



Precision Spray Nozzles for the Chemical Industry

A technical drawing of a spray nozzle in cross-section. The drawing shows the internal and external features of the nozzle. Dimensions are indicated with arrows and labels: L_1 is the total length, L_2 is the length of the upper section, B is the diameter of the upper section, D is the diameter of the lower section, CA is the length of the nozzle tip, and CG is the length of the nozzle body. The drawing is overlaid on a background of a molecular structure and a grid.

L_2

L_1

B

D

CA

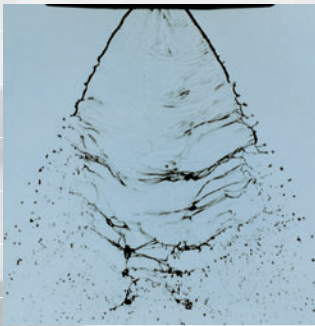
CG

A 3x3 grid of images illustrating the use of spray nozzles in various chemical and industrial settings. The images include: a multi-well plate being sprayed, an industrial refinery tower, two scientists in a lab, a collection of colorful capsules, a molecular model, test tubes with colored liquids, a laboratory setup with flasks, a pile of colorful granules, and a close-up of a nozzle spraying a liquid.

Chemical

MODERN NOZZLE TECHNOLOGY OPENS UP INTERESTING POSSIBILITIES FOR THE CHEMICAL INDUSTRY

Increasing quality demands and ever more sophisticated production processes make it necessary to exploit all



technical possibilities so that you can continue to be a successful force on the market. More and more, it is a matter of making even already automated process sequences more efficient (and thus more economical) by integrating new technologies. Nozzle and spraying technology can make positive contributions towards this in many cases.

In many applications, practical experience has shown that the best results are always achieved where nozzle technology has been optimally tailored to individual requirements. With a broad product range and reliable technical information and documentation, Lechler has created the perfect conditions for solving many tasks. Nevertheless, areas do of course still remain in which the combination of nozzle know-how and, in addition, special industry knowledge is necessary in order to achieve genuinely perfect results.

The Lechler consultant engineers know what matters in your area of work, and how to realise your ideas and goals from a technical point of view.



Here you benefit from the experience gained from many realised applications – perhaps even with similar tasks. This significantly minimises the risk to you, in addition to which you also gain genuine market advantages.

You will also find many ideas, comprehensive information and work tools on the Internet at www.lechler.com.



The chemistry's right with Lechler

In the many engineering processes in the chemical and petrochemical industry, atomization technology is one area in which precision and reproducibility play an important role.

Lechler has been a reliable partner in this area for over 130 years – not only with a wide and quickly available selection of standard nozzles, but also with the know-how and sophisticated measuring and production technology for products that are tailored exactly to your needs.

The standard

Even in the Lechler core catalogue "Precision Spray Nozzles and Accessories", you will find a wide selection of high-quality nozzles that are available quickly at a reasonable price and for the many different tasks that arise in chemical and physics technology.

Special solutions

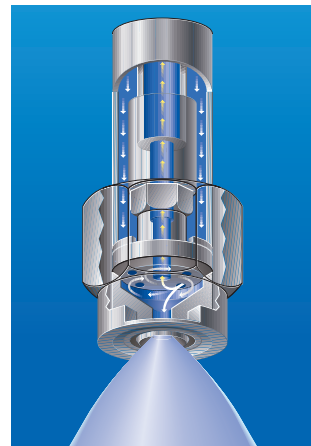
Often however, standard products are not sufficient for the large-scale industrial framework conditions that exist in special industries. That's why in addition to our standard range, you will also find in this brochure other Lechler nozzles that we manufacture only to order, e.g. for the particular needs of the chemicals and petrochemical industry. If none of these meet your requirements, we would be happy to examine the possibilities open to us for developing optimum atomization nozzles that are tailor-made to meet your needs.

Compared with the in-stock products from our standard catalogue that are manufactured in large-series production, these nozzles are inevitably somewhat more expensive. And of course the production-related delivery times are longer. Please bear this in mind.



Our competence

Lechler is a world leader in the field of nozzle and spray technology. Many renowned companies, including in the chemical industry, have taken advantage of this fact. Our application engineers are familiar with practical use from many successful applications, and are therefore competent partners in the development and realisation of exemplary solutions.



This know-how and the excellent technical possibilities that Lechler can offer in research, design and production provide you with the security that is essential in process development today. Find out for yourself in a no-obligation information discussion with us.



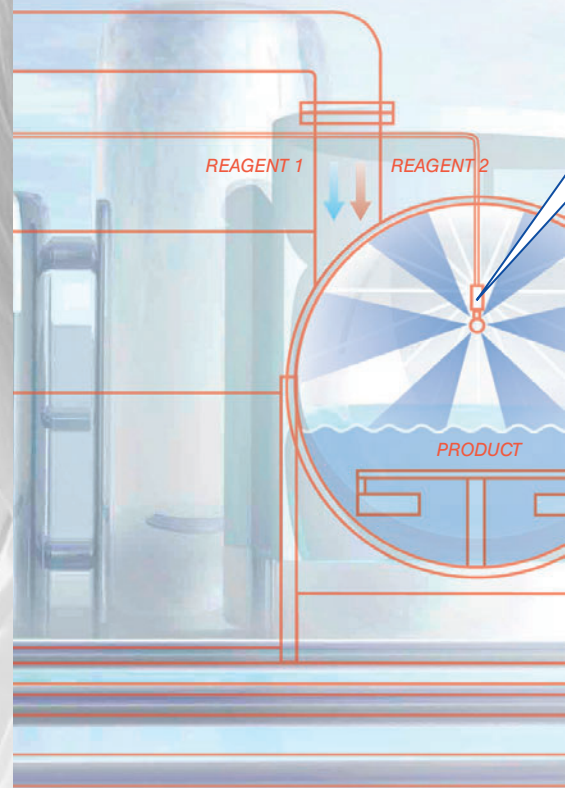
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LECHLER NOZZLES ARE USED IN MANY FIELDS IN THE CHEMICAL INDUSTRY

Applications from A to Z

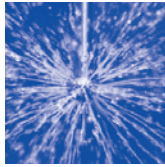
- A** Absorption, Adsorption, Adiabatic Cooling
- B** Belt Lubrication & Cooling,
- C** Cryogenics, Coating, Cleaning in Place (CIP), Conveyor Lubrication, Condensation, Cooling, Centrifuge Cleaning
- D** Decontamination, Disinfection, Dosing, Dedusting, Degassing, Denitrification, Drying, Droplet Separators
- E** Emergency Showers, Evaporation
- F** Flash Evaporation, Filter Cleaning, Fire Protection, Foam Suppression, Flue Gas Desulfurization, Fluidized Bed Technology
- G** Gas Treatment, Granulation
- H** High Pressure Cleaning, Humidification
- I** Impregnation, Injection Cooling
- J** Jet Cutting
- M** Mixing Devices
- N** NOx Removal
- O** Oven Cooling, Oversaturation
- P** Pelletizing
- Q** Quenching
- R** Rain Curtains, Reactor Cleaning, Retrofitting of Air Cooling Banks
- S** Spray Drying, Spraying filled and packed Columns, Scrubbers, Steam Quenching, Separating Agents Spray
- T** Tank Cleaning, Temperature Control
- V** Venturi Scrubbers,
- W** Water Treatment, Waste Gas Treatment
- Z** Zone Cleaning

Isn't your job in the list? Talk to us – we'd be happy to advise you!



