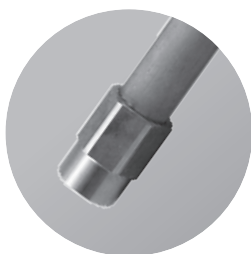




Return-flow Nozzles for Gas Cooling

SPB Series



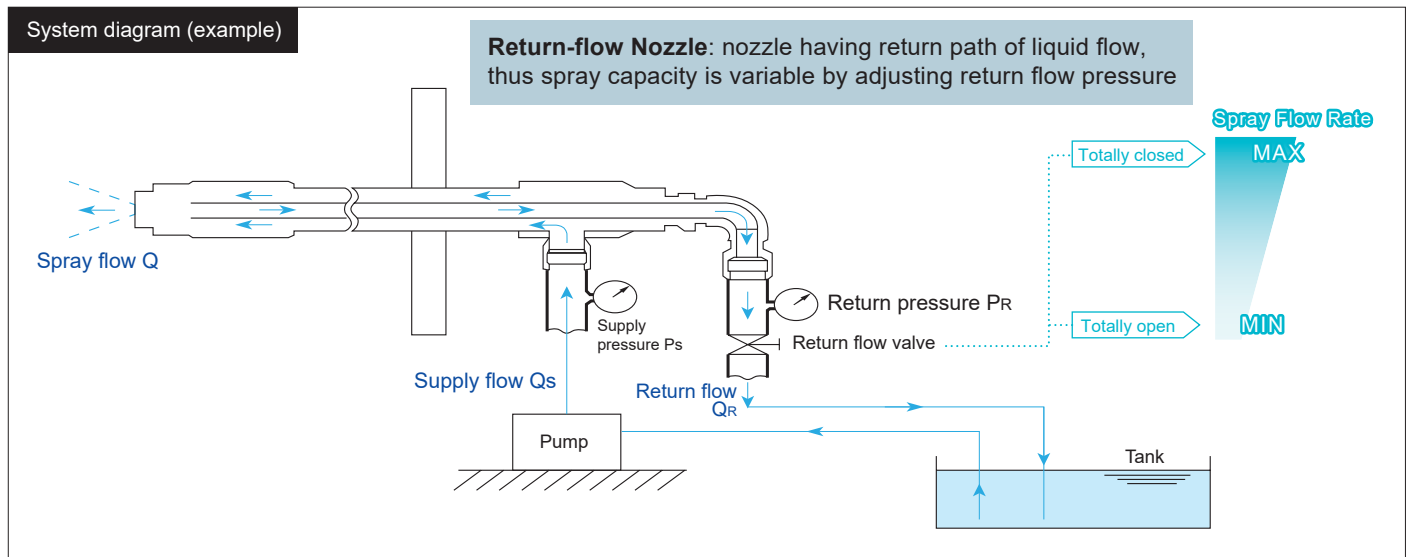
SPILLBACK Nozzles



SPILLBACK Nozzles SPB SERIES

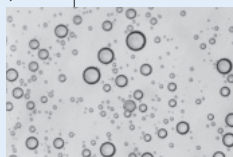
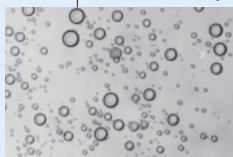
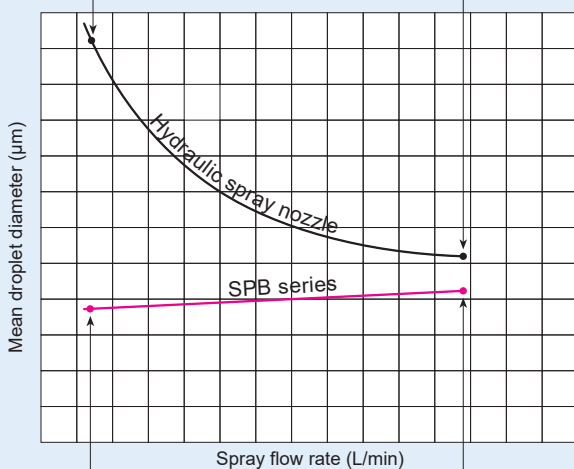
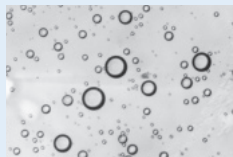
Return-flow Nozzles for Gas Cooling

With the liquid/water supplied at constant pressure, the spray capacity can be controlled by opening or closing the return flow valve. The SPB series features minimal variation in the spray droplet size and a large turn-down ratio of the spray capacity. This makes it ideal for gas cooling where the temperature and volume of the inlet gas varies.



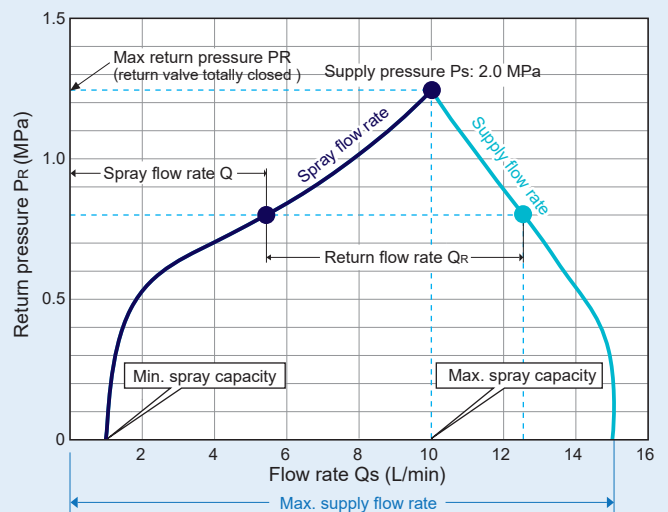
Fine Atomization

SPB series produces a fully vaporized spray, with minimal variation in spray droplet diameter, even with changing spray flow rate.



