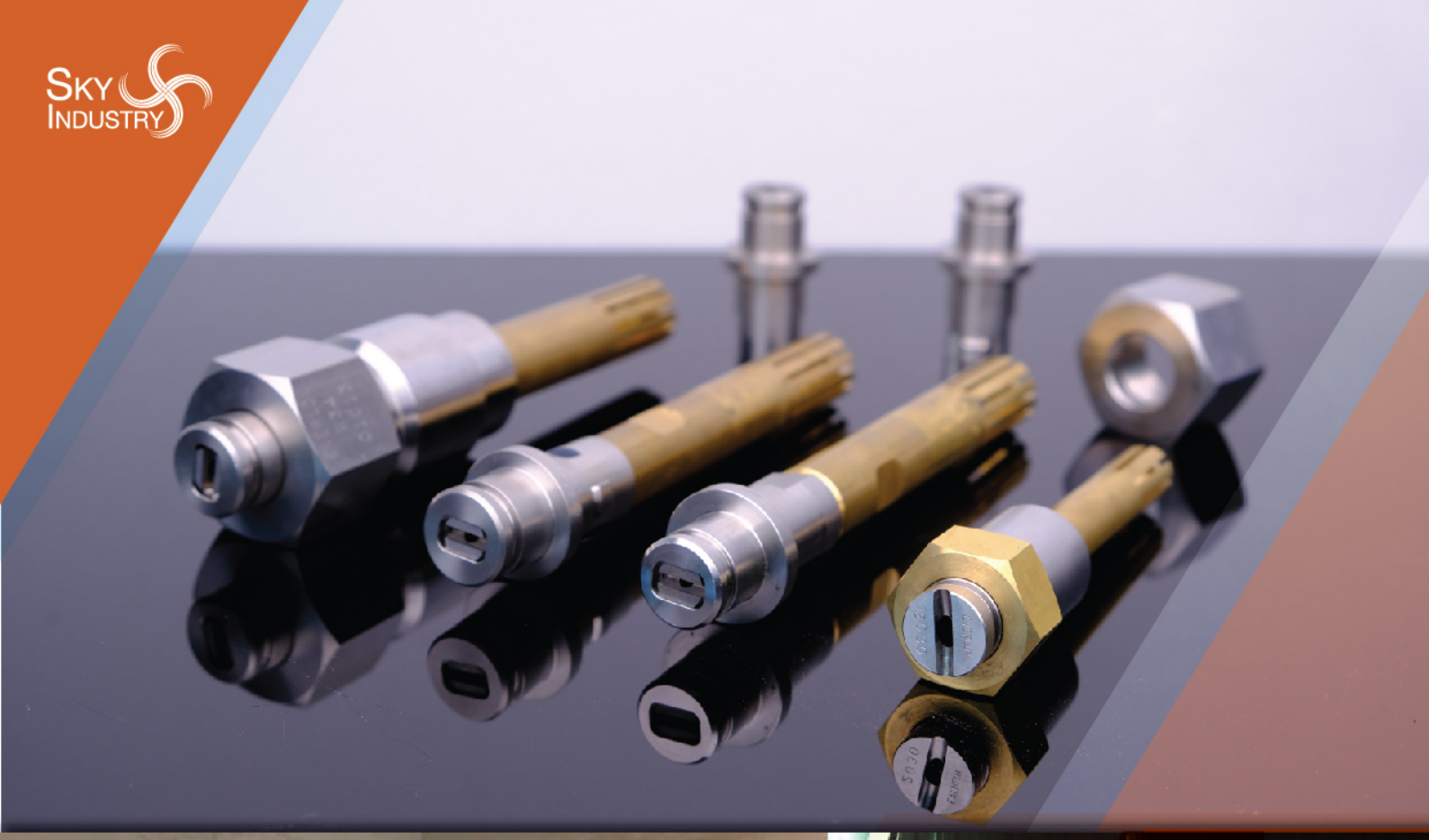
SKY INDUSTRY



SPRAY NOZZLES FOR STEEL MILLS

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WE ARE EVERLOY

Founded more than five decades ago, EVERLOY has a technology - rich history in Spray Nozzles and Tungsten Carbides, offering a broad range products for the steel making industry.

Its flagship product, EVERLOY's Descaling Nozzles, are made of highly durable tungsten carbide and have become an international benchmark for descaling in the steel industry, providing more uniform and consistent impact force along the spray width with excellent wear resistance.

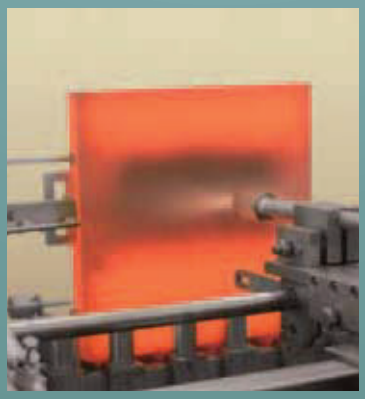
Most importantly, EVERLOY understands the challenges its customers face in delivering clean, high performance, quality steel. To meet those demands, EVERLOY's engineers are continuously researching and testing its products to provide technological advancements to help.

Global sales network

EVERLOY's reputation in the steel industry is advanced by the knowledge and experience of its global sales force. Our sales representatives work closely with customers to understand their issues, find solutions and fine - tune Everloy product applications to optimize energy savings and product quality. Visit our website and find contact information under the "Company" roll down menu.

More Than Nozzles

One of EVERLOY's philosophies is the importance of evolution, meaning we need to evolve our products as our customers' needs evolve. We need to use technology to not only develop the highest grade of spray nozzles, but to thoroughly understand how our products perform in customer applications.
EVERLOY invests a sizable amount of time and energy at its Kaibara Works Research & Evaluation Facility in Japan simulating nozzle performance based on actual customer applications. For Descale Nozzles we've conducted extensive studies to measure scale removal behavior with variables such as flow rate, pressure, spray distance, and spray time, including impact force distribution. Similarly, we are unsurpassed in the depth of research and data developed for Air Mist Nozzle.



Academic Literature

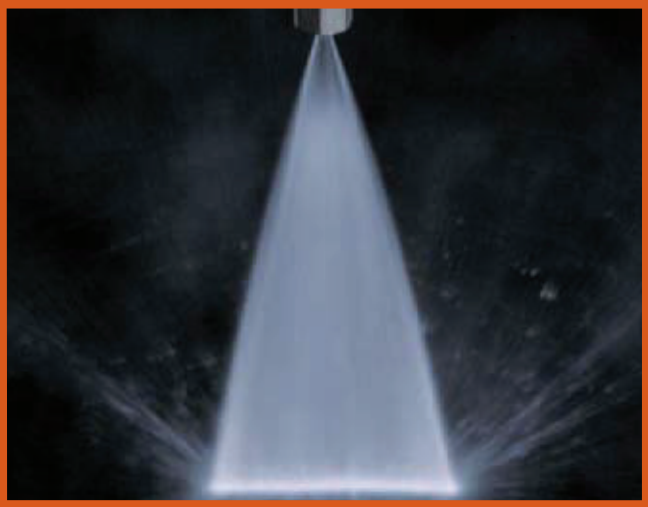
EVERLOY's technical papers are available to customers upon request:

- Research on higher pressure Descaling Nozzles together with extended life and durability (1995)
- Research for the impact force on super high pressure Descaling Nozzle (1997)
- Improvement of Strip Surface by Eliminating Tiger Mark (2000)
- The sophisticated Air Mist Nozzle for secondary cooling of the continuous caster (2010)
- Development and evaluation of Descaling Nozzles with high performance (2014)

Everloy Covers Steel

Precision. Wear resistance. Operational and maintenance flexibility. Customized solutions. And technical support. Just a few of the reasons so many steel makers consider Everloy an indispensable component in their steel making process.

EVERLOY Technology



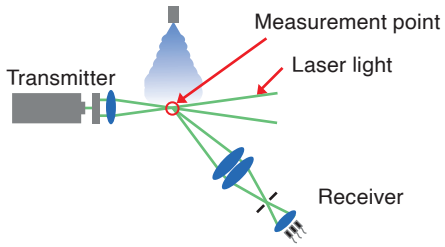
Continuous Caster

Hot Rolling Mill

Other Applications

TEST EQUIPMENT

Phase Doppler Particle Analyzer(PDPA) System



EVERLOY uses the PDPA measurement system, the most authoritative technology for particle size analysis.
The PDPA system uses the laser doppler effect to measure, simultaneously, the size, velocity and concentration of spray particles. This highly specialized technology is capable of sampling many particles.

Flow Distribution Measurement System

This system measures the distribution of spray flow density by spraying liquid on an acrylic container grid and measuring the amount of deposits.
The results of the measurement tests are illustrated in a resulting flow.

Impact Force Distribution Tester

This system determines the impact force distribution of a spray by running a pressure sensor underneath the spray.
It is also capable of producing measurement results in an impact force distribution graph.

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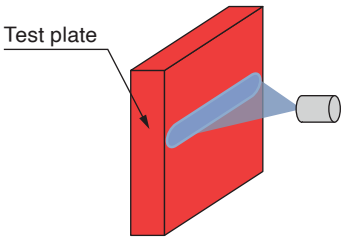
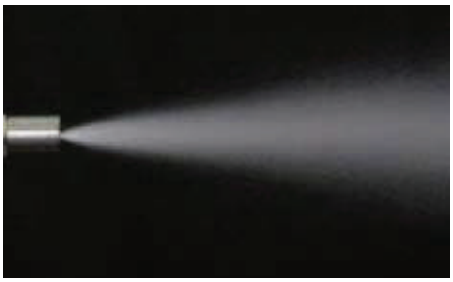
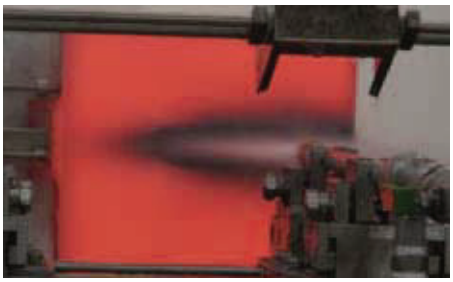
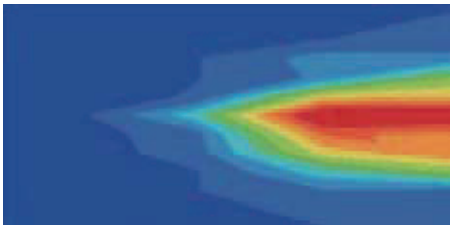
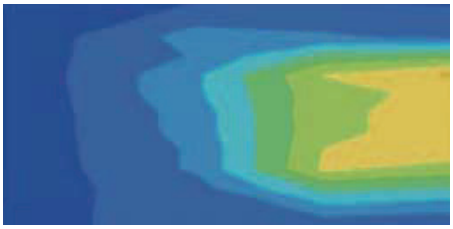
Air Mist Nozzles

Heat Transfer Coefficient (HTC) Test

The temperature of the plate is measured through thermocouples that are installed and the HTC is calculated to evaluate cooling performance.



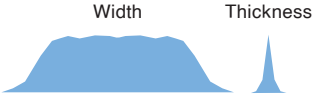
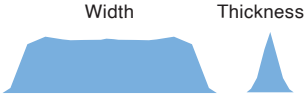
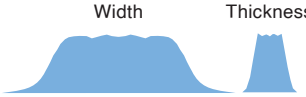
Nozzle type	KSAME (Single slit)	KSAMK (Double slit)
Spray Pattern		
Spray Footprint		
Distribution of HTC (surface temperature at 900 °C) **Condition** Air flow : 10 m^3/h(nor) Water flow : 20 L/min	Average HTC : 435 W/ (m^2·K) 	Average HTC : 540 W/ (m^2·K) 

Continuous Caster

EVERLOY understands the intense pressure continuous casters face to produce a wider variety of steel grades, the need for operational and maintenance flexibility, and the desire to reduce operation costs while optimizing product quality. That's why EVERLOY, more than any of its competitors, works closely with steelmakers and OEMs to create customized solutions to their continuous casting need. EVERLOY nozzles offer the highest precision in water density, distribution and thickness, more uniform flow and impact, and the most hardware features to provide customer - specific configurations.

EVERLOY **Air Mist Nozzles** and **Hydraulic Nozzles** are a critical component of the continuous casting process.

Air Mist Nozzles

	KSAME	KSAMH	KSAMK
Model			
Nozzle Tip			
Flow Distribution			
Spray Pattern			

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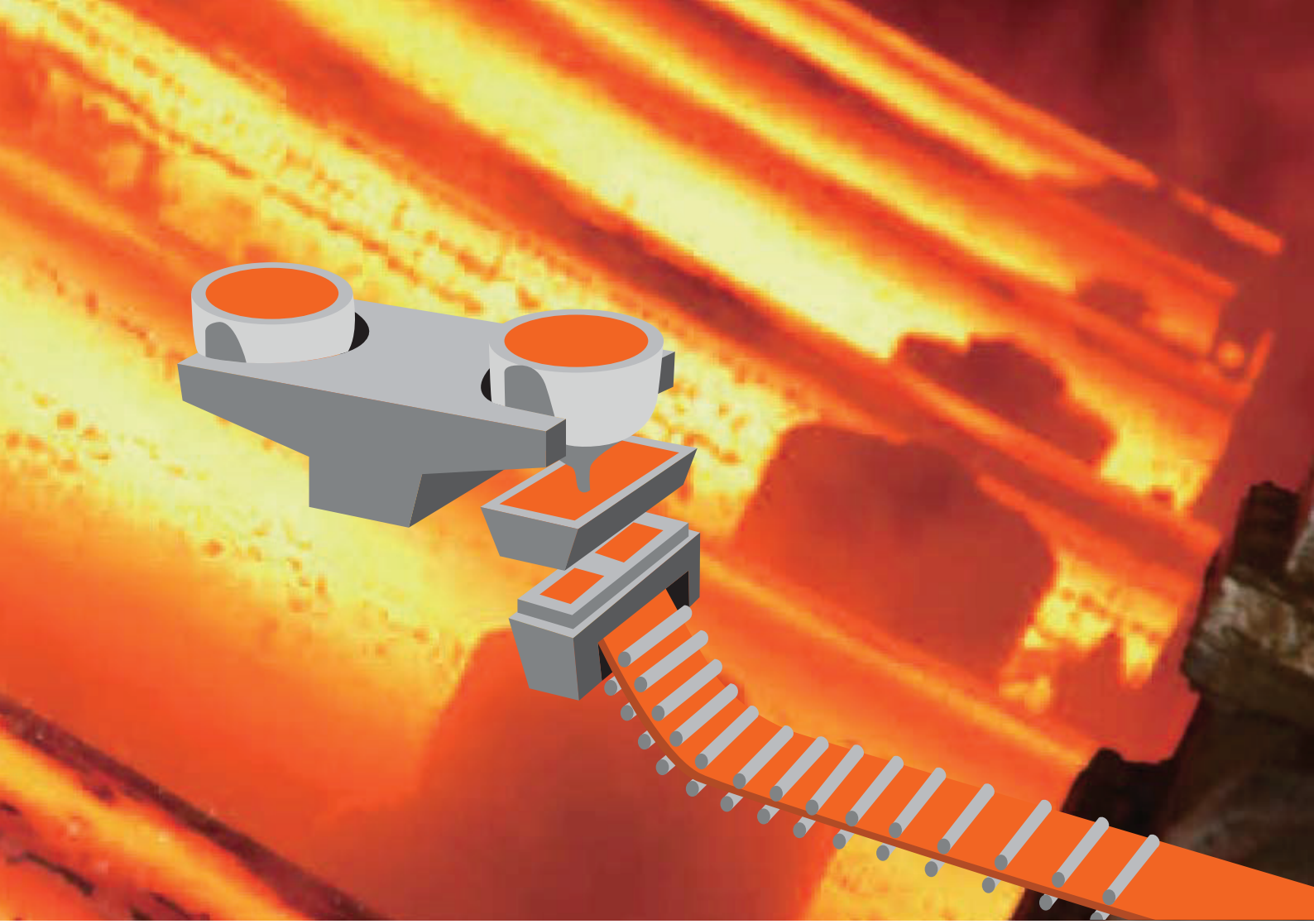
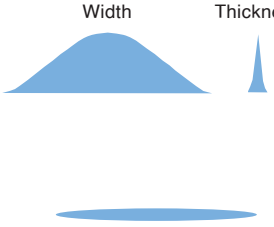
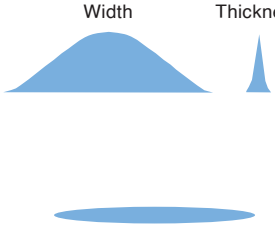
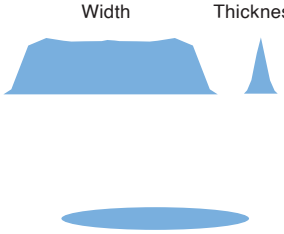


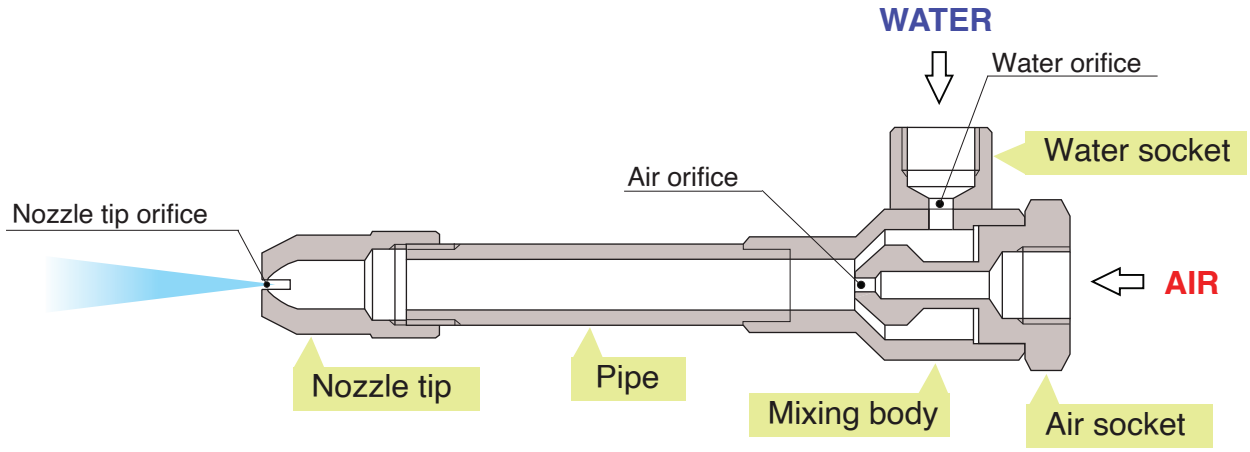
Hydraulic Nozzles

KSZ	KSAMR	KSTF
		
		
		

