ENGINEERING
YOUR SPRAY SOLUTION

PRECISION SPRAY NOZZLES FOR PICKLING LINES

METALLURGY

HIGH QUALITY NOZZLES FOR YOUR HIGH QUALITY PROCESS

The closer it comes to the final step of a production process the more important the direct result is. Hence, the pickling line has a decisive function in the entire production chain of steel.

There is an amazing number of options to improve and optimize your process by nozzles and nozzle arrangements. Lechler will be pleased to assist you.

Lechler develops and manufactures precision nozzles for various applications. For this we can fall back on all the experience of our 135-year history. The extensive know-ledge of nozzles among our 680-strong workforce and a deep understanding of typical industry processes mean that we have been at the forefront of innovation in nozzle technology for many years.

Today, Lechler manufactures nozzles in Germany, England, Hungary, India, China and the USA. But despite this international alignment, at our heart we remain a Swabian family company with the typical passion for precision, innovation and the drive to always become that little bit better. Other subsidiary companies plus more than 40 representative offices round off our global sales network.

WIDE RANGE OF SERVICES FOR YOUR SUCCESS

Nozzles for pickling lines

In this brochure we have compiled for you an overview of our most common nozzles used in pickling lines.
In addition to the information given in this brochure our local sales staff will be glad to offer the best nozzle solution for your specific challenge.

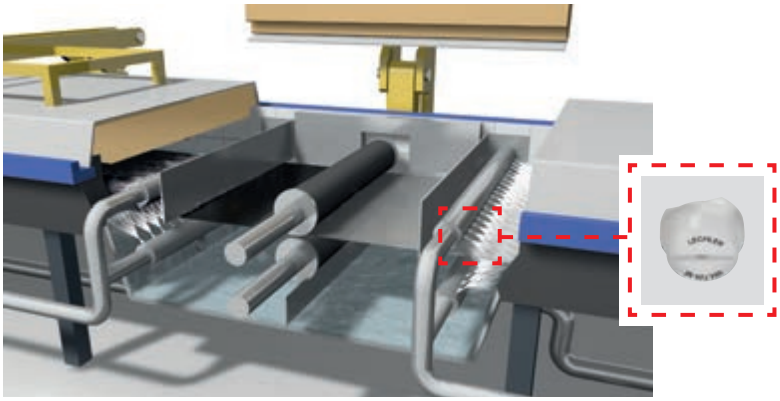
Thanks to our detailed knowledge and long-time experience we will be able to elaborate also innovative customized solutions.

We would like to accompany you to your success. With our vision of a life-time partnership we will always be available to inform you about the latest developments in nozzle technology.

CONTENT

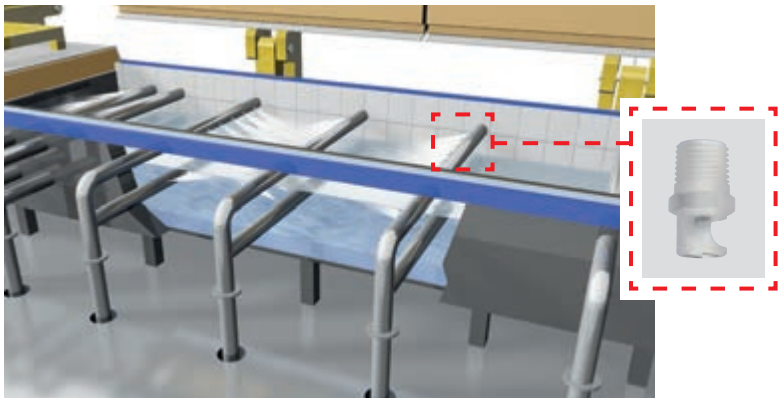
TYPICAL PROCESS:
TURBULENCE PICKLING LINE

Turbulent pickling



Series 664/665 flat jet nozzles with 45° or 60° spray angle and dovetail connection generate high turbulence. The automatic self-adjusting orientation of the flat jet ensures optimum alignment and easy maintenance.
Also flat jet nozzles **series 621/625** with a male thread connection fulfill the job of generating turbulence.

Rinsing



Series 686 tongue-type flat jet nozzles with 90° or 140° spray angle offer a powerful spray. The large free cross sections minimize the risk of clogging.

WHAT YOU SHOULD KEEP IN MIND WHEN PLANNING

Nozzle selection

① Material

The basis for all other following steps is to select an adequate material for the nozzles and the accessories. Also the life-time of these components depends on the material and the atmosphere they are used in.
As the resistance of the material depends very much on the specific operation conditions (such as temperature, acid concentration, residence time, mechanical stress, etc.) the table shown below could only give a rough and general recommendation.

② Turbulence pickling

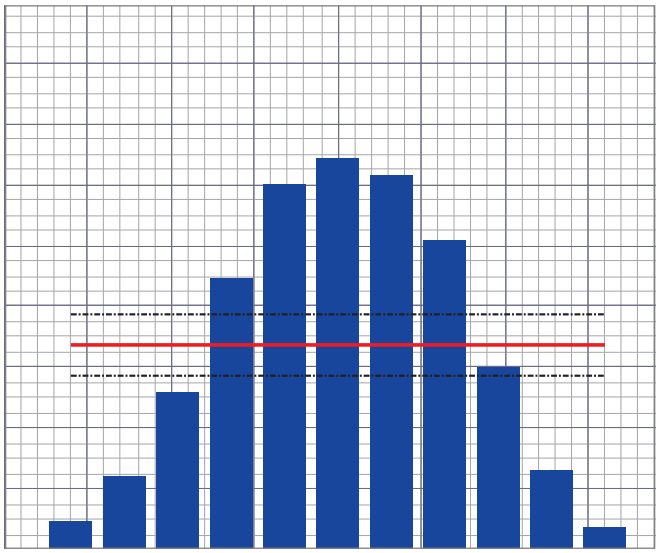
In the turbulence pickling section the nozzles have to offer a homogeneous liquid distribution over the entire material width.

At the same time they are responsible for creating turbulence in the pickling liquid. The nozzle sprays have to force continuously the heated acid into the cracks of the scale layer on the strip. This is most important for an effective pickling and helps to accelerate the chemical process which will lead to an optimum capacity of the entire line. Flat jet nozzles could fulfill these demands in perfection.

Whenever possible a staggered nozzle arrangement (see adjoining graphic) should be preferred to avoid any linear spray pattern on the strip.

Furthermore, optimal overlapping of the adjacent sprays is a fundamental factor when defining the nozzle arrangement.

Lechler will be pleased to assist you.



Liquid distribution measurement (standard parabolic liquid distribution of a flat jet nozzle)

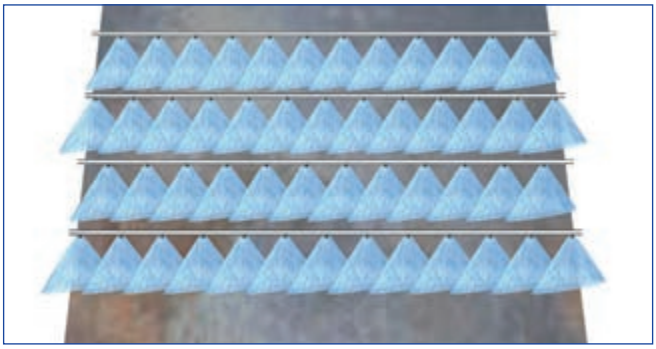
Chemical Resistance

	Code	17 / 1Y	5E	53
	Material	AISI 316Ti / AISI 316L	PVDF	PP
Acetic Acid	C2H4O2	○	○	only at room temperature
Caustic Soda	NaOH	only low concentration and only at room temperature	-	○
Formic Acid	CH2O2	only at room temperature	○	only at room temperature
Hydrochloric Acid	HCl	-	○	max. 60 – 80 °C (depending on concentration)
Hydrofluoric Acid	HF	-	○	only low concentration and only at room temperature
Hydroxypropionic Acid	C3H6O3	only at room temperature	only at room temperature	only at room temperature
Nitric Acid	HNO3	only low concentration	max.concentration 70%	-
Phosphoric Acid	H3PO4	max.concentration 10% if temperature higher than room temperature	○	only low concentration and only at room temperature
Sulfuric Acid	H2SO4	only low concentration (max.7,5%) and only at room temperature	○	only low concentration and only at room temperature

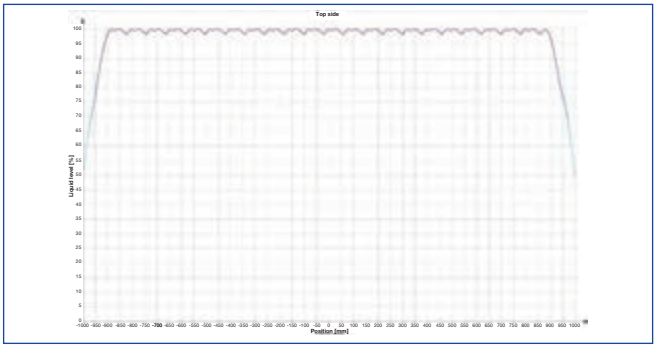
This table is only a rough recommendation. It is not to be considered as any kind of guarantee. The resistance in detail is highly dependent on the combination of thermal, mechanical and chemical load as well as on the exact material composition and the duration of the mentioned loads.

③ Rinsing

The rinsing section is absolutely decisive as it has to stop the chemical reaction and prevent over-pickling. An effective rinsing by an appropriate nozzle installation has a significant influence to the optimum result. Areas with a lower rinsing water density or even gaps in between the sprays could lead to severe quality issues. Therefore, an adequate nozzle selection and arrangement with an even liquid distribution is as important as good maintenance work.



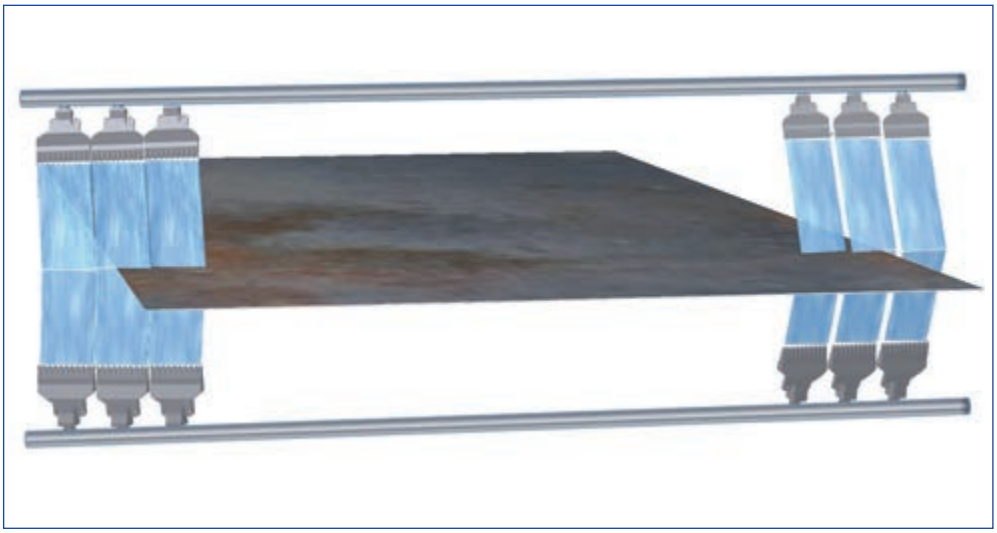
Example of a staggered nozzle arrangement



Simulation of liquid distribution

④ Blow-off

After leaving the rinsing section the water should be removed from the strip. Typically, nozzles for compressed air could manage this job.
Especially, at the edges of the strip remaining rinsing water droplets have to be blown off. The multi-channel Whisperblast nozzles are especially designed to offer highest performance. Installed properly they are most effective. The air nozzles must cover the full range of the possible strip edges. Therefore, minimum and maximum strip width as well as the accuracy of the horizontal strip guidance has to be taken into account.

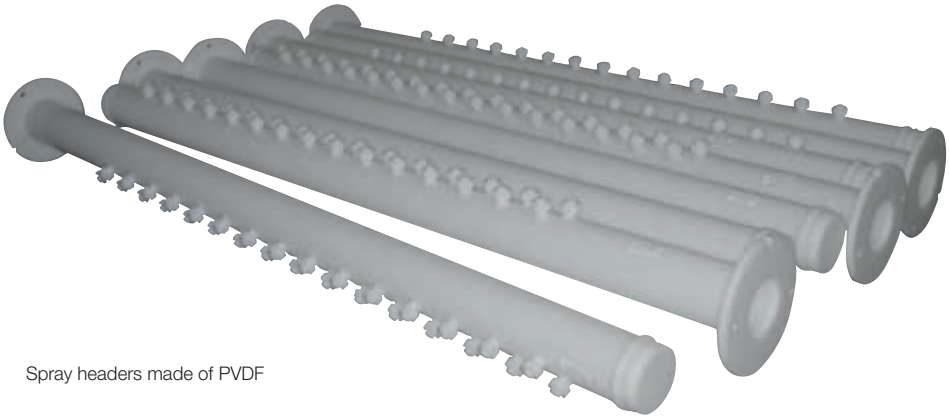


Strip edge blow-off with multi-channel nozzles for compressed air

WHAT YOU SHOULD KEEP IN MIND WHEN PLANNING

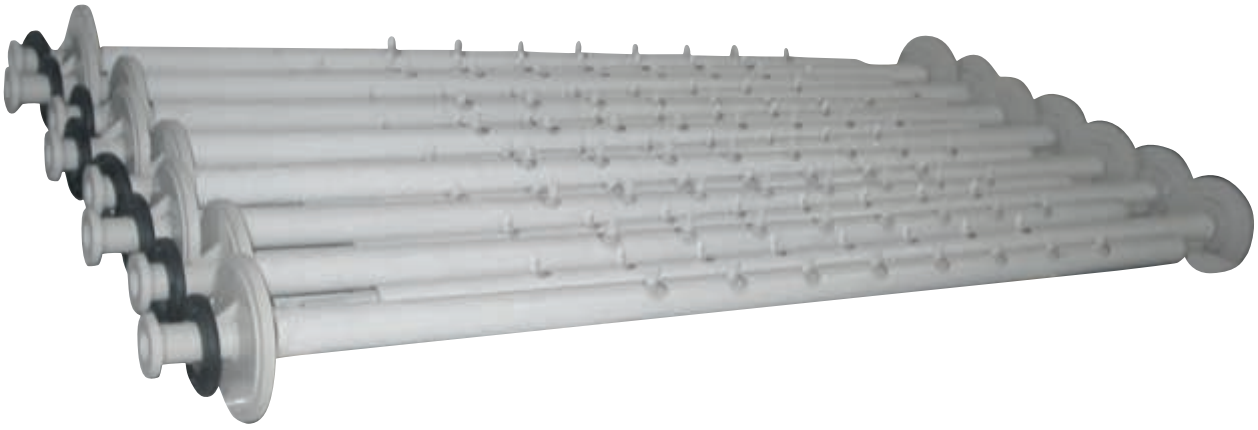
⑤ Spray Headers

Precise nozzle sprays need to be installed accurately on precise spray headers. Complete spray headers could be manufactured by Lechler according to your drawings. Lechler could produce headers in material stainless steel as well as in plastics according to your specifications.



Spray headers made of PVDF

Spray header made of stainless steel



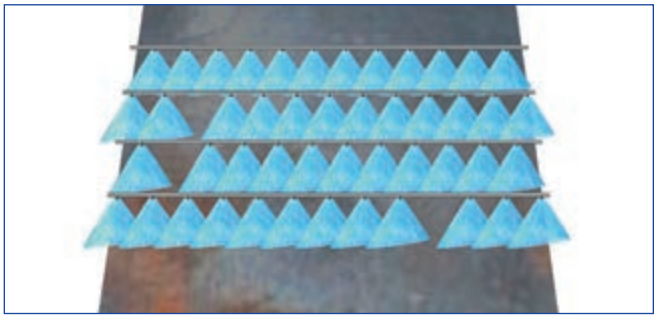
Spray headers equipped with tongue type nozzles

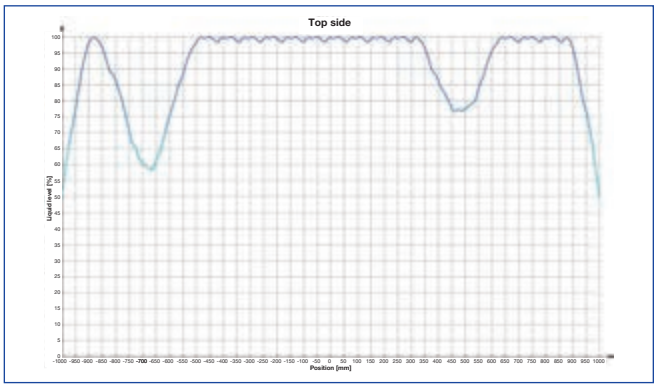
⑥ Maintenance

As the nozzles and accessories are exposed to the rough operation conditions their state should be checked regularly. Especially the nozzles themselves are subject to wear, clogging or damage.

A worn out nozzle could not fulfill the high functional demand anymore. An uneven overall liquid distribution and hence a non-uniform product surface could be the result. Worn out or clogged nozzles must be replaced by new ones in regular intervals to ensure optimum operation.

Worn out bayonet cap





Influence of clogged nozzles to the liquid distribution

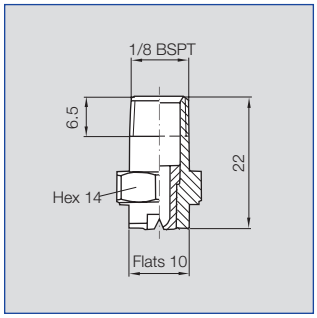
Clogged nozzle (front side)

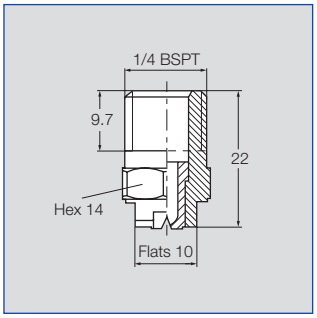
Clogged nozzle (back side)

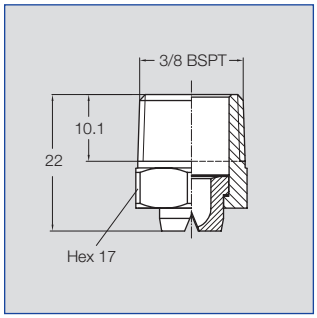
Flat fan nozzles

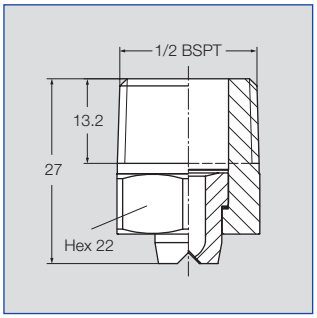
Series 632 / 633

Standard design with high-precision spray angle, exact flow rate, and extremely narrow spray depth, achieved through close manufacturing tolerances. Parabolic distribution of liquid ensures that spray pipes equipped with these nozzles show an extremely uniform total liquid distribution. Conical, self-sealing thread connection. The design of spray headers is very easy due to the thread connection of the nozzles. The entire product range is available at short notice, due to the modular design.
Applications:
Cleaning, pickling, coating, surface treatment, rinsing.