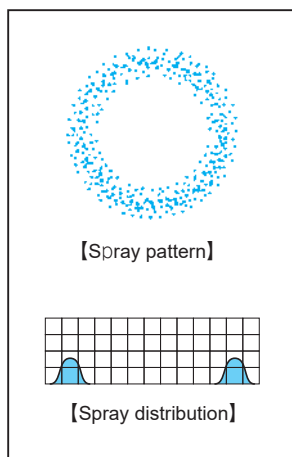
Turn-down ratio of 1:10

The spray capacity is maximized by fully closing the return flow valve and minimized by fully opening the return flow valve.
(Min. spray capacity:Max. spray capacity = 1:10, except for SPB8530R)



Supply flow rate Q_s = Spray flow rate Q (Spray capacity) + Return flow rate Q_R

Single-head Return-flow Nozzles SPB-R SERIES



[FEATURES]

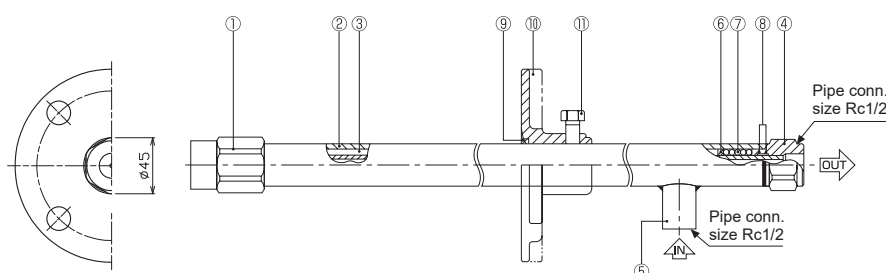
- Variable capacity hollow cone spray nozzles, generate fine atomization with uniform spray distribution (single-head).
- Spray capacity can be controlled by simply adjusting the return pressure while the supply pressure is kept constant. Spray capacity is maximized by fully closing the return flow valve and minimized by fully opening the return flow valve. The turn-down ratio of the spray capacity is 1:10 (except for SPB8530R).
- Part of the supplied liquid flows back when the return flow valve is opened, causing the supply flow to increase. The increase of supply flow is within 40–50% of the maximum spray capacity.
- Minimal variation in spray droplet diameter, regardless of the spray flow rate, makes the SPILLBACK nozzles ideal for gas cooling where the temperature of the inlet gas varies.
- Available in spray angle code 60 or 85.

[STANDARD PRESSURE]

Supply pressure: 2.0 MPa (with return flow valve totally closed)

[APPLICATIONS]

Gas cooling, moisture control at blast furnace



■ Components and materials

No.	Components	Standard material
①	Nozzle body & whirler	S316L
②	Inlet pipe	S316L
③	Outlet pipe	S304
④	Outlet socket	S304
⑤	Inlet socket	S304
⑥	Ring	S304
⑦	Spring	S304
⑧	O-ring	NBR
⑨	Packing	Metal wire reinforced AES wool
⑩	Flange	SCS13 (S304)
⑪	Bolt	S304 equivalent

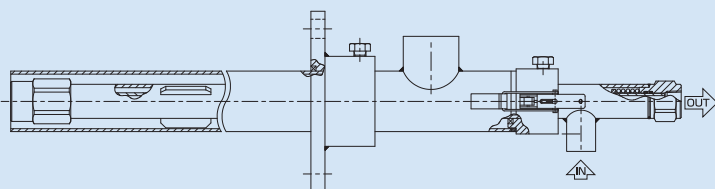
In the material code, "S" represents "stainless steel".

The above diagram is an example.

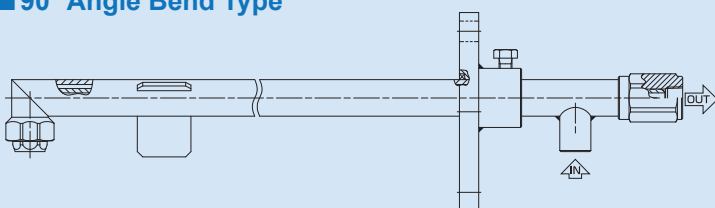
Inquiry forms with outline drawings are available to verify desired dimensions and specifications.

In addition to the example above, SPB series with 90° or 45° angle adaptor and an optional protection pipe are also available. Custom designs can be tailored to your needs.

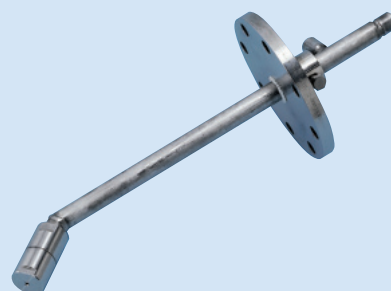
■ SPB Series with Protection Pipe



■ 90° Angle Bend Type



■ 45° Angle Bend Type



The protection pipe is available also for the angle bent type.

