



SPRAY NOZZLES FOR INDUSTRIAL APPLICATIONS



**SELF-CLEANING
SHOWER PIPES
FOR METAL INDUSTRY**

SELF-CLEANING SHOWER PIPES ENHANCING CLEANING EFFICIENCY IN STEEL MILLS

Maintaining cleanliness in steel mills is crucial for efficient operations and ensuring product quality.

Shower pipes play a vital role in cleaning various equipment and surfaces, including the steel rolls used in the production process.

To improve cleaning effectiveness and efficiency, steel mills have adopted an innovative solution: self-cleaning shower tubes.

PNR Italia is pleased to show you its solution.

BENEFITS OF SELF-CLEANING SHOWER PIPES

IMPROVED EFFICIENCY

By preventing scaling and clogging, self-cleaning shower tubes ensure uninterrupted and consistent water distribution, optimizing the cooling or quenching processes and enhancing overall operational efficiency.

EXTENDED LIFESPAN

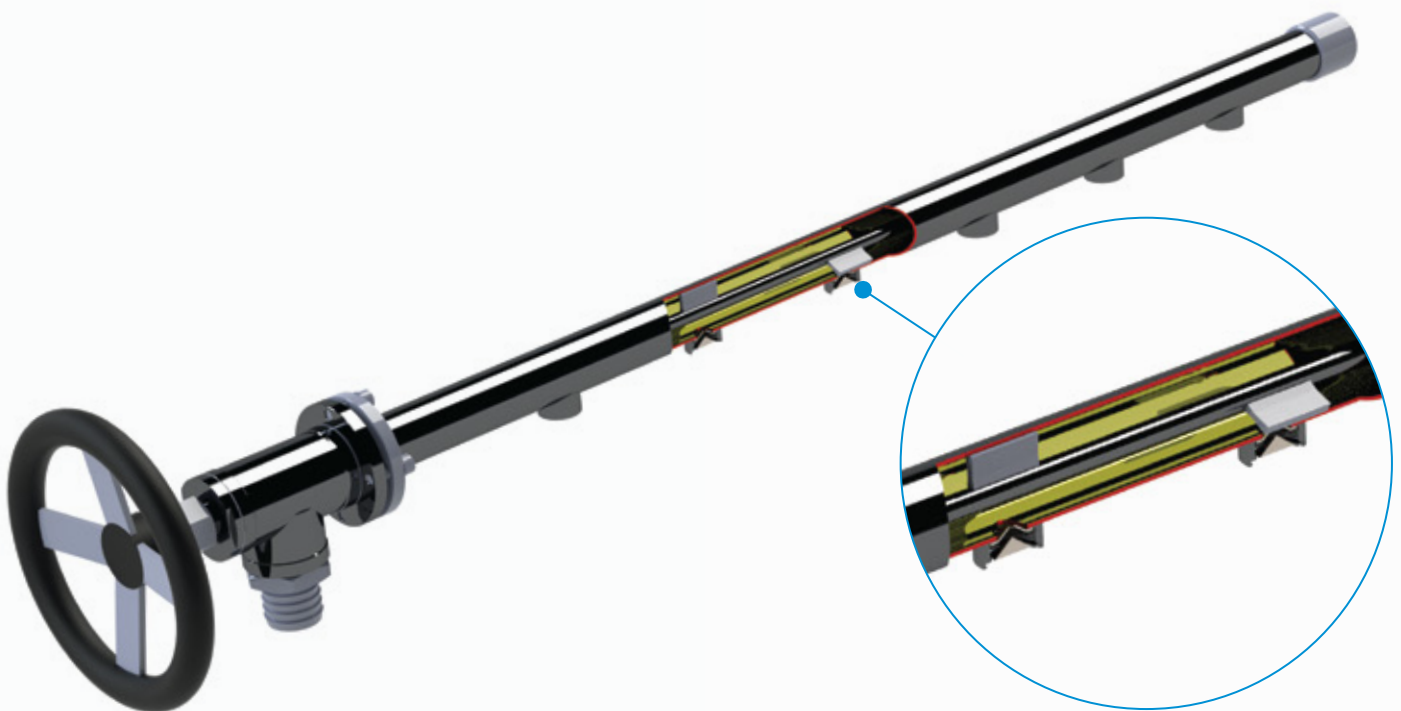
Continuous scaling and deposits on shower tubes can lead to corrosion and reduced lifespan. With self-cleaning capabilities, these tubes maintain clean internal surfaces, minimizing the risk of damage and prolonging their useful life.

