RO Pre-Treatment Guide

Protecting Reverse Osmosis Membranes

Pre-Treatment Methods, Sizing Best Practices & Feed Water Requirements

SECTION 1 — WHY PRE-TREATMENT MATTERS

RO membranes are designed to filter dissolved solids, not suspended solids. Without proper pre-treatment, fouling occurs rapidly from colloidal material, bacteria, suspended solids, and hardness scaling. Chlorine and chloramines cause irreversible damage to thin-film composite (TFC) membranes. Pre-treatment methods include multimedia or sediment filtration to remove larger particles, activated carbon filtration to eliminate chlorine and chloramines, antiscalant dosing or water softening to prevent scaling, and a 1-5 micron cartridge filter as final protection. Iron and manganese removal is critical when present, and pH adjustment may be needed to optimize membrane performance. Temperature significantly affects pump sizing because water viscosity changes with temperature; a variable frequency drive (VFD) is recommended when feed water temperature varies by more than 10 degrees Celsius to maintain consistent flow and pressure.

SECTION 2 — BEST PRACTICES

- Obtain a full water analysis before designing any pre-treatment system. - Conduct SDI (Silt Density Index) testing at the RO feed point. - Monitor normalized pressure drop and salt rejection daily to detect fouling early. - Establish a clean-in-place (CIP) protocol based on foulant type. - Size all pre-treatment components conservatively to handle peak flow and worst-case water quality. - Match antiscalant type and dosage precisely to the specific water chemistry.

Product Specifications

Guide Type	Technical Pre-Treatment Reference
Step 1	Multimedia / sediment filtration
Step 2	Activated carbon (chlorine removal)
Step 3	Softening or antiscalant dosing
Step 4	Cartridge pre-filter (1–5 micron)
Step 5	Iron / manganese removal if needed
Key Tool	VFD pump for variable temperature feed
Critical Test	SDI (Silt Density Index) — target < 5
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