Nozzles for container and tank cleaning

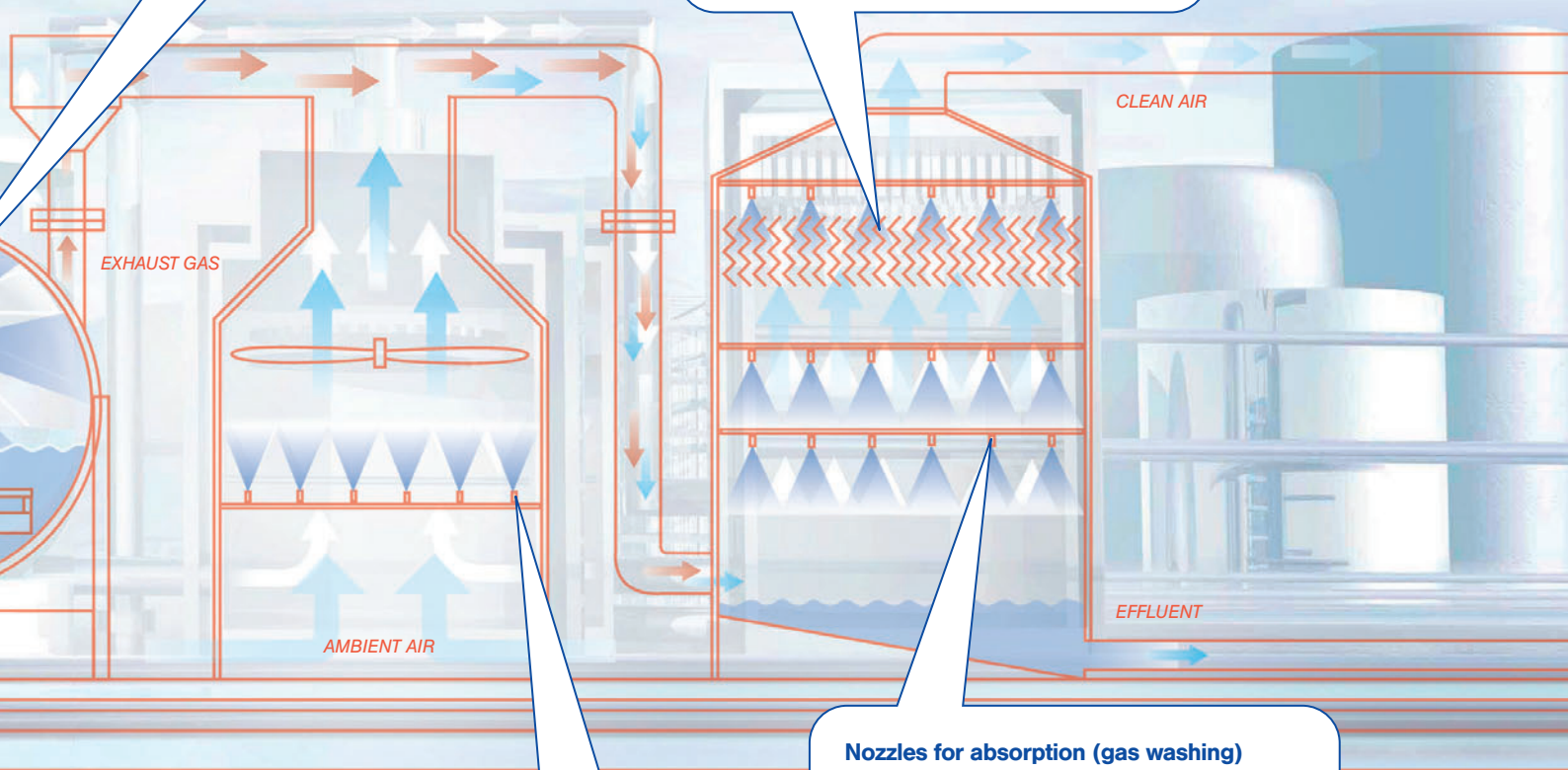
Lechler tank cleaning nozzles are used for cleaning or flushing containers and tanks, and also for the adding and dosing of reactants. These can be permanently installed (CIP) or incorporated as required. Cleaning makes the subsequent processes more efficient. The product range covers a wide variety of rotation cleaners and stationary spray balls of different sizes, connection types and materials, as well as models with ATEX approval.



Droplet separators

Droplets can be carried along in the gas flow during the upstream absorption process. Lechler droplet separators remove these droplets from the gas flow in order to prevent, for example, downstream measuring devices from being affected.

Special full cone nozzles are available for cleaning droplet separators.



Nozzles for air cooling and humidification

The thermodynamic processes of evaporation are normally aimed for in air cooling and humidification. Fine to very fine droplets are injected into the air/gas flow at a pressure of 10-20 bar.

Producing the suitable droplet size and even distribution over the intake channel are particularly important here. Lechler hollow cone nozzles have been shown to be ideally suited for this job.



Nozzles for absorption (gas washing)

If the waste gas is to undergo absorption, Lechler full cone nozzles (for example) are used. It is of great importance here to obtain the longest possible droplet dwell time and to create a large specific reaction surface. Process effectiveness can be decisively boosted by making the right nozzle selection and having an optimum nozzle arrangement.



Photo: Prantner GmbH, Reutlingen

WHAT YOU SHOULD BEAR IN MIND WHEN PLANNING

Nozzle selection criteria:

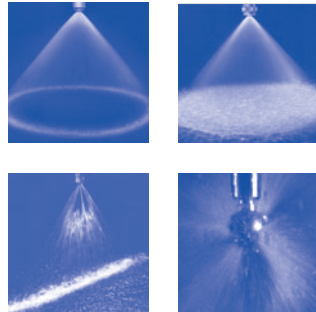
- ① Atomization methods
- ② Flow rate
- ③ Spray pattern
- ④ Spray angle
- ⑤ Viscosity
- ⑥ Narrowest cross section
- ⑦ Droplet sizes
- ⑧ Spray impact
- ⑨ Ambient conditions
- ⑩ Materials
- ⑪ Connections

The most important criteria that must be taken into account when selecting nozzles are listed below.

① Atomization methods

Single-fluid nozzles spray small to very large volumes of liquid solely via pressure. This makes them particularly suitable for spraying low-viscosity (e.g. water, alcohols) to slightly viscous (e.g. engine oil 0W30 at 27°C) liquids and, depending on the jet shape, pressure and flow rate, they produce fine to very coarse droplets. Since only one fluid flow must be handled, single-fluid nozzles are comparatively easy to install and use.

The typical pressures are between 0.5 and 30 bar. With single-fluid nozzles, higher differential pressures than 30 bar are in most cases used only for atomizing viscous product, or in cleaning systems with special high-pressure flat fan and solid stream nozzles. Twin-fluid nozzles atomize the liquid with the aid of a compressible medium, in most cases compressed air or steam.



They work in the range of very small to medium flow rates and are preferred for particularly fine misting or the atomization of high-viscosity liquids and dispersions (e.g. glycerine at 20°C or mayonnaise). A distinction is made between twin-fluid nozzles with internal mixing and those with external mixing. The combining of two different fluid flows makes the installation and operating complexity greater than is the case with comparable single-fluid nozzles.

② Flow rate

Unless otherwise stated, the flow rate information for our nozzles always refers to water. The conversion of differing liquid densities is explained in our standard catalogue.

③ Spray pattern

Depending on the version, single-fluid nozzles can spray the liquid as a hollow cone, full cone or flat fan. The solid stream nozzle does not spray, but rather produces a closed spray that hits at a concentrated point. The spray only begins to break up after some distance. Twin-fluid nozzles normally produce full cone or flat fan spray patterns, and some versions can change from one pattern to the other according to specific procedures for those models.

④ Spray angle

Twin-fluid nozzles have a narrow spray angle of approximately 20° due to the high speed at which the compressible medium exits. However, as the distance from the nozzle increases, the spray pattern becomes increasingly less sharply delimited.

Single-fluid nozzles are available with different spray angles depending on the version and job, e.g. solid stream nozzle < 0° and tank cleaning nozzle < 360°. The spray angles quoted by Lechler apply close to the nozzle and in a still atmosphere. Gravity and flow processes in the ambient atmosphere alter the spray pattern.

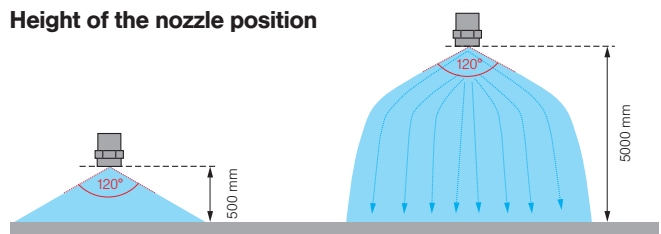
⑤ Viscosity

In the case of single-fluid, hollow cone and full cone nozzles in particular, increased viscosity of the liquid brings about a reduction in the flow rate, a change to the spray pattern (a sharper spray angle) and a coarser droplet spectrum.

Depending on the fluid properties, it is possible to counteract this to a certain extent by means of higher pressure. For very viscous substances, it is recommended to use twin-fluid nozzles in most cases. When taking into account the viscosity, it is also helpful to likewise consider the rheological flow characteristics.

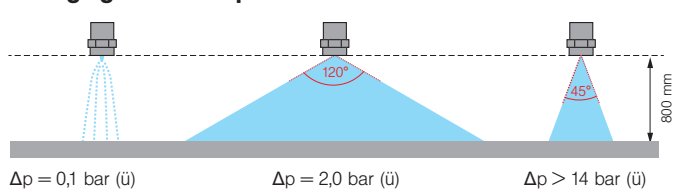
The following parameters influence the spray pattern:

Height of the nozzle position

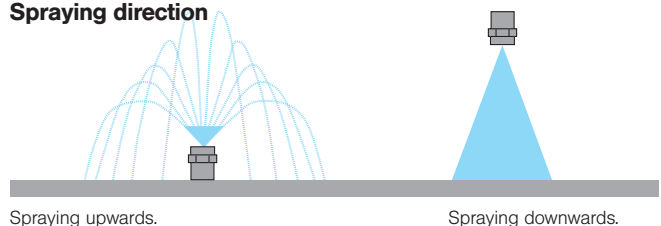


The diagram above illustrates how height influences the spray pattern.

Changing the nozzle pressure



Spraying direction



⑥ Narrowest cross section

For orientation purposes with respect to the risk of blockage, we specify a narrowest cross section ($\varnothing E$) for most of our nozzles. Experience has shown that the maximum particle size in a liquid should not exceed one-third of the narrowest cross section.

Single-fluid, hollow cone and full cone nozzles with axial flow have an internal swirler, whereas hollow cone and full cone nozzles with inflow at the side (tangential or eccentric design) do not need a swirler and are therefore much less prone to blockages. In the field of flat fan nozzles, our tongue-type nozzles represent a special design that is less susceptible to blockages.

⑦ Droplet sizes

Twin-fluid nozzles can produce very fine to extremely fine droplets, this being mainly dependent on the flow rate ratio of the compressible medium being used (m^3/h) to the atomized liquid (l/min). The greater this ratio, the finer the atomization.