Single-head Return-flow Nozzles SPB-R SERIES

Performance Chart

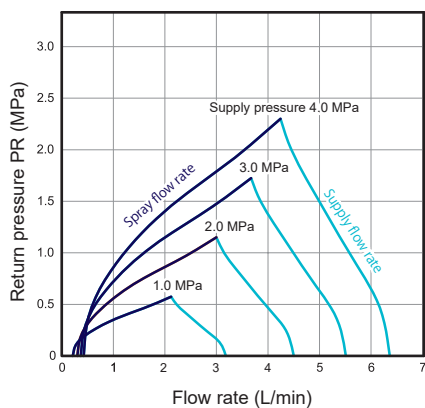
Nozzle code	Spray capacity (L/min) at supply pressure 2.0 MPa				Spray angle (°) at supply pressure 2.0 MPa			Free passage diameter (mm)
	Return pressure				Return pressure			
	Max.*1	0.8 MPa	0.4 MPa	0 MPa*2	Max.*1	0.8 MPa	0 MPa*2	
6003R	3.00	1.76	0.65	0.30	65	85	110	1.5
6004R	4.00	2.35	0.85	0.40				2.0
6005R	5.00	2.75	1.05	0.50				2.0
6006R	6.00	3.05	1.18	0.60	60	84	110	2.0
6007R	7.00	3.56	1.37	0.70				2.0
6008R	8.00	4.05	1.60	0.80				2.0
6010R	10.0	5.09	1.96	1.00				2.5
6012R	12.0	6.11	2.36	1.20				2.5
6014R	14.0	7.13	2.75	1.40				2.5
6016R	16.0	8.15	3.15	1.60				2.5
6018R	18.0	9.16	3.54	1.80				2.5
6020R	20.0	10.2	3.93	2.00				3.0
	Return pressure				Return pressure			
	Max.*1	0.6 MPa	0.3 MPa	0 MPa*2	Max.*1	0.6 MPa	0 MPa*2	
8505R	5.00	2.97	0.90	0.50	85	95	130	1.3
8510R	10.0	4.20	1.50	1.00	85	100	130	2.0
8515R	15.0	5.20	2.25	1.50	85	105	130	2.5
8520R	20.0	6.80	3.00	2.00				2.5
8525R	25.0	9.25	3.75	2.50				3.0
8530R	30.0	14.40	5.60	3.80	85	100	130	3.0

*1) When the return flow valve is totally closed *2) When the return flow valve is totally open

