

# Technical Information

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**400**

## GUIDELINES FOR THE SELECTION OF ANTI-SCALANTS AND BIOCIDES FOR RO-MEMBRANE UNIT



## 1. Principles

The building of deposits (scaling and fouling) on membrane surfaces is usually unavoidable. However, it can be reduced to an acceptable level by using an adequate chemical treatment.

These guidelines should help you to select the appropriate product for the desired treatment.

## 2. What is Scaling?

During the RO process, a salt solution flows along a membrane and is concentrated to a certain level. When the concentrations of the dissolved salts exceed their solubility levels, the salts may precipitate. A crystalline layer is formed which is recognised as **scaling**.

The following factors have influence on the scaling:

- the flow velocity and turbulence of the feed flow;
- the permeate flow;
- the recovery rate
- the concentration of the dissolved salts in the feed;
- the temperature;
- The pH-value.

All these factors refer to the boundary layer directly at the membrane and not only on the parameters that are measured e.g. in the concentrate. This is important because the solubility of the salts at the membrane could be exceeded without being reflected in the analytical data of the feed or the concentrate.

## 3. What is Fouling?

Blocking of the membrane due to contamination by any kind of particulate material is known as fouling. The particles could be suspended or dissolved colloidal solids or indeed, be a biological contamination on the surface of the membrane (bio-fouling).

## 4. Prevention of Scaling and Fouling

The building of scaling and fouling can be avoided by the use of antiscalants, dispersants and biocides.

The brands are:            **Osmotech™**    dispersants and antiscalants  
                                  **Ferroid®**        biocides

The essential properties of the raw materials used in the Osmotech™ product range are scale inhibition and hardness stabilising in the sub-stoichiometric range. They exhibit the so-called "THRESHOLD EFFECT" (see Technical Information 101 – Threshold Effect). Furthermore, the dispersants delay the sedimentation of mineral sludge in RO-systems. They transfer sludge deposits into the dispersed phase and remove them from the system in the concentrate flow.

Ferroid® provides a wide range of microbiocidal effects for use in controlling bacteria, fungi, and algae in RO-systems. The range includes oxidising and non-oxidising biocides. If oxidising biocides are used, they should be removed before the membrane with a reducing agent like Osmotech 3258 in order to avoid damage to the membrane.



## 5. Dosage of Products

The dose rates of Osmotech™ and Ferrocid® products depend on many factors, e.g. recovery rate, hardness, sludge content, etc. and should preferably be selected with the help of a BKG Water Solutions-representative. The dose rate of antiscalants and dispersants can also be estimated using our Software "RO-soft".

| Selection of Antiscalants / Dispersants |                   |                   |                   |        |                  |  |
|---|-------------------|-------------------|-------------------|--------|------------------|--|
|   | Type of deposit   |                   |                   |        |                  |  |
| Osmotech                                | CaCO <sub>3</sub> | CaSO <sub>4</sub> | CaPO <sub>4</sub> | Silica | Suspended Solids | Dose rate in the concentrate [g/m <sup>3</sup> ] |
| <b>1135</b>                             | ++                | +                 | +                 | +      | +                | 80 - 120   |
| <b>1140</b>                             | ++                | +                 | o                 | o      | o                | 3 - 15   |
| <b>1141</b>                             | ++                | +                 | +                 | +      | +                | 3 - 30   |
| <b>1150*</b>                            | ++                | +                 | +                 | +      | +                | 6 - 60   |
| <b>1261*</b>                            | +                 | +                 | ++                | +      | ++               | 10 - 100   |
| <b>1309</b>                             | +                 | +                 | ++                | ++     | ++               | 4 - 20   |
| <b>1319</b>                             | +                 | +                 | o                 | +      | +                | 20 - 50  |
| <b>1339</b>                             | ++                | ++                | +                 | +      | +                | 3 - 30   |

++ = especially suitable for high concentrations  
 + = suitable  
 o = partially suitable

\* P-free products

**Selection of Biocides**

|                      | Type           | Chemical basis       | Shot dosage | Cont. dosage | Dose rate g/m <sup>3</sup>                    |
|----------------------|----------------|----------------------|-------------|--------------|---|
| <b>Ferroid 8590</b>  | Oxidising      | Peroxide             | +           | +            | 10 - 250                                      |
| <b>Ferroid 8591</b>  | Oxidising      | Peracetic acid       | +           | +            | 10 - 250                                      |
| <b>Ferroid 8592</b>  | Oxidising      | Hypochlorite         | +           | +            | 5 - 15  |
| <b>Ferroid 8580</b>  | Non-oxidising  | DBNPA                | +           | o            | 10 - 40                                       |
| <b>Ferroid 8583</b>  | Conservation   | organic heterocyclic | +           | o            | 10 - 100                                      |
| <b>Osmotech 3258</b> | Reducing agent | Sulphite             | o           | +            | Depending on the content of oxidising biocide |

**Remark:** To prevent damage of the membranes by oxidising biocides, please check the membrane specifications and use a reducing agent.

+ = suitable  
o = partially suitable

**Attention:** Use biocides safely. Always read the label and product information before use.

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