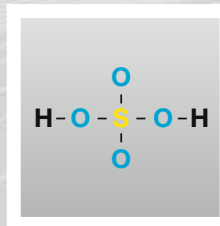
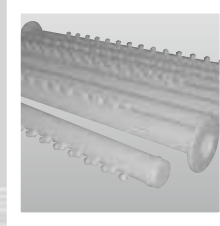
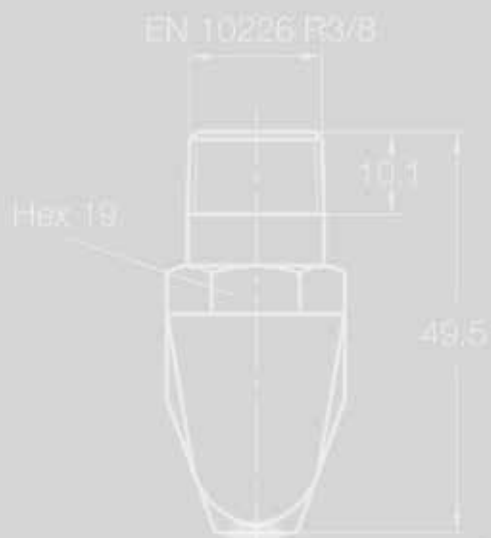


**ENGINEERING
YOUR SPRAY SOLUTION**



Precision Spray Nozzles for Pickling Lines



Pickling Lines

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.

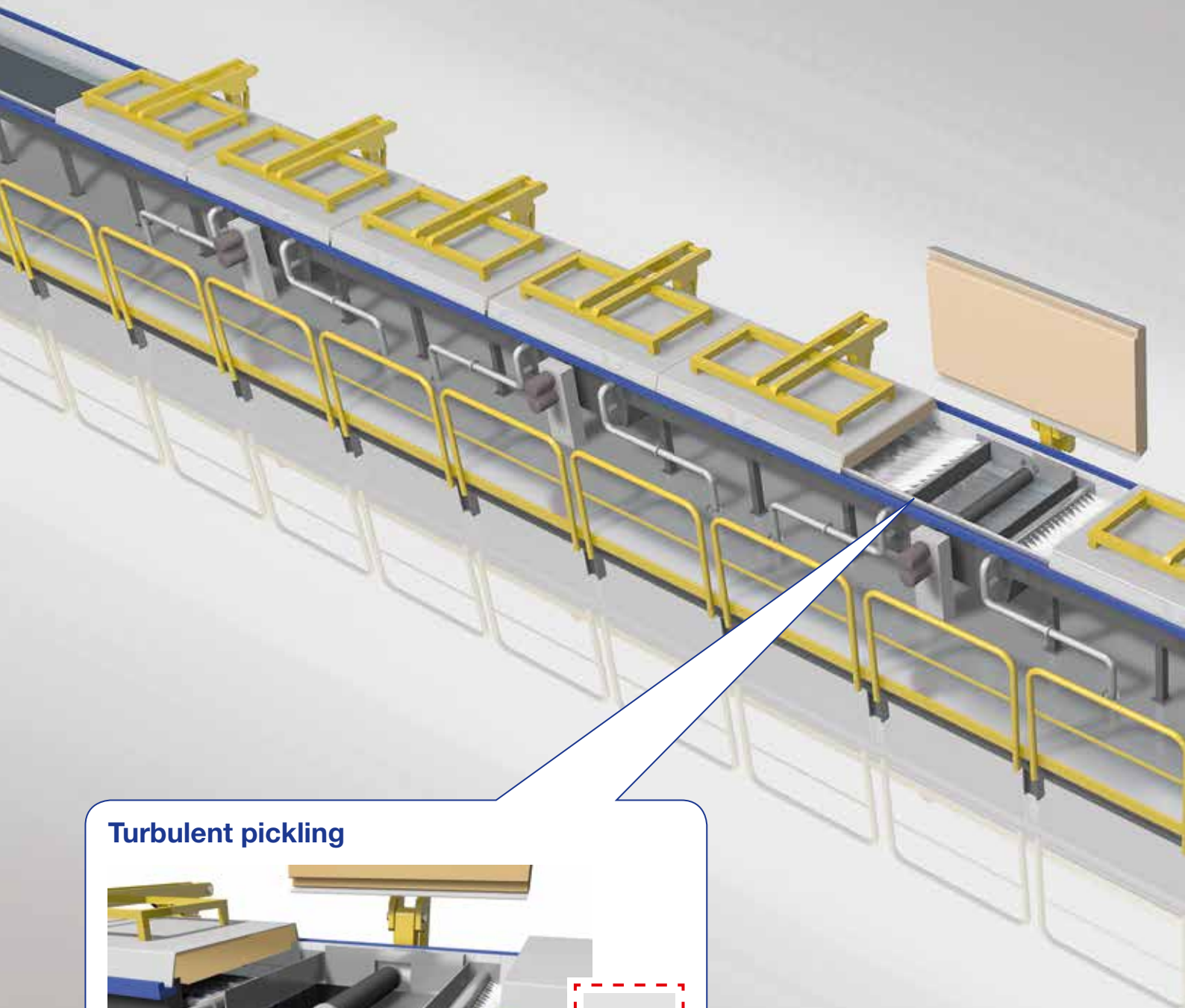
Thanks to our detailed knowledge and long-time experience we will be able to elaborate also innovative customized solutions.

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.

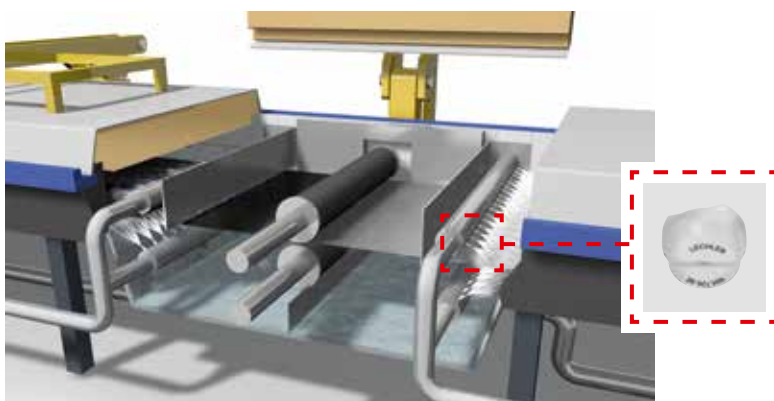


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TYPICAL PROCESS: TURBULENCE PICKLING LINE

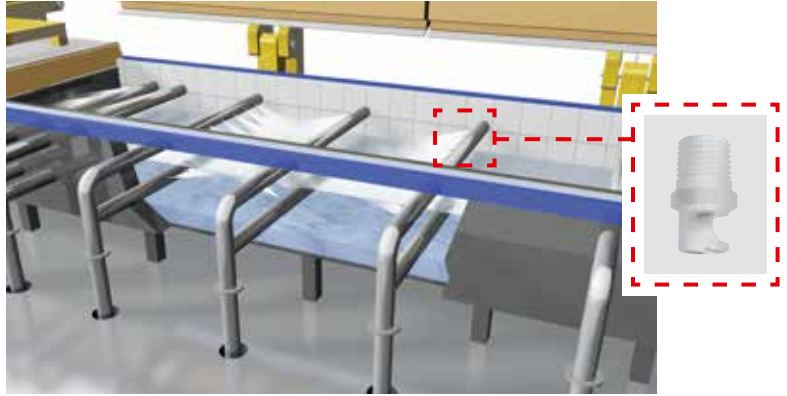


Turbulent pickling

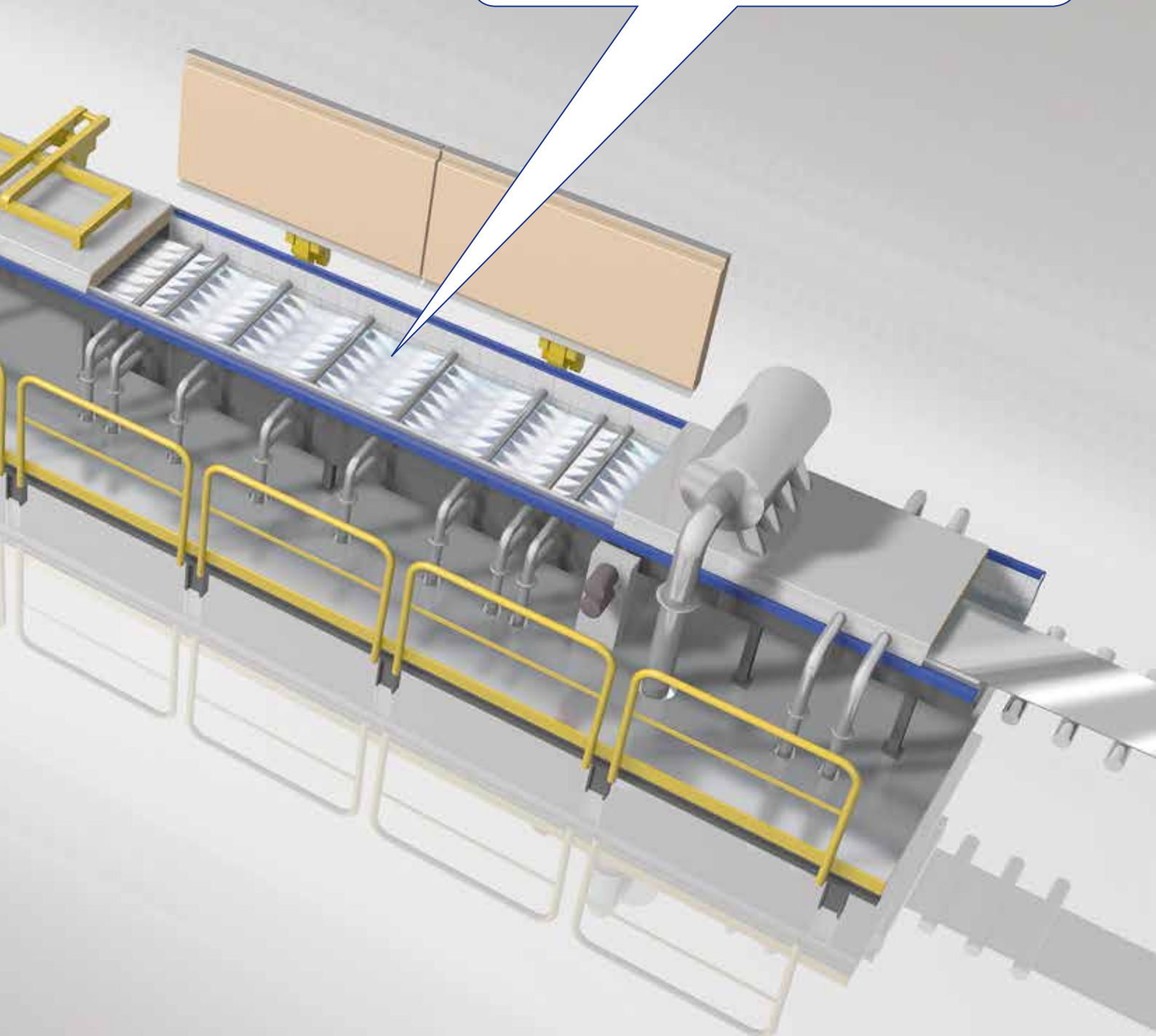


Series 664/665 flat jet nozzles with 45° or 60° spray angle and dovetail connection generate high turbulence. The automatic self-adjusting orientation of the flat jet ensures optimum alignment and easy maintenance. Also flat jet nozzles **series 621/625** with a male thread connection fulfill the job 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
- ② Turbulence pickling
- ③ Rinsing
- ④ Blow-off
- ⑤ Spray headers
- ⑥ Maintenance

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

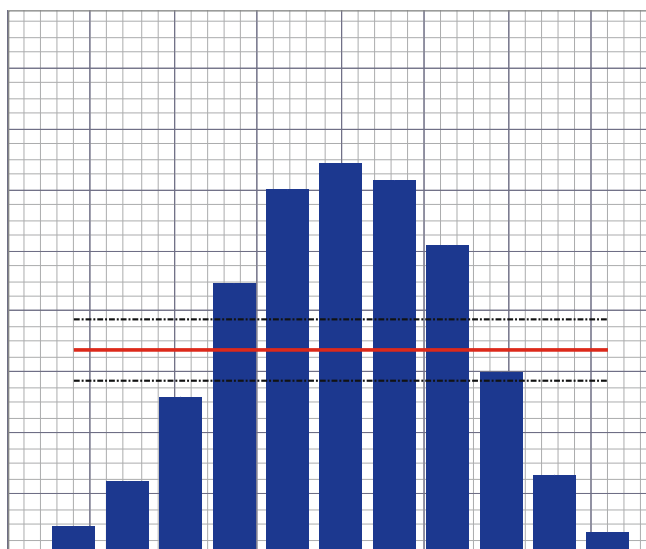
In the turbulence pickling section the nozzles have to offer a homogeneous liquid distribution over the entire material width.

