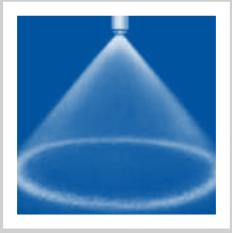
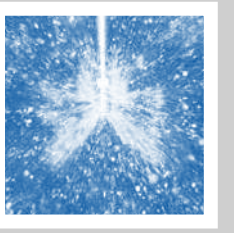
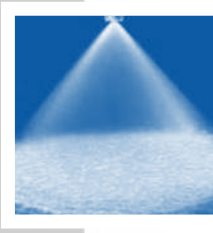
ENGINEERING
YOUR SPRAY SOLUTION

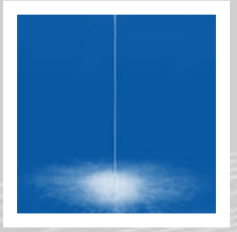
LECHLER

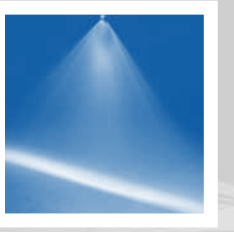
Precision Spray Nozzles and Accessories Edition 501

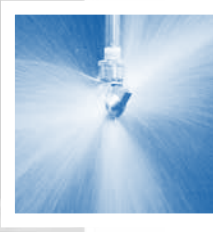


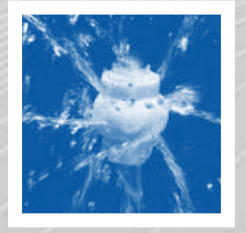


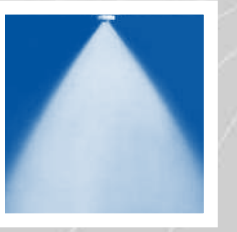












Spray Nozzles

OUR CORE PRODUCT LINES: BEST VALUE, PRECISION, RELIABILITY, QUICK DELIVERY.

INCREASE YOUR PRODUCTIVITY WITH LECHLER SPRAY TECHNOLOGY

Competition is getting fiercer by the day. Your customers' requests for the highest quality and lowest price force you to seek creative solutions. Lechler spray technology can be part of those solutions by helping you improve your manufacturing processes and technologies.

For further information on nozzle technology, please visit www.lechlerusa.com.

What really matters is that you have a competent partner for the job right from the planning stage. We supply vital measuring data from the beginning to ensure your process runs smoothly. With so many nozzle options to choose from, we can offer you a customized spray solution.

Opting for an experienced partner like Lechler provides you with: a broad product line, unmatched quality, international engineering expertise, and delivery of most catalog items straight off our stock shelves. Is that what you expect from a nozzle supplier? You can expect that from Lechler.

This Lechler Catalog 501 is a reference book designed to assist you with the solutions to your spray application needs. It provides detailed information about our standard product line along with the types of applications for which those products are typically used. Not only is there a complete section of nozzle accessories included but you will also find the nozzle products with which those accessories were designed to operate. Additional catalog help comes from a full list of engineering data, assistance in designing your own spray header, and information to help you choose a tank cleaning product. All in all, this catalog is designed to assist you in making product choices for your spray applications.

Don't feel like you're in this alone. For expert assistance in finding the solution to whatever spray application you may have, we invite you to contact your local representative or Lechler directly. When you partner with Lechler, you're backed by over 130 years of spray technology experience, experience borne from hundreds of applications at thousands of companies around the world. Let us put that experience to work for you.

Index of parts by nozzle series

TABLE OF CONTENTS Page

TERMS OF EXPLANATION

Here you will find explanations of the special terms and abbreviations used in the tables on the following pages.

Lechler nozzles are manufactured with the highest precision and undergo numerous quality checks. Nevertheless, production-related tolerances can affect the spray angle, flow rate, droplet size, and droplet distribution of the nozzle's performance.

Equivalent orifice diameter

Applies to elliptical discharge holes of flat fan nozzles. A cylindrical hole with the listed diameter has the same surface area as the ellipse. Otherwise, for full cones and solid streams, the orifice diameter simply is a measure of the diameter of the round nozzle orifice.

Free passage

Diameter size of the largest particle which can successfully pass through the nozzle. Can be less than the orifice diameter on certain nozzles due to the presence of internal swirl inserts.

Flow rate

All volume flow rate data in this catalog is based upon measurements with water.

Spray width

Spray widths listed as theoretical are based upon table values for a given spray height and spray angle. Otherwise spray widths are actual, based upon empirical testing.

Equivalent Orifice diam.

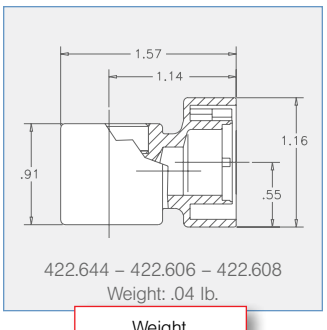
Free passage

Flow Rate (Gallons Per Minute)

Theoretical Spray Width

Spray angle	Type	Ordering no. Material no. 303 SS 16	316 SS 17	Brass 30	PVDF 5E	Connection Male NPT 1/8"	1/4"	3/8"	1/2"	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	litres per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Theoretical Spray Width (in.) H=10"	H=24"
15°	632. 301	○	○	○	○	BA	BC	BE	-	.028	.024	.05	.07	.32	.10	.12	.14	.16	3	6
	632. 361	○	○	○	○	BA	BC	-	-	.039	.032	.10	.14	.63	.20	.24	.28	.31	3	6
	632. 401	○	○	○	-	BA	BC	-	-	.047	.035	.16	.22	1.0	.31	.38	.44	.49	3	6
	632. 441	○	○	○	○	BA	BC	-	-	.053	.043	.19	.27	1.3	.39	.48	.55	.61	3	6
	632. 481	○	○	○	○	BA	BC	-	-	.059	.047	.25	.35	1.6	.50	.61	.70	.78	3	6
	632. 511	○	○	○	○	BA	BC*	-	-	.065	.055	.29	.42	1.9	.59	.72	.83	.93	3	6
	632. 561	○	○	○	-	BA	BC**	-	-	.079	.059	.25	.35	1.6	.50	.61	.70	.78	3	6
	632. 601	○	○	○	-	BA	BC***	-	-	.087	.067	.49	.69	3.2	.98	1.2	1.4	1.5	3	6
	632. 671	○	○	○	-	-	BC	BE	-	.106	.087	.74	1.0	4.8	1.5	1.8	2.1	2.3	3	6
	632. 721	○	○	○	-	-	BC	BE	-	.118	.098	.98	1.4	6.3	2.0	2.4	2.8	3.1	3	6
	632. 801	○	○	○	-	-	BC	BE	-	.157	.126	1.6	2.2	10.0	3.1	3.8	4.4	4.9	3	6
	632. 841	○	○	○	-	-	BC	BE	-	.177	.142	1.9	2.7	12.5	3.9	4.8	5.5	6.1	3	6
	632. 881	○	○	○	-	-	BC	BE	BG	.197	.157	2.5	3.5	16.0	5.0	6.1	7.0	7.9	3	6
	632. 921	○	○	○	-	-	BC	BE	-	.217	.165	3.1	4.4	20.0	6.2	7.6	8.8	9.8	3	6
	632. 941	○	○	○	-	-	BC	-	-	.224	.189	3.5	4.9	22.4	7.0	8.5	9.8	11.0	3	6
	632. 961	○	○	○	-	-	-	BE	BG	.236	.185	3.9	5.5	25.0	7.8	9.5	11.0	12.3	3	6
	633. 011	○	○	○	-	-	-	BE	BG	.272	.229	5.2	7.4	50.0	12.7	14.7	16.4	16.4	3	6
	633. 041	○	○	○	-	-	-	BE	-	.315	.236	6.2	8.8	40.0	12.4	15.2	17.6	19.6	3	6
	633. 081	○	○	○	-	-	-	-	BG	.354	.268	7.7	11.0	50.0	15.5	19.0	21.9	24.5	3	6
	633. 121	○	○	○	-	-	-	-	BG	.394	.299	9.4	13.5	60.0	18.8	23.2	26.8	30.0	3	6

Spray Diam. D (in.) @ 30 psi



422.644 – 422.606 – 422.608
Weight: .04 lb.

Weight

Spray angle	Type	Ordering no. Material no. 316 SS 17	Brass 30	PVDF 5E	Connection Male NPT 1/8"	1/4"	3/8"	1/2"	3/4"	1"	Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 p	20	litres per minute 2	30	40 psi	60 psi	80 psi	100 psi	150 psi	(in.) @ 30 psi H=8"	H=20"
45°	460. 403	○	○	-	BA	-	-	-	-	-	.047	.033					.30	.35	.40	.43	.51	6	16
	460. 523	○	○	-	BA	-	-	-	-	-	.059	.053	.35	.46	2.0	.54	.60	.71	.79	.87	1.0	6	16
	460. 603	○	○	-	-	BC	BE	-	-	-	.075	.071	.54	.72	3.2	.84	.95	1.1	1.2	1.4	1.6	6	16
	460. 643	○	○	-	-	BC	BE	-	-	-	.085	.079	.69	.91	4.0	1.1	1.2	1.4	1.6	1.7	2.0	6	16
	460. 683	○**	○	-	-	BC	BE	-	-	-	.095	.079	.86	1.1	5.0	1.3	1.5	1.8	2.0	2.2	2.5	6	16
	460. 703	-	○	-	-	-	BE	-	-	-	.100	.087	.97	1.3	5.6	1.5	1.7	2.0	2.2	2.4	2.9	6	16
	460. 723	○	○	-	-	-	BE	BG	-	-	.106	.093	1.1	1.4	6.3	1.7	1.9	2.2	2.5	2.7	3.2	6	16
	460. 783	-	○	-	-	-	-	BG	-	-	.126	.126	1.6	2.0	9.0	2.4	2.7	3.2	3.6	3.9	4.6	6	16
	460. 803	○	○	-	-	-	-	BG	-	-	.133	.130	1.7	2.3	10.0	2.7	3.0	3.5	4.0	4.3	5.1	6	16
	460. 843	-	○	-	-	-	-	BG	-	-	.150	.146	2.2	2.8	12.5	3.3	3.8	4.4	5.0	5.4	6.4	6	16
60°	460. 404	○	○	-	BA	-	-	-	-	-	.047	.033	.17	.23	1.0	.27	.30	.35	.40	.43	.51	9	22
	460. 444	○	○	-	BA	-	-	-	-	-	.051	.041	.22	.28	1.3	.33	.38	.44	.50	.54	.64	9	22
	460. 484	○	○	-	BA	-	-	-	-	-	.057	.045	.28	.36	1.6	.43	.48	.57	.63	.69	.82	9	22
	460. 524	○	○	-	BA	-	-	-	-	-	.063	.047	.35	.46					.79	.87	1.0	9	22
	460. 564	○	○	-	BA	-	-	-	-	-	.066	.051	.43	.57					.99	1.08	1.27	9	22
	460. 604	○	○	-	BA	BC	BE	-	-	-	.081	.055	.54	.72								9	22

Pressure

Weight

All weight information refers to nozzles made of brass, unless otherwise stated. See page 16 for conversion factors for other materials.

Pressure (in psi)

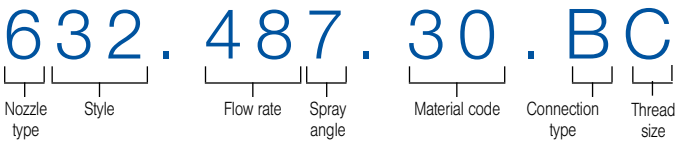
Pressure is the differential pressure to the nozzle surrounding. If you require a pressure stage not given in the tables, you can calculate the volume flow rate at the desired pressure with the formula at the bottom of the respective table page.

PRODUCT CLASSIFICATION

Lechler product number system

The following diagram will help explain product number codes in relation to the Lechler spray nozzle line.

Please note that some products, such as pneumatic atomizing, do not exactly follow this product coding system.



Nozzle type code

1= Pneumatic
2= Axial Hollow Cone
3= Tangential Hollow Cone
4= Full Cone
5= Tank Cleaning, Solid Stream and Special Purpose
6= Flat Spray
7= Air Atomizing
8= Lances Supersonic/Spillback
9= Special Projects
0= Accessories

Style code

See specific nozzle chart for style code

Flow rate code

See specific nozzle chart for style code

Spray angle code

0= 0° (Solid Stream)
1= 20°
2= 30°
3= 45°
4= 60°
5= 75°
6= 95°
7=120°

HOLLOW AND FULL CONE
1= 20°
2= 30°
3= 45°
4= 60°
5= 80°
6= 90°
8=120° or larger
9=180°

Material code

02 Mild Steel
11 430 FSS
15 321 SS
16 303 SS
17 316 SS
1C 304 SS
1D 304L SS
1Y 316L SS
22 Hastelloy® B
23 Hastelloy® C-4
24 Hastelloy® C-276
25 Titanium GR2
26 Monel 400
27 Tungsten Carbide
2A Nickel 200
2E Nickel 201
30 Brass
32 Bronze
35 Nickel-Plated Brass
3W Zinc
42 Aluminum, Alloy
50 PVC (Polyvinylchloride)
51 Nylon (Polyamide)
53 PP (Polypropylene)
55 PTFE (Polytetrafluoroethylene) or Teflon®
56 POM (Polyacetate) or Delrin®
5D PVDF (Natural)
5E PVDF (Polyvinylidenefluoride)
5K ABS (Acrylonitrile Butadiene Styrene) Plastic
6C EPDM (Ethylene Propylene Diene Monomer) Rubber
6D Nitride-Bonded Silicon Carbide
7A Viton®
7E Silicone
7J Santoprene
7T 316L SS with Peek
73 Soft Rubber

A3 Hardened Stainless
C8 POM Shell with Zirconium Oxide Insert
C9 316L SS Kolsterized
J7 PTFE and Hastelloy® C-276
S2 PP (Polypropylene) conforming to FDA standards

Connection type

A=BSPP Connection
B=NPT Connection
C=BSPT Connection

Thread size code

male		female	
A	= 1/8"	B	= 1/8"
C	= 1/4"	D	= 1/4"
E	= 3/8"	F	= 3/8"
G	= 1/2"	H	= 1/2"
K	= 3/4"	L	= 3/4"
M	= 1"	N	= 1"
P	= 1 1/4"	Q	= 1 1/4"
R	= 1 1/2"	S	= 1 1/2"
V	= 2"	W	= 2"
Y	= 2 1/2"	Z	= 2 1/2"
MA	= 3"	MB	= 3"
ME	= 4"	MF	= 4"
MG	= 5"	MH	= 5"
MK	= 6"	ML	= 6"

(3"-6" designations are NPT only)

Lechler manufactures thousands of individual products which are constantly being changed and redesigned for many reasons. While we do our best to make sure the data in our publications accurately reflects our products, there are times when some aspect of performance or physical configuration of a product may change. We reserve the right to make such changes when required, but we will do our best to alert you to any modifications that could affect your application. When any nozzle attribute is particularly critical, please feel free to contact us to address any concerns you may have.

