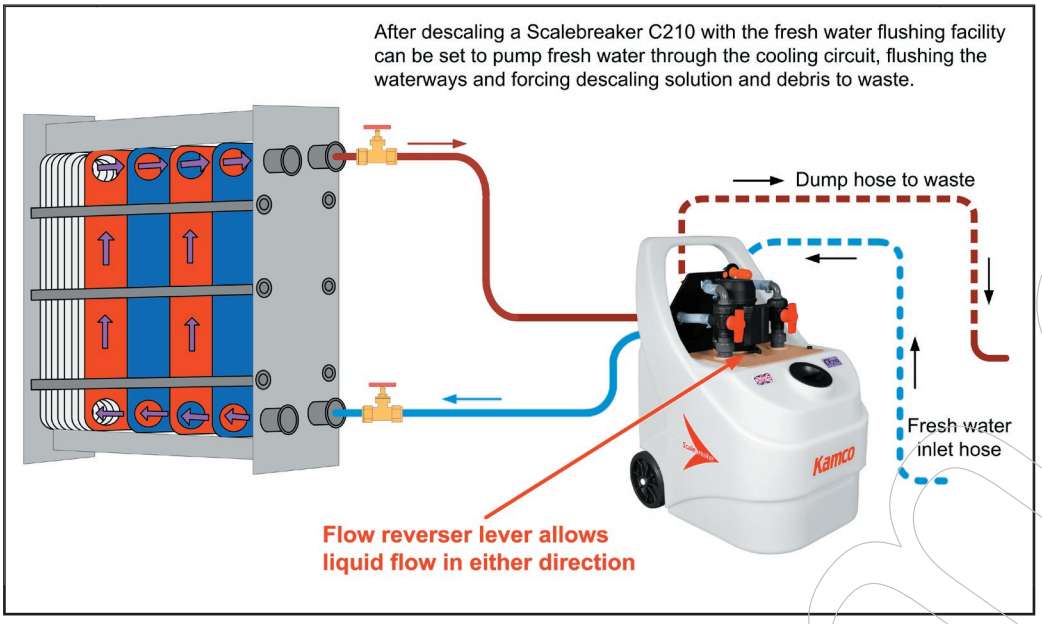
Kamco
Solutions to Scale

Guidance notes on descaling plate heat exchangers with a Scalebreaker descaling pump



CHOICE OF DESCALING CHEMICAL AND QUANTITY REQUIRED:

Plate heat exchangers invariably use stainless steel in their construction, and either SCALEBREAKER SR or SCALEBREAKER FX should be used, dependent on the type of fouling. SCALEBREAKER HD should not be used.

1. Check the volume / capacity of the circuit to be descaled, and calculate the amount of descaling chemical required.

2. As a guide, for a 100 litre capacity heat exchanger, use 10 litres of 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.

3. In this situation (point 2), a C40 descaling pump, with 39 litre tank capacity, will allow all the neat descaling chemical to be placed directly in the pump tank, without first draining out a corresponding volume of water from the heat exchanger.
For plate heat exchangers with larger volumes, and larger quantities of plates, consider a descaling pump with larger pump and pressure output.

4. A descaling pump with a smaller tank would require some water to be run out of the heat exchanger before commencing, and the tank of the pump would need to be filled with descaling chemical two or more times, each time operating the pump briefly to transfer the chemical into the heat exchanger before commencing normal circulation. The chemical will rapidly dilute to the working strength on commencing circulation.

PROCEDURE

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

2. Isolate water inlet and outlet pipework to and from the equipment to be descaled, by valve, or blanking plates if necessary.

3. After disconnecting connections to heat exchanger, couple flow and return hoses from descaling pump to the water inlet and outlet of the plate heat exchanger circuit to be descaled.

4. If you have a FWF (fresh water flushing facility) model pump,
a) connect the dump/discharge hose to the marked connection point on the hose connection bracket of the pump, and run the other end of the hose to waste or to a collection vessel.
b) Connect the water inlet hose to the orange water inlet valve on the hose connection bracket, and the other end to a suitable water supply.