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)

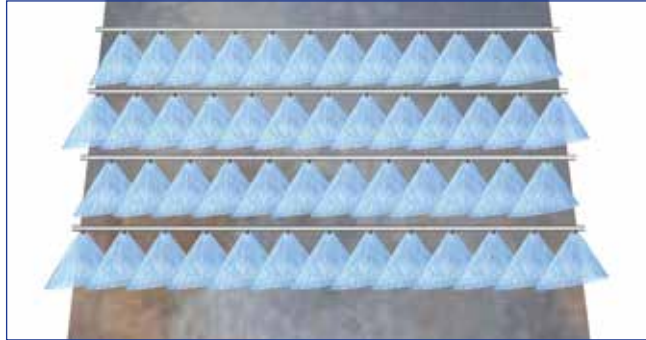
Chemical Resistance

	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

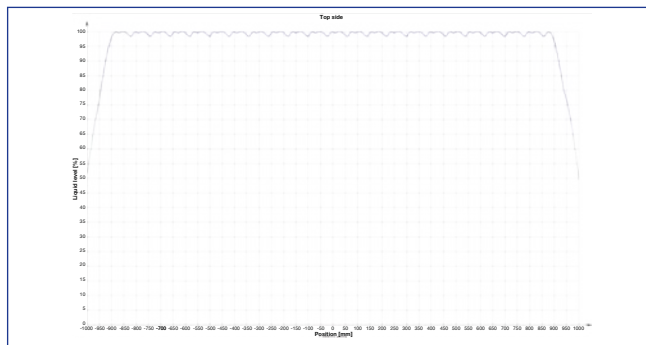
This table is only a rough recommendation. It is not to be considered as any kind of guarantee. The resistance in detail is highly dependent on the combination of thermal, mechanical and chemical load as well as on the exact material composition and the duration of the mentioned loads.

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.



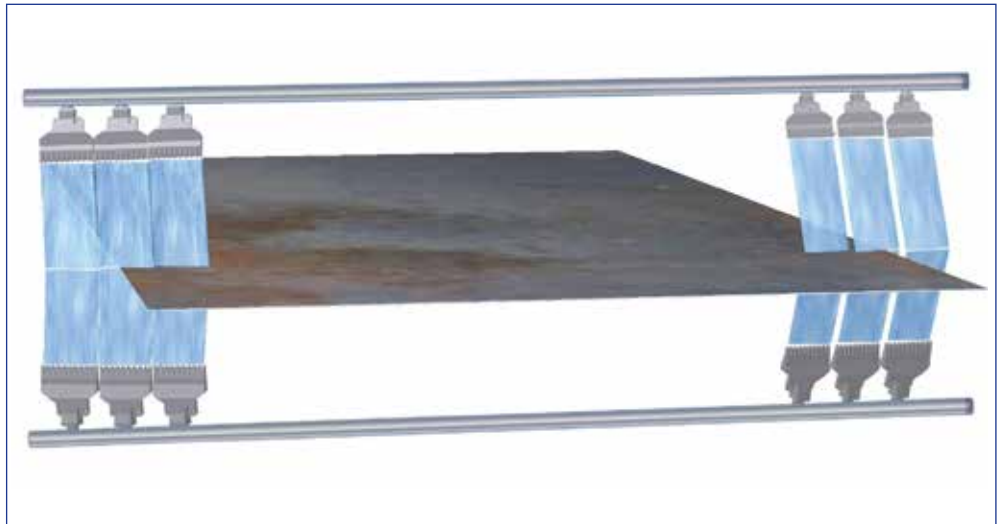
Example of a staggered nozzle arrangement



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 Whisper-blast 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.

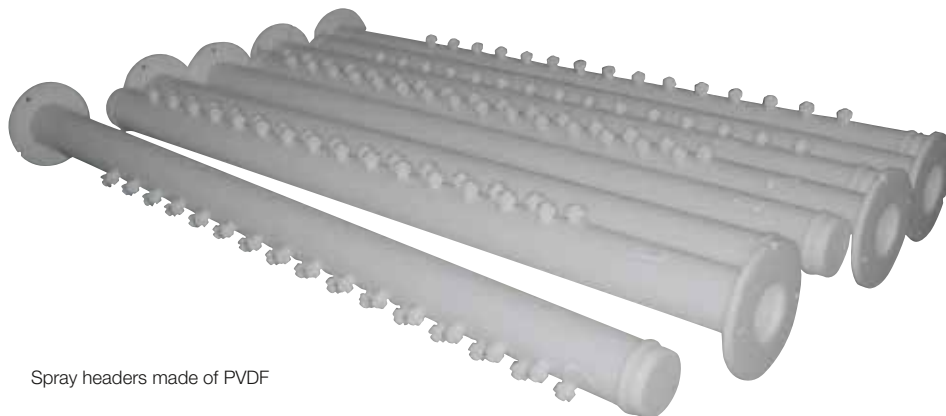


Strip edge blow-off with multi-channel nozzles for compressed air

WHAT YOU SHOULD KEEP IN MIND WHEN PLANNING

⑤ Spray Headers

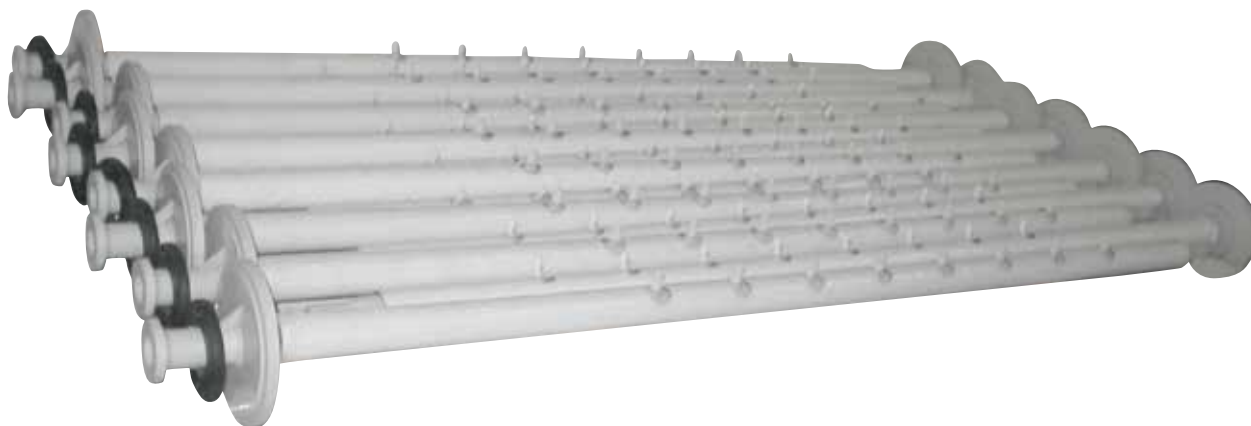
Precise nozzle sprays need to be installed accurately on precise spray headers. Complete spray headers could be manufactured by Lechler according to your drawings. Lechler could produce headers in material stainless steel as well as in plastics according to your specifications.



Spray headers made of PVDF



Spray header made of stainless steel



Spray headers equipped with tongue type nozzles

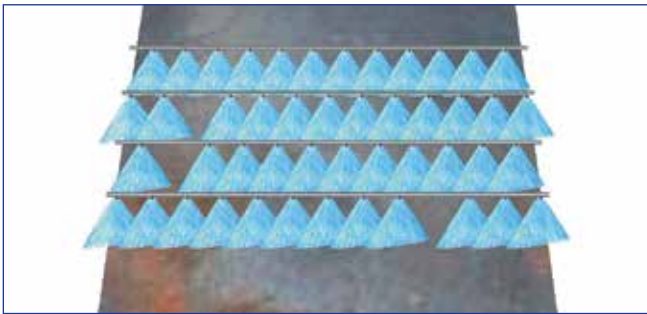
⑥ Maintenance

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.



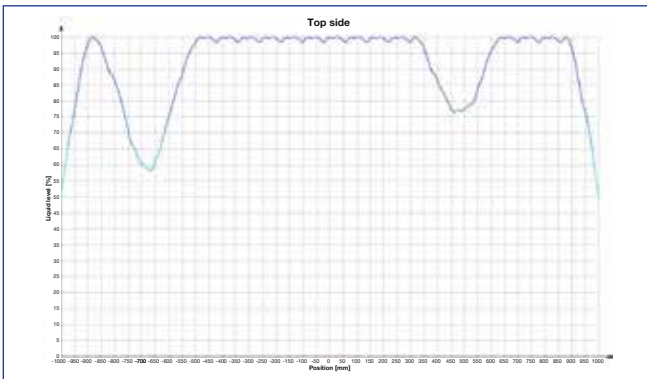
Worn out bayonet cap



Clogged nozzle (front side)



Clogged nozzle (back side)

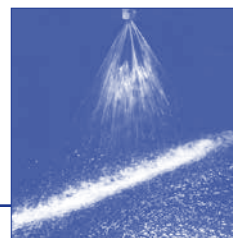


Influence of clogged nozzles to the liquid distribution



Flat fan nozzles

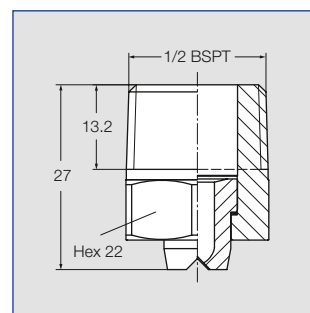
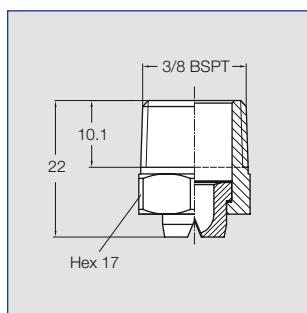
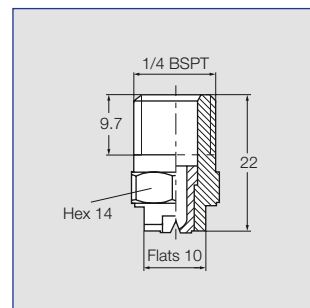
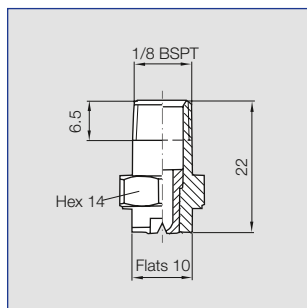
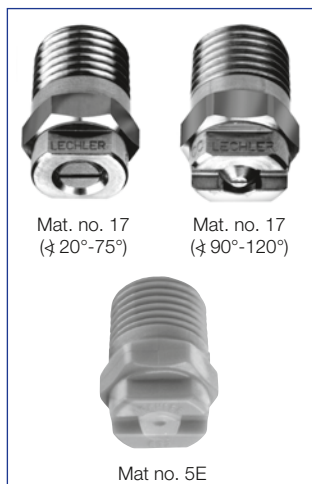
Series 632 / 633



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]	ṽ [l/min]							Spray width B  at p=2 bar	
	Type	Mat. no.		Code						p [bar]								
		17 ¹	5E	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		
		AISI 316Ti/ AISI 316L	PVDF															
20°	632.441	○	○	CA	CC	-	-	1.35	1.10								0.62*	0.88
	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

¹We 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.