ENHANCED PRODUCT QUALITY

Consistent and uniform water distribution provided by self-cleaning shower tubes contributes to improved product quality, as it helps to achieve precise cooling or quenching parameters.

REDUCED MAINTENANCE

Traditional shower tubes often require frequent manual cleaning and maintenance to remove scale and deposits. Self-cleaning shower tubes significantly reduce the need for such interventions, resulting in cost savings and increased uptime.



TS SERIES

SELF-CLEANING SHOWER PIPES

Self-cleaning shower pipes are used in the pulp and paper industry for washing and cleaning forming fabrics and felts. There are two kinds of pipes:

- Low pressure (2 ÷ 6 bar) fixed pipes with flat fan nozzles (**PNR Italia nozzle: GE**)
- High pressure (25 ÷ 70 bar) oscillating pipes with straight jet nozzles (**PNR Italia nozzles: GEA**)

Both fixed and oscillating pipes must have the following characteristics:

- presence of a cleaning system that cleans the nozzles with simultaneous discharge of impurities;
- easy and fast activation of the cleaning system, without interrupting the spray and without problems for the operators;
- usage of nozzles that allow to save water and that never get blocked, eventually after a long time.

Shower pipes that satisfy these three characteristics have a structure made of three main parts.

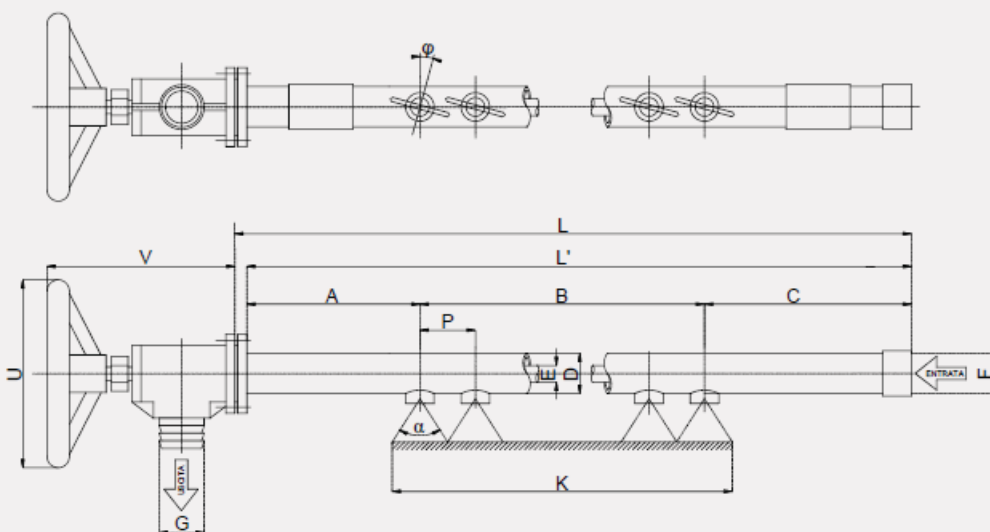
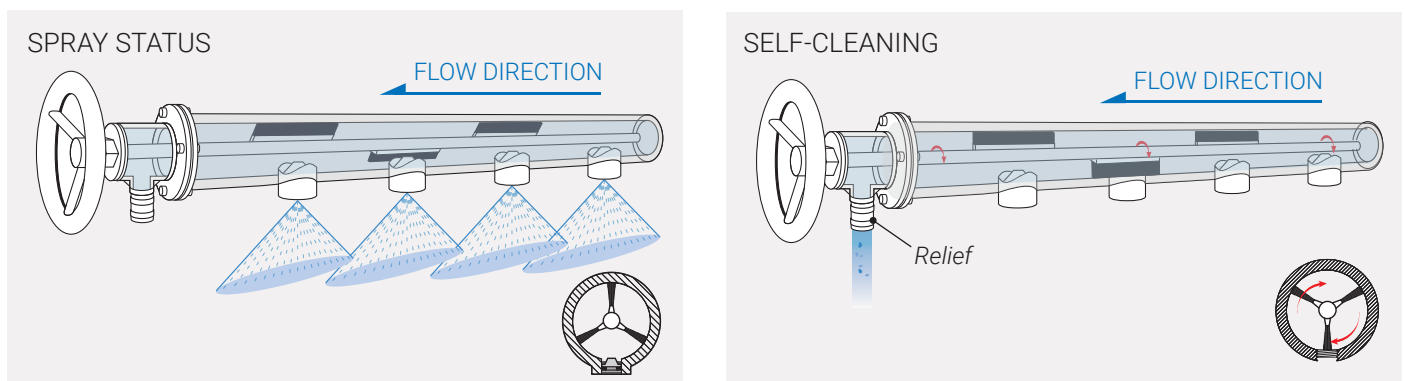
The Assy Valve must allow the passage or the stop of the discharge flux, through the opening or the closing of a lock, moved by a shaft, manually activated by a hand wheel. This movement is used to activate the Assy Shaft.

