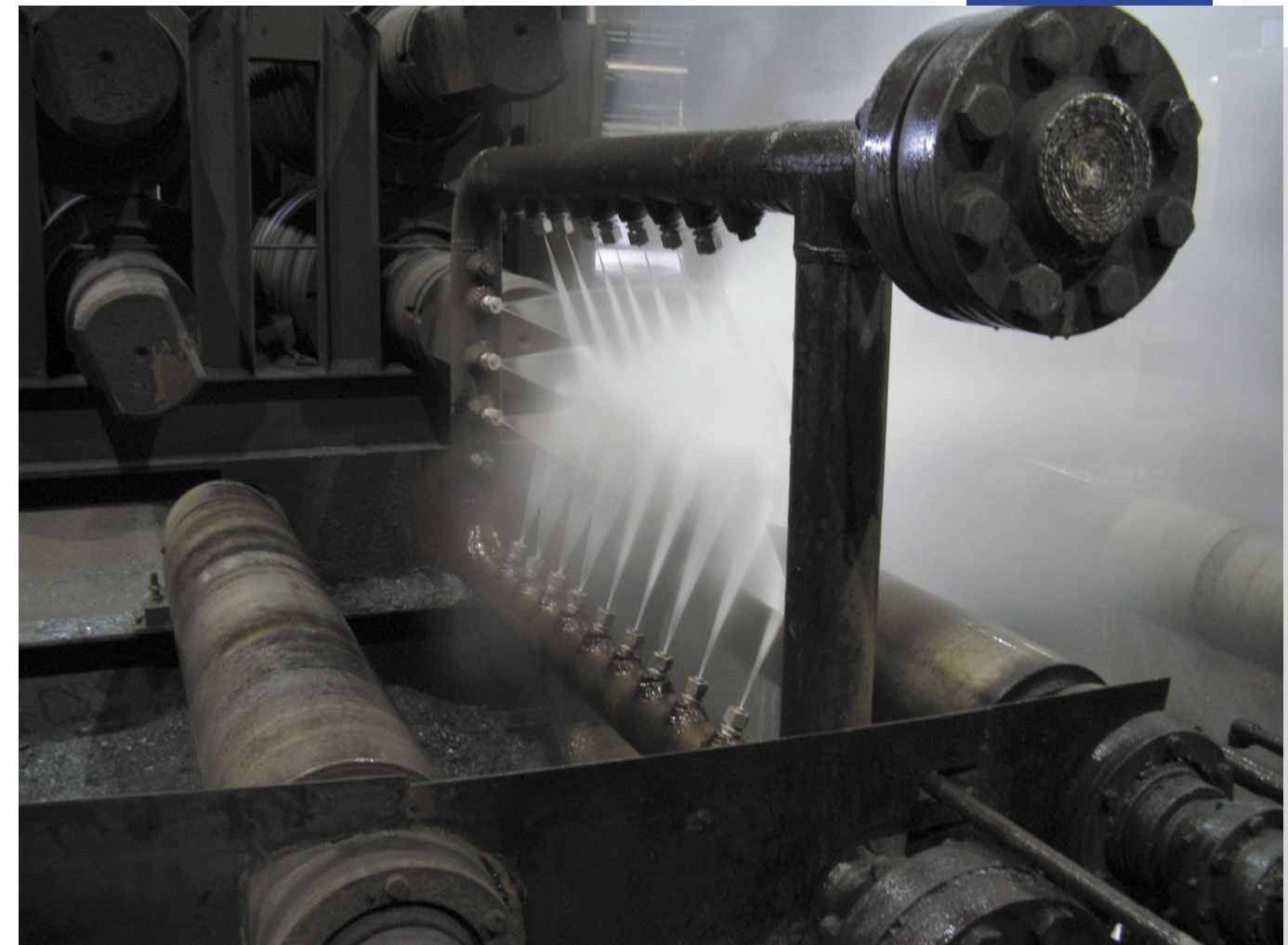
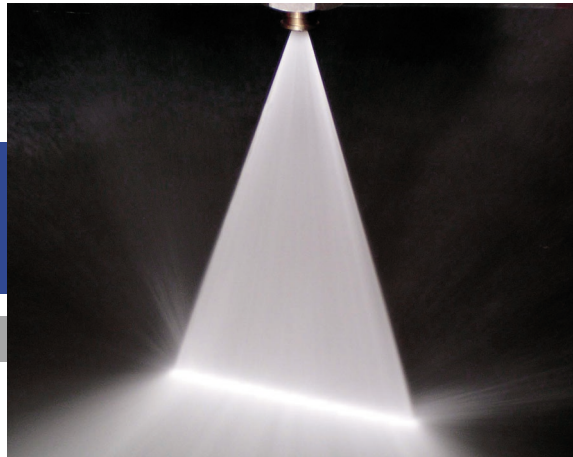


# IKEUCHI Spray nozzles for the Iron & Steel Industry



“The Fog Engineers”  
**H. IKEUCHI & CO., LTD.**



**Headquarters**

Daiichi Kyogyo Bldg., 1-15-15, Awaza, Nishi-ku,  
 Osaka 550-0011, Japan  
 Tel: 81-6-6538-4015 Fax: 81-6-6538-4022  
 e-mail: [overseas@kirinoikeuchi.co.jp](mailto:overseas@kirinoikeuchi.co.jp)  
 URL: <http://www.kirinoikeuchi.co.jp/eng/>

**Affiliated Companies**

**IKEUCHI (SHANGHAI) CO., LTD.**

Room 1311, Building A, North Region Commercial Plaza,  
 988 Da Tong Road, Zha Bei District, Shanghai 200070, P.R.China  
 Tel: 86-21-6140-9731 Fax: 86-21-6123-4239  
 e-mail: [mist@kirinoikeuchi.com](mailto:mist@kirinoikeuchi.com)  
 URL: <http://www.kirinoikeuchi.com/>

**IKEUCHI EUROPE B.V.**

Asterweg 17 A6, 1031 HL Amsterdam, The Netherlands  
 Tel: 31-20-820-2175 Fax: 31-20-820-2176  
 e-mail: [info@ikeuchieurope.com](mailto:info@ikeuchieurope.com)  
 URL: <http://www.ikeuchieurope.com/>

**IKEUCHI USA, INC.**

8110 Beckett Center Drive, West Chester, OH 45069, USA  
 Tel: 1-513-942-3060 Fax: 1-513-942-3064  
 e-mail: [info@ikeuchiusa.com](mailto:info@ikeuchiusa.com)  
 URL: <http://www.ikeuchiusa.com/>

**IKEUCHI TAIWAN CO., LTD.**

11F-1, No. 27, Sec. 1, Chung Shan N. Rd., Taipei 10441,  
 Taiwan, R.O.C.  
 Tel: 886-2-2511-6289 Fax: 886-2-2541-6392  
 e-mail: [sales@ikeuchi.com.tw](mailto:sales@ikeuchi.com.tw)  
 URL: <http://www.ikeuchi.com.tw/>



S101203E



“The Fog Engineers”  
**H. IKEUCHI & CO., LTD.**

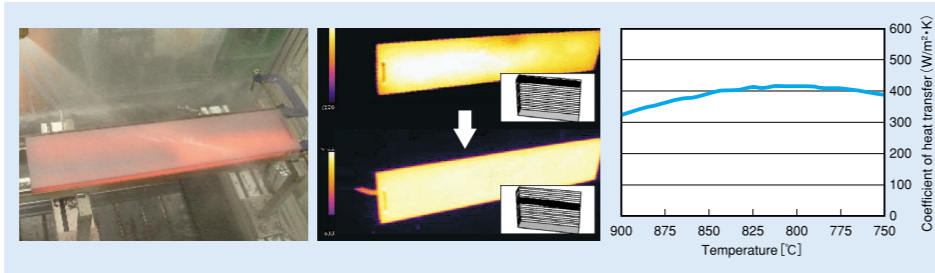


# IKEUCHI Cooling Technology

IKEUCHI provides high-quality spray nozzles and control systems, CFD simulation analysis, and cooling trial experiments combined with an outstanding performance record for the steel industry.