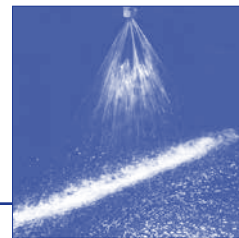
Continued on next page.

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



Flat fan nozzles

Series 632 / 633



Spray angle 	Ordering no.							A Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray width B	
	Type	Mat. no.		Code						p [bar]							at p=2 bar 	
		17 ¹	5E	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

¹We 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.

Continued on next page.

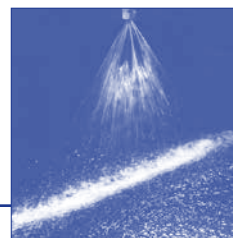
Example **Type** + **Material no.** + **Code** = **Ordering no.**
of ordering: 632.483 + 17 + CA = 632.483.17.CA

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



Flat fan nozzles

Series 632 / 633



Spray angle 	Ordering no.							A Ø [mm]	E Ø [mm]	ṽ [l/min]							Spray width B		
	Type	Mat. no.		Code						p [bar]							at p=2 bar		
		17 ¹	5E	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	

¹We 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

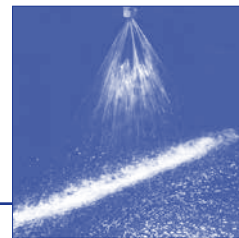
Subject to technical modifications.

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



Flat fan nozzles

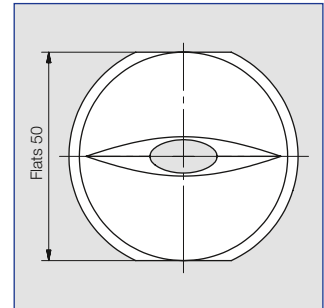
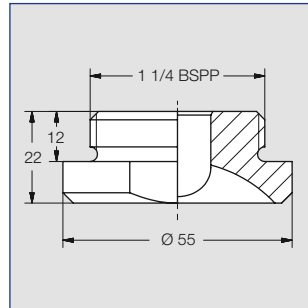
Series 621



Parabolic distribution of liquid.

Applications:

Cleaning, pickling, surface treatment, rinsing.



Spray angle 	Ordering no.		A Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray width B	
	Type	Mat. no.			p [bar]								at p=2 bar
		5E PVDF			0.5	1.0	2.0	3.0	5.0	7.0	10.0		
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

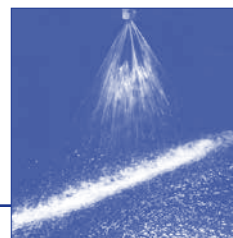
E = Narrowest free cross section · A = Equivalent bore diameter
incl. gasket 062.140.72.00 (Material: EWP 210)

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



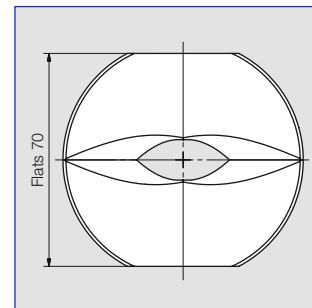
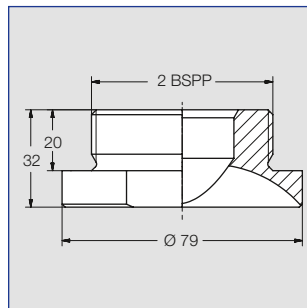
Flat fan nozzles

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.		A Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray width B	
	Type	Mat. no.			p [bar]							 at p=2 bar	
		5E											
					PVDF	0.5	1.0	2.0	3.0	5.0	7.0		
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

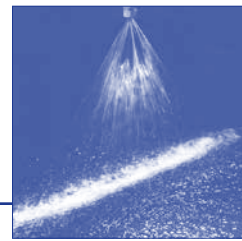
E = Narrowest free cross section · A = Equivalent bore diameter
Incl. gasket 062.540.72.00 (Material: EWP 210)

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



Flat fan nozzles for retaining nut

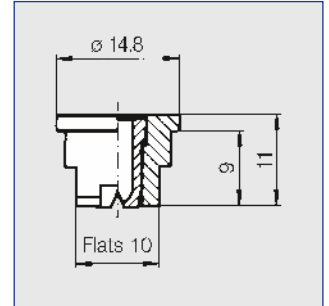
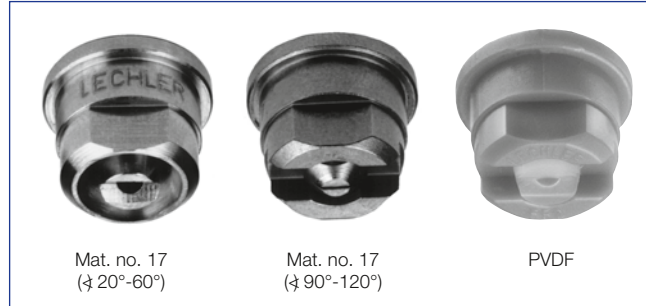
Series 652



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.



Spray angle 	Ordering no.		A Ø [mm]	E Ø [mm]	V̇ [l/min]								Spray width B	
	Type	Mat. no.			p [bar]									at p=2 bar H = 250 mm H = 500 mm
		17 ¹	5E											
		AISI 316Ti/ AISI 316L	PVDF											
						0.5	1.0	2.0	[US gal./ min] at 40 psi	3.0	5.0	10.0		
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

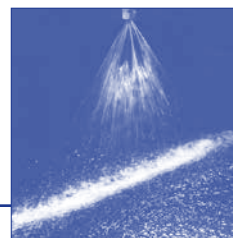
Example of ordering:	Type	+	Material no.	= Ordering no.
	652.441	+	17	= 652.441.17

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



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:

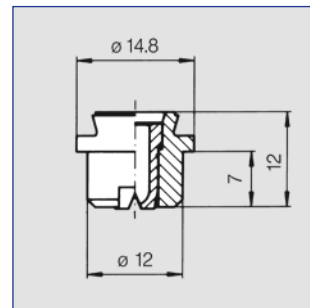
Cleaning, pickling, coating, rinsing.



Mat. no. 17



Mat. no. 5E



Spray angle 	Ordering no.			A Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray width B	
	Type	Mat. no.				p [bar]							 at p=2 bar H = 250 mm H = 500 mm	
		17'	5E											
		AISI 316Ti/ AISI 316L	PVDf			0.5	1.0	2.0	3.0	5.0	7.0	10.0		
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

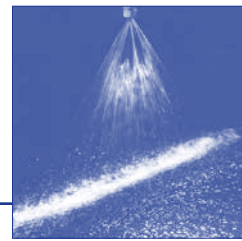
¹ We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
E = Narrowest free cross section · A = Equivalent bore diameter

Continued on next page.



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	
	Type	Mat. no.				p [bar]							H = 250 mm	H = 500 mm
		17'	5E											
		AISI 316Ti/ AISI 316L	PVDF			0.5	1.0	2.0	3.0	5.0	7.0	10.0		
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

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

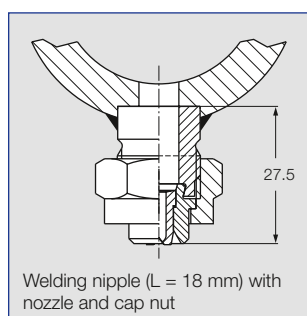
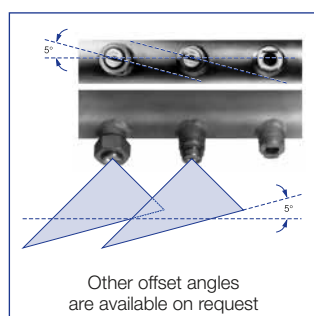
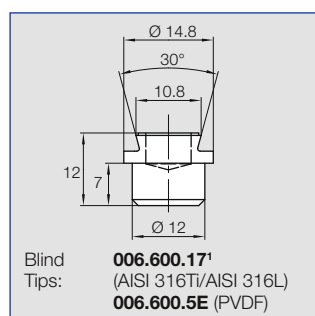
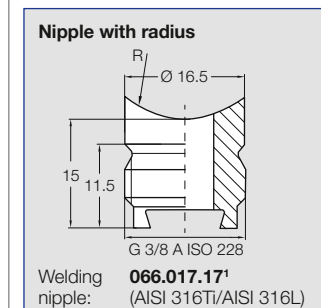
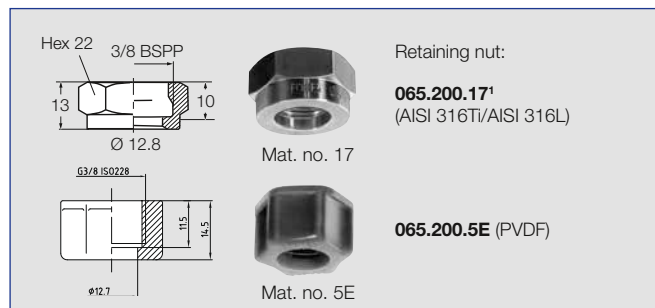
Example	Type	+	Material no.	=	Ordering no.
of ordering:	660.566	+	17	=	660.566.17



Spray header with flat fan dovetail nozzles series 660



Flat fan dovetail nozzles Accessories Series 660

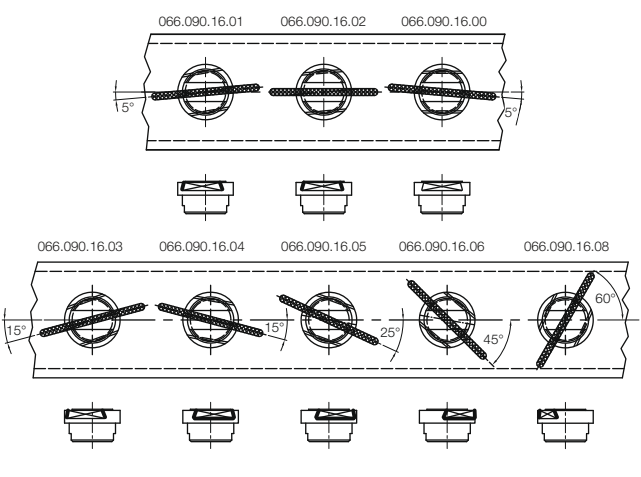


Standard radiuses for welding nipples (others on request)

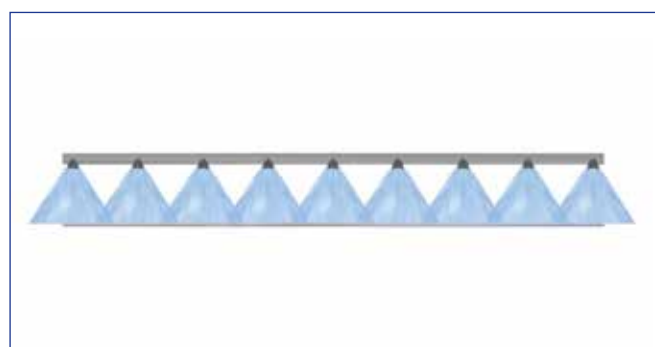
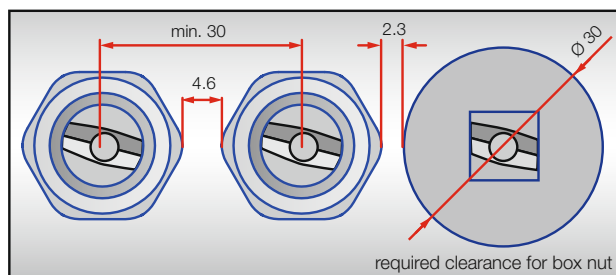
Ordering no.	Radius
066.017.17.10	10
066.017.17.13	12.5
066.017.17.16	16
066.017.17.20	20
066.017.17.25	25
066.017.17.31	31

Alignment Tips

Material AISI 303



Minimum pitch for series 660



Front view of nozzle arrangement



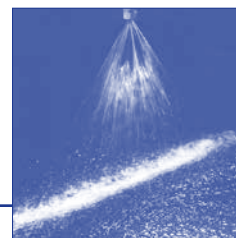
3D View of nozzle arrangement

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



Flat fan dovetail nozzles

Series 664 / 665



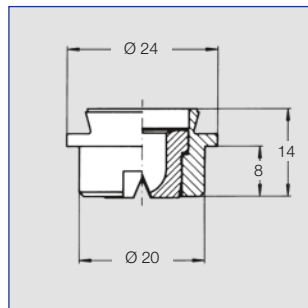
Assembly with retaining nut. Automatic jet alignment due to dovetail guide. Stable spray angle. Parabolic distribution of liquid. Spray pipes with these nozzles show an extremely uniform total liquid distribution.