Spray angle	Ordering no.							A Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray width B at p=2 bar	
	Type	Mat. no. 17[1] AISI 316Ti/ AISI 316L	Mat. no. 5E PVDF	Code 1/8 BSPT	Code 1/4 BSPT	Code 3/8 BSPT	Code 1/2 BSPT			p [bar] 0.5	1.0	2.0	3.0	5.0	7.0	10.0	H = 200 mm	H = 500 mm
20°	**632.441**	○	○	**CA**	**CC**	-	-	1.35	1.10	0.62*	0.88	1.25	1.53	1.98	2.34	2.80	75	145
	632.481	○	○	**CA**	**CC**	-	-	1.50	1.20	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	75	150
30°	**632.482**	○	○	**CA**	**CC**	-	-	1.50	1.10	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	120	235
	632.562	○	○	**CA**	**CC**	-	-	2.00	1.50	1.25	1.77	2.50	3.06	3.95	4.68	5.59	120	235
	632.642	○	-	-	**CC**	-	-	2.50	1.80	2.00	2.83	4.00	4.90	6.33	7.48	8.94	120	240
	632.722	○	-	-	**CC**	-	-	3.00	2.40	3.15	4.46	6.30	7.72	9.96	11.79	14.09	125	240
	632.762	○	-	-	**CC**	-	-	3.50	2.70	4.00	5.66	8.00	9.80	12.65	14.97	17.89	125	240
	632.802	○	-	-	**CC**	-	-	4.00	3.10	5.00	7.07	10.00	12.25	15.81	18.71	22.36	130	250

[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
A = equivalent bore diameter · E = Narrowest free cross section
*differing spray pattern
Subject to technical modifications.

Continued on next page.

Example of ordering:	Type	+	Material no.	+	Code	=	Ordering no.
	632.441	+	**17**	+	**CC**	=	**632.441.17.CC**

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

Flat fan nozzles

Series 632 / 633

Spray angle	Ordering no.							A Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray width B at p=2 bar	
	Type	Mat. no.		Code						p [bar]								
		17[1] AISI 316Ti/ AISI 316L	5E PVDF	1/8 BSPT	1/4 BSPT	3/8 BSPT	1/2 BSPT			0.5	1.0	2.0	3.0	5.0	7.0	10.0	H = 200 mm	H = 500 mm
45°	**632.483**	○	○	**CA**	**CC**	**-**	**-**	1.50	1.10	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	180	340
	632.563	○	○	**CA**	**CC**	**-**	**-**	2.00	1.40	1.25	1.77	2.50	3.06	3.95	4.68	5.59	185	355
	632.643	○	○	**CA**	**CC**	**-**	**-**	2.50	1.80	2.00	2.83	4.00	4.90	6.33	7.48	8.94	195	370
	632.673	○	-	**-**	**CC**	**CE**	**-**	2.70	2.00	2.83	3.36	4.75	5.82	7.51	8.89	10.62	200	375
	632.723	○	-	**-**	**CC**	**CE**	**-**	3.00	2.40	3.15	4.46	6.30	7.72	9.96	11.79	14.09	200	375
	632.763	○	-	**-**	**CC**	**CE**	**-**	3.50	2.60	4.00	5.66	8.00	9.80	12.65	14.97	17.89	200	380
	632.803	○	-	**-**	**CC**	**CE**	**CG**	4.00	3.00	5.00	7.07	10.00	12.25	15.81	18.71	22.36	205	385
	632.843	○***	-	**-**	**CC**	**-**	**CG**	4.50	3.40	6.25	8.84	12.50	15.31	19.76	23.39	27.95	205	385
	632.883	○	-	**-**	**-**	**-**	**CG**	5.00	3.80	8.00	11.31	16.00	19.60	25.30	29.93	35.78	205	385
	632.923	○	-	**-**	**-**	**-**	**CG**	5.50	4.20	10.00	14.14	20.00	24.50	31.62	37.42	44.72	205	385
	632.963	○	-	**-**	**-**	**-**	**CG**	6.00	4.40	12.50	17.68	25.00	30.62	39.53	46.77	55.90	205	385
60°	**632.484**	○	○	**CA**	**CC**	**-**	**-**	1.50	1.00	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	260	510
	632.514	○	○	**CA**	**CC**	**-**	**-**	1.65	1.10	0.95*	1.34	1.90	2.33	3.00	3.56	4.25	270	520
	632.564	○	○	**CA**	**CC**	**-**	**-**	2.00	1.30	1.25	1.77	2.50	3.06	3.95	4.68	5.59	280	535
	632.604	○	○	**CA**	**CC**	**-**	**-**	2.20	1.50	1.58	2.23	3.15	3.86	4.98	5.89	7.04	290	550
	632.644	○	○**	**-**	**CC**	**CE**	**-**	2.50	1.60	2.00	2.83	4.00	4.90	6.33	7.48	8.94	295	565
	632.674	○	○**	**-**	**CC**	**CE**	**-**	2.70	1.80	2.38	3.36	4.75	5.82	7.51	8.89	10.62	300	575
	632.724	○	○**	**-**	**CC**	**CE**	**-**	3.00	2.10	3.15	4.46	6.30	7.72	9.96	11.79	14.09	305	590
	632.764	○	-	**-**	**CC**	**CE**	**-**	3.50	2.30	4.00	5.66	8.00	9.80	12.65	14.97	17.89	310	595
	632.804	○***	○**	**-**	**CC**	**-**	**CG**	4.00	2.60	5.00	7.07	10.00	12.25	15.81	18.71	22.36	310	595
	632.844	○***	○**	**-**	**CC**	**-**	**CG**	4.50	3.00	6.25	8.84	12.50	15.31	19.76	23.39	27.95	310	590
	632.884	○***	○**	**-**	**CC**	**-**	**CG**	5.00	3.40	8.00	11.31	16.00	19.60	25.30	29.93	35.78	300	570
	632.924	○	-	**-**	**-**	**-**	**CG**	5.50	4.10	10.00	14.14	20.00	24.50	31.62	37.42	44.72	330	630
	632.964	○	-	**-**	**-**	**-**	**CG**	6.00	4.20	12.50	17.68	25.00	30.62	39.53	46.77	55.90	330	630
	633.004	○	-	**-**	**-**	**-**	**CG**	7.00	4.80	15.75	22.27	31.50	38.57	49.80	58.92	70.43	330	630
	633.044	○	-	**-**	**-**	**-**	**CG**	8.00	5.50	20.00	28.28	40.00	48.99	63.25	74.83	89.44	340	640
	633.084	○	-	**-**	**-**	**-**	**CG**	9.00	6.80	25.00	35.36	50.00	61.24	79.06	93.54	111.80	340	640
90°	**632.566**	○	○	**CA**	**CC**	**-**	**-**	2.00	1.10	1.25	1.77	2.50	3.06	3.95	4.68	5.59	445	850
	632.606	○	○	**CA**	**CC**	**-**	**-**	2.20	1.20	1.58	2.23	3.15	3.86	4.98	5.89	7.04	450	860
	632.646	○	○**	**-**	**CC**	**CE**	**-**	2.50	1.30	2.00	2.83	4.00	4.90	6.33	7.48	8.94	455	865
	632.676	○	○**	**-**	**CC**	**CE**	**-**	2.70	1.40	2.38	3.36	4.75	5.82	7.51	8.89	10.62	465	875
	632.726	○	○**	**-**	**CC**	**CE**	**-**	3.00	1.70	3.15	4.46	6.30	7.72	9.96	11.79	14.09	470	885
	632.766	○	○**	**-**	**CC**	**CE**	**-**	3.50	1.90	4.00	5.66	8.00	9.80	12.65	14.97	17.89	475	890
	632.806	○***	○**	**-**	**CC**	**-**	**CG**	4.00	2.40	5.00	7.07	10.00	12.25	15.81	18.71	22.36	480	900
	632.846	○***	○**	**-**	**CC**	**-**	**CG**	4.50	2.40	6.25	8.84	12.50	15.31	19.76	23.39	27.95	480	900
	632.886	○***	○**	**-**	**CC**	**-**	**CG**	5.00	3.10	8.00	11.31	16.00	19.60	25.30	29.93	35.78	480	910
	632.926	○	-	**-**	**-**	**-**	**CG**	5.50	3.60	10.00	14.14	20.00	24.50	31.62	37.42	44.72	525	1020
	632.966	○	-	**-**	**-**	**-**	**CG**	6.00	3.90	12.50	17.68	25.00	30.62	39.53	46.77	55.90	525	1020

[1]We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.

Continued on next page.

A = equivalent bore diameter · E = Narrowest free cross section
*differing spray pattern
**only available with code CC
***only available with code CG
Subject to technical modifications.

Example of ordering:	Type	+	Material no.	+	Code	=	Ordering no.
	632.483	+	**17**	+	**CA**	=	**632.483.17.CA**

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

Flat fan nozzles

Series 632 / 633

Spray angle	Ordering no.							A Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray width B at p=2 bar	
	Type	Mat. no.		Code						p [bar]								
		17[1] AISI 316Ti/ AISI 316L	5E PVDF	1/8 BSPT	1/4 BSPT	3/8 BSPT	1/2 BSPT			0.5	1.0	2.0	3.0	5.0	7.0	10.0	H = 200 mm	H = 500 mm
120°	**632.607**	○	-	**CA**	**CC**	-	-	2.20	1.10	1.58	2.23	3.15	3.86	4.98	5.89	7.04	700	1300
	632.647	○***	○**	-	**CC**	**CE**	-	2.50	1.30	2.00	2.83	4.00	4.90	6.33	7.48	8.94	700	1300
	632.677	○***	○**	-	**CC**	**CE**	-	2.70	1.40	2.38	3.36	4.75	5.82	7.51	8.89	10.62	720	1330
	632.727	○***	○**	-	**CC**	**CE**	-	3.00	1.60	3.15	4.46	6.30	7.72	9.96	11.79	14.09	740	1360
	632.767	○	-	-	**CC**	**CE**	-	3.50	1.70	4.00	5.66	8.00	9.80	12.65	14.97	17.89	760	1400
	632.807	○	-	-	**CC**	-	**CG**	4.00	2.00	5.00	7.07	10.00	12.25	15.81	18.71	22.36	790	1450
	632.847	○	-	-	**CC**	-	**CG**	4.50	2.30	6.25	8.84	12.50	15.31	19.76	23.39	27.95	790	1450
	632.887	○	-	-	-	-	**CG**	5.00	2.60	8.00	11.31	16.00	19.60	25.30	29.93	35.78	800	1460
	632.927	○	-	-	-	-	**CG**	5.00	2.90	10.00	14.14	20.00	24.50	31.62	37.42	44.72	800	1460

[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
A = equivalent bore diameter · E = Narrowest free cross section
*differing spray pattern
**only available with code CC
***only available with code CG
Subject to technical modifications.

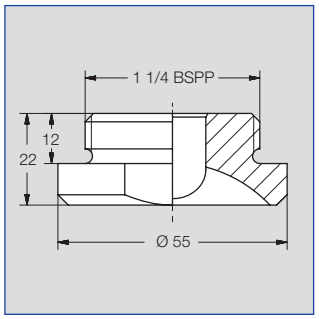
Example of ordering:	Type	+	Material no.	+	Code	=	Ordering no.
	632.607	+	**17**	+	**CA**	=	**632.607.17.CA**

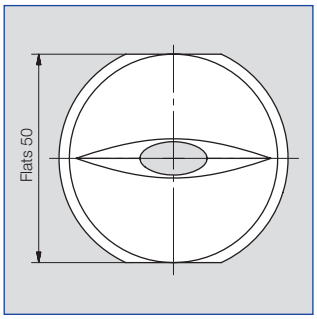
Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

Flat fan nozzles

Series 621

Parabolic distribution of liquid.
Applications:
Cleaning, pickling, surface treatment, rinsing.





Spray angle	Ordering no. Type	Mat. no. 5E PVDF	A Ø [mm]	E Ø [mm]	V̇ [l/min] p [bar] 0.5	1.0	2.0	3.0	5.0	7.0	10.0	Spray width B at p=2 bar H = 250 mm	H = 500 mm
20°	**621.121**	○	8.0	6.5	32	45	63	77	100	118	141	115	210
45°	**621.123**	○	10.0	7.3	32	45	63	77	100	118	141	250	490
	621.203	○	12.0	9.8	50	71	100	122	158	187	224	250	490
	624.243	○	13.3	10,2	62	88	125	153	197.6	234	279	250	490
	621.263	○	14.2	10.6	70	99	140	171	221	261	313	250	490
	621.283	○	15.0	11.5	80	113	160	193	253	299	358	250	490
	621.343	○	18	14.4	112	158	224	274	354	419	501	250	490
60°	**621.124**	○	10.0	7.4	32	45	63	77	100	118	141	340	640
	621.204	○	12.0	9.5	50	71	100	122	158	187	224	340	640
	621.284	○	15.0	9.4	80	113	160	193	253	299	358	340	640
90°	**621.126**	○	10.0	6.5	32	45	63	77	100	118	141	525	1020
	621.206	○	12.0	8.7	50	71	100	122	158	187	224	525	1020
	621.286	○	15.0	12.0	80	113	160	193	253	299	358	525	1020

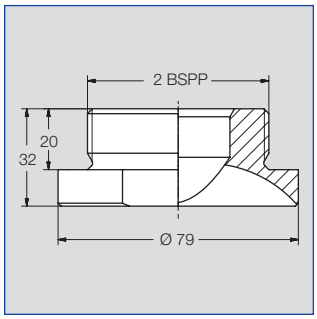
E = Narrowest free cross section · A = Equivalent bore diameter
incl. gasket 062.140.72.00 (Material: EWP 210)

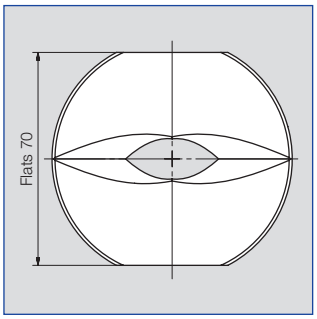
Example of ordering:	Type	+	Material no.	=	Ordering no.
	621.121	+	**5E**	=	**621.121.5E**

Flat fan nozzles

Series 625

Parabolic distribution of liquid. Headers, equipped with these nozzles, show a highly uniform total distribution of liquids, even at different installation heights and centers.
Applications:
Cleaning, pickling, surface treatment, rinsing.





Spray angle	Ordering no. Type	Mat. no. 5E PVDF	A Ø [mm]	E Ø [mm]	V̇ [l/min] p [bar] 0.5	1.0	2.0	3.0	5.0	7.0	10.0	Spray width B at p=2 bar H = 250 mm	H = 500 mm
20°	**625.301**	○	16.0	13.2	90	127	180	220	285	337	402	115	210
	625.321	○	17.0	14.2	100	141	200	245	316	374	447	115	210
	625.361	○	19.0	16.3	125	177	250	306	395	468	559	115	210
	625.421	○	22.5	19.2	183	258	365	447	577	683	816	115	210
	625.451	○	24.5	20.9	213	301	425	521	672	795	950	115	210
60°	**625.404**	○	21.0	13.2	158	223	315	386	498	589	704	340	640
	625.454	○	24.5	16.2	213	301	425	521	672	795	950	340	640
120°	**625.367**	○	19.0	15.0	125	177	250	306	395	468	559	800	1460
	625.407	○	21.0	18.0	158	223	315	386	498	589	704	800	1460
	625.427	○	22.5	18.0	183	258	365	447	577	683	816	800	1460

E = Narrowest free cross section · A = Equivalent bore diameter
Incl. gasket 062.540.72.00 (Material: EWP 210)

Example of ordering:	Type	+	Material no.	=	Ordering no.
	625.301	+	**5E**	=	**625.301.5E**

Flat fan nozzles for retaining nut

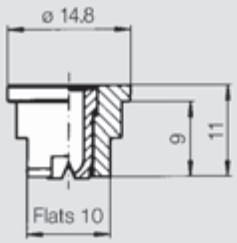
Series 652

Assembly with retaining nut. Easy nozzle changing, simple jet alignment. Parabolic distribution of liquid. Spray pipes equipped with these nozzles show an extremely uniform total liquid distribution.
Applications:
Cleaning, surface treatment, pickling, rinsing.