## Slab cooling

For cooling of hot slabs, strong impact force is needed to break through the film boiling. Through cooling trial experiments, we can provide the optimum nozzles and layout.



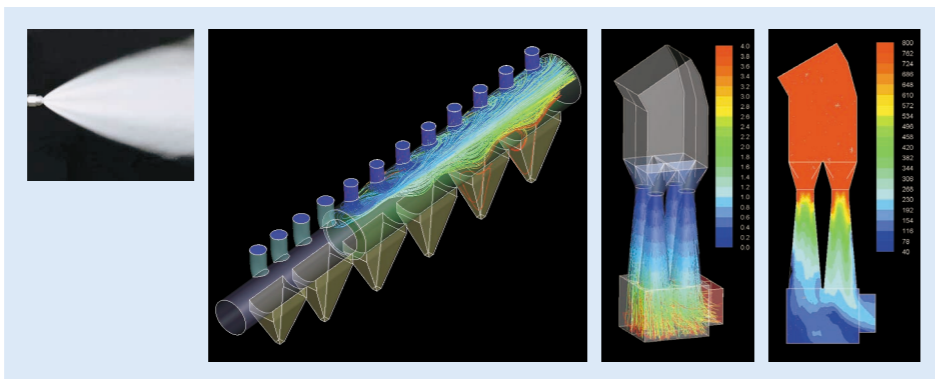
## Thin slab cooling

Cooling for surface finishing of steel slabs requires a large amount of fine fog to produce a smooth surface texture. IKEUCHI has been developing low-energy atomizing nozzle units.



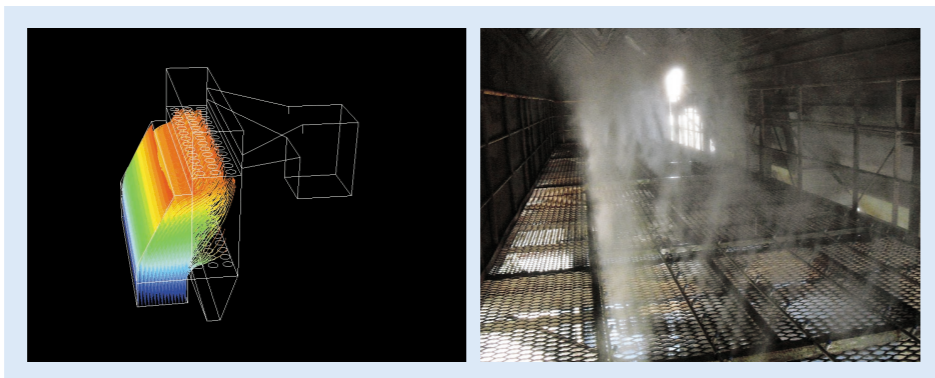
## Flue gas cooling

Cooling of high temperature flue gas such as sintering exhaust requires spray control and droplet diameters that yield complete evaporation. IKEUCHI uses CFD simulation when selecting the control system and nozzles that can provide completely evaporating spray.



## Gas turbine inlet cooling

Cooling of outdoor air is effective at countering the drop in power output of gas turbines in summer. IKEUCHI provides gas turbine inlet cooling systems that guarantee the cooling temperature.

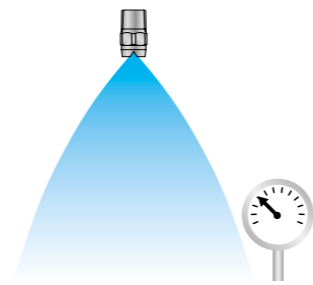


# ◆ Introduction of "The Fog Engineers IKEUCHI" ◆

## Guarantee of nozzle performance

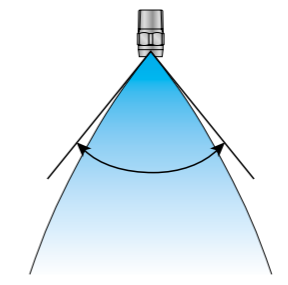
All IKEUCHI's precision-made hydraulic nozzles are guaranteed for spray angles and spray capacities.

### Spray Capacity Tolerance



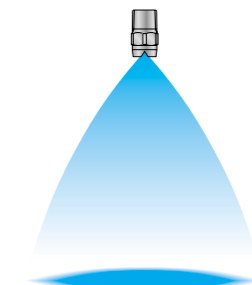
Spray capacities shown in this catalog are based on city water at room temperature and all spray nozzles are guaranteed for spray capacities within  $\pm 5\%$  under standard pressure.

### Spray Angle Tolerance



Based on city water at room temperature, all spray nozzles are guaranteed for spray angles within  $\pm 5^\circ$  under standard pressure. Spray angle is the angle of spray measured near the nozzle unless otherwise specified.

### Spray Pattern



In addition to spray capacity and angle inspection, IKEUCHI has an original inspection standard for spray pattern; cross sectional shape of the spray. Only nozzles that pass the inspection will be shipped.

Standard pressure is defined as a design pressure based on usual liquid pressure in common use. Nozzles are designed to provide the specified spray angle, spray capacity, optimum spray pattern and spray distribution at each standard pressure.

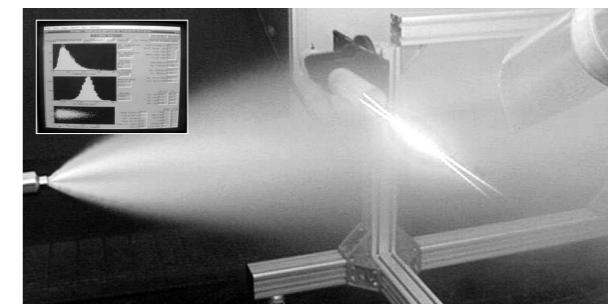
\* Figures in this catalog are based on city water at room temperature and liquid pressure at the immediate upstream of the nozzle.

## Instruments for measuring spray performance

We measure spray performance with the latest measuring instruments.