In the case of single-fluid nozzles, the droplet spectrum is determined primarily by the pressure, the nozzle design and the flow rate. Increasing pressure results in finer atomization, but mostly only up to a certain level. Provided that the pressure and flow rate are the same, hollow cone nozzles produce very fine to fine droplets, full cone nozzles produce somewhat coarser droplet spectrums and flat fan nozzles have the coarsest droplet spectrum.



If we compare nozzles of one series at a particular pressure, nozzles with a lower flow rate produce finer droplet spectrums than nozzles with a higher flow rate.

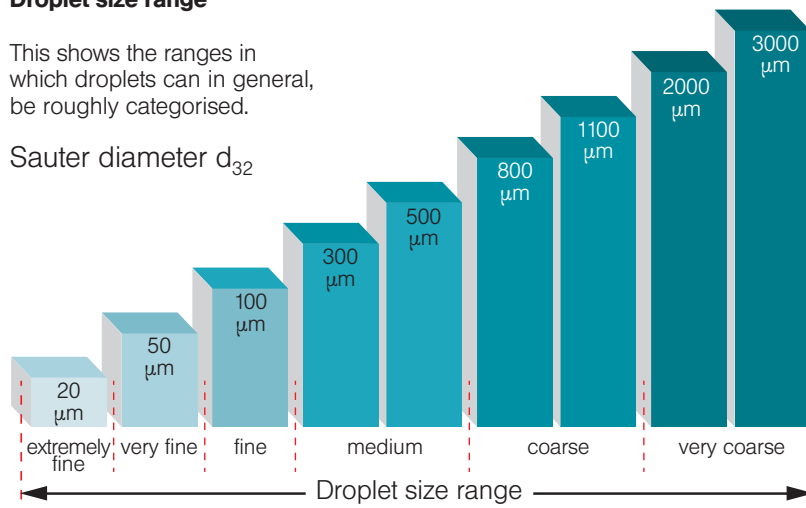
⑧ Spray impact

The conversion of the total spray force onto the surface being sprayed is referred to as the spray pressure. Fine atomization, low pressure and/or flow rate, long spraying distance and a wide spray angle result in a low spray pressure. High spray pressures are primarily obtained by means of flat fan nozzles with narrow to medium spray angles ($20^\circ-60^\circ$). Solid stream nozzles and special high-pressure, flat fan and solid stream nozzles used for short spraying distances are particularly suitable for maximum spray pressures.

Droplet size range

This shows the ranges in which droplets can in general, be roughly categorised.

Sauter diameter d_{32}



⑨ Ambient conditions

The environment being sprayed into is a decisive criterion for which spray angle, pressure, material or droplet size should be selected for the process. If the surrounding gas circulates around the nozzle, this can have a direct influence on the trajectory of the droplets and therefore on the process. Influencing factors in the environment include, for example, the ambient pressure and temperature, gas type (e.g. air or SO_2), dimensions (e.g. in the case of containers) or other parameters.

⑩ Materials

Our standard materials for metallic nozzles are brass and the stainless steels 303 SS, 316 SS/316 L. Series-produced plastic nozzles are mostly made of PA, PVDF or POM. For special mechanical, thermal or chemical loads, we supply a wide variety of special materials, for example acid-resistant or heat-resistant stainless steels, special alloys like Alloy or Hastelloy, ceramic materials or plastics such as PP, PE1000 or PTFE.

It is also necessary to select the optimum material for the seals. Viton, Teflon®, EPDM or EWP are used, depending on the job. However, sealing materials such as Inconel or Centellen are also used for special cases.

⑪ Connections








Nozzles are mainly constructed with the thread standards ISO 228, DIN 2999 (EN 10226-1) and NPT. At the same time, a distinction is made between sealing and non-sealing threads. In the case of non-sealing threads, Teflon® strip or a thread paste is used to provide the seal.

Not all nozzles can be connected with a thread. For these we supply flange solutions conforming to the standards DIN 2527, EN 1092-1 and ASME B 16.5. Aseptic clamp connections (Tri-Clamp connections) conforming to the standard DIN 11864-3 are also possible. Whether a connection other than the standard connection is feasible for a nozzle must be decided on an individual case basis.

THE RIGHT NOZZLE FOR EVERY JOB – AN OVERVIEW OF THE MOST IMPORTANT SELECTION CRITERIA

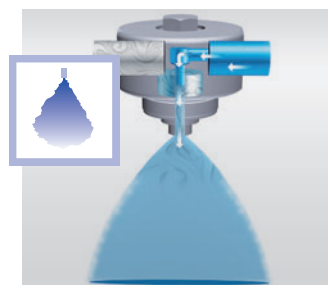
The adjacent table gives you an overview of the most important criteria that are crucial to selecting the nozzles suitable for your particular application.

More detailed technical information and ordering instructions for the respective nozzle series can be found on the quoted pages in this brochure and/or in supplementary information documents on pages 22 and 23.

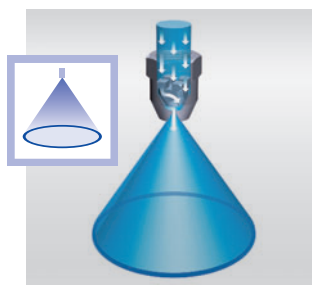
Optimum nozzle selection criteria		Twin-fluid nozzles		Axial-flow hollow cone nozzles			Eccentric hollow cone nozzles	
								
		Series	150	76X 77X	212	214 216 218	302	304 306 307
More detailed information on page		10	23	22	11	22	22	12
Flow rate	very low	0 - 0.1 l/min		●	●			
	low	0.1 - 1.66 l/min	●	●	●	●		
	medium	1.66 - 83.33 l/min	●	●		●	●	●
	high	83.33 - 1250 l/min				●		●
	very high	> 1250 l/min						●
Droplet size	extremely fine	≈ 20 μm	●	●				
	very fine	≈ 50 μm	●	●	●	●		
	fine	≈ 100 μm	●	●	●	●	●	
	medium	≈ 300 - 500 μm	●			●	●	●
	coarse	≈ 800 - 1100 μm						●
	very coarse	≈ 2000 - 3000 μm						
Spray angle	small	< 45°	●	●				
	medium	45 - 80°			●	●	●	●
	large	80 - 120°				●	●	●
	very large	> 120°					●	●
Operating pressure	low	0 - 11 bar(a)	●	●	●	●	●	●
	high	11 - 101 bar(a)			●	●	●	●
	extremely high	101 - 2001 bar(a)						
Viscosity	small	< 20 mPa·s	●	●	●	●	●	●
	medium	80 - 500 mPa·s	●	●		●	●	●
	high	> 500 mPa·s		●				
Narrowest cross section	small	< 2 mm	●	●	●	●		
	medium	2 - 8 mm	●	●		●	●	
	large	> 8 mm					●	●

A wide range of nozzles with different jet shapes is available to you.

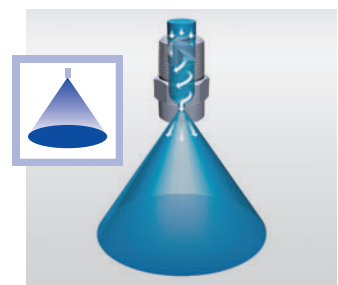
Twin-fluid nozzles



Hollow cone nozzles



Full cone nozzles

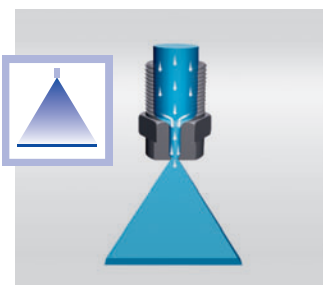


Single-fluid nozzles

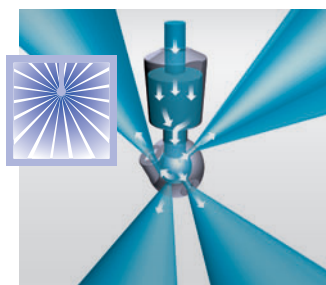
Axial-flow full cone nozzles							Tangential-flow full cone nozzles	Flat fan nozzles			Tank cleaning nozzles		Vario Spray II
460 461	490 491	403	405	421	502 503	524 525	422 423	686 687	632 633	616 617	577 579	599	634
22	13	15	22	16	18	19	23	23	23	23	20	21	23
•	•				•		•	•	•				•
•	•		•		•	•	•	•	•	•		•	
•		•	•	•	•	•	•	•	•	•	•	•	
		•		•							•	•	
•	•				•		•	•	•	•			•
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• = optimum operating range

Flat fan nozzles



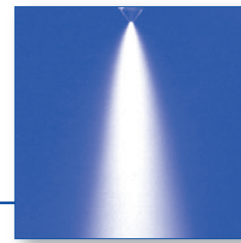
Tank cleaning nozzles





Twin-fluid nozzles

Series 150



Fine liquid atomization by means of air or vapour.

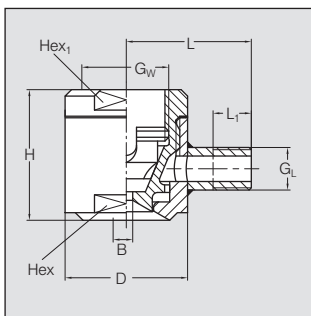
Chemical process engineering, cooling processes, atomizing viscous liquids. Liquid and air/vapour are added under pressure. The air pressure must always be above the liquid pressure. Higher air pressure and a greater volume of air result in finer atomization at lower liquid pressure.