In most cases, products are manufactured to performance rather than dimensions. This could result in manufacturing batches that do not match dimensionally, particularly critical points like orifice diameters. If you see something that causes you concern, please consult with your Lechler representative.

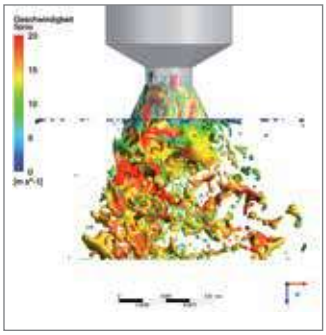
For the most up-to-date information regarding our catalog, please refer to our web site, **www.lechlerusa.com**, where you can download whatever sections of the catalog you need.

TRADITION AND PROGRESS IN SPRAY TECHNOLOGY

What does the Lechler brand represent? A worldwide leader among nozzle manufacturers; innovative spraying technology based upon our engineering expertise; an interdisciplinary approach towards the development of spray solutions; state-of-the-art production equipment and methodology; experienced employees who care about our customers and their spray applications; and a high standard of quality in the manufacture of our products, resulting in successful applications and satisfied customers. We've worked over 130 years to earn the reputation that the Lechler brand represents. We're not about to stop now.

Research and development for a better future

Since 1879 Lechler has been searching for new solutions to spraying problems and has developed and manufactured spray nozzles for many trend-setting applications. Research and development is essential for the innovative products we have developed over the years. Our engineering experience and international support help keep Lechler on the leading edge of R&D.



Using ultra-modern techniques for construction and simulation, Lechler engineers and technicians convert their ideas into products of high practical value. Full scale tests simulate real life conditions. Only when all details comply with our requirements are products released into production.

ISO 9001:2008 Certified

PERRY JOHNSON REGISTRARS, INC.

ACCREDITED

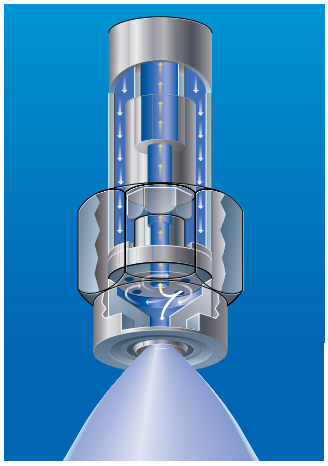
Your advantage lies in our productivity

New custom-made manufacturing techniques guarantee productivity and flexibility.

Making a product right once isn't very meaningful if you can't make it that way again… and again…and again. Lechler has developed quality procedures and automated processes which ensure production repeatability with consistent product properties. For us, this means that not only does one nozzle in a family look like another, but its spray performance will be identical to it, too. This applies to 25,000 different variants, materials and sizes. So for us it's not an insult to say, "If you've seen one Lechler nozzle, you've seen them all."

A few words on quality

Lechler products are used in many different industries and applications. Therefore, the requirements of the products have to meet certain specifications. Lechler defines "quality" as the ability of our products to not only meet but surpass the customer's individual requirements for performance.



In order to meet the varied specifications of these products required by our customers, Lechler operates according to the requirements of ISO 9001:2008 in setting the objectives and standards we wish to achieve. Lechler's staff works carefully and diligently to carry out permanent quality control from material reception through manufacturing to shipment.

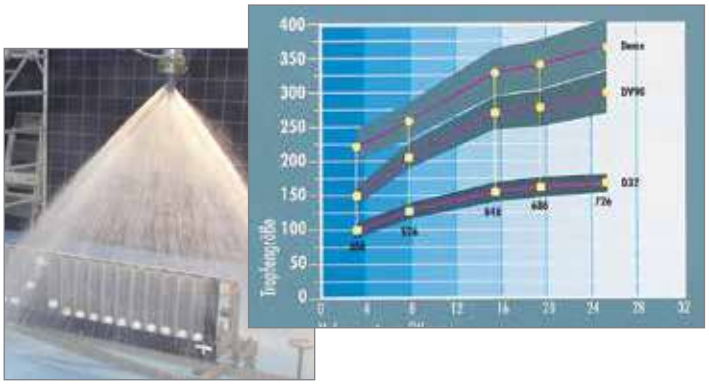
And through our continuous improvement objectives, you can count on Lechler products only getting better and better.

What can be measured

Even before we complete its manufacturing, we know the exact flow rate, spray angle and uniformity of distribution of each Lechler nozzle.

Right from the beginning, functions and spray characteristics are accurately defined and recorded by our sophisticated measuring techniques and reliable documentation.

Our computer-controlled measuring equipment, such as the Phase-Doppler Particle Analyzer, the spray jet measuring device with 3D presentation, and our liquid distribution systems, are the essential prerequisites for precise measuring data.



We offer reliability and expertise

You look for reliability in a supplier. That's why Lechler strives to be a trusted supplier to its customers. As you search through our catalog, you'll find a large product offering with engineered solutions for all your application needs. Many of these products are readily available to ship within one to two business days. For fabricated engineered systems, Lechler will strive to meet your delivery requirements.

At Lechler, the service starts before the sale. We offer technical advice and assistance with your spray applications through our experienced staff and sales representatives. You'll have confidence making the purchase, knowing that our solution is the right one.

When you purchase products from Lechler, you'll know that our worldwide engineering and manufacturing expertise go a long way in providing reliable solutions. We are supported by six manufacturing locations and sales offices throughout the world and have been in business since 1879 and you can count on Lechler being there tomorrow.

PERFECT NOZZLE TECHNOLOGY TO SOLVE MANY INDUSTRIAL TASKS

In many industries there are a number of tasks that can be economically accomplished with the aid of spraying techniques. However, optimum effects only can be achieved when a spray nozzle manufacturer's wide knowledge of specific requirements and particular service conditions are taken into account, too—right from the project stage. Where this is not the case, a job may quickly end up as a costly experiment for the user.

Lechler, aware of this risk, has put up special teams for a number of fields of applications. These teams are joined by external consultants for various industries. In addition there is the know-how Lechler has accumulated over many years of direct activity in all industries. These synergies are also useful for other, new spray applications. That's why our spray nozzle specialists are often asked to participate as competent consultants in the first planning phases by our customers. The typical result? Quality products and successful spray applications.

This catalog contains a wide selection of nozzles that can be used in many different areas of industry. Where specific information would be useful for special applications, we would be happy to send you our trade brochures.

Surface treatment

- Degreasing
- Phosphating
- Spray painting
- Galvanizing
- Cleaning

Paper industry

- Foam suppression
- Jet cutting
- Humidification
- Cleaning

Chemical and pharmaceutical industries

- Cleaning
- Humidificationg
- Coating
- Mixing disinfection
- Atomization of viscous liquids

Food and beverage industries

- Cleaning
- Pasteurization
- Belt lubrication
- Disinfection
- Humidification
- Cooling

Electronic industry

- Circuit board cleaning
- Spray etching
- Coating

Fire protection

- Tank cooling
- Spraying aboard ships
- Water curtains
- Shavings hopper

Automotive industry

- Degreasing
- Cleaning
- Preservation
- Coating
- Cooling
- Lubricating
- Drying

Machine tools

- Cooling
- Lubricating
- Cleaning
- Blowing off

You can use the order form in the back of this catalog to request specific, special information on nozzles and their areas of use that are not covered in this catalog.

SPECIAL TASKS REQUIRE SPECIAL SOLUTIONS

Very individual demands are placed on nozzle technology in the steel industry, environmental engineering, and agriculture. That's why Lechler maintains specialist teams who have the specific expertise in these areas. We have compiled product information in separate brochures for these specialized areas. These can be requested using the form at the end of this catalog.

Smelting and rolling mill technology

A whole range of specifically developed and proven nozzles in different versions and materials is available to meet the unique requirements of this specialized area.

Descaling, secondary cooling in continuous casting systems, and roller cooling are just a few of the many different applications. Nozzles and nozzle systems play a crucial role in all production stages in terms of process optimization through increased quality and efficient production.

A wide range of standard nozzles is supplemented by the possibilities that are available for individual special solutions. At the same time, customers have at their disposal a competent team of experienced specialists employing state-of-the-art design and production methods.

Environmental technology

Flue gas desulphurization and gas treatment are important areas of work in energy and environmental technology in which Lechler nozzles and systems are used. Internationally, our wide-ranging expert knowledge and unsurpassed experience has made Lechler a sought-out partner in this sector.

Leading system manufacturers and operators all over the world have opted to become Lechler partners because they have been impressed by our innovative strength, our high level of competence in solving problems, and our global organization.

Find out about the possibilities for collaboration with Lechler and how you can profit from our expert knowledge.

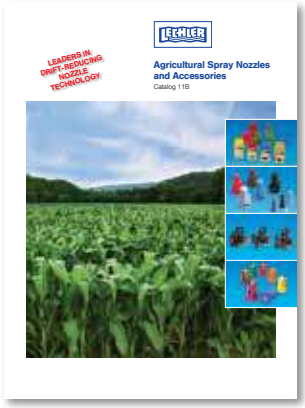
Agricultural technology

All over the world, Lechler agricultural nozzles and accessories are synonymous with efficiency and economy, while also taking account of environmental aspects.

Lechler has taken a leading role in loss-reducing application technology in particular. Lechler nozzles ensure that the pesticide lands on the plant exactly where it's needed.

This makes a decisive contribution towards optimizing the use of pesticides and protecting the environment.

A comprehensive range of nozzle accessories and other useful tools that Lechler can provide help the farmer to optimize the application technology and thereby increase his earnings.



Lechler teams with specialist knowledge will support you in your work. We would also be happy to provide you with specialized product information.

SELECTING THE RIGHT SPRAY CHARACTERISTICS

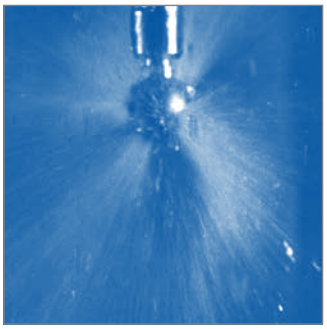
Principles of Spray Technology

Atomization is the process of breaking a mass of fluid into smaller droplets for a twofold purpose: Control the distribution of liquid and increase the amount of liquid surface area to best achieve the spray's ultimate purpose. Nozzles follow these basic principles of atomization:

Single fluid atomization
Forcing pressurized liquid through a specifically-shaped chamber and orifice increases its velocity and breaks it into droplets. Each nozzle combines internal liquid collision, turbulence, spinning action, and its own specific design to create the desired shape and distribution of the liquid as it leaves the orifice.

Pneumatic (twin fluid) atomization
Gas streams collide with liquid, transferring energy to the liquid to create very small droplets. This method allows atomization of liquids whose viscosity is too high for single fluid nozzles. Air atomizing nozzles are either internal or external mix, meaning the gas and liquid mix either inside or outside the nozzle chamber.

Nozzles are also classified by their spray pattern and physical configuration. Here are the primary types you will find in this catalog:



Tank cleaning nozzles

Tank cleaning nozzles are either rotating or static sprays. Rotating nozzles are either free spinning (i.e., driven by reactive force of the cleaning fluid) or gear-driven by turbine or internal gears. These nozzles effectively clean tank surfaces through rapid repetition impact and flow movement, which loosens the soil and rinses it away. Free spinning nozzles operate best at lower pressures (20-60 psi), as higher pressures cause the head to rotate too fast, creating more of an atomized mist spray which is less effective for cleaning. Gear-driven models can successfully operate at slightly elevated pressures, and these generate more impact, as their head rotation is controlled by the gears.

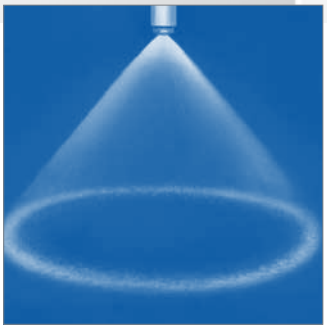
Static spray balls do not rotate. They are used primarily for washing down relatively small tanks and vessels.

Pneumatic atomizing

This is a wide-ranging product family used where low liquid capacities and fine droplets are required. While these are normally used with pressurized air and water-like fluids, certain of these nozzles are well suited for higher viscosity liquids or situations where pressurized air is not available and gravity feed or siphoning measures must be used instead. Applications include: Humidification, dust control, gas cooling, precision coating, and spray drying.

Flat fan air atomizers:
These produce a flat spray pattern with extremely fine droplets. Spray angles can range as high as 80°. They are available in both internal and external mix configurations.

Full cone air atomizers:
These produce a round, conical spray with extremely fine droplets distributed throughout. Spray angles range from 20° to 60°. They are available in both internal and external mix configurations.



Hollow cone spray

This design is employed more frequently for its ability to create fine droplets rather than the shape of the spray. Applications include: Scrubbers, chemical reactors, gas cooling, and dust control.

Axial flow:
An internal vane (swirl insert) creates a conical spray with a hollow center. The resulting impact area is ring-shaped. This configuration is generally limited to small capacities but generates some of the finest droplet size profiles of any single fluid nozzle.

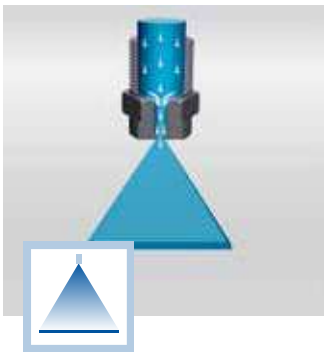
Tangential flow:
The liquid enters the nozzle on a path perpendicular to the output cone to generate swirling action without an internal vane. Most hollow cone nozzles use this design approach, especially in larger capacities, due to its higher clog resistance. The centrifugal force on the swirling liquid helps form the droplets as the liquid leaves the orifice.