Applications:

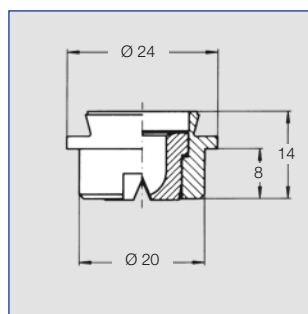
Cleaning, pickling, coating, rinsing.



Mat. no. 17



Mat. no. 5E



Spray angle 	Ordering no.				A Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray width B	
	Type	Mat. no.					p [bar]							 at p=2 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		
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

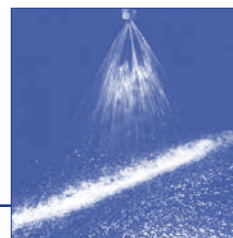
¹We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.
E = Narrowest free cross section - A = Equivalent bore diameter

Continued on next page.



Flat fan dovetail nozzles

Series 664 / 665



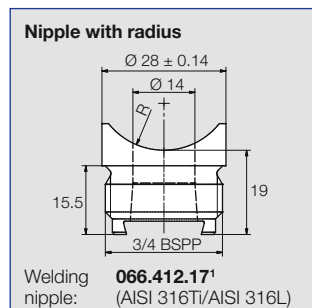
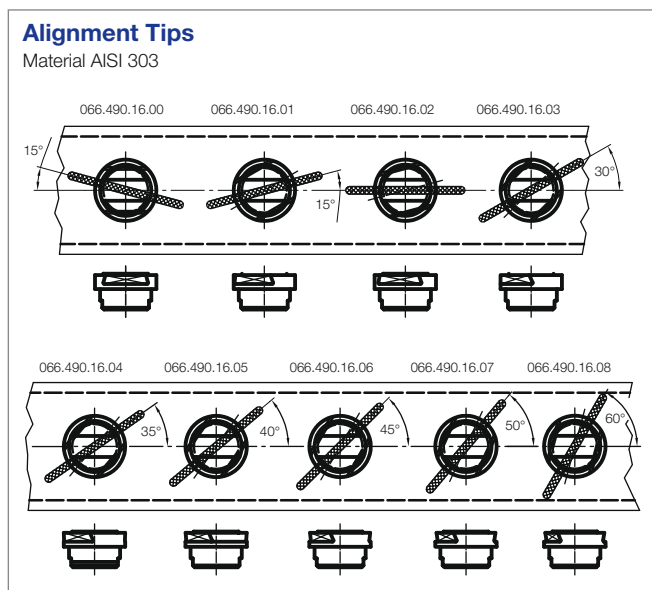
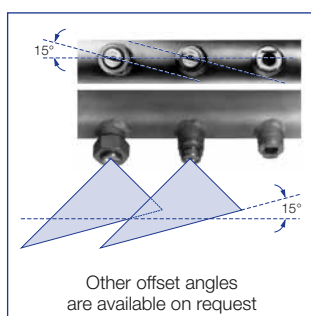
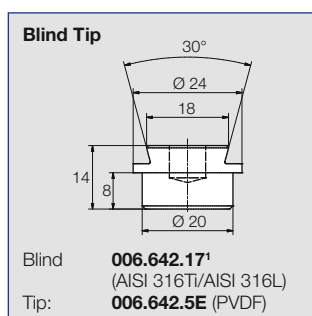
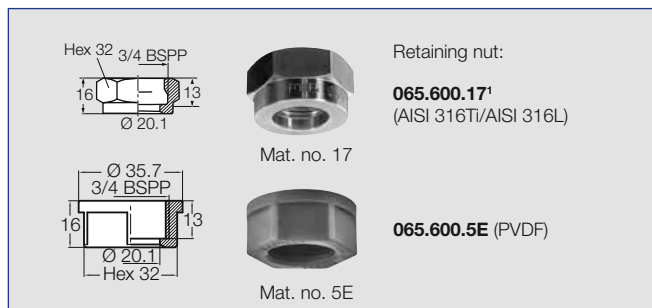
Spray angle 	Ordering no.				A Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray width B		
	Type	Mat. no.					p [bar]							 at p=2 bar H = 250 mm H = 500 mm		
		17 ¹	5E	53												
							AISI 316Ti/ AISI 316L	PVDF	PP	0.5	1.0	2.0	3.0			5.0
60°	665.004	○	○	○	6.60	4.80	15.75	22.27	31.50	38.57	49.80	58.92	70.43	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

¹We 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

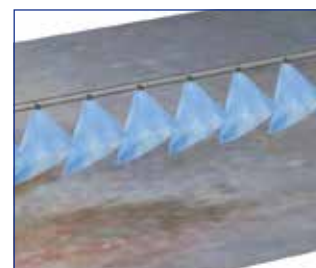
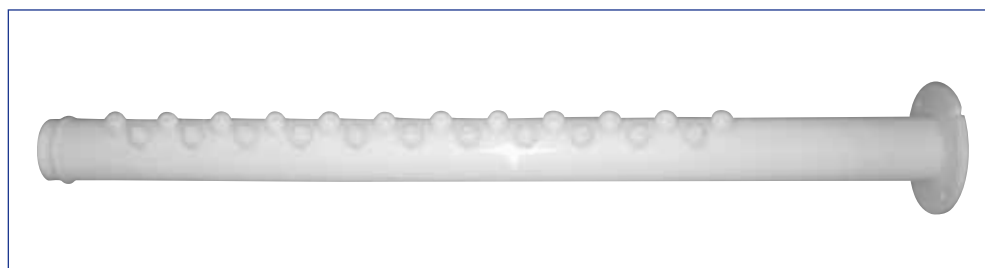
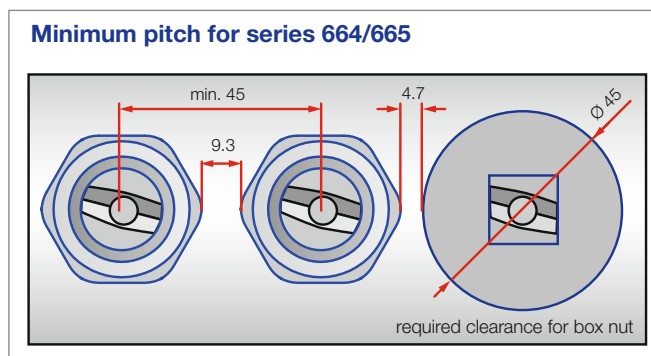
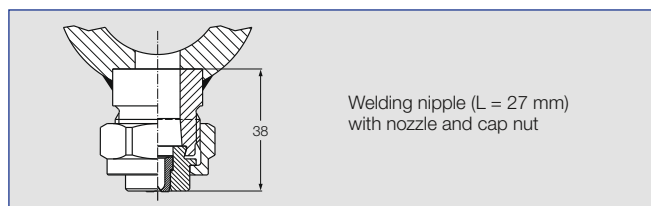


Flat fan dovetail nozzles Accessories Series 664 / 665



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



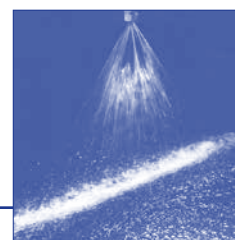
Spray header for pickling line with nozzles series 664/665

¹We 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.

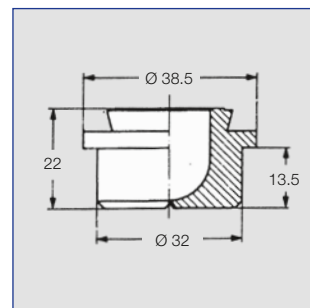
Applications:
Cleaning, pickling, coating, rinsing.



Mat. no. 17



Mat. no. 5E



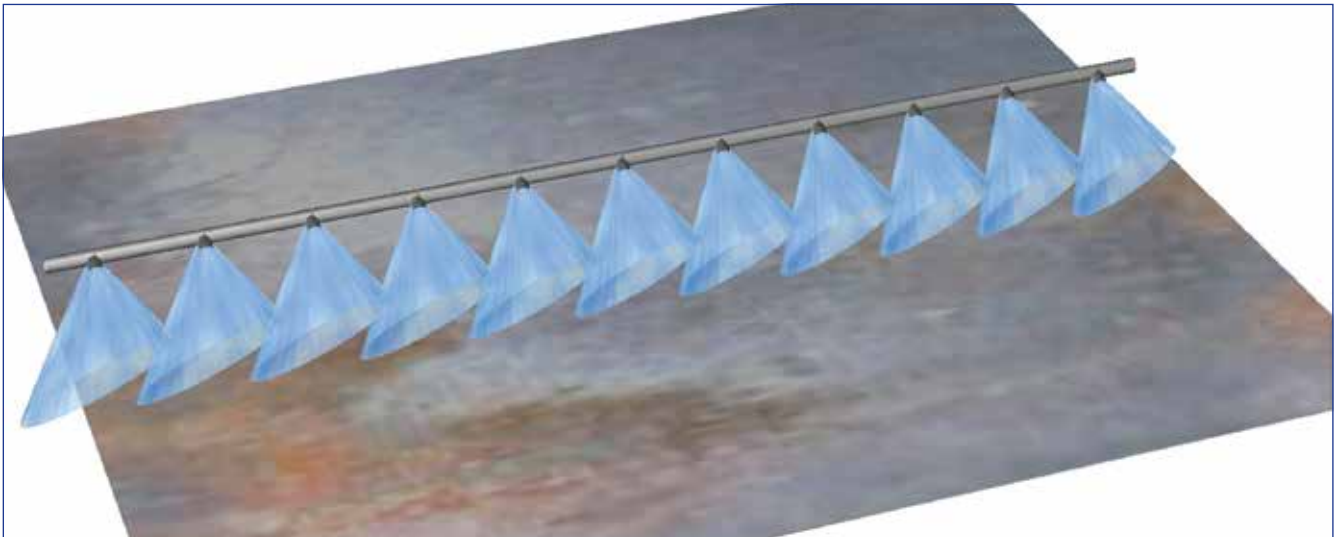
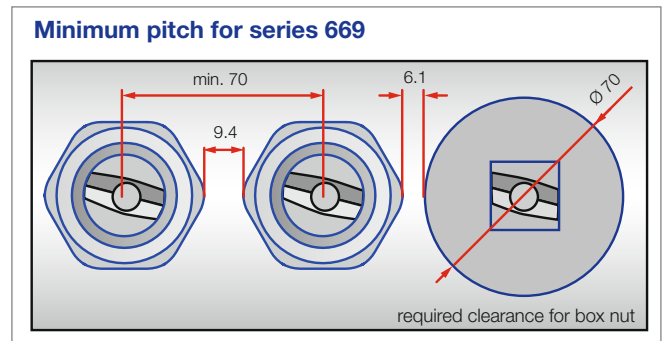
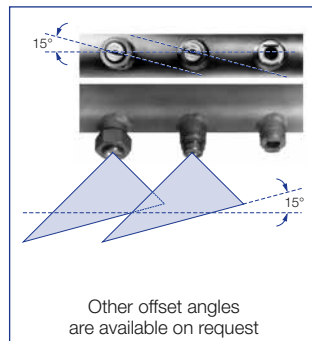
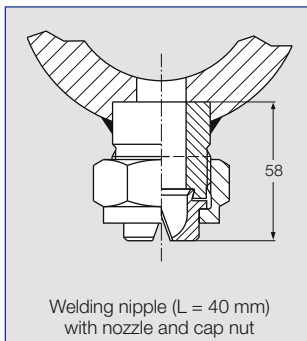
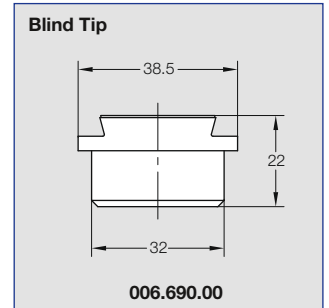
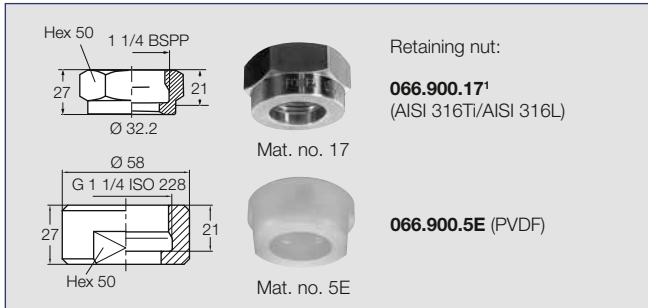
Spray angle 	Ordering no.			A Ø [mm]	E Ø [mm]	V̇ [l/min]								Spray width B  at p=2 bar	
	Type	Mat. no.				p [bar]								H = 250 mm	H = 500 mm
		17 ¹	5E												
		AISI 316Ti/ AISI 316L	PVDF			0.5	1.0	2.0	[US gal./ min] at 40 psi	3.0	5.0	7.0	10.0		
20°	669.041	○	○	8.00	6.50	20.00	28.00	40.00	12.41	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