Spray angle	Ordering no.		B Ø [mm]	E Ø [mm]	\dot{V} [l/min]						\dot{V}_n [m³/h] Air			
	Type	Mat. no.			p [bar]						Air pressure			
					p [bar]						p [bar]			
	17	316 SS			0.3	0.5	0.7	1.0	1.5	2.0	1.0	2.0	3.0	4.0
20-30°	150.005	○	1.0	1.0	0.15	0.20	0.24	0.28	0.35	0.40	10	15	20	25
	150.007	○	2.0	2.0	0.39	0.50	0.59	0.71	0.87	1.00	10	15	20	25
	150.009	○	4.0	2.0	0.97	1.25	1.48	1.77	2.17	2.50	10	15	20	25
	150.010	○	3.5	2.0	1.55	2.00	2.37	2.83	3.46	4.00	10	15	20	25
	150.013	○	6.0	2.0	3.10	4.00	4.73	5.66	6.93	8.00	10	15	20	25
	150.032	○	8.0	2.7	3.10	4.00	4.73	5.66	6.93	8.00	31	47	63	80
	150.050	○	9.0	4.9	6.20	8.00	9.47	11.31	13.86	16.00	60	90	120	150
	150.052	○	9.0	4.9	12.20	15.75	18.64	22.27	27.28	31.50	60	90	120	150
150.063	○	15.0	4.9	24.40	31.50	37.27	44.55	54.56	63.00	100	150	200	250	

B = bore diameter · E = narrowest free cross section

Example	Type	+	Material no.	=	Ordering no.
for ordering:	150.005	+	17	=	150.005.17

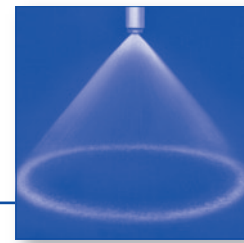


Type	G _w BSPP	G _L BSPP	H [mm]	D [mm]	L [mm]	L ₁ [mm]	Hex [mm]	Hex ₁ [mm]	Weight 316 SS
150.005.17 -150.013.17	3/8"	1/4"	38.0	28.0	32.5	10.0	24.0	24.0	140 g
150.032.17	1"	3/8"	52.0	48.0	49.0	15.0	41.0	41.0	500 g
150.050.17 -150.063.17	1 1/4"	1/2"	75.0	65.0	58.0	15.0	55.0	55.0	1350 g



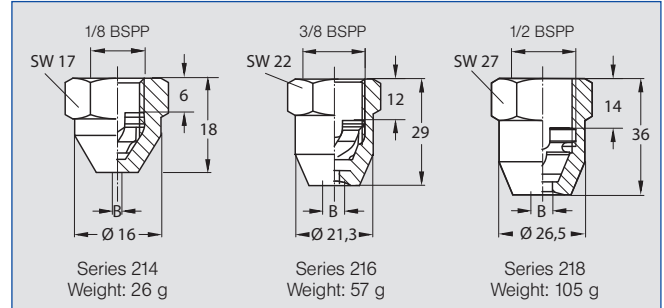
Axial-flow hollow cone nozzles

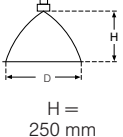
Series 214 / 216 / 218



Fine, uniform hollow cone spray.

Applications:
Cooling and cleaning of air and gas, dust control, spraying onto filters, spray drying, desuperheating.



Spray angle	Ordering no.		G	B Ø [mm]	E Ø [mm]	V̇ [l/min]							Spray diameter D at p = 3 bar  H = 250 mm	
	Type	Mat. no.				p [bar]								
						0.5	1.0	2.0	3.0	5.0	10.0	20.0		
60°	214. 184	17	1/8"	0.50	0.50	-	-	0.08	0.10	0.3	0.18	0.25	200	
		316 SS				-	-	0.16	0.20	0.25	0.36	0.51	450	
						-	0.23	0.32	0.39	0.51	0.72	1.01	450	
60°	216. 324 216. 364 216. 404	17	3/8"	1.00	1.00	-	0.28	0.40	0.49	0.63	0.89	1.26	200	
		316 SS				-	0.45	0.63	0.77	1.00	1.41	1.99	200	
						-	0.71	1.00	1.22	1.58	2.24	3.16	200	
90°	216. 496 216. 566 216. 646 216. 686 216. 726 216. 776 218. 646 218. 706 218. 766 218. 826 218. 846 218. 886	17	3/8"	3.00	2.00	-	1.20	1.70	2.08	2.69	3.80	5.38	500	
		316 SS				-	1.77	2.50	3.06	3.95	5.59	7.91	500	
						2.00	2.83	4.00	4.90	6.32	8.94	12.65	500	
			17	3/8"	4.00	2.00	2.50	3.54	5.00	6.12	7.91	11.18	15.81	500
		316 SS	3.15				4.45	6.30	7.72	9.96	14.09	19.92	500	
			4.30				6.00	8.50	10.40	13.40	19.00	26.90	500	
			17	1/2"	5.00	2.00	2.00	2.83	4.00	4.90	6.32	8.94	12.65	500
		316 SS	2.80				3.96	5.60	6.86	8.85	12.52	17.71	500	
			4.00				5.66	8.00	9.80	12.65	17.89	25.30	500	
			17	1/2"	6.50	2.00	5.60	7.92	11.20	13.72	17.71	25.04	35.42	500
316 SS	6.25	8.84	12.50				15.31	19.76	27.95	39.53	500			
	8.00	11.31	16.00				19.60	25.30	35.78	50.60	500			

B = bore diameter · E = narrowest free cross section

Example for ordering:	Type 214. 184	+	Material no. 17	=	Ordering no. 214. 184. 17
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Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 \cdot \sqrt{\frac{p_2}{p_1}}$

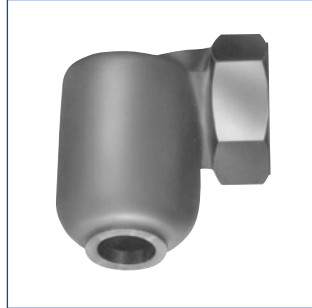


Eccentric hollow cone nozzles

Series 373 „Ramp Bottom“



Fine, uniform hollow cone spray, also at low pressures.
Applications:
cooling and cleaning of gas,
water re-cooling, dust control,
chemical process engineering.



Sectional view of a series 373
»Ramp Bottom« nozzle

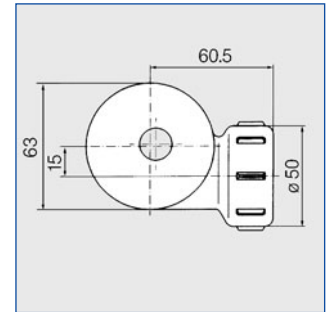
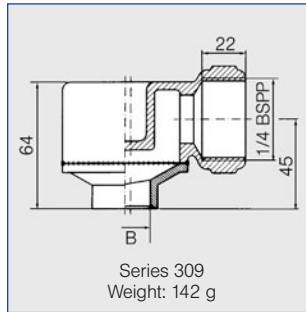
»Ramp Bottom« design offering a longer service life, due to the patented »sloping« bottom of mixing chamber.

Series 373 „Ramp Bottom“

Dimensions

BSPP	L [mm]	D [mm]	H [mm]	E [mm]	Hex	Weight 316 SS [g]
1"	67	45	52	6.3	41	285
1 1/4"	77	51	65	7.9	48	570
1 1/2"	97	65	81	7.9	58	900
2"	108	71	94	12.7	67	1250
2 1/2"	134	92	114	20.6	80	2050

Less expensive plastic version, with low requirements on temperature and scuff resistance.



Spray angle	Ordering no.						B Ø [mm]	\dot{V} [l/min]						Spray diameter D at p = 2 bar		
	Type	Mat. no.	Code					p [bar]								
			17	316 SS	1" BSPP	1 1/4" BSPP		1 1/2" BSPP	2" BSPP	2 1/2" BSPP	0.3	0.5	1.0			2.0
70°	373. 115	○	AN	-	-	-	11.40	24.40	31.50	44.50	63.00	99.60	141.00	650	1300	
80°	373. 175	○	AN	-	-	-	12.90	31.00	40.00	56.60	80.00	126.00	179.00	800	1550	
	373. 235	○	-	AQ	-	-	16.20	45.70	59.00	83.40	118.00	187.00	264.00	700	1350	
	373. 285	○	-	AQ	-	-	20.50	62.00	80.00	113.00	160.00	253.00	358.00	800	1550	
	373. 325	○	-	-	AS	-	22.20	77.50	100.00	141.00	200.00	316.00	447.00	800	1550	
	373. 365	○	-	-	AS	-	23.60	67.90	114.00	161.00	227.00	359.00	508.00	700	1400	
	373. 415	○	-	-	-	AW	25.60	131.00	169.00	238.00	337.00	533.00	754.00	700	1400	
	373. 465	○	-	-	-	AW	30.70	182.00	235.00	332.00	469.00	742.00	1049.00	965	1800	
	373. 505	○	-	-	-	-	AZ	32.50	209.00	270.00	382.00	540.00	854.00	1207.00	800	1500
	373. 515	○	-	-	-	-	AZ	34.80	233.00	301.00	425.00	601.00	950.00	1344.00	900	1700
373. 555	○	-	-	-	-	AZ	41.10	290.00	375.00	530.00	750.00	1186.00	1677.00	900	1700	