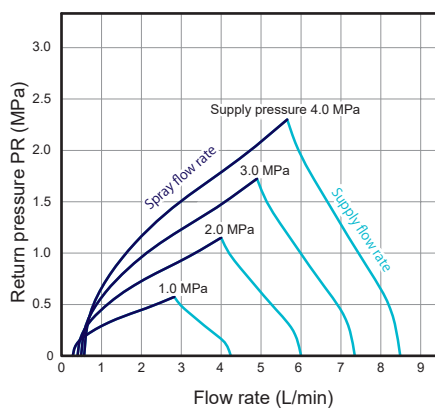
Flow-rate Diagram

Spray Angle Code 60

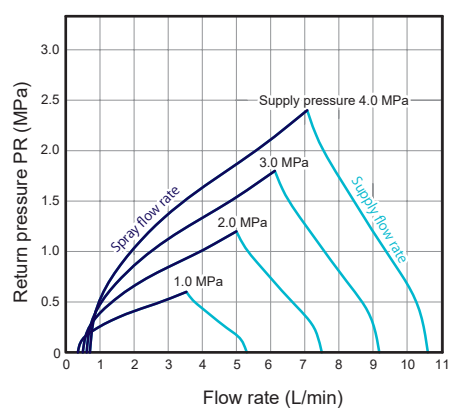
■ SPB6003R



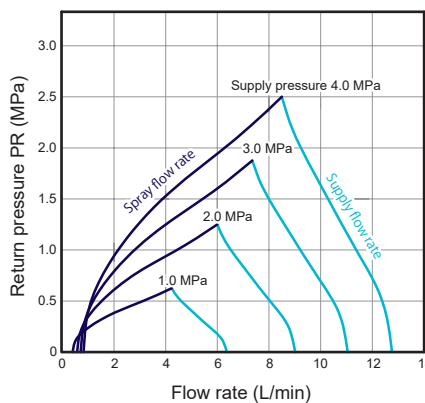
■ SPB6004R



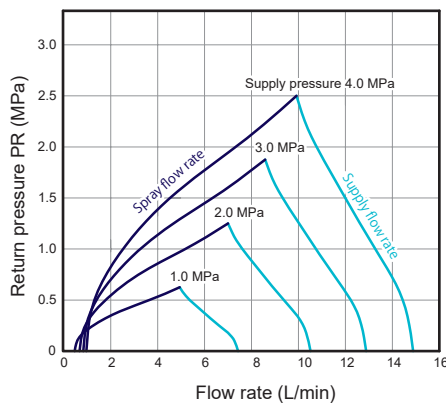
■ SPB6005R



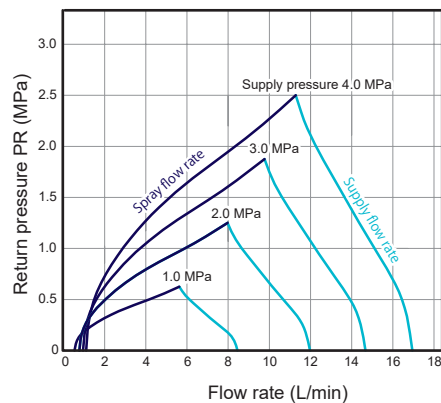
■ SPB6006R



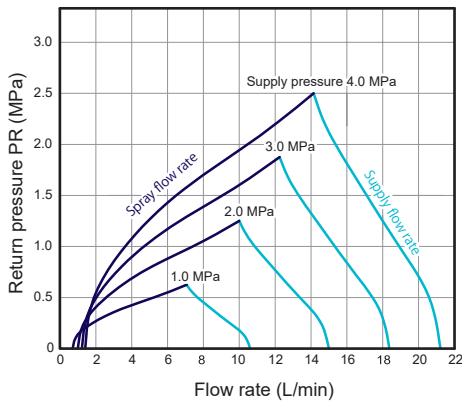
■ SPB6007R



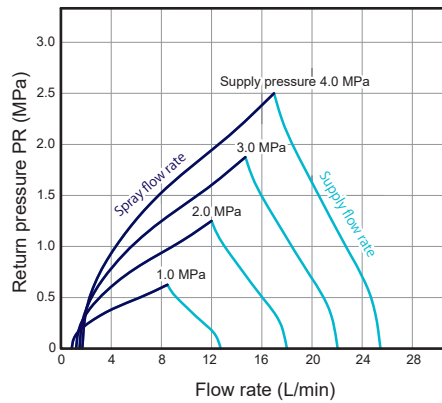
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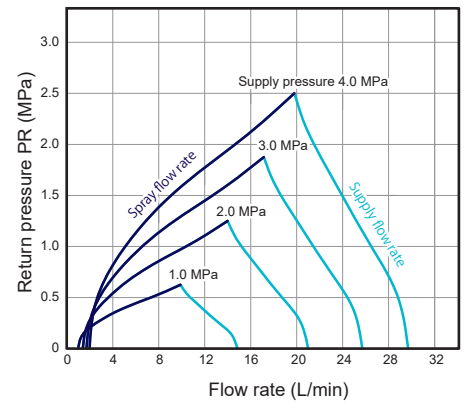
■ SPB6010R