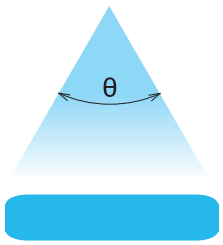
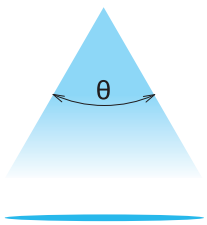
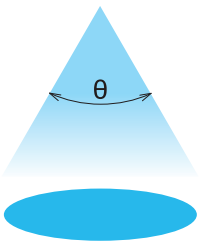
Advantage of Air Mist Nozzle

Most of the modern continuous casters are equipped with Air Mist Nozzles. The advantages of Air Mist Nozzles are summarized as follows:

Basic structure



Advantage

Nozzle type	Air Mist Nozzle	Flat Spray Nozzle	Oval Spray Nozzle
Fluid	Air & Water	Water	Water
Spray pattern	 θ < 120°	 θ < 120°	 θ < 90°
Water flow distribution			
Turn-down ratio	1 : 20 (max.)	1 : 5	1 : 5
Features	● Variable spray area ● Higher impact force ● Smaller particle size ● Resistance to clogging	● Simple structure for resistance to clogging	● Wider spray area ● Smaller particle size

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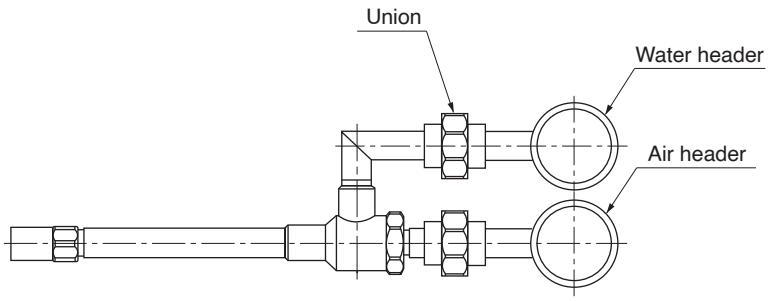
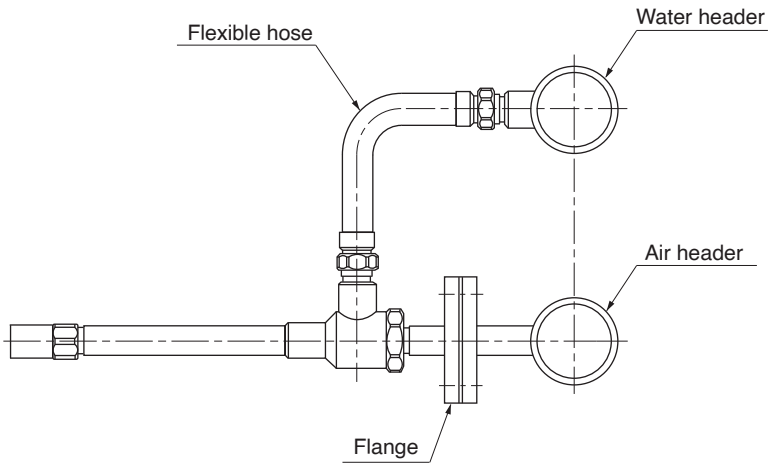
Nozzle mounting

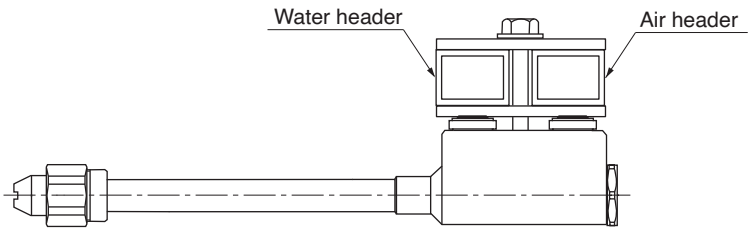
Union style



Flange style



Block style



The installation can be easily completed by bolting air/water connections to the pipe. At the same time, the nozzle tip allows precise self-alignment by putting the key groove of the nozzle tip on the keys of the pipe.

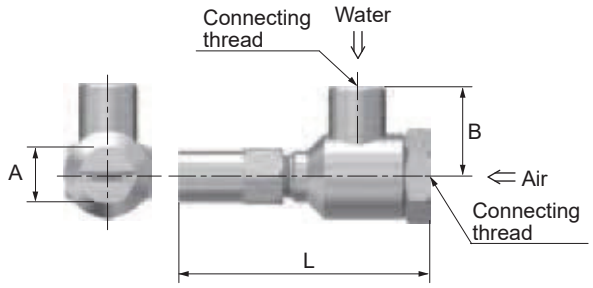
Air Mist Nozzles

Features

- Uniform flow distribution.
- Wide water turn-down ratio.
- Highly resistant to clogging, with a long service life.
- Truly custom made specification and shapes.

Shapes & dimensions

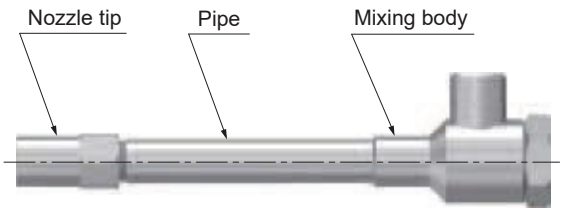
Compact type



Model	Dimension [mm]			Connecting thread		Weight [g]
	A	B	L	Water	Air	
1/4 KSAME	17	34.5	100	Rc 1/4	Rc 1/4	200
3/8 KSAME	21	34.5	100	Rc 3/8	Rc 3/8	350
1/2 KSAME	26	49	140	Rc 1/2	Rc 1/2	850
3/4 KSAME	32	49	150	Rc 1/2	Rc 1/2	1000

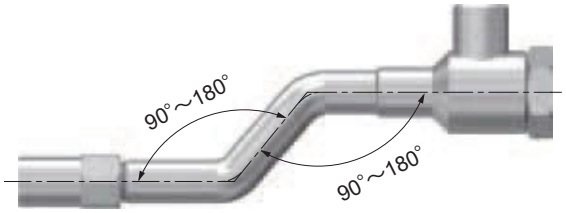
* NPT thread also available

Straight type



Part	Material
Nozzle tip	303 Stainless steel, Brass
Pipe	304 Stainless steel
Mixing body	304 & 303 Stainless steel

Bend type



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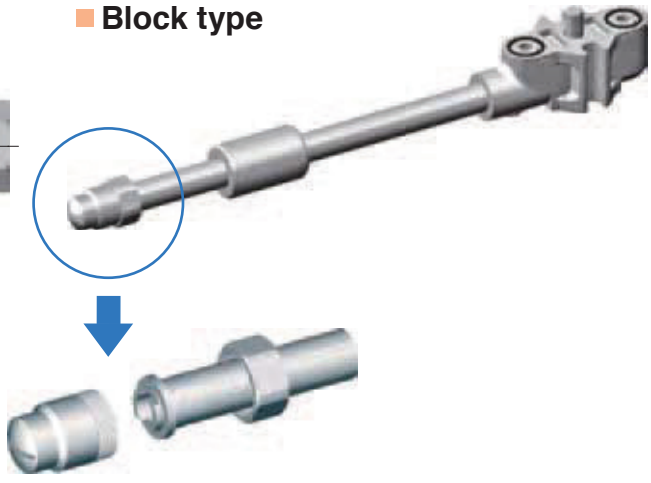

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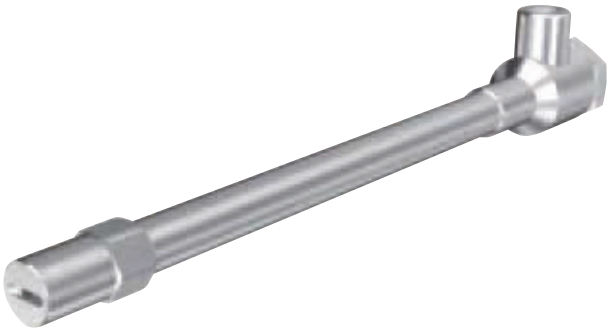
Air Mist Nozzles
KSAME

Features

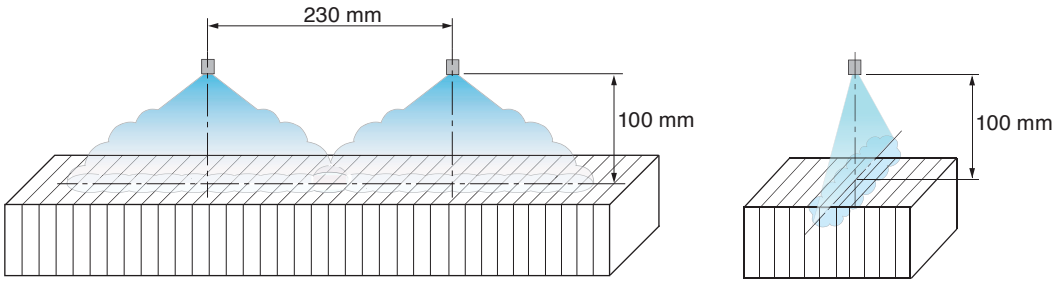
- Uniform flow and impact force distribution.

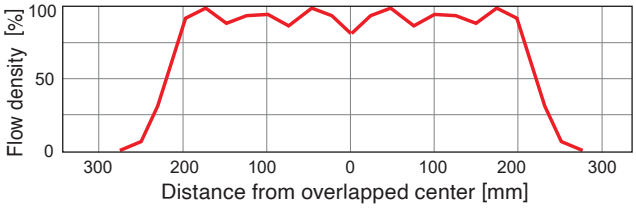
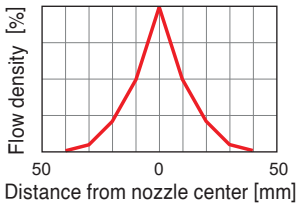
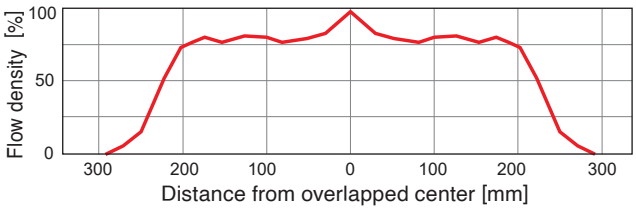
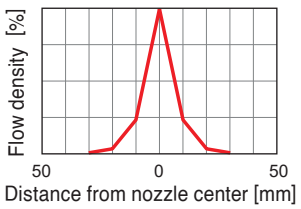
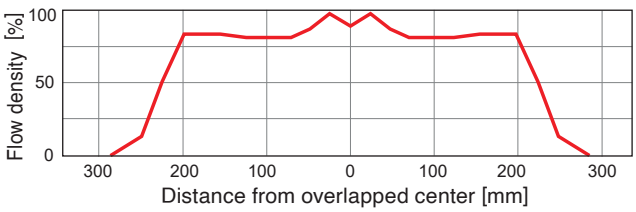
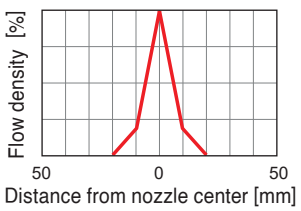


Technical data

Flow distribution

Nozzle model ³/₈ KSAME 52120 - ³/₈ S750 - ³/₈ A57 ³/₈ W35

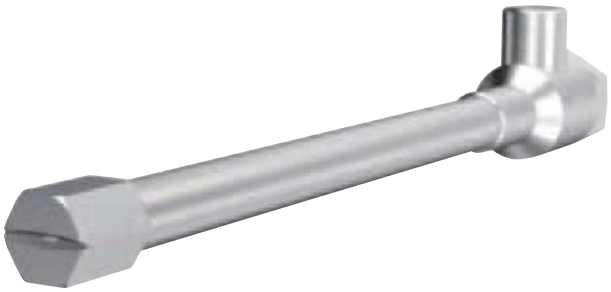


Flow distribution at overlapped configuration	Flow distribution of spray thickness direction	Condition
		**Air flow** =29.0 m³/h(nor) **Water flow** =0.93 L/min **Air-Water volume ratio** =520
		**Air flow** =19.5 m³/h(nor) **Water flow** =9.57 L/min **Air-Water volume ratio** =34.0
		**Air flow** =14.9 m³/h(nor) **Water flow** =17.2 L/min **Air-Water volume ratio** =14.4

Air Mist Nozzles
KSAMH

Features

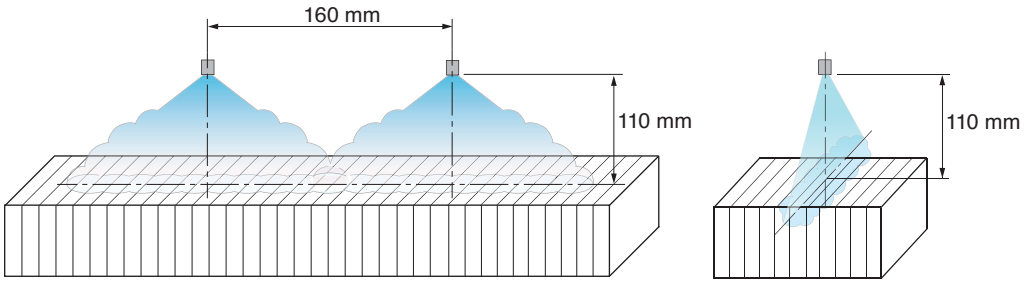
- Creating a thicker spray pattern than the standard single slit nozzle that leads to higher cooling efficiency.

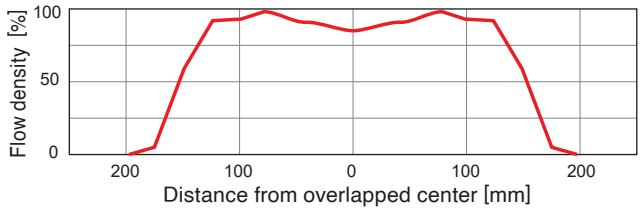
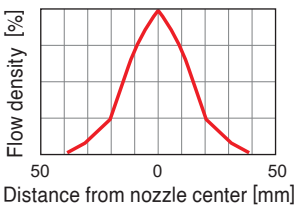
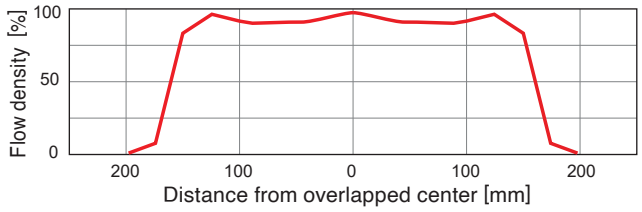
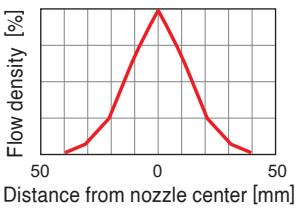
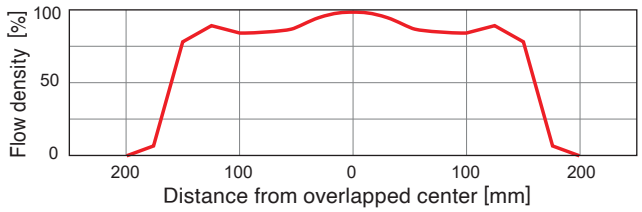
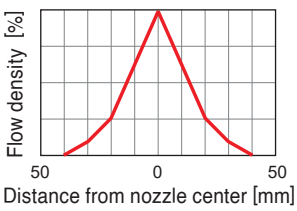


Technical data

Flow distribution

Nozzle model ½ KSAMH 5580-½ S350 - ½ A80 ½ W51



Flow distribution at overlapped configuration	Flow distribution of spray thickness direction	Condition
		**Air flow** =27.0 m³/h(nor) **Water flow** =4.9 L/min **Air-Water volume ratio** =91.8
		**Air flow** =27.0 m³/h(nor) **Water flow** =17.3 L/min **Air-Water volume ratio** =26.0
		**Air flow** =27.0 m³/h(nor) **Water flow** =30.0 L/min **Air-Water volume ratio** =15.0

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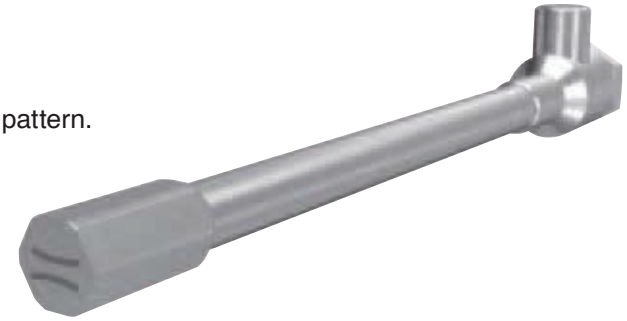
Air Mist Nozzles
KSAMK

Features

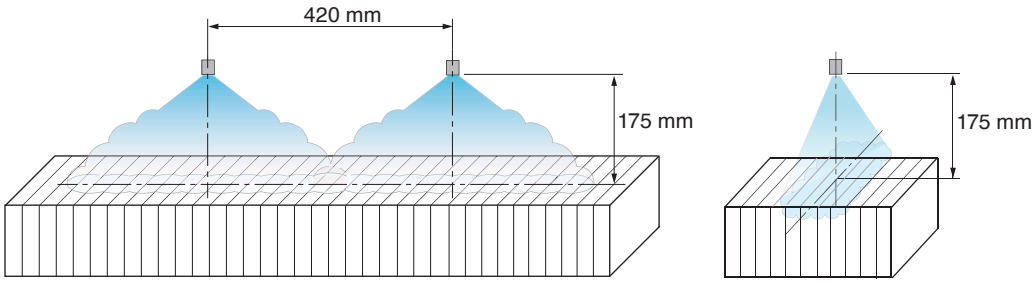
- A double slit leading to a thick spray pattern spray pattern.
- Uniform impact force distribution.
- Higher cooling performance at higher water flow rate.