5. If it is anticipated that descaling is to be a routine maintenance procedure, consider installing valved tee-pieces in the standard flow and return pipework to the heat exchanger, terminating in 1/2" or 3/4" BSP male threads. This will enable immediate coupling of the descaling pump across the heat exchanger whenever cleaning is required.

6. The pump connection to the lower point of the heat exchanger should always be through a valve as a precaution. Failing this, power failure to the pump would result in the head of water in a larger heat exchanger overflowing the pump tank, unless prevented by closing the valve.

7. Flow and return connections should be made so that there is a closed circuit between the pump output hose, through the plate heat exchanger to the return hose.

NOTE: Avoid draining down the heat exchanger before commencing descale (or opening up to inspect the plates) otherwise air trapped at the top of the heat exchanger when it is subsequently refilled with water may prevent descaling chemical from reaching those areas.

8. Venting of the carbon dioxide gas generated during cleaning is through the pump tank filling aperture. The cap should be screwed on by no more than one quarter of a turn. This is sufficient to vent the gas, but will reduces fumes and prevents splashes.

9. 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.

10. The flow reverser handle points in the direction of flow of the liquid. Turn the handle so that it initially points towards the hose going to the lower heat exchanger connection. The hose from the top of the heat exchanger will then return the descaling solution to the pump tank.

11. Before adding descaling chemical to the pump tank, first 'prove' the circuit with fresh water alone. Add water to tank to approx. 4" (10cm) above minimum liquid level, switch on pump, and immediately open the valve detailed in point 6 above, to allow circulation to commence. If the water level drops, add more water to the tank, and check that all connections are tight. If using an FWF model pump, extra water is simply added to the tank by opening the orange water inlet valve.

12. To commence descaling, slowly add descaling chemical into descaling pump tank. As circulation commences, bubbles will be seen in the return hose to the pump, indicating that limescale is being dissolved. If foam formation is excessive, carefully remove descaling pump tank cap, and add FOAMBREAKER to the pump tank to suppress the foaming.
This is more likely to occur when there is a large amount of limescale in the heat exchanger.

13. Reverse the direction of flow periodically, checking all connections for tightness and absence of leaks.

14. 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.

15. SCALEBREAKER descaling chemicals contain a built-in colour change to monitor strength. An alternative simple check may be made by dropping a sample of limescale into the solution, and observing if there is any effervescence.

16. 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 and corrosion deposits is effectively spent, and more descaling chemical or a fresh solution will be required.

17. When descaling / chemical cleaning is complete, switch off the descaling pump. Undo the hose connection to the top of the heat exchanger and run this to a suitable drain / discharge point. Allow the spent descaling solution to drain back through the other hose into the pump tank. If the level in the pump tank rises above the maximum mark, the pump may be briefly operated after setting the flow reverser lever to point in the direction of the previously disconnected hose now leading to waste. This will pump out the tank contents to waste.

18. After draining the spent descaling chemical, flush the heat exchanger with fresh water.

Many natural waters are slightly alkaline, and water flushing may be all that is required. Alternatively, circulate a 0.5 to 1% solution of NEUTRALISING CRYSTALS through the heat exchanger for 15 minutes, drain, and then flush with clean water.

19. 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. If foaming is excessive add FOAMBREAKER to the descaling pump tank.

20. If you have a FWF pump model, pumping the spent liquid away is easily achieved without first disconnecting one of the flow / return hoses. First check which direction the flow reverser lever is pointing, and then turn the isolating valve on the OPPOSITE side of the pump through 180 degrees. This will divert the return flow from the heat exchanger to waste.

Immediately open the orange water inlet valve to feed the pump tank (and consequently the heat exchanger) with fresh water, pushing the spent descaling solution to waste ahead of it.

21. Continue flushing the heat exchanger with fresh water until the pH of the water leaving the discharge hose is 7.

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.

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

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 heat exchangers 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.