Full cone spray

Internal swirling action creates a cone with uniform distribution throughout. This is most appropriate when trying to completely cover a large area with medium-sized droplets. Applications include: Product cooling, washing, and conveyor cleaning.

Axial flow:
The most common configuration uses an internal vane (swirl insert) to create a spray angle as wide as 120°. Vanes are designed to reduce clogging potential with uniform liquid distribution.

Tangential flow:
Due to their vaneless design, these nozzles can offer an even more clog-resistant approach for smaller capacities if the inlet position is not a constraint. Critical internal geometry allows the spray to fill in to achieve distribution similar to axial counterparts.



Flat fan spray

This design is the first choice when a sharply defined spray is needed for concentrated impact and cleaning power. There are a wide variety of capacities, spray angles and distributions to create the desired effect very precisely. Applications include: Parts cleaning, product cooling, conveyor washing, and strip coating.

Axial flow:
Most designs use a precisely shaped orifice to create controlled turbulence which breaks apart the liquid. Spray angles range from 15° to 110° with specific liquid distribution.

Tangential (deflector) flow:
Some designs use a solid stream orifice that sprays against a deflecting surface, sometimes referred to as a "tongue." One such model produces an exceptionally wide spray angle while another channels the fluid into a powerful narrow angle jet. The round orifice of each minimizes clog potential.

Solid stream spray

Calling this nozzle a spray is misleading in that it is the only family designed specifically not to produce droplets. This nozzle creates a solid shaft of water that retains its shape as long as possible before it begins to atomize. This generates the most concentrated impact possible. All conventional designs are axial. Applications include: Concentrated cleaning, cutting, and trimming.

Air nozzles

Air does not have the same spray characteristics as liquids, so most liquid nozzles are not suited for air. Air nozzle designs typically concentrate the stream into a small area, or disperse it into a flat fan. Compressed air can create very high noise levels, so effective designs minimize this while achieving the desired distribution. Many of Lechler's air nozzles use a multi-channel orifice configuration for just this purpose.

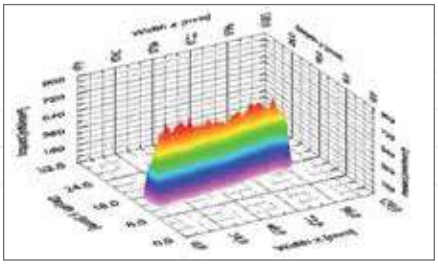
NOZZLE PERFORMANCE AND CHARACTERISTICS

The most essential nozzle operating attributes are:

- Flow rate
- Spray angle
- Liquid distribution
- Spray impact
- Droplet size

Flow rate and spray angle
Flow rate varies directly with pressure (except for internal pneumatic atomizers). Flow rate and spray angle are also dependent upon the fluid being sprayed. **All data shown in our catalog is based upon spraying water.** A spray angle is measured from the nozzle orifice. As spray distances increase, the measure of spray width or pattern diameter is significantly less accurate and largely dependent upon gravity and ambient conditions, such as air friction losses. This results in an actual spray width which is less than the theoretical one for the nozzle's stated spray angle. In critical situations, only empirical testing can determine the final spray width.

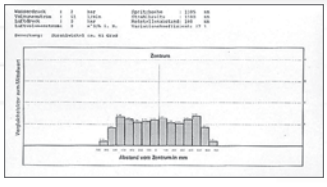
Liquid distribution
Liquid distribution refers to the distribution of droplets of a spray within the spray area. For most spray applications, an even distribution of liquid upon the target is paramount. Most axial flat fan nozzles have distribution which is parabolic across the nozzle's spray width—i.e., heavier in the middle and less on either end. This is due to the elliptical shape of the nozzle orifice required to create the fan pattern. Thus, flat fan nozzles must be overlapped on headers to create an even distribution across the total spray width. Certain deflector flat fan nozzles spray more uniformly, however, and can be used individually for even distribution.



Spray impact
Impact is the impingement of a spray upon its target. It is a factor of:

- The droplet size created by the specific nozzle
- The feed pressure through the nozzle
- The flow rate of the nozzle at the feed pressure.

While impact is quantitatively measurable, it is more typically qualitatively measured. That is, testing with various nozzles and operating conditions can determine what impact is most effective for that spray application.



Viscosity
Viscosity is probably the most significant of all liquid properties because it can vary over an extreme range. Liquid viscosity resists surface formation. If the viscosity is great enough, a nozzle may produce a mass of filaments instead of a spray. Liquid viscosity is remarkably sensitive to temperature. Thus, liquid viscosity has a significant effect on all of the spray characteristics.

Specific gravity
The main effect of the specific gravity of a fluid being sprayed is on the flow rate of the nozzle. The lower the specific gravity of a liquid, the higher the velocity through the nozzle, and vice versa. Thus, for lower specific gravity, the flow rate is larger than the liquid with a higher specific gravity at the same pressure. To find the expected flow rate for liquid whose specific gravity is different from that of water, use the formula in the chart below.

Surface tension
Surface tension is an important physical properly affecting surface formation. This quality makes the liquid resist breaking into droplets. The main effect of the surface tension is on the spray angle and droplet size of the spray nozzle as well as on the spray distribution.

Temperature
Temperature influences a liquid's viscosity, surface tension, and specific gravity, which in turn can affect spray nozzle performance.

Pressure
The greatest influence on the flow rate is pressure. Flow rate not only increases directly with an increase in pressure but does so at a consistent rate. Please see the Flow rate/pressure chart below for formulas to determine for either flat fans or full cones (1) a flow rate when pressures are known or (2) the necessary pressure to create a desired flow rate.

Flow rate/pressure chart*

Formulas for determining unknown flow rate (v_2) and pressure (p_2) for nozzles other than Axial Full Cones	$v_2 = \sqrt{\frac{p_2}{p_1}} \cdot v_1$ [gpm] $p_2 = \left(\frac{v_2}{v_1}\right)^2 \cdot p_1$ [psi]
Formulas for determining unknown flow rate (v_2) and pressure (p_2) for Axial Full Cones	$v_2 = \left(\frac{p_2}{p_1}\right)^{0.4} \cdot v_1$ [gpm] $p_2 = \left(\frac{v_2}{v_1}\right)^{2.5} \cdot p_1$ [psi]

*** Flow rate/pressure chart key**
For either flat fans or full cones, v_1 and p_1 are the known flow rate and pressure respectively. For an unknown flow rate, v_2 is the resulting flow rate at the desired pressure p_2. For an unknown pressure, p_2 is the resulting pressure required to achieve the desired flow rate v_2.

Specific gravity

SG = Specific gravity SG_{FL} = Specific gravity of fluid $Density_{FL}$ = Density (g/mL) of fluid	SG = $Density_{FL}$ (g/mL)/Density of water (1g/mL) Therefore, specific gravity of water = 1.00
Expected flow rate of fluid other than water = Any given flow rate of water x $(1/\sqrt{p_{FL}})$	Example: For fluid with SG_{FL} = 1.2 and given flow rate of 4.0 gpm, expected flow = 4.0 x $(1/\sqrt{1.2})$ = 3.6 gpm

DROPLET SIZE INFORMATION

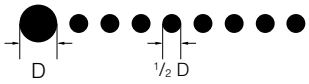
Droplet size
Droplet size is important both as a part of achieving an even spray distribution and in the accomplishment of goals required by certain spray applications. The spray from a given nozzle does not break into uniform droplets but atomizes into a wide range of individual droplet sizes. Lechler measures droplet size and velocity of a given spray with a Phase Doppler Particle Analyzer. If droplet size is critical to your application, contact us to discuss your specific requirements.

Droplet sizes
(One inch = 25,400 microns)

500 microns

1,200 microns

5,500 microns



Given a large droplet and a smaller droplet which is half the diameter of the large one: The volume of the large droplet corresponds to the total volume of eight of the smaller droplets. The surface area of the large droplet is four times the size of that of the smaller droplet. The total surface of the eight smaller droplets, however, is twice the size of the large droplet.

A spray nozzle breaks up a mass of fluid into a multitude of smaller droplets for the purpose of achieving one of these end results:

- Cleaning
- Cooling
- Coating
- Combustion

Droplet size is typically measured in microns. A micron is 1/1000 of a millimeter (mm), and for this purpose, relates to a mean or median droplet diameter.

Droplet size considerations

Droplet size is important in a spray's performance. Large droplets are best when impact is important, such as for cleaning. Smaller droplets are best when more uniform coverage is required or if a fine mist is required (such as for humidification or evaporation). There are several different ways that droplet sizes are expressed but the main two ways are as follows:

- ***Sauter Mean (or SMD)***
  The diameter of a droplet whose ratio of volume to surface area is equal to that of the entire spray sample; also called "volume surface mean."
- ***Mass (Volume) Median***
  The mass (volume) median diameter of a droplet which divides the mass (volume) of the spray into two equal halves.

Significant factors influencing droplet size include:

- Nozzle type
- Flow capacity
- Inlet feed flow pressure (psig)
- Spray pattern

All other factors being equal, the following nozzle types produce droplet size from smallest to largest:

- Pneumatic atomizing
- Hollow cone
- Flat fan
- Full cone

Refer to the chart on page 14 regarding Spray Performance to see how other operating and fluid conditions can affect droplet size.

Droplet size range according to nozzle type (Sauter Mean Diameter, SMD)

Single fluid nozzles	Liquid pressure (psi)					
	15		30		75	
	Flow rate (gpm)	Droplet size (µm)	Flow rate (gpm)	Droplet size (µm)	Flow rate (gpm)	Droplet size (µm)
Axial flow hollow cone nozzle	- -	- -	.03 .30	140 240	.04 .42	100 180
Tangential hollow cone nozzle	- .48	- -	.30 6.6	320 640	.38 9.5	240 490
Full cone nozzle	.21 5.0	540 1300	.30 6.6	400 1100	.42 10.6	300 750
Cluster head nozzle	.24 5.3	200 400	.33 7.4	175 265	.53 11.6	150 190
Flat fan nozzle	.18 4.8	400 1200	.30 6.6	360 1000	.42 10.6	300 690

Pneumatic atomizing nozzles	Air/water ratio (m^3/h:l/min)					
	5		10		20	
	Flow rate (l/min)	Droplet size (µm)	Flow rate (l/min)	Droplet size (µm)	Flow rate (l/min)	Droplet size (µm)
Various	Various	90	Various	55	Various	40

SPRAY NOZZLE CONSIDERATIONS

How well and how long any nozzle will perform is largely affected by its operating conditions. A nozzle's spray performance should be regularly checked and evaluated to determine if it is acceptable. The nozzle itself should also be visually inspected during a maintenance shutdown and checked for signs of wear or damage. Reasons for a poor or deteriorating spray performance include:

Wear/Erosion

- *What is it*—Gradual reduction of the nozzle material resulting in an enlarged orifice or internal passages.
- *Symptoms*
  - — Larger flow rate
  - — Reduced spray angle
  - — Decreased impact
  - — Larger droplets
  - — Irregular spray pattern
- *Solution*—Replace nozzle.

Corrosion

- *What is it*—Deterioration of the essential properties of a material due to the chemical reaction to the material it is spraying. Can result in a build-up of oxides or salt on the outside of the nozzle near the orifice.
- *Symptoms*
  - — Same as for Wear/Erosion
  - — Damage to the nozzle
- *Solution*—Replace nozzle.

Bearding/Caking

See page 54.

Clogging

- *What is it*—Unwanted particles from the sprayed fluid which become lodged in the orifice, restricting the incoming flow.
- *Symptoms*
  - — Reduced flow rate
  - — Reduced spray angle
  - — Irregular spray pattern
- *Solution*—Clean out nozzle orifice and internals (CAUTION: Do NOT clean with a metal utensil).

High Temperature

- *What is it*—Breakdown of the nozzle material due to elevated temperatures of either the fluid being sprayed, the surrounding environment, or both.
- *Symptoms*
  - — Softened material
  - — Unpredictable performance
- *Solution*—Replace nozzle and ensure that material of replacement nozzle is more resistant to high temperatures.

Accidental Damage

- *What is it*—Physical damage to the nozzle or its orifice by dropping during installation, falling during operation, or scratching while attempting to clean with inappropriate tools.
- *Symptoms*
  - — Noticeable damage to outside of nozzle
  - — Possible leakage around nozzle if damage to threads
  - — Unpredictable performance if damage to orifice
- *Solution*—Replace nozzle, especially if performance is affected or nozzle leaks due to thread damage.

Service life

The service life of a given nozzle is dependent on various circumstances:

- Operating pressure
- The liquid being sprayed
- The surrounding environment
- Solids in the liquid
- Deposits on the nozzle
- Installation and handling

Therefore we cannot predict how long a nozzle will last in a given application. Select from our long list of materials one that works best for you.

Nozzle wear

Nozzle wear is manifested by an increased flow and the subsequent deterioration of spray performance.

A reduction in system operating pressure is often an indication of increased nozzle wear, especially when positive displacement pumps are used.

Flat fan axial nozzles exhibit a narrowing of the spray pattern with wear. Other type spray nozzles reveal a loss in distribution uniformity within the spray pattern, though without a noticeable change in pattern size.

Please call and consult with our sales engineers to determine the best nozzle design and material to satisfy your specific spray requirements. We will be glad to help.

Conditions affecting spray nozzle performance

The charts below are for:

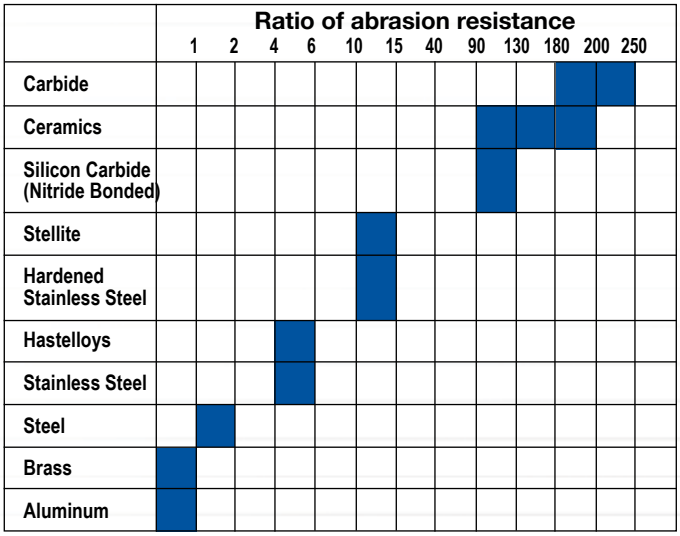
- The basic cause-and-effect relationship between spraying conditions and performance
- The ratio of abrasion resistance differences between various nozzle materials

Spray Performance

	Increase in operating pressure	Increase in viscosity	Increase in specific gravity	Increase in fluid temperature	Increase in surface tension
Pattern quality	+	*	—	+	○
Capacity	+	—	*	*	○
Spray angle	+ then -	○	—	+	—
Velocity	+	—	—	—	○
Droplet size	—	○	+	—	+
Impact	+	○	—	+	○
Wear	+	○	—	*	○

* Depends on Fluid Being Sprayed and Spray Nozzle Used.