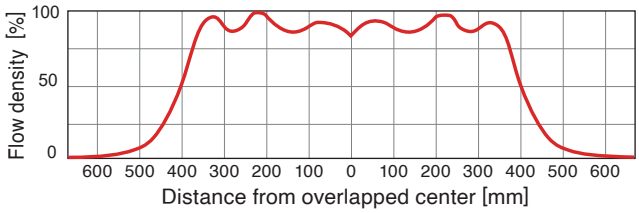
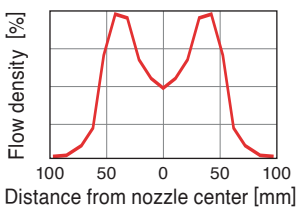
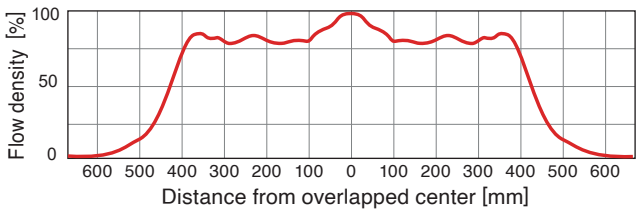
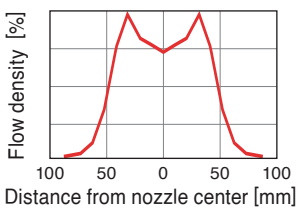
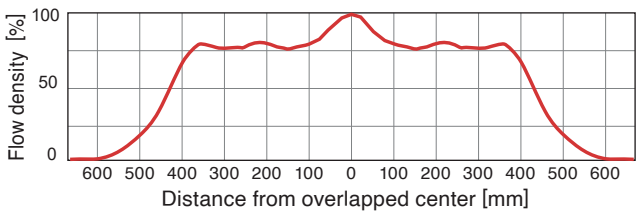
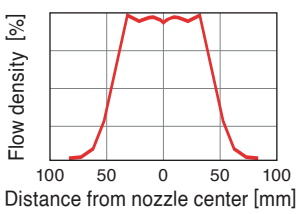


Technical data

Flow distribution

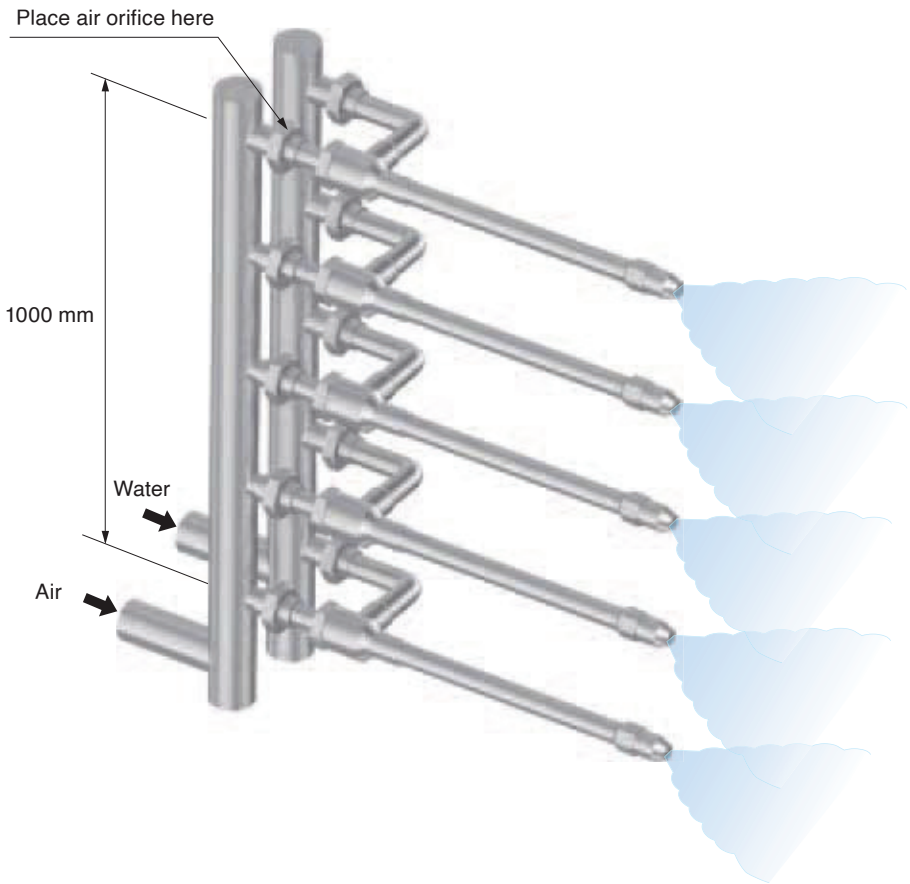
Nozzle model ³/₈ KSAMK 16170x2-³/₈ S1000 - ³/₈ A42 ³/₈ W46



Flow distribution at overlapped configuration	Flow distribution of spray thickness direction	Condition
		**Air flow** =13.8 m³/h(nor) **Water flow** =1.00 L/min **Air-Water volume ratio** =230
		**Air flow** =13.8 m³/h(nor) **Water flow** =7.9 L/min **Air-Water volume ratio** =29.1
		**Air flow** =13.8 m³/h(nor) **Water flow** =14.8 L/min **Air-Water volume ratio** =15.5

Height difference

As air and water have physical properties, water pressure varies more than air pressure if there is a height difference between the nozzle in the same air and water control loop. The influence of height difference becomes larger when water volume becomes smaller. As a result, nozzles installed in a higher position create less water volume when their volume is in the lower side and a nozzle installed in the lower position creates larger water volume. Consequently, specified water volume cannot be sprayed onto the slab. To solve such issues, put air orifices between the nozzle and air pipe, except for the lowest row, to control air volume in the same loop is proposed.



Height difference [mm]	Total air flow [m³/h(nor)]	Water flow [L/min]			
		Without air orifice		With air orifice	
		At min.	At max.	At min.	At max.
1000	150	0.64	13.80	1.88	14.56
750		1.16	14.08	1.70	14.26
500		1.64	14.44	1.86	14.38
250		2.22	14.84	1.60	14.42
0		2.90	14.88	1.66	14.19
Average (Variation)		1.71 (±70 %)	14.41 (±4 %)	1.74 (±8 %)	14.36 (±1 %)

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Control methods

1. Constant air pressure

- Control is easy.
- Air flow is lowest at maximum water flow, and air flow is highest at minimum water flow.

2. Constant air volume

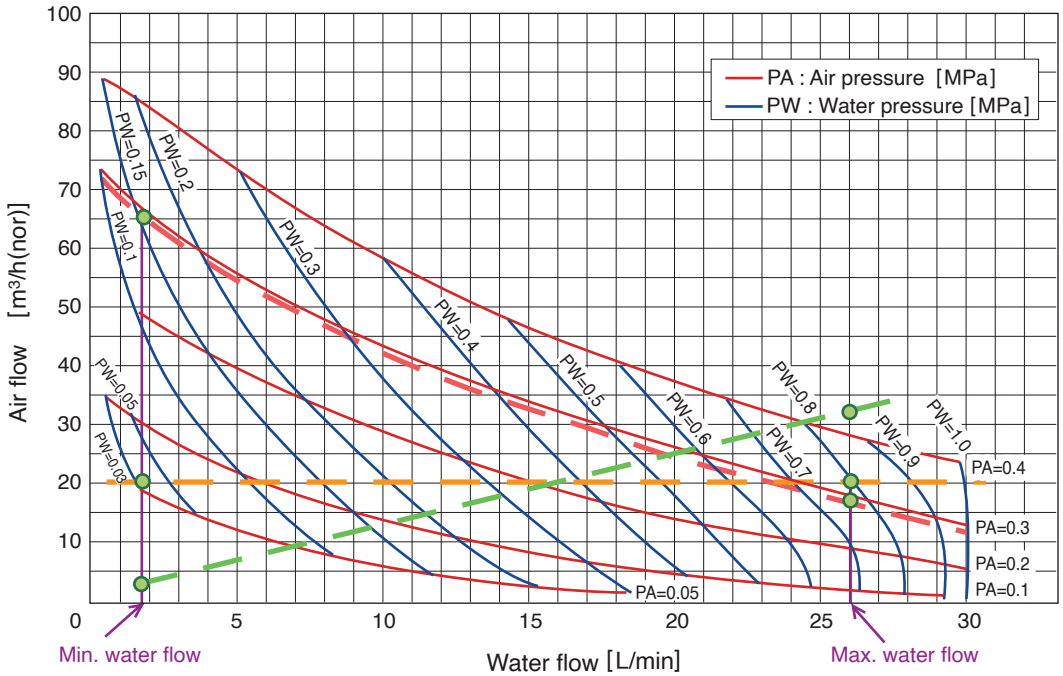
- Control is relatively easy.
- Higher turn-down ratio is possible.

3. Constant air-water volume ratio

- Control is difficult and turn down ratio is lower.
- Less change in droplet size.

4. Combination

- Control is difficult.
- Combination of above-mentioned control methods.



Air Mist Nozzles

Spray width control

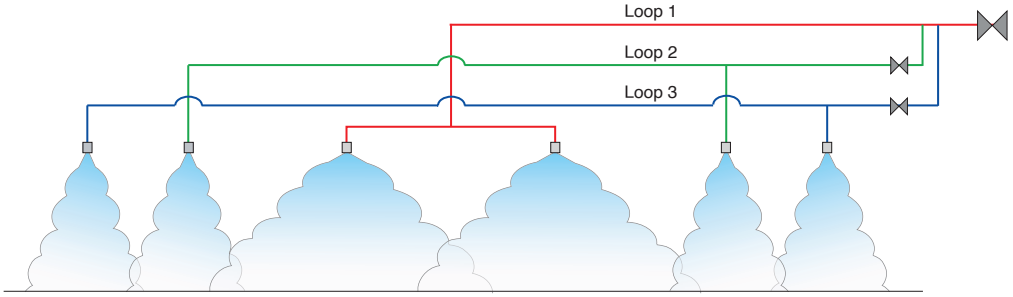
If casting a wide range of slab widths, the spray nozzle control mechanism is critical in controlling over cooling of slab edges. There are mainly two ways to control spray width.

Width control by water control loop

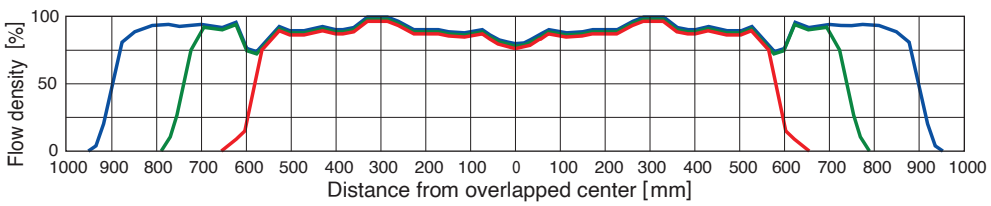
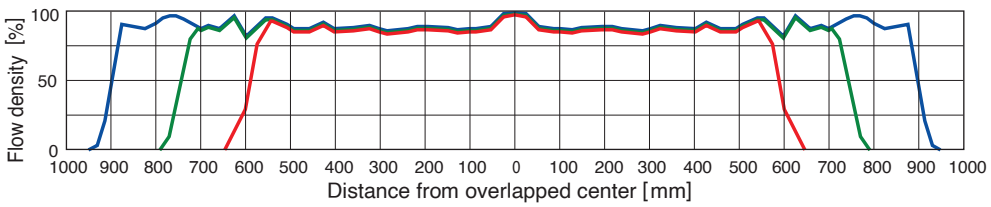
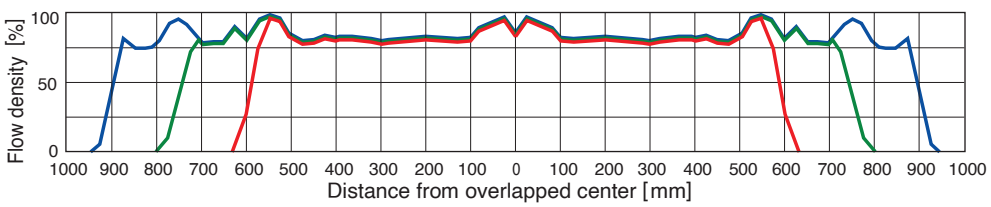
A water loop allows for cooling of varying width of slabs. For narrow slabs, outside nozzles on the loop can be turned off. For wider slabs, narrow-angled outside nozzles can be turned on to provide more coverage.

Nozzle model 1/2 KSAME 9596 -1/2 S1000 - 1/2 A120 1/2 W66 (Loop 1)

Nozzle model 3/8 KSAME 2258 -3/8 S1000 - 3/8 A60 1/2 W33 (Loop 2, 3)



Loop 1
Loop 1, 2
Loop 1, 2, 3

Flow distribution at overlapped configuration	Condition
	**Loop 1** **Air flow** =18.4 m³/h(nor) **Water flow** =3.47 L/min **Air-Water volume ratio** =88.4 **Loop 2, 3** **Air flow** =4.6 m³/h(nor) **Water flow** =0.87 L/min **Air-Water volume ratio** =88.1
	**Loop 1** **Air flow** =18.4 m³/h(nor) **Water flow** =5.35 L/min **Air-Water volume ratio** =57.3 **Loop 2, 3** **Air flow** =4.6 m³/h(nor) **Water flow** =1.34 L/min **Air-Water volume ratio** =57.2
	**Loop 1** **Air flow** =18.4 m³/h(nor) **Water flow** =34.7 L/min **Air-Water volume ratio** =8.8 **Loop 2, 3** **Air flow** =4.6 m³/h(nor) **Water flow** =8.7 L/min **Air-Water volume ratio** =8.8

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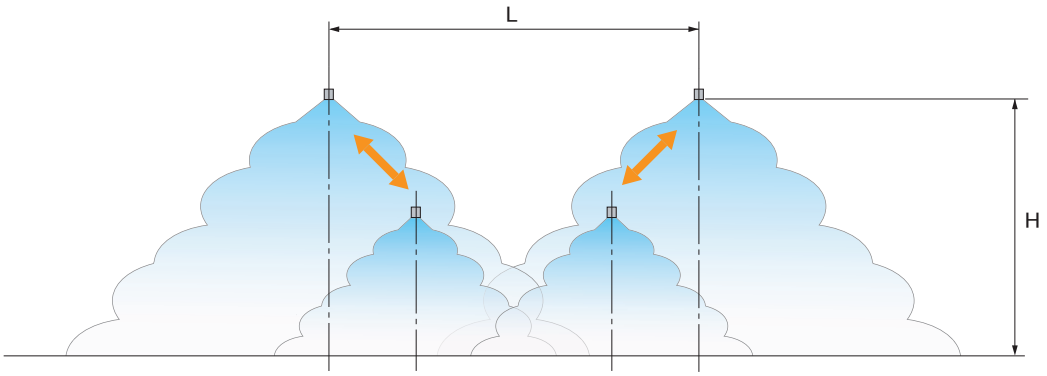
Spray width control

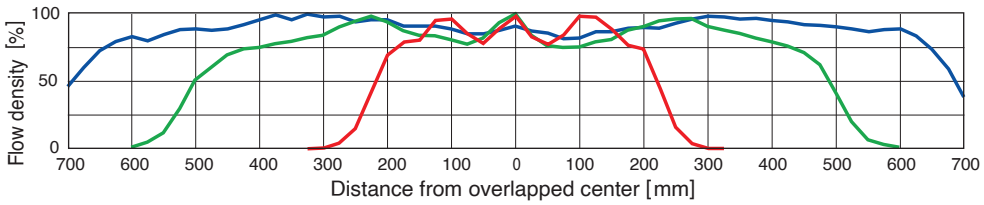
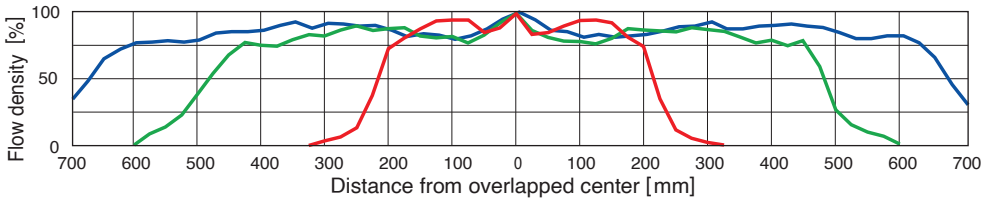
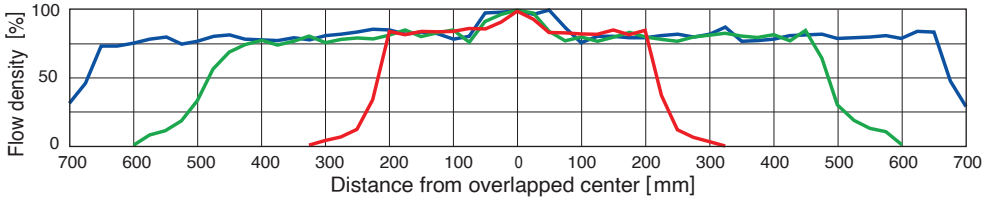
Width control by changing nozzle pitch and distance

Spray width control is accomplished by changing nozzle pitch and spray height. Precise spray width control is possible but higher spray distance is required when a wide size slab needs to be sprayed.