Plastic version:

90°	309. 236. 5E	(Material PVDF)	20.00	45.70	59.00	83.40	118.00	187.00	264.00	850	1500
	309. 286. 5E	(Material PVDF)	24.00	62.00	80.00	113.00	160.00	253.00	358.00	750	1400

B = bore diameter

Example for ordering: Type + Material no. + Code = Ordering no.
373. 115 + 17 + AN = 373. 115. 17. AN





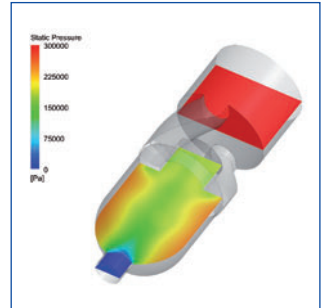
Axial-flow full cone nozzles

Series 490

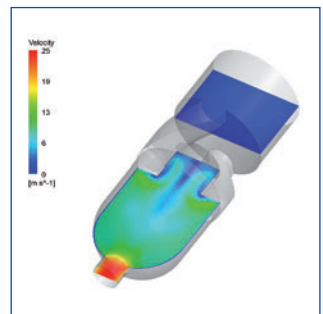


Series 490 represents a new generation within the axial-flow full cone nozzles product group. These nozzles were developed using state-of-the-art design and simulation methods (CFD) and in practical operation they impress with the following advantages:

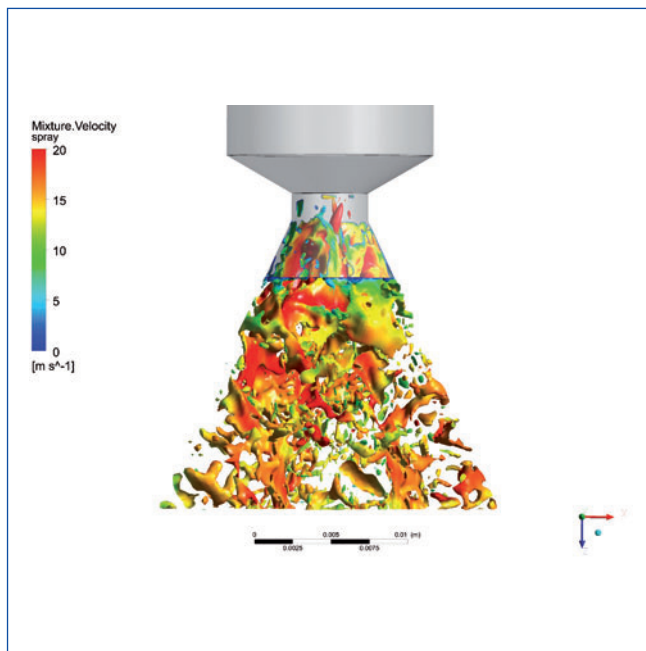
- A new internal design with approximately 30-40 % larger free cross sections compared to standard axial-flow full cone nozzles. Greater operational reliability by minimising susceptibility to blockage.
- Even greater process reliability thanks to a stable spray angle across the entire pressure range.
- The extraordinarily even liquid distribution guarantees homogeneous wetting of the product being sprayed.



Simulation of the static pressure in the vortex chamber with CFD



Simulation of the velocity curve in the vortex chamber with CFD



Simulation of the spray jet with CFD (computational fluid dynamics)

Detailed technical information and order data for Series 490 can be found on the next page.



Axial-flow full cone nozzles

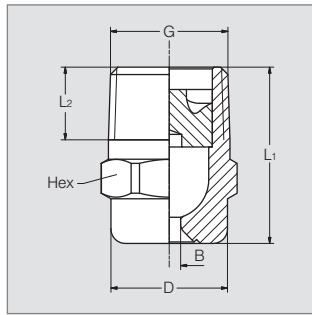
Series 490

NEW Patent pending



Non-clogging nozzle design, stable spray angle and particularly even liquid distribution.

Applications:
Cleaning and washing processes, cooling of gaseous and solid materials, surface irrigation, mat spraying in air washers, improving chemical reactions.



Code	G	Dimensions [mm]		D	Hex	Weight 316 L
		L ₁	L ₂			
CA	1/8" BSPT	18.0	6.5	10.0	11	13 g
CC	1/4" BSPT	22.0	10.0	13.0	14	16 g
CE	3/8" BSPT	24.5	10.0	16.0	17	28 g

Example for ordering: Type **490.566** + Material no. **1Y** + Code **CA** = Ordering no. **490.566.1Y.CA**

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]								H = 200 mm	H = 500 mm
			1Y	1/8" BSPT	1/4" BSPT			3/8" BSPT	0.5	1.0	2.0	3.0	5.0	7.0	10.0		
60°	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	2.10	2.10	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	3.00	2.80	3.62	4.77	6.30	7.41	9.09	10.40	11.99	220	560	
	490.764	○	-	-	CE	3.30	3.30	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	
90°	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	2.10	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	3.20	3.20	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	4.70	4.00	7.18	9.47	12.50	14.70	18.03	20.63	23.80	390	960		
120°	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	2.10	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	2.80	2.80	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	3.50	3.50	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	

B = bore diameter · E = narrowest free cross section

Other nozzle sizes and materials 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)





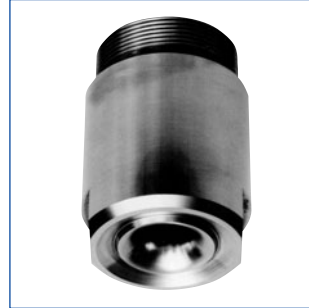
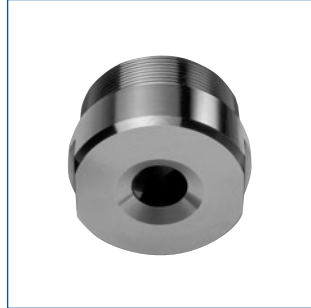
Axial-flow full cone nozzles

Series 403

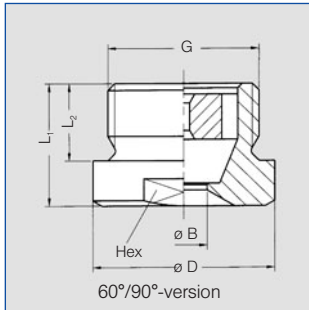


Very uniform spray pattern.

Applications:
Surface spraying, spraying over packings, chemical process engineering, cooling of gaseous fluids and solids.

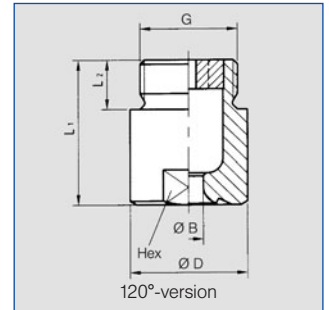


Plastic versions on request.



90°-version

Type	Dimensions [mm]				
	BSPP	L ₁	L ₂	D	Hex
403. 444/403. 446/ 403. 484/403. 486	2 1/2"	52	27	83	75
403. 524/403. 526	3"	60	30	98	85
403. 564/403. 604/ 403. 606	3 1/2"	70	32	118	105
403. 624	4"	90	36	128	110



120°-version

Type	Dimensions [mm]				
	BSPP	L ₁	L ₂	D	Hex
403. 448/403. 488	2 1/2"	124	27	83	75
403. 528	3"	153	30	98	85
403. 608	3 1/2"	156	32	118	105
403. 628	4"	165	36	128	110

Spray angle	Ordering no.		B ø [mm]	E ø [mm]	V̇ [l/min]							Spray diameter D at p = 2 bar	
	Type	Mat. no. 1Y			p [bar]							 H = 0.5 m H = 1 m	
					0.3	0.5	1.0	2.0	3.0	5.0	7.0		
60°	403. 444	○	25.00	6.00	187	230	303	400	470	577	660	580	1100
	403. 484	○	29.50	9.00	234	297	379	500	588	721	825	620	1150
	403. 524	○	32.00	8.00	295	362	477	630	741	909	1040	620	1150
	403. 564	○	38.00	14.00	375	459	606	800	941	1154	1320	620	1150
	403. 604	○	41.50	10.00	468	574	758	1000	1176	1443	1651	630	1200
	403. 624	○	48.50	15.00	484	625	887	1250	1531	1977	2339	770	1400
90°	403. 446	○	25.00	12.00	187	230	303	400	470	577	660	900	1700
	403. 486	○	29.50	12.00	234	287	379	500	588	721	825	900	1700
	403. 526	○	32.00	13.80	295	362	477	630	741	909	1040	900	1700
	403. 606	○	40.00	15.00	468	574	758	1000	1176	1443	1651	980	1750
120°	403. 448	○	25.50	10.00	187	230	303	400	470	577	660	1500	2850
	403. 488	○	29.50	11.00	234	287	379	500	588	721	825	1500	2850
	403. 528	○	32.00	15.00	295	362	477	630	741	909	1040	1500	2850
	403. 608	○	42.00	12.00	469	574	759	1000	1176	1443	1651	1550	2850
	403. 628	○	45.00	15.00	585	718	947	1250	1470	1903	2063	1600	2900

B = bore diameter · E = narrowest free cross section

Example for ordering:	Type 403. 444	+ Material no. + 1Y	= Ordering no. = 403. 444. 1Y
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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

Series 421



Even full cone distribution, high flow rates.