\+ Increases — Decreases ○ Negligible or no effect



SELECTING NOZZLE MATERIAL

There are more than 100 different materials from which our nozzles can be made but for most applications, a handful of compositions can handle the task.

Brass
- Economical
- Long-lasting metal material for low pressure applications where chemical corrosion is not an issue

Stainless steel and nickel-based alloys
- Excellent performance in more aggressive environments where higher temperatures and corrosive products may shorten the life of a lesser material
- Good value for the above conditions

Ceramic and refractory-based materials
- Best for erosive wear conditions
- Can handle extreme temperatures that might melt or corrode common metals or plastics
- Provide long life in the toughest applications

Plastics
- Includes PVDF, PP, PTFE, and POM among others (more info on PVDF on this page)
- High value combination of economy, long service life, and resistance to a broad range of chemicals (where temperatures allow)

PVDF – Polyvinylideneflouride

PVDF is one of the more sophisticated materials today that can be used as nozzle material. Lechler's injection molded PVDF material offers spray quality and durability as good as its best brass and stainless steel counterparts. And because of its low cost, we say that PVDF provides "the performance of stainless steel at the price of brass". Lechler has its own in-house mold-making and injection-molding equipment which allows us to control quality and manufacturing while keeping costs low. See our product offerings for nozzles in PVDF. PVDF is an outstanding choice as a nozzle material for many reasons:

- **Chemical resistance**
  PVDF is typically resistant to:
  - Most acids
  - Salts and weak bases
  - Halogens and halogenated solvents
  - Alcohol
  - Oxidants
  - DI water
  - UV and nuclear radiation
- **Temperature range**
  PVDF can be used at temperatures as high as 285°F depending on the chemical environment.
- **Abrasion resistance**
  In most nozzle applications, PVDF will outlast brass, mild steel, PVC, PTFE, and most grades of stainless steel
- **FDA acceptance**
  The FDA accepts PVDF for uses in a broad range of food and pharmaceutical applications where stainless steel used to be the only choice.

Conversion factors for determining the weight of various materials

Material	Factor
Brass	1.00
Stainless steel	.95
Plastics (PVDF)	.21
Aluminum	.33
Silicon carbide	.39
Titanium	.54
Cast iron	.89
Tantalum	2.00

Most weights in this catalog refer to brass. By applying the conversion factors of this chart, the approximate weight of nozzles in selected other materials can be easily calculated.

Stainless steel

Plastic material

Brass

Silicone carbide

CONVERSION TABLES AND COVERAGE CHART

Multiply	by	to obtain
Bar	100	Kpa
Bar	14.5	P.S.I.
Centimeters	0.3937	Inches
Centistokes	Sp. gravity	Centipoise
Cubic Centimeters	0.061	Cubic Inches
Cubic Centimeters	0.000264	Gallons
Cubic Centimeters	0.001	Liters
Cubic Feet	1728	Cubic Inches
Cubic Feet	0.02832	Cubic Meters
Cubic Feet	7.48	Gallons
Cubic Feet	28.32	Liters
Cubic Feet (Water)	62.43	Pounds (Water)
Cubic Inches	16.39	Cubic Centimeter
Cubic Inches	0.00433	Gallons
Cubic Inches	0.0164	Liters
Cubic Meters	35.31	Cubic Feet
Cubic Meters	61023	Cubic Inches
Cubic Meters	264.2	Gallons
Cubic Meters	1000	Liters
Degree (Celsius)	(°Cx1.8)+32	Degree (Fahrenheit)
Degree (Fahrenheit)	(°F-32)x0.56	Degree (Celsius)
Feet	0.3048	Meters
Feet of Water	0.0295	Atmospheres
Feet of Water	0.433	P.S.I.
Gallons	3785	Cubic Centimeters
Gallons	0.1337	Cubic Feet
Gallons	0.83267	Imperial Gallons
Gallons	3.785	Liters
Gallons	8.34	Pounds (Water)
Grams	.0022	Pounds
Imperial Gallons	1.2	Gallons
Inches	2.54	Centimeters
Kgf./Sq. Cms.	14.22	P.S.I.
Liters	1000	Cubic Centimeters
Liters	0.264	Gallons
Liters	0.22	Imperial Gallons
Liters	33.8	Ounces (Fluids)
Meters	3.281	Feet
Microns	0.0394	Thousandth of an Inch
Millimeters	0.0394	Inches
Pounds	453.6	Grams
Pounds (Water)	0.1198	Gallons
P.S.I.	0.068	Atmospheres
P.S.I.	0.06895	Bar
P.S.I.	2.307	Feet of Water
P.S.I.	0.0703	Kgf./Sq. Cms.
P.S.I.	6.895	Kpa
to obtain	**by**	**divide**
to obtain	**by**	**divide**
to obtain	**by**	**divide**

P Pressure

Unit	bar	Pascal [Pa] = N/m²	kp/cm² = 1 at	psi	lb/sq ft
1 bar	1	100000	1.02	14.5	2089
1 Pascal [Pa]	$1 \cdot 10^{-5}$	1	$1.02 \cdot 10^{-5}$	$14.5 \cdot 10^{-5}$	0.0209
1 at = kp/cm²	0.9807	98070	1	14.22	2048
1 psi	0.06895	6895	0.07031	1	144
1lb/sq ft	$0.479 \cdot 10^{-3}$	47.9	$0.4882 \cdot 10^{-3}$	$6.94 \cdot 10^{-3}$	1

V Volume

Conversion / Unit	l	m³	Imp. gal	US gal
1 l (1 dm³)	1	$1 \cdot 10^{-3}$	0.22	0.264
1 m³	1000	1	220	264.2
1 Imp. gallon	4.546	$4.546 \cdot 10^{-3}$	1	1.201
1 US gallon	3.785	$3.785 \cdot 10^{-3}$	0.8327	1

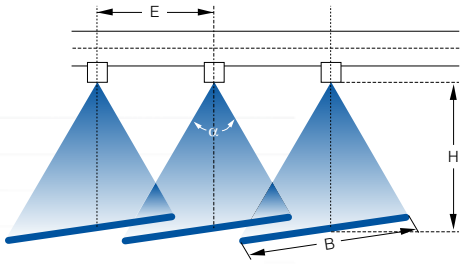
Theoretical Spray Coverages

Spray angle	Distance from nozzle orifice													
	2"	4"	6"	8"	10"	12"	15"	18"	24"	30"	36"	48"	60"	72"
5°	0.2"	0.4"	0.5"	0.7"	0.9"	1.1"	1.3"	1.6"	2.1"	2.6"	3.1"	4.2"		
10°	0.4"	0.7"	1.1"	1.4"	1.8"	2.1"	2.6"	3.1"	4.2"	5.2"	6.3"	8.4"		
15°	0.5"	1.1"	1.6"	2.1"	2.6"	3.2"	3.9"	4.7"	6.3"	7.9"	9.5"	12.6"		
20°	0.7"	1.4"	2.1"	2.8"	3.5"	4.2"	5.3"	6.4"	8.5"	10.6"	12.7"	16.9"		
25°	0.9"	1.8"	2.7"	3.5"	4.4"	5.3"	6.6"	8.0"	10.6"	13.3"	15.9"	21.2"		
30°	1.1"	2.1"	3.2"	4.3"	5.4"	6.4"	8.1"	9.7"	12.8"	16.1"	19.3"	25.7"	32.2"	38.6"
35°	1.3"	2.5"	3.8"	5.0"	6.3"	7.6"	9.5"	11.3"	15.5"	18.9"	22.7"	30.3"	37.8"	45.4"
40°	1.5"	2.9"	4.4"	5.8"	7.3"	8.7"	10.9"	13.1"	17.5"	21.8"	26.2"	34.9"	43.6"	52.4"
45°	1.7"	3.3"	5.0"	6.6"	8.3"	9.9"	12.4"	14.9"	19.9"	24.8"	29.8"	39.7"	49.6"	59.6"
50°	1.9"	3.7"	5.6"	7.5"	9.3"	11.2"	14.0"	16.8"	22.4"	28.0"	33.6"	44.8"	56.0"	67.2"
55°	2.1"	4.2"	6.3"	8.3"	10.3"	12.5"	15.6"	18.7"	25.0"	31.2"	37.5"	50.0"	62.4"	75.0"
60°	2.3"	4.6"	6.9"	9.2"	11.5"	13.8"	17.3"	20.6"	27.7"	34.6"	41.6"	55.4"	69.2"	83.0"
65°	2.5"	5.1"	7.6"	10.2"	12.7"	15.3"	19.2"	22.9"	30.5"	38.2"	45.8"	61.2"	76.4"	91.6"
70°	2.8"	5.6"	8.4"	11.2"	14.0"	16.8"	21.0"	25.2"	33.6"	42.0"	50.4"	67.2"	84.0"	101.0"
75°	3.1"	6.1"	9.2"	12.3"	15.3"	18.4"	23.0"	27.6"	36.8"	46.0"	55.2"	73.6"	92.0"	110.0"
80°	3.4"	6.7"	10.1"	13.4"	16.8"	20.2"	25.2"	30.3"	40.3"	50.4"	60.4"	80.6"	101.0"	121.0"
85°	3.7"	7.3"	11.0"	14.7"	18.3"	22.0"	27.5"	33.0"	44.0"	55.0"	66.0"	88.0"	110.0"	132.0"
90°	4.0"	8.0"	12.0"	16.0"	20.0"	24.0"	30.0"	36.0"	48.0"	60.0"	72.0"	96.0"	120.0"	144.0"
95°	4.4"	8.7"	13.1"	17.5"	21.8"	26.2"	32.8"	39.3"	52.4"	65.5"	78.6"	105.0"		
100°	4.8"	9.5"	14.3"	19.1"	23.8"	28.6"	35.8"	43.0"	57.2"	71.6"	85.9"	114.0"		
110°	5.7"	11.4"	17.1"	22.8"	28.5"	34.3"	42.8"	51.4"	68.5"	85.6"	103.0"			
120°	6.9"	13.9"	20.8"	27.7"	34.6"	41.6"	52.0"	62.4"	83.2"	104.0"				
130°	8.6"	17.2"	25.7"	34.3"	42.9"	51.5"	64.4"	77.3"	103.0"					
140°	10.9"	21.9"	32.9"	43.8"	54.8"	65.7"	82.2"	98.6"						
150°	14.9"	29.8"	44.7"	59.6"	74.5"	89.5"	112.0"							
160°	22.7"	45.4"	68.0"	90.6"	113.0"									
170°	45.8"	91.6"												

EXAMPLES FOR NOZZLE ARRANGEMENTS

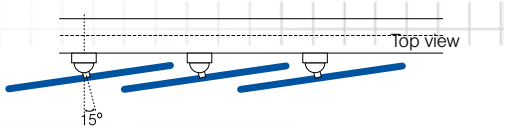
Arrangement of flat fan nozzles with parabolic liquid distribution

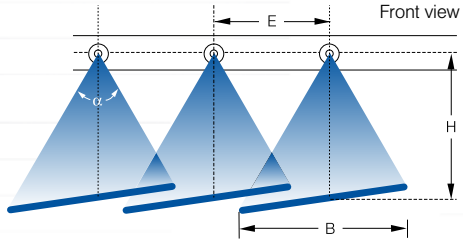
Lechler flat fan nozzles provide a consistent, parabolic coverage over the impact area. For this purpose, the spray widths B ought to overlap each other by 1/3 to 1/4. To avoid interferences of the sprays, the nozzle orifices must be offset 5°-15° to the pipe axis.



Alignment of tongue-type nozzles

Lechler tongue-type nozzles have an even or uniform liquid distribution. In order to achieve an even surface coverage the nozzles need to be aligned in such a way that spray widths B overlap by either 0% or 50%. Therefore the nozzles should be inclined in an angle of 15° to the vertical of the horizontal axis of the tube (either with a weld base at an angle or a Lechler ball joint nozzle mount) in order to prevent a disturbance of the spray.

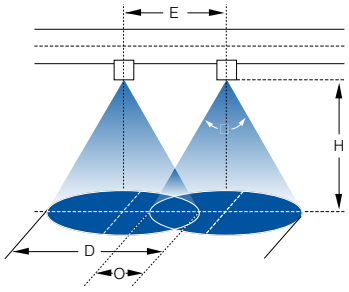




Arrangement of full cone and hollow cone nozzles

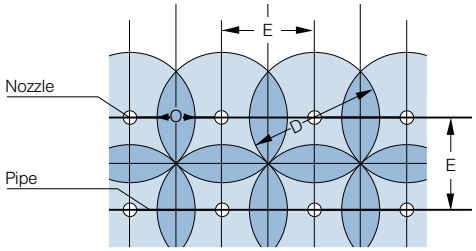
For full cone and hollow cone nozzles, the distance E should be sized so that the spray cones overlap by about 1/3 to 1/4.

O = Overlap of spray angles
D = Spray diameter
E = Nozzle distance
H = Installation distance of nozzles
α = Spray angle



Square or offset arrangement of full cone or hollow cone nozzles

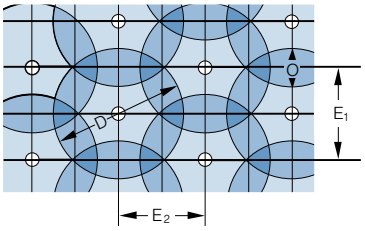
Square arrangement



Nozzle distance: $E = \frac{D}{\sqrt{2}}$

Overlap: $O = D - E$

Offset arrangement



Nozzle distance: $E_1 = \frac{D}{2} \times \sqrt{3}$

Nozzle distance: $E_2 = \frac{3}{4} D$

Overlap: $O = D - E_1$

ACCESSORIES TO SIMPLIFY OPERATION

Choosing one of our nozzles is only half of the total process. It can't do its job without being connected properly to the liquid supply. Our range of accessories can help you optimize nozzle mounting and placement to save time and ensure reliable operation.