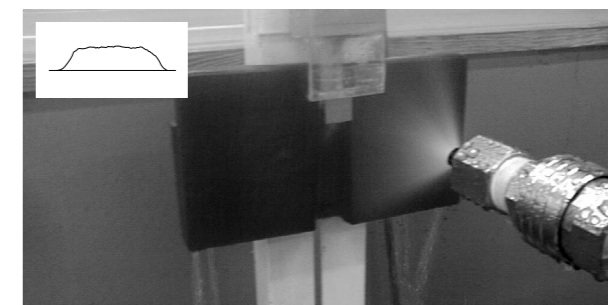
### Measurement of spray droplet diameter and velocity

Spray droplet diameter and velocity are measured with a Laser doppler analyzer.



### Measurement of spray impact

Spray impact, an important factor for cooling/cleaning applications is measured automatically.



### Measurement of spray distribution

Spray distribution is measured automatically.

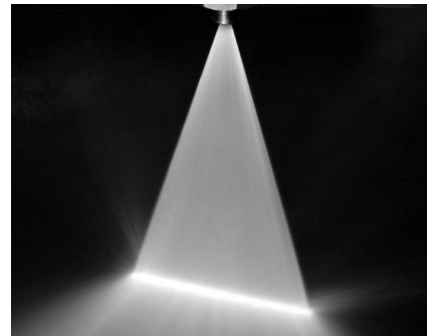


To characterize the effects of spraying, we perform cooling experiments to measure the temperature and measure the spray distribution on mock rolls.

# ◆ Example of IKEUCHI Original Spray Nozzles ◆

## Descaling nozzles for plate and hot strip

Our descaling nozzles achieve higher spray impact with less water compared to conventional nozzles. Water saving and long nozzle life. (P.10)



## Secondary cooling nozzles for continuous casting steel cooling

The latest fog spray nozzles keep their cooling effect even if at a very low air/water ratio. Available for various kinds of steel cooling. Enables reduction of plant energy costs. (P.15)



## COOLJetter® Semi Dry Fog® cooling fan unit

COOLJetter® is a combined unit of a fan and nozzles that can blow Semi Dry Fog® further and broader using fan wind. Ideal for outdoor cooling and dust suppression. Energy saving design. (P.59)



## Contents

- Introduction of our cooling technology and fog cooling system ..... P.1, P.9
- Guarantee of nozzle performance ..... P.2
- How to read the tables ..... P.4
- Nozzle applications for each process ..... P.5-8
- Spray nozzles lineup for cast steel cooling ..... P.62
- Spray nozzles and applied equipments... P.10-61

	Nozzle series	Nozzle description	Page
Descaling nozzles	● TDSS series	Descaling Nozzles	P.10
Brush-cleaning nozzle header	● BRASIKan® series	Manual Brush-cleaning Nozzle Header	P.13
Pneumatic spray nozzles	● DOVEA series ● DDA series ● DDRP+AS series	Secondary Cooling Nozzles / Flat Spray Secondary Cooling Nozzles / Oval Spray Hydraulic/Pneumatic (dual-use) Thick flat spray nozzles with Even Distribution	P.15 P.17 P.19
	● BIM series ● BIM Header series ● GSIM-s series ● VVEA series ● PSN series	Small Capacity Fine Fog Nozzles Integrated Spray Header with BIM Fine Fog Nozzles Medium/Large Capacity Fine Fog Nozzles High Impact Flat Spray/Semi-fine, Semi-coarse Fog Nozzles Pneumatic Slit Nozzles	P.21 P.24 P.26 P.29 P.30
Hydraulic flat spray nozzles	● VVP series ● VVP+AS series ● WVVP series ● WVVEP series ● EJV series	Standard Flat Spray Nozzles Hydraulic/Pneumatic (dual-use) Flat Spray Nozzles Thick Flat Spray Nozzles Thick Flat Spray Nozzles with Even Distribution Air Mixing Type Flat Spray Nozzles	P.31 P.33 P.34 P.35 P.36
	● DDRP series ● VV+YY series ● OVVEP series ● WOVVEP series	Thick Flat Spray Nozzles with Even Distribution Dual Flat Spray Nozzles Off-center Flat Spray Nozzles with Even Distribution Thick Off-center Flat Spray Nozzles with Even Distribution	P.37 P.38 P.39 P.39
Hydraulic cone spray nozzles	● AJP series ● TAA series ● WTAA series ● JUXP series ● JJXP series ● BBXP series ● SSXP series ● TJX series ● 7JJXP/13JJXP series ● SPB series ● KKK series ● LLYOH series	Anti-clogging Vaneless Full Cone Spray Nozzles Wear-resistant Hollow Cone Spray Nozzles Wear-resistant bi-directional hollow cone spray nozzles Wear-resistant Full Cone Spray Nozzles Standard Full Cone Spray Nozzles Wide-angle Full Cone Spray Nozzles Square Spray Nozzles Flange Type Full Cone Spray Nozzles 7-head, 13-head Full Cone Spray Nozzles SPILLBACK Nozzle - with Variable Flow Nozzle with Variable Spray Angle and Spray Capacity Blower LYOHM header	P.40 P.42 P.42 P.42 P.43 P.45 P.47 P.48 P.49 P.50 P.51 P.52
	● TAIFUJet® series ● SLNHB/SLNH(A)-H series ● UT series ● KIT series ● ES, N-series ● CLJ series ● ARS Filter	Air Nozzles Slit Nozzles Universal Ball Joints High-Pressure Tank Cleaning Nozzles Rotating Tank Cleaning Nozzle COOLJetter® Cooling Fan Unit with Semi Dry Fog® Nozzles Auto Reverse Self-cleaning Filter	P.53 P.55 P.56 P.57 P.58 P.59 P.61
Special purpose spray nozzles / Applied equipments			

# How to Read the Tables

● Shows steel making process where this nozzle is used, and its application (Ref. P.5-8 for nozzle applications for each process)

### TDSS series Descaling Nozzles

Rolling Mills Descaling

**FEATURES**

- Stabilizing strainer for making perfect straight flow.
- Unique nozzle tip design produces razor-like sharp stream.
- Water saving descaling nozzle, achieving higher impact with less water.

● Features of spray nozzles and spray pattern, etc.

● Photo of nozzle spraying under standard pressure

● In our material code, "S" represents "stainless steel".

**[Example]**  
S303 represents stainless steel 303.  
S316 represents stainless steel 316.

● Threads noted in this catalog are taper pipe threads.

"M" refers to male thread and "F" refers to female thread.