The Assy Valve is connected to the Assy Pipe through a flanged connection, and to the discharge pipes through a specific connection (thread or hose fitting).

The Assy Shaft is made by a pipe with specific brushes mounted on it; thanks to the connection with the shaft of the Assy Valve, it moves radially and axially. In this way, the brushes can remove the impurities both from the nozzles and from the inner part of the Assy Pipe.

The nozzles are assembled on the **Assy Pipe**, which is connected to the main pipe.

Nozzles can be installed with specific welding nipples or through plastic pipe clamps.



DIM.	MIN	MAX
D (mm)	OD 48.3	OD 60.3
L (mm)	600	7.100
A (mm)	200	735
B (mm)	200	6.000
C (mm)	200	1.350
N	2	51
P (mm)	80	2.950
F (inch)	1-1/2" F	2-1/2" F
G (mm)	Ø 48	Ø 60

A: FIRST NOZZLE POSITION

B: NOZZLE SPAN

C: LAST NOZZLE POSITION

D: EXTERNAL DIAMETER X PIPE WIDTH

E: SHAFT OUTER DIAMETER

F: INLET CONNECTION

G: OUTLET CONNECTION

H: HEIGHT

L: STANDARD REFERENCE LENGTH

M: SUPPORT LENGTH N: NOZZLES NUMBER

P: NOZZLE PITCH

R: SUPPORT POSITION

S: SLEEVE SPAN

U: HAND WHEEL DIAMETER

V: VALVE LENGTH

W: NIPPLE LENGTH

A: SPRAY ANGLE

(1): ASSY VALVE

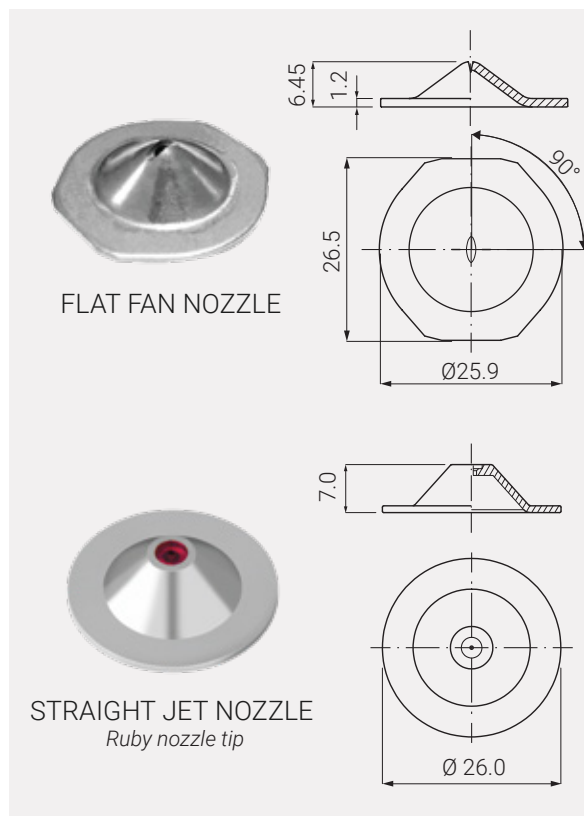
(2): ASSY SHAFT

(3): ASSY PIPE

In GE flat fan nozzle (thickness 1.2 mm), the spray jet is close to the turbulence structure and this special design makes them very easy to clean.

Within the delivery pipe these nozzles are assembled to a steel brush, that can be manually or automatically rotated, which takes off all the dirt washed out by water and then flushed out through a release valve positioned at the end of the pipe. PNR Italia nozzles, with their special low profile design, **can be easily removed for cleaning** so they reduce maintenance times and costs and improve the plant efficiency.

CODE	Angle [deg] 3bar	Nominal orifice diameter [mm]	Flow rate at different pressure values (l/min) (bar)				
			3	10	15	20	30
GEA 0300	0° * (straight jet)	0,4	0,3	0,55	0,67	0,77	0,95
GEA 0500		0,6	0,5	0,9	1,1	1,3	1,6
GEA 0900		1,0	0,9	1,6	2,0	2,3	2,8
GEA 1130		1,2	1,3	2,4	2,9	3,4	4,1
GEA 1170		1,5	1,7	3,1	3,8	4,4	5,4
GEA 1310		2,0	3,1	5,7	6,9	8,0	9,8
GEF 1310	30°	2,0	3,1	5,7	6,9	8,0	9,8
GEF 1490		2,5	4,9	8,9	11,0	12,7	15,5
GES 1780		3,0	7,8	14,2	17,4	20,1	24,7
GES 2194		5,0	19,4	35,4	43,4	50,1	61,3
GES 2310		6,0	31	56,6	69,3	80,0	98,0
GEQ 0900	60°	1,0	0,9	1,6	2,0	2,3	2,8
GEQ 1170		1,5	1,7	3,1	3,8	4,4	5,4
GEQ 1234		1,8	2,4	4,4	5,4	6,2	7,6
GEQ 1310		2,0	3,1	5,7	6,9	8,0	9,8
GEQ 1490		2,5	4,9	8,9	11,0	12,7	15,5
GEQ 1780		3,0	7,8	14,2	17,4	20,1	24,7
GEQ 2124		4,0	12,4	22,6	27,7	32,0	39,2
GEQ 2194		5,0	19,4	35,4	43,4	50,1	61,3
GEQ 2310		6,0	31	56,6	69,3	80,0	98,0
GEQ 2490		8,0	49	89,5	109,6	126,5	155,0
GEF 0900	75°	1,0	0,9	1,6	2,0	2,3	2,8
GEF 1170		1,5	1,7	3,1	3,8	4,4	5,4
GEF 1234		1,8	2,4	4,4	5,4	6,2	7,6
GEF 1310		2,0	3,1	5,7	6,9	8,0	9,8
GEF 1490		2,5	4,9	8,9	11,0	12,7	15,5
GEF 1780		3,0	7,8	14,2	17,4	20,1	24,7
GEF 2124		4,0	12,4	22,6	27,7	32,0	39,2
GEF 2194		5,0	19,4	35,4	43,4	50,1	61,3
GEF 2310		6,0	31	56,6	69,3	80,0	98,0



GEA (ruby insert)*

CODE	Angle [deg] 3bar	Nominal orifice diameter [mm]	Flow rate (lpm) at different pressure (bar)				
			3	10	15	20	30
GEA 0380	0° * (straight jet)	0,38	0,12	0,22	0,27	0,31	0,38
GEA 0630		0,63	0,34	0,62	0,76	0,88	1,08
GEA 0810		0,81	0,50	0,91	1,12	1,29	1,58
GEA 0910		0,91	0,70	1,28	1,57	1,81	2,21
GEA 1010		1,01	0,88	1,61	1,97	2,27	2,78
GEA 1200		1,19	1,03	1,88	2,30	2,66	3,26

*The flow rate between metal and ruby insert nozzles may differ from the different finish applied to the orifice