The most useful approach may be a custom fabricated header. Lechler can design and build a header to support and supply multiple nozzles in a way that will simplify plumbing, speed installation, and create a trouble-free spray process.

With a few moments of planning ahead, you can consider some well-placed accessories that might make your job a lot easier.

Standard threaded nozzles:
Clip-on nozzle bases for quick, inexpensive header mounting, pages 103, 137

Ball joints allow precise nozzle aim and alignment, pages 128, 133

Custom headers provide structure, simple plumbing, and ideal nozzle placement, page 143

Tip configurations:
Threaded bases and caps, page 126

Special accessories for dovetail fan nozzles provide presetting of the spray alignment, page 132

Strainers to prevent clogging and check valve assemblies to prevent dripping, pages 131, 132

Split eyelet mounts for custom headers, page 130

TWISTLOC and bayonet quick release systems:
TWISTLOC stainless steel and brass bases and caps, pages 131-133

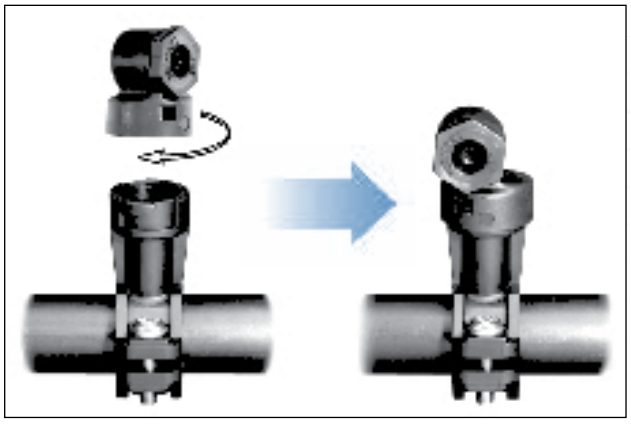
Plastic bayonet bases and caps, pages 131-133

Split eyelet bayonet mounts, page 135

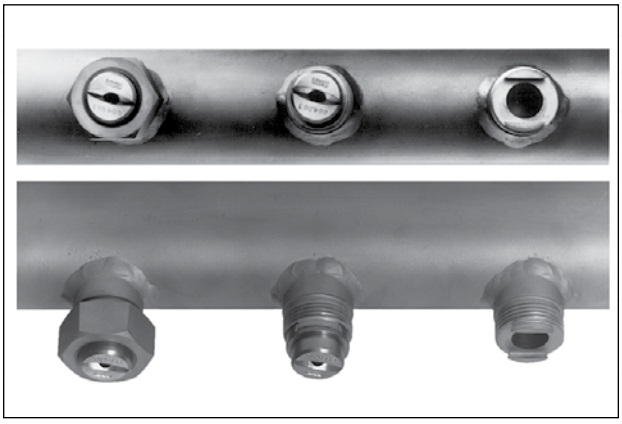
Custom headers:
Brush and flush header systems, page 144

Fabricated headers, page 142-143

For quick reference, Lechler's mounting options are illustrated in the Accessories section of this catalog, page 129



Bayonet quick release system



Dovetail guide

Tank cleaning nozzles

Beverage industry
Bioengineering
Chemical industry
Cosmetic industry
Food industry
Pharmaceutical industry
Tank building
and many others...

How to choose the right tank cleaning nozzle

The following step-by-step procedure will help you define your cleaning task and get the most out of our products.

Begin by analyzing your cleaning task:

- How large is the tank in terms of size and interior surface area?
- Where is the dirt located; how bad is it; and what is its nature?
- Which method of cleaning is required: strong blasts of cleaner or repetitive rinsing?
- What kind of cleaning fluid products are you using?
- Are there any internal obstacles (e.g., mixing blades, baffles, etc.)?
- More information on page 21.

When planning your tank cleaning nozzle installation, be sure to observe the following four parameters:

1) Rinsing effect — a function of flow rate

Determine the required liquid flow rate by testing the applied pressure and the liquid's ability to clean the dirt from the tank's surface.

- As the nozzle head revolves, it should cover the entire area to be cleaned with an effective amount of cleaning liquid.
- In comparison with rotational cleaners, static spray balls require roughly twice as much liquid flow.
- Remember: Your drain must be able to handle the flow rate of what you're putting in the tank.
- More information on flow rate guidelines on page 25.

2) Force of impact — helps strip off crusty dirt

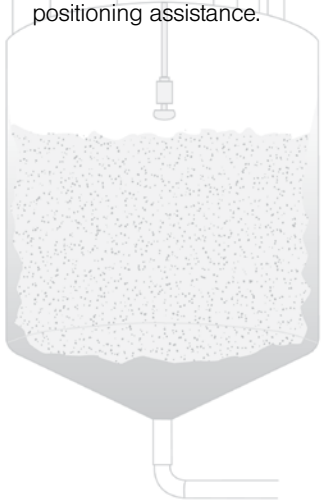
The force of impact depends upon:

- Adherence to the optimal operating pressure range for the type of nozzle in use.
- The right cleaning radius and volumetric flow for the size of tank in question.
- Concentration of the spray jets on the most badly soiled areas, e.g., 270° up or down.

As pressure increases, relative droplet size (mass) decreases. If pressure is elevated too high, an ineffectual mist is created. Increasing flow rate rather than pressure is a more efficient method of increasing impact. Lechler highly suggests contacting us if you have an application requiring operating pressures outside of the ranges for tank cleaning products listed herein.

3) Proper positioning — for optimal targeting

- In case of internal obstacles, either use several nozzles or place the nozzle at different locations.
- Slowly rotate any mixing blades or the like during the cleaning process.
- See "Typical Applications" box on page 21 for nozzle positioning assistance.



4) Application suitability — ensures safe operation

- When using any type of plastic spray nozzle, there is the possibility for static charge buildup that could create potential problems in some applications.
- For all tank applications involving combustible gas, flammable liquids, and/or other potentially explosive materials, please consult Lechler prior to purchasing tank cleaning nozzles.
- ATEX comprises two EU (European Union) directives describing what equipment and work is allowed in an explosive atmosphere. For companies in such areas who must also follow EU directives, Lechler makes tank cleaning nozzles which have ATEX approval. Contact Lechler for more information.

Contact Lechler for assistance in evaluating your particular tank cleaning application.

Rotating tank cleaning nozzle advantages

- Low-pressure application for lower energy consumption.
- Increased cleaning effectiveness due to fluid flow movement compared to static spray.

Types of rotating tank cleaning nozzles:

■ Free-spinning heads

The cleaning liquid turns the spray head by means of specially positioned nozzles. The greater the inlet pressure, the faster the head rotation. Repetitive impact cleans the tank surfaces. The effect is best at low pressures in small to medium-size tanks.

■ See pages 26-30, 33-36, and 39 for free-spinning nozzle design families

■ Internal regulated drive

The liquid flow powers the head by way of an internal propeller. This keeps the speed of the head within its optimal range across a wider span of pressures, and the nozzle creates more powerful spray impact.

■ See page 37 for XactClean® HP nozzles

Programmed rotation machines

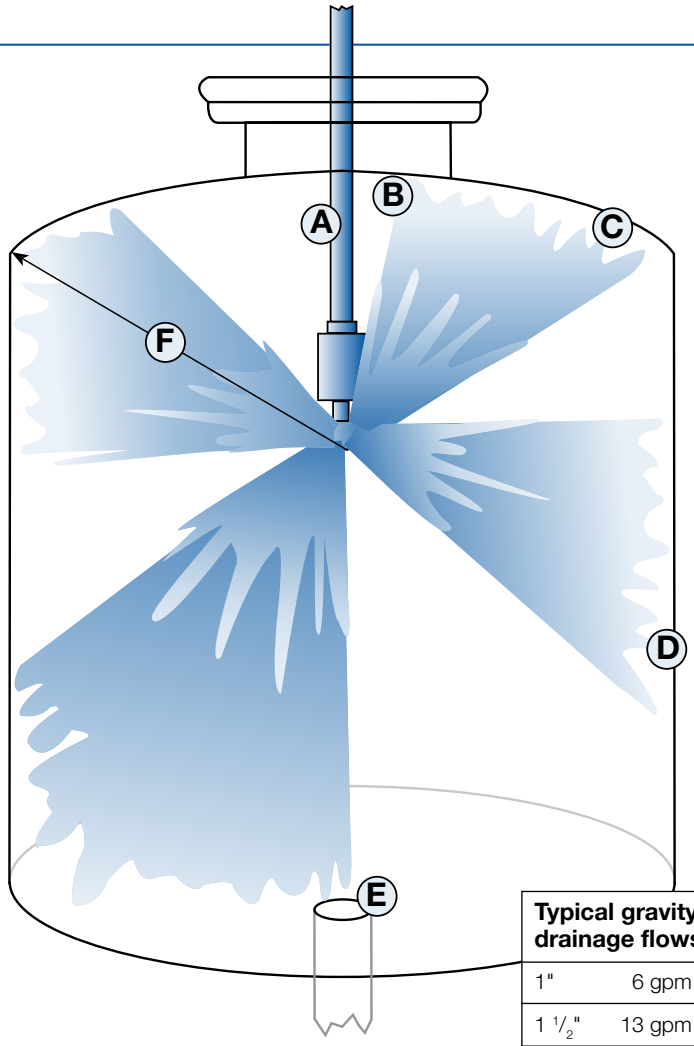
One variation of the internally-regulated drive is the programmed machine. Here, the cleaning fluid drives an internal gear reducer that keeps the sprayer turning in two planes. During a spray cycle, the jets sweep the entire tank interior following a programmed pattern. These models generate the highest impact and are therefore ideal for very large tanks and the toughest of cleaning tasks.

■ See page 40 for the 5TM design family

Static spray balls

Static spray balls do not rotate, so they require a comparatively large amount of liquid in order to generate turbulent flow, up to 2 to 3 times the amount compared to rotating nozzles. They are not as effective for most cleaning tasks as a comparable rotating nozzle. Their advantages include (1) having no moving parts, (2) being self draining, and (3) being traditionally used in sanitary environments. Whereas if a rotating nozzle stops turning, its cleaning effectiveness suffers, this is not a concern with a static ball. However, if a static ball has any of its orifices clogged, this can result in voids in coverage. Static balls are used primarily for washing down relatively small tanks and vessels.

■ See pages 31-32 for spray balls



Typical gravity drainage flows

1"	6 gpm
1 1/2"	13 gpm
2"	23 gpm
2 1/2"	35 gpm
3"	50 gpm
4"	91 gpm
5"	142 gpm
6"	204 gpm
7"	278 gpm
8"	363 gpm
9"	459 gpm
10"	567 gpm

Typical applications

Ⓐ – Position the tank cleaning nozzle(s) at the center of the tank. For the best nozzle depth location in the tank, see point Ⓒ below.

Ⓑ – Nozzles invariably leave an unsprayed shadow area directly overhead, the size of which varies according to the type of nozzle and the piping.

Ⓒ – The distance between the top of the tank and the nozzle should amount to 40%–70% of the nozzle's cleaning radius. Size your unit to ensure sufficient flow to the top part of the tank wall. Nozzles work under a "line of sight" principle. You may need more than one nozzle to eliminate spray shadowing produced by internal components of a tank, such as mixers, agitators, dip tubes, etc. Generally, the nozzle should be located so that it is at least 1/2" to 1" above the maximum fill level of the tank so that the nozzle does not become submerged in the product of the tank. Also, the nozzle should be located in the upper third of the tank height to ensure cleaning of the top as well as to take maximum use of the cascading effect of the cleaning fluid against the walls of the tank.

Ⓓ – The film of liquid grows thicker toward the bottom of the tank, where the washing effect is the most pronounced.

Ⓔ – Standing water reduces impact and allows solids to accumulate. Make sure that the drain can handle whatever you put into the tank (see chart at right).

Ⓕ – The critical spray distance is from the nozzle to the top corner, so the nozzle should be sized for this "effective washing distance".

All pressure data is stated in terms of differential pressure directly at the nozzle, so be sure to take the line-pressure drop into account.

Mounting configurations
Requirements for critical CIP applications

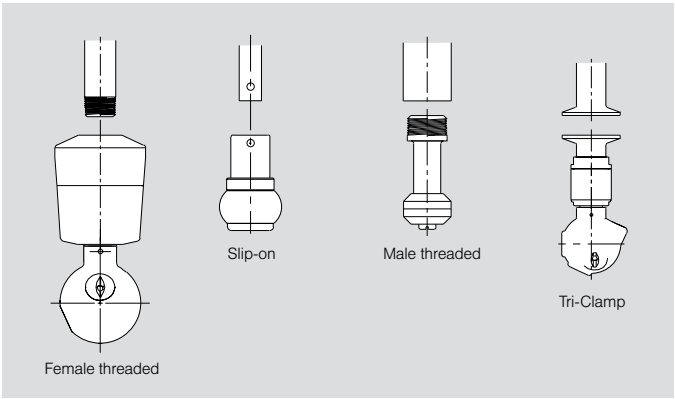
Mounting configurations

All Lechler tank cleaning nozzles are designed to be mounted on a pipe or tube. However there are several options for making the connection:

Threaded
Most designs use a female pipe thread for mounting on a male threaded pipe.

Slip-on
Nozzles for sanitary use do not use threads but slip around the end of a tube that has a cross hole drilled. A pin is then inserted to hold the head in place.

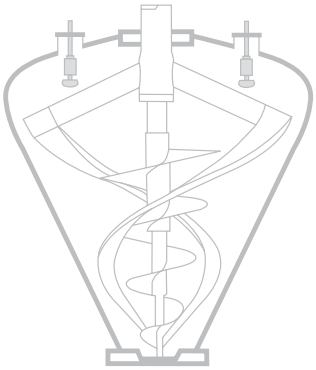
Tri-Clamp
Some manufacturers use tri-clamp connectors to join pipe. Lechler makes tank cleaning nozzles which have a compatible flange to mate with those. Each product section describes the mounting options in detail.



