

# How to recover energy by cooling high-temperature gas

A cooling system with hydraulic atomizers optimizes processes in a heat recovery boiler



## SCENARIO FOR THE SECTOR

Energy recovery from industrial processes

The high energy cost and the need to reduce CO2 emissions have highlighted the importance of optimizing the efficiency of all production processes.

Thanks to thermal recovery systems, the residual heat from many industrial processes is transformed into energy that can be put back into circulation in the same plant.

One of the many instruments to save energy at an industrial level is the **recovery boiler**, an industrial installation able to capture the energy that would otherwise be lost in waste products that are not completely burned.

## THE PROBLEM OF OUR CLIENT

The company that contacted us works in designing, constructing, and installing large-scale boilers for electricity production plants.

The request was to design a cooling system for the steam coming out of a flash tank of a recovery boiler.

This tank collects drains and vents residue from other lines, cools them, and conveys them to turbines that will generate additional energy.

The inlet steam can reach the temperature of 90° C, and the maximum temperature of the cooling water is 70° C.

## PNR ITALIA SOLUTION

The technical department of PNR Italia has developed a cooling system composed of a **manifold placed inside the flash tank to which have been connected 14 RZ hydraulic atomizers**.

Considering that the project's purpose is to **cool a stream of superheated steam**, the smaller the droplets' average size, the greater the surface of the heat exchange for a given volume of fluid.

For this reason, **RZ atomizers have been used to produce a fine atomized hollow cone**.

**INDUSTRY**  
Energy industry



**APPLICATION**  
Cooling and washing of fumes and gases



**PROBLEM**  
Cooling of steam at high temperatures



**SOLUTION**  
Manifold with hydraulic atomizers



## ADVANTAGES FOR OUR CLIENT

The system designed by PNR Italia uses hydraulic atomizers to **optimize the gas cooling process**, reaching the required temperatures of the outgoing gas with a smaller amount of water than traditional nozzles.

## OPERATING CONDITIONS

### RZ ATOMIZERS AND MANIFOLD

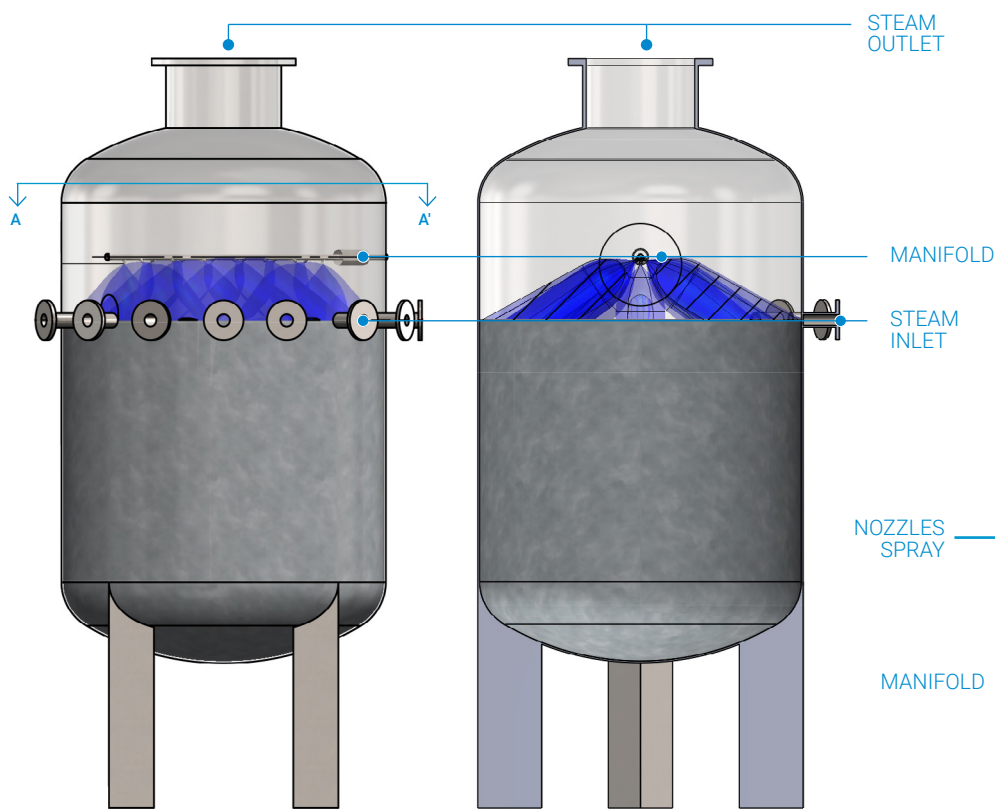
@PW=20 BAR	UNIT OF MEASURE	VALUE
NOMINAL SPRAY ANGLE	°	60
NOZZLE FLOW RATE	LPM	3,61/nozzle
ATOMISERS #	-	14
MANIFOLD FLOW RATE	LPM	50,54

## FOCUS ON THE PRODUCT

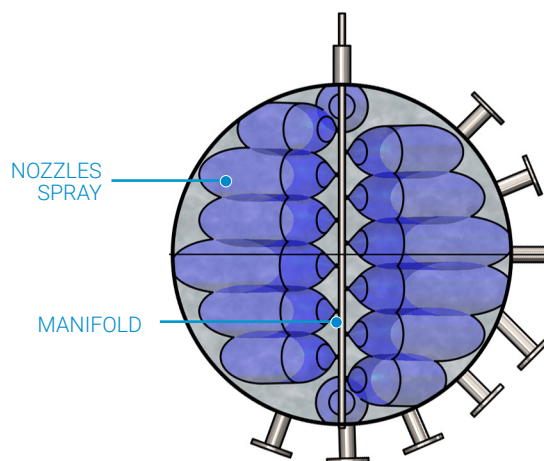


**RZ**  
HOLLOW CONE HYDRAULIC ATOMIZER

RZ hollow cone nozzle delivers a finely atomized hollow cone spray. They contain a precisely machined insert with narrow passages that can be easily disassembled for cleaning in case of obstruction.



**MANIFOLD INSTALLED IN THE FLASH TANK**  
SIDE AND FRONT VIEW OF THE MANIFOLD  
AND THE FLASH TANK



**SECTION AA' FLASH TANK**  
INSTALLED MANIFOLD