¹We 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 **Type** **+** **Material no.** **=** **Ordering no.**
of ordering: **669.041** **+** **17** **=** **669.041.17**



Flat fan dovetail nozzles Accessories Series 669



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

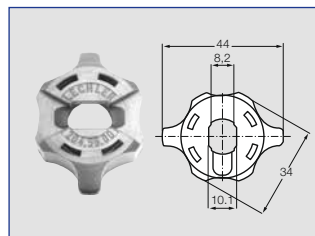


Accessories

Bayonet quick-release system

Bayonet nipple

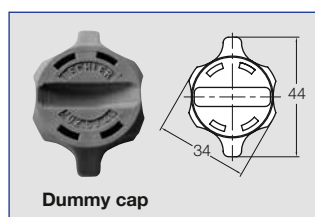
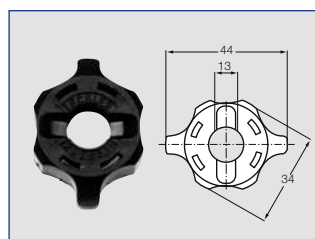
Bayonet quick-release system



For series	Ordering no.	Material	Colour
652	065.202.53.17	Polypropylene	grey
	065.202.5E.00	PVDF	blue

incl. gasket 065.242.7A
(Material: Viton, Colour: black)

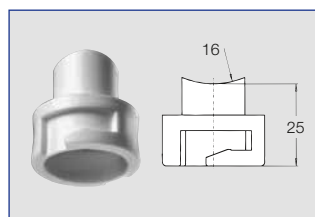
incl. gasket 065.242.7A
(Material: Viton, Colour: black)



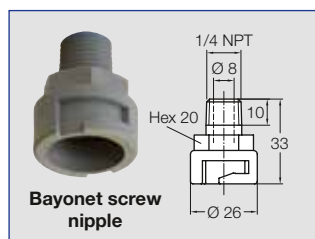
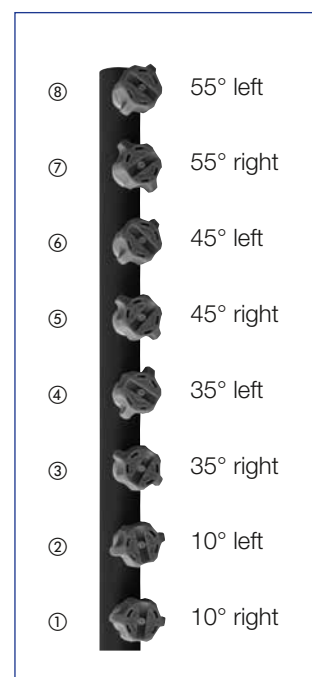
Ordering no.	Material	Colour
065.202.53.40	Polypropylene	grey

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



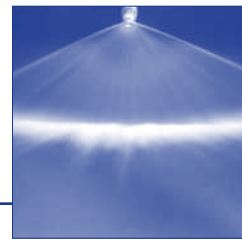
For series	Ordering no.	Material	Connection
652	090.075.53.00	PP	1/4 NPT

Nozzle mounting with different twist angles



Tongue-type nozzles

Series 686



**Wide flat fan with a sharply delimited jet pattern.
Non-clogging.**

Applications:

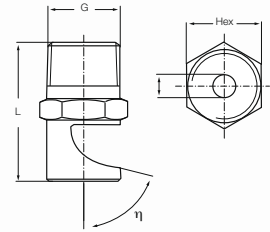
Cleaning, pickling, rinsing,
requiring powerful and
concentrated water jets.



Mat. no. 17
($\angle 140^\circ$)



Mat. no. 5E
($\angle 140^\circ$)



Schematic design
for $\angle 140^\circ$

Spray angle 	η	Ordering no.							B Ø [mm]	Ṽ [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 ASI 316Ti/ ASI 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

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

B = Bore diameter

Other types on request.

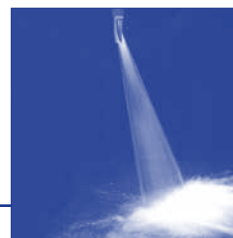
Example **Type** + **Material no.** + **Code** = **Ordering no.**
of ordering: 686.646 + 17 + CA = 686.646.17.CA

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



Tongue-type nozzles

Series 688 / 689



Hard, sharp flat fan, narrowly delimited jet pattern. Non-clogging.

Applications:

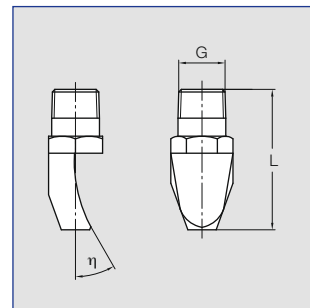
Cleaning, pickling, rinsing, cross spray, requiring powerful and concentrated water jets.



Mat. no. 17
(45°)



Mat. no. 5E
(45°)



Spray angle 	η	Ordering no.								B Ø [mm]	V [l/min]			Dimensions						Spray width B 		
		Type	Mat. no.		Code						p [bar]			L [mm]			Hex [mm]			H = 250 mm	H = 500 mm	
			17 ¹	5E	3/8 BSPT	3/8 BSPP	1/2 BSPT	1/2 BSPP	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			
			AISI 316Ti/ AISI 316L	PVDF																		
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	
	15°	689.082	○	-	-	-	90	-	AK	7.6	35.36	50.00	79.06	-	-	97,5	-	-	27	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	-	AK	6	22.27	31.50	49.81	65	-	73,5	24	-	27	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	

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

B = bore diameter

Other types on request.

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



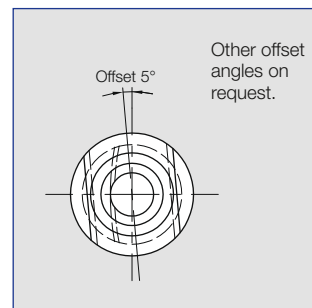
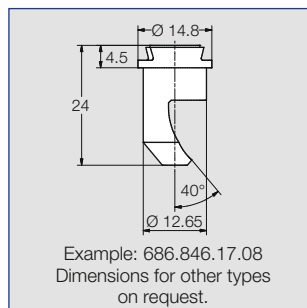
Tongue-type nozzles with dovetail

Series 686. XXX.WW.08



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

Applications:
 Pickling, rinsing.



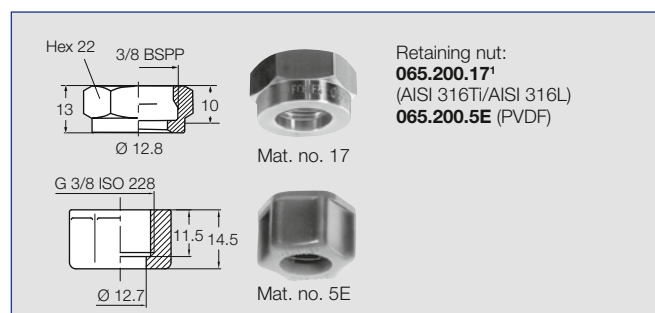
Spray angle 	η	Ordering no.		B Ø [mm]	$\dot{V}$ [l/min]			Spray width B  at p=2 bar H = 250 mm
		Type	Mat. no.		p [bar]			
			17'					
					AISI 316Ti/ AISI 316L			
					1.0	2.0	5.0	
90°	40°	686.646	○	2.2	2.83	4.00	6.32	530
		686.686	○	2.4	3.54	5.00	7.91	530
		686.726	○	2.7	4.45	6.30	9.96	530
		686.766	○	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

¹We 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 **Type** + **Material no.** + **Code** = **Ordering no.**
of ordering: 686.646 + 17 + 08 = 686.646.17.08



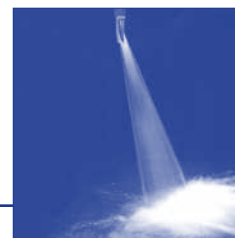
Welding nipples and cap nuts must be ordered separately. Please see folded page at the end of the catalogue for suitable accessories.

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

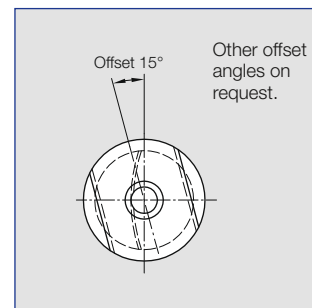
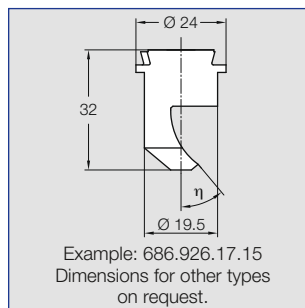


Tongue-type nozzles with dovetail

Series 686. XXX.WW.15



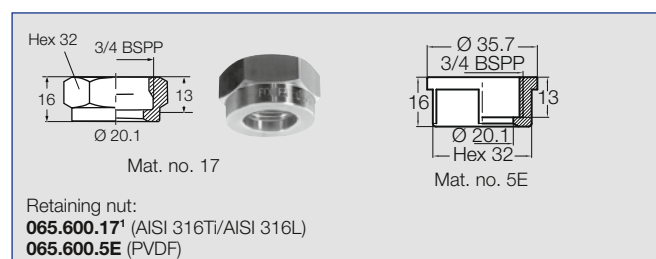
Wide, sharply defined flat fan pattern.
Non-clogging.
Automatic jet alignment due to dovetail guide.
 Applications:
 Pickling, rinsing.



Spray angle 	η	Ordering no.		B Ø [mm]	$\dot{V}$ [l/min]			Spray width B  at p=2 bar H = 250 mm
		Type	Mat. no.		p [bar]			
			17'					
					AISI 316Ti/ AISI 316L			
					1.0	2.0	5.0	
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

¹We 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 **Type** + **Material no.** + **Code** = **Ordering no.**
of ordering: 686.646 + 17 + 15 = 686.646.17.15



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

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

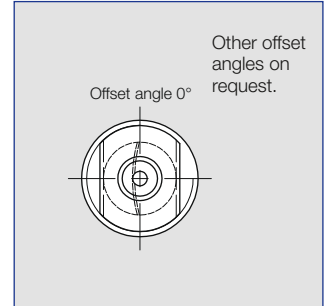
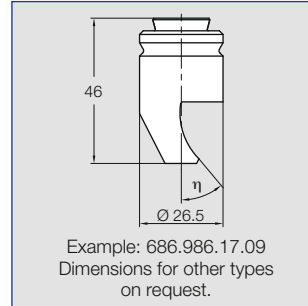


Tongue-type nozzles with dovetail and captive cap nut Series 686. XXX.WW.09



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

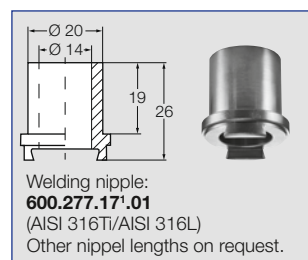
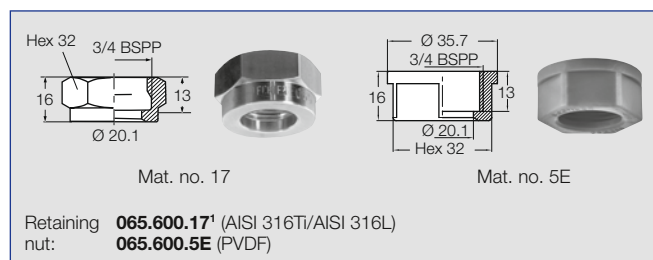
Applications:
Pickling, rinsing.