CIP nozzles for sanitary applications

Some installations leave the cleaning nozzle in the tank during production cycles such that it has contact with the product. If the product is critical, such as food or pharmaceutical materials, the nozzle has to be designed following specific protocols so that it will not contaminate the product.

■ See pages 32 and 35 for CIP nozzles



Typical washing sequences

A thorough tank cleaning sequence depends on the interaction between the soil, the cleaning solution and spray impact. The following sequence of steps are used in many applications:

- Pre-rinse — Begin with low grade or “used” water to rinse the interior, washing out the heaviest soil.
- Alkali wash — Use a mild solution such as 1% sodium hydroxide or trisodium phosphate. This removes most types of deposits.
- Second rinse — Follow with cleaner water to rinse out the alkali. This water can be used next time for the pre-rinse.
- Acid wash — A mild acid wash will neutralize any alkalinity and remove mineral deposits
- Final rinse — Use your cleanest water as the final step.

This approach may not be suitable for every application but it is adaptable. The degree of soiling in the tank and the cleaning chemical selected to clean it will determine how many times you can use the same chemicals and rinse water. If the pre-rinse is effective, it can extend the life of chemicals in the other steps.

Documentation

Once the sequence is established, all steps of the process should be documented for consistency in future operations. This includes many operational details:

- Washing sequence with number of execution times for each step
- Cleaning chemical selection and concentration
- Washing temperatures and pressures
- Maximum time between the shut-down of the process and cleaning cycle
- Operation of any internal equipment, mixers, etc.
- Manual valve settings, equipment disassembly or other personnel-dependent operations
- Order information and operation parameters of the installed nozzle

Resources for maximizing your tank cleaning capabilities

Service and support

As mentioned below, each 5TM (M20) customer may choose to maintain their own unit by following the directions in the Operation Manual. But for even greater ease of maintenance, send your unit to Lechler and let our service staff do all of the maintenance work for you. We have years of experience in maintaining these units and guarantee to return your freshly-refurbished unit back to you within 48 hours of our receiving it. So let our experienced staff take the worry out of the maintenance of your 5TM (M20) machine.

Rent vs. own

The purchase of a Lechler 5TM (M20) High Impact Tank Cleaning Machine is a major decision. To help assist you in this decision-making, Lechler offers its customers the option of renting an 5TM (M20) first. And if you eventually decide to purchase that unit, all rental fees paid to that point will be applied to the purchase price. While rentals are generally for trials by our customers, we at Lechler feel confident that once you have used your 5TM (M20) machine, you won't want to be without it again.

The five factors of cleaning

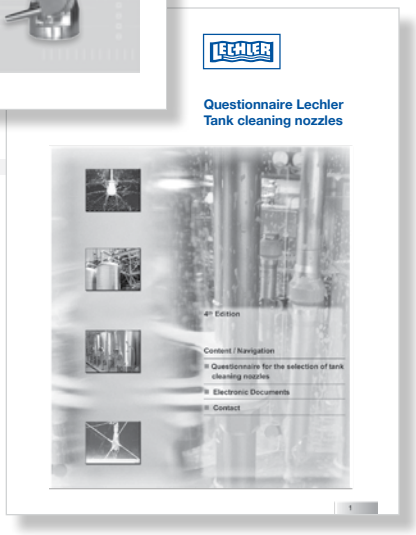
Tank cleaning, or any type of cleaning for that matter, is the result of four inter-related factors which can be manipulated for the greatest effectiveness:

- Temperature
- Chemical Reaction
- Mechanical Force
- Time
- Soil Composition

A tank cleaning nozzle (or machine) requires fluid (typically water) of a certain temperature, some type of chemical cleaning agent to interact with the cleaning medium, the mechanical action of the nozzle (typically its rotation) to project the fluid, and a period of time for the cleaning to occur. If any factor's effectiveness is reduced, it must be compensated by one or more of the other factors in order to ensure proper cleaning. For instance, to reduce the cleaning time for a tank, a greater inlet pressure (mechanical force) may need to be applied for higher impact and faster soil removal. Hotter water (temperature) for assistance in loosening that soil may also be required and perhaps even a greater amount of soap (chemical reaction) is needed to further assist the soil removal. And in comparing the two most common tank cleaning methods, a spray ball requires much more time and chemical action to clean when compared to a typical Lechler rotating nozzle, which relies more on the mechanical force of the rotating head (therefore using less time) to get the job done.

5TM (M20) Operation Manual

If you purchase our 5TM (M20) High Impact Tank Cleaning Machine, you will receive an Operation Manual for the unit. This manual explains how to maintain your unit for a long, reliable service life. This can either involve simply sending the unit to Lechler for regular maintenance or following the instructions in the manual for self-maintenance of the unit. Let this manual be your guide to years and years of effective tank cleaning.



Tank cleaning design assistance

If you need to design a tank cleaning system for your application, let Lechler assist you. We have more than 25 years of experience in designing and manufacturing tank cleaning products for any size job. If you go to our web site, www.lechlerusa.com, you can access a questionnaire which you can complete and email to Lechler for assistance in selecting the right nozzle(s) and quantity for your application.

Nozzle selection guide

The FDA, the U.S. Food & Drug Administration, is a federal agency which oversees those two industries. Where so noted in the catalog, materials used in making Lechler products are complaint with the requirements of FDA regulation 21 CFR for use in food applications.

The 3-A council is a U.S. organization which has set up a comprehensive inventory of sanitary standards and accepted practices for food and dairy processing equipment and systems. Manufacturer's equipment must meet these standards before the 3-A symbol is authorized to be used with it.

ATEX product availability
Lechler offers specific tank cleaning nozzles that conform to Directive 94/9/AC (ATEX) for European Union (EU) organizations for use in applications where an explosion hazard may exist. Please consult Lechler, Inc. if you have any questions regarding use of our products in your application.

Chart Heading Explanations

Tank diameter cleaning range
This is the range of sizes of the largest spherical tank in which the given tank cleaning product, while operating at the maximum recommended pressure, can deposit a thick film of liquid with a high force of impact.

Tank diameter rinsing range
This is the range of sizes of the largest spherical tank that can be covered with a somewhat thinner film of water by the given tank cleaning product operating at the maximum recommended pressure.

Operating pressure
This is the recommended range for maximum cleaning efficiency. The individual product tabulations may extend beyond these levels.

Flow rate range
This term includes the smallest through the largest flow rates in a family across the recommended pressure range.

Safe use of products

Lechler, Inc. bears responsibility towards all of its spray products to (1) be free of manufacturing defects and (2) perform within normal tolerance values for the specific flow and coverage parameters that have been established. The customer using our products is responsible for the safe use and suitability of our tank cleaning products.

Explosion protection

Due to the occurrence of static electricity, plastic heads are not suitable for spraying combustible cleansing media in potentially explosive atmospheres.

The following table will help you compare the various characteristics of Lechler's diverse products.
The basic technical data of each design family is provided here to enable quick selection of the most suitable type(s).

Series	Page	Type of rotation	Cleaning mechanism/ action	Tank diameter cleaning range (Ø ft.)	Tank diameter rinsing range (Ø ft.)	Operating pressure (psi)	Flow rate range (gal./min.)	Coverage options
PicoWhirly 500 MicroWhirly 500.191, 566	26-28	Free spinning	Flat fan, solid-stream nozzles	up to 5	up to 6	0 15 30 45 60 75 90 105	3-6	360° 300° 180°s
PopUp Whirly 5P2/5P3	29	Free spinning, friction bearing	Flat fan nozzles	3-5	5-7	0 15 30 45 60 75 90 105	2-12	200°
Hygienic Whirly 594/595	30	Free spinning, friction bearing	Flat fan nozzles	5-8	8-12	0 15 30 45 60 75 90 105	1-20	360°
Spray ball 540/541, 527 (3A)	31-32	No rotation, static spray	Solid stream nozzle, max. impact	5-25	8-35	0 15 30 45 60 75 90 105	4-155	360° 240°
Spinner 5MC/5MI	33	Free spinning, ball bearing	Flat fan nozzle, wash-down actions	4-9	6-12	0 15 30 45 60 75 90 105	6-21	360° 180° 60°
Stainless Steel Whirly 569	34	Free spinning, ball bearing	Flat fan nozzle, washdown action	4-10	10-15	0 15 30 45 60 75 90 105	15	360° 180° 270°s
Teflon Whirly 583/573 (3A) Hi-Temp Whirly 599	35-36	Free spinning, friction bearing	Solid stream nozzle, wash-down actions	4-10	10-15	0 15 30 45 60 75 90 105	18-70	360° 270°s
XactClean® HP 5S2/5S3	37	Controlled rotation, Internal turbine	Flat fan nozzles, high impact	10-20	15-30	0 15 30 45 60 75 90 105	3-54	360°
IntenseClean Hygienic 5TA/5TB	38	Gear-controlled	Solid stream, high impact	42-46	26-39	0 30 60 90 120 150 180 210	30-100	360°
Gyro 577	39	Free spinning, friction bearing	Flat fan nozzle, Solid stream, high impact	8-20	25-40	0 15 30 45 60 75 90 105	35-429	360° 180°s 270°
Tank Cleaning Machine 5TM	40	Gear-controlled	Solid stream nozzle, max. impact	20-50	40-75	0 15 30 45 60 75 90 105	40-110	360°

Orientation aid for flow-rate determination

Spherical

Diameter (feet)	Interior Surface (sq. feet)	Rinse (gpm)	Regular Wash (gpm)	Heavy Wash (gpm)
3	28	1	3	6
4	50	2	5	10
5	79	4	8	16
6	113	5	11	23
7	154	7	15	31
8	201	9	20	40
9	254	11	25	51
10	314	14	31	63
12	452	20	45	90
15	707	32	71	141
20	1256	57	126	251
25	1963	88	196	393
30	2826	127	283	565
35	3847	173	385	769
40	5024	226	502	1005

Short Cylinder (height = diameter)

Diameter (feet)	Height (feet)	Interior Surface (sq. feet)	Rinse (gpm)	Regular Wash (gpm)	Heavy Wash (gpm)
3	3	42	2	4	8
4	4	75	3	8	15
5	5	118	5	12	24
6	6	170	8	17	34
7	7	231	10	23	46
8	8	301	14	30	60
9	9	382	17	38	76
10	10	471	21	47	94
12	12	678	31	68	136
15	15	1060	48	106	212
20	20	1884	85	188	377
25	25	2944	132	294	589
30	30	4239	191	424	848
35	35	5770	260	577	1154
40	40	7536	339	754	1507

Medium Cylinder (height = 1.5 x diameter)

Diameter (feet)	Height (feet)	Interior Surface (sq. feet)	Rinse (gpm)	Regular Wash (gpm)	Heavy Wash (gpm)
3	4.5	57	3	6	11
4	6.0	100	5	10	20
5	7.5	157	7	16	31
6	9.0	226	10	23	45
7	10.5	308	14	31	62
8	12.0	402	18	40	80
9	13.5	509	23	51	102
10	15.0	628	28	63	126
12	18.0	904	41	90	181
15	22.5	1413	64	141	283
20	30.0	2512	113	251	502
25	37.5	3925	177	393	785
30	45.0	5652	254	565	1130
35	52.5	7693	346	769	1539
40	60.0	10048	452	1005	2010

Tall Cylinder (height = 2 x diameter)

Diameter (feet)	Height (feet)	Interior Surface (sq. feet)	Rinse (gpm)	Regular Wash (gpm)	Heavy Wash (gpm)
3	6	71	3	7	14
4	8	126	6	13	25
5	10	196	9	20	39
6	12	283	13	28	57
7	14	385	17	38	77
8	16	502	23	50	100
9	18	636	29	64	127
10	20	785	35	79	157
12	24	1130	51	113	226
15	30	1766	79	177	353
20	40	3140	141	314	628
25	50	4906	221	491	981
30	60	7065	318	707	1413
35	70	9616	433	962	1923
40	80	12560	565	1256	2512

Flow rate guidelines

These charts can help you choose a tank cleaning nozzle based on its size and configuration. Find the closest shape and size to yours and match the color to the key at the bottom. For purposes of flow sizing, we recommend evaluation based on flow per unit of interior surface area. For most washing applications using a rotating nozzle, a flow rate of 0.1 gpm per square foot of interior surface area is sufficient. This ensures coverage with a full sheet of liquid at the least adequately washed areas of the tank.

Light rinsing with full coverage requires at least 0.04 gpm per square foot. With less than that, there will be areas where the flow can tend to pull itself into channels.

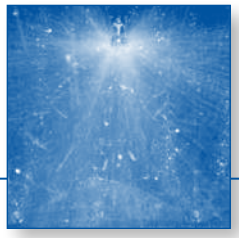
Heavier washing will require greater flows. In severe cases, it can require as much as 0.2 gpm per square foot or more.

Static spray balls require at least 0.2 gpm per square foot (heavy wash column).

Tank cleaning machines, like the 5TM, should be sized using a different approach discussed on page 40. This includes the number of nozzles on the machine and the desired cycle time for a complete revolution.

SMALL SPRAY BALLS
"Mini designs"
Small PVDF 500
Pop-up 5P2/5P3
Low capacity 5S2/5S3 or 594/595
High capacity 595
Low capacity 569 or 583
High capacity 569 or 583
LARGE SPRAY BALLS
High capacity 5S3
High capacity Gyro 577/579

PicoWhirly — for cleaning compact spaces Series 500



PicoWhirly series 500.234

Product features:
- Unique extremely compact nozzle design
- All stainless steel Kolsterized
- Slide bearing
- Free spinning, self-lubricating, and self-flushing
- Operates in every position
- FDA Compliant (see page 24)

Applications:
- Kegs
- Cans
- Bottles
- Autoclaves
- Barrel washers
- Machines

Max. tank diameter:
3 ft.

Operating pressure:
40 psi

Max. fluid temperature*:
400°F

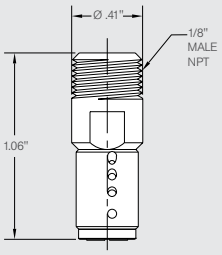
Weight:
.025 lb.