**[Example]**  
3/8M...3/8" Male thread (PT), R3/8  
1/2F...1/2" Female thread (PT), Rc1/2

**TDSS series**

Offset angle Left (L) Right (R)

**MATERIALS**

- 1 Nozzle tip
  - Standard nozzle tip/Tip with cover
    - Tip: Tungsten carbide
    - Tip body: S303
  - Long nose nozzle tip
    - Tip: Tungsten carbide
    - Tip body: S304
- 3 Packing: Copper
- 4 Stabilizing strainer
  - Standard/Long strainer
    - Strainer adaptor: Brass (C3604)
    - Strainer: Brass or S316L (for #1 only)
    - Stabilizer: S316L
  - Strainer with check valve
    - Strainer adaptor: Brass (C3604)
    - Check valve adaptor: S403
    - Piston valve: S303
    - Spring: S304
    - Strainer: Brass or S316L (for #1 only)
    - Stabilizer: S316L

● Strainer with check valve

● Strainer adaptor: Brass (C3604)  
● Check valve adaptor: S403  
● Piston valve: S303  
● Spring: S304  
● Strainer: Brass or S316L (for #1 only)  
● Stabilizer: S316L

Series	Types of Strainers	Dimensions (mm)			
		L1	L2	a	#d
TDSS	Standard strainer (type B)	126	52	25	30
	Long strainer (type E)	173	52	25	30
	Strainer with check valve (type LCV)	178	52	25	30

● Nozzle tip (⊙ Tip ⊕ Tip body)  
● Packing  
● Stabilizing strainer (⊙ Strainer adaptor ⊕ Stabilizer ⊗ Strainer)

**TDSS series nozzle selection chart**

Conversion of unit [Pressure] 0.1MPa ≈ 14.50psi (Flow rate) 1ℓ (liter) ≈ 0.264 US gal, 10psi ≈ 0.069MPa, 1US gal ≈ 3.79ℓ (liter)

Spray capacity code	015	016	022	027	037	044	056	065	074	083	087	089	111	138
Spray angle	15.0	16.5	22.0	27.7	37.0	44.0	56.0	65.0	74.0	82.8	87.0	89.0	111	138
65°					○			○						
45°		○												
44°										○			○	
40°				○							○		○	
38°											○			
35°												○	○	○
32°				○		○	○	○	○	○	○	○	○	○
28°		○	○											
25°							○	○	○	○	○	○	○	○
20°													○	○

\*The above figure indicates spray capacity and spray angle at standard pressure (15MPa).

**10**

● Example of use and performance/technical data are shown.

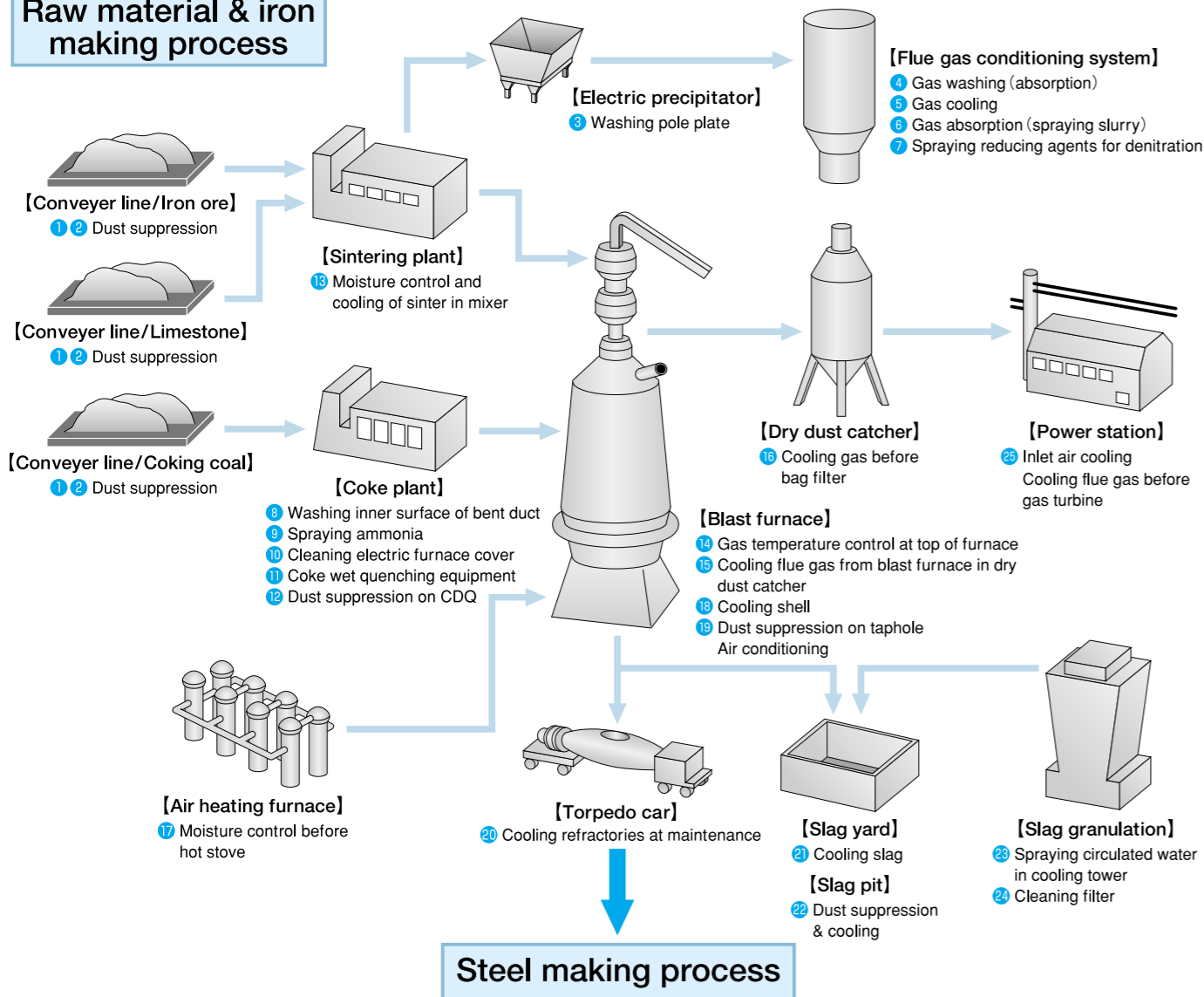
● Calculated spray capacity and air consumption at the specified pressure [(9.21 ℓ/min) (65 ℓ/min, Normal) at 0.2MPa]

Spray angle code (110°)	Spray capacity code (180)	Air pressure (MPa)	Spray capacity (ℓ/min) & Air consumption (ℓ/min, Normal)						Mean droplet dia. (μm)		Free passage dia. (mm)		
			Liquid pressure (MPa)						Immersion sampling method	Fraunhofer diffraction method	Adaptor		
			0.07	0.1	0.2	0.4	0.7	9.21			Liquid	Air	
110°	180	0.1	0.92 / 275	3.18 / 180	9.21 / 65	—	—	100	50	—	—	—	—
		0.2	—	—	4.34 / 280	12.9 / 100	—	100	50	—	—	—	—
		0.3	—	—	—	9.49 / 250	18.0 / 100	100	50	—	—	—	—
		0.4	—	—	—	—	15.9 / 200	350	150	—	—	—	—
110°	400	0.1	2.05 / 620	7.07 / 410	20.5 / 150	—	—	100	50	—	—	—	—
		0.2	—	—	9.65 / 630	28.6 / 220	—	100	50	—	—	—	—
		0.3	—	—	—	21.1 / 560	40 / 225	100	50	—	—	—	—
		0.4	—	—	—	—	35.4 / 450	400	200	—	—	—	—
95°	82	0.1	0.42 / 125	1.45 / 85	4.19 / 30	—	—	100	50	—	—	—	—
		0.2	—	—	1.98 / 125	5.86 / 45	—	100	50	—	—	—	—
		0.3	—	—	—	4.32 / 110	8.2 / 45	100	50	—	—	—	—
		0.4	—	—	—	—	7.26 / 90	300	150	—	—	—	—
95°	180	0.1	0.92 / 275	3.18 / 180	9.21 / 65	—	—	100	50	—	—	—	—
		0.2	—	—	4.34 / 280	12.9 / 100	—	100	50	—	—	—	—
		0.3	—	—	—	9.49 / 250	18.0 / 100	100	50	—	—	—	—
		0.4	—	—	—	—	15.9 / 200	350	175	—	—	—	—
95°	400	0.1	2.05 / 620	7.07 / 410	20.5 / 150	—	—	100	50	—	—	—	—
		0.2	—	—	9.65 / 630	28.6 / 220	—	100	50	—	—	—	—
		0.3	—	—	—	21.1 / 560	40 / 225	100	50	—	—	—	—
		0.4	—	—	—	—	35.4 / 450	400	200	—	—	—	—