Nozzle model ½ KSAME 52142 -½ S500 - ½ A100 ½ W70



L=266 mm, H= 72 mm
L=500 mm, H=175 mm
L=700 mm, H=250 mm

Flow distribution at overlapped configuration	Condition
	**Air flow** =18.0 m³/h(nor) **Water flow** =2.00 L/min **Air-Water volume ratio** =150
	**Air flow** =12.0 m³/h(nor) **Water flow** =20 L/min **Air-Water volume ratio** =10.0
	**Air flow** =8.0 m³/h(nor) **Water flow** =40 L/min **Air-Water volume ratio** =3.3

Flat Spray Nozzle
KSZ

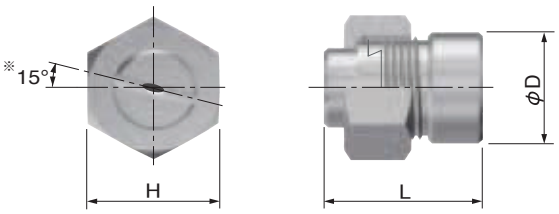
Features

- Dove tail shaped groove provides:
  - Precise self-alignment and fixed spray position.
  - Anti-drop off when nozzle tip is put on/off.

Applications

- Work Roll cooling
- Slab cooling

Shapes & dimensions



※ Offset angle

Model	Dimension [mm]			Value at 0.3 MPa pressure		
	H	L	D	Flow rate [L/min]	Spray angle (width)	Spray angle (thickness)
KSZ	32	38	28	6 to 80	15 to 120°	5 to 10°
KSZS	22	27	17	4 to 20	15 to 120°	5 to 10°

Cap　　Nozzle tip　　Weld adapter

Part	Material	Weight at following model [g]	
		KSZS	KSZ
Cap	303 Stainless steel	25	50
Nozzle tip	303 Stainless steel	10	35
Weld adapter	304 Stainless steel	20	65

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Models & specifications

Model	Model number	Minimum orifice diameter [mm]	Flow rate [L/min] at following pressure [MPa]								Spray angle at following pressure [MPa]				
			0.05	0.1	0.2	0.3	0.5	0.7	1.0	1.5	0.1	0.2	0.3	0.5	1.0
KSZS	0430	1.6	1.6	2.3	3.3	4.0	5.2	6.1	7.3	8.9	24°	28°	30°	32°	34°
	0445	1.5	1.6	2.3	3.3	4.0	5.2	6.1	7.3	8.9	36°	42°	45°	48°	51°
	0460	1.3	1.6	2.3	3.3	4.0	5.2	6.1	7.3	8.9	49°	57°	60°	65°	67°
	0490	1.1	1.6	2.3	3.3	4.0	5.2	6.1	7.3	8.9	75°	86°	90°	96°	101°
KSZS KSZ	0630	2.1	2.4	3.5	4.9	6.0	7.7	9.2	11.0	13.4	24°	28°	30°	32°	34°
	0645	2.0	2.4	3.5	4.9	6.0	7.7	9.2	11.0	13.4	36°	42°	45°	48°	51°
	0660	1.8	2.4	3.5	4.9	6.0	7.7	9.2	11.0	13.4	49°	57°	60°	65°	67°
	0690	1.3	2.4	3.5	4.9	6.0	7.7	9.2	11.0	13.4	75°	86°	90°	96°	101°
	0830	2.5	3.3	4.6	6.5	8.0	10.3	12.2	14.6	17.9	24°	28°	30°	32°	34°
	0845	2.3	3.3	4.6	6.5	8.0	10.3	12.2	14.6	17.9	36°	42°	45°	48°	51°
	0860	2.0	3.3	4.6	6.5	8.0	10.3	12.2	14.6	17.9	50°	57°	60°	65°	65°
	0890	1.6	3.3	4.6	6.5	8.0	10.3	12.2	14.6	17.9	75°	86°	90°	96°	101°
	1030	2.8	4.1	5.8	8.2	10.0	12.9	15.3	18.3	22.4	24°	28°	30°	32°	36°
	1045	2.6	4.1	5.8	8.2	10.0	12.9	15.3	18.3	22.4	36°	42°	45°	48°	51°
	1060	2.2	4.1	5.8	8.2	10.0	12.9	15.3	18.3	22.4	50°	57°	60°	65°	65°
	1090	2.0	4.1	5.8	8.2	10.0	12.9	15.3	18.3	22.4	75°	86°	90°	96°	101°
	1230	3.0	4.9	6.9	9.8	12.0	15.5	18.3	21.9	26.8	24°	28°	30°	32°	36°
	1245	2.8	4.9	6.9	9.8	12.0	15.5	18.3	21.9	26.8	36°	42°	45°	48°	51°
	1260	2.4	4.9	6.9	9.8	12.0	15.5	18.3	21.9	26.8	49°	57°	60°	65°	65°
	1290	2.1	4.9	6.9	9.8	12.0	15.5	18.3	21.9	26.8	75°	86°	90°	96°	100°
	1530	3.5	6.1	8.7	12.2	15.0	19.4	22.9	27.4	33.5	24°	28°	30°	32°	36°
	1545	3.4	6.1	8.7	12.2	15.0	19.4	22.9	27.4	33.5	36°	42°	45°	48°	51°
	1560	3.1	6.1	8.7	12.2	15.0	19.4	22.9	27.4	33.5	49°	57°	60°	65°	65°
	1590	2.3	6.1	8.7	12.2	15.0	19.4	22.9	27.4	33.5	75°	86°	90°	96°	100°
	2030	4.0	8.2	11.5	16.3	20.0	25.8	30.6	36.5	44.7	24°	28°	30°	32°	36°
	2045	3.8	8.2	11.5	16.3	20.0	25.8	30.6	36.5	44.7	36°	42°	45°	48°	51°
	2060	3.5	8.2	11.5	16.3	20.0	25.8	30.6	36.5	44.7	49°	57°	60°	65°	65°
	2090	2.8	8.2	11.5	16.3	20.0	25.8	30.6	36.5	44.7	75°	86°	90°	96°	100°
KSZ	2530	4.5	10.2	14.4	20.4	25.0	32.3	38.2	45.6	55.9	24°	28°	30°	32°	36°
	2545	4.3	10.2	14.4	20.4	25.0	32.3	38.2	45.6	55.9	36°	42°	45°	48°	51°
	2560	3.9	10.2	14.4	20.4	25.0	32.3	38.2	45.6	55.9	49°	57°	60°	65°	66°
	2590	3.2	10.2	14.4	20.4	25.0	32.2	38.2	45.6	55.9	75°	86°	90°	96°	99°
	3030	4.7	12.2	17.3	24.5	30.0	38.7	45.8	54.8	67.1	24°	28°	30°	32°	36°
	3045	4.5	12.2	17.3	24.5	30.0	38.7	45.8	54.8	67.1	36°	42°	45°	48°	51°
	3060	4.3	12.2	17.3	24.5	30.0	38.7	45.8	54.8	67.1	49°	57°	60°	65°	65°
	3090	3.7	12.2	17.3	24.5	30.0	38.7	45.8	54.8	67.1	75°	86°	90°	96°	99°
	3530	5.0	14.3	20.2	28.6	35.0	45.2	53.5	63.9	78.3	24°	28°	30°	32°	36°
	3545	4.8	14.3	20.2	28.6	35.0	45.2	53.5	63.9	78.3	36°	42°	45°	48°	51°
	3560	4.5	14.3	20.2	28.6	35.0	45.2	53.5	63.9	78.3	49°	57°	60°	65°	65°
	3590	3.9	14.3	20.2	28.6	35.0	45.2	53.5	63.9	78.3	75°	86°	90°	96°	99°
	4030	5.5	16.3	23.1	32.7	40.0	51.6	61.1	73.0	89.4	24°	28°	30°	32°	34°
	4045	5.2	16.3	23.1	32.7	40.0	51.6	61.1	73.0	89.4	36°	42°	45°	48°	51°
	4060	5.0	16.3	23.1	32.7	40.0	51.6	61.1	73.0	89.4	49°	57°	60°	65°	65°
	4090	4.1	16.3	23.1	32.7	40.0	51.6	61.1	73.0	89.4	75°	86°	90°	96°	97°
	5030	6.3	20.4	28.9	40.8	50.0	64.5	76.4	91.3	112	24°	28°	30°	32°	34°
	5045	5.8	20.4	28.9	40.8	50.0	64.5	76.4	91.3	112	36°	42°	45°	48°	51°
	5060	5.6	20.4	28.9	40.8	50.0	64.5	76.4	91.3	112	49°	57°	60°	65°	65°
	5090	4.6	20.4	28.9	40.8	50.0	64.5	76.4	91.3	112	75°	86°	90°	96°	96°
	6030	6.9	24.5	34.6	49.0	60.0	77.5	91.7	110	134	24°	28°	30°	32°	34°
	6045	6.4	24.5	34.6	49.0	60.0	77.5	91.7	110	134	36°	42°	45°	48°	51°
	6060	6.2	24.5	34.6	49.0	60.0	77.5	91.7	110	134	49°	57°	60°	65°	65°
	6090	5.4	24.5	34.6	49.0	60.0	77.5	91.7	110	134	75°	86°	90°	96°	95°
	7030	7.5	28.6	40.4	57.2	70.0	90.4	107	128	157	24°	28°	30°	32°	34°
	7045	6.9	28.6	40.4	57.2	70.0	90.4	107	128	157	36°	42°	45°	48°	51°
	7060	6.6	28.6	40.4	57.2	70.0	90.4	107	128	157	49°	57°	60°	65°	65°
	7090	6.0	28.6	40.4	57.2	70.0	90.4	107	128	157	75°	86°	90°	96°	95°
	8030	8.0	32.7	46.2	65.3	80.0	103	122	146	179	24°	28°	30°	32°	34°
	8045	7.3	32.7	46.2	65.3	80.0	103	122	146	179	36°	42°	45°	48°	51°
	8060	6.9	32.7	46.2	65.3	80.0	103	122	146	179	49°	57°	60°	65°	65°
	8090	6.4	32.7	46.2	65.3	80.0	103	122	146	179	75°	86°	90°	96°	95°

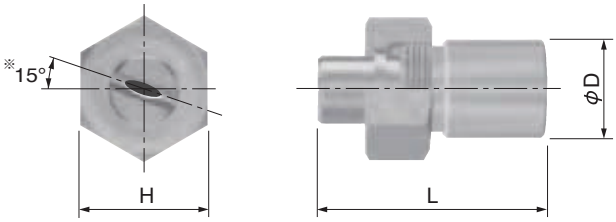
Thickening Flat Spray Nozzle
KSAMR

Hydraulic nozzles

Features

- Thicker spray thickness compared with standard flat spray nozzle.
- Precise alignment of nozzle tip and adapter.

Shapes & dimensions



※ Offset angle

Size	Dimension [mm]			Value at 0.3 MPa pressure		
	H	D	L	Flow rate [L/min]	Spray angle (width)	Spray angle (thickness)
3/8	22	17	40	2 to 20	40 to 110°	20 to 25°
1/2	26	22	55	10 to 40	40 to 110°	20 to 25°

Cap　　Nozzle tip　　Weld adapter

Part	Material	Weight at following size [g]	
		3/8	1/2
Cap	303 Stainless steel	30	50
Nozzle tip	303 Stainless steel	10	40
Weld adapter	304 Stainless steel	30	55

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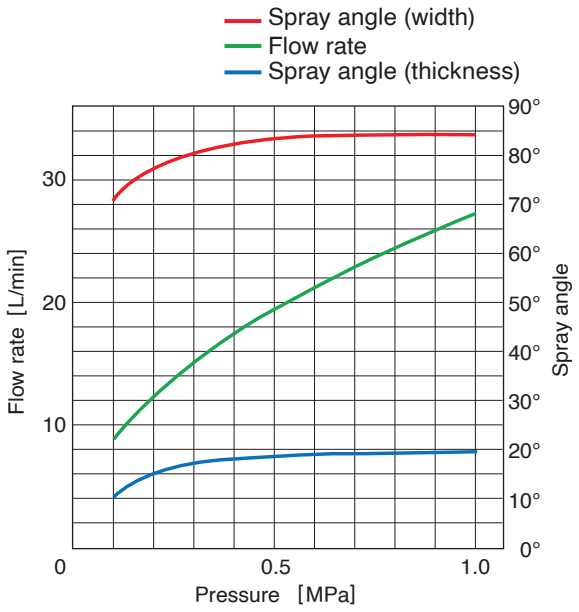
Models & specifications

Model	Size	Model number	Minimum orifice diameter [mm]	Flow rate [L/min] at following pressure [MPa]							Spray angle at following pressure [MPa]				
				0.1	0.2	0.3	0.5	0.7	1.0	1.5	0.1	0.2	0.3	0.5	1.0
KSAMR	3/8	1065	2.6	5.8	8.2	10.0	12.9	15.3	18.3	22.4	56°	63°	65°	68°	70°
		1080	1.9	5.8	8.2	10.0	12.9	15.3	18.3	22.4	70°	78°	80°	83°	84°
		1565	3.0	8.7	12.2	15.0	19.4	22.9	27.4	33.5	57°	63°	65°	68°	70°
		1580	2.7	8.7	12.2	15.0	19.4	22.9	27.4	33.5	71°	78°	80°	83°	84°
		2065	3.6	11.5	16.3	20.0	25.8	30.6	36.5	44.7	57°	63°	65°	68°	70°
		2080	3.3	11.5	16.3	20.0	25.8	30.6	36.5	44.7	73°	78°	80°	82°	83°
	1/2	3065	4.4	17.3	24.5	30.0	38.7	45.8	54.8	67.1	57°	63°	65°	68°	70°
		3080	3.8	17.3	24.5	30.0	38.7	45.8	54.8	67.1	73°	78°	80°	81°	82°
		4065	5.0	23.1	32.7	40.0	51.6	61.1	73.0	89.4	57°	63°	65°	68°	70°
		4080	4.7	23.1	32.7	40.0	51.6	61.1	73.0	89.4	75°	78°	80°	81°	81°
	3/4	5065	5.8	28.9	40.8	50.0	64.5	76.4	91.3	112	57°	63°	65°	68°	70°
		5080	5.2	28.9	40.8	50.0	64.5	76.4	91.3	112	75°	78°	80°	81°	81°
		6065	6.5	34.6	49.0	60.0	77.5	91.7	110	134	57°	63°	65°	68°	70°
		6080	5.8	34.6	49.0	60.0	77.5	91.7	110	134	75°	78°	80°	81°	81°

Technical data

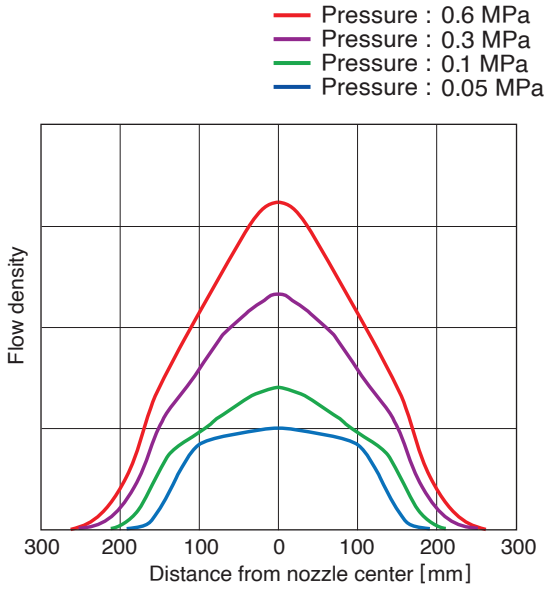
Characteristic curves

Nozzle model 3/8 KSAMR 1580



Flow distribution

Nozzle model 3/8 KSAMR 1565
Distance 300 mm



Extra Thickening Flat Spray Nozzle
KSTF

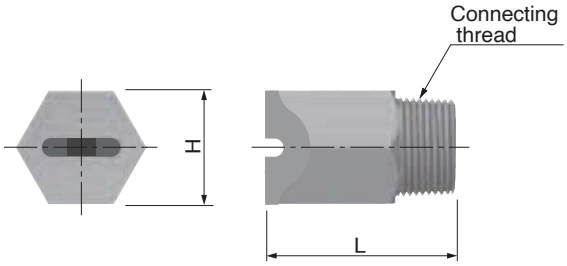
Hydraulic nozzles

Features

- Extra thick spray pattern.
- Flow distribution is wide and uniform.

