How to ensure maximum spray uniformity in a watermaker

PNR Italia designs a spraying system for a seawater desalination system

INDUSTRY
Chemical processing

APPLICATION
Spraying in desalination plants

PROBLEM
Ensure maximum spray uniformity

SOLUTION
Spiral full cone nozzles and manifold system

SCENARIO FOR THE SECTOR

What is a sea water desalination system?

By "Seawater desalination," we mean the process of removing the saline fraction from waters containing salt, generally marine. The purpose is to obtain water with low salt content. The system used for this purpose is called "watermaker."

Evaporative desalination involves the evaporation of water that is recovered by condensation. Generally, a liquid waste with a higher salinity than the feed water is obtained, and the solid one is sodium chloride in crystalline form.
The evaporation process takes place by spraying the saltwater on heat exchangers in which steam flows; in this way, part of the liquid content evaporates with an extremely low percentage of salt.

Evaporative desalination is used for large productions of desalinated water.
This type of desalinator operates at relatively high temperatures (between 40 and 200 ° C), and it's essential to have them built in resistant materials due to alkaline corrosion.

THE PROBLEM OF OUR CLIENT

The customer who contacted us is a manufacturer of industrial evaporative desalination systems.

216 full cone nozzles were required to be installed in six manifolds of a watermaker to spray seawater onto heat exchangers. The first 4 manifolds are designed to contain 42 nozzles each, while the last two house 24 nozzles each, for a total of 3 desalination and evaporation units.

The surface to wet consists of heat exchangers with steam on the side of the tubes. The nozzles, placed at a distance of 50 cm from the beam, must guarantee maximum uniformity of wetting to avoid areas of flooding or poor wetting to ensure adequate heat exchange.

The nozzles must be supplied in S31803 super duplex stainless steel, a material with high resistance to corrosion caused by seawater.

PNR ITALIA SOLUTION

Given the flow constraints (116 lpm at 3 bar) and the required ¾ "connection, the **PNR Italia Technical Office has identified as a solution the E-type spiral full cone nozzles with reduced flow rate through an insert.**

ADVANTAGES FOR OUR CLIENT

The full cone E nozzles represent an excellent solution for this system because it's a durable product. Their unique shape minimizes clogging, producing a wider spray coverage than other nozzles under the same operating conditions.

FOCUS ON THE PRODUCTS

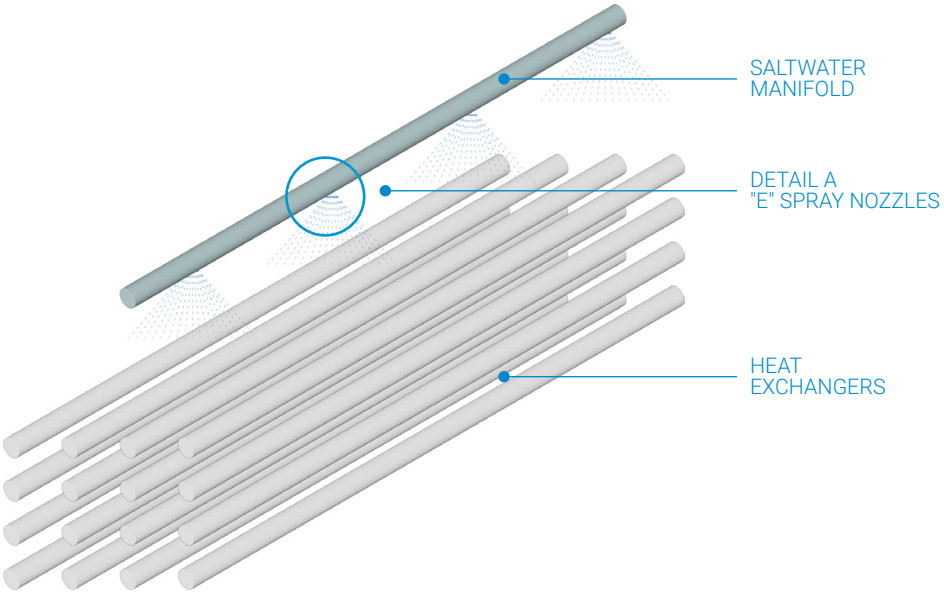
E
FULL CONE NOZZLE

E full cone nozzle works on the impact principle, by the deflection of a water stream that impacts onto a spiral profiled surface which provides the desired spray angle.

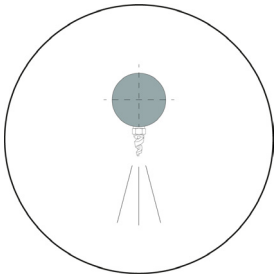
OPERATING CONDITIONS

EDW NOZZLES | DESALINATION PLANT

@PW= 0,5 BAR	UNIT OF MEASURE	VALUE
TEMPERATURE	°C	62°
PRESSURE	BAR	0,5
FLOW RATE AT @3BAR	LPM	67 LPM/nozzles



SIMPLIFIED DIAGRAM OF AN EVAPORATION WATERMAKER
SPRAYING SALT WATER ON THE HEAT EXCHANGERS



DETAIL A
MANIFOLD WITH "E" NOZZLES

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