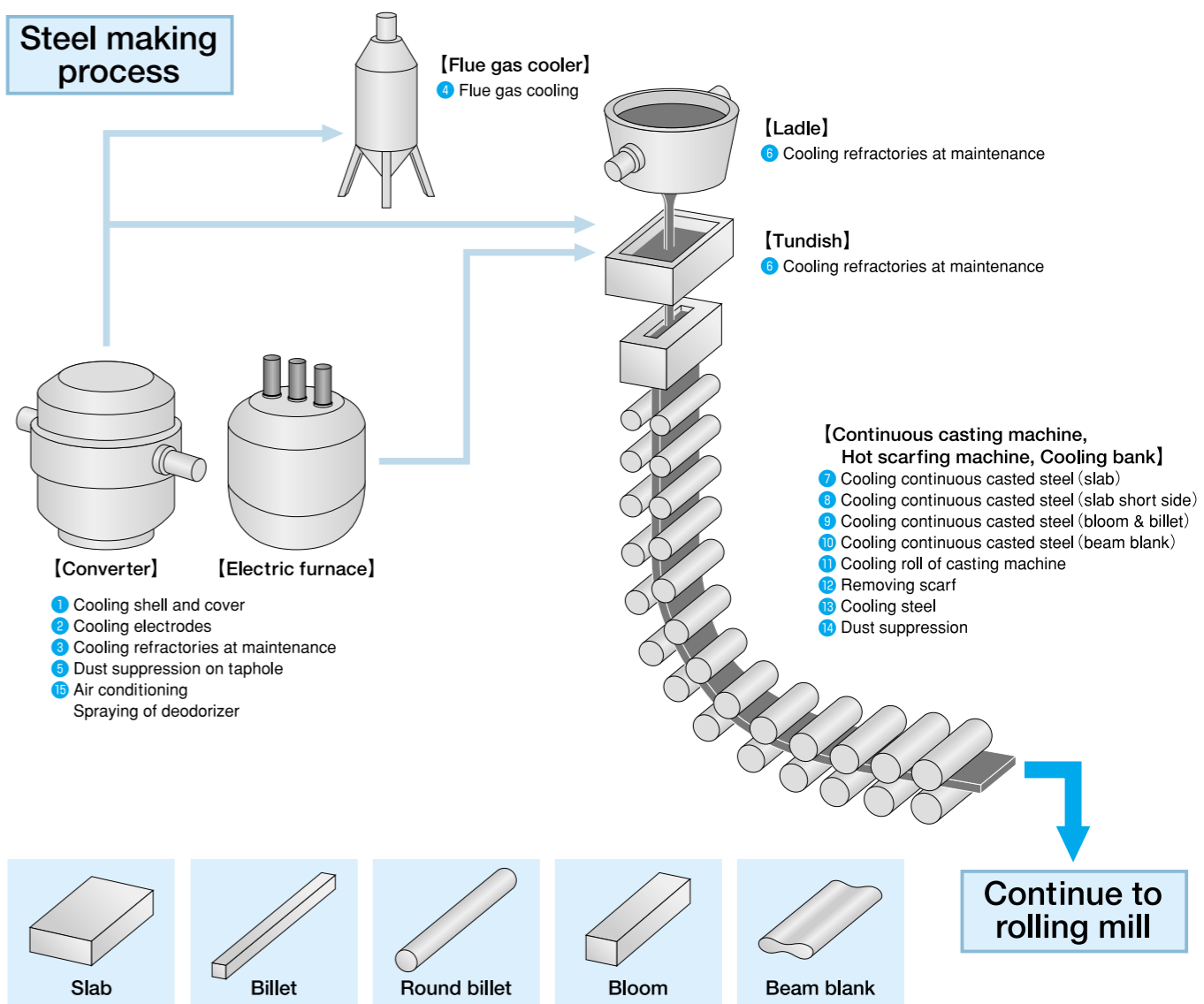
# Applications for each process

## Raw material & iron making process



## Steel making process

## Steel making process



Process No.	Application	Nozzle series	Nozzle description	Page
1	Dust suppression on raw material conveyer line •Dust suppression	VVP AJP	•Standard flat spray •Anti-clogging vaneless full cone spray nozzles	P. 31 P. 40
2	Conveyer line/Limestone •Dust suppression	BIM	•Fine fog pneumatic spray nozzles •Semi Dry Fog® cooling fan unit	P. 21 P. 59
3	Electric precipitator •Washing pole plate	EJVV AJP	•Air mixing type flat spray •Anti-clogging vaneless full cone spray nozzles	P. 36 P. 40
4	Flue gas conditioning system •Gas washing (absorption)	TJJX	•Flange type full cone spray	P. 48
5	Flue gas conditioning system •Gas cooling	SPB	•SPILLBACK nozzle with variable flow	P. 50
6	Flue gas conditioning system •Gas absorption (spraying slurry)	WTAA TAA TJJX	•Wear-resistant bi-directional hollow cone spray nozzles •Wear-resistant hollow cone spray nozzles •Flange type full cone spray nozzles	P. 42 P. 42 P. 48
7	Flue gas conditioning system •Spraying reducing agents for denitration	BIM	•Fine fog pneumatic spray nozzles	P. 21
8	Coke plant •Washing inner surface of bent duct	VV+YY	•Dual flat spray	P. 38
9	Coke plant •Spraying ammonia	AJP	•Anti-clogging vaneless full cone spray nozzles	P. 40
10	Coke plant •Cleaning electric furnace cover	CP-Sa	•Wear-resistant solid stream jet with sapphire orifice	*
11	Coke plant •Coke wet quenching equipment	JJXP	•Standard full cone spray	P. 43
12	Coke plant •Dust suppression on CDQ	GSIM.s	•Large capacity fine fog pneumatic spray nozzles	P. 26
13	Sintering plant •Moisture control and cooling of sinter in mixer	AJP CLJ	•Anti-clogging vaneless full cone spray nozzles •Semi Dry Fog® cooling fan unit	P. 40 P. 59

Remarks: For details of the products marked with \*, please contact us.