Mat. no. 17
(∢ 20°-60°)

Mat. no. 17
(∢ 90°-120°)

PVDF



Spray angle	Ordering no. Type	Mat. no. 17[1] AISI 316Ti / AISI 316L	Mat. no. 5E PVDF	A Ø [mm]	E Ø [mm]	V̇ [l/min] p [bar] 0.5	1.0	2.0	[US gal./min] at 40 psi	3.0	5.0	10.0	Spray width B at p=2 bar H = 250 mm	H = 500 mm
20°	**652.441**	○	○	1.35	1.10	0.62*	0.88	1.25	0.39	1.53	1.98	2.80	65	125
	652.481	○	○	1.50	1.20	0.80*	1.13	1.60	0.50	1.96	2.53	3.58	65	125
30°	**652.482**	○	○	1.50	1.10	0.80*	1.13	1.60	0.50	1.96	2.53	3.58	115	230
	652.562	○	○	2.00	1.50	1.25	1.77	2.50	0.78	3.06	3.95	5.59	115	230
	652.642	○	-	2.50	1.80	2.00	2.83	4.00	1.24	4.90	6.33	8.94	120	230
	652.722	○	-	3.00	2.40	3.15	4.46	6.30	1.95	7.72	9.96	14.09	120	235
	652.762	○	-	3.50	2.70	4.00	5.66	8.00	2.48	9.80	12.65	17.89	120	235
	652.802	○	-	4.00	3.10	5.00	7.07	10.00	3.10	12.25	15.81	22.36	120	240
45°	**652.483**	○	○	1.50	1.10	0.80*	1.13	1.60	0.50	1.96	2.53	3.58	185	340
	652.563	○	○	2.00	1.40	1.25	1.77	2.50	0.78	3.06	3.95	5.59	185	340
	652.643	○	○	2.50	1.80	2.00	2.83	4.00	1.24	4.90	6.33	8.94	185	345
	652.723	○	-	3.00	2.40	3.15	4.46	6.30	1.95	7.72	9.96	14.09	190	355
	652.763	○	-	3.50	2.60	4.00	5.66	8.00	2.48	9.80	12.65	17.89	190	355
	652.803	○	-	4.00	3.00	5.00	7.07	10.00	3.10	12.25	15.81	22.36	195	360
60°	**652. 484**	○	○	1.50	1.00	0.80*	1.13	1.60	0.50	1.96	2.53	3.58	280	530
	652. 514	○	○	1.65	1.10	0.95*	1.34	1.90	0.59	2.33	3.00	4.25	280	530
	652. 564	○	○	2.00	1.30	1.25	1.77	2.50	0.78	3.06	3.95	5.59	280	525
	652. 604	○	○	2.20	1.50	1.58	2.23	3.15	0.98	3.86	4.98	7.04	280	520
	652.644	○	○	2.50	1.60	2.00	2.83	4.00	1.24	4.90	6.33	8.94	275	520
	652.674	○	○	2.70	1.80	2.38	3.36	4.75	1.47	5.82	7.51	10.62	275	520
	652.724	○	○	3.00	2.10	3.15	4.46	6.30	1.95	7.72	9.96	14.09	275	520
	652.764	○	-	3.50	2.30	4.00	5.66	8.00	2.48	9.80	12.65	17.89	270	515
	652.804	○	○	4.00	2.60	5.00	7.07	10.00	3.10	12.25	15.81	22.36	270	510
	652.844	-	○	4.50	3.00	6.25	8.84	12.50	3.88	15.31	19.76	27.95	270	510
90°	**652. 566**	○	○	2.00	1.10	1.25	1.77	2.50	0.78	3.06	3.95	5.59	450	805
	652. 606	○	○	2.20	1.20	1.58	2.23	3.15	0.98	3.86	4.98	7.04	450	805
	652.646	○	○	2.50	1.30	2.00	2.83	4.00	1.24	4.90	6.33	8.94	450	805
	652.676	○	○	2.70	1.40	2.38	3.36	4.75	1.47	5.82	7.51	10.62	450	810
	652.726	○	○	3.00	1.70	3.15	4.46	6.30	1.95	7.72	9.96	14.09	450	810
	652.766	○	-	3.50	1.90	4.00	5.66	8.00	2.48	9.80	12.65	17.89	450	815
	652.806	○	○	4.00	2.40	5.00	7.07	10.00	3.10	12.25	15.81	22.36	450	820
	652.846	-	○	4.50	2.40	6.25	8.84	12.50	3.88	15.31	19.76	27.95	450	820
	652.886	-	○	5.00	3.10	8.00	11.31	16.00	4.96	19.60	25.30	35.78	450	835
120°	**652. 607**	○	○	2.20	1.10	1.58	2.23	3.15	0.98	3.86	4.98	7.04	675	1285
	652.647	○	-	2.50	1.30	2.00	2.83	4.00	1.24	4.90	6.33	8.94	680	1295
	652.677	○	-	2.70	1.40	2.38	3.36	4.75	1.47	5.82	7.51	10.62	685	1300
	652.727	○	○	3.00	1.60	3.15	4.46	6.30	1.95	7.72	9.96	14.09	695	1315
	652.767	○	-	3.50	1.70	4.00	5.66	8.00	2.48	9.80	12.65	17.89	705	1330
	652.847	-	○	4.50	2.30	6.25	8.84	12.50	3.88	15.31	19.76	27.95	800	1460
	652.887	-	○	5.00	2.60	8.00	11.31	16.00	4.96	19.60	25.30	35.78	800	1460

[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
A = equivalent bore diameter · E = Narrowest free cross section ·
*differing spray pattern

Example of ordering:	Type	+	Material no.	= Ordering no.
	652.441	+	**17**	= **652.441.17**

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

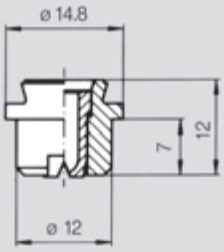
Flat fan dovetail nozzles

Series 660

Assembly with retaining nut. Automatic jet alignment due to dovetail guide. Stable spray angle. Parabolic distribution of liquid. Spray pipes with these nozzles show an extremely uniform total liquid distribution.
Applications:
Cleaning, pickling, coating, rinsing.

Mat. no. 17

Mat. no. 5E



Spray angle	Ordering no. Type	Mat. no. 17[1] AISI 316Ti/ AISI 316L	Mat. no. 5E PVDF	A Ø [mm]	E Ø [mm]	V̇ [l/min] p [bar] 0.5	1.0	2.0	3.0	5.0	7.0	10.0	Spray width B at p=2 bar H = 250 mm	H = 500 mm
45°	**660.443**	○	○	1.35	1.00	0.62	0.88	1.25	1.53	1.97	2.33	2.79	185	340
	660.483	○	○	1.50	1.10	0.80	1.13	1.60	1.96	2.53	2.99	3.57	185	340
	660.513	○	○	1.65	1.20	0.95	1.34	1.90	2.32	3.00	3.55	4.24	190	345
	660.563	○	○	2.00	1.40	1.25	1.76	2.50	3.06	3.95	4.67	5.59	190	345
	660.603	○	○	2.20	1.60	1.57	2.22	3.15	3.85	4.98	5.89	7.04	190	345
	660.643	○	○	2.50	1.80	2.00	2.82	4.00	4.89	6.32	7.48	8.94	190	350
	660.673	○	○	2.70	2.00	2.37	3.35	4.75	5.81	7.51	8.88	10.62	190	350
	660.723	○	○	3.00	2.40	3.15	4.45	6.30	7.71	9.96	11.78	14.08	190	350
	660.763	○	○	3.50	2.60	4.00	5.65	8.00	9.79	12.64	14.96	17.88	190	350
	660.803	○	○	4.00	3.00	5.00	7.07	10.00	12.24	15.81	18.70	22.36	190	350
	660.843	○	○	4.50	3.40	6.25	8.83	12.50	15.30	19.76	23.38	27.95	190	350
	660.883	○	○	5.00	3.80	8.00	11.31	16.00	19.53	25.29	29.93	35.77	190	350
	660.923	○	○	5.50	4.20	10.00	14.14	20.00	24.49	31.26	37.42	44.72	190	350
60°	**660.484**	○	○	1.50	1.00	0.80	1.13	1.60	1.96	2.53	2.99	3.57	275	525
	660.514	○	○	1.65	1.10	0.95	1.34	1.90	2.32	3.00	3.55	4.24	275	525
	660.564	○	○	2.00	1.30	1.25	1.76	2.50	3.06	3.95	4.67	5.59	275	525
	660.604	○	○	2.20	1.50	1.57	2.22	3.15	3.85	4.98	5.89	7.04	275	525
	660.644	○	○	2.50	1.60	2.00	2.82	4.00	4.89	6.32	7.48	8.94	275	525
	660.674	○	○	2.70	1.80	2.37	3.35	4.75	5.81	7.51	8.88	10.62	275	525
	660.724	○	○	3.00	2.10	3.15	4.45	6.30	7.71	9.96	11.78	14.08	275	520
	660.764	○	○	3.50	2.30	4.00	5.65	8.00	9.79	12.64	14.96	17.88	270	520
	660.804	○	○	4.00	2.60	5.00	7.07	10.00	12.24	15.81	18.70	22.36	270	520
	660.844	○	○	4.50	3.00	6.25	8.83	12.50	15.30	19.76	23.38	27.95	270	520
	660.884	○	○	5.00	3.40	8.00	11.31	16.00	19.53	25.29	29.93	35.77	270	520
	660.924	○	○	5.50	4.10	10.00	14.14	20.00	24.49	31.26	37.42	44.72	270	520
75°	**660.565**	○	○	2.00	1.10	1.25	1.76	2.50	3.06	3.95	4.67	5.59	345	645
	660.645	○	○	2.50	1.30	2.00	2.82	4.00	4.89	6.32	7.48	8.94	345	645
	660.725	○	○	3.00	1.70	3.15	4.45	6.30	7.71	9.96	11.78	14.08	345	645
	660.765	○	○	3.50	1.90	4.00	5.65	8.00	9.79	12.64	14.96	17.88	345	645
	660.805	○	○	4.00	2.40	5.00	7.07	10.00	12.24	15.81	18.70	22.36	345	645
	660.845	○	○	4.50	2.60	6.25	8.83	12.50	15.30	19.76	23.38	27.95	345	645
	660.885	○	○	5.00	3.10	8.00	11.31	16.00	19.53	25.29	29.93	35.77	345	645
	660.925	○	○	5.50	3.60	10.00	14.14	20.00	24.49	31.26	37.42	44.72	345	645

[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
E = Narrowest free cross section · A = Equivalent bore diameter

Continued on next page.

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

Flat fan dovetail nozzles

Series 660

Spray angle	Ordering no.			A Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray width B at p=2 bar	
		Mat. no.				p [bar]								
	Type	17[1] AISI 316Ti/ AISI 316L	5E PVDF			0.5	1.0	2.0	3.0	5.0	7.0	10.0	H = 250 mm	H = 500 mm
90°	**660.566**	○	○	2.00	1.10	1.25	1.76	2.50	3.06	3.95	4.67	5.59	505	920
	660.606	○	○	2.20	1.20	1.57	2.22	3.15	3.85	4.98	5.89	7.04	505	915
	660.646	○	○	2.50	1.30	2.00	2.82	4.00	4.89	6.32	7.48	8.94	500	910
	660.674	○	○	2.70	1.40	2.37	3.35	4.75	5.81	7.51	8.88	10.62	495	905
	660.726	○	○	3.00	1.70	3.15	4.45	6.30	7.71	9.96	11.78	14.08	490	900
	660.766	○	○	3.50	1.90	4.00	5.65	8.00	9.79	12.64	14.96	17.88	470	875
	660.806	○	○	4.00	2.40	5.00	7.07	10.00	12.24	15.81	18.70	22.36	470	875
	660.846	○	○	4.50	2.40	6.25	8.83	12.50	15.30	19.76	23.38	27.95	470	875
	660.886	○	○	5.00	3.10	8.00	11.31	16.00	19.53	25.29	29.93	35.77	470	875
	660.926	○	○	5.50	3.60	10.00	14.14	20.00	24.49	31.26	37.42	44.72	470	875
120°	**660.607**	○	○	2.20	1.10	1.57	2.22	3.15	3.85	4.98	5.89	7.04	695	1285
	660.647	○	○	2.50	1.00	2.00	2.82	4.00	4.89	6.32	7.48	8.94	705	1295
	660.677	○	○	2.70	1.40	2.37	3.35	4.75	5.81	7.51	8.88	10.62	735	1315
	660.727	○	○	3.00	1.70	3.15	4.45	6.30	7.71	9.96	11.78	14.08	780	1315
	660.767	○	○	3.50	1.70	4.00	5.65	8.00	9.79	12.64	14.96	17.88	780	1315
	660.807	○	○	4.00	2.00	5.00	7.07	10.00	12.24	15.81	18.70	22.36	780	1315
	660.847	○	-	4.50	2.30	6.25	8.83	12.50	15.30	19.76	23.38	27.95	780	1315
	660.887	○	-	5.00	2.60	8.00	11.31	16.00	19.53	25.29	29.93	35.77	780	1315
	660.927	○	-	5.50	2.90	10.00	14.14	20.00	24.49	31.26	37.42	44.72	780	1315

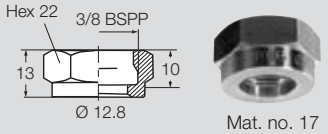
[1]We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
E = Narrowest free cross section · A = Equivalent bore diameter

Example of ordering:	Type	+	Material no.	=	Ordering no.
	660.566	+	**17**	=	**660.566.17**

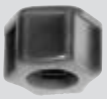
Spray header with flat fan dovetail nozzles series 660

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

Flat fan dovetail nozzles
Accessories
Series 660



Mat. no. 17

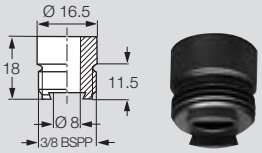


Mat. no. 5E

Retaining nut:

065.200.17[1]
(AISI 316Ti/AISI 316L)

065.200.5E (PVDF)

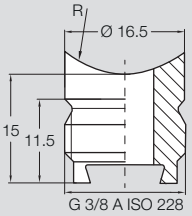


Weight 21 g

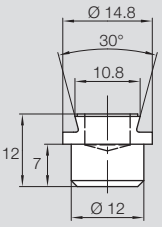
Welding nipple: **066.011.17**[1] (AISI 316Ti/AISI 316L)
066.011.5E (PVDF)
066.011.53 (PP)

Other lengths on request.

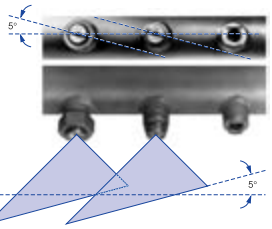
Nipple with radius



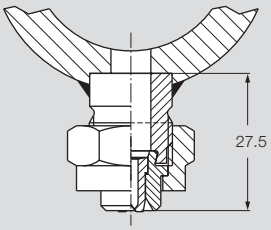
Welding nipple: **066.017.17**[1] (AISI 316Ti/AISI 316L)



Blind Tips: **006.600.17**[1] (AISI 316Ti/AISI 316L)
006.600.5E (PVDF)



Other offset angles are available on request



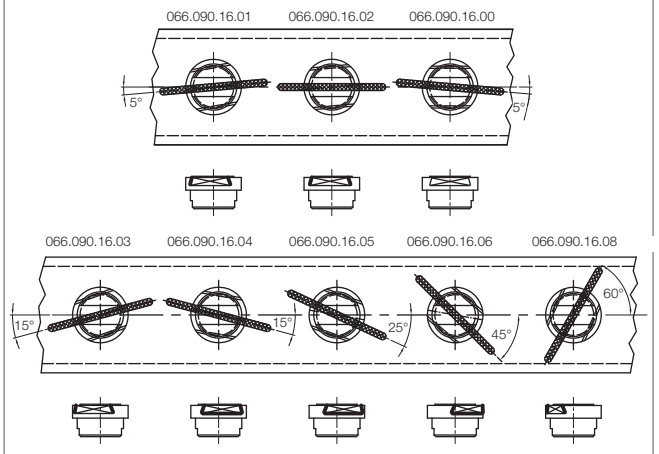
Welding nipple (L = 18 mm) with nozzle and cap nut

Standard radiuses for welding nipples (others on request)

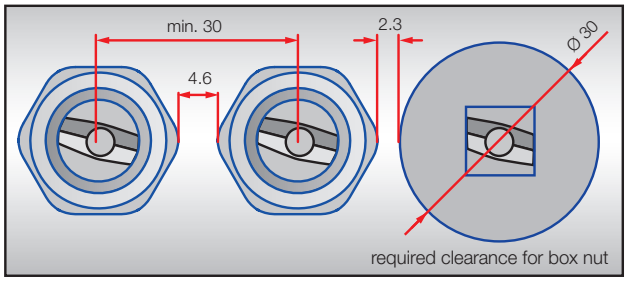
Ordering no.	Radius
066.017.17.10	10
066.017.17.13	12.5
066.017.17.16	16
066.017.17.20	20
066.017.17.25	25
066.017.17.31	31

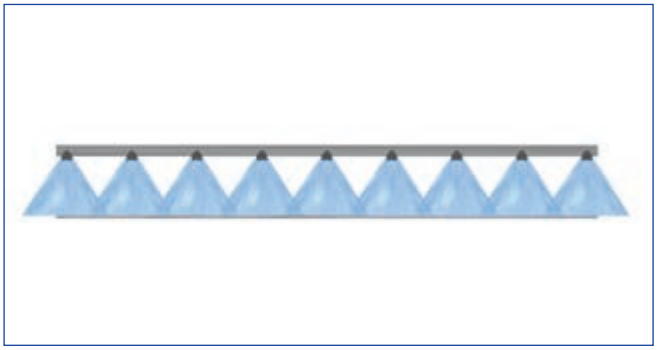
Alignment Tips

Material AISI 303



Minimum pitch for series 660





Front view of nozzle arrangement

3D View of nozzle arrangement

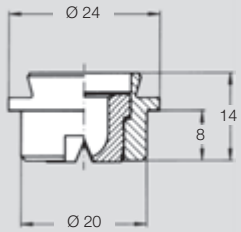
[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.

Flat fan dovetail nozzles

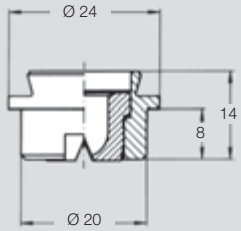
Series 664 / 665

Assembly with retaining nut. Automatic jet alignment due to dovetail guide. Stable spray angle. Parabolic distribution of liquid. Spray pipes with these nozzles show an extremely uniform total liquid distribution.
Applications:
Cleaning, pickling, coating, rinsing.

Mat. no. 17



Mat. no. 5E



Spray angle	Ordering no. Type	Mat. no. 17[1] AISI 316Ti/ AISI 316L	Mat. no. 5E PVDF	Mat. no. 53 PP	A Ø [mm]	E Ø [mm]	V̇ [l/min] p [bar] 0.5	1.0	2.0	3.0	5.0	7.0	10.0	Spray width B at p=2 bar H = 250 mm	H = 500 mm
45°	**664.723**	○	○	○	3.00	2.40	3.15	4.45	6.30	7.72	9.96	11.79	14.09	205	400
	664.763	○	○	○	3.50	2.60	4.00	5.66	8.00	9.80	12.65	14.97	17.89	205	400
	664.803	○	○	○	4.00	3.00	5.00	7.07	10.00	12.25	15.81	18.71	22.36	205	400
	664.843	○	○	○	4.50	3.40	6.25	8.84	12.50	15.31	19.67	23.39	27.95	205	400
	664.883	○	○	○	5.00	3.80	8.00	11.31	16.00	19.60	25.30	29.93	35.78	205	400
	664.923	○	○	○	5.50	4.20	10.00	14.14	20.00	24.49	31.62	37.42	44.72	205	400
	664.943	○	○	○	5.70	4.30	11.20	15.84	22.40	27.44	35.42	41.91	50.09	205	400
	664.963	○	○	○	6.00	4.40	12.50	17.68	25.00	30.62	39.53	46.77	55.90	205	400
	664.983	○	○	○	6.30	4.70	14.00	19.80	28.00	34.29	44.27	52.38	62.61	205	400
	665.003	○	○	○	6.60	5.20	15.75	22.27	31.50	38.57	49.80	58.92	70.43	205	400
	665.013	○	○	○	6.80	5.20	16.75	23.69	33.50	41.03	52.97	62.67	74.91	205	400
	665.043	○	○	○	8.00	5.90	20.00	28.28	40.00	48.99	63.25	74.83	89.44	205	400
	665.063	○	○	○	8.70	6.20	22.50	31.84	45.00	55.15	71.20	84.24	100.69	205	400
	665.083	○	○	○	9.00	6.60	25.00	35.36	50.00	61.24	79.06	93.54	111.80	205	400
	665.123	○	○	○	10.00	7.40	31.50	44.55	63.00	77.16	99.61	117.86	140.87	205	400
	665.163	○	○	○	10.80	8.40	40.00	56.57	80.00	97.99	126.50	149.68	178.90	205	400
	665.183	○	○	○	11.30	9.20	45.00	63.54	90.00	110.23	142.30	168.37	201.24	205	400
	665.203	○	○	○	12.00	9.80	50.00	70.71	100.00	127.47	158.11	167.08	223.61	205	400
60°	**664.724**	○	○	○	3.00	2.10	3.15	4.45	6.30	7.72	9.96	11.79	14.09	300	560
	664.764	○	○	○	3.50	2.30	4.00	5.66	8.00	9.80	12.65	14.97	17.89	300	565
	664.804	○	○	○	4.00	2.60	5.00	7.07	10.00	12.25	15.81	18.71	22.36	300	565
	664.844	○	○	○	4.50	3.00	6.25	8.84	12.50	15.31	19.67	23.39	27.95	300	570
	664.884	○	○	○	5.00	3.40	8.00	11.31	16.00	19.60	25.30	29.93	35.78	305	570
	664.924	○	○	○	5.50	4.10	10.00	14.14	20.00	24.49	31.62	37.42	44.72	305	575
	664.944	○	○	○	5.70	4.20	11.20	15.84	22.40	27.44	35.42	41.91	50.09	305	575
	664.964	○	○	○	6.00	4.20	12.50	17.68	25.00	30.62	39.53	46.77	55.90	310	580
	664.984	○	○	○	6.30	4.50	14.00	19.80	28.00	34.29	44.27	52.38	62.61	315	585

[1]We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
E = Narrowest free cross section · A = Equivalent bore diameter

Continued on next page.