Applications:

For even surface irrigation, cooling and cleaning of gases, water recooling, column irrigation and for improving chemical reactions via surface enlargement.



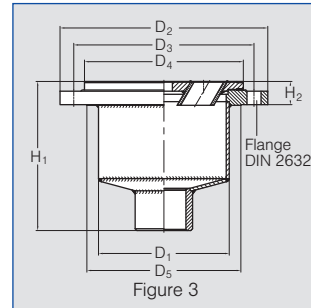
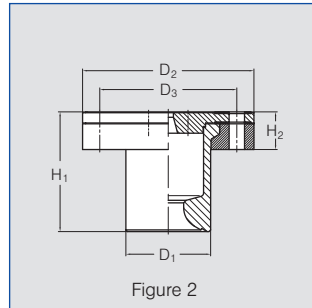
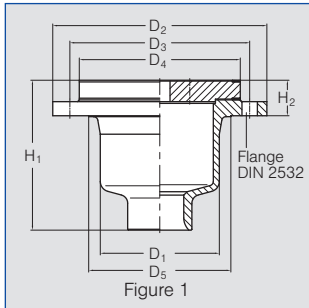
 Spray angle	Ordering no.			B ∅ [mm]	E ∅ [mm]		ṽ [l/min]						
	Type	Mat. no.			Material		p [bar]						
		05	17	53	17	05 53	0.3	0.5	1.0	2.0	5.0	10.0	
	Cast iron	316 SS	PP										
60°	421.564	○	○	○	27	-	12	375	459	606	800	1154	1523
	421.604	○	○	○	39	-	14	468	574	758	1000	1443	1904
	421.624	○	○	○	41	-	13	585	718	947	1250	1803	2380
	421.644	○	○	○	49	-	16	749	919	1213	1600	2308	3046
	421.664	○	○	○	56	-	16	936	1149	1516	2000	2885	3807
	421.684	○	○	○	58	21	21	1171	1436	1895	2500	3607	4759
	421.704	○	○	○	65	24	24	1475	1809	2387	3150	4545	5997
	421.724	○	○	○	72	28	28	1873	2297	3031	4000	5771	7615
	421.744	○	○	○	81	32	32	2341	2872	3789	5000	7214	9518
	421.764	-	○	○	88	38	39	2950	3618	4775	6300	9089	11993
	421.784	-	○	○	99	43	37	3746	4595	6063	8000	11542	15229
	421.804	-	○	-	112	46	42	4682	5743	7579	10000	14427	19037
421.824	-	○	-	125	52	47	5853	7179	9473	12500	18034	23796	
90°	421.566	○	○	○	37	-	15	375	459	606	800	1154	1523
	421.606	○	○	○	39	-	14	468	574	758	1000	1443	1904
	421.626	○	○	○	43	-	18	585	718	947	1250	1803	2380
	421.646	○	○	○	53	-	22	749	919	1213	1600	2308	3046
	421.666	○	○	○	56	-	24	936	1149	1516	2000	2885	3807
	421.686	○	○	○	59	28	28	1171	1436	1895	2500	3607	4759
	421.706	○	○	○	66	32	32	1475	1809	2387	3150	4545	5997
	421.726	○	○	○	72	36	33	1873	2297	3031	4000	5771	7615
	421.746	○	○	○	81	40	38	2341	2872	3789	5000	7214	9518
	421.766	-	○	○	88	42	37	2950	3618	4775	6300	9089	11993
	421.786	-	○	○	99	47	42	3746	4595	6063	8000	11542	15229
	421.806	-	○	-	112	53	48	4682	5743	7579	10000	14427	19037
421.826	-	○	-	125	59	54	5853	7179	9473	12500	18034	23796	
120°	421.568	○	○	○	36	-	15	375	459	606	800	1154	1523
	421.608	○	○	○	40	-	14	468	574	758	1000	1443	1904
	421.628	○	○	○	43	-	18	585	718	947	1250	1803	2380
	421.648	○	○	○	53	-	22	749	919	1213	1600	2308	3046
	421.668	○	○	○	55	-	24	936	1149	1516	2000	2885	3807
	421.688	○	○	○	59	28	28	1171	1436	1895	2500	3607	4759
	421.708	○	○	○	66	32	32	1475	1809	2387	3150	4545	5997
	421.728	○	○	○	75	36	35	1873	2297	3031	4000	5771	7615
	421.748	○	○	○	81	40	40	2341	2872	3789	5000	7214	9518
	421.768	-	○	○	86	42	37	2950	3618	4775	6300	9089	11993
	421.788	-	○	○	96	47	42	3746	4595	6063	8000	11542	15229
	421.808	-	○	-	108	53	48	4682	5743	7579	10000	14427	19037
421.828	-	○	-	121	59	54	5853	7179	9473	12500	18034	23796	

B = bore diameter · E = narrowest free cross section



Axial-flow full cone nozzles

Series 421



Type	α	Mat. no.	Fig.	Dimensions [mm]								Flange hole	
				D ₁	D ₂	D ₃	D ₄	D ₅	H ₁	H ₂	D _N	Number	Ø mm
421.56x/ 421.60x	60°-120°	05/17	1	96	200	160	122	121	140	39	80	8	18
		53	2	99	200	160	-	-	131	44	80	8	18
421.62x	60°-120°	05/17	1	113	220	180	158	141	156	28	100	8	18
		53	2	117	220	180	-	-	157	53	100	8	18
421.64x/ 421.66x	60°-90°	05/17	1	140	250	210	188	166	177	41,5	125	8	18
	120°	05/17	1	140	250	210	188	166	177	29	125	8	18
	60°-120°	53	2	141	250	210	-	-	174	57	125	8	18
421.68x/ 421.70x	60°-120°	05/17	1	170	285	240	207	195	188	38	150	8	23
	60°-120°	53	2	171	285	240	-	-	188	51	150	8	23
421.72x/ 421.74x	60°-120°	05	1	220	340	295	260	252	250	46	200	8	23
	60°	17	3	214	340	295	260	252	243	35	200	8	23
	90°-120°	17	3	214	340	295	260	252	246	38	200	8	23
421.76x/ 421.78x	60°-120°	53	2	225	340	295	-	-	252	50	200	8	23
	60°	17	3	264	395	350	320	309	290	39	250	12	23
	90°-120°	17	3	264	395	350	320	309	291	40	250	12	23
421.80x/ 421.82x	60°-120°	53	2	280	395	350	-	293	300	53	250	12	23
	60°	17	3	315	445	400	348	359	355	39	300	12	23
	90°-120°	17	3	315	445	400	348	359	356	40	300	12	23
421.82x	60°-120°	53	2	328	445	400	-	360	369	57	300	12	23

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \left(\frac{p_2}{p_1}\right)^{0,4}$
 (≤ 10 bar)



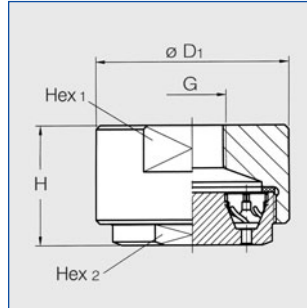
Cluster head nozzles

Series 502 / 503

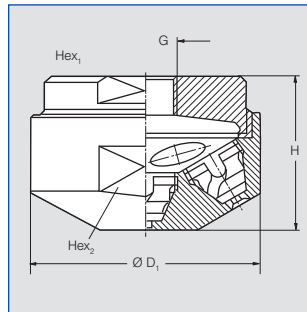
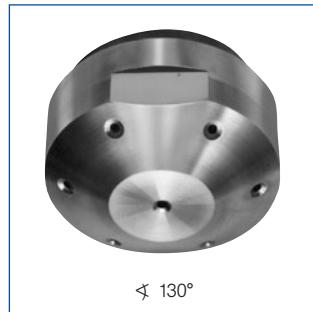


Fine full cone atomization with the aid of several hollow cones spraying into one another.

Applications:
Cooling of gaseous and solid material, desuperheating, chlorine precipitation, absorption as well as for improvement of chemical reaction by enlarging the contact area.