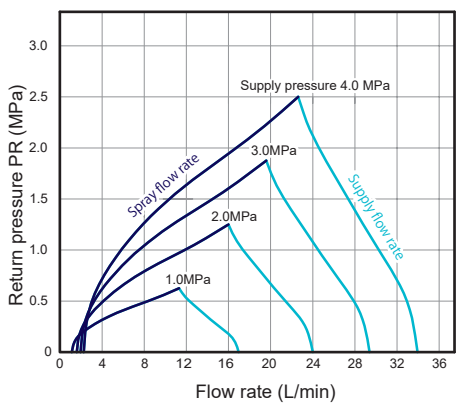
■ SPB6012R



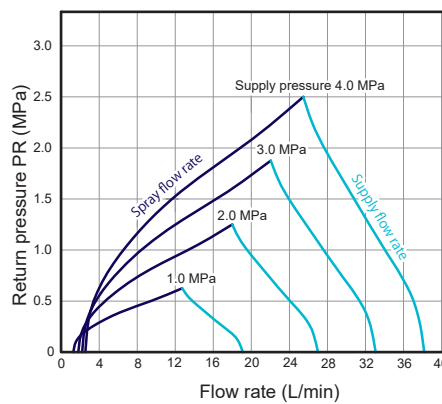
■ SPB6014R



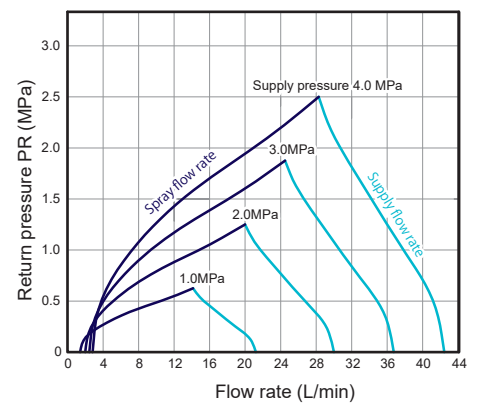
■ SPB6016R



■ SPB6018R



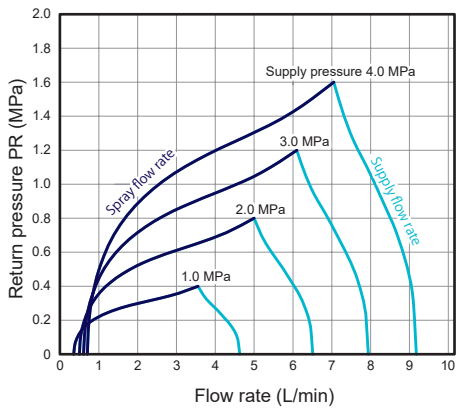
■ SPB6020R



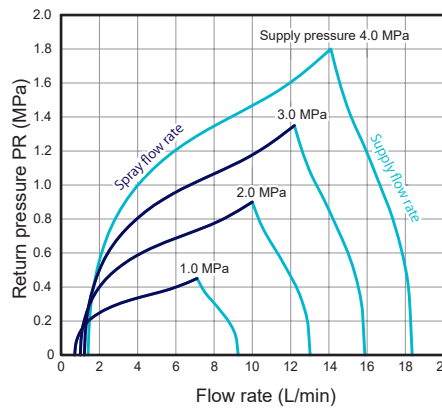
Flow-rate Diagram

Spray Angle Code 85

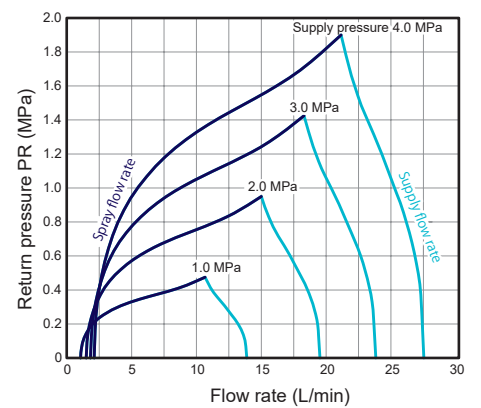
■ SPB8505R



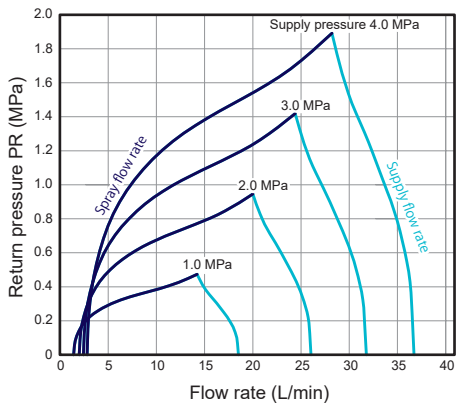
■ SPB8510R



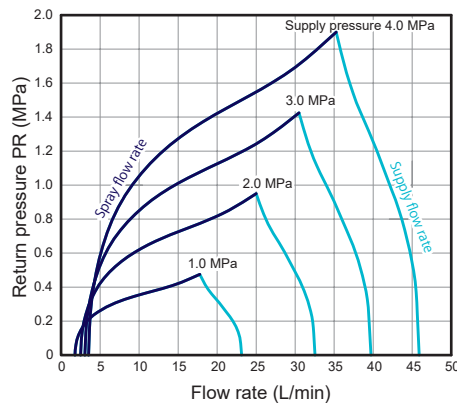
■ SPB8515R



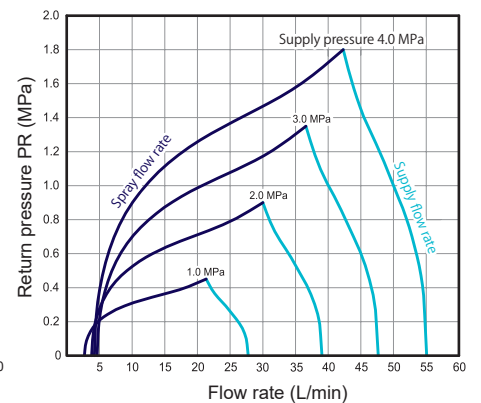
■ SPB8520R



■ SPB8525R

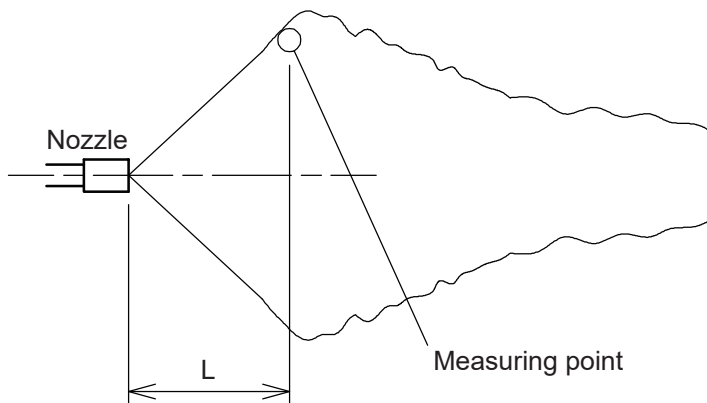


■ SPB8530R



Single-head Return-flow Nozzles SPB-R SERIES

Spray Droplet Diameter



Spray liquid: tap water, normal temperature

■ Spray Angle Code: 60

Supply pressure Ps: 2.0 MPa

Nozzle code	Return pressure* Pr (MPa)	Spray angle (°)	Spray capacity Q (L/min)	Sauter mean diameter d ₃₂ (μm)		Distance L (mm)	
				Immersion sampling	Laser analyzer	Immersion sampling	Laser analyzer
SPB6003R	1.15 (MAX)	65	3.00	133	120	500	300
	0.80	85	1.76	—	—	—	—
	0.40	105	0.65	—	—	—	—
	0 (MIN)	110	0.30	99	91	150	100
SPB6004R	1.15 (MAX)	65	4.00	139	125	500	300
	0.80	85	2.35	—	—	—	—
	0.40	105	0.85	—	—	—	—
	0 (MIN)	110	0.40	103	93	150	100
SPB6005R	1.20 (MAX)	65	5.00	147	132	500	300
	0.80	85	2.75	—	—	—	—
	0.40	105	1.05	—	—	—	—
	0 (MIN)	110	0.50	106	96	150	100
SPB6006R	1.25 (MAX)	60	6.00	154	139	500	300
	0.80	84	3.05	—	—	—	—
	0.40	108	1.18	—	—	—	—
	0 (MIN)	110	0.60	117	105	150	100
SPB6007R	1.25 (MAX)	60	7.00	160	144	500	300
	0.80	84	3.56	—	—	—	—
	0.40	108	1.37	—	—	—	—
	0 (MIN)	110	0.70	123	111	150	100
SPB6008R	1.25 (MAX)	60	8.00	165	149	500	300
	0.80	84	4.05	—	—	—	—
	0.40	108	1.60	—	—	—	—
	0 (MIN)	110	0.80	129	116	150	100
SPB6010R	1.25 (MAX)	60	10.00	174	157	500	300
	0.80	84	5.09	—	—	—	—
	0.40	108	1.96	—	—	—	—
	0 (MIN)	110	1.00	146	120	150	100
SPB6012R	1.25 (MAX)	60	12.00	184	166	500	300
	0.80	84	6.11	—	—	—	—
	0.40	108	2.36	—	—	—	—
	0 (MIN)	110	1.20	149	130	150	100
SPB6014R	1.25 (MAX)	60	14.00	192	173	500	300
	0.80	84	7.13	—	—	—	—
	0.40	108	2.75	—	—	—	—
	0 (MIN)	110	1.40	158	142	150	100
SPB6016R	1.25 (MAX)	60	16.00	199	179	500	300
	0.80	84	8.15	—	—	—	—
	0.40	108	3.15	—	—	—	—
	0 (MIN)	110	1.60	166	149	150	100
SPB6018R	1.25 (MAX)	60	18.00	206	185	500	300
	0.80	84	9.16	—	—	—	—
	0.40	108	3.54	—	—	—	—
	0 (MIN)	110	1.80	174	157	150	100
SPB6020R	1.25 (MAX)	60	20.00	213	192	500	300
	0.80	84	10.20	—	—	—	—
	0.40	108	3.93	—	—	—	—
	0 (MIN)	110	2.00	180	162	150	100

*(MAX): return flow valve is totally closed, (MIN): return flow valve is totally open