Material:
Kolsterized 316L SS

Bearing:
Sleeve bearing

Filtration:
Line strainer with 50 mesh size

Series 500



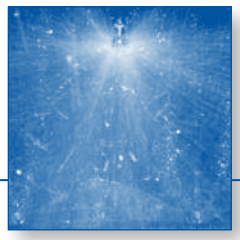
Spray Angle	Ordering no. Type	Connection 1/8" Male NPT	3/8" Male NPT	3/8" Female NPT	3/4" OD Slip-on	Free Passage (in.)	Flow Rate (Gallons Per Minute) 20 psi	liters per minute 2 bar	40 psi	60 psi
300° down	**500. 234. G9**	**BA**	-	-	-	.07	1.8	8	2.5	3.0

Example for ordering:	**Type** **500. 234. G9**	**+**	**Conn.** **BA**	**=**	**Ordering no.** **500. 234. G9. BA**

* Contact Lechler for maximum ambient temperature.

For various configurations to mount your tank cleaning nozzle, see the Lances and Nozzle Headers section beginning on page 143.

Miniature stainless steel rotating nozzles — compact design with powerful spray impact Series 566



Also available with ATEX approval. Call us for details.

Stainless Steel Micro Whirly series 566

Product features:
- Very compact design
- Free spinning, self-lubricating, and self-flushing
- Operates in every position
- Suitable for use with steam
- FDA Compliant (see page 24)

Applications:
- Kegs
- Cans
- Bottles
- Autoclaves
- Barrel washers
- Machines

Max. tank diameter:
5 ft.

Operating pressure:
40 psi

Max. fluid temperature*:
266°F

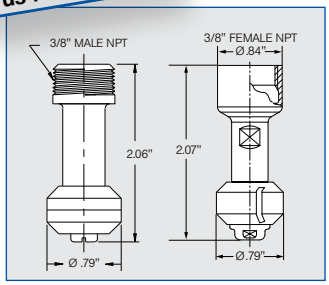
Weight:
566 thread .1 lb.
566 slip-on .2 lb.

Material:
316L SS
PEEK

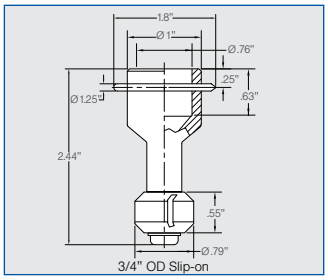
Bearing:
Sleeve bearing

Filtration:
Line strainer with 50 mesh size

Series 566



Series 566 slip-on



Spray Angle	Ordering no. Type	Connection 1/8" Male NPT	3/8" Male NPT	3/8" Female NPT	3/4" OD Slip-on	Free Passage (in.)	Flow Rate (Gallons Per Minute) 20 psi	liters per minute 2 bar	40 psi	60 psi
180° up	**566. 873. 1Y**	-	**BE**	**BF**	**TF07**	.04	3.3	15	4.7	5.7
	566. 933. 1Y	-	**BE**	**BF**	**TF07**	.04	4.6	21	6.5	8.0
180° down	**566. 874. 1Y**	-	**BE**	**BF**	**TF07**	.04	3.3	15	4.7	5.7
	566. 934. 1Y	-	**BE**	**BF**	**TF07**	.04	4.6	21	6.5	8.0
360°	**566. 879. 1Y**	-	**BE**	**BF**	**TF07**	.04	3.3	15	4.7	5.7
	566. 939. 1Y	-	**BE**	**BF**	**TF07**	.04	4.6	21	6.5	8.0

Please note: We do not recommend operation of these products with compressed air, steam, or gases.
To protect the products' inner workings, we suggest use of a line strainer with a 50 mesh size.
For further information, please contact Lechler.

Example for ordering:	Type	+	Conn.	=	Ordering no.
	566. 939. 1Y	+	**BE**	=	**566. 939. 1Y. BE**

For various configurations to mount your tank cleaning nozzle, see the Lances and Nozzle Headers section beginning on page 143.

Miniature plastic nozzles — compact design with powerful spray impact Series 500

PVDF Micro Whirly series 500.191

Product features:
- Good corrosion resistance
- Very compact design
- Free spinning, self-lubricating, and self-flushing
- Operates in every position
- Fits 1/2" NPT connections
- FDA Compliant (see page 24)

Applications:
- Kegs
- Cans
- Bottles
- Autoclaves
- Barrel washers
- Machines

Max. tank diameter: 5 ft.

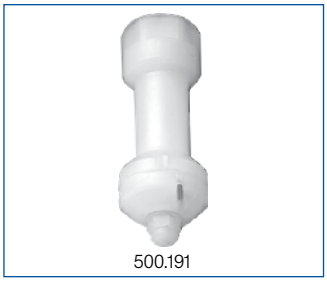
Operating pressure: 30 psi

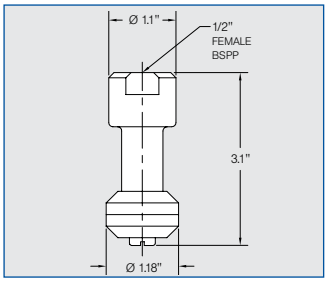
Max. fluid temperature: 19°F

Weight: .06 lb.

Material: PVDF

Bearing: Sleeve bearing


500.191



Filtration: Line strainer with 50 mesh size

Spray angle	Ordering no.	Free Passage (in.)	Connection	Flow Rate (Gallons Per Minute) 20 psi	30 psi	liters per minute 2 bar	40 psi	60 psi
180°	**500. 191. 5E. 02**	.086	1/2" Female BSPP	2.9	3.5	13	4.0	4.9
180°	**500. 191. 5E. 01**	.086	1/2" Female BSPP	2.9	3.5	13	4.0	4.9
360°	**500. 191. 5E. 00**	.086	1/2" Female BSPP	4.4	5.4	20	6.2	7.6

Plastic Mini Whirly series 500.186

Product features:
- Good corrosion resistance
- Very compact design
- Free spinning, self-lubricating, and self-flushing
- Operates in every position
- Fits 1/2" NPT connections
- FDA Compliant (see page 24)

Applications:
- Kegs
- Cans
- Bottles
- Autoclaves
- Barrel washers
- Machines

Max. tank diameter: 5 ft.

Operating pressure: 30 psi

Max. fluid temperature: 122°F

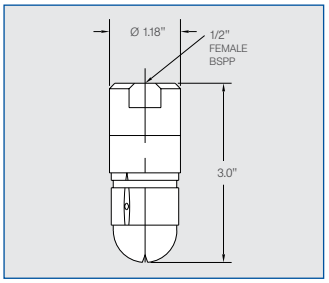
Weight: .15 lb.

Material: PVDF

Bearing: Ball bearing

Filtration: Line strainer with 50 mesh size

500.186

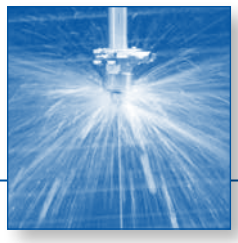


Spray angle	Ordering no.	Free Passage (in.)	Flow Rate (Gallons Per Minute) 20 psi	30 psi	liters per minute 2 bar	40 psi	60 psi
300°	**500. 186. 56. AH**	.075	4.0	4.8	18	5.6	6.8

For various configurations to mount your tank cleaning nozzle, see the Lances and Nozzle Headers section beginning on page 143.

Please note: We do not recommend operation of these products with compressed air, steam, or gases. To protect the products' inner workings, we suggest use of a line strainer with a 50 mesh size. For further information, please contact Lechler.

Rotating pop-up nozzles — “PopUp Whirly” Series 5P2 / 5P3



PopUp Whirly series 5P2 / 5P3

With minimal liquid pressure, this nozzle pops up and rotates to clean. Can be installed in container wall or used when installation conditions are difficult due to presence of agitators, baffles, etc. Appropriate for CIP when nozzle cannot remain in container during production.

Product features:
- For installation in the tank wall
- Suitable for cleaning with foam
- Self rotating
- FDA Compliant (see page 24)

Applications:
- For cleaning and rinsing of small tanks, containers or duct work
- Where nozzle cannot remain in container during production
- Hard-to-reach areas in a vessel

Operating pressure:
30 psi, 5P2: opening pressure approx. 14.5 psi; closing pressure approx. 7 psi, 5P3: opening pressure approx. 13 psi, closing pressure approx. 7 psi

Max. fluid temperature:
284°F

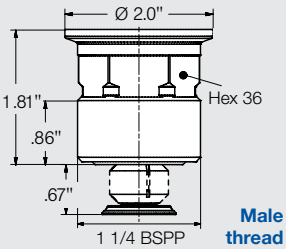
Weight:
5P2 series approx. .66 lb.
5P3 series approx. 1.21 lb.

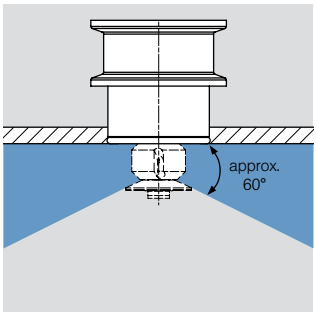
Bearing:
Sleeve bearing made of PEEK

Filtration:
Line strainer with 50 mesh size

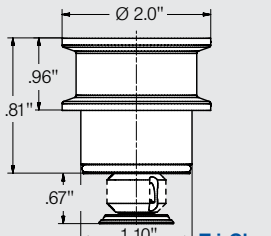
Note Tri-Clamp Version:
Gasket with a thickness of .08 in. must be used with weld-in-flange.
Not sold with nozzle.
5P2 requires standard DIN32676-A / DN40
5P3 requires standard DIN32676-A / DN50

5P2



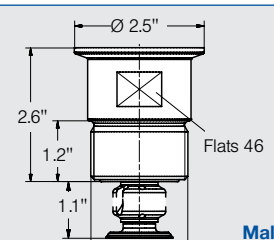


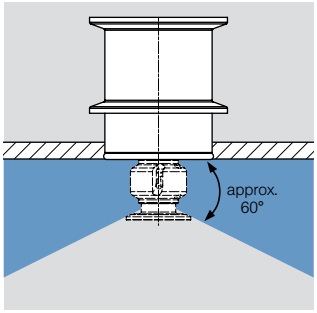
Flange Ordering no.: 050.020.1Y.01.00



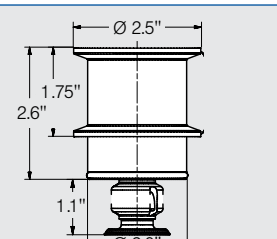
Material:
316L stainless steel, spring made of 301 stainless steel, PEEK, O-ring made of EPDM

5P3





Flange Ordering no.: 050.020.1Y.01.01



Material:
316L stainless steel, spring made of 301 stainless steel, PEEK, O-ring made of FPM

For various configurations to mount your tank cleaning nozzle, see the Lances and Nozzle Headers section beginning on page 143.

Spray angle	Ordering no.	Tank connection		Free Passage (in.)	Flow Rate (Gallons Per Minute)			
		1¼" Male BSPP	Tri Clamp		20 psi	30 psi	liters per minute 2 bar	40 psi
	5P2. 873. 1Y. AP	○	-	.04	3.3	4	15.0	4.7
	5P2. 873. 1Y. 00	-	○	.04	3.3	4	15.0	4.7
	5P2. 923. 1Y. AP	○	-	.04	4.4	5.4	20.0	6
	5P2. 923. 1Y. 00	-	○	.04	4.4	5.4	20.0	6
	5P3. 043. 1Y. AP	○	-	.05	3.3	4	15	4.7
	5P3. 043. 1Y. 00	-	○	.05	3.3	4	15	4.7

Hygienic Whirly — designed to clean with foam Series 594 / 595

Series 594 / 595

The hygienic Whirly is specifically designed for both (1) cleaning with foam from a mixture of liquid detergent and water and (2) sterilizing with steam. Optionally available as part of a fabricated lance containing two Hygienic Whirlies for even greater coverage.

Product features:
- Low water and detergent consumption
- Optimum cleaning efficiency due to slow rotation
- Sprays steam for sterilizing purposes
- Operates in any position
- FDA Compliant (see page 24)

Applications:
For cleaning of:
- Tanks with liquids and/or with foam from detergent/ water mixtures
- Bottling machines, especially for cold aseptic filling

Max. tank diameter:
5 feet
Type 595.139.1Y up to 8 feet

Operating pressure:
40 psi

Max. fluid temperature*:
212°F; short-term up to 284°F

Weight:
594 .4 lb.
595 .6 lb.

Material:
316L stainless steel
PEEK

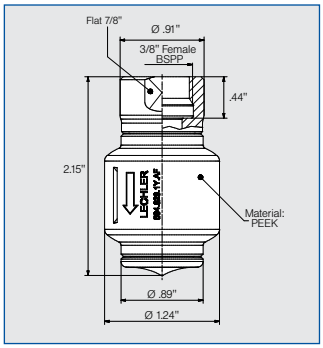
Bearing:
Sleeve bearing

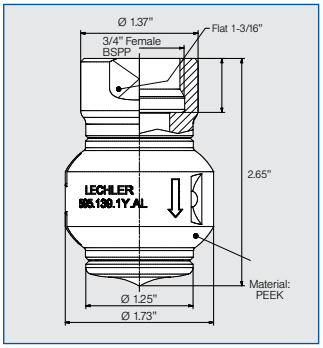
Filtration:
Line strainer with 50 mesh size

* Contact Lechler for maximum ambient temperature.

Standard version

Series 595





Spray Angle	Ordering no. Type	Connection 3/8" Female BSPP**	Connection 3/4" Female BSPP**	Free Passage (in.)	Flow Rate (Gallons Per Minute) 7 psi	15 psi	liters per minute 2 bar	30 psi	40 psi
360°	**594. 829. 1Y**	**AF**	**-**	.067	1.4	2.1	11	3.0	3.4
	594. 879. 1Y	**AF**	**-**	.098	1.9	2.9	15	4.0	4.7
	595. 009. 1Y	**AF**	**-**	.157	4.2	6.1	32	8.6	9.8
	595. 049. 1Y	**AF**	**-**	.165	5.2	7.6	40	10.7	12.4
	595. 139. 1Y	**-**	**AL**	.197	8.7	12.7	67	18.0	20.8

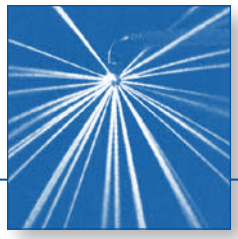
** NPT on request.

Please note: To protect the products' inner workings, we suggest use of a line strainer with a 50 mesh size. For further information, please contact Lechler.