	Dimensions	
	1/2"	3/4"
Hex ₁	46	65
Hex ₂	38	55
H	25	46
D ₁	50	75
Weight (Brass)	250 g	870 g



	Dimensions	
	1/2"	3/4"
Hex ₁	27	50
Hex ₂	36	55
H	28	53
D ₁	40	60
Weight (Brass)	150 g	410 g

Spray angle	Ordering no.		G	B ∅ [mm]	E ∅ [mm]	V̇ [l/min]						Spray diameter D at p = 2 bar		
	Type	Mat. no.				p [bar]								
		17 ¹⁾												30
	316 SS	Brass				BSPP	0.5	1.0	2.0	3.0	5.0	10.0	H = 1000 mm	H = 2000 mm
70°	502.445	○	○	1/2"	1.00	0.50	-	-	1.25	1.53	1.98	2.80	400	400
	502.545	○	○	1/2"	1.80	0.50	-	1.58	2.24	2.74	3.54	5.01	400	400
	502.585	○	○	3/4"	1.00	1.00	1.40	1.98	2.80	3.43	4.43	6.30	600	700
	502.665	○	○	3/4"	1.40	1.40	2.20	3.18	4.50	5.51	7.11	10.10	800	900
	502.745	○	○	3/4"	2.00	2.00	3.50	5.00	7.10	8.70	11.20	15.90	800	900
	502.795	○	○	3/4"	2.50	2.00	4.60	6.70	9.50	11.60	15.00	21.20	900	1100
	502.835	○	○	3/4"	3.00	2.00	6.00	8.30	11.80	14.50	18.70	26.40	1000	1200
	502.875	○	○	3/4"	3.50	2.00	7.20	10.60	15.00	18.40	23.70	33.50	1100	1300
	502.905	○	○	3/4"	4.00	2.00	8.80	12.70	18.00	22.05	28.40	40.20	1200	1500
	502.985	○	○	3/4"	3.50	2.00	14.00	19.80	28.00	34.29	44.30	62.60	1200	1500
	502.025	○	○	3/4"	4.00	2.00	17.70	25.10	35.50	43.48	56.10	79.40	1200	1600
502.065	○	○	3/4"	5.00	2.00	22.10	31.80	45.00	55.11	71.10	100.60	1200	1800	
502.115	○	○	3/4"	6.00	2.00	30.00	42.00	60.00	72.80	95.00	134.00	1300	2000	
130°	502.448	○	○	1/2"	1.00	0.50	-	-	1.25	1.53	1.98	2.80	500	500
	502.548	○	○	1/2"	1.80	0.50	-	1.58	2.24	2.74	3.54	5.01	700	700
	502.588	○	○	3/4"	1.00	1.00	1.40	1.98	2.80	3.43	4.43	6.30	800	900
	502.668	○	○	3/4"	1.50	1.50	2.20	3.18	4.50	5.51	7.11	10.10	1000	1100
	502.748	○	○	3/4"	2.00	2.00	3.50	5.00	7.10	8.70	11.20	15.90	1100	1200
	502.798	○	○	3/4"	2.50	2.00	4.60	6.70	9.50	11.60	15.00	21.20	1200	1300
	502.838	○	○	3/4"	3.00	2.00	6.00	8.30	11.80	14.50	18.70	26.40	1400	1600
	502.878	○	○	3/4"	3.50	2.00	7.20	10.60	15.00	18.40	23.70	33.50	1500	1700
	502.908	○	○	3/4"	4.00	2.00	8.80	12.70	18.00	22.05	28.40	40.20	1500	1800
	502.988	○	○	3/4"	3.50	2.00	14.00	19.80	28.00	34.29	44.30	62.60	1500	1800
	503.028	○	○	3/4"	4.00	2.00	17.70	25.10	35.50	43.48	56.10	79.40	1600	1800
	502.068	○	○	3/4"	5.00	2.00	22.10	31.80	45.00	55.11	71.10	100.60	2000	2500
	503.118	○	○	3/4"	6.00	2.00	30.00	42.00	60.00	72.80	95.00	134.00	2000	3000

¹⁾ We reserve the right to deliver 316 SS or 316 L under the material no. 17.
B = bore diameter · E = narrowest free cross section

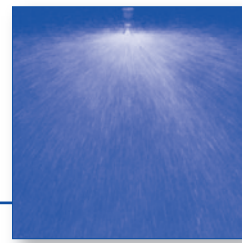


Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 \cdot \sqrt{\frac{p_2}{p_1}}$

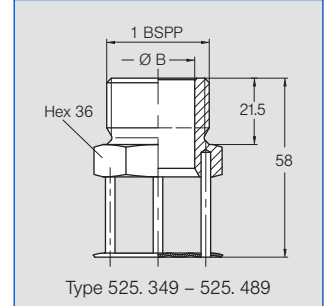
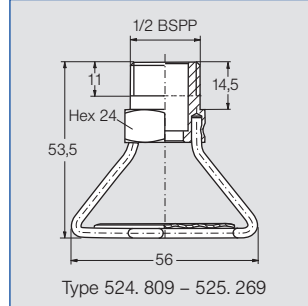


Deflector-plate nozzle

Series 524 / 525



Full cone spray. Non clogging nozzle without swirl insert.
Applications:
Fire fighting and broadcast spraying, wide area spray.



Spray angle	Ordering no.		B Ø mm	\dot{V} [l/min]						Spray diameter D at p = 3 bar approx.		
	Type	Mat no.		p [bar]						 H = 1 m H = 3 m		
				30	17 ¹⁾	0.5	1.0	2.0	3.0			5.0
			Brass/1.4310	316 SS/316 L								
180°	524. 809	○	○	4.00	5.00	7.10	10.00	12.20	15.80	22.40	5.60 m	6.40 m
	524. 939	○	○	5.90	10.60	15.00	21.20	25.90	33.50	47.40	6.00 m	7.00 m
	524. 969	○	○	6.20	12.50	17.70	25.00	30.60	39.50	55.90	8.00 m	9.00 m
	525. 049	○	○	8.00	20.00	28.30	40.00	49.00	63.20	89.40	10.00 m	13.20 m
	525. 109	○	-	9.30	28.00	40.00	56.00	69.00	89.00	125.00	10.20 m	13.40 m
	525. 169	○	-	10.90	40.00	57.00	80.00	98.00	126.00	179.00	10.60 m	13.60 m
	525. 229	○	-	12.20	56.00	79.00	112.00	137.00	177.00	250.00	6.80 m	10.40 m
	525. 269	○	○	12.30	70.00	99.00	140.00	171.00	221.00	313.00	5.20 m	10.20 m
	525. 349	○	○	16.20	112.00	158.40	224.00	274.30	354.20	500.80	4.80 m	9.70 m
	525. 469	○	○	23.80	222.70	315.00	445.50	545.60	704.40	996.20	4.50 m	9.50 m
525. 489	○	○	25.30	250.00	353.60	500.00	612.40	790.60	1118.00	4.00 m	9.00 m	

¹⁾ We reserve the right to deliver 316 SS or 316 L under the material no. 17.
B = bore diameter

Example for ordering:	Type 525.809	+ Material no. + 30	= Ordering no. = 525. 809. 30
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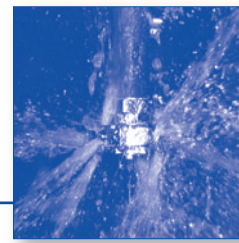
Version with dust protection cap on request.

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



Rotation nozzle „Gyro“

Series 577/579



- Self-spinning stainless steel tank cleaning head
- Powered and lubricated by the cleaning fluid
- Flat fan nozzle holes for particularly powerful all-round cleaning
- Large free cross sections, less prone to clogging

Applications:

For cleaning medium-sized to large containers, e.g. in the chemical industry and also in the paper and food industry.

Recommended operating pressure:

1-3.5 bar, max. 5 bar

Max. temperature:

90°C

Weight:

NPT 1" 750g
NPT 2" 1800g
NPT 3" 3600g

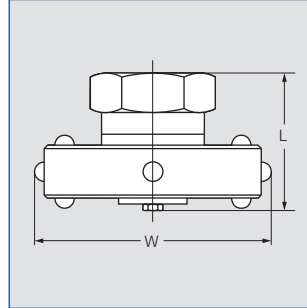
Material:

Housing: 316 SS
Bearing: Teflon® (PTFE) sliding bearing

Accessories:

Spare parts set consisting of:

- Top seal
- Bottom seal
- Bolt
- Nut
- Sleeve
- Instructions for use



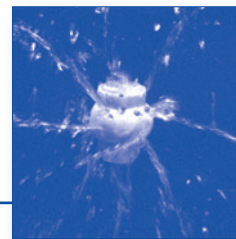
Spray angle	Ordering no.				\dot{V} [l/min]					Dimensions		Effective spray diameter
	Type	Connection			p [bar]					Length [mm]	Width [mm]	Ø [m]
		NPT 1"	NPT 2"	NPT 3"	1	2	3	5	40 psi [US gal/min]			
180°	577.283.17	BN	-	-	115	163	200	258	50	68,4	118	4
	577.363.17	BN	-	-	182	258	316	408	80	68,4	118	4
	577.404.17	-	BW	-	228	322	394	509	100	103	151	5
	577.434.17	-	BW	-	273	386	473	610	120	103	151	5
	577.524.17	-	BW	-	452	639	783	1010	170	103	151	5
	577.564.17	-	-	MB	564	798	977	1262	250	116	188	6
	577.594.17	-	-	MB	677	958	1173	1515	300	116	188	6
577.614.17	-	-	MB	791	1118	1369	1768	350	116	188	6	
180°	579.284.17	BN	-	-	115	163	200	258	50	68,4	118	4
	579.364.17	BN	-	-	182	258	316	408	80	68,4	118	4
	579.404.17	-	BW	-	228	322	394	509	100	103	151	5
	579.434.17	-	BW	-	273	386	473	610	120	103	151	5
	579.494.17	-	BW	-	380	538	659	851	170	103	151	5
	579.564.17	-	-	MB	564	798	977	1262	250	116	188	6
	579.594.17	-	-	MB	677	958	1173	1515	300	116	188	6
579.614.17	-	-	MB	791	1118	1369	1768	350	116	188	6	
270°	577.285.17	BN	-	-	115	163	200	258	50	68,4	118	4
	577.365.17	BN	-	-	182	258	316	408	80	68,4	118	4
	577.405.17	-	BW	-	228	322	394	509	100	103	151	5
	577.435.17	-	BW	-	273	386	473	610	120	103	151	5
	577.495.17	-	BW	-	380	538	659	851	170	103	151	5
	577.566.17	-	-	MB	564	798	977	1262	250	116	188	6
	577.596.17	-	-	MB	677	958	1173	1515	300	116	188	6
577.616.17	-	-	MB	791	1118	1369	1768	350	116	188	6	
360°	577.289.17	BN	-	-	115	163	200	258	50	68,4	118	4
	577.369.17	BN	-	-	182	258	316	408	80	68,4	118	4
	577.409.17	-	BW	-	228	322	394	509	100	103	151	5
	577.439.17	-	BW	-	273	386	473	610	120	103	151	5
	577.499.17	-	BW	-	380	538	659	851	170	103	151	5
	577.569.17	-	-	MB	570	806	987	1274	250	116	188	6
	577.599.17	-	-	MB	685	969	1187	1532	300	116	188	6
577.619.17	-	-	MB	798	1128	1382	1784	350	116	188	6	

Please note: Higher pressure generally means higher wear and smaller droplets. This might have adverse effects on the cleaning result. We do not recommend the operation with compressed air.