Process No.	Application	Nozzle series	Nozzle description	Page
14	Blast furnace •Gas temperature control at top of furnace	JJXP BBXP VVP	•Standard full cone spray •Wide-angle full cone spray •Standard flat spray	P. 43 P. 45 P. 31
15	Blast furnace •Cooling flue gas from blast furnace in dry dust collector	7JJXP 4SPB	•7-head full cone spray •4-head SPILLBACK nozzles	P. 49 P. 50
16	Dry dust catcher •Cooling gas before bag filter	SPB	•SPILLBACK nozzle with variable flow	P. 50
17	Air heating furnace •Moisture control before hot stove	SPB	•SPILLBACK nozzle with variable flow	P. 50
18	Blast furnace •Cooling shell	AJP	•Anti-clogging vaneless full cone spray nozzles	P. 40
19	Blast furnace •Dust suppression on taphole •Air conditioning	GSIM.s CLJ	•Large capacity fine fog pneumatic spray nozzles •Semi Dry Fog® cooling fan unit	P. 26 P. 59
20	Torpedo car •Cooling refractories at maintenance	GSIM.s BIM Header CLJ	•Large capacity fine fog pneumatic spray nozzles •BIM integrated spray header	P. 26 P. 24
21	Slag yard •Cooling slag	KKK	•Variable spray angle and spray capacity	P. 51
22	Slag pit •Dust suppression & cooling	3OV	•3-head nozzle with large spray coverage	*
23	Slag granulation •Spraying circulated water in cooling tower	TAA TJJX	•Wear-resistant hollow cone spray nozzles •Flange type full cone spray nozzles	P. 42 P. 48
24	Slag granulation •Cleaning filter	VVP VEP	•Standard flat spray •Even flat spray	P. 31 *
25	Power station •Inlet air cooling •Cooling flue gas before gas turbine	GSIM.s KB	•Large capacity fine fog pneumatic spray nozzles •Ultra small capacity hollow cone spray	P. 26 *

Remarks: For details of the products marked with \*, please contact us.

Process No.	Application	Nozzle series	Nozzle description	Page
1	Electric furnace •Cooling shell and cover	AJP Wide-angle AJP	•Anti-clogging vaneless full cone spray nozzles •Anti-clogging vaneless full cone spray nozzles (wide spray angle)	P. 40 P. 41
2	Electric furnace •Cooling electrodes	VVP BIM	•Standard flat spray •Fine fog pneumatic spray nozzles	P. 31 P. 21
3	Electric furnace/Converter •Cooling refractories at maintenance	GSIM.s	•Large capacity fine fog pneumatic spray nozzles	P. 26
4	Electric furnace/Converter •Flue gas cooling	GSIM.s	•Large capacity fine fog pneumatic spray nozzles	P. 26
5	Electric furnace/Converter •Dust suppression on taphole	GSIM.s	•Large capacity fine fog pneumatic spray nozzles	P. 26
6	Ladle/Tundish •Cooling refractories at maintenance	GSIM.s BIM Header CLJ	•Large capacity fine fog pneumatic spray nozzles •BIM integrated spray header •Semi Dry Fog® cooling fan unit	P. 26 P. 24 P. 59
7	Continuous casting machine •Cooling continuous casted steel (slab)	DOVEA DOVEA-W DDRP+AS VVP+AS BIM	•Flat spray, secondary cooling nozzles •Flat spray, secondary cooling nozzles with double-wide spray thickness •Hydraulic/Pneumatic (dual-use) thick flat spray nozzles with even distribution •Hydraulic/Pneumatic (dual-use) flat spray nozzles	P. 15 P. 16 P. 19 P. 33
8	Continuous casting machine •Cooling continuous casted steel (slab short side)	DDA	•Oval spray, secondary cooling nozzles	P. 17

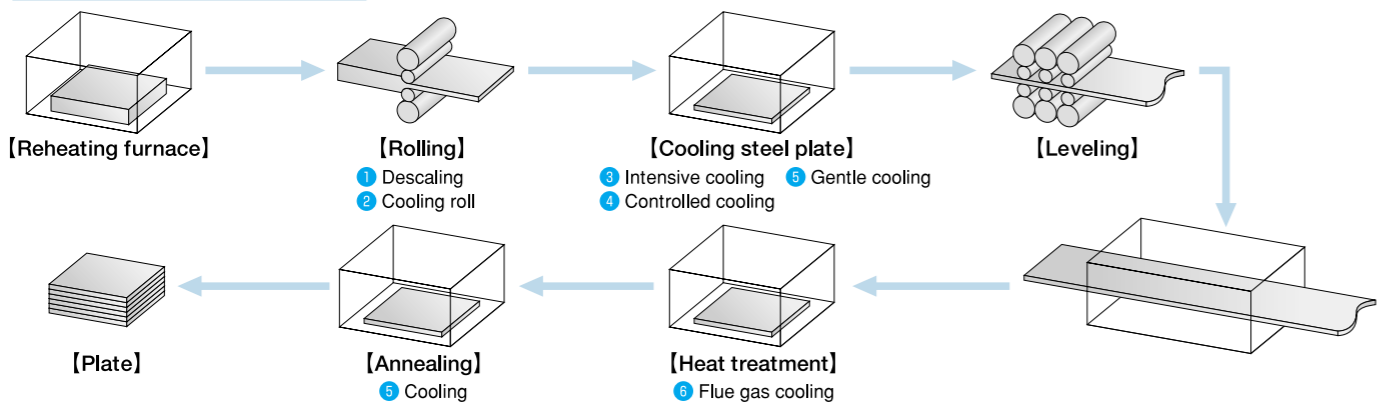
Remarks: For details of the products marked with \*, please contact us.

Process No.	Application	Nozzle series	Nozzle description	Page
9	Continuous casting machine •Cooling continuous casted steel (bloom & billet)	DDA DDRP+AS VVP+AS DDRP WVVP SSXP VVP JJXP	•Oval spray, secondary cooling nozzles •Hydraulic/Pneumatic (dual-use) thick flat spray nozzles with even distribution •Hydraulic/Pneumatic (dual-use) flat spray nozzles •Thick flat spray with even distribution •Thick flat spray •Square spray •Standard flat spray •Standard full cone spray	P. 17 P. 19 P. 33 P. 37 P. 34 P. 47 P. 31 P. 43
10	Continuous casting machine •Cooling continuous casted steel (beam blank)	DOVEA DOVEA-W	•Flat spray, secondary cooling nozzles •Flat spray, secondary cooling nozzles with double-wide spray thickness	P. 15 P. 16
11	Continuous casting machine •Cooling roll of casting machine	DDA DOVEA DOVEA DDRP+AS VVP+AS BIM	•Oval spray, secondary cooling nozzles •Flat spray, secondary cooling nozzles •Hydraulic/Pneumatic (dual-use) thick flat spray nozzles with even distribution •Hydraulic/Pneumatic (dual-use) flat spray nozzles •Fine fog pneumatic spray nozzles	P. 17 P. 15 P. 19 P. 33 P. 21
12	Hot scarfing machine •Removing scarf	CCP VVEP	•Standard solid stream jet •Even flat spray	* *
13	Cooling bank •Cooling steel	CLJ GSIM.s	•Semi Dry Fog® cooling fan unit •Large capacity fine fog pneumatic spray nozzles	P. 59 P. 26
14	Environment •Dust suppression	KB CLJ	•Ultra small capacity hollow cone spray •Semi Dry Fog® cooling fan unit	* P. 59
15	Environment •Air conditioning •Spraying of deodorizer	LYOHM System® CLJ	•Semi Dry Fog® cooling system •Semi Dry Fog® cooling fan unit	* P. 59

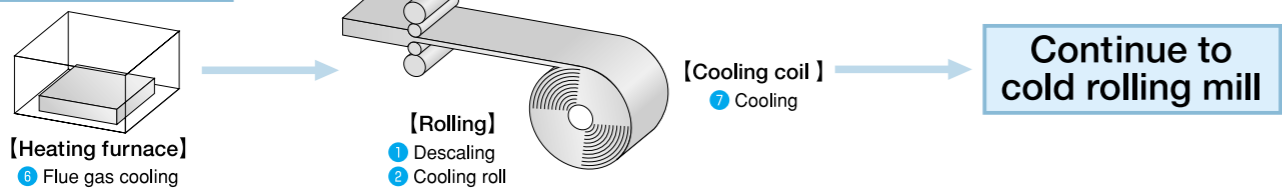
Remarks: For details of the products marked with \*, please contact us.