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

Flat fan dovetail nozzles

Series 664 / 665

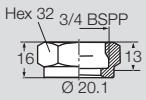
Spray angle	Ordering no.				A Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray width B at p=2 bar	
	Type	Mat. no.					p [bar]								
		17[1] AISI 316Ti/ AISI 316L	5E PVDF	53 PP			0.5	1.0	2.0	3.0	5.0	7.0	10.0	H = 250 mm	H = 500 mm
60°	**665.004**	○	○	○	6.60	4.80	15.75	22.27	31.50	38.57	49.80	58.92	70.43	310	580
	665.014	○	○	○	6.80	4.90	16.75	23.69	33.50	41.03	52.97	62.67	74.91	310	580
	665.044	○	○	○	8.00	5.50	20.00	28.28	40.00	48.99	63.25	74.83	89.44	315	585
	665.064	○	○	○	8.70	5.80	22.50	31.84	45.00	55.15	71.20	84.24	100.69	315	585
	665.084	○	○	○	9.00	6.20	25.00	35.36	50.00	61.24	79.06	93.54	111.80	320	590
	665.124	○	○	○	10.00	7.40	31.50	44.55	63.00	77.16	99.61	117.86	140.87	325	600
	665.164	○	○	○	10.80	8.30	40.00	56.57	80.00	97.99	126.50	149.68	178.90	325	600
	665.184	○	○	○	11.30	8.90	45.00	63.54	90.00	110.23	142.30	168.37	201.24	325	600
	665.204	○	○	○	12.00	9.50	50.00	70.71	100.00	127.47	158.11	167.08	223.61	325	600
75°	**664.725**	○	○	○	3.00	1.90	3.15	4.45	6.30	7.72	9.96	11.79	14.09	345	645
	664.765	○	○	○	3.50	2.10	4.00	5.66	8.00	9.80	12.65	14.97	17.89	345	645
	664.805	○	○	○	4.00	2.60	5.00	7.07	10.00	12.25	15.81	18.71	22.36	345	645
	664.845	○	○	○	4.50	3.00	6.25	8.84	12.50	15.31	19.67	23.39	27.95	345	645
	664.885	○	○	○	5.00	3.30	8.00	11.31	16.00	19.60	25.30	29.93	35.78	345	645
	664.925	○	○	○	5.50	3.80	10.00	14.14	20.00	24.49	31.62	37.42	44.72	345	645
	664.965	○	○	○	6.00	4.10	12.50	17.68	25.00	30.62	39.53	46.77	55.90	345	645
	665.005	○	○	○	6.60	4.30	15.75	22.27	31.50	38.57	49.80	58.92	70.43	345	645
	665.015	○	○	○	6.80	4.60	16.75	23.69	33.50	41.03	52.97	62.67	74.91	345	645
	665.045	○	○	○	8.00	5.30	20.00	28.28	40.00	48.99	63.25	74.83	89.44	345	645
	665.085	○	○	○	9.00	6.10	25.00	35.36	50.00	61.24	79.06	93.54	111.80	345	645
	665.125	○	○	○	10.00	6.80	31.50	44.55	63.00	77.16	99.61	117.86	140.87	345	645
90°	**664.726**	○	○	○	3.00	1.70	3.15	4.45	6.30	7.72	9.96	11.79	14.09	420	800
	664.766	○	○	○	3.50	1.90	4.00	5.66	8.00	9.80	12.65	14.97	17.89	420	800
	664.806	○	○	○	4.00	2.40	5.00	7.07	10.00	12.25	15.81	18.71	22.36	420	800
	664.846	○	○	○	4.50	2.40	6.25	8.84	12.50	15.31	19.67	23.39	27.95	420	800
	664.886	○	○	○	5.00	3.10	8.00	11.31	16.00	19.60	25.30	29.93	35.78	420	800
	664.926	○	○	○	5.50	3.60	10.00	14.14	20.00	24.49	31.62	37.42	44.72	420	800
	664.966	○	○	○	6.00	3.90	12.50	17.68	25.00	30.62	39.53	46.77	55.90	420	800
	665.046	○	○	○	8.00	4.90	20.00	28.28	40.00	48.99	63.25	74.83	89.44	420	800
	665.126	○	○	○	10.00	6.40	31.50	44.55	63.00	77.16	99.61	117.86	140.87	420	800
120°	**664.727**	○	○	○	3.00	1.60	3.15	4.45	6.30	7.72	9.96	11.79	14.09	1240	2150
	664.767	○	○	○	3.50	1.70	4.00	5.66	8.00	9.80	12.65	14.97	17.89	1240	2150
	664.807	○	○	○	4.00	2.00	5.00	7.07	10.00	12.25	15.81	18.71	22.36	1240	2150
	664.847	○	○	○	4.50	2.30	6.25	8.84	12.50	15.31	19.67	23.39	27.95	1240	2150
	664.887	○	○	○	5.00	2.60	8.00	11.31	16.00	19.60	25.30	29.93	35.78	1240	2150
	664.927	○	○	○	5.50	2.90	10.00	14.14	20.00	24.49	31.62	37.42	44.72	1240	2150
	664.967	○	○	○	6.00	3.20	12.50	17.68	25.00	30.62	39.53	46.77	55.90	1240	2150
	665.047	○	○	○	8.00	4.40	20.00	28.28	40.00	48.99	63.25	74.83	89.44	1240	2150
	665.127	○	○	○	10.00	5.70	31.50	44.55	63.00	77.16	99.61	117.86	140.87	1240	2150

[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
E = Narrowest free cross section · A = Equivalent bore diameter

Example of ordering:	Type	+	Material no.	=	Ordering no.
	665.004	+	**17**	=	**665.004.17**

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

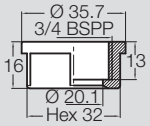
Flat fan dovetail nozzles
Accessories
Series 664 / 665



Mat. no. 17

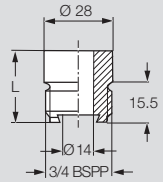
Retaining nut:

065.600.17[1]
(AISI 316Ti/AISI 316L)



Mat. no. 5E

065.600.5E (PVDF)



Welding nipple:

066.410.17[1]
(AISI 316Ti/AISI 316L):
L= 27 mm

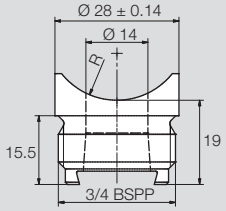
066.410.5E (PVDF):
L= 27 mm

066.411.17[1]
(AISI 316Ti/AISI 316L):
L= 60 mm

066.411.17[1]**.04**
(AISI 316Ti/AISI 316L):
L= 110 mm

Other lengths on request.

Nipple with radius

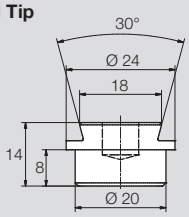


Welding nipple: **066.412.17**[1]
(AISI 316Ti/AISI 316L)

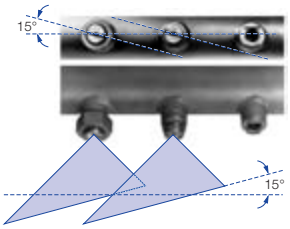
Standard radiuses for welding nipples (others on request)

Ordering no.	Radius
066.412.17.10	10
066.412.17.13	12.5
066.412.17.16	16
066.412.17.20	20
066.412.17.25	25
066.412.17.31	31

Blind Tip



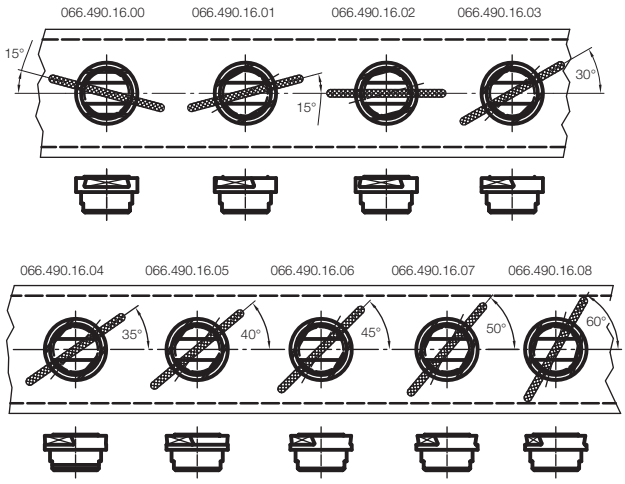
Blind Tip: **006.642.17**[1]
(AISI 316Ti/AISI 316L)
006.642.5E (PVDF)

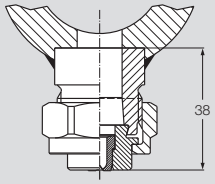


Other offset angles
are available on request

Alignment Tips

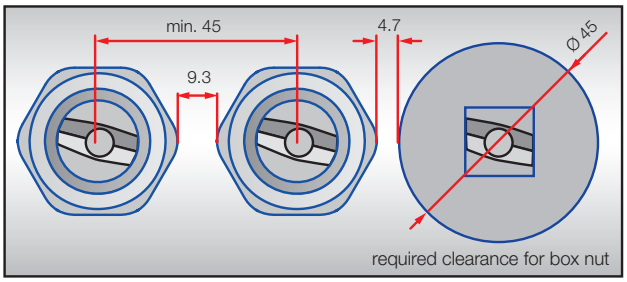
Material AISI 303

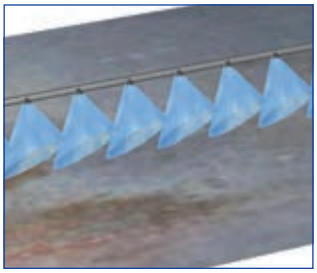




Welding nipple (L = 27 mm)
with nozzle and cap nut

Minimum pitch for series 664/665





Spray header for pickling line with nozzles series 664/665

[1]We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.

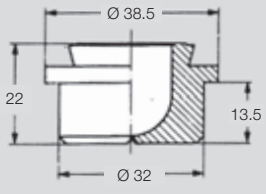
Flat fan dovetail nozzles

Series 669

Spray pipes with these nozzles show an extremely uniform total liquid distribution.
Applications:
Cleaning, pickling, coating, rinsing.

Mat. no. 17

Mat. no. 5E



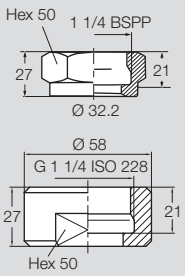
Spray angle	Ordering no. Type	Mat. no. 17[1] AISI 316Ti/ AISI 316L	Mat. no. 5E PVDF	A Ø [mm]	E Ø [mm]	V̇ [l/min] p [bar] 0.5	1.0	2.0	[US gal./ min] at 40 psi	3.0	5.0	7.0	10.0	Spray width B at p=2 bar H = 250 mm	H = 500 mm
20°	**669.041**	○	○	8.00	6.50	20.00	28.00	40.00	12.41	49.00	63.00	75.00	90.00	115	210
	669.121	○	○	10.00	8.30	32.00	45.00	63.00	15.50	77.00	100.00	118.00	141.00	115	210
	669.201	○	○	12.00	10.60	50.00	71.00	100.00	31.00	122.00	158.00	187.00	224.00	115	210
	669.281	○	○	15.00	13.00	80.00	113.00	160.00	49.60	196.00	253.00	299.00	358.00	115	210
30°	**669.042**	○	○	8.00	6.40	20.00	28.00	40.00	12.41	49.00	63.00	75.00	90.00	160	310
	669.122	○	○	10.00	8.20	32.00	45.00	63.00	15.50	77.00	100.00	118.00	141.00	160	310
	669.202	○	○	12.00	10.40	50.00	71.00	100.00	31.00	122.00	158.00	187.00	224.00	160	310
	669.282	○	○	15.00	12.10	80.00	113.00	160.00	49.60	196.00	253.00	299.00	358.00	160	310
45°	**669.043**	○	○	8.00	5.90	20.00	28.00	40.00	12.41	49.00	63.00	75.00	90.00	250	490
	669.123	○	○	10.00	7.30	32.00	45.00	63.00	15.50	77.00	100.00	118.00	141.00	250	490
	669.163	○	○	10.80	8.40	40.00	57.00	80.00	24.80	98.00	126.50	150.00	179.00	250	490
	669.203	○	○	12.00	9.80	50.00	71.00	100.00	31.00	122.00	158.00	187.00	224.00	250	490
	669.243	○	○	13.40	10.20	62.00	88.00	125.00	38.74	153.00	197.60	234.00	279.00	250	490
	669.263	○	○	14.20	10.60	70.00	99.00	140.00	43.33	171.00	221.00	261.00	313.00	250	490
	669.283	○	○	15.00	11.50	80.00	113.00	160.00	49.60	196.00	253.00	299.00	358.00	250	490
	669.343	○	○	18.00	14.40	112.00	158.00	224.00	69.40	274.00	354.00	419.00	501.00	250	490
60°	**669.044**	○	○	8.00	5.50	20.00	28.00	40.00	12.41	49.00	63.00	75.00	90.00	340	640
	669.124	○	○	10.00	7.40	32.00	45.00	63.00	15.50	77.00	100.00	118.00	141.00	340	640
	669.204	○	○	12.00	9.50	50.00	71.00	100.00	31.00	122.00	158.00	187.00	224.00	340	640
	669.284	○	○	15.00	9.40	80.00	113.00	160.00	49.60	196.00	253.00	299.00	358.00	340	640
90°	**669.046**	○	○	8.00	4.90	20.00	28.00	40.00	12.41	49.00	63.00	75.00	90.00	525	1020
	669.126	○	○	10.00	6.50	32.00	45.00	63.00	15.50	77.00	100.00	118.00	141.00	525	1020
	669.206	○	○	12.00	8.70	50.00	71.00	100.00	31.00	122.00	158.00	187.00	224.00	525	1020
	669.286	○	○	15.00	9.45	80.00	113.00	160.00	49.60	196.00	253.00	299.00	358.00	525	1020
120°	**669.047**	○	○	8.00	4.40	20.00	28.00	40.00	12.41	49.00	63.00	75.00	90.00	800	1460
	669.127	○	○	10.00	5.90	32.00	45.00	63.00	15.50	77.00	100.00	118.00	141.00	800	1460
	669.207	○	○	12.00	7.60	50.00	71.00	100.00	31.00	122.00	158.00	187.00	224.00	800	1460
	669.287	○	○	15.00	8.85	80.00	113.00	160.00	49.60	196.00	253.00	299.00	358.00	800	1460

[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
E = Narrowest free cross section · A = Equivalent bore diameter

Example of ordering:	Type	+	Material no.	=	Ordering no.
	669.041	+	**17**	=	**669.041.17**

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

Flat fan dovetail nozzles
Accessories
Series 669



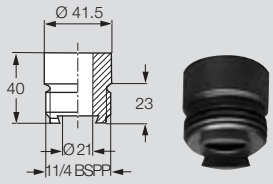
Mat. no. 17

Mat. no. 5E

Retaining nut:

066.900.17[1]
(AISI 316Ti/AISI 316L)

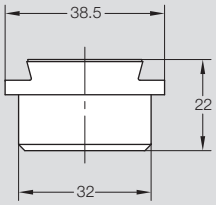
066.900.5E (PVDF)



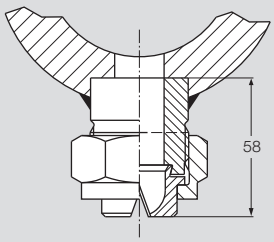
Welding nipple:

066.910.17[1]
(AISI 316Ti/AISI 316L)
066.910.5E (PVDF)

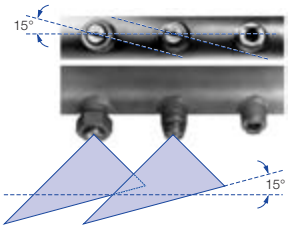
Blind Tip



006.690.00

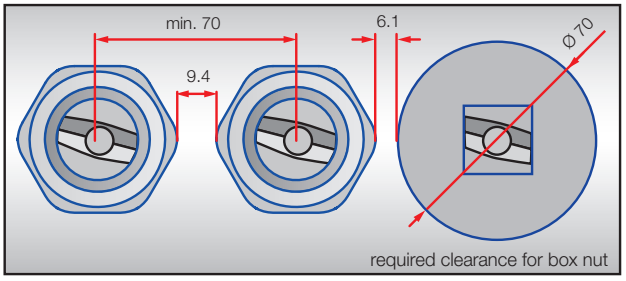


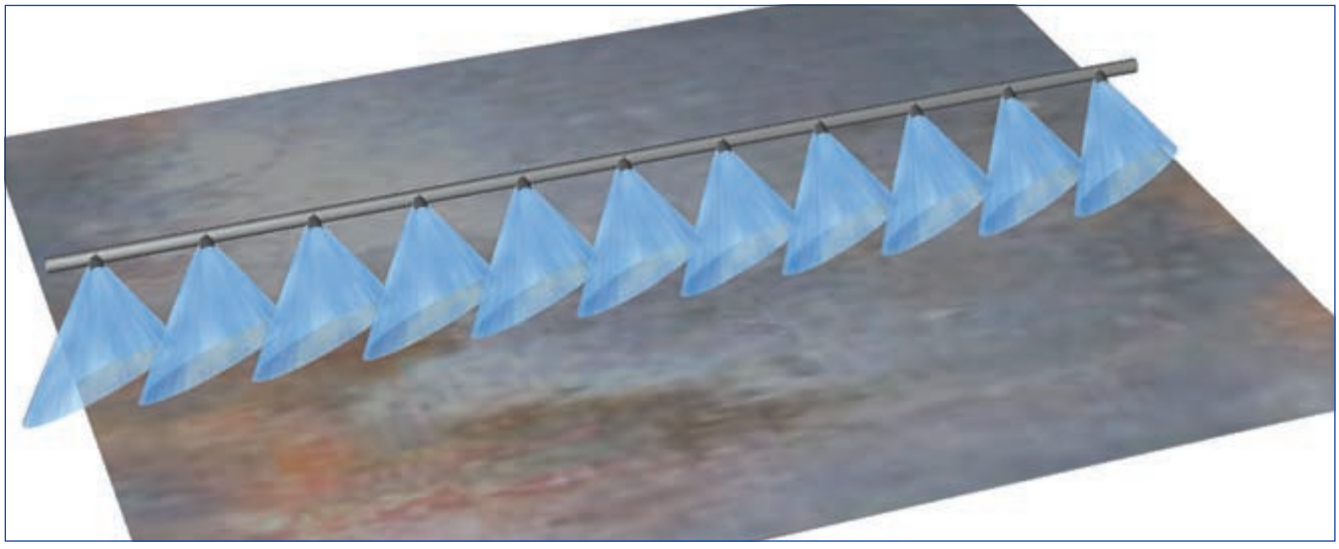
Welding nipple (L = 40 mm)
with nozzle and cap nut



Other offset angles
are available on request

Minimum pitch for series 669

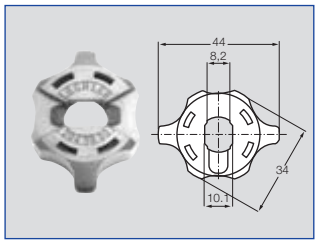




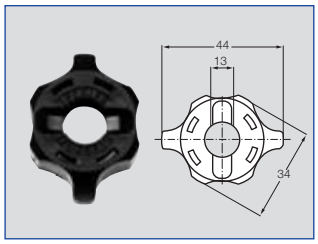
[1]We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.