Spray angle 	η	Ordering no.		B Ø [mm]	$\dot{V}$ [l/min]			Spray width B  at p=2 bar H = 250 mm
		Type	Mat. no.		p [bar]			
			17 ¹					
			AISI 316Ti/ AISI 316L		1.0	2.0	5.0	
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

¹We 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 **Type** **+** **Material no.** **+** **Code** **=** **Ordering no.**
of ordering: 686.646 + 17 + 09 = 686.646.17.09



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

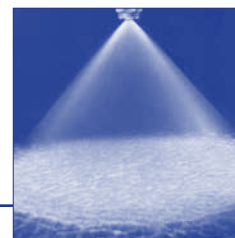
¹We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.

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



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.



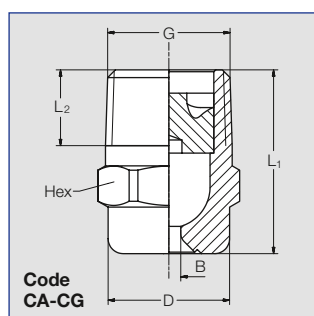
Series 490



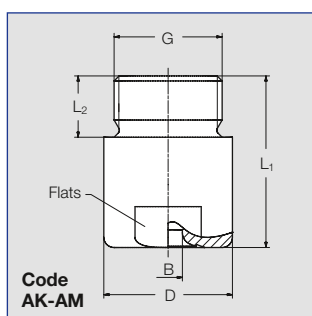
Series 491

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
CG	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]							Spray diameter D at p=2 bar 		
	Type	Mat. no.	Code								p [bar]									
		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.

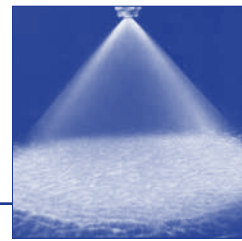


Axial-flow full cone nozzles

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. 1Y	Code								p [bar]								
			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		
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 Type + Material no. + Code = Ordering no.
for ordering: 490.406 + 1Y + CA = 490.406.1Y.CA

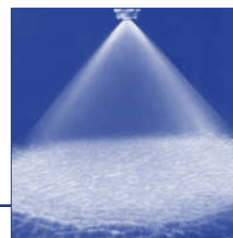
Other nozzle materials (special alloys, plastics)
are available on request.

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

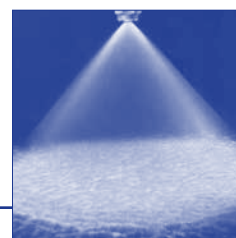


PVDF
Series 460 / 461

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

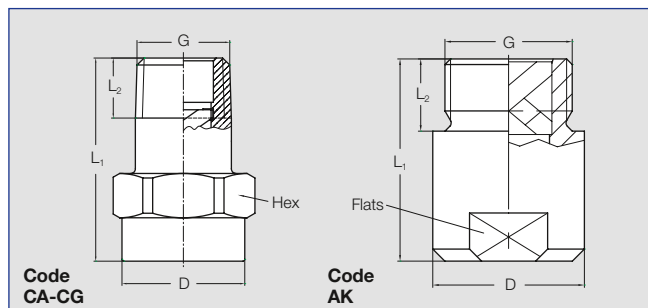


Axial-flow full cone nozzles PVDF version Series 460 / 461



**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]							Spray diameter D  at p=2 bar H = 200 mm H = 500 mm		
	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	
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 **Type** + **Material no.** + **Code** = **Ordering no.**
for ordering: 460.644 + **5E** + **CC** = **460.644.5E.CC**

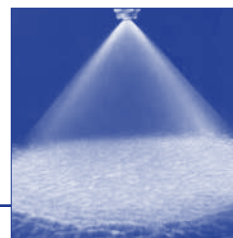
Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 \cdot \left(\frac{p_2}{p_1}\right)^{0.4}$
(≤ 10 bar)



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 	
	Type	Mat. no.	Code							p [bar]							at p = 2 bar	
		5E	1/8 BSPT	1/4 BSPT	3/8 BSPT	1/2 BSPT	3/4 BSPT										H = 200 mm	H = 500 mm
										PVDF	0.5	1.0	2.0	3.0	5.0	7.0		
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 **Type** **+ Material no.** **+ Code** **= Ordering no.**
for ordering: 460.408 **+ 5E** **+ CA** **= 460.408.5E.CA**



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.



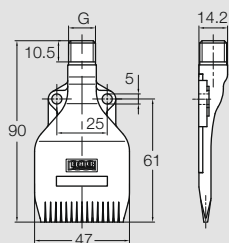
600.130.S2
(PP colourless)



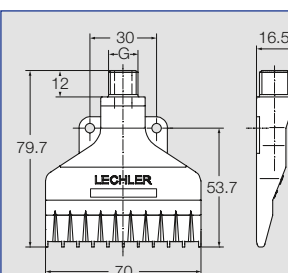
600.493.1Y
(Stainless steel AISI 316L)



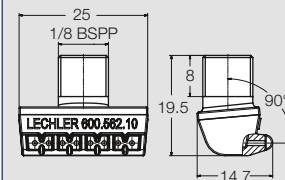
600.562.1Y.10
(Stainless steel AISI 316L)



Weight: 15 g · Tmax: 60 °C

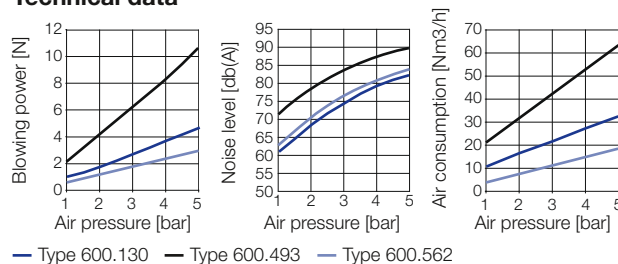


Weight: 126 g · Tmax: 550 °C



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 Type + Material no. + Code = Ordering no.
for ordering: 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:

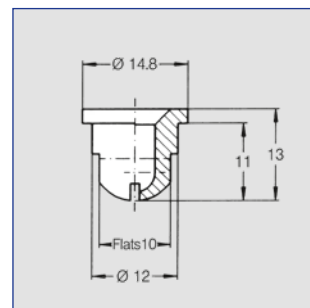
Blowing off liquids, cooling,
reheating, drying.



Mat. no. 17



Mat. no. 5E

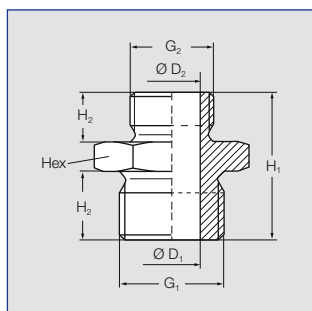


Spray angle 	Ordering no.			A Ø [mm]	$\dot{V}_n$ L = Air [m³/h]							
	Type	Mat. no.			$\dot{M}$ S = Saturated Steam [kg/h]							
		17'	5E		p [bar]							
		AISI 316Ti/ AISI 316L	PVDF		0.5		2.0		5.0		10.0	
					L	S	L	S	L	S	L	S
ca. 70°	679.085	○	○	1.3	2.00	1.60	4.00	3.10	8.00	6.10	14.70	11.10
	679.117	○	○	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

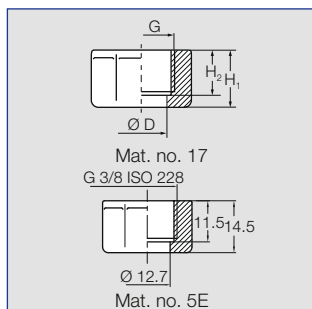
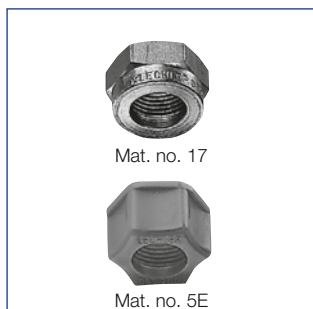
Example **Type** + **Material no.** = **Ordering no.**
of ordering: 679.085 + 17 = 679.085.17

Double nipple



Ordering no.			Dimensions [mm]								Weight	
Type	Mat. no.		17'	5E	G ₁ BSPP	G ₂ BSPP	H ₁	H ₂	D ₁	D ₂		Hex
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



Ordering no.			Dimensions [mm]					Weight					
Type	Mat. no.												
	17'	5E	G BSPP	H ₁	H ₂	D	Hex						
	AISI 316Ti/ AISI 316L	PVDF											
	065.200	○							-	3/8	13,0	10,0	12,8
065.200	-	○						3/8	14.5	11.5	12.8	22	23.75 g

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



Multi-channel round jet nozzles for air

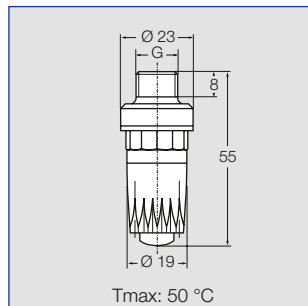
Series 600.326

Powerful air jet, producing punctiform impact patterns. Low noise level. Low air consumption.

Applications:
Targeted blowing out and blowing off with compressed air.

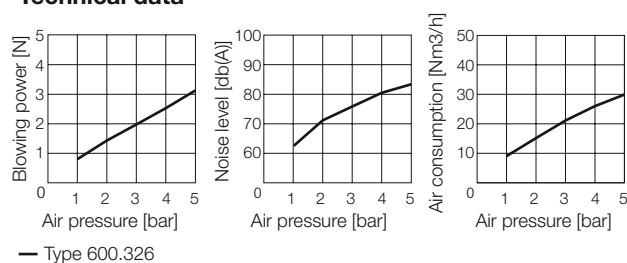


600.326.5K (ABS)



Tmax: 50 °C

Technical data



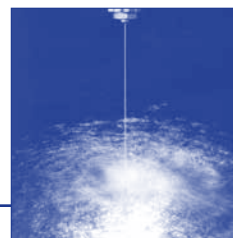
Ordering no.		Connection thread G	Weight
Type	Code		
600.326.5K (Material: ABS)	AC	1/4 BSPP	9 g
	HG	M 12 x 1.25	9 g

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



Eductor nozzles

Series 500.262 / 500.428

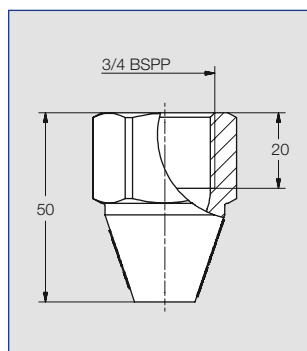
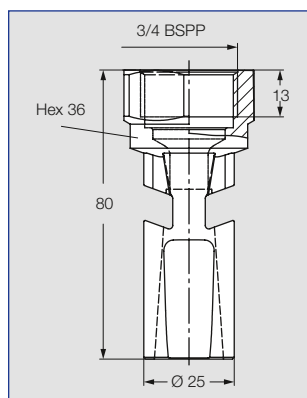
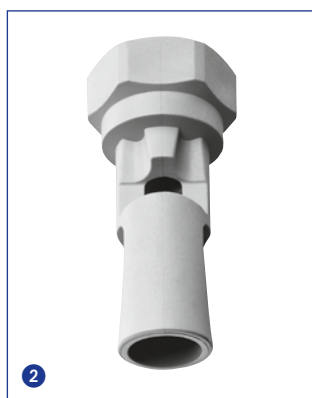
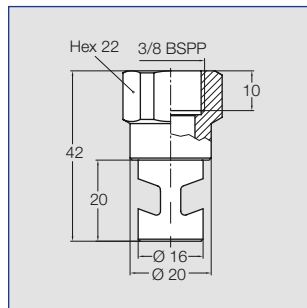


No risk of blockage thanks to the large cross sections from 2.0 to 10.0 bar.