# Applications for each process

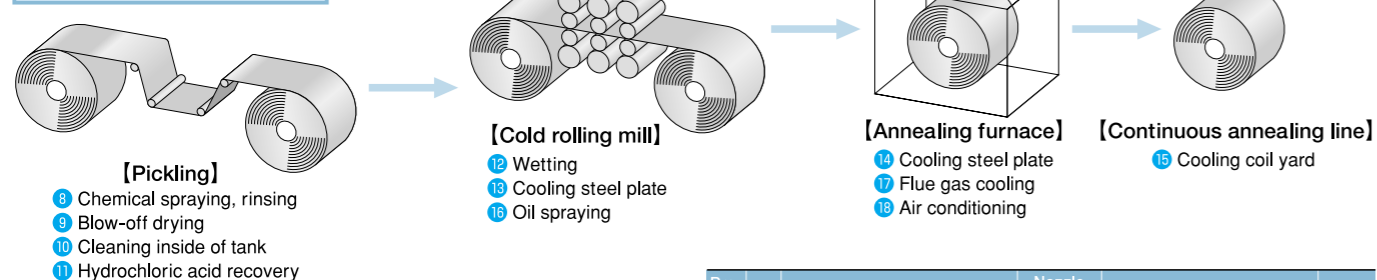
## Plate mill process



## Hot rolling mill



## Cold rolling mill



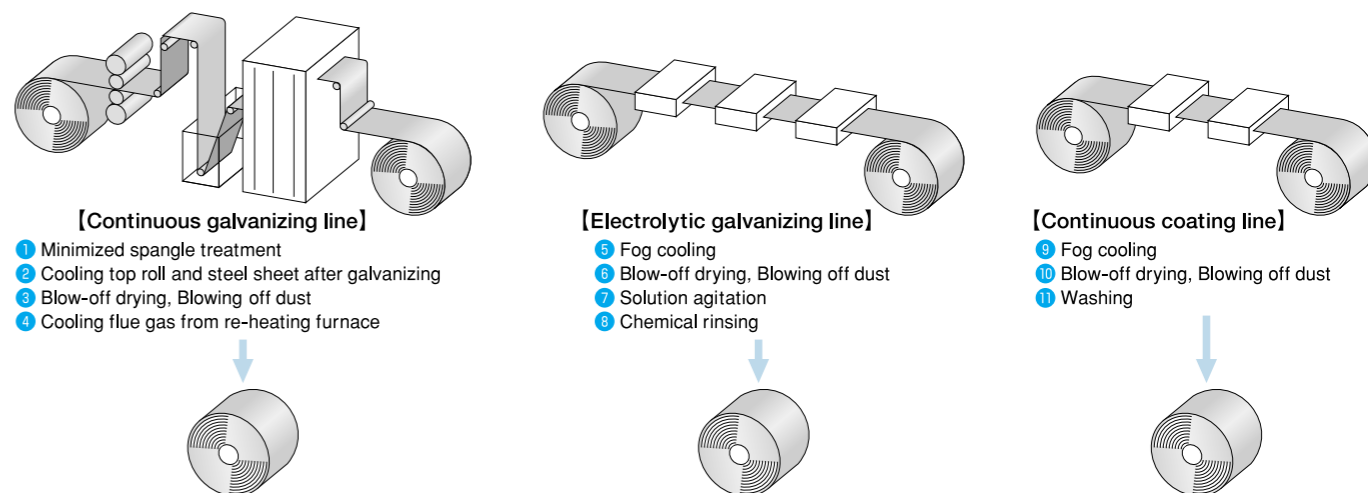
Process	No.	Application	Nozzle series	Nozzle description	Page
Rolling mills	1	Descaling	TDSS	• Descaling nozzles	P.10
	2	Cooling roll	DDRP+AS	• Hydraulic/Pneumatic (dual-use) thick flat spray nozzles with even distribution	P.19
			VVP+AS	• Hydraulic/Pneumatic (dual-use) flat spray nozzles	P.33
			VVP	• Standard flat spray	P.31
			WVVP	• Thick flat spray	P.34
	3	Cooling steel plates • Intensive cooling	WOVVEP	• Thick off-center flat spray with even distribution	P.39
			WVVEP	• Thick flat spray with even distribution	P.35
		EJVJ	• Air mixing type flat spray	P.36	
4	Cooling steel plates • Controlled cooling	DDRP+AS	• Hydraulic/Pneumatic (dual-use) thick flat spray nozzles with even distribution	P.19	
		VVP+AS	• Hydraulic/Pneumatic (dual-use) flat spray nozzles	P.33	
		WOVVEP	• Thick off-center flat spray with even distribution	P.39	
		SSXP	• Square spray	P.47	
		DDRP	• Thick flat spray with even distribution	P.37	
		VVP	• Standard flat spray	P.31	
		AJP	• Anti-clogging vaneless full cone spray nozzles	P.40	
5	Cooling steel plates • Gentle cooling	BIM	• Fine fog pneumatic spray nozzles	P.21	
		TAIFUJet®	• Air nozzles	P.53	
		LLYOH	• Blower LYOHM header	P.52	
6	Heating furnace • Flue gas cooling	GSIM.s	• Large capacity fine fog pneumatic spray nozzles	P.26	
7	Cooling coil • Cooling	CLJ	• Semi Dry Fog® cooling fan unit	P.59	

Remarks: For details of the products marked with \*, please contact us.