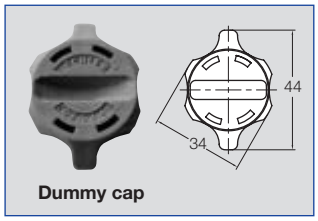
Accessories
Bayonet quick-release system
Bayonet nipple

Bayonet quick-release system



For series	Ordering no.	Material	Colour	
652	**065.202.53.17**	Polypropylene	grey	incl. gasket 065.242.7A (Material: Viton, Colour: black)
	065.202.5E.00	PVDF	blue	incl. gasket 065.242.7A (Material: Viton, Colour: black)



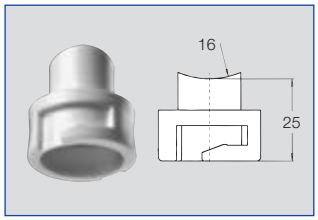


Dummy cap

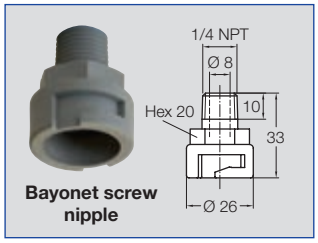
Ordering no.	Material	Colour
065.202.53.40	Polypropylene	grey

Incl. gasket 065.242.73 (Material: rubber, Colour: white)
Other gasket material on request.

Bayonet-Nipple

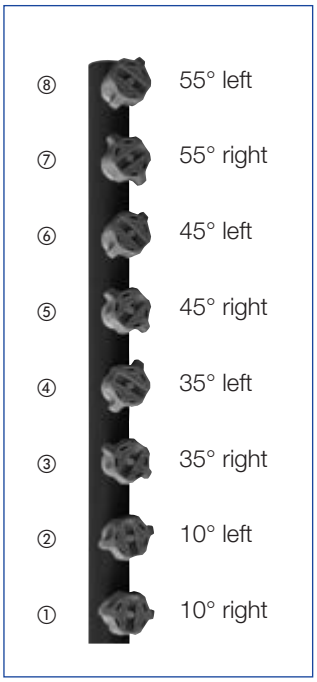


For series	Ordering no.	Material	Twist angle to the pipe axis	
			Angle	Direction
652	① **095. 016. 53. 08. 05**	PP	10°	right
	② **095. 016. 53. 09. 29**	PP	10°	left
	③ **095. 016. 53. 09. 99**	PP	35°	right
	④ **095. 016. 53. 09. 98**	PP	35°	left
	⑤ **095. 016. 53. 07. 36**	PP	45°	right
	⑥ **095. 016. 53. 09. 30**	PP	45°	left
	⑦ **095. 016. 53. 10. 87**	PP	55°	right
	⑧ **095. 016. 53. 10. 88**	PP	55°	left



Bayonet screw nipple

For series	Ordering no.	Material	Connection
652	**090.075.53.00**	PP	1/4 NPT



Nozzle mounting with different twist angles

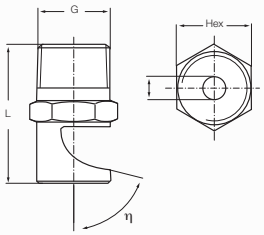
Tongue-type nozzles

Series 686

Wide flat fan with a sharply delimited jet pattern. Non-clogging.
Applications:
Cleaning, pickling, rinsing, requiring powerful and concentrated water jets.

Mat. no. 17
(∢ 140°)

Mat. no. 5E
(∢ 140°)



Schematic design
for ∢ 140°

Spray angle	η	Ordering no.							B Ø [mm]	V̇ [l/min]			Dimensions								Spray width B at p=2 bar H = 250 mm
		Type	Mat. no.		Code G					p [bar]			L [mm]				Hex [mm]				
			17[1] AISI 316Ti/ AISI 316L	5E PVDF	1/8 BSPT	1/4 BSPT	3/8 BSPT	1/2 BSPT		1.0	2.0	5.0	R 1/8	R 1/4	R 3/8	R 1/2	R 1/8	R 1/4	R 3/8	R 1/2	
90°	40°	**686.646**	○	-	**CA**	-	-	-	2.2	2.83	4.00	6.32	24.5	-	-	-	11	-	-	-	530
		686.686	○	-	**CA**	**CC**	-	-	2.4	3.54	5.00	7.91	25	29.5	-	-	11	14	-	-	530
		686.726	○	-	-	**CC**	-	-	2.7	4.45	6.30	9.96	-	31	-	-	-	14	-	-	530
		686.766	○	-	-	**CC**	-	-	3	5.66	8.00	12.65	-	33	-	-	-	14	-	-	530
		686.806	○	○	-	**CC**	-	-	3.4	7.07	10.00	15.81	-	33	-	-	-	14	-	-	530
		686.846	○	-	-	**CC**	**CE**	-	3.8	8.84	12.50	19.76	-	34	34	-	-	14	17	-	530
		686.846	-	○	-	**CC**	-	-	3.8	8.84	12.50	19.76	-	34	-	-	-	14	-	-	530
		686.886	○	-	-	**CC**	-	-	4.2	11.31	16.00	25.3	-	35	-	-	-	17	-	-	530
		686.926	○	-	-	-	**CE**	-	4.7	14.14	20.00	31.62	-	-	38.5	-	-	-	17	-	530
		686.926	-	○	-	-	**CE**	**CG**	4.7	14.14	20.00	31.62	-	-	38.5	43	-	-	17	22	530
		686.966	-	○	-	-	-	**CG**	5.3	17.68	25.00	39.53	-	-	-	46	-	-	-	22	530
		686.966	○	-	-		**CE**	**CG**	5.3	17.68	25.00	39.53	-	-	39.5	46	-	-	17	22	530
		686.986	○	-	-	-	-	**CG**	5.6	19.80	28.00	44.27	-	-	-	46	-	-	-	22	530
140°	75°	**686.648**	○	-	-	**CC**	-	-	2.2	2.83	4.00	6.32	-	24	-	-	-	14	-	-	1370
		686.688	○	-	**CA**	**CC**	-	-	2.4	3.54	5.00	7.91	23	27	-	-	11	14	-	-	1370
		686.728	○	-	**CA**	**CC**	-	-	2.7	4.45	6.30	9.96	23	27	-	-	11	14	-	-	1370
		686.728	-	○	-	**CC**	-	-	2.7	4.45	6.30	9.96	-	27	-	-	-	14	-	-	1370
		686.768	○	-	**CA**	**CC**	-	-	3	5.66	8.00	12.65	23	27	-	-	11	14	-	-	1370
		686.808	○	-	**CA**	**CC**	-	-	3.4	7.07	10.00	15.81	23	27	-	-	11	14	-	-	1370
		686.808	-	○	-	**CC**	-	-	3.4	7.07	10.00	15.81	-	27	-	-	-	14	-	-	1370
		686.828	○	-	**CA**	**CC**	-	-	3.6	7.92	11.20	17.71	23	27	-	-	11	14	-	-	1370
		686.848	○	-	**CA**	**CC**	-	-	3.8	8.84	12.50	19.76	23	27	-	-	11	14	-	-	1370
		686.848	-	○	-	**CC**	-	-	3.8	8.84	12.50	19.76	-	27	-	-	-	14	-	-	1370
		686.868	-	○	-	**CC**	-	-	4	9.90	14.00	22.14	-	28	-	-	-	14	-	-	1370
		686.888	○	○	-	**CC**	-	-	4.2	11.31	16.00	25.30	-	28	-	-	-	14	-	-	1370
		686.908	○	-	-	**CC**	**CE**	-	4.5	12.73	18.00	28.46	-	28	30	-	-	14	17	-	1370
		686.928	○	○	-	-	**CE**	-	4.7	14.14	20.00	31.62	-	-	30	-	-	-	17	-	1370
		686.948	○	-	-	-	**CE**	-	4.9	15.84	22.40	35.42	-	-	30	-	-	-	17	-	1370
		686.968	○	-	-	-	**CE**	**CG**	5.3	17.68	25.00	39.53	-	-	32	37	-	-	17	22	1370
		686.988	○	-	-	-	**CE**	**CG**	5.6	19.80	28.00	44.27	-	-	32	37	-	-	17	22	1370

[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
B = Bore diameter
Other types on request.

Example of ordering:	Type	+	Material no.	+	Code	=	Ordering no.
	686.646	+	17	+	CA	=	686.646.17.CA

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

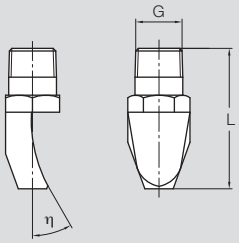
Tongue-type nozzles

Series 688 / 689

Hard, sharp flat fan, narrowly delimited jet pattern. Non-clogging.
Applications:
Cleaning, pickling, rinsing, cross spray, requiring powerful and concentrated water jets.

Mat. no. 17
(≙ 45°)

Mat. no. 5E
(≙ 45°)



Spray angle	η	Ordering no.							B Ø [mm]	V̇ [l/min]			Dimensions						Spray width B at p=2 bar	
		Type	Mat. no.		Code					p [bar]			L [mm]			Hex [mm]				
			17[1] AISI 316Ti/ AISI 316L	5E PVDF	3/8 BSPT	3/8 BSPP	1/2 BSPT	3/4 BSPP		1.0	2.0	5.0	R 3/8	R 1/2	R 3/4	R 3/8	R 1/2	R 3/4	H = 250 mm	H = 500 mm
15°	10°	**688.921**	○	-	-	-	**CG**	-	4.7	14.14	20.00	31.62	-	103	-	-	22	-	65	120
	9°	**689.001**	○	-	-	-	-	**AK**	6	22.27	31.50	49.81	-	-	141	-	-	27	65	120
	9°	**689.121**	○	-	-	-	-	**AK**	8.6	44.55	63.00	99.61	-	-	168	-	-	27	65	120
30°	17°	**688.922**	○	-	-	-	**CG**	-	4.7	14.14	20.00	31.62	-	73	-	-	22	-	160	310
	17°	**689.002**	○	-	-	-	-	**AK**	6	22.27	31.50	49.81	-	-	86.5	-	-	27	160	310
	21°	**689.082**	○	-	-	-	-	**90**	7.6	35.36	50.00	79.06	-	-	112	-	-	32	160	310
	15°	**689.122**	○	-	-	-	-	**AK**	8.6	44.55	63.00	99.61	-	-	108.5	-	-	27	160	310
45°	35°	**688.763**	○	○	**CE**	-	-	-	3	5.66	8.00	12.65	42	-	-	19	-	-	220	440
	30°	**688.843**	○	○	**CE**	-	-	-	3.8	8.84	12.50	19.76	49.5	-	-	19	-	-	220	440
	29°	**688.923**	○	-	**CE**	-	-	-	4.8	14.14	20.00	31.62	58.5	-	-	22	-	-	220	440
	29°	**688.923**	-	○	-	**AE**	-	-	4.8	14.14	20.00	31.62	54	-	-	22	-	-	220	440
	35°	**689.003**	○	-	**CE**	-	-	**90**	6	22.27	31.50	49.81	65	-	80	24	-	32	250	490
	21°	**689.043**	○	-	**CE**	-	-	-	6.9	28.28	40.00	63.25	66.5	-	-	24	-	-	250	490
	18°	**689.083**	○	-	-	-	-	**AK**	7.6	35.36	50.00	79.06	-	-	73.5	-	-	27	250	490
	18°	**689.123**	○	-	**CE**	-	-	-	8.6	44.55	63.00	99.61	78.5	-	-	24	-	-	250	490

[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
B = bore diameter
Other types on request.

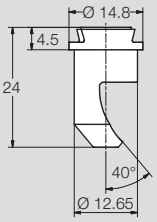
Example of ordering:	Type	+	Material no.	+	Code	=	Ordering no.
	688.921	+	**17**	+	**CG**	=	**688.921.17.CG**

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

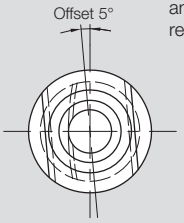
Tongue-type nozzles with dovetail

Series 686. XXX.WW.08

Wide, sharply defined flat fan pattern.
Non-clogging.
Automatic jet alignment due to dovetail guide.
Applications:
Pickling, rinsing.



Example: 686.846.17.08
Dimensions for other types on request.

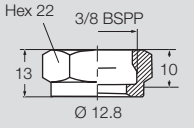


Other offset angles on request.

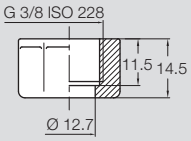
Spray angle	η	Ordering no. Type	Mat. no. 17[1] AISI 316Ti/ AISI 316L	B Ø [mm]	V̇ [l/min] p [bar] 1.0	2.0	5.0	Spray width B at p=2 bar H = 250 mm
90°	40°	**686.646**	○	2.2	2.83	4.00	6.32	530
		686.686	○	2.4	3.54	5.00	7.91	530
		686.726	○	2.7	4.45	6.30	9.96	530
		686.766	○	3	5.66	8.00	12.65	530
		686.806	○	3.4	7.07	10.00	15.81	530
		686.846	○	3.8	8.84	12.50	19.76	530
		686.886	○	4.2	11.31	16.00	25.30	530
		686.926	○	4.7	14.14	20.00	31.62	530
		686.926	-	4.7	14.14	20.00	31.62	530
140°	75°	**686.648**	○	2.2	2.83	4.00	6.32	1370
		686.688	○	2.4	3.54	5.00	7.91	1370
		686.728	○	2.7	4.45	6.30	9.96	1370
		686.768	○	3	5.66	8.00	12.65	1370
		686.808	○	3.4	7.07	10.00	15.81	1370
		686.828	○	3.6	7.92	11.20	17.71	1370
		686.848	○	3.8	8.84	12.50	19.76	1370
		686.888	○	4.2	11.31	16.00	25.3	1370
		686.908	○	4.5	12.73	18.00	28.46	1370
		686.928	○	4.7	14.14	20.00	31.62	1370

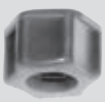
[1]We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
B = Bore diameter
Other types and materials on request.

Example of ordering:	Type	+	Material no.	+	Code	=	Ordering no.
	686.646	+	**17**	+	**08**	=	**686.646.17.08**



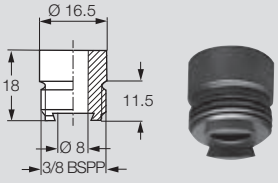
Mat. no. 17





Mat. no. 5E

Retaining nut:
065.200.17[1]
(AISI 316Ti/AISI 316L)
065.200.5E (PVDF)



Welding nipple: **066.011.17**[1]
(AISI 316Ti/AISI316L)
066.011.5E (PVDF)
Other nippel lengths on request.

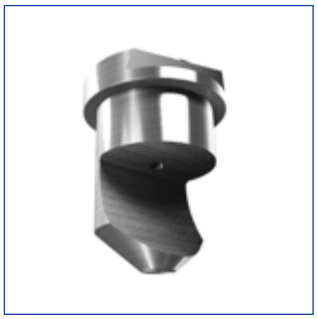
Welding nipples and cap nuts must be ordered separately. Please see folded page at the end of the catalogue for suitable accessories.

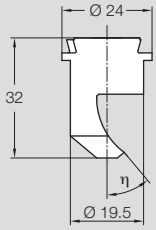
Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

Tongue-type nozzles with dovetail

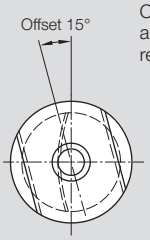
Series 686. XXX.WW.15

Wide, sharply defined flat fan pattern.
Non-clogging.
Automatic jet alignment due to dovetail guide.
Applications:
Pickling, rinsing.





Example: 686.926.17.15
Dimensions for other types on request.

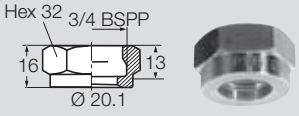


Other offset angles on request.

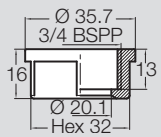
Spray angle	η	Ordering no. Type	Mat. no. 17[1] AISI 316Ti/ AISI 316L	B Ø [mm]	V̇ [l/min] p [bar] 1.0	2.0	5.0	Spray width B at p=2 bar H = 250 mm
90°	40°	**686.646**	○	2.2	2.83	4.00	6.32	530
		686.686	○	2.4	3.54	5.00	7.91	530
		686.726	○	2.7	4.45	6.30	9.96	530
		686.766	○	3	5.66	8.00	12.65	530
		686.806	○	3.4	7.07	10.00	15.81	530
		686.846	○	3.8	8.84	12.50	19.76	530
		686.886	○	4.2	11.31	16.00	25.30	530
		686.926	○	4.7	14.14	20.00	31.62	530
		686.966	○	5.3	17.68	25.00	39.53	530
		686.986	○	5.6	19.80	28.00	44.27	530
140°	75°	**686.648**	○	2.2	2.83	4.00	6.32	1370
		686.688	○	2.4	3.54	5.00	7.91	1370
		686.728	○	2.7	4.45	6.30	9.96	1370
		686.768	○	3	5.66	8.00	12.65	1370
		686.808	○	3.4	7.07	10.00	15.81	1370
		686.828	○	3.6	7.92	11.20	17.71	1370
		686.848	○	3.8	8.84	12.50	19.76	1370
		686.888	○	4.2	11.31	16.00	25.30	1370
		686.908	○	4.5	12.73	18.00	28.46	1370
		686.928	○	4.7	14.14	20.00	31.62	1370
		686.948	○	4.9	15.84	22.40	35.42	1370
		686.968	○	5.3	17.68	25.00	39.53	1370
		686.988	○	5.6	19.80	28.00	44.27	1370

[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
B = Bore diameter
Other types and materials on request.