Example for ordering: Type 577.404.17 + Connection BW = Ordering no. 577.404.17.BW



PTFE Whirling Nozzle – for high temperature applications Series 599



- PTFE whirling nozzle for high temperature applications
- Balanced rotating action
- Gap-free all-around cleaning
- Free spinning, self-lubricating and self-flushing
- All used materials are FDA-conform

Applications:

For rinsing of small and medium-sized vessels and reactors in higher temperature processing environments.

Max. tank diameter:

Rinsing: 5 m
Cleaning: 3 m

Recommended operating pressure:

1-2 bar, max. 6 bar

Installation:

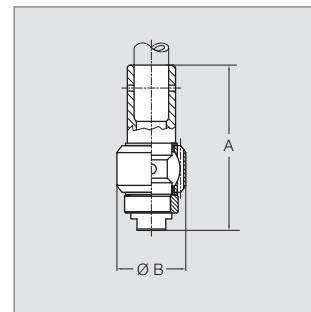
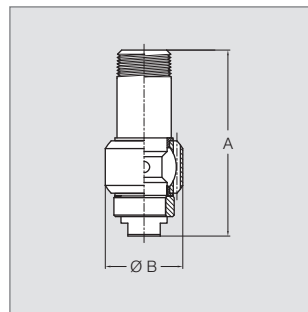
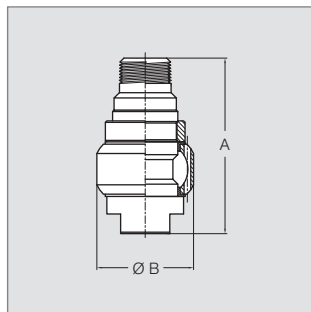
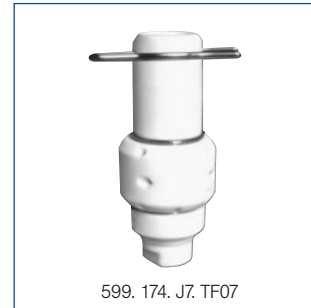
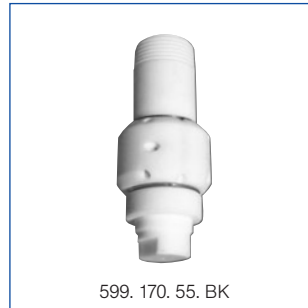
Operation in every direction is possible

Max. temperature:

130°C

Materials:

- PTFE
- Rings: Hastelloy®



Spray angle	Ordering no.			\dot{V} [l/min]				A Length [mm]	B Ø [mm]	Weight [g]
	Type	Connection		p [bar]						
		3/4" male NPT	3/4" female tube	1	2	3	40 psi [US gal./min]			
360°	599. 133. 55	BK	-	71	100	122	31	89	51	160
	599. 170. 55	BK	-	61	84	103	26	91	38	115
	599. 174. J7	-	TF07	61	84	103	26	91	38	115

Please note: Higher pressure generally means higher wear and smaller droplets. This might have adverse effects on the cleaning result. We do not recommend the operation with compressed air.

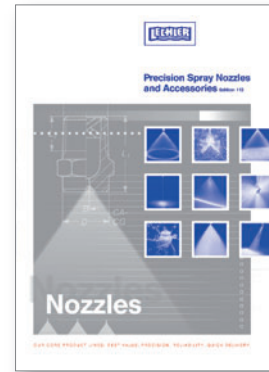
Example for ordering:	Type	+ Connection	= Ordering no.
	599. 170. 55.	+ BK	= 599. 170. 55. BK








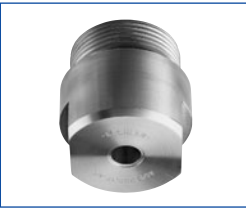
YOU WILL FIND OTHER NOZZLES FOR USE IN THE CHEMICAL INDUSTRY IN OUR INDUSTRY CATALOGUE ...





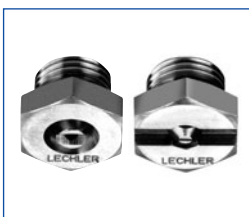

Over the years, our catalogue for precision nozzles and accessories has become an in-demand nozzle technology

handbook. It contains valuable tools and comprehensive technical information on Lechler products.

Many of them have for a long time also been used in the chemical industry to solve a very wide range of tasks.



Axial-flow hollow cone nozzles	Series		\dot{V} [l/min] at p = 2 bar	Connection	Application/Design	Catalogue page
	212	60° 80°	0.015 – 0.46 (at p = 7 bar)	1/4 BSPT 1/4 BSPP	Disinfection, humidification of air, spraying over germinating boxes, product dampening, humidification of textiles, oil spraying, absorption. Extremely fine, fog-like hollow cone spray.	2.5
Eccentric hollow cone nozzles	Series		\dot{V} [l/min] at p = 2 bar	Connection	Application/Design	Catalogue page
	302	60° 80° 90° 130°	0.40 – 25.00	3/8 BSPP	Humidification of air in air washers, dust control, spraying onto filters, foam control, cooling. Non-clogging nozzle design, without swirl insert.	2.8 2.9
	304 306 307	90° 130°	5.60 – 33.50	1/2 BSPP 3/4 BSPP	Fire fighting, protection of storage tanks, foam control. Non-clogging nozzle design, without swirl insert.	2.12
Full cone nozzles	Series		V [l/min] at p = 2 bar	Connection	Application/Design	Catalogue page
	460 461	45° 60° 90° 120°	0.40 – 71.00	1/8 BSPT 1/4 BSPT 3/8 BSPT 1/2 BSPT 3/4 BSPP 1 BSPP	Cleaning and washing process, cooling of gaseous fluids and solids, surface spraying, spraying onto mats in air washers, improving on chemical reactions. Large free cross-sections, due to optimized x-style swirl insert.	3.5
	405	60° 90° 120°	100.00 – 315.00	1 1/4 BSPP 1 1/2 BSPP 2 BSPP	Surface spraying, spraying over packings, cleaning and washing process, chemical process engineering, cooling of gaseous fluids and solids, water treatment. Uniform full cone spray.	3.7

Full cone nozzles	Series		V [l/min] at p = 2 bar	Connection	Application/ Design	Catalogue page
	422 423	60° 90° 120°	1.00 – 100.00	1/4 BSPT 3/8 BSPT 1/2 BSPT 3/4 BSPT 1 BSPT	Cleaning and washing process, cooling of gaseous fluids and solids, surface spraying, spraying onto mats in air washers, improving on chemical reactions, continuous casting. Without swirl inserts, non-clogging.	3.10 3.11
Flat fan nozzles	Series		V [l/min] at p = 2 bar	Connection	Application/ Design	Catalogue page
	632 633	20° 30° 45° 60° 75° 90° 120°	0.05 – 49.96	1/8 BSPP 1/4 BSPP 3/8 BSPP 1/2 BSPP	Spray cleaning, surface treatment, filter cleaning, belt cleaning, lubricating, coating. Standard design with conical, self sealing thread.	4.8
	616 617	20° 30° 45° 60° 90° 120°	6.30 – 63.00	3/4 BSPP	Cleaning installations, rain curtains, gravel washing, spray pipes, foam spraying, roll cooling, cooling of rolled stock. Non-clogging nozzle design.	4.15
	686	90° 140°	0.50 – 28.00	1/8" BSPT 1/4" BSPT 3/8" BSPT 1/2" BSPT	Foam control in storage tanks and sewage treatment plants, for cleaning and washing process. Particularly clog proof.	4.31

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Lechler Tank Cleaning Nozzles

Pneumatic Atomizing Lances Series 77X / 78X / 79X

VarioSpray II – Nozzle valve system for the variable atomization of very small liquid volumes

Lechler Droplet Separators



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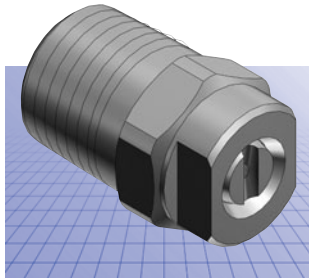


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