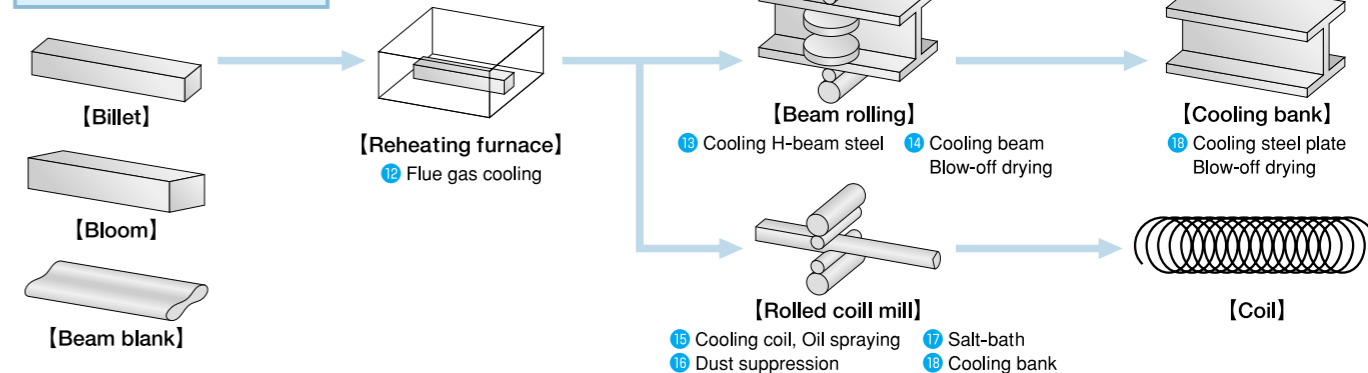
Process	No.	Application	Nozzle series	Nozzle description	Page
Cold rolling mills	8	Pickling • Chemical spraying/rinsing	VVEA	• High impact flat spray, semi-fine, semi-coarse fog nozzles	P.29
			PSN	• Pneumatic slit nozzles	P.30
			VVP	• Standard flat spray	P.31
			BRASIKAN®	• Manual brush-cleaning nozzle header	P.13
	9	Pickling • Blow-off drying	TAIFUJet®	• Air nozzles	P.53
	10	Pickling • Cleaning inside of tank	7JJXP	• 7-head full cone spray	P.49
			KIT	• High-pressure tank cleaning nozzles	P.57
	11	Pickling • Hydrochloric acid recovery	KB	• Ultra small capacity hollow cone spray (ceramic orifice)	*
			KKB	• Ultra small capacity hollow cone spray (all metal)	*
	12	Cold rolled steel • Wetting	BIM Header	• BIM integrated spray header	P.24
			DDA	• Oval spray, secondary cooling nozzles	P.17
	13	Electromagnetic steel • Cooling steel plate	DDRP+AS	• Hydraulic/Pneumatic (dual-use) thick flat spray nozzles with even distribution	P.19
			VVP+AS	• Hydraulic/Pneumatic (dual-use) flat spray nozzles	P.33
			AJP	• Anti-clogging vaneless full cone spray nozzles	P.40
			DDA	• Oval spray, secondary cooling nozzles	P.17
	14	Continuous annealing line • Cooling steel plate	DDRP+AS	• Hydraulic/Pneumatic (dual-use) thick flat spray nozzles with even distribution	P.19
			VVP+AS	• Hydraulic/Pneumatic (dual-use) flat spray nozzles	P.33
	15	Continuous annealing line • Cooling coil yard	CLJ	• Semi Dry Fog® cooling fan unit	P.59
16	Cold rolling mill • Oil spraying	BIM Header	• BIM integrated spray header	P.24	
17	Annealing furnace • Flue gas cooling	GSIM.s	• Large capacity fine fog pneumatic spray nozzles	P.26	
18	Annealing furnace • Air conditioning	CLJ	• Semi Dry Fog® cooling fan unit	P.59	

Remarks: For details of the products marked with \*, please contact us.

## Surface finish



## Other processes



Process	No.	Application	Nozzle series	Nozzle description	Page
Surface finish	1	Continuous galvanizing line • Minimized spangle treatment	BIM	• Fine fog pneumatic spray nozzles	P.21
			BIM Header	• BIM integrated spray header	P.24
			LLYOH	• Blower LYOHM header	P.52
	2	Continuous galvanizing line • Cooling top roll and steel sheet after galvanizing	BIM	• Fine fog pneumatic spray nozzles	P.21
			BIM Header	• BIM integrated spray header	P.24
	3	Continuous galvanizing line • Blow-off drying/Blowing off dust	TAIFUJet®	• Air nozzles	P.53
			VVEA	• High impact flat spray, semi-fine, semi-coarse fog nozzles	P.29
			PSN	• Pneumatic slit nozzles	P.30
	4	Continuous galvanizing line • Cooling flue gas from re-heating furnace	GSIM.s	• Large capacity fine fog pneumatic spray nozzles	P.26
	5	Electrolytic galvanizing line • Fog cooling	BIM Header	• BIM integrated spray header	P.24
			LLYOH	• Blower LYOHM header	P.52
6	Electrolytic galvanizing line • Blow-off drying/Blowing off dust	TAIFUJet®	• Air nozzles	P.53	
		VVEA	• High impact flat spray, semi-fine, semi-coarse fog nozzles	P.29	
		PSN	• Pneumatic slit nozzles	P.30	
7	Electrolytic galvanizing line • Solution agitation	EJX	• Ejector nozzle for solution agitation	*	
8	Electrolytic galvanizing line • Chemical rinsing	SLNH(A)-H	• Slit nozzles	P.55	
		VEP	• Even flat spray	*	
9	Continuous coating line • Fog cooling	BIM Header	• BIM integrated spray header	P.24	
		LLYOH	• Blower LYOHM header	P.52	
10	Continuous coating line • Blow-off drying/Blowing off dust	TAIFUJet®	• Air nozzles	P.53	
		VVEA	• High impact flat spray, semi-fine, semi-coarse fog nozzles	P.29	
		PSN	• Pneumatic slit nozzles	P.30	
11	Continuous coating line • Washing	QB	• Quick installation nozzles	*	

Remarks: For details of the products marked with \*, please contact us.

Process	No.	Application	Nozzle series	Nozzle description	Page
Other processes	12	Reheating furnace • Flue gas cooling	GSIM.s	• Large capacity fine fog pneumatic spray nozzles	P.26
	13	Beam rolling • Cooling H-beam steel	WOVVEP	• Thick off-center flat spray with even distribution	P.39
			EJVJ	• Air mixing type flat spray	P.36
			DDRP	• Thick flat spray with even distribution	P.37
	14	Beam rolling • Cooling beam • Blow-off drying	OVVEP	• Off-center flat spray with even distribution	*
			VVP	• Standard flat spray	P.31
			TAIFUJet®	• Air nozzles	P.53
	15	Rolling mill • Cooling coil/Oil spraying	BIM	• Fine fog pneumatic spray nozzles	P.21
	16	Rolling mill • Dust suppression	GSIM.s	• Large capacity fine fog pneumatic spray nozzles	P.26
	17	Salt-bath • Mixing liquid in salt-bath	EJX	• Ejector nozzle for solution agitation	*
Environmental	18	Cooling bank • Cooling steel plate • Blow-off drying	VVP	• Standard flat spray	P.31
			CLJ	• Semi Dry Fog® cooling fan unit	P.59
			TAIFUJet®	• Air nozzles	P.53
		Environment • Dust suppression	KB	• Ultra small capacity hollow cone spray	*
		Environment • Spot cooling	CLJ	• Semi Dry Fog® cooling fan unit	P.59
		Environment • Spraying water on road	LYOHM System®	• Semi Dry Fog® cooling fan unit	P.59
	Fire prevention • Fire fighting/Fire prevention/Water curtain	YYP	• Wide-angle flat spray	*	
		VVP	• Standard flat spray	P.31	
		CCP	• Standard solid stream jet	*	

Remarks: For details of the products marked with \*, please contact us.