■ Spray Angle Code: 85

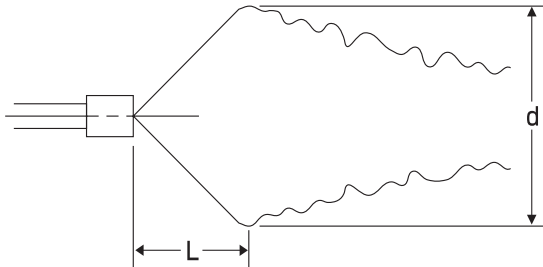
Supply pressure Ps: 2.0 MPa

Nozzle code	Return pressure* Pr (MPa)	Spray angle (°)	Spray capacity Q (L/min)	Sauter mean diameter d ₃₂ (μm)		Distance L (mm)	
				Immersion sampling	Laser analyzer	Immersion sampling	Laser analyzer
SPB8505R	0.80 (MAX)	85	5.00	147	132	500	300
	0.60	95	2.97	—	—	—	—
	0.30	120	0.90	—	—	—	—
	0 (MIN)	130	0.50	106	96	150	100
SPB8510R	0.90 (MAX)	85	10.00	174	157	500	300
	0.60	100	4.20	—	—	—	—
	0.30	125	1.50	—	—	—	—
	0 (MIN)	130	1.00	146	131	150	100
SPB8515R	0.95 (MAX)	85	15.00	198	178	500	300
	0.60	105	5.20	—	—	—	—
	0.30	127	2.25	—	—	—	—
	0 (MIN)	130	1.50	162	146	150	100
SPB8520R	0.95 (MAX)	85	20.00	215	194	500	300
	0.60	105	6.80	—	—	—	—
	0.30	127	3.00	—	—	—	—
	0 (MIN)	130	2.00	180	162	150	100
SPB8525R	0.95 (MAX)	85	25.00	228	205	500	300
	0.60	105	9.25	—	—	—	—
	0.30	127	3.75	—	—	—	—
	0 (MIN)	130	2.50	191	172	150	100
SPB8530R	0.90 (MAX)	85	30.00	237	213	500	300
	0.60	100	14.40	—	—	—	—
	0.30	125	5.60	—	—	—	—
	0 (MIN)	130	3.80	217	195	150	100

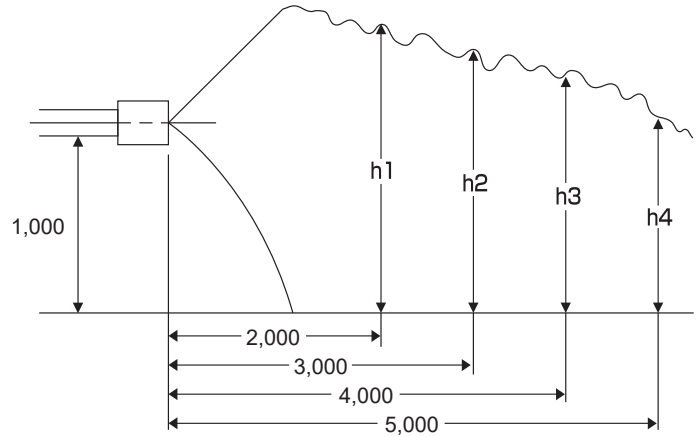
*(MAX): return flow valve is totally closed, (MIN): return flow valve is totally open

Spray Dimensions

Largest spray width (d) at distance L



Spray dimension (h1–h4) by reach distance



(Unit: mm)

■ Spray Angle Code: 60

Supply pressure Ps: 2.0 MPa

Nozzle code	Return pressure* Pr (MPa)	Distance (mm)	Spray dimensions (mm)				
		L	d	h1	h2	h3	h4
SPB6003R	1.15 (MAX)	700	900	1,100	900	700	400
	0.80	600	1,000	900	700	500	300
	0.40	300	800	500	100	0	0
	0 (MIN)	150	450	100	0	0	0
SPB6004R	1.15 (MAX)	800	1,000	1,000	900	700	400
	0.80	650	1,100	900	700	500	300
	0.40	400	900	500	100	0	0
	0 (MIN)	150	550	100	0	0	0
SPB6005R	1.20 (MAX)	900	1,050	1,050	950	800	500
	0.80	700	1,150	1,000	850	600	400
	0.40	400	950	600	150	0	0
	0 (MIN)	200	650	150	0	0	0
SPB6006R	1.25 (MAX)	1,000	1,000	1,100	1,000	900	700
	0.80	800	1,200	1,050	950	700	500
	0.40	450	1,000	700	200	0	0
	0 (MIN)	250	700	200	0	0	0
SPB6007R	1.25 (MAX)	1,000	1,050	1,100	1,000	900	750
	0.80	850	1,200	1,050	950	750	550
	0.40	450	1,000	700	250	0	0
	0 (MIN)	300	750	300	0	0	0
SPB6008R	1.25 (MAX)	1,050	1,100	1,150	1,050	950	750
	0.80	900	1,300	1,100	1,000	800	600
	0.40	500	1,050	750	300	100	0
	0 (MIN)	350	800	350	0	0	0
SPB6010R	1.25 (MAX)	1,100	1,100	1,200	1,100	1,000	800
	0.80	900	1,300	1,150	1,000	800	600
	0.40	500	1,100	800	400	100	0
	0 (MIN)	350	900	400	100	0	0
SPB6012R	1.25 (MAX)	1,100	1,150	1,200	1,100	1,000	800
	0.80	950	1,350	1,150	1,000	850	600
	0.40	550	1,200	800	400	100	0
	0 (MIN)	350	950	450	100	0	0
SPB6014R	1.25 (MAX)	1,150	1,200	1,250	1,150	1,050	850
	0.80	950	1,400	1,150	1,050	900	650
	0.40	600	1,300	850	450	100	0
	0 (MIN)	400	1,000	500	150	0	0
SPB6016R	1.25 (MAX)	1,150	1,250	1,250	1,150	1,050	900
	0.80	1,000	1,400	1,200	1,050	950	700
	0.40	600	1,350	850	450	150	0
	0 (MIN)	400	1,050	550	150	0	0
SPB6018R	1.25 (MAX)	1,200	1,250	1,300	1,200	1,100	900
	0.80	1,000	1,450	1,200	1,100	1,000	750
	0.40	650	1,400	900	500	200	0
	0 (MIN)	450	1,100	550	200	0	0
SPB6020R	1.25 (MAX)	1,200	1,300	1,300	1,200	1,100	950
	0.80	1,050	1,500	1,200	1,100	1,000	800
	0.40	700	1,500	900	500	200	0
	0 (MIN)	450	1,200	600	200	0	0

