the minimum mark.

Continue dumping until fresh water is leaving the end of the dump hose.

Turn the valve which is in 'dump' mode through 180° to restore full circulation through the pump and the system. Close the water supply inlet valve once the level in the reservoir has stabilised between minimum and maximum markers.

Allow fresh water to circulate through the descaled equipment for ten minutes.

**Before leaving the site, it is prudent to draw a sample of water from the nearest tap to the calorifier, and to 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. Refer to instructions on labels of descaling chemicals, and refer to Material Safety Data Sheets.**

Caps should be kept securely on all chemical containers whilst not in use. To avoid splashes, operators should not stand 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 calorifiers 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.**