Example of ordering:	Type	+	Material no.	+	Code	=	Ordering no.
	686.646	+	**17**	+	**15**	=	**686.646.17.15**

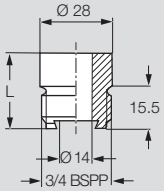


Mat. no. 17



Mat. no. 5E

Retaining nut:
065.600.17[1] (AISI 316Ti/AISI 316L)
065.600.5E (PVDF)



Welding nipple:
066.410.17[1]
(AISI 316Ti/AISI 316L):
L= 27 mm
066.410.5E (PVDF):
L= 27 mm
Other nippel lengths on request.

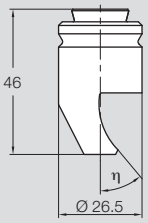
Welding nipples and cap nuts must be ordered separately. Please see folded page at the end of the catalogue for suitable accessories.

[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.

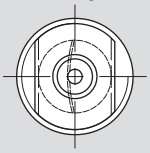
Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

Tongue-type nozzles with dovetail and captive cap nut Series 686. XXX.WW.09

Wide, sharply defined flat fan pattern.
Non-clogging.
Automatic jet alignment due to dovetail guide.
Captive cap nut for easy maintenance.
Applications:
Pickling, rinsing.



Example: 686.986.17.09
Dimensions for other types on request.

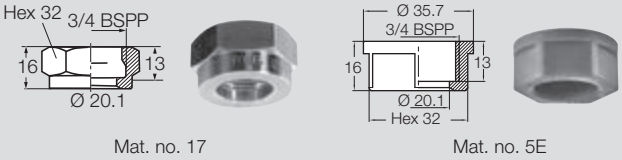


Other offset angles on request.

Spray angle	η	Ordering no. Type	Mat. no. 17[1] AISI 316Ti/ AISI 316L	B Ø [mm]	V̇ [l/min] p [bar] 1.0	2.0	5.0	Spray width B at p=2 bar H = 250 mm
90°	40°	**686.646**	○	2.2	2.83	4.00	6.32	530
		686.686	○	2.4	3.54	5.00	7.91	530
		686.726	○	2.7	4.45	6.30	9.96	530
		686.766	○	3	5.66	8.00	12.65	530
		686.806	○	3.4	7.07	10.00	15.81	530
		686.846	○	3.8	8.84	12.50	19.76	530
		686.886	○	4.2	11.31	16.00	25.3	530
		686.926	○	4.7	14.14	20.00	31.62	530
		686.966	○	5.3	17.68	25.00	39.53	530
		686.986	○	5.6	19.80	28.00	44.27	530
140°	75°	**686.648**	○	2.2	2.83	4.00	6.32	1370
		686.688	○	2.4	3.54	5.00	7.91	1370
		686.728	○	2.7	4.45	6.30	9.96	1370
		686.768	○	3	5.66	8.00	12.65	1370
		686.808	○	3.4	7.07	10.00	15.81	1370
		686.828	○	3.6	7.92	11.20	17.71	1370
		686.848	○	3.8	8.84	12.50	19.76	1370
		686.888	○	4.2	11.31	16.00	25.30	1370
		686.908	○	4.5	12.73	18.00	28.46	1370
		686.928	○	4.7	14.14	20.00	31.62	1370
		686.948	○	4.9	15.84	22.40	35.42	1370
		686.968	○	5.3	17.68	25.00	39.53	1370
		686.988	○	5.6	19.80	28.00	44.27	1370

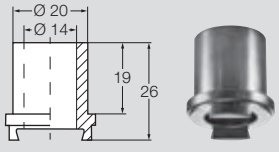
[1]We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
B = Bore diameter
Other types and materials on request.

Example of ordering:	Type	+	Material no.	+	Code	=	Ordering no.
	686.646	+	**17**	+	**09**	=	**686.646.17.09**



Mat. no. 17 Mat. no. 5E

Retaining nut: **065.600.17**[1] (AISI 316Ti/AISI 316L)
065.600.5E (PVDF)



Welding nipple:
600.277.17[1]**.01**
(AISI 316Ti/AISI 316L)
Other nippel lengths on request.

Welding nipples and cap nuts must be ordered separately. Please see folded page at the end of the catalogue for suitable accessories.

[1]We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$

Axial-flow full cone nozzles
Stainless steel version
Series 490 / 491

NEW Patent pending

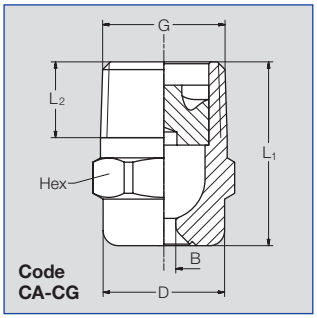
Non-clogging nozzle design. Stable spray angle. Particularly even liquid distribution.
Applications:
Pickling, Surface treatment, rinsing, acid fume scrubbing.

Series 490

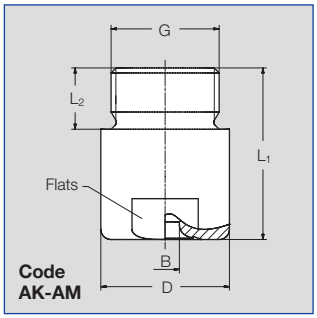
Series 491

Series 490/491 represents a new generation within the axial-flow full cone nozzles product group. These nozzles were developed using state-of-the-art design and simulation methods (CFD).

Nozzles of series 490/491 replace series 460/461 which are still available on request.



Code CA-CG



Code AK-AM

Code	Dimensions [mm]					Weight
	G	L_1	L_2	D	Hex/Flats	
CA	1/8 BSPT	18.0	6.5	10.0	11	12 g
CC	1/4 BSPT	22.0	10.0	13.0	14	15 g
CE	3/8 BSPT	24.5	10.0	16.0	17	29 g
CE	3/8 BSPT	30.0	10.0	16.0	17	48 g
CG	1/2 BSPT	32.5	13.0	21.0	22	57 g
CG	1/2 BSPT	43.5	13.0	21.0	22	81 g
AK	3/4 BSPP	42.0	15.0	32.0	27	181 g
AM	1 BSPP	56.0	17.0	40.0	36	333 g

Subject to technical modification.
In a critical installation situation, please ask for the exact dimensions.

Spray angle	Ordering no.								B Ø [mm]	E Ø [mm]	V̇ [l/min] p [bar]							Spray diameter D at p=2 bar	
	Type	Mat. no.	Code															H = 200 mm	H = 500 mm
		1Y																	
		AISI 316L	1/8 BSPT	1/4 BSPT	3/8 BSPT	1/2 BSPT	3/4 BSPP	1 BSPP			0.5	1.0	2.0	3.0	5.0	7.0	10.0		
45°	**490.403**	○	**CA**	-	-	-	-	-	1.25	1.25	0.57	0.76	1.00	1.18	1.44	1.65	1.90	160	400
	490.523	○	**CA**	-	-	-	-	-	1.70	1.70	1.15	1.52	2.00	2.35	2.89	3.30	3.81	160	400
	490.603	○	-	**CC**	**CE**	-	-	-	2.00	2.00	1.81	2.39	3.15	3.70	4.54	5.20	6.00	160	400
	490.723	○	-	-	**CE**	-	-	-	2.85	2.85	3.62	4.77	6.30	7.41	9.09	10.40	11.99	160	400
60°	**490.404**	○	**CA**	-	-	-	-	-	1.15	1.15	0.57	0.76	1.00	1.18	1.44	1.65	1.90	220	560
	490.444	○	**CA**	-	-	-	-	-	1.25	1.25	0.72	0.95	1.25	1.47	1.80	2.06	2.38	220	560
	490.484	○	**CA**	-	-	-	-	-	1.45	1.45	0.92	1.21	1.60	1.88	2.31	2.64	3.05	220	560
	490.524	○	**CA**	-	-	-	-	-	1.60	1.60	1.15	1.52	2.00	2.35	2.89	3.30	3.81	220	560
	490.564	○	**CA**	-	-	-	-	-	1.80	1.80	1.44	1.89	2.50	2.94	3.61	4.13	4.76	220	560
	490.604	○	**CA**	**CC**	**CE**	-	-	-	2.05	2.05	1.81	2.39	3.15	3.70	4.54	5.20	6.00	220	560
	490.644	○	-	**CC**	**CE**	-	-	-	2.30	2.30	2.30	3.03	4.00	4.70	5.77	6.60	7.61	220	560
	490.684	○	-	**CC**	**CE**	-	-	-	2.60	2.60	2.87	3.79	5.00	5.88	7.21	8.25	9.52	220	560
	490.724	○	-	**CC**	**CE**	-	-	-	2.95	2.80	3.62	4.77	6.30	7.41	9.09	10.40	11.99	220	560
	490.764	○	-	-	**CE**	-	-	-	3.25	3.25	4.59	6.06	8.00	9.41	11.54	13.20	15.22	220	560
	490.804	○	-	-	**CE**	-	-	-	3.70	3.70	5.74	7.58	10.00	11.76	14.43	16.51	19.04	220	560
	490.844	○	-	-	-	**CG**	-	-	4.05	4.05	7.18	9.47	12.50	14.70	18.03	20.63	23.80	220	560
	490.884	○	-	-	-	**CG**	-	-	4.65	4.65	9.19	12.13	16.00	18.82	23.08	26.41	30.46	220	560
	490.924	○	-	-	-	-	**AK**	-	5.20	5.20	11.49	15.16	20.00	23.52	28.85	33.01	38.07	220	560
	490.964	○	-	-	-	-	**AK**	-	5.80	5.80	14.36	18.95	25.00	29.40	36.07	41.26	47.59	220	560
	491.044	○	-	-	-	-	-	**AM**	7.25	7.25	22.97	30.31	40.00	47.04	57.71	66.02	76.15	220	560
	491.084	○	-	-	-	-	-	**AM**	8.15	8.15	28.72	37.89	50.00	58.80	72.14	82.53	95.18	220	560

B = bore diameter · E = Narrowest free cross section

Continued on next page.

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \left(\frac{p_2}{p_1}\right)^{0.4}$ (≤ 10 bar)

Axial-flow full cone nozzles
Stainless steel version
Series 490 / 491

NEW Patent pending

Spray angle	Ordering no.								B Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray diameter D at p = 2 bar	
	Type	Mat. no.	Code								p [bar]								
		1Y									0.5	1.0	2.0	3.0	5.0	7.0	10.0	H = 200 mm	H = 500 mm
		AISI 316L	1/8 BSPT	1/4 BSPT	3/8 BSPT	1/2 BSPT	3/4 BSPP	1 BSPP											
90°	490.406	○	CA	-	-	-	-	-	1.20	1.20	0.57	0.76	1.00	1.18	1.44	1.65	1.90	380	860
	490.486	○	CA	-	-	-	-	-	1.45	1.45	0.92	1.21	1.60	1.88	2.31	2.64	3.05	380	860
	490.526	○	CA	-	-	-	-	-	1.70	1.55	1.15	1.52	2.00	2.35	2.89	3.30	3.81	380	860
	490.566	○	CA	-	-	-	-	-	1.90	1.90	1.44	1.89	2.50	2.94	3.61	4.13	4.76	380	860
	490.606	○	CA	-	CE	-	-	-	2.10	2.05	1.81	2.39	3.15	3.70	4.54	5.20	6.00	380	860
	490.646	○	-	CC	CE	-	-	-	2.40	2.40	2.30	3.03	4.00	4.70	5.77	6.60	7.61	390	960
	490.686	○	-	CC	CE	-	-	-	2.70	2.70	2.87	3.79	5.00	5.88	7.21	8.25	9.52	390	960
	490.726	○	-	CC	CE	-	-	-	3.20	2.80	3.62	4.77	6.30	7.41	9.09	10.40	11.99	390	960
	490.746	○	-	-	CE	-	-	-	3.15	3.15	4.08	5.38	7.10	8.35	10.24	11.72	13.52	390	960
	490.766	○	-	-	CE	-	-	-	3.40	3.40	4.59	6.06	8.00	9.41	11.54	13.20	15.22	390	960
	490.806	○	-	-	CE	-	-	-	3.90	3.90	5.74	7.58	10.00	11.76	14.43	16.51	19.04	390	960
	490.846	○	-	-	CE	-	-	-	4.65	4.00	7.18	9.47	12.50	14.70	18.03	20.63	23.80	390	960
	490.886	○	-	-	-	CG	-	-	5.45	4.50	9.19	12.13	16.00	18.82	23.08	26.41	30.46	390	960
	490.926	○	-	-	-	CG	-	-	5.90	4.50	11.49	15.16	20.00	23.52	28.85	33.01	38.07	390	960
	490.966	○	-	-	-	CG	AK	-	6.55	4.85	14.36	18.95	25.00	29.40	36.07	41.26	47.59	390	960
	491.006	○	-	-	-	-	AK	-	7.55	5.50	18.09	23.87	31.50	37.05	45.45	51.99	59.97	390	960
	491.046	○	-	-	-	-	AK	-	8.60	6.60	22.97	30.31	40.00	47.04	57.71	66.02	76.15	390	960
	491.086	○	-	-	-	-	-	AM	9.45	7.25	28.72	37.89	50.00	58.80	72.14	82.53	95.18	390	960
	491.126	○	-	-	-	-	-	AM	10.40	8.00	36.18	47.75	63.00	74.09	90.89	103.98	119.93	390	960
	491.146	○	-	-	-	-	-	AM	11.00	7.50	40.78	53.81	71.00	83.50	102.43	117.19	135.16	390	960
120°	490.368	○	CA	-	-	-	-	-	0.85	0.65	0.36	0.48	0.63	0.74	0.91	1.04	1.20	680	1220
	490.408	○	CA	-	-	-	-	-	1.20	1.20	0.57	0.76	1.00	1.18	1.44	1.65	1.90	680	1220
	490.448	○	CA	-	-	-	-	-	1.30	1.30	0.72	0.95	1.25	1.47	1.80	2.06	2.38	680	1220
	490.488	○	CA	-	-	-	-	-	1.45	1.45	0.92	1.21	1.60	1.88	2.31	2.64	3.05	680	1220
	490.528	○	CA	-	-	-	-	-	1.70	1.70	1.15	1.52	2.00	2.35	2.89	3.30	3.81	680	1220
	490.568	○	CA	-	-	-	-	-	1.90	1.90	1.44	1.89	2.50	2.94	3.61	4.13	4.76	680	1220
	490.608	○	CA	-	-	-	-	-	2.10	2.05	1.81	2.39	3.15	3.70	4.54	5.20	6.00	680	1220
	490.648	○	-	CC	CE	-	-	-	2.40	2.40	2.30	3.03	4.00	4.70	5.77	6.60	7.61	680	1330
	490.688	○	-	CC	CE	-	-	-	2.75	2.75	2.87	3.79	5.00	5.88	7.21	8.25	9.52	680	1330
	490.728	○	-	CC	CE	-	-	-	3.20	2.80	3.62	4.77	6.30	7.41	9.09	10.40	11.99	680	1330
	490.748	○	-	-	CE	-	-	-	3.20	3.20	4.08	5.38	7.10	8.35	10.24	11.72	13.52	680	1330
	490.768	○	-	-	CE	-	-	-	3.45	3.45	4.59	6.44	8.00	9.41	11.54	13.20	15.22	680	1330
	490.808	○	-	-	CE	-	-	-	3.90	3.90	5.74	7.58	10.00	11.76	14.43	16.51	19.04	680	1330
	490.848	○	-	-	CE	-	-	-	4.70	4.00	7.18	9.47	12.50	14.70	18.03	20.63	23.80	680	1330
	490.888	○	-	-	-	CG	-	-	5.10	4.50	9.19	12.13	16.00	18.82	23.08	26.41	30.46	680	1330
	490.928	○	-	-	-	CG	-	-	5.80	4.75	11.49	15.16	20.00	23.52	28.85	33.01	38.07	680	1330
	490.968	○	-	-	-	CG	AK	-	6.65	4.85	14.36	18.95	25.00	29.40	36.07	41.26	47.59	680	1330
	491.048	○	-	-	-	-	AK	-	9.20	5.85	22.97	30.31	40.00	47.04	57.71	66.02	76.15	680	1330
	491.128	○	-	-	-	-	-	AM	10.80	7.75	36.18	47.75	63.00	74.09	90.89	103.98	119.93	680	1330
	491.148	○	-	-	-	-	-	AM	11.40	7.65	40.78	53.81	71.00	83.50	102.43	117.19	135.16	680	1330

B = Bore diameter · E = Narrowest free cross section

Example for ordering:	Type	+	Material no.	+	Code	=	Ordering no.
	490.406	+	1Y	+	CA	=	490.406.1Y.CA

Other nozzle materials (special alloys, plastics) are available on request.

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \left(\frac{p_2}{p_1}\right)^{0.4}$ **(≤ 10 bar)**

Axial-flow full cone nozzles

Application example

Advantages of new series 490 / 491

- **Non-clogging**
- **Very stable spray angle**
- **Homogeneous liquid distribution**

Acid fume scrubbing

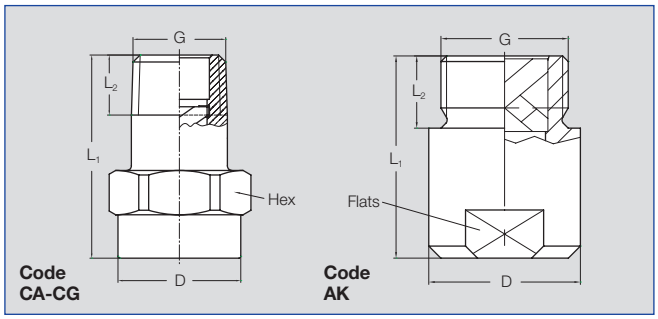
Stainless steel
Series 490 /491

PVDF
Series 460/461

For cleaning the acid fume Lechler **full cone nozzles** in material stainless steel or PVDF are commonly used.

Axial-flow full cone nozzles
PVDF version
Series 460 / 461

Very uniform spray pattern. Large free cross-sections, due to optimized x-style swirl insert.
Applications:
Pickling, Surface treatment, rinsing, acid fume scrubbing.



Code	Dimensions [mm]				
	G	L_1	L_2	D	Hex/Flats
CA	1/8 BSPT	22.0	6.5	13.0	14
CC	1/4 BSPT	22.0	9.7	13.0	14
CE	3/8 BSPT	30.0	10.0	17.0	17
CG	1/2 BSPT	43.5	13.2	22.0	22
AK	3/4 BSPP	42.0	15.0	31.5	27

Subject to technical modifications. Please enquire about the exact dimensions if the installation situation is critical!