*(MAX): return flow valve is totally closed, (MIN): return flow valve is totally open

■ Spray Angle Code: 85

Supply pressure Ps: 2.0 MPa

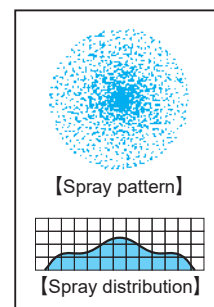
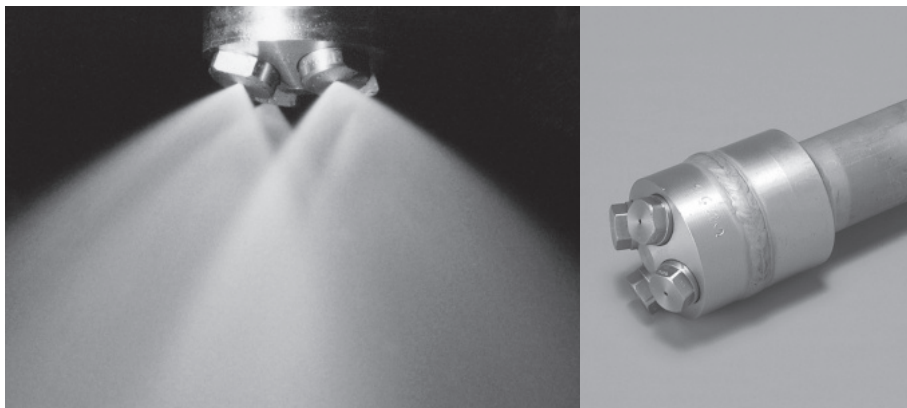
Nozzle code	Return pressure* Pr (MPa)	Distance (mm)	Spray dimensions (mm)				
		L	d	h1	h2	h3	h4
SPB8505R	0.80 (MAX)	900	1,400	1,000	1,000	900	750
	0.60	800	1,400	1,050	950	800	600
	0.30	300	1,000	900	500	100	0
	0 (MIN)	250	700	250	100	0	0
SPB8510R	0.90 (MAX)	1,100	1,400	1,150	1,050	950	850
	0.60	900	1,500	1,050	1,000	850	700
	0.30	500	1,250	950	700	400	150
	0 (MIN)	400	1,000	700	450	200	0
SPB8515R	0.95 (MAX)	1,300	1,400	1,250	1,150	1,100	1,000
	0.60	1,000	1,600	1,100	1,050	950	900
	0.30	500	1,400	950	800	500	200
	0 (MIN)	400	1,200	850	600	300	0
SPB8520R	0.95 (MAX)	1,400	1,450	1,300	1,150	1,100	1,050
	0.60	1,100	1,700	1,200	1,100	1,050	950
	0.30	600	1,400	1,000	850	600	300
	0 (MIN)	500	1,300	900	750	400	0
SPB8525R	0.95 (MAX)	1,400	1,500	1,400	1,200	1,150	1,050
	0.60	1,200	1,800	1,300	1,200	1,100	1,000
	0.30	650	1,500	1,100	950	700	400
	0 (MIN)	550	1,350	1,000	850	500	100
SPB8530R	0.90 (MAX)	1,400	1,500	1,450	1,250	1,150	1,100
	0.60	1,300	1,900	1,350	1,250	1,150	1,050
	0.30	700	1,600	1,150	1,000	850	500
	0 (MIN)	600	1,400	1,100	900	600	200

*(MAX): return flow valve is totally closed, (MIN): return flow valve is totally open

Related Products

Four-tip head Compact Return-flow Nozzles 4SPB-S Series

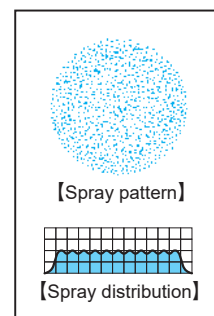
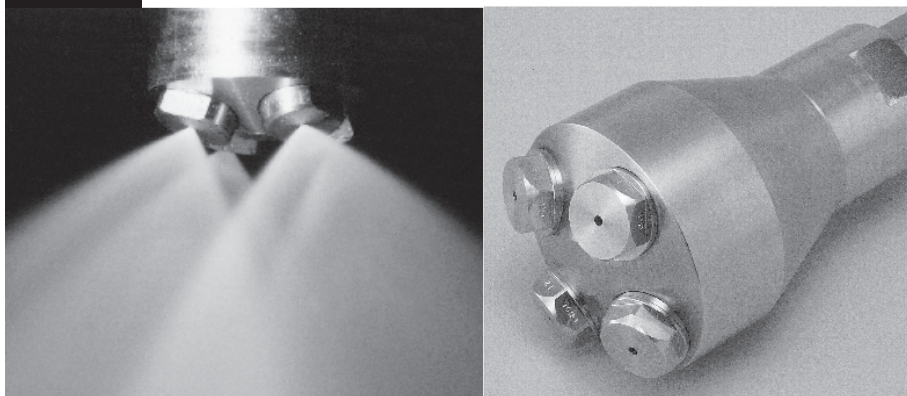
Even equipped with four nozzle tips, the nozzle body is lightweight and compact with an outside diameter of 50 mm. This allows for a smaller protection pipe. Compared to a single-head return-flow nozzle at the same flow rate, the spray droplet diameter is smaller.



