

Design and construction experiences of multi-stage flash evaporator module train for 4500 m³/d MSF plant coupled to nuclear power plant at Kalpakkam

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ABSTRACT

The flash evaporator modules are the core installations of any MSF desalination plant. These are normally rectangular modules consisting of brine flash chambers and vapour condensers generally mounted at high elevations based on NPSH considerations of brine re-circulation pumps. BARC has recently constructed a 4500 m³/d MSF desalination plant coupled to 235 MWe nuclear reactor at Kalpakkam in the southern region of India. The plant consists of 39 nos of flash evaporation stages distributed among 10 nos of large flash evaporator modules of different sizes, arranged in a longitudinal layout (long tube design). The smallest of these modules has internal dimensions 2.20 m width, 2.95 m height and 11.30 m length and the largest module is 3.10 m wide, 3.50 m high and 16.30 m long. Major materials of construction include carbon steel, stainless steel, cupro-nickel and inconel. The rectangular geometry, massive size, number of internal compartments, built in condenser, the corrosive seawater environment, etc. make the design and construction of these modules different from conventional process equipments. In this paper, mechanical design and construction experiences of these modules are described covering design and construction features of the modules, construction methodologies adopted, its qualifications, problems faced during construction, etc.

Keywords: Multi-stage flash; Evaporator module; Design

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