DESCALING A BOILER

Guidance notes

CHOICE OF DESCALING CHEMICAL AND QUANTITY REQUIRED:

SCALEBREAKER HD may be used with virtually all commercial and industrial boilers. Should there be any aluminium heat transfer surfaces in the boiler, then **SCALEBREAKER SR** should be used.

Should there be any stainless steel in the construction of the boiler, then use **SCALEBREAKER FX**. Do not use **SCALEBREAKER HD** with stainless steel.

1. Calculate the amount of descaling chemical required. As a guide, for a 2,000 litre capacity boiler, use 4 x 25 litres descaling chemical (ie. a 5% solution by volume). A weaker solution may be used, but will take longer to remove a given amount of scale.

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 boiler.

3. A descaling pump with a smaller tank would require some water to be run out of the boiler 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 boiler, before commencing normal circulation. The chemical will rapidly dilute to the working strength on commencing circulation.

4. A chart to calculate the approximate volume of a cylindrical boiler from its length and diameter is available from Kamco. However, allowance must be made for the volume of the combustion chamber and fire-tubes or flue ways, and it is preferable to ascertain water capacity from manufacturers' specifications.

Note 1:
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.

Note 2: **APPLICATION OF HEAT**.
Heat may be applied to the boiler, **but BEFORE ADDITION OF CHEMICAL ONLY**, whilst full circulation is still possible (i.e. before isolation of pipework), to a maximum temperature of 50oC, and this will speed up descaling. After such firing of the boiler, allow circulation for half an hour before isolation, and check temperature before introduction of descaling chemical.

SCALEBREAKER pumps incorporate polypropylene and other engineering plastics components to give high resistance to chemical attack, but this means that the descaling solution must not be allowed to rise above 50oC whilst the pump is in use, otherwise the rotor cover may be distorted and require replacing.

PROCEDURE:

1. Ensure an adequate water supply to dilute or neutralise any chemical leaks, or the spent descaling chemical, so that disposal does not contravene local regulations.

2. Disconnect or isolate water inlet / feed-pump / hot water return pipework.

3. Disconnect or isolate hot water/steam outlet.

4. Disconnect or isolate any connections to remote pressure gauges, boiler water sampling lines etc.

5. Isolate water level gauges and other level devices, and open their drain lines.

6. Connect a hose from descaling pump to blow-down valve fitting or drain valve. In the case of drain valves, check that valve is clear and will pass water through at a reasonable rate.

If necessary clear a passage through any blockage.

7. The pump connection to the lower point of the boiler should always be through a valve, as a prudent precaution.

Failing this, power failure to the pump would result in the head of water in the boiler causing the liquid level in the descaling pump tank to rise and overflow, unless prevented by closing the valve as mentioned in point 7.

8. Connect the other (return) pump hose to a suitable high point / pipe fitting on the boiler, preferably as far from the inlet hose as practicable.

9. Connections should be made so that there is a closed circuit between the pump flow (output) hose, through the boiler to the return hose.

10. Venting of the carbon dioxide gas evolved is achieved through the pump tank filler cap aperture. The 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.

11. 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.

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

13. 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 boiler drain valve (the lower hose connection point) to allow circulation to commence. If water level drops initially, add more water to tank, and check that all connections are tight.

14. To commence descaling, slowly add descaling chemical into pump tank, waiting until liquid is returning into the descaling pump tank from the boiler, 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 boiler. If this is excessive, add a little **FOAMBREAKER** carefully to the tank to reduce the foaming.

15. As the pumping is commenced, bubbles will be seen in the return hose to the pump, from the top of the boiler, indicating that limescale is being dissolved.

16. Allow circulation through the boiler and descaling pump to continue, briefly reversing the direction of flow periodically.

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

19. Scale removal can be considered complete when bubbles are no longer seen in the return pipe, and yet the descaling solution is still sufficiently strong to remove hard water deposits.

18. **SCALEBREAKER** descaling chemicals contain a built-in colour change to monitor strength, and so the strength of the **SCALEBREAKER** solution may be monitored visually.

19. A simple check may be made by dropping a sample of limescale into the solution, and observing if there is any effervescence.

20. Alternatively, a pH meter, or pH indicator paper, may also 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 and corrosion deposits is effectively spent, and more descaling chemical or a fresh solution will be required.

21. After draining off the spent descaling chemical, flush the boiler with fresh water. Many natural waters are slightly alkaline, and water flushing may be all that is required.

22. Alternatively, circulate a 0.5 to 1% solution of **NEUTRALISING CRYSTALS** through the boiler for 15 minutes, drain, and then flush with clean water once more.

23. Operators may prefer to neutralise the spent descaling solution "in situ" whilst the liquid is still circulating, by carefully adding neutralising crystals to the solution until the pH is brought up to a value of 7, and then flushing to drain.

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 boilers in general. It is given in good faith, but due to the diverse and varied nature of such equipment, and its application, the user must satisfy himself that the above procedure is viable in the prevailing situation.