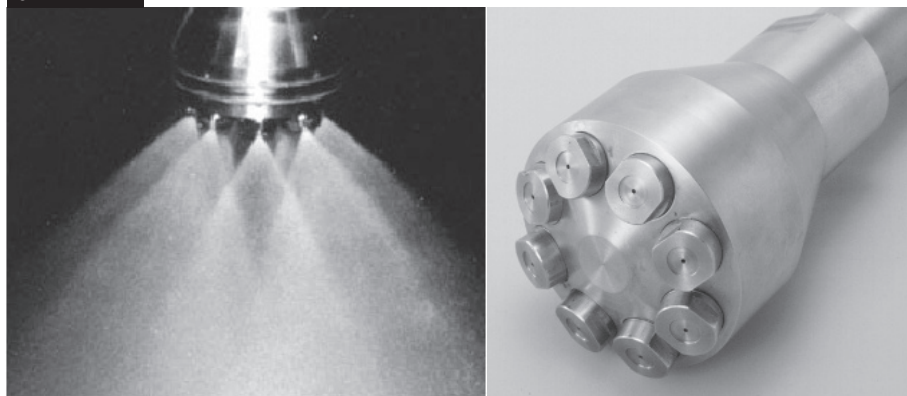
Multi-tip head Return-flow Nozzles 4SPB / 8SPB Series

Multiple nozzle tips are installed on one customized nozzle head. Capable of the finest atomization in the SPB nozzles having the same spray flow rate.

4SPB series

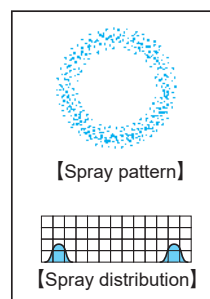


8SPB series



Large Capacity High-Pressure Return-flow Nozzles GSPB Series

Hollow cone spray nozzle able to produce a spray flow of 1–10,000 liters per hour.
Suitable for circulating fluidized bed flue gas desulfurization (CFB-FGD).



INQUIRY

This nozzle series is mainly used in gas cooling towers for cooling exhaust gas.

When selecting a nozzle, it is necessary to consider various factors such as the shape of the cooling tower, the nature and flow of the gas, the nozzle installation position, and the piping layout.

Please consult with our expert engineers during the design stage.

IKEUCHI will select optimal spray nozzles, configure ancillary devices and design an installation layout to assure ideal cooling performance. Without our engineering service, efficient performance may not be achieved.



Related Products

The following are available to suit a variety of installation needs.

Valve Stand



**Flange-mounted
Protection Pipe**



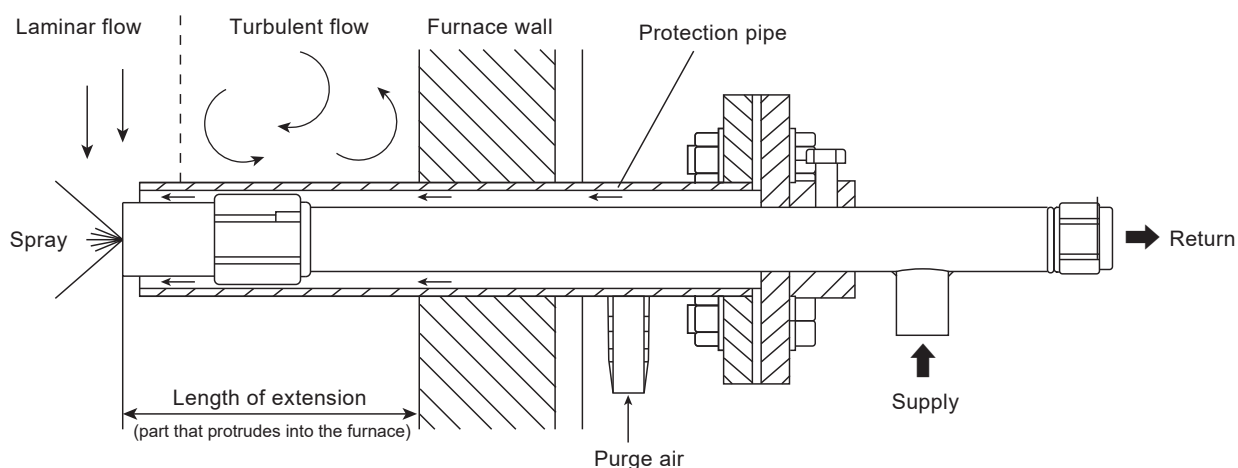
**Automatic
Nozzle-retracting Mount**



For Effective Cooling

Finding the best spray nozzle for effective cooling is not the only thing that matters. The location where the nozzle will be installed is important as well.

In a gas cooling tower, the nozzle should be installed so that the nozzle tip extends into the laminar flow, avoiding the turbulences near the furnace wall and thus preventing the wall from getting wet.



In order to maximize the cooling effect, IKEUCHI's offer includes measures for improving nozzle durability and prevention of contamination. Please contact IKEUCHI for details.

Please feel free to send any inquiry, request for information or quote regarding this product to the contact below.



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We have branches and affiliate companies around the world—in China, the USA, the Netherlands, Thailand, Indonesia, and more.
Please see our website for the nearest contact.

<https://www.kirinoikeuchi.co.jp/eng/company/location/>

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