Application:
Tank mixing, liquid circulation,
preventing sedimentation

Material:

- ① Polypropylene
- ② + ③ Polypropylene
Fibreglass reinforced



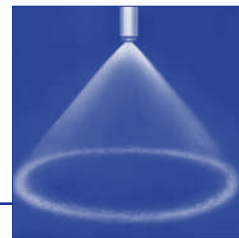
	Ordering no.	B Ø [mm]	V̇ [l/min]				
			p [bar]				
			2	4	6	8	10.0
①	500.262.53.02	2.2	4.4	6.3	7.7	8.9	9.9
	500.262.53.04	3.6	11.1	15.7	19.2	22.1	27.7
	500.262.53.06	4.5	18.3	26.0	31.8	36.7	41.0
	500.262.53.08	6.0	31.6	44.7	54.8	63.2	70.7
②	500.262.53.20	10.6	96.1	136.0	166.5	192.3	215.0
③	500.428.53.00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

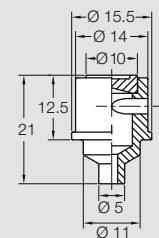
Acid regeneration.



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

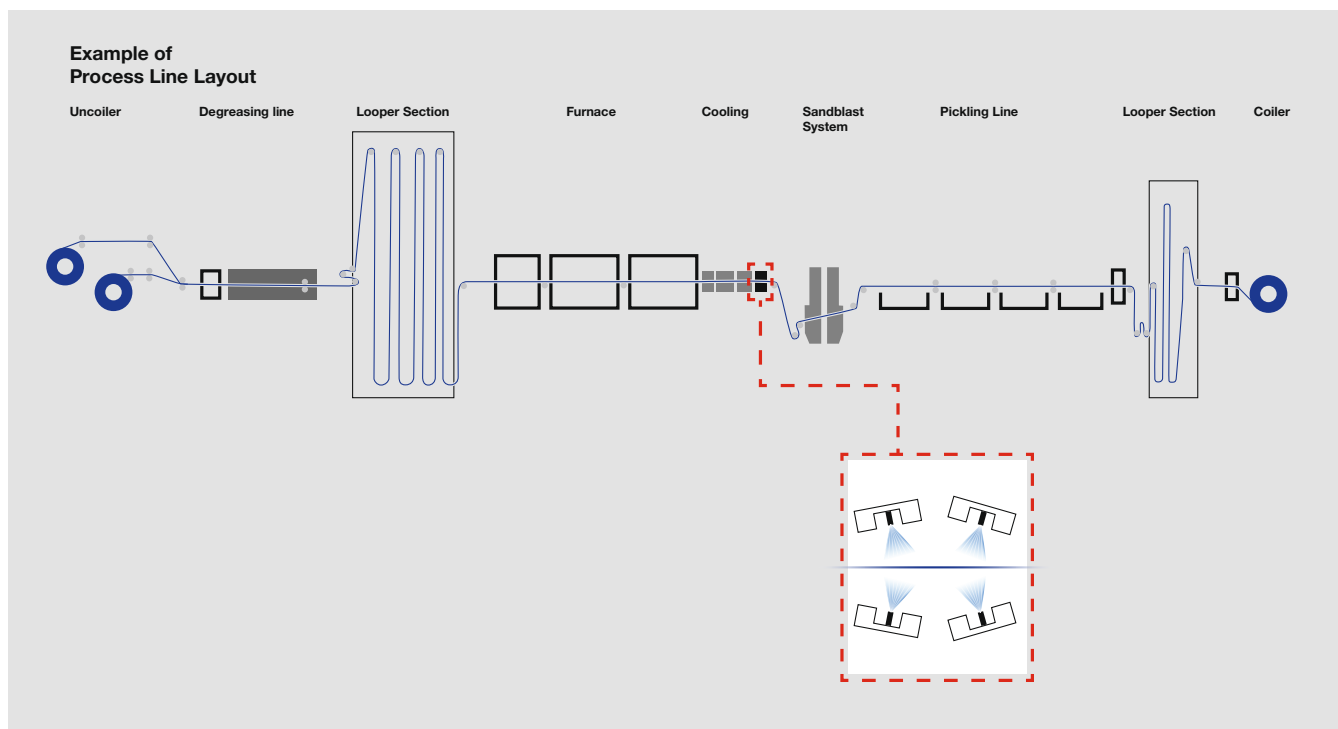
OPTIMIZED STRIP COOLING IN COLD CONTINUOUS ANNEALING AND PICKLING LINES (CAPL) WITH LECHLER AIR MIST SPRAY COOLING HEADERS

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

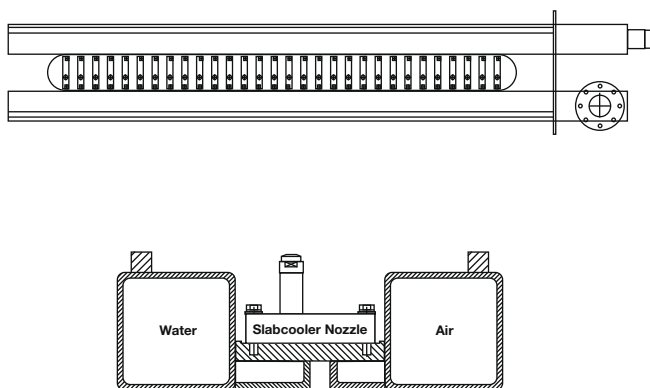
recrystallisation takes place in the furnace before the strip is cooled from top and bottom by means of air blowing, conventional water spray cooling and air-mist spray cooling. Often it is a combination of all three methods. Varying

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

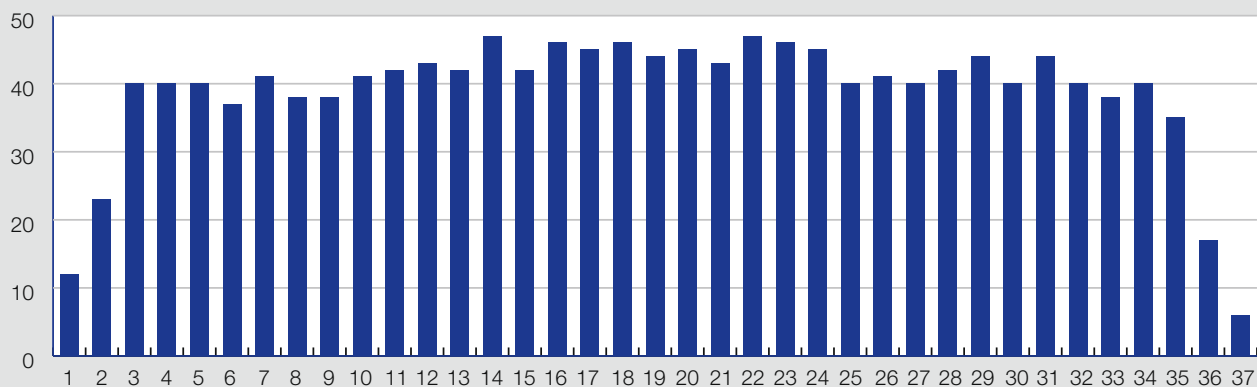


Lechler air mist Header in operation



Sprays in operation with cover plate on

Liquid Distribution with Lechler Header using Slabcooler nozzles



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

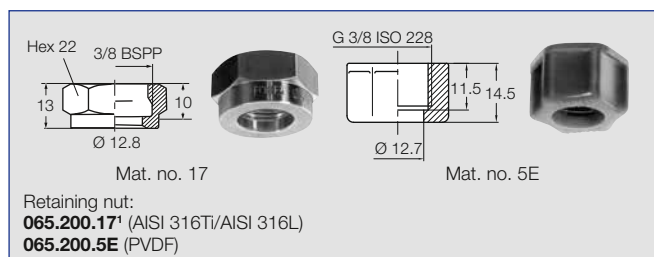
Air mist nozzles with a very wide water control range (turn down ratio)	Specify cooling rate can be set for every steel grade and line speed for greatest machine flexibility
SlabCooler air mist nozzles with reduced compressed air consumption	Reduced energy costs
SlabCooler air mist Nozzles with stable 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

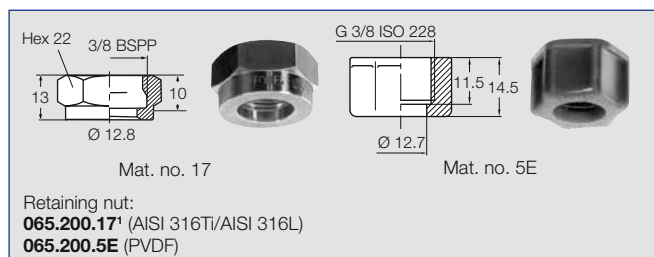
Welding Nipples and Retaining Nuts

For series 652

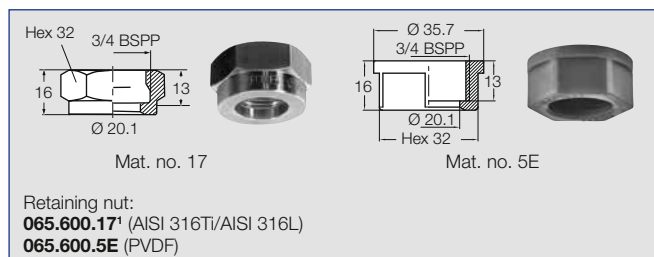


Nipples see page 43

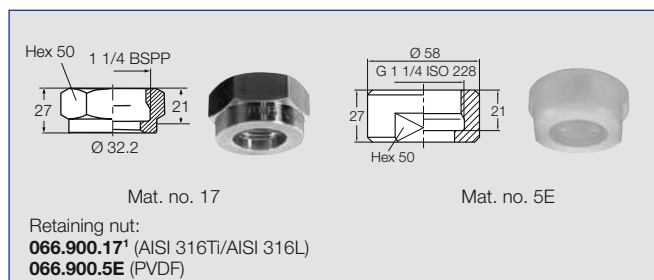
For series 660 and 686.XXX.WW.08



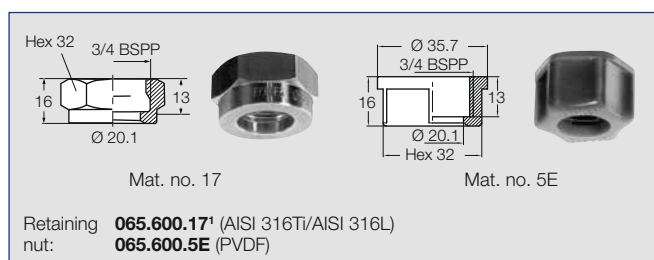
For series 664/665 and 686.XXX.WW.15



For series 669



For series 686.XXX.WW.09



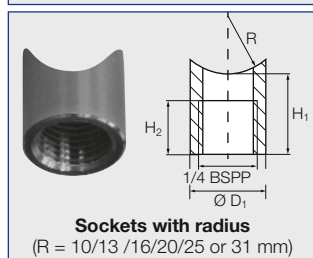
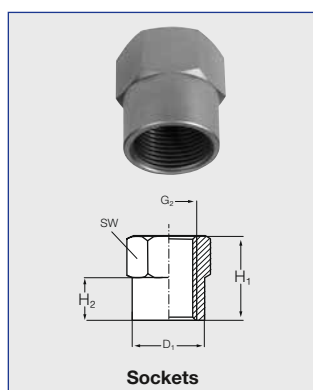
¹We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.