The nozzles with a slip-on connection type fitting may have a higher flow rate than listed due to the self-flushing design around the customer's tube which is inserted into the nozzle socket.

For various configurations to mount your tank cleaning nozzle, see the Lances and Nozzle Headers section beginning on page 143.

Static Spray Balls — for rinsing or producing steam Series 540 / 541



Series 540 / 541

This nozzle is a very compact static spray ball. As it produces sharp solid jets, it is excellent for rinsing small drums.

Product features:
- For use with air or saturated steam
- Partial coverage (240°)

Applications:
- Small kegs
- Drums
- Barrel washers
- Totes
- Carboys

Max. tank diameter:
Rinsing: 10 ft.
Cleaning: 5 ft.

Operating pressure:
45 psi

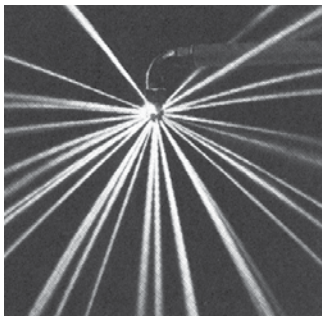
Max. fluid temperature:
392°F

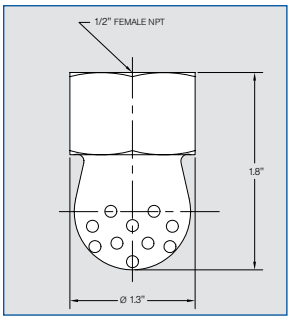
Weight: .20 lb.

Material: 303 SS

Filtration: Line strainer with 50 mesh size

Series 540 / 541





Spray Angle 	Ordering no.	Free Passage (in.)	Connection Female NPT	Flow Rate (Gallons Per Minute) 20 psi	liters per minute 2 bar	40 psi	60 psi	Length (in.)	Maximum Width (in.)
240° down 	**540. 909. 16. BH**	.031	1/2"	4	18	6	7	1.8	1.3
	540. 989. 16. BH	.039	1/2"	6	28	9	11	1.8	1.3
	541. 109. 16. BH	.059	1/2"	13	57	18	22	1.8	1.3
	541. 189. 16. BH	.079	1/2"	20	90	28	34	1.8	1.3
	541. 239. 16. BH	.090	1/2"	26	118	37	45	1.8	1.3

Please note: To protect against clogging, we suggest use of a line strainer with an appropriate line strainer sized to trap particles larger than the free passage. For further information, please contact Lechler.

For various configurations to mount your tank cleaning nozzle, see the Lances and Nozzle Headers section beginning on page 143.

Static Spray Balls — for sanitary CIP applications Series 527

Fulfills the hygienic requirements of 3-A*.

Series 527

For critical sanitary applications Lechler provides these specially designed spray balls:

Product features:
- Meets the requirements of 3A standards
- Very fine surface finish inside and outside
- All mount using slip-on fittings and pins
- For use with air or saturated steam
- FDA Compliant (see page 24)

Applications:
- For sanitary environments, e.g., dairies, pharmaceutical processing, food and beverage manufacturing, high purity chemicals

Max. tank diameter:
3/4" inlet 17 ft.
1-1/2" inlet 20 ft.
2" inlet 27 ft.

Operating pressure:
15 – 45 psi, max. 75 psi

Max. fluid temperature:
400°F

Weight:
3/4" inlet .11 lb.
1-1/2" inlet .52 lb.
2" inlet 1.43 lb.

Material:
316L stainless steel

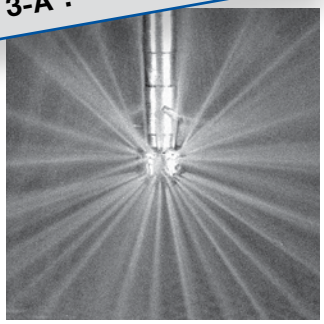
Filtration:
3/4" — Line strainer with 50 mesh size

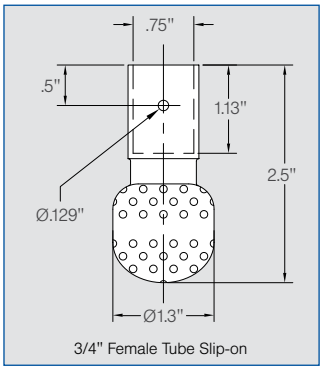
1-1/2" — Line strainer with 50 mesh size

2" — Line strainer with 30 mesh size

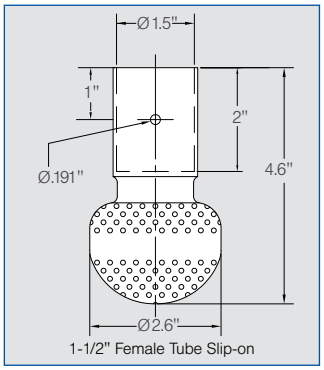
Note: There are no threaded inlets available.

Series 527

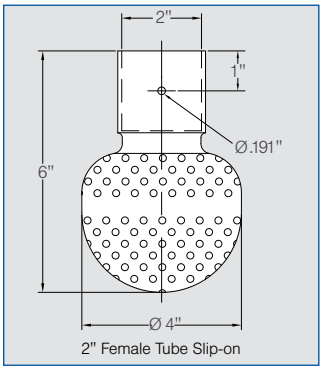




3/4" Female Tube Slip-on



1-1/2" Female Tube Slip-on



2" Female Tube Slip-on

Spray angle	Ordering no.	Free Passage (in.)	Flow Rate (Gallons Per Minute)				Dimensions approx. (in.)				
			20 psi	2 bar	40 psi	60 psi	Height H (in.)	Diameter D (in.)	B	C	A
360°	**527. 209. 1Y. 00. 75**	.031	13	60	19	23	2.7	1.3	.75	.13	.50
	527. 289. 1Y. 01. 50	.043	37	170	53	65	4.6	2.6	1.51	.19	1.00
	527. 449. 1Y. 02. 00	.067	92	420	130	160	6.0	4.0	2.01	.19	1.00

The 3/4" spray ball has a minimum orifice size of .033".
The 1-1/2" spray ball has a minimum free passage size of .045".
The 2" spray ball has a minimum free passage size of .068".

The nozzles with a slip-on connection type fitting may have a higher flow rate than listed due to the self-flushing design around the customer's tube which is inserted into the nozzle socket.

* This product has been authorized to use the 3-A® Symbol by the 3-A® Sanitary Symbol Council Administrative Council for Spray Cleaning Devices (78-01).

For various configurations to mount your tank cleaning nozzle, see the Lances and Nozzle Headers section beginning on page 143.

Static Spray Balls — RinseClean Series 5B2/5B3

Series 5B2/5B3

The spray ball design has proven itself in many applications. It can be used in areas with high hygienic requirements and high temperatures. Our RinseClean spray ball is available with various slip-on connections, as well as in threaded or welded versions.

Product features:
- Very fine surface finish inside and outside
- For use with air or saturated steam
- FDA Compliant

Applications:
- For sanitary environments, e.g. pharmaceutical processing, food and beverage manufacturing, high purity chemicals

Max. tank diameter:
1/8" inlet 7 ft.
1/2" inlet 11 ft.
1" inlet 17 ft
2" inlet 18 ft.

Operating pressure:
30 psi

Max. fluid temperature:
392°F

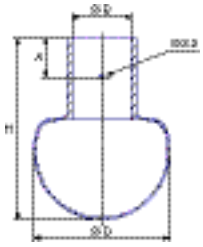
Weight:
3/4" inlet .11 lb.
1-1/2" inlet .52 lb.
2" inlet 1.43 lb.

Material:
316L stainless steel

Series 5B2/5B3

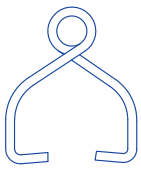
Pin	Ordering no.
1	095.013.1Y.06.55.0
2	095.013.1Y.06.58.0
3	095.013.1Y.06.56.0
4	095.013.1Y.06.59.0
5	095.013.1Y.06.57.0

Slip-on connection



Dimensions slip-on connection according to DIN 10357

Pin 1



Pin 2-5

With the slip-on connection, the spray ball is pushed onto the customer's connection pipe and secured with the supplied R-clip. Lechler offers the right connection sizes for the three most common pipe standards.

Slip-on information

- Pin made of 316L SS is included. Ordering no.: See table on page 3
- Depending on diameter of adapter, the flow rate can increase due to leakage between connecting pipe and static spray ball.

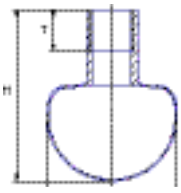
Slip-on connection according to DIN EN 10357 series D (ASME BPE 1997, OD tube compatible)

Spray angle	Ordering no. Type	E Ø [in]	Flow Rate (Gallons per minute) 20 psi	30 psi	liters per minute 2 bar	40 psi	60 psi	Dimensions [in] Ø D	Height H	Connection B	Distance to bore hole A	Pin
360°	**5B3.089.1Y.A1.00.0**	.04	10.9	13.4	50	15.5	19	1.10	1.65	0.39	.35	1
	5B3.209.1Y.A1.90.0	.06	22.0	26.9	100	31.0	38	1.10	1.65	0.76	.35	1
	5B3.309.1Y.A1.90.0	.07	39.4	48.4	180	55.9	68.4	2.52	3.31	0.76	.71	2
	5B3.379.1Y.A2.60.0	.08	57.1	69.9	260	80.7	98.8	2.52	3.31	1.01	.71	3
	5B3.449.1Y.A3.80.0	.12	89.9	110.2	410	127.2	155.8	2.52	3.31	1.51	.71	3
	5B3.539.1Y.A5.10.0	.13	147.0	180	670	207.9	254.6	3.54	4.37	2.01	.98	5

E = narrowest free cross-section

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

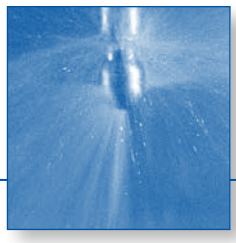
Female Threaded connection



Spray angle	Ordering no. Type	Connection NPT	E Ø [in]	Flow Rate (Gallons per minute) 20 psi	30 psi	liters per minute 2 bar	40 psi	60 psi	Dimensions [in] Ø D	Height H	Screw-in length T
360°	**5B2.879.1Y.BB.00.0**	1/8"	.03	3.4	4.0	15	4.7	5.7	.79	1.5	.31
	5B3.309.1Y.BH.00.0	1/2"	.07	39.5	48.4	180	55.9	68.4	2.5	3.3	.55
	5B3.379.1Y.BN.00.0	1"	.08	57.1	69.9	260	80.7	98.8	2.5	3.3	.71
	5B3.539.1Y.BW.00.0	2"	.12	147.0	180.0	670	207.9	254.6	3.5	4.4	.94

Spinners 2—
thin profiles for small openings
Series 5M1/ 5M2/ 5M3/ 5M4

ATEX version on request



Series 5M1/ 5M2/ 5M3/ 5M4

When small tank openings restrict the size of the nozzle, the Spinner 2 series offers high flow rates with a thin profile that will slip into tight spuds.

Product features:
- High flow slot orifices produce big sprays from a small head
- Head balanced for minimum vibration
- Operates in any position
- Free spinning, self-lubricating, and self-flushing
- FDA Compliant

(see page 24)

Applications:
- Barrel washing
- For small and medium processing tanks
- CNC machining centers

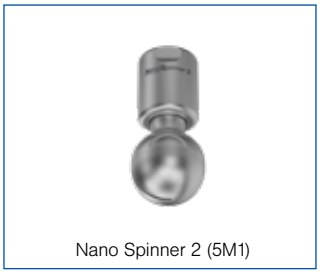
Operating pressure:
30 psi

Max. fluid temperature*:
284°F

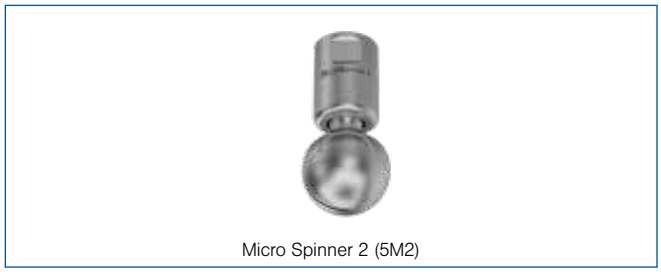
Materials:
316L SS

Bearing:
Double ball bearing

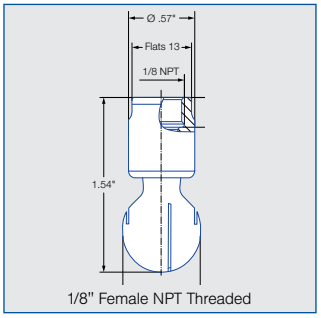
Filtration:
Line strainer with 170 mesh size



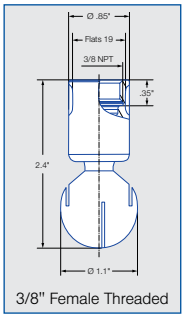
Nano Spinner 2 (5M1)



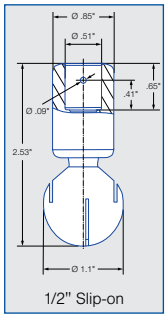
Micro Spinner 2 (5M2)



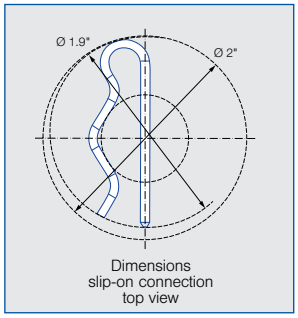
1/8" Female NPT Threaded



3/8" Female Threaded



1/2" Slip-on



Dimensions slip-on connection top view

Spray angle	Ordering number Type 1/8 NPT	E Ø [in]	V̇ [l/min] p [psi] (p_{max} = 100 psi) 20 psi	30 psi	**2 bar**	40 psi	Max. tank diameter [ft]
360°	**5M1.879.1Y.BB**	0.016	3.2	4.0	**15**	4.6	4.6
	5M1.929.1Y.BB	0.019	4.5	5.5	**20**	6.3	5.2

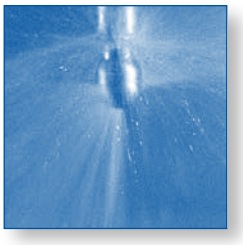
Spray angle	Ordering number Type	Connