

BRIDGING THE PRESSURE BOUNDARY WITH REDUCED FOOTPRINT USING SERIES STACKED ULTRAFILTRATION AND NANOFILTRATION MEMBRANES

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Ultrafiltration (UF) systems are typically employed as separate systems operating at low pressure prior to nanofiltration (NF) or reverse osmosis (RO) membranes. A method has been developed whereby the UF membranes are operated at the same feed pressure as the downstream NF membranes. This process, trademarked as REDft[®], allows the UF membranes to be placed downstream of the high pressure feed pump and in the same membrane housing as the NF membranes. The UF membranes are operated in dead-end or cross-flow filtration mode, with transmembrane pressure maintained by means of regular on-line backwashing. NF permeate is produced at constant rate and is not affected by the backwash of the upstream UF. The configuration, together with the use of large diameter elements, results in a drastic reduction in plant footprint, with calculated savings in excess of 35% compared to systems utilizing standard UF racks, NF membrane trains and related ancillaries. This is of particular interest for applications with very limited plant area and weight restrictions, such as offshore installations. Although this paper focuses on a combination of UF and NF membranes, the technology is applicable to combinations of UF or microfiltration with RO. The results of a pilot plant operating on seawater on the south coast of South Africa are presented which verify operation and results.