Accessories

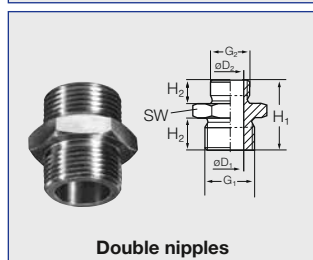
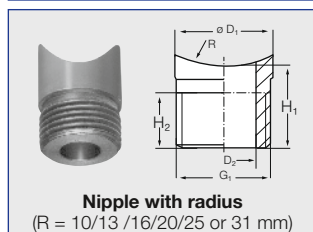
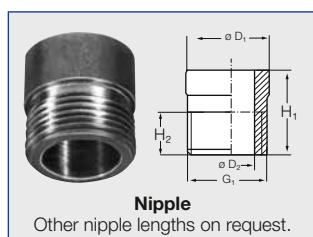
Sockets / Nipples

For nozzles with male thread



For Series	Ordering no.					Dimensions [mm]						
	Type	Material no.										
		1Y AISI 316L	17' AISI 316Ti/ AISI 316L	5E PVDF	53 Polypropy- lene	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



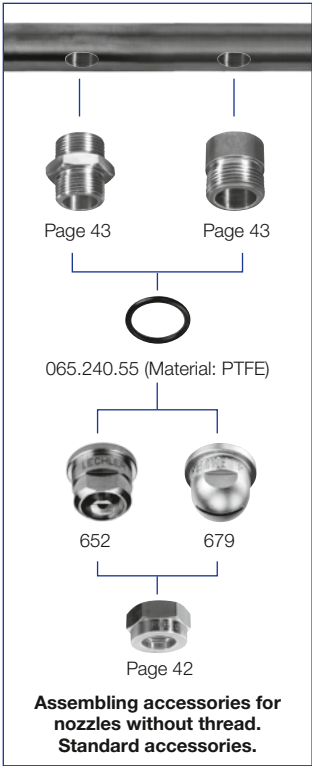
652	065.210	○	○	○	○	3/8 BSPP	-	18	10	17.2	11.5	-
652	065.217. xx.yy*	-	○	-	-	3/8 BSPP	-	18	10	17.2	11.5	-
652	065.215	-	○	○	-	3/8 BSPP	1/4 BSPP	25	10	10	7	22
	065.211	-	○	○	-	3/8 BSPP	3/8 BSPP	25	10	11.5	-	22

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

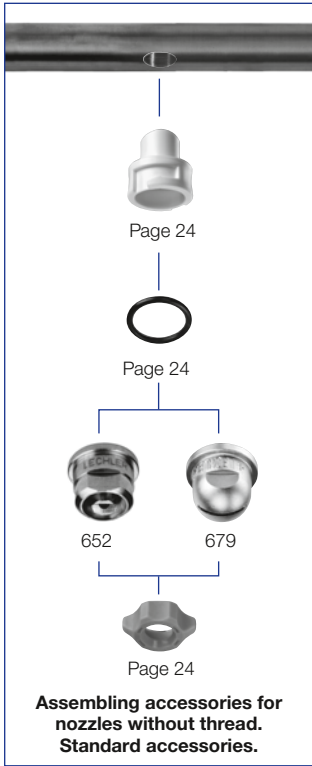
¹We reserve the right to deliver AISI 316Ti or AISI 316L under the material no. 17.

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

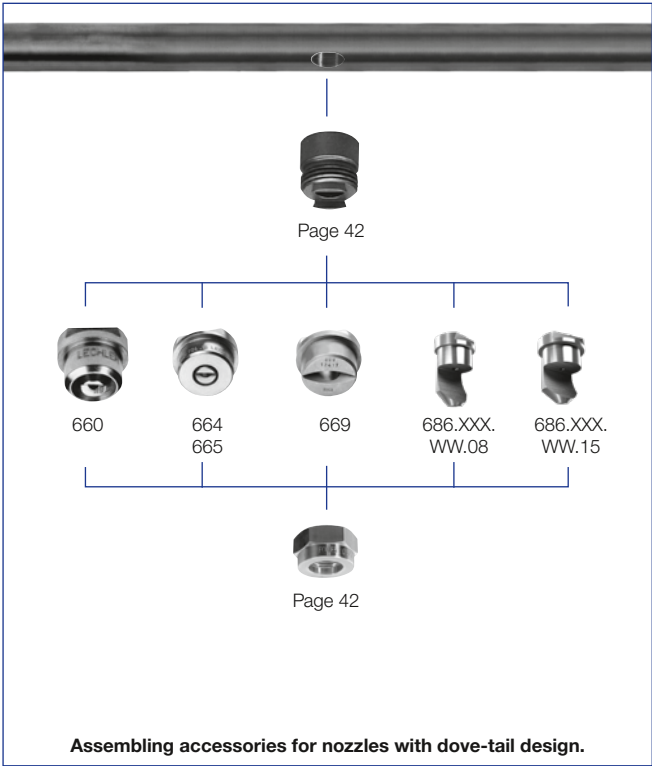
Assembling accessories for nozzles series 652 and 679



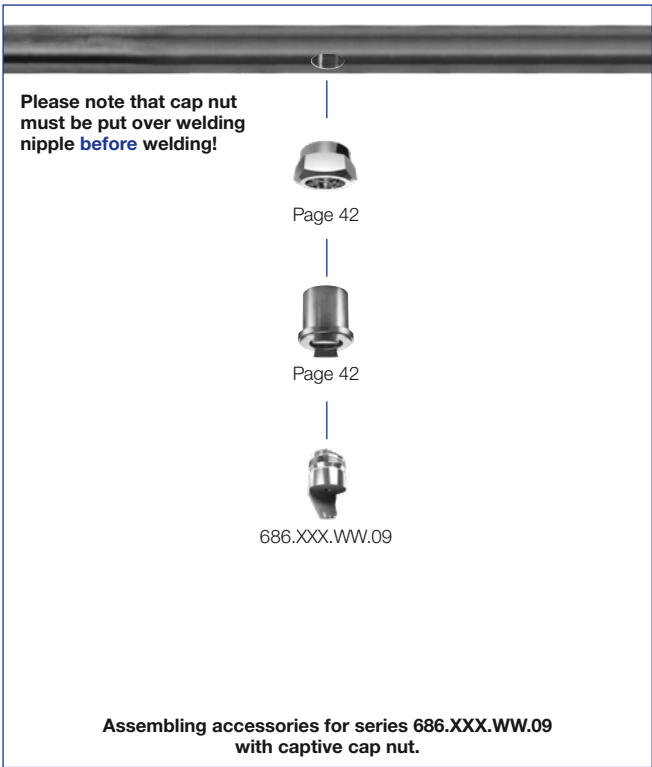
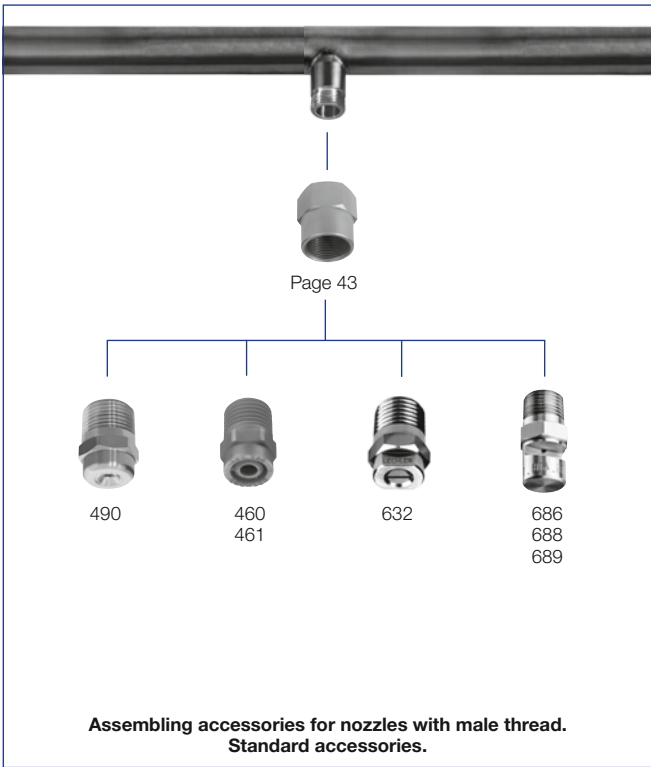
Assembling accessories for nozzles series 652 and 679 with quick-release system



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



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

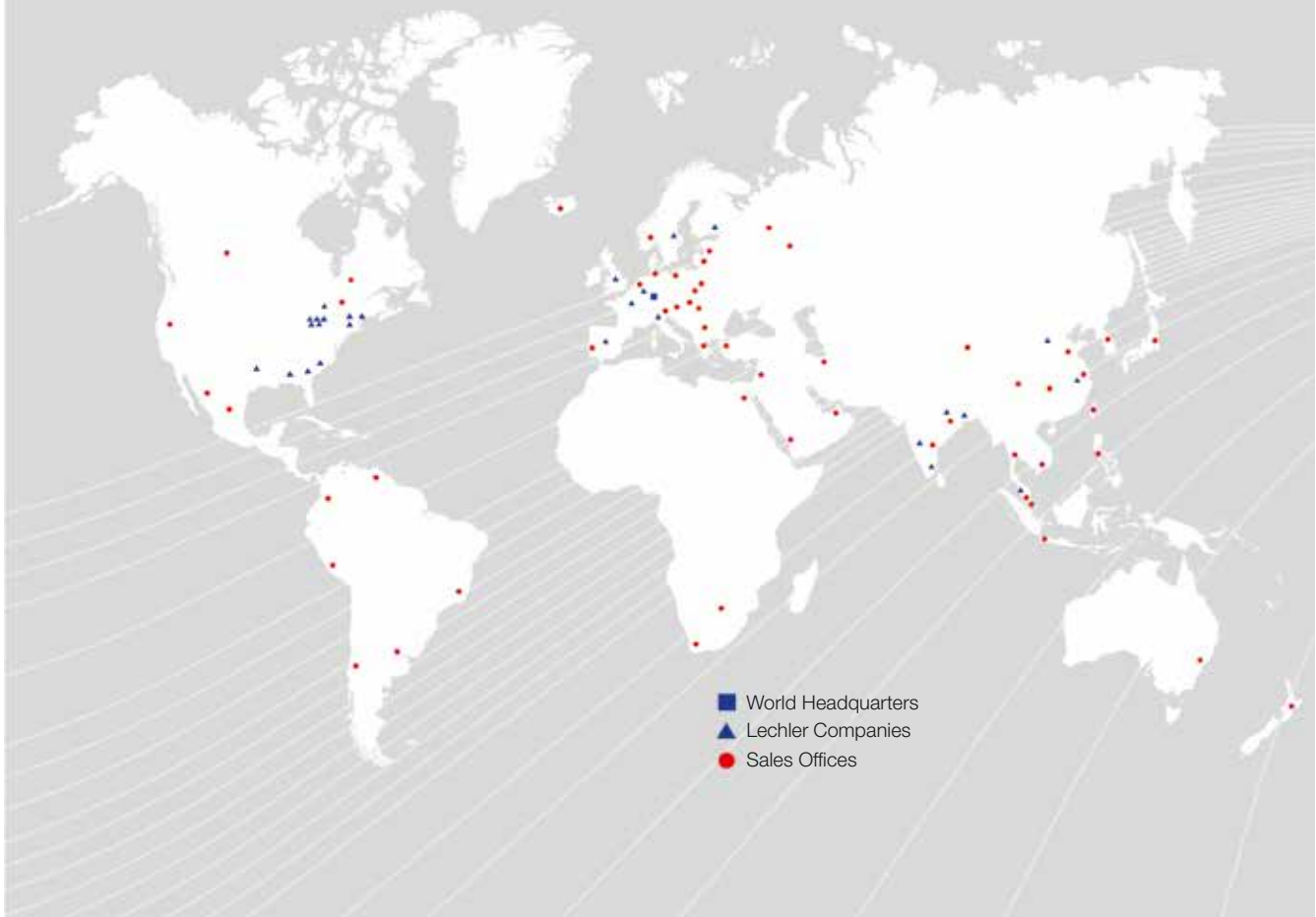


FOR YOUR NOTES

**ENGINEERING
YOUR SPRAY SOLUTION**



LECHLER WORLD-WIDE



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