Shapes & dimensions

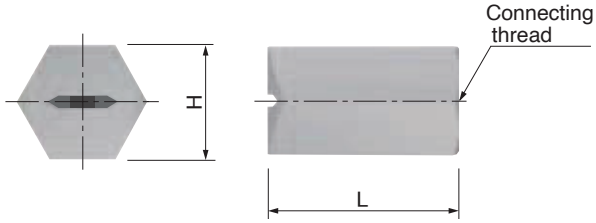
Male connection type



Connecting thread	Dimension [mm]		Value at 0.3 MPa pressure			Weight [g]
	H	L	Flow rate [L/min]	Spray angle (width)	Spray angle (thickness)	
R 3/4	32	67	40 to 110	70 to 140°	25 to 35°	230
R 1	38	60	to 150	70 to 140°	25 to 35°	400
R 1 1/4	46	75	to 200	70 to 140°	25 to 35°	730
R 1 1/2	50	90	to 250	70 to 140°	25 to 35°	1030

* NPT thread also available

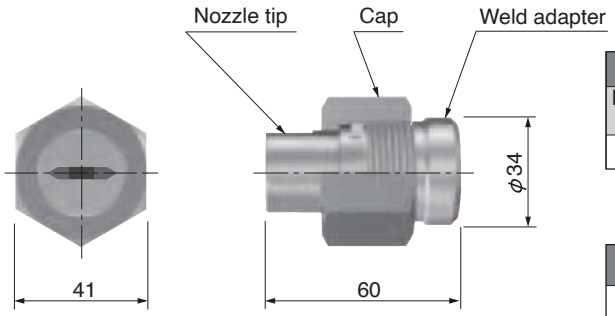
Female connection type



Connecting thread	Dimension [mm]		Value at 0.3 MPa pressure			Weight [g]
	H	L	Flow rate [L/min]	Spray angle (width)	Spray angle (thickness)	
Rc 3/8	19	30	6 to 20	70 to 140°	25 to 35°	50
Rc 1/2	24	40	to 40	70 to 140°	25 to 35°	110
Rc 3/4	32	50	to 110	70 to 140°	25 to 35°	240

* NPT thread also available

Welding type



Unit : mm

Value at 0.3 MPa pressure			Weight [g]
Flow rate [L/min]	Spray angle (width)	Spray angle (thickness)	
6 to 20	70 to 140°	25 to 35°	400

Part	Material
Cap	303 Stainless steel
Nozzle tip	303 Stainless steel
Weld adapter	304 Stainless steel

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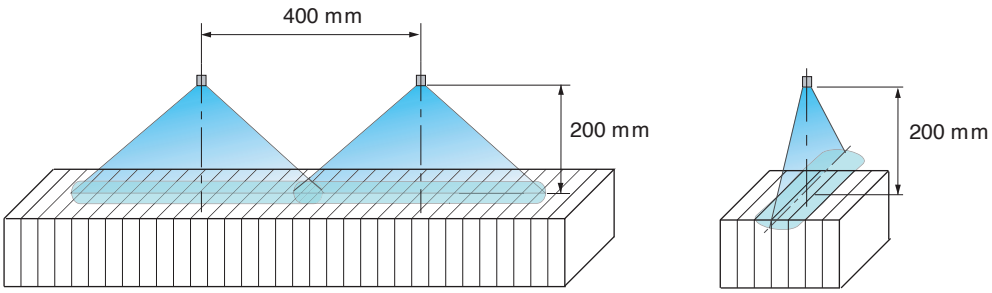
Models & specifications

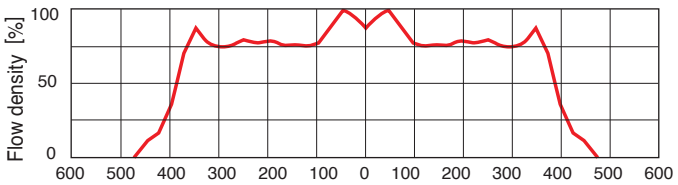
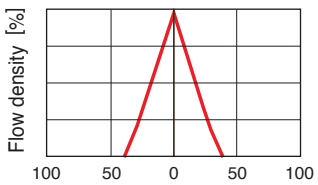
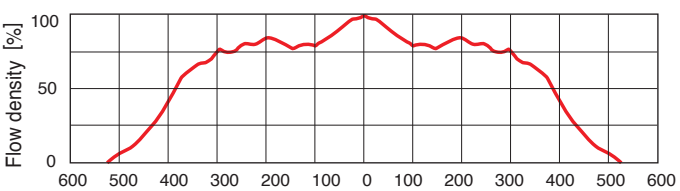
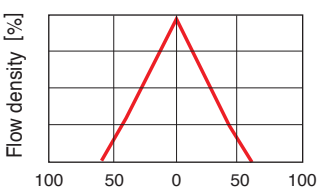
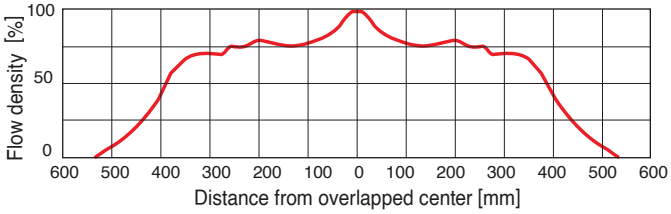
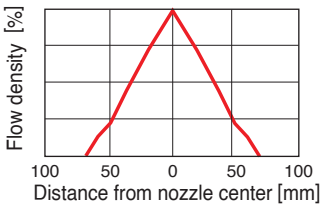
Model	Size	Model number	Minimum orifice diameter [mm]	Flow rate [L/min] at following pressure [MPa]							Spray angle at 0.3 MPa
				0.1	0.2	0.3	0.5	0.7	1.0	1.5	0.5
KSTF	3/8	0698	1.7	3.5	4.9	6.0	7.7	9.2	11.0	13.4	98°
		11122	1.4	6.4	9.0	11.0	14.2	16.8	20.1	24.6	122°
		13106	2.7	7.5	10.6	13.0	16.8	19.9	23.7	29.1	106°
	1/2	20145	2.3	11.5	16.3	20.0	25.8	30.6	36.5	44.7	145°
		25110	2.6	14.4	20.4	25.0	32.3	38.2	45.6	55.9	110°
		33130	3.4	19.1	26.9	33.0	42.6	50.4	60.2	73.8	130°
	3/4	8580	6.5	49.1	69.4	85.0	110	130	155	190	80°
		108100	7.0	62.4	88.2	108	139	165	197	241	100°
	1	120115	7.0	69.3	98.0	120	155	183	219	268	115°
		130115	8.0	75.1	106	130	168	199	237	291	115°
	1 1/4	160100	9.8	92.4	131	160	207	244	292	358	100°
		17970	9.0	103	146	179	231	273	327	400	70°
	1 1/2	210100	14.0	121	171	210	271	321	383	470	100°
		245120	12.0	141	200	245	316	374	447	548	120°

Technical data

Flow distribution

Nozzle model 3/4 KSTF 27139HU

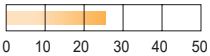
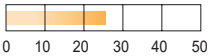
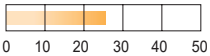
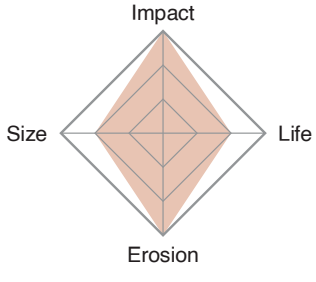
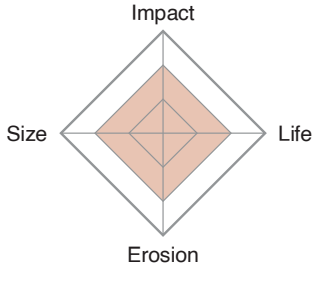
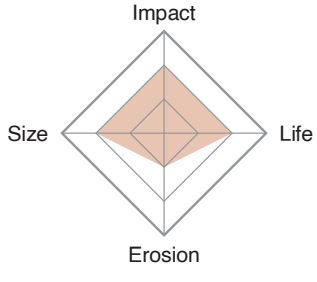


Flow distribution at overlapped configuration	Flow distribution of spray thickness direction	Condition
		**Water pressure** = 0.022 MPa **Water flow** = 6.7 L/min
		**Water pressure** = 0.165 MPa **Water flow** = 20.2 L/min
		**Water pressure** = 0.475 MPa **Water flow** = 33.6 L/min

Hot Rolling Mill

Descaling nozzles are an indispensable part in achieving surface quality in the steel making process. With energy costs rising, demand for difficult grades coming on strong, and an increased need for environmentally friendly systems. Everloy's wide variety of Descaling Nozzles are providing options that were not previously possible. As an industry trendsetter, Everloy keeps raising the standard and advancing the Descaling nozzle technologies.

Descaling Nozzles

Model	DNEX	DNX	DNH
			
Maximum Working Pressure	25 MPa 	25 MPa 	25 MPa 
Tungsten Carbide Tips	Standard	Standard	Standard
Performance (25 MPa)			

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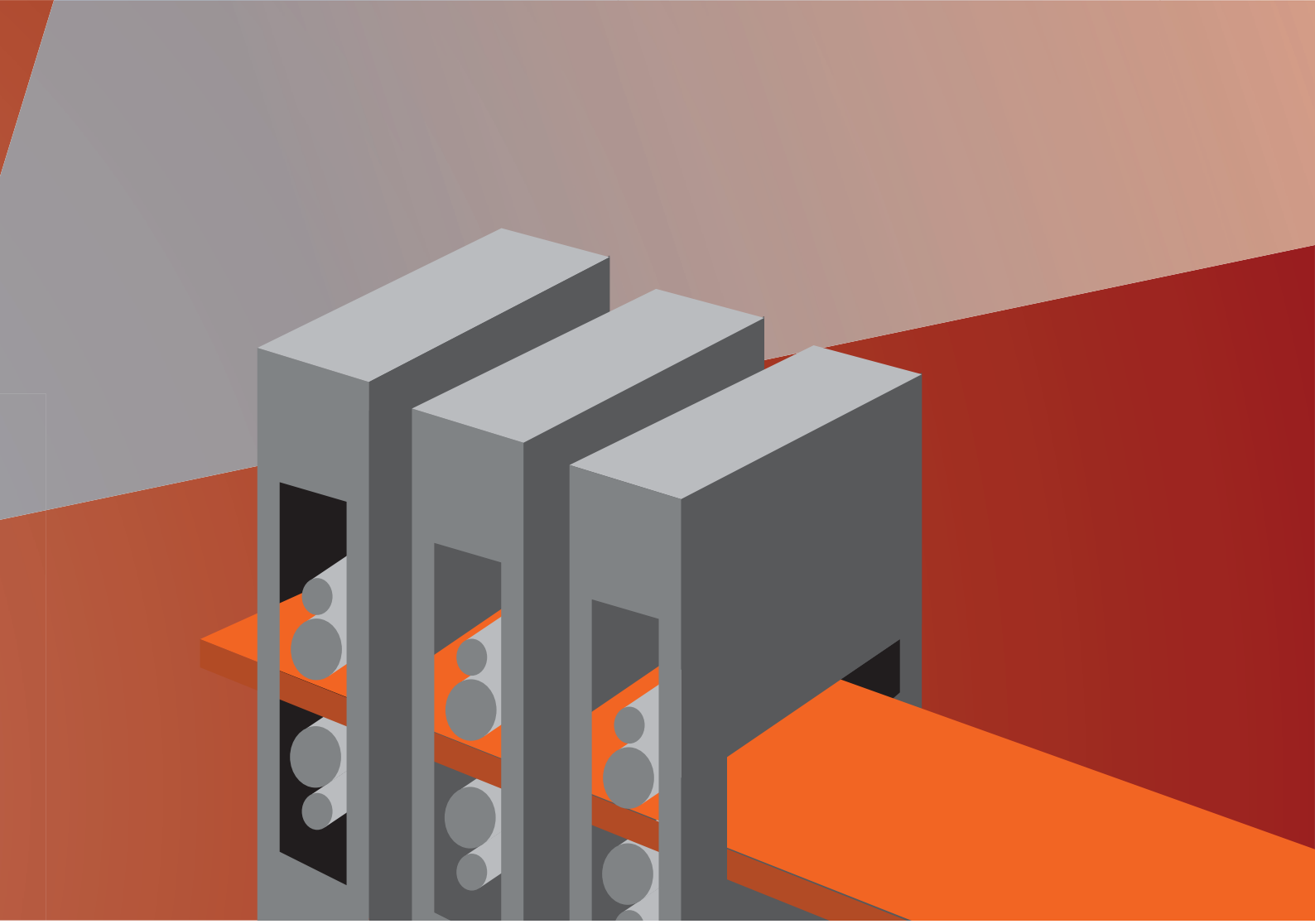
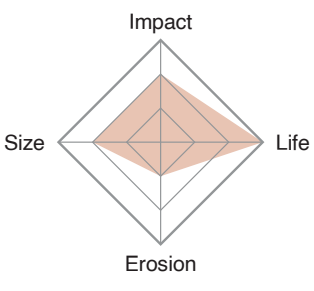
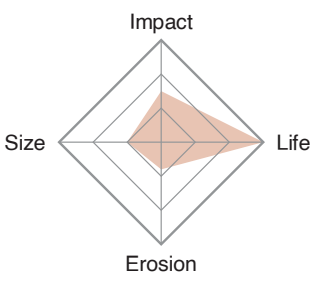
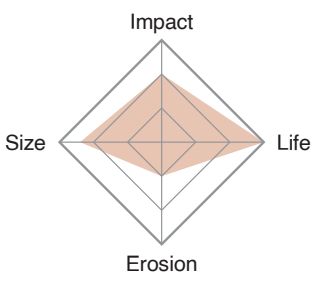


DNR	DNM	DNK
		
30 MPa 	50 MPa 	50 MPa 
High hardness	High hardness	High hardness
		

Everloy Descaling Nozzle Technology

Erosion

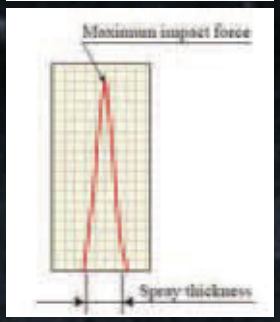
EVERLOY was the first nozzle manufacturer to develop the aluminum erosion test as a completely new nozzle evaluation method. As the aluminum plate A1050 has similar hardness characteristics at ambient temperatures as steel does at the temperature range with which it should be descaled, this is an effective way to measure performance of the nozzle. Since its development, this method has become the industry standard.

Impact Force

One of the most important factors for choosing the Descaling Nozzle is its impact force.

For spray width : Impact force distribution is evaluated to ensure descaling performance across the entire spray width is optimized.

For spray thickness : The thinner the spray thickness, the greater the impact force. The peak of the impact force is called the maximum impact force and this has become the standard to evaluate the performance of our Descaling Nozzle.



Spray Angle – Everloy brand Tungsten Carbide

EVERLOY offers spray angles with single digit increments for precise applications and superior performance. We offer the best tips and grades of tungsten carbide. In-house Manufacturing capabilities, production and quality control are strictly monitored and flexible enough to make fast deliveries feasible.

As a leading manufacturer of tungsten carbide, EVERLOY, over the past 70 years, has developed proprietary technology that is applied to extend the life and performance of tungsten carbide.

Overlap

Having a proper overlap is extremely important to avoid stripe marking on the strip surface known as “tiger marks”. At the same time, the thickness and waves of the strip need to be considered. Ask an Everloy Sales Representative for the best layout feasible utilizing Everloy’s Descaling Calculation Program.

Solutions

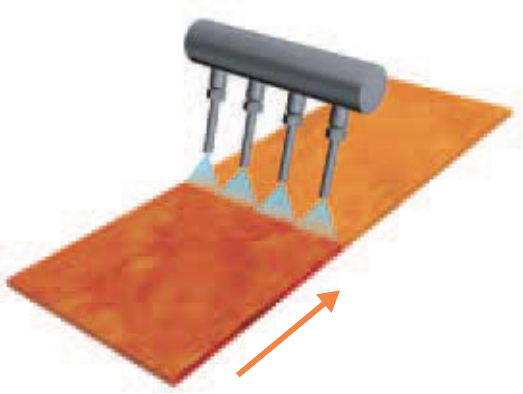
Higher impact force options:

1. The latest DNEX technology gives customers a higher impact force than conventional nozzles without increasing water flow/pump capacity.
⇒ Improved surface quality by keeping same water flow with the current nozzles.

2. Applying the long nose tip with the wider spray angle model that compensates for the lack of proper spray height and provides appropriate overlap. The long nose tips are normally used for trial purposes only.

Use of normal standard tip

Use of long nose tip

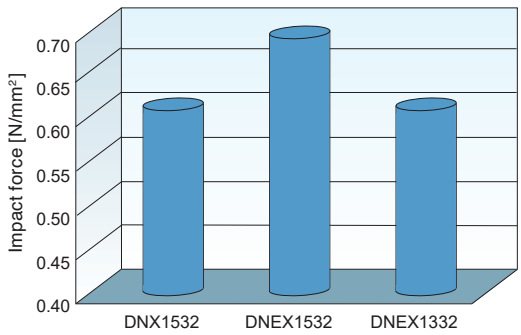


Water flow reduction

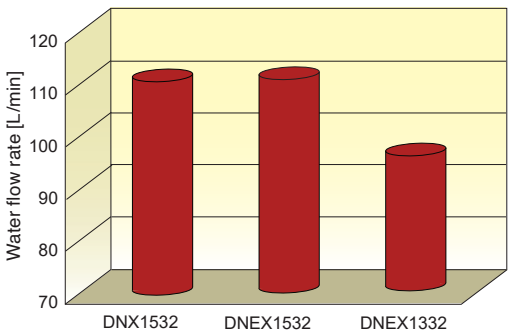
With the DNEX technology, even if the flow rate is reduced by 15 %, it keeps the same impact force of the DNX.

Case study at 150 bar pressure and at 300 mm spray distance

Max. impact force



Flow rate



DNX1532 + Long filter
Max. Impact : 0.59 N/mm²
Water flow : 110.8 L/min

DNEX1332 + Long filter
Max. Impact : 0.59 N/mm²
Water flow : 94.9 L/min

Benefit of water flow reduction

Lower water consumption contributes to substantial cost.
savings regarding:

Electricity Reduction

- Reduced pump capacity and/or fewer operating pumps.

Gas Reduction

- Potential for discharge temperature drop from re-heat furnace.

Descaling Nozzles
DNEX

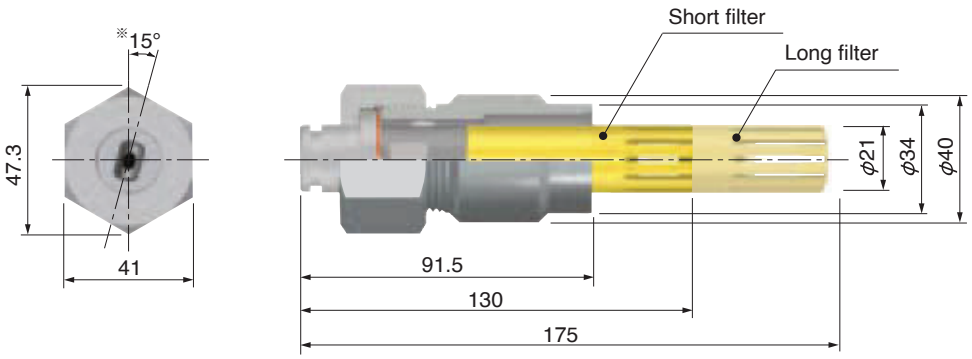
Features

- The highest impact force and the deepest erosion for more efficient scale removal.
- Lower water consumption with the same impact of existing descaling nozzles.
- Sharper spray edge definition for optimized descaling performance.
- The DNEXR type for high wear resistance based on a trumpet-shaped orifice is available.

Maximum working pressure

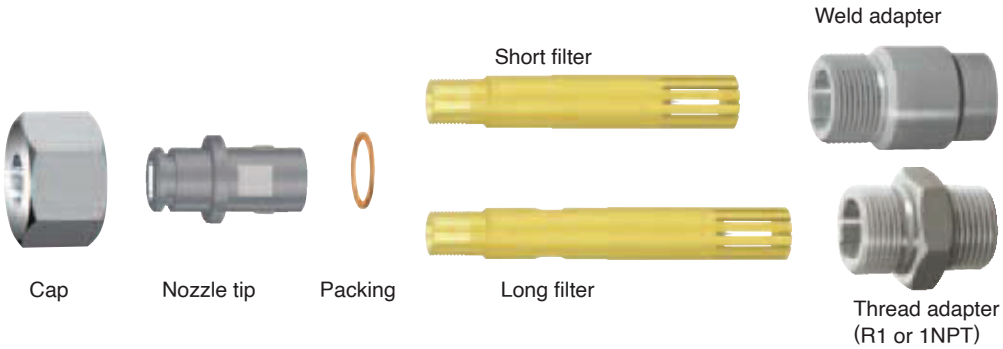
- 25 MPa

Shapes & dimensions



※ Offset angle of nozzle tip against tabs

Unit : mm



Part	Material	Weight [g]
Cap	303 Stainless steel	150
Nozzle tip	Tungsten carbide & 303 SS	100
Packing	Copper	4
Short filter	Brass & 303 SS	170
Long filter	Brass & 303 SS	215
Weld adapter	304 Stainless steel	255
Thread adapter	304 Stainless steel	215

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Typical applications of the DNEX

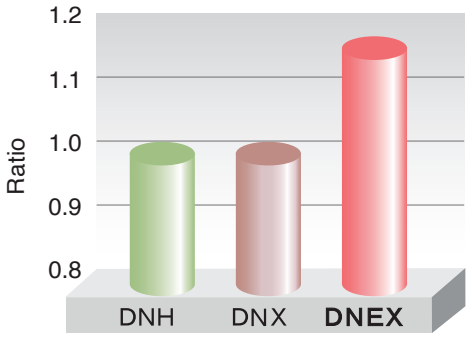
The latest model offers customers the following two options:

1. Improved surface quality with the same water flow and spray angle as competing spray nozzles.

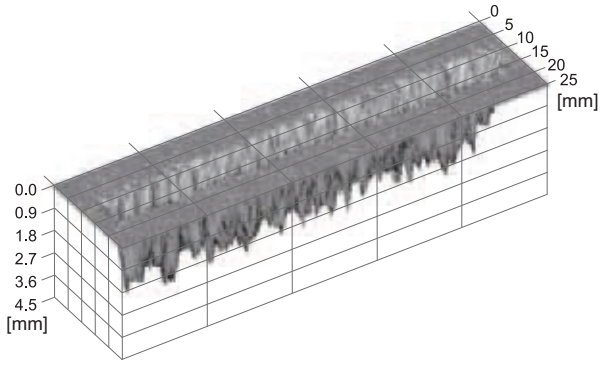
2. Water flow reduction. With the DNEX model, even if the flow rate is reduced by 15 %, it keeps the same impact force of the DNX.

Technical data

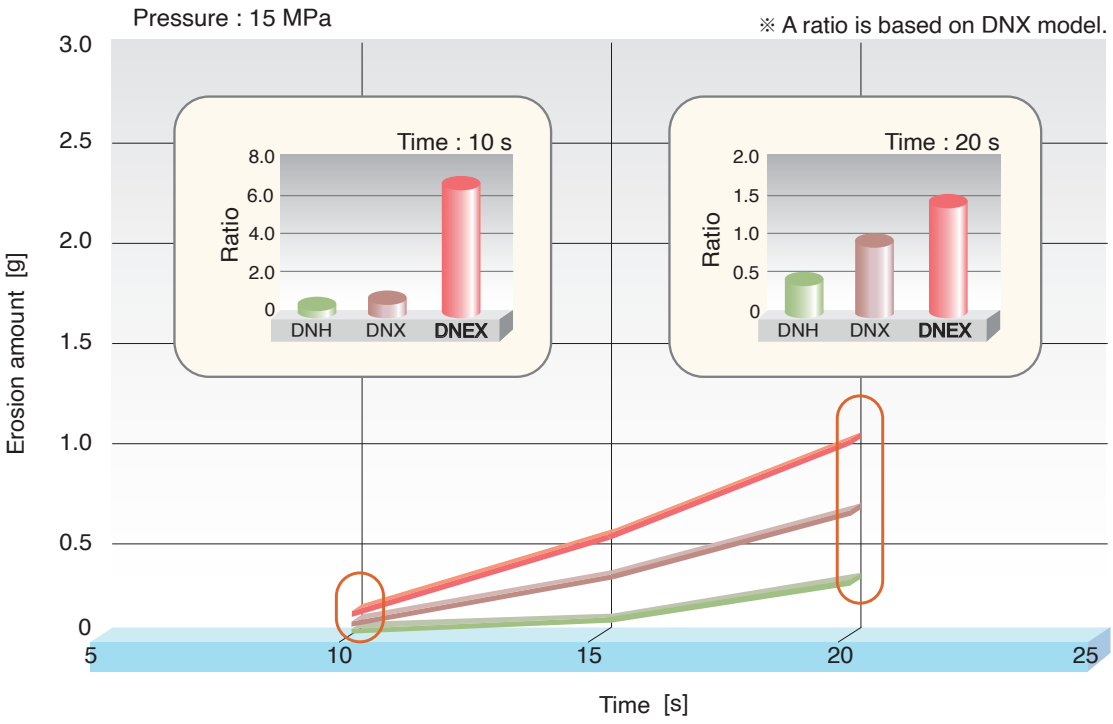
Impact force graph



3D Erosion Footprint



Erosion test comparison



Descaling Nozzles
DNX

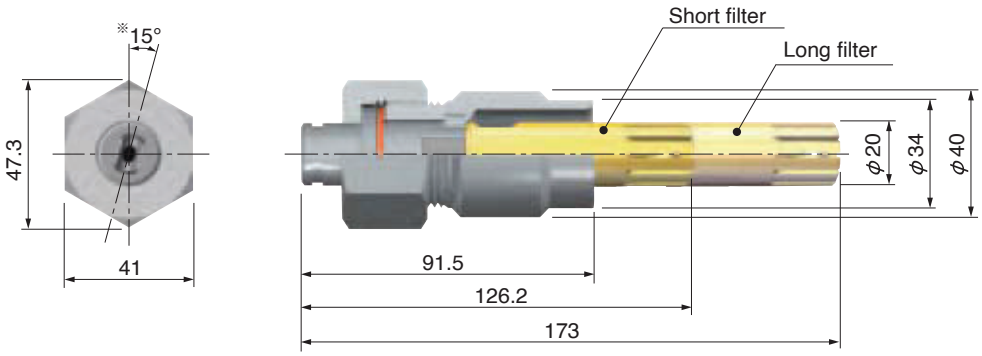
Features

- Higher impact force and deeper erosion for more efficient scale removal.
- Lower water consumption with the same impact of existing descaling nozzles.
- Sharper spray edge definition for optimized descaling performance.

Maximum working pressure

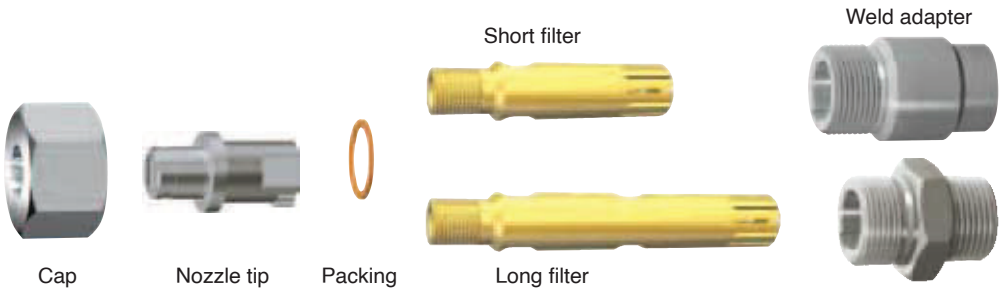
- 25 MPa

Shapes & dimensions



※ Offset angle of nozzle tip against tabs

Unit : mm



Part	Material	Weight [g]
Cap	303 Stainless steel	150
Nozzle tip	Tungsten carbide & 303 SS	115
Packing	Copper	4
Short filter	Brass	120
Long filter	Brass	215
Weld adapter	304 Stainless steel	255
Thread adapter	304 Stainless steel	215

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Descaling Nozzles
DNH

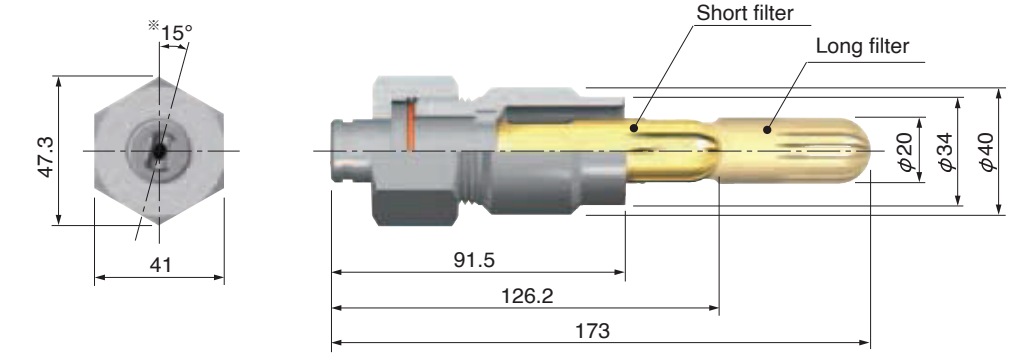
Features

- Conventional model to produce higher impact force.

Maximum working pressure

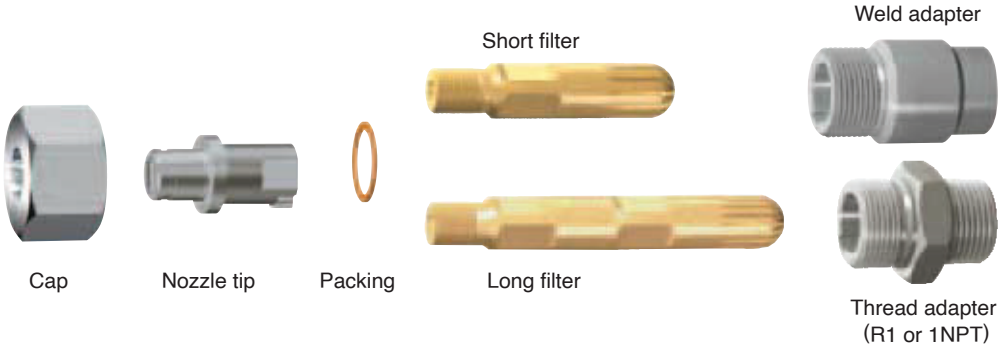
- 25 MPa

Shapes & dimensions



※ Offset angle of nozzle tip against tabs

Unit : mm



Part	Material	Weight [g]
Cap	303 Stainless steel	150
Nozzle tip	Tungsten carbide & 303 SS	115
Packing	Copper	4
Short filter	Brass	120
Long filter	Brass	215
Weld adapter	304 Stainless steel	255
Thread adapter	304 Stainless steel	215

Descaling Nozzles
DNR

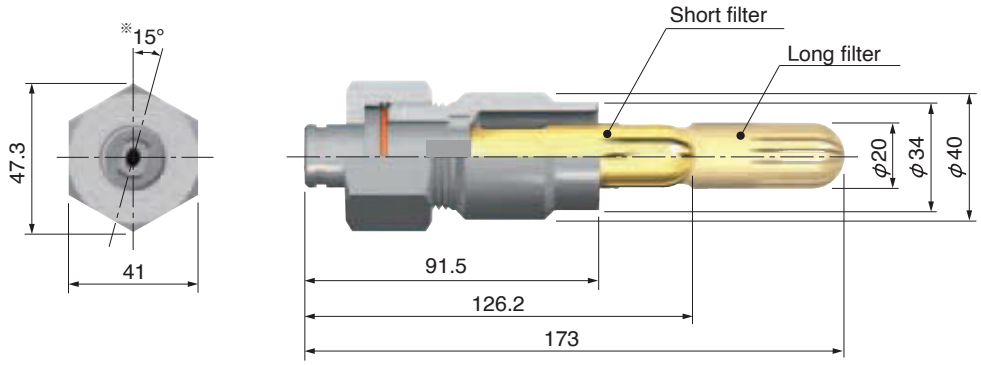
Features

- The orifice is based on high hardness Tungsten Carbide for extra wear resistance.

Maximum working pressure

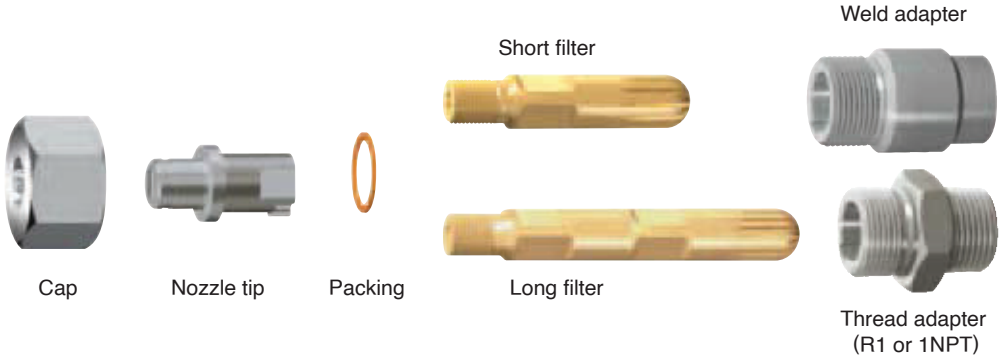
- 30 MPa

Shapes & dimensions



※ Offset angle of nozzle tip against tabs

Unit : mm



Part	Material	Weight [g]
Cap	303 Stainless steel	150
Nozzle tip	High hardness tungsten carbide & 303 SS	115
Packing	Copper	4
Short filter	Brass	120
Long filter	Brass	215
Weld adapter	304 Stainless steel	255
Thread adapter	304 Stainless steel	215

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Descaling Nozzles
DNK

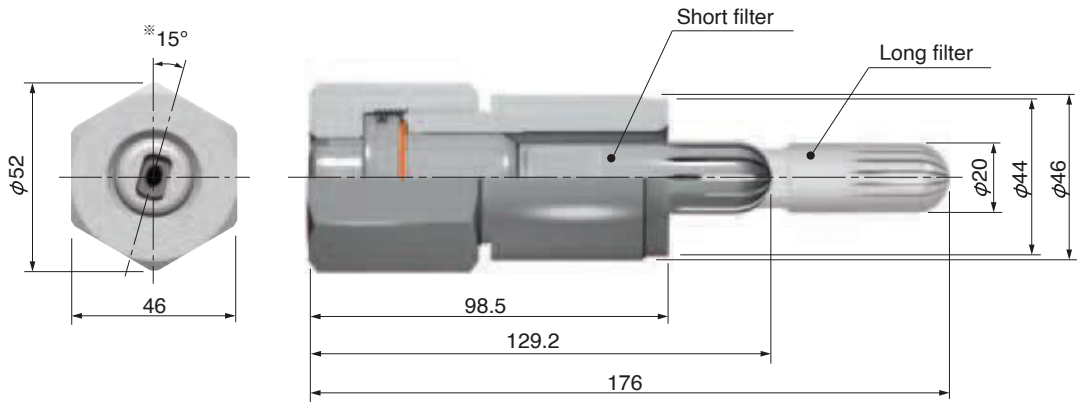
Features

- The trumpet shaped orifice is based on high hardness Tungsten Carbide for extra wear resistance.
- A straightening filter provides a uniform high impact force distribution.

Maximum working pressure

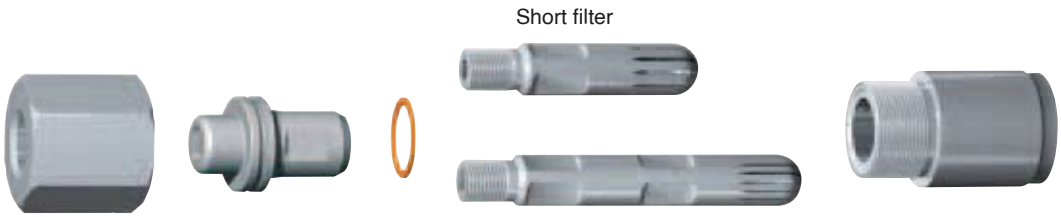
- 50 MPa

Shapes & dimensions



※ Offset angle of nozzle tip against tabs

Unit : mm



Part	Material	Weight [g]
Cap	303 Stainless steel	345
Nozzle tip	High hardness tungsten carbide & 303 SS	180
Packing	Copper	5
Short filter	303 Stainless steel	113
Long filter	303 Stainless steel	203
Weld adapter	304 Stainless steel	530

Descaling Nozzles
DNM

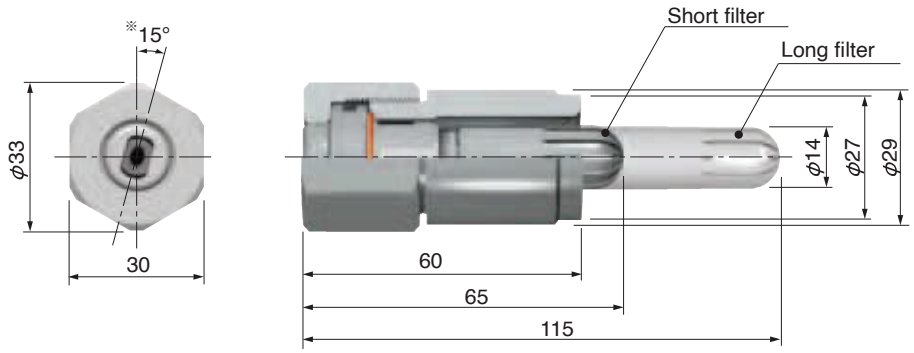
Features

- The trumpet shaped orifice based on high hardness Tungsten Carbide for extra wear resistance.
- A straightening filter provides a uniform high impact force distribution.
- The compact design of the nozzle is good for mini-mill or any application that requires shorter spray distance.

Maximum working pressure

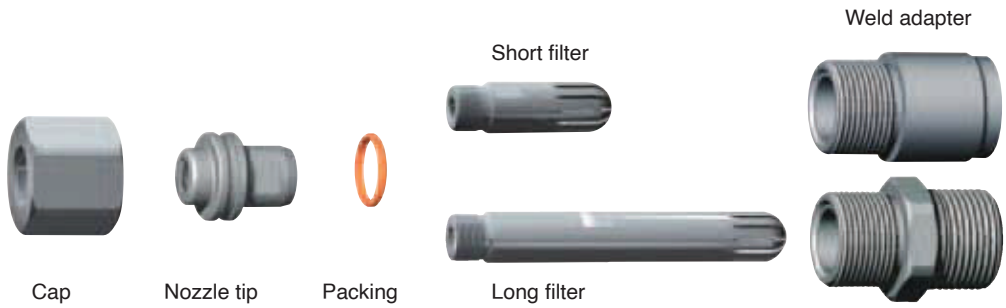
- 50 MPa

Shapes & dimensions



※ Offset angle of nozzle tip against tabs

Unit : mm



Part	Material	Weight [g]
Cap	303 Stainless steel	80
Nozzle tip	High hardness tungsten carbide & 303 SS	45
Packing	Copper	1
Short filter	303 Stainless steel	25
Long filter	303 Stainless steel	75
Weld adapter	304 Stainless steel	120
Thread adapter	304 Stainless steel	120

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Models & specifications

Model						Model number	Minimum orifice diameter [mm]	Flow rate [L/min] at following pressure [MPa]								Spray angle at following pressure [MPa]	
DNEX	DNX	DNH	DNR	DNK	DNM			1	10	15	20	25	30	40	50	15	50
		●	●	●	●	0325	1.5	5.7	18.0	22.0	25.5	28.5	31.2	36.0	40.2	27°	28°
		●	●	●	●	0332	1.4	5.7	18.0	22.0	25.5	28.5	31.2	36.0	40.2	35°	36°
		●	●	●	●	0340	1.3	5.7	18.0	22.0	25.5	28.5	31.2	36.0	40.2	43°	44°
●	●	●	●	●	●	0425	1.7	7.6	24.0	29.4	33.9	37.9	41.6	48.0	53.7	27°	28°
●	●	●	●	●	●	0432	1.6	7.6	24.0	29.4	33.9	37.9	41.6	48.0	53.7	35°	36°
●	●	●	●	●	●	0440	1.5	7.6	24.0	29.4	33.9	37.9	41.6	48.0	53.7	43°	44°
●	●	●	●	●	●	0525	1.9	9.5	30.0	36.8	42.4	47.4	52.0	60.0	67.1	27°	28°
●	●	●	●	●	●	0532	1.8	9.5	30.0	36.8	42.4	47.4	52.0	60.0	67.1	35°	36°
●	●	●	●	●	●	0540	1.7	9.5	30.0	36.8	42.4	47.4	52.0	60.0	67.1	43°	44°
●	●	●	●	●	●	0625	2.1	11.4	36.0	44.1	50.9	56.9	62.4	72.0	80.5	27°	28°
●	●	●	●	●	●	0632	2.0	11.4	36.0	44.1	50.9	56.9	62.4	72.0	80.5	35°	36°
●	●	●	●	●	●	0640	1.9	11.4	36.0	44.1	50.9	56.9	62.4	72.0	80.5	43°	44°
●	●	●	●	●	●	0725	2.3	13.3	42.0	51.4	59.4	66.4	72.7	84.0	93.9	27°	28°
●	●	●	●	●	●	0732	2.2	13.3	42.0	51.4	59.4	66.4	72.7	84.0	93.9	35°	36°
●	●	●	●	●	●	0740	2.1	13.3	42.0	51.4	59.4	66.4	72.7	84.0	93.9	43°	44°
●	●	●	●	●	●	0825	2.5	14.3	45.3	55.5	64.1	71.6	78.5	90.6	101	27°	28°
●	●	●	●	●	●	0832	2.3	14.3	45.3	55.5	64.1	71.6	78.5	90.6	101	35°	36°
●	●	●	●	●	●	0840	2.2	14.3	45.3	55.5	64.1	71.6	78.5	90.6	101	43°	44°
●	●	●	●	●	●	0925	2.6	17.1	54.0	66.1	76.4	85.4	93.5	108	121	27°	28°
●	●	●	●	●	●	0932	2.5	17.1	54.0	66.1	76.4	85.4	93.5	108	121	35°	36°
●	●	●	●	●	●	0940	2.4	17.1	54.0	66.1	76.4	85.4	93.5	108	121	43°	44°
●	●	●	●	●		1125	3.1	21.4	67.7	83.0	95.7	107	117	135	151	27°	28°
●	●	●	●	●		1132	2.8	21.4	67.7	83.0	95.7	107	117	135	151	35°	36°
●	●	●	●	●		1140	2.7	21.4	67.7	83.0	95.7	107	117	135	151	43°	44°
●	●	●	●	●		1325	3.2	24.5	77.5	95.0	110	123	134	155	173	27°	28°
●	●	●	●	●		1332	3.1	24.5	77.5	95.0	110	123	134	155	173	35°	36°
●	●	●	●	●		1340	2.9	24.5	77.5	95.0	110	123	134	155	173	43°	44°
●	●	●	●	●		1525	3.5	28.6	90.5	111	128	143	157	181	202	27°	28°
●	●	●	●	●		1532	3.3	28.6	90.5	111	128	143	157	181	202	35°	36°
●	●	●	●	●		1540	3.2	28.6	90.5	111	128	143	157	181	202	43°	44°
●	●	●	●	●		1825	3.8	34.2	108	132	153	171	187	216	241	27°	28°
●	●	●	●	●		1832	3.6	34.2	108	132	153	171	187	216	241	35°	36°
●	●	●	●	●		1840	3.4	34.2	108	132	153	171	187	216	241	43°	44°
●	●	●	●	●		1925	3.9	35.7	113	138	160	179	196	226	253	27°	28°
●	●	●	●	●		1932	3.7	35.7	113	138	160	179	196	226	253	35°	36°
●	●	●	●	●		1940	3.6	35.7	113	138	160	179	196	226	253	43°	44°
●	●	●	●	●		2325	4.3	43.0	136	167	192	215	236	272	304	27°	28°
●	●	●	●	●		2332	4.1	43.0	136	167	192	215	236	272	304	35°	36°
●	●	●	●	●		2340	3.9	43.0	136	167	192	215	236	272	304	43°	44°

Note :
The available model numbers are shown in the list marked with ●. Please ask an Everloy representative for a customized model number.
The spray angle shown in the list is calculated from the spray width at 300 mm. A spray angle varies according to a spray distance.

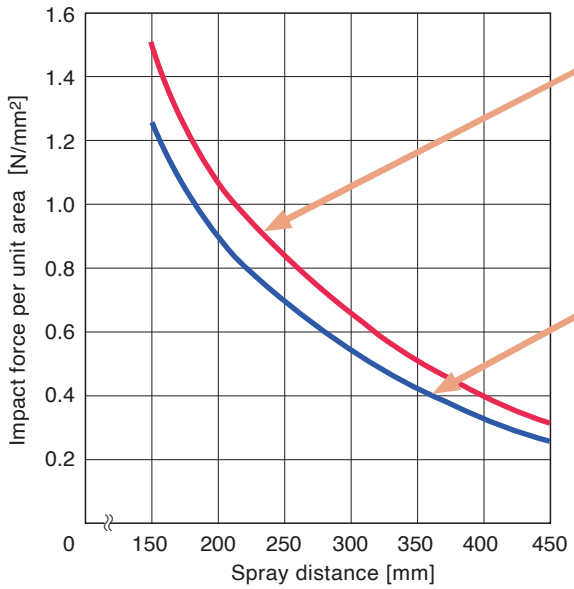
Descaling Nozzles

Long Filter

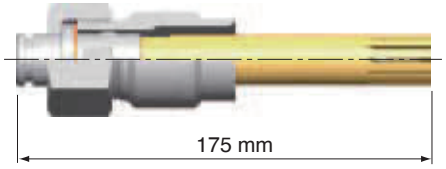
Using a filter with a straightener, turbulence created by the whirling water is eliminated and makes the water laminar. As a result, the spray pattern becomes thinner and it creates higher impact force.

Technical data

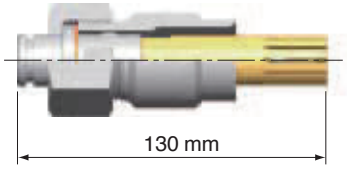
Spray distance vs. Impact force graph



DNEX1532 with Long Filter

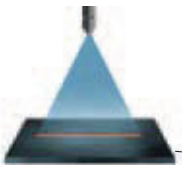


DNEX1532 with Short Filter



Long Filter increases the impact force by approx. 1.2 times than Short Filter.

Lead plate erosion test

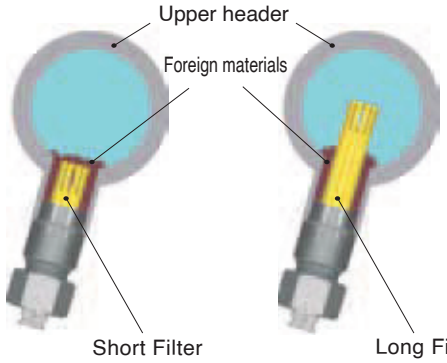


Spray pressure : 15 MPa
Spray distance : 200 mm
Spray time : 1 min

Lead plate

The Long Filter creates a thinner spray pattern resulting in deeper surface penetration compared with the Short Filter.

Preventive measures against filter clogging



Putting filter slits on the upper side of the header prevents filter from clogging as foreign material gathers on the lower side.

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Descaling Nozzles

Descaling Check Valve (DCV)

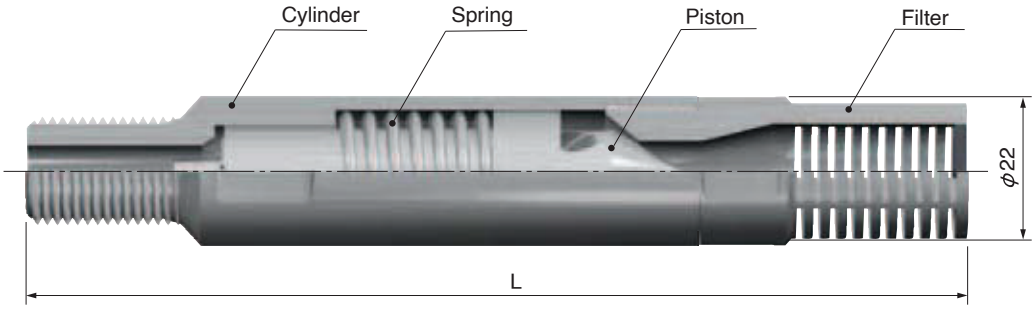
Features

- Optimized internal structure offers less pressure loss which results in higher impact force.
- Good for preventing:
  - water hammer, bypass water, temperature drop of steel plates.

Maximum working pressure

- 30 MPa

Shapes & dimensions



Unit : mm

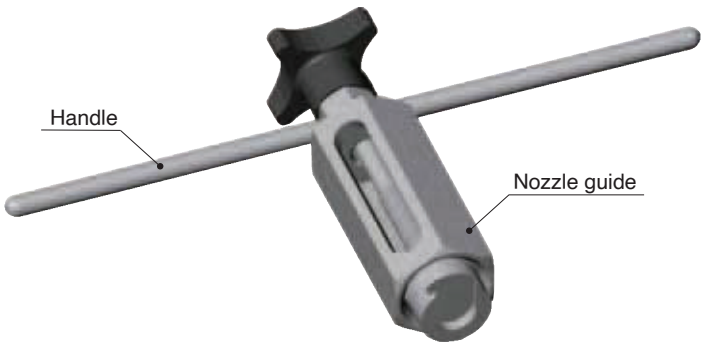
Part	Material
Cylinder	303 Stainless steel
Spring	304 Stainless steel
Piston	304 Stainless steel
Filter	304 Stainless steel

Model	Part No.	Dimension L [mm]	Operating pressure [MPa]	Weight [g]
DNH•DNR	01V00	143	1.0	250
DNX	01V01	189.5	0.6	330
DNEX	01V04	191.5	0.6	290

Descaling Nozzles
Remover

Three types of remover tools are available.
You can remove the nozzle unit more easily with them.

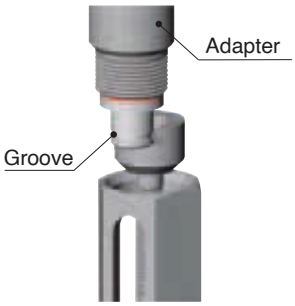
Screw remover



With the cap detached, put the screw remover in the nozzle tip groove and pull out the nozzle by turning the tool handle.
The nozzle is held in the nozzle guide of the remover so as to prevent it from dropping during removal.

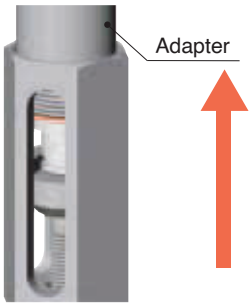
Instructions

1



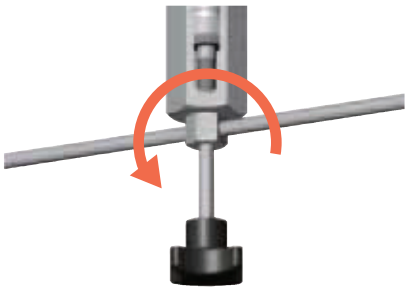
Detach the cap and put the end of the tool in the groove in the nozzle tip.

2



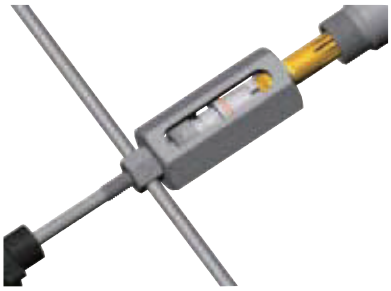
Push the nozzle guide toward the adapter.

3



Turn the tool handle counterclockwise.

4



The nozzle can be removed.

Model	Part No.
DNH·DNR·DNX	01J00
DNM	01J01
DNK	01J02
DNEX	01J10

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C-type remover

Prior to loosening the cap, put the C-type remover in the groove in the tip end.
You can pull out and remove the nozzle easily by loosening the cap.

Instructions

1

Put the C-type remover in the groove in the nozzle tip.

2

Turn the cap counterclockwise by using a wrench or spanner.

3

The nozzle can be removed together with the cap.

Model	Part No.
DNH·DNR·DNX	01J03
DNEX	01J12

Pull-out remover

With the cap detached, put the pull-out remover in the groove in the nozzle tip and pull the handle.
You can pull out the nozzle with ease.

Instructions

1

Detach the cap and put the end of the tool in the groove in the nozzle tip.

2

Pull the handle.

3

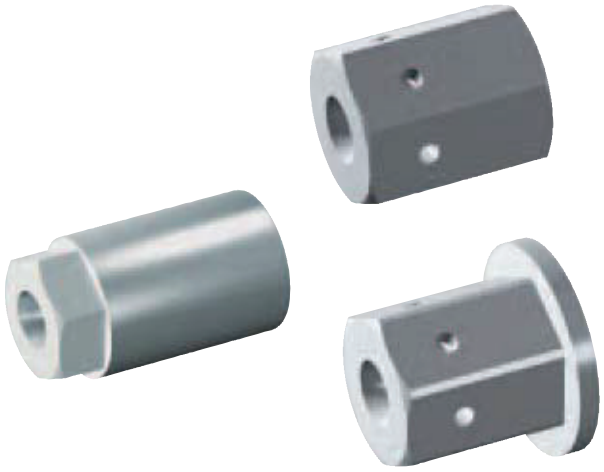
The nozzle can be removed.

Model	Part No.
DNH·DNR·DNX·DNEX	01J04
DNM	01J05
DNK	01J06

Descaling Nozzles

Protective Cap

Protective caps are the best way to protect nozzle tips from scale or rebound water.



Standard type

Damage to a nozzle tip can be minimized by putting a cap on the entire nozzle tip.
To enhance the protectiveness of a nozzle tip, the nozzle tip is designed so that the end of the nozzle tip is located in the inner part of the cap. Also, to prevent water from gathering in the cap, drain holes are located around it.

Model	Part No.
DNH·DNR·DNX	01C03
DNM	01C04
DNK	01C05
DNEX	01C14

Flange type

There is a flange round rim protective cap.
In addition to the tip, it can protect a wide range.

Model	Part No.
DNH·DNR·DNX	01C06
DNM	01C07
DNK	01C08
DNEX	01C15

Full face type

A full face type can protect the adapter as well as the tip on the entire adapter.

Model	Part No.
DNH·DNR·DNX	01C09
DNM	01C10
DNK	01C11
DNEX	01C16

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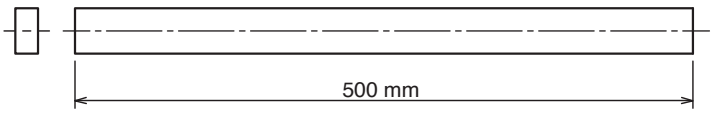
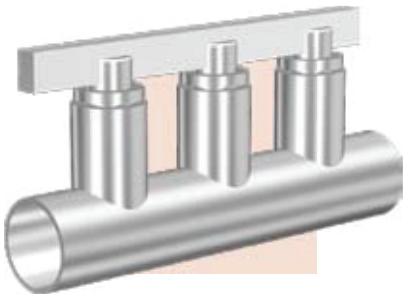
Descaling Nozzles

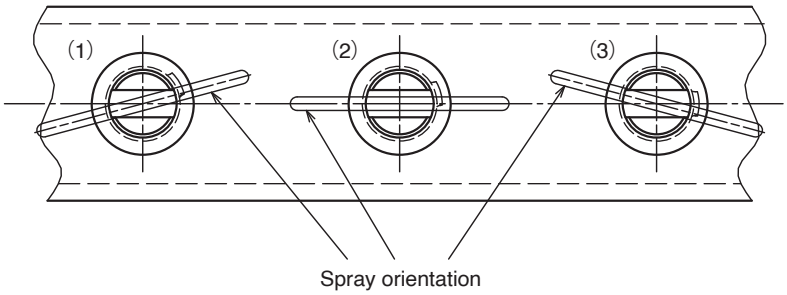
Alignment Tip and Bar

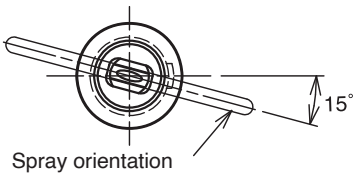
Alignment bar

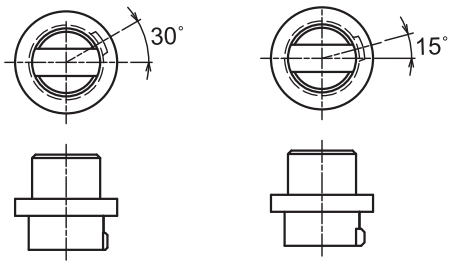




Alignment tip







(2) Alignmet tip
Model No. L-15

(2) Alignmet tip
Model No. F-0

(3) Alignmet tip
Model No. R-15

Instructions:

Note : All standard descaling tips will have an offset angle of Right -15°.

1. Choose an alignment tip from (1) to (3), depending on the offset angle you wish to, then put it onto Everloy adapter.

   R-15:
   The standard spray orientation is R-15. In this case the adaptor will be installed with the grooves on the side parallel to the header centre line.
   Use alignment tip (3) for this type of orientation.

   F-0 :
   If all sprays must be at 0° offset angle, please use alignment tip (2). The adaptor will have the grooves on the side at L-15 to the header centre line.

   L-15 :
   If the sprays must be at L-15, please use alignment tip (1). The adaptor will have the grooves on the side at L-30 to the header centre line.

2. Turn the adapter by using the alignment bar, so that the slit on the tip would be parallel to the header's longitudinal direction.
3. Just put our nozzle tip which has 15 degrees offset angle, then you can get desired spray pattern/offset angle automatically.

Remarks:

- The alignment bar on the nozzle tip shows 500 mm, but we can manufacture any length based on your request.
- For other nozzle offset angles, please ask for Everloy assistance.

Please follow the specifications below.

Handling specifications

Item		Model					
		DNEX	DNX	DNH	DNR	DNK	DNM
Max. working pressure [MPa]		25	25	25	30	50	50
Min. nozzle pitch [mm]		54	54	54	54	60	36
Tightening torque [N·m]	Cap	245 to 490				490 to 784	98 to 245
	Filter	Max. 58.8				Max. 58.8	Max. 29.4

Note : The min. nozzle pitch mentioned above is calculated based on the standard cap utilizing socket wrench.

Part number list

Make sure to confirm the following interchangeable parts. Different combinations may result in damage or water leakage.

Part	Model					
	DNEX	DNX	DNH	DNR	DNK	DNM
Short filter	Exclusive	Exclusive	Interchangeable (01F01)		Exclusive	Exclusive
Long filter	Exclusive	Exclusive	Interchangeable (01F04)		Exclusive	Exclusive
Cap	Exclusive	Interchangeable (01C00)			Exclusive	Exclusive
Packing	Interchangeable (01P00)				Exclusive	Exclusive
Weld adapter	Interchangeable (01A00)				Exclusive	Exclusive
Thread adapter	Interchangeable (01A01)				—	Exclusive

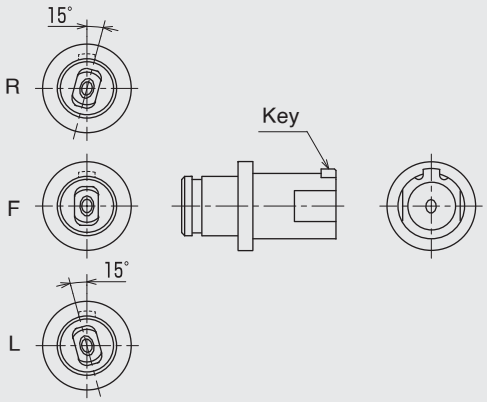
Ordering tips

DNH — Model

1525 — Model number

L — Direction of offset angle

- R or no symbol : Right 15°
- L : Left 15°
- F : No offset angle (0°)



Hot Rolling Mill

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SKY INDUSTRY

Descaling Nozzles

Specification sheet

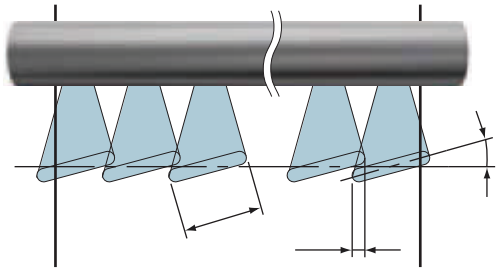
Please fill in the blanks with your existing descaling nozzle arrangemwnt to that we can select our proper nozzle.

Overseas Seles Depatment
FAX : +81-6-6452-2187

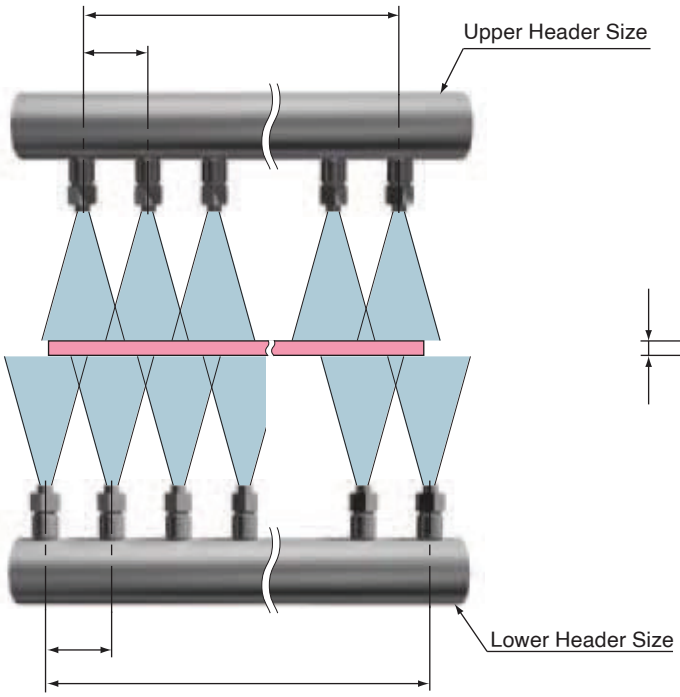
Date : / / /

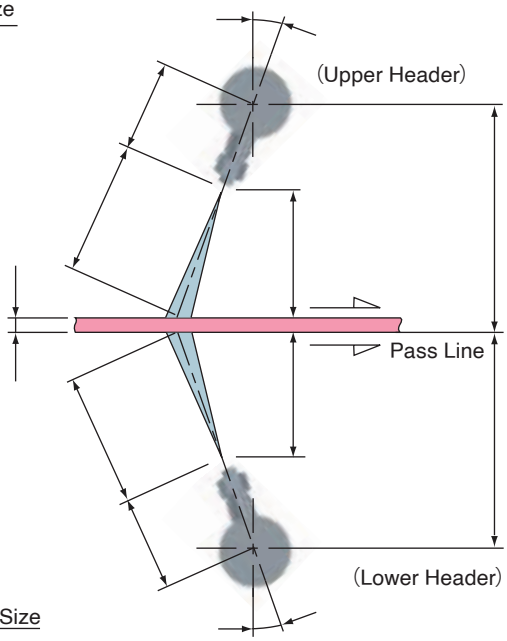
Customer Name : Person in Charge :

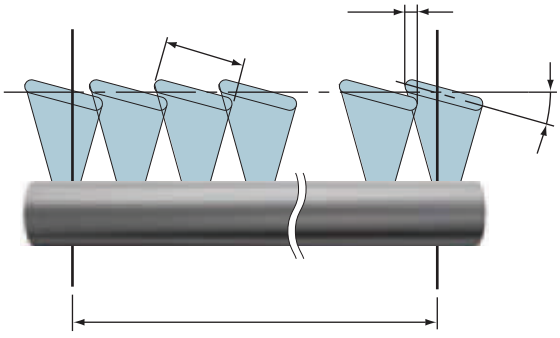
(Upper Header)



Location of descaling :
Existing Nozzle :
Pressure :
Flow Rate per One Nozzle :
Number of Nozzles : Pcs. per Header







Location of descaling :
Existing Nozzle :
Pressure :
Flow Rate per One Nozzle :
Number of Nozzles : Pcs. per Header

(Lower Header)

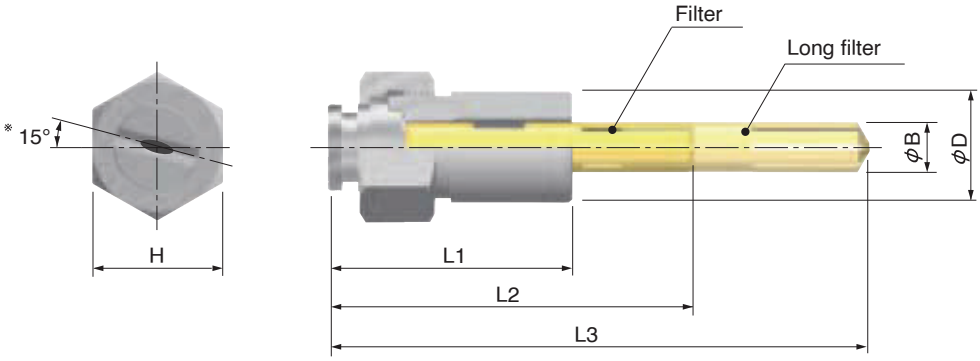
Hot Rolling Mill

Flat Spray Nozzle
KSAM

Features

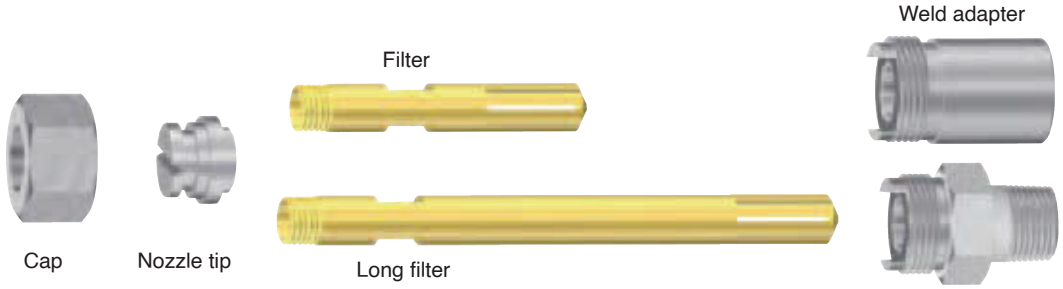
- A special filter that is mounted on the backside of the nozzle tip creates:
  - defined spray pattern which contributes to higher impact force.
  - Less clogging.
- Precise alignment of nozzle tip and adapter.

Shapes & dimensions



※ Offset angle

Size	Dimension [mm]						Value at 0.3 MPa pressure		
	H	D	B	L1	L2	L3	Flow rate [L/min]	Spray angle (width)	Spray angle (thickness)
3/8	26	22	10	50	75	120	0.6 to 20	15 to 120°	5 to 10°
1/2	29	26	14	50	80	130	to 40	15 to 120°	5 to 10°
3/4	35	28	18	52	85	140	to 80	15 to 120°	5 to 10°
1	46	33	22	55	90	150	to 110	15 to 120°	5 to 10°



Part	Material	Weight at following size [g]			
		3/8	1/2	3/4	1
Cap	303 Stainless steel	30	40	60	115
Nozzle tip	303 Stainless steel	20	30	40	60
Filter	Brass	20	40	70	90
Long filter	Brass	40	75	125	170
Weld adapter	304 Stainless steel	75	95	100	120
Thread adapter	303 Stainless steel	60	80	110	140

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Models & specifications

Model	Size	Model number	Minimum orifice diameter [mm]	Flow rate [L/min] at following pressure [MPa]								Spray angle at following pressure [MPa]				
				0.05	0.1	0.2	0.3	0.5	0.7	1.0	1.5	0.1	0.2	0.3	0.5	1.0
KSAM	3/8	0430	1.6	1.6	2.3	3.3	4.0	5.2	6.1	7.3	8.9	24°	28°	30°	32°	34°
		0445	1.5	1.6	2.3	3.3	4.0	5.2	6.1	7.3	8.9	36°	42°	45°	48°	51°
		0460	1.3	1.6	2.3	3.3	4.0	5.2	6.1	7.3	8.9	50°	57°	60°	63°	66°
		0490	1.1	1.6	2.3	3.3	4.0	5.2	6.1	7.3	8.9	75°	85°	90°	96°	101°
		0830	2.5	3.3	4.6	6.5	8.0	10.3	12.2	14.6	17.9	24°	28°	30°	32°	34°
		0845	2.3	3.3	4.6	6.5	8.0	10.3	12.2	14.6	17.9	36°	42°	45°	48°	51°
		0860	2.0	3.3	4.6	6.5	8.0	10.3	12.2	14.6	17.9	50°	57°	60°	63°	65°
		0890	1.6	3.3	4.6	6.5	8.0	10.3	12.2	14.6	17.9	75°	85°	90°	96°	101°
		1030	2.9	4.1	5.8	8.2	10.0	12.9	15.3	18.3	22.4	24°	28°	30°	32°	34°
		1045	2.7	4.1	5.8	8.2	10.0	12.9	15.3	18.3	22.4	36°	42°	45°	48°	51°
		1060	2.4	4.1	5.8	8.2	10.0	12.9	15.3	18.3	22.4	50°	57°	60°	63°	65°
		1090	2.0	4.1	5.8	8.2	10.0	12.9	15.3	18.3	22.4	75°	85°	90°	96°	101°
		1530	3.5	6.1	8.7	12.2	15.0	19.4	22.9	27.4	33.5	24°	28°	30°	32°	34°
		1545	3.3	6.1	8.7	12.2	15.0	19.4	22.9	27.4	33.5	36°	42°	45°	48°	51°
		1560	3.0	6.1	8.7	12.2	15.0	19.4	22.9	27.4	33.5	52°	57°	60°	63°	65°
		1590	2.3	6.1	8.7	12.2	15.0	19.4	22.9	27.4	33.5	76°	86°	90°	96°	100°
	1/2	2030	4.0	8.2	11.5	16.3	20.0	25.8	30.6	36.5	44.7	24°	28°	30°	32°	34°
		2045	3.8	8.2	11.5	16.3	20.0	25.8	30.6	36.5	44.7	36°	42°	45°	48°	51°
		2060	3.5	8.2	11.5	16.3	20.0	25.8	30.6	36.5	44.7	52°	57°	60°	65°	65°
		2090	2.8	8.2	11.5	16.3	20.0	25.8	30.6	36.5	44.7	76°	86°	90°	96°	100°
		3030	4.7	12.2	17.3	24.5	30.0	38.7	45.8	54.8	67.1	24°	28°	30°	32°	34°
		3045	4.5	12.2	17.3	24.5	30.0	38.7	45.8	54.8	67.1	36°	42°	45°	48°	51°
		3060	4.3	12.2	17.3	24.5	30.0	38.7	45.8	54.8	67.1	52°	57°	60°	65°	65°
		3090	3.7	12.2	17.3	24.5	30.0	38.7	45.8	54.8	67.1	77°	86°	90°	96°	99°
		4030	5.6	16.3	23.1	32.7	40.0	51.6	61.1	73.0	89.4	24°	28°	30°	32°	34°
		4045	5.3	16.3	23.1	32.7	40.0	51.6	61.1	73.0	89.4	36°	42°	45°	48°	51°
		4060	5.0	16.3	23.1	32.7	40.0	51.6	61.1	73.0	89.4	52°	57°	60°	65°	65°
		4090	4.1	16.3	23.1	32.7	40.0	51.6	61.1	73.0	89.4	79°	86°	90°	96°	97°
	3/4	5030	6.3	20.4	28.9	40.8	50.0	64.5	76.4	91.3	112	24°	28°	30°	32°	34°
		5045	5.9	20.4	28.9	40.8	50.0	64.5	76.4	91.3	112	36°	42°	45°	48°	51°
		5060	5.5	20.4	28.9	40.8	50.0	64.5	76.4	91.3	112	52°	57°	60°	65°	65°
		5090	4.6	20.4	28.9	40.8	50.0	64.5	76.4	91.3	112	80°	87°	90°	96°	96°
		7030	7.4	28.6	40.4	57.2	70.0	90.4	107	128	157	24°	28°	30°	32°	34°
		7045	6.9	28.6	40.4	57.2	70.0	90.4	107	128	157	36°	42°	45°	48°	51°
		7060	6.6	28.6	40.4	57.2	70.0	90.4	107	128	157	52°	57°	60°	65°	65°
		7090	6.0	28.6	40.4	57.2	70.0	90.4	107	128	157	81°	86°	90°	96°	95°
	1	9045	7.8	36.7	52.0	73.5	90.0	116	137	164	201	36°	42°	45°	48°	51°
		9060	7.5	36.7	52.0	73.5	90.0	116	137	164	201	49°	57°	60°	65°	67°
		9090	7.0	36.7	52.0	73.5	90.0	116	137	164	201	75°	86°	90°	96°	101°
		11045	8.8	44.9	63.5	89.8	110	142	168	201	246	36°	42°	45°	48°	51°
		11060	8.4	44.9	63.5	89.8	110	142	168	201	246	49°	57°	60°	65°	67°
		11090	7.7	44.9	63.5	89.8	110	142	168	201	246	75°	86°	90°	96°	101°

Technical data

Spray pattern comparison

Without filter	With filter
	

Nozzle model

3/4 KSAM 5045

Condition

Pressure : 1.0 MPa

Distance : 100 mm

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