Spray angle	Ordering no.							B Ø [mm]	E Ø [mm]	V̇ [l/min] p [bar]							Spray diameter D at p = 2 bar	
	Type	Mat. no.	Code															
		5E																
		PVDF	1/8 BSPT	1/4 BSPT	3/8 BSPT	1/2 BSPT	3/4 BSPP			0.5	1.0	2.0	3.0	5.0	7.0	10.0	H = 200 mm	H = 500 mm
60°	**460. 644**	○	-	**CC**	-	-	-	2.40	1.90	2.30	3.03	4.00	4.70	5.77	6.60	7.61	220	560
	460. 964	○	-	-	-	-	**AK**	5.80	4.90	14.36	18.95	25.00	29.40	36.07	41.26	47.59	220	560
90°	**460. 326**	○	**CA**	-	-	-	-	0.80	0.55	0.23	0.30	0.40	0.47	0.58	0.66	0.76	380	860
	460. 406	○	**CA**	-	-	-	-	1.20	0.85	0.57	0.76	1.00	1.18	1.44	1.65	1.90	380	860
	460. 486	○	**CA**	-	-	-	-	1.45	1.20	0.92	1.21	1.60	1.88	2.31	2.64	3.05	380	860
	460. 526	○	**CA**	-	-	-	-	1.65	1.30	1.15	1.52	2.00	2.35	2.89	3.30	3.81	380	860
	460. 606	○	**CA**	-	**CE**	-	-	2.05	1.45	1.81	2.39	3.15	3.70	4.54	5.20	6.00	380	860
	460. 646	○	-	**CC**	-	-	-	2.30	1.80	2.30	3.03	4.00	4.70	5.77	6.60	7.61	390	960
	460. 726	○	-	-	**CE**	-	-	2.95	2.00	3.62	4.77	6.30	7.41	9.09	10.40	11.99	390	960
	460. 746	○	-	-	**CE**	-	-	3.30	1.90	4.08	5.38	7.10	8.35	10.24	11.72	13.52	390	960
	460. 766	○	-	-	**CE**	-	-	3.30	2.40	4.59	6.06	8.00	9.41	11.54	13.20	15.22	390	960
	460. 806	○	-	-	**CE**	-	-	3.70	2.70	5.74	7.58	10.00	11.76	14.43	16.51	19.04	390	960
	460. 846	○	-	-	**CE**	-	-	4.05	3.20	7.18	9.47	12.50	14.70	18.03	20.63	23.80	390	960
	460. 886	○	-	-	-	**CG**	-	4.70	3.10	9.19	12.13	16.00	18.82	23.08	26.41	30.46	390	960
	460. 966	○	-	-	-	**CG**	-	5.80	3.80	14.36	18.95	25.00	29.40	36.07	41.26	47.59	390	960
	461. 006	○	-	-	-	**CG**	-	6.40	3.80	18.09	23.87	31.50	37.05	45.45	51.99	59.97	390	960
	461. 046	⊗	-	-	-	-	**AK**	7.20	5.30	22.97	30.31	40.00	47.04	57.71	66.02	76.15	390	960

B = Bore diameter · E = Narrowest free cross section
⊗ material PP (material no. 53), connection 3/4 BSPT (Code CK)

Continued on next page.

Example for ordering:	Type	+	Material no.	+	Code	=	Ordering no.
	460.644	+	**5E**	+	**CC**	=	**460.644.5E.CC**

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \left(\frac{p_2}{p_1}\right)^{0.4}$
(≤ 10 bar)

Axial-flow full cone nozzles
PVDF version
Series 460 / 461

Spray angle	Ordering no.							B Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray diameter D at p = 2 bar	
	Type	Mat. no.	Code							p [bar]								
		5E																
		PVDF	1/8 BSPT	1/4 BSPT	3/8 BSPT	1/2 BSPT	3/4 BSPP			0.5	1.0	2.0	3.0	5.0	7.0	10.0	H = 200 mm	H = 500 mm
120°	**460. 408**	○	**CA**	-	-	-	-	1.20	0.85	0.57	0.76	1.00	1.18	1.44	1.65	1.90	680	1220
	460. 488	○	**CA**	-	-	-	-	1.50	1.00	0.92	1.21	1.60	1.88	2.31	2.64	3.05	680	1220
	460. 528	○	**CA**	-	-	-	-	1.65	1.20	1.15	1.52	2.00	2.35	2.89	3.30	3.81	680	1220
	460. 608	○	**CA**	-	-	-	-	2.10	1.40	1.81	2.39	3.5	3.70	4.54	5.20	6.00	680	1220
	460. 648	○	-	**CC**	-	-	-	2.45	1.60	2.30	3.03	4.00	4.70	5.77	6.60	7.61	680	1330
	460. 728	○	-	-	**CE**	-	-	3.10	1.90	3.62	4.77	6.30	7.41	9.09	10.40	11.99	680	1330
	460. 748	○	-	-	**CE**	-	-	3.30	1.90	4.08	5.38	7.10	8.35	10.24	11.72	13.52	680	1330
	460. 768	○	-	-	**CE**	-	-	3.50	1.90	4.59	6.44	8.00	9.41	11.54	13.20	15.22	680	1330
	460. 808	○	-	-	**CE**	-	-	3.80	2.40	5.74	7.58	10.00	11.76	14.43	16.51	19.04	680	1330
	460. 848	○	-	-	**CE**	-	-	4.20	2.70	7.18	9.47	12.50	14.70	18.03	20.63	23.80	680	1330
	460. 888	○	-	-	-	**CG**	-	4.60	3.10	9.19	12.13	16.00	18.82	23.08	26.41	30.46	680	1330
	460. 968	○	-	-	-	**CG**	-	5.90	4.10	14.36	18.95	25.00	29.40	36.07	41.26	47.59	680	1330
	461. 048	⊗	-	-	-	-	**AK**	7.60	4.90	22.97	30.31	40.00	47.04	57.71	66.02	76.15	680	1330

B = Bore diameter · E = Narrowest free cross section
⊗ material PP (material no. 53), connection 3/4 BSPT (Code CK)

Example for ordering:	Type	+	Material no.	+	Code	=	Ordering no.
	460.408	+	**5E**	+	**CA**	=	**460.408.5E.CA**

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \left(\frac{p_2}{p_1}\right)^{0.4}$ (≤ 10 bar)

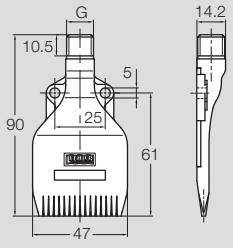
Multi-channel flat fan nozzles for air Whisperblast Series 600.130 / 600.493 / 600.562

Highly efficient air stream, acting upon areas. Reduced noise levels. Low air consumption.
Applications:
Blowing off and blowing out, cleaning, drying, cooling, conveying with air.

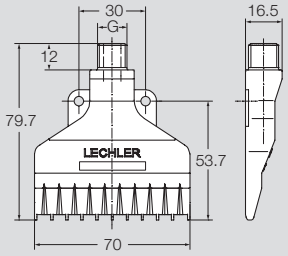
600.130.S2
(PP colourless)

600.493.1Y
(Stainless steel AISI 316L)

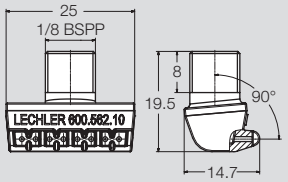
600.562.1Y.10
(Stainless steel AISI 316L)



Weight: 15 g · Tmax: 60 °C

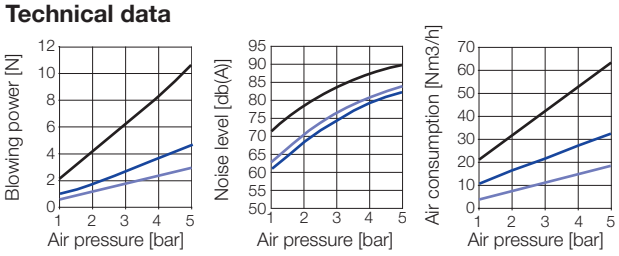


Weight: 126 g · Tmax: 550 °C



Weight: 17 g · Tmax: 180 °C

Technical data



Ordering no.					
Type	Mat. no.		Code		
	1Y Stainless steel	**S2** PP colourless	1/8 BSPP	1/4 BSPP	1/4 NPT
600.130	-	○	-	**AC**	**BC**
600.493	○	-	-	**AC**	**BC**
600.562.1Y.10	○	-	○	-	-

Example for ordering:	Type	+	Material no.	+	Code	=	Ordering no.
	600.130	+	**S2**	+	**AC**	=	**600.130.S2.AC**

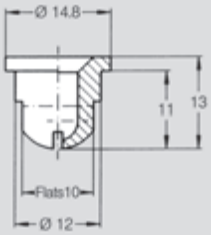
Flat fan nozzles for air or saturated steam

Series 679

Particularly wide-angle, powerful air jet. Assembling with retaining nut. Easy nozzle changing. Simple jet alignment.
Applications:
Blowing off liquids, cooling, reheating, drying.

Mat. no. 17

Mat. no. 5E

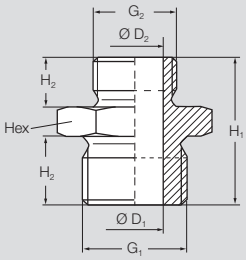


Spray angle	Ordering no. Type	Mat. no. 17[1] AISI 316Ti/ AISI 316L	Mat. no. 5E PVDF	A Ø [mm]	$\dot{V}_n$ L = Air [m³/h] $\dot{M}$ S = Saturated Steam [kg/h] p [bar] 0.5 L	0.5 S	2.0 L	2.0 S	5.0 L	5.0 S	10.0 L	10.0 S
ca. 70°	**679.085**	○	○	1.3	2.00	1.60	4.00	3.10	8.00	6.10	14.70	11.10
	679.117	○	○	1.5	2.10	1.70	4.20	3.30	8.40	6.50	15.40	11.70
	679.165	○	○	1.8	2.60	2.00	5.10	4.10	10.30	8.00	18.80	14.30
	679.255	○	○	2.1	3.60	2.80	7.30	5.70	14.50	11.20	26.60	20.20
	679.365	○	○	2.8	6.30	5.00	12.70	10.00	25.40	19.60	46.50	35.30
	679.415	○	○	3.6	10.20	8.00	20.30	16.00	40.70	31.40	74.60	56.70
	679.495	○	○	4.3	15.60	12.40	31.10	24.80	62.20	48.50	114.00	87.60

A = Equivalent bore diameter

Example of ordering:	Type	+	Material no.	=	Ordering no.
	679.085	+	**17**	=	**679.085.17**

Double nipple

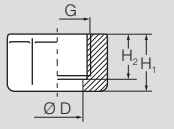


Ordering no. Type	Mat. no. 17[1] AISI 316Ti/ AISI 316L	Mat. no. 5E PVDF	Dimensions [mm] G_1 BSPP	G_2 BSPP	H_1	H_2	D_1	D_2	Hex	Weight
065.215	○	○	3/8 A	1/4 A	25	10	10	7	22	28.5 g
065.211	○	○	3/8 A	3/8 A	25	10	11.5	-	22	23.75 g

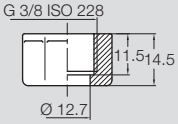
Nuts

Mat. no. 17

Mat. no. 5E



Mat. no. 17



Mat. no. 5E

Ordering no. Type	Mat. no. 17[1] AISI 316Ti/ AISI 316L	Mat. no. 5E PVDF	Dimensions [mm] G BSPP	H_1	H_2	D	Hex	Weight
065.200	○	-	3/8	13,0	10,0	12,8	22	23.75 g
065.200	-	○	3/8	14,5	11,5	12,8	22	23.75 g

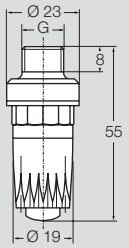
[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.

Multi-channel round jet nozzles for air

Series 600.326

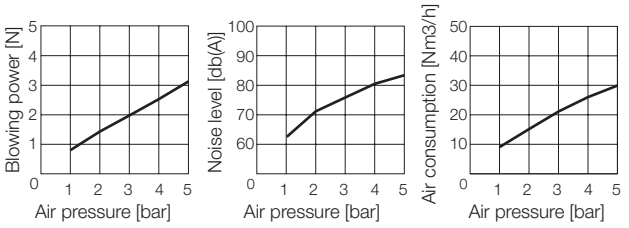
Powerful air jet, producing punctiform impact patterns. Low noise level. Low air consumption.
Applications:
Targeted blowing out and blowing off with compressed air.

600.326.5K (ABS)



Tmax: 50 °C

Technical data

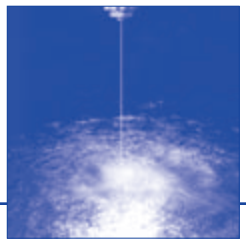


Ordering no.		Connection thread G	Weight
Type	Code		
600.326.5K (Material: ABS)	**AC**	1/4 BSPP	9 g
	HG	M 12 x 1.25	9 g

Example of ordering:	**Type**	**600.326.5K**	**+**	**Code**	**=**	**Ordering no.** **600.326.5K.AC**

Eductor nozzles

Series 500.262 / 500.428

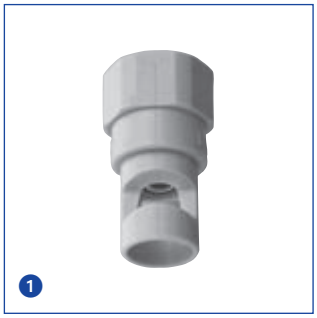


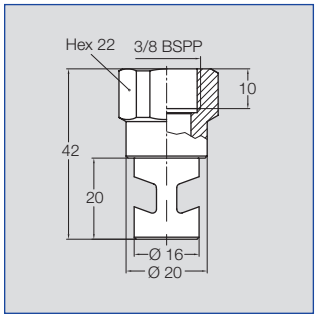
No risk of blockage thanks to the large cross sections from 2.0 to 10.0 bar.

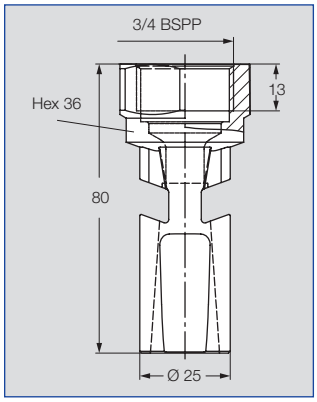
Application:
Tank mixing, liquid circulation, preventing sedimentation

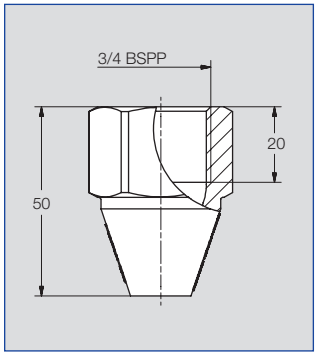
Material:
1 Polypropylene

2 + 3 Polypropylene
Fibreglass reinforced









	Ordering no.	B Ø [mm]	V̇ [l/min] p [bar] 2	4	6	8	10.0
1	**500.262.53.02**	2.2	4.4	6.3	7.7	8.9	9.9
	500.262.53.04	3.6	11.1	15.7	19.2	22.1	27.7
	500.262.53.06	4.5	18.3	26.0	31.8	36.7	41.0
	500.262.53.08	6.0	31.6	44.7	54.8	63.2	70.7
2	**500.262.53.20**	10.6	96.1	136.0	166.5	192.3	215.0
3	**500.428.53.00**	9.7	86.6	122.5	150.1	173.3	193.7

Other sizes on request.

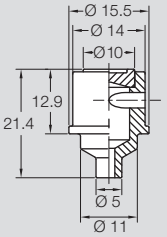
Tangential Nozzles

Series 300.185

Very homogeneous and stable hollow cone spray pattern.
Not prone to clogging due to tangential design.
Applications:
Acid regeneration.

Material: Aluminium oxide

Material: Silicon carbide



Typical dimensions
(details on request)

For the acid regeneration a very precise spray pattern even at low flow rates is required.

The nozzles are fitted in a plate with multiple borings allowing the flow to pass through to the nozzles and to position them correctly.

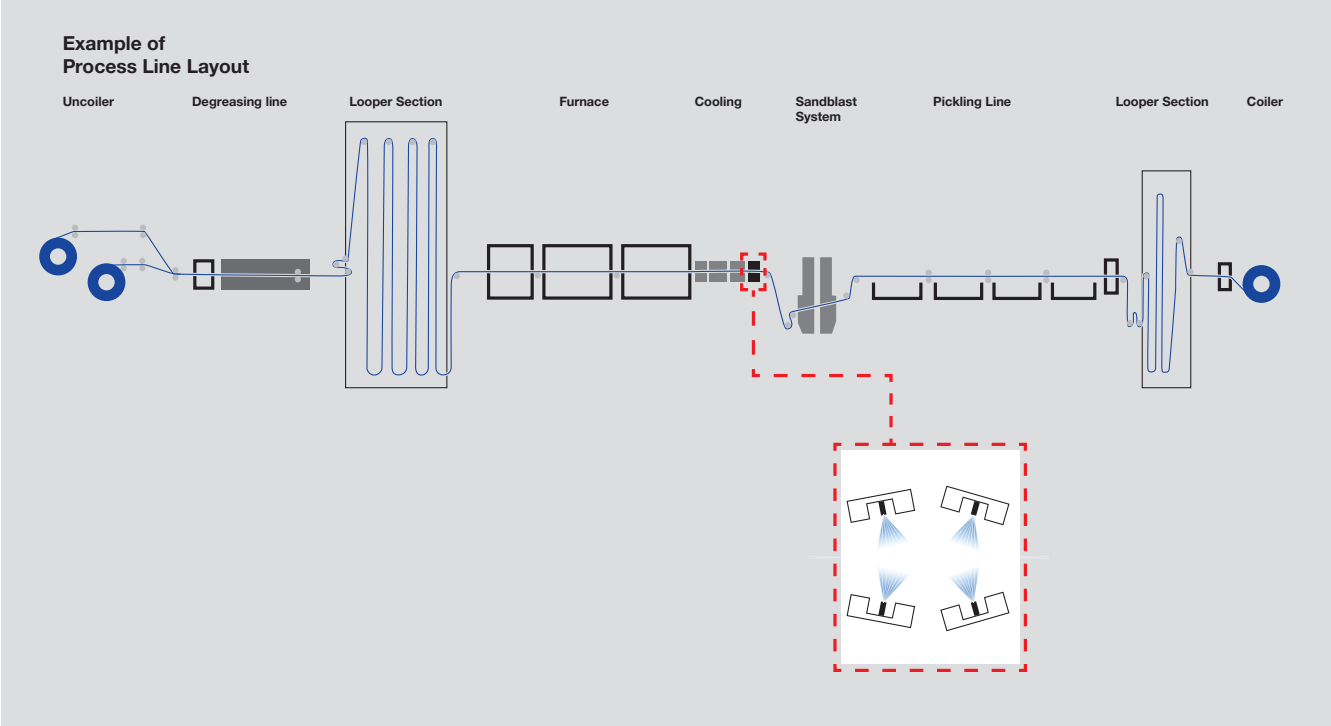
Special materials such as sintered silicon carbide or aluminium oxide are used for the nozzles to prolong the life-time in this demanding atmosphere.

Please contact Lechler for available flow rates and spray angles.

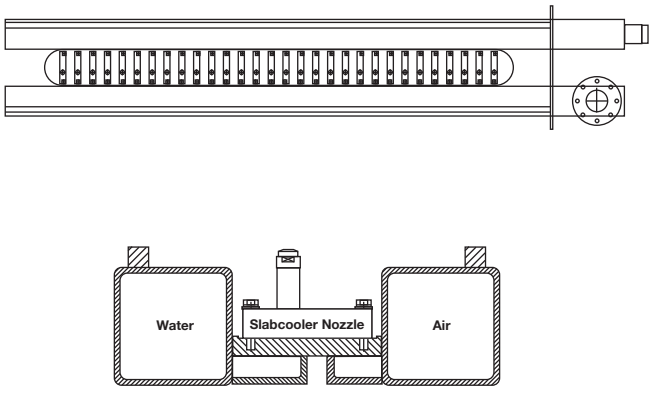
Schematic view of reactor

OPTIMIZED STRIP COOLING IN COLD CONTINUOUS ANNEALING AND PICKLING LINES (CAPL) WITH LECHLER AIR MIST SPRAY COOLING HEADERS

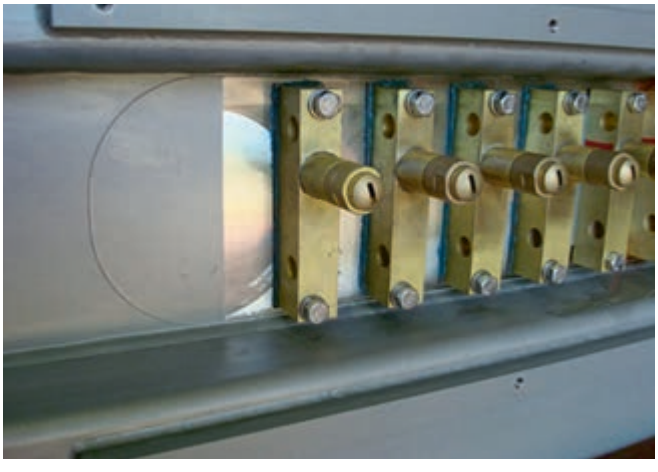
It is in the cold continuous annealing and pickling line where the treatment of the strip is performed, providing the metallurgical structure of the stainless steel.
At temperatures between 800 °C and 1200 °C the recrystalisation takes place in the furnace before the strip is cooled from top and bottom by means of air blowing, conventional water spray cooling and air-mist spray cooling. Often it is a combination of all three methods. Varying steel grades and line speeds require specific cooling rates to avoid carbide precipitation at grain boundaries.
The special Lechler AirMist Cooling Header design is providing exactly that. The 1 : 10 water control ratio (turn down ratio) allows a precise setting with perfect spray patterns from min. to max. line speeds. The large spray overlaps ensure a uniform cooling over the entire strip width for an optimal thermal homogeneity across the strip.



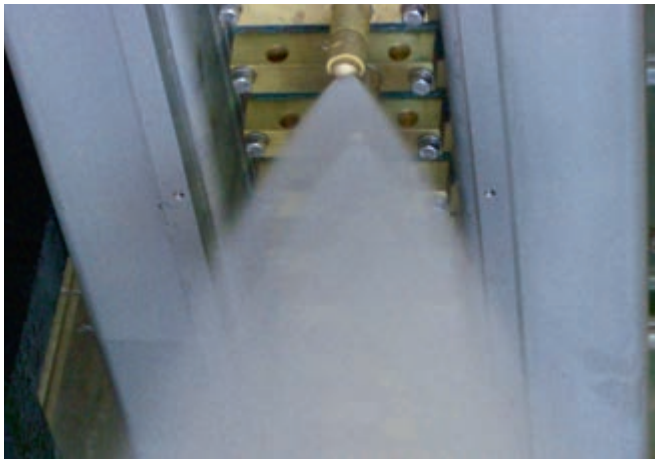
Typical process scheme with a twin Lechler air mist header set up in the final strip cooling section



Example of Lechler air mist header design without cover plate on

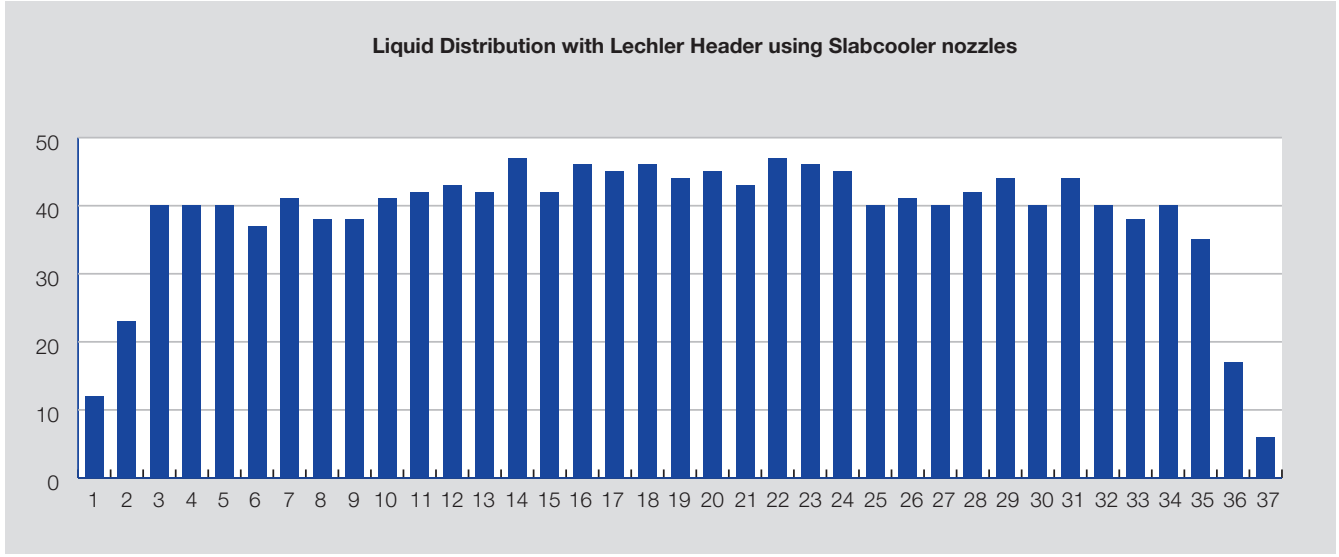


Front view



Lechler air mist Header in operation

Sprays in operation with cover plate on



Water density measurement showing a very uniform liquid distribution over entire strip width

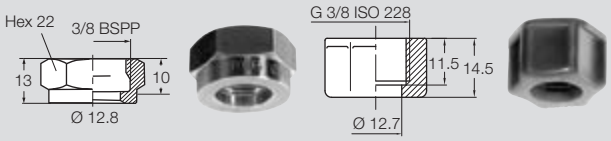
Air mist nozzles with a very wide water control range (turn down ratio)	**Specify cooling rate can be set for every steel grade and line speed for greatest machine flexibility**
SlabCooler air mist nozzles with reduced compressed air consumption	**Reduced energy costs**
SlabCooler air mist Nozzles with stable spray angle over control range	**Perfect cooling conditions at each cooling rate for perfect strip quality and flatness**
Uniform cooling pattern over entire strip width at fluctuating strip level	**Optimal thermal and grain structure homogeneity across the strip**
Tailored header design to match existing line design	**Optimal solution can be found for every condition**
Nozzles protected by nozzles cover plate (if space available)	**High operation safety and plant availability**

Accessories

Welding Nipples and Retaining Nuts

For series 652

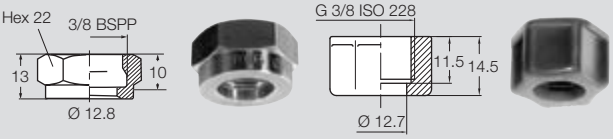
Nipples see page 43



Mat. no. 17 Mat. no. 5E

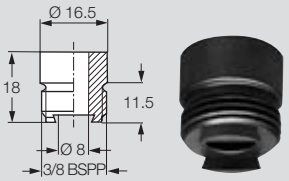
Retaining nut:
065.200.17[1] (AISI 316Ti/AISI 316L)
065.200.5E (PVDF)

For series 660 and 686.XXX.WW.08



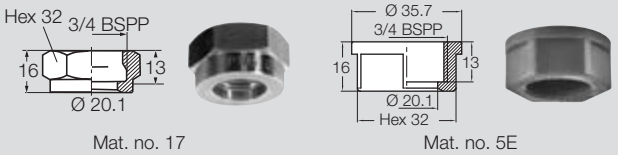
Mat. no. 17 Mat. no. 5E

Retaining nut:
065.200.17[1] (AISI 316Ti/AISI 316L)
065.200.5E (PVDF)



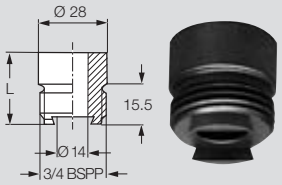
Welding nipple:
066.011.17[1] (AISI 316Ti/AISI 316L)
066.011.5E (PVDF)
066.011.53 (PP)
Other nippel lengths on request.

For series 664/665 and 686.XXX.WW.15



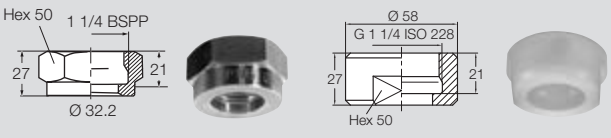
Mat. no. 17 Mat. no. 5E

Retaining nut:
065.600.17[1] (AISI 316Ti/AISI 316L)
065.600.5E (PVDF)



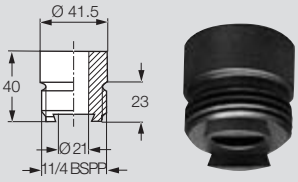
Welding nipple:
066.410.17[1]
(AISI 316Ti/AISI 316L): L= 27 mm
066.410.5E
(PVDF): L= 27 mm
066.411.17[1]
(AISI 316Ti/AISI 316L): L= 60 mm
066.411.17[1]**.04**
(AISI 316Ti/AISI 316L): L= 110 mm
Other nippel lengths on request.

For series 669



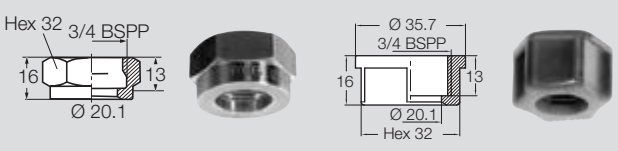
Mat. no. 17 Mat. no. 5E

Retaining nut:
066.900.17[1] (AISI 316Ti/AISI 316L)
066.900.5E (PVDF)



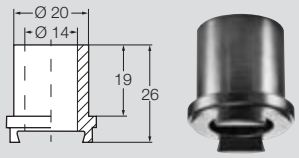
Welding nipple:
066.910.17 (AISI 316Ti/AISI 316L)
066.910.5E (PVDF)
Other nipple lengths on request.

For series 686.XXX.WW.09



Mat. no. 17 Mat. no. 5E

Retaining nut: **065.600.17**[1] (AISI 316Ti/AISI 316L)
065.600.5E (PVDF)



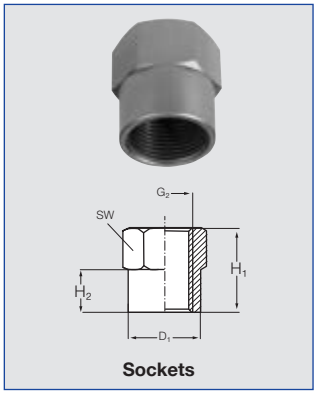
Welding nipple:
600.277.17[1]**.01**
(AISI 316Ti/AISI 316L)
Other nippel lengths on request.

[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.

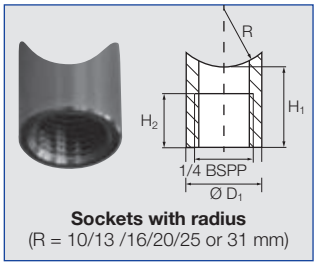
Accessories

Sockets / Nipples

For nozzles with male thread



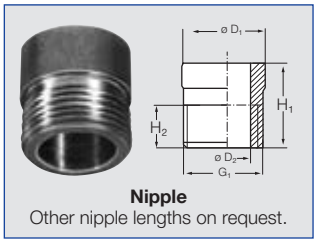
Sockets



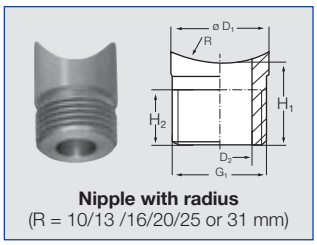
Sockets with radius
(R = 10/13 /16/20/25 or 31 mm)

For Series	Type	Ordering no. Material no. 1Y AISI 316L	17[1] AISI 316Ti/ AISI 316L	5E PVDF	53 Polypropylene	G_1	G_2	H_1	H_2	D_1	D_2	Hex
For all nozzles with 1/8" male thread.	**040.270**	○	-	○	-	-	1/8 BSPP	20	10	13.8	-	14
For all nozzles with 1/4" male thread.	**061.220**	○	-	○	-	-	1/4 BSPP	20	10	16.8	-	17
For all nozzles with 3/8" male thread.	**040.271**	-	○	-	-	-	3/8 BSPP	20	10	21.5	-	22
	040.271	-	-	○	○		3/8 BSPP	20	10	24.5	-	22
For all nozzles with 1/4" male thread.	**040.228. xx.yy***	○	-	-	-	-	1/4 BSPP	20	10	13.8	-	14

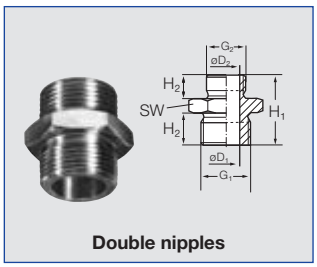
For series 652



Nipple
Other nipple lengths on request.



Nipple with radius
(R = 10/13 /16/20/25 or 31 mm)



Double nipples

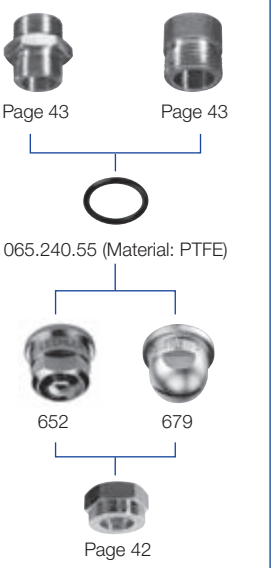
652	**065.210**	○	○	○	○	3/8 BSPP	-	18	10	17.2	11.5	-
652	**065.217. xx.yy***	-	○	-	-	3/8 BSPP	-	18	10	17.2	11.5	-
652	**065.215**	-	○	○	-	3/8 BSPP	1/4 BSPP	25	10	10	7	22
	065.211	-	○	○	-	3/8 BSPP	3/8 BSPP	25	10	11.5	-	22

* Replace **xx** by material no. and **yy** by radius R

[1] We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.

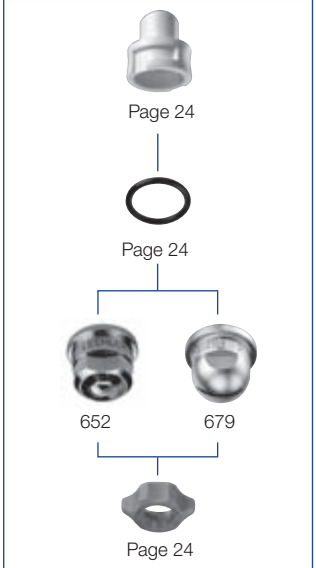
IN THIS WAY YOU CAN MATCH NOZZLE ASSEMBLING TO YOUR VERY SPECIAL REQUIREMENTS.

Assembling accessories for nozzles series 652 and 679



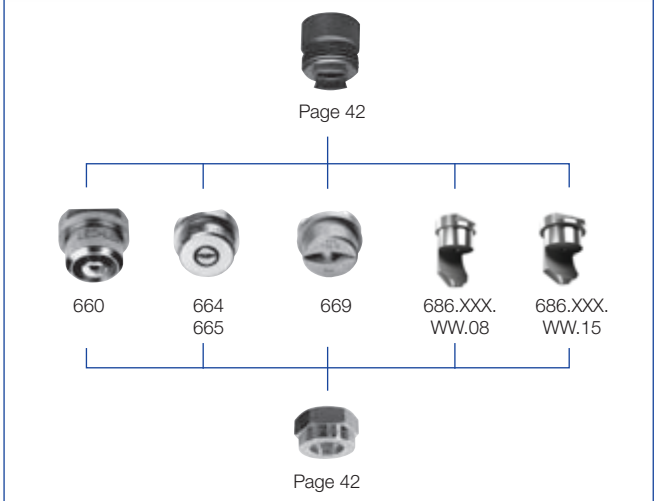
Assembling accessories for nozzles without thread. Standard accessories.

Assembling accessories for nozzles series 652 and 679 with quick-release system



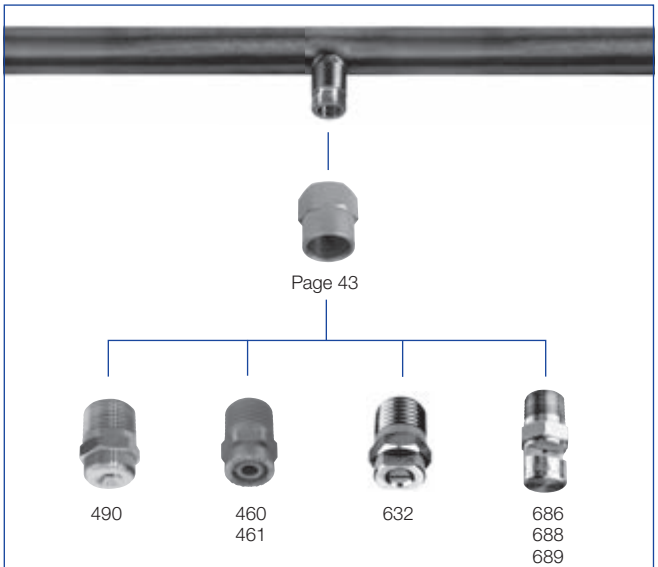
Assembling accessories for nozzles without thread. Standard accessories.

Assembling accessories for nozzles series 660, 664/665, 669, 686.XXX.WW.08 and 686.XXX.WW.15



Assembling accessories for nozzles with dove-tail design.

Assembling accessories for nozzles with male thread series 460/461, 490 and 686/688/689



Assembling accessories for nozzles with male thread. Standard accessories.

Please note that cap nut must be put over welding nipple before welding!

Assembling accessories for series 686.XXX.WW.09 with captive cap nut.

FOR YOUR NOTES

ENGINEERING
YOUR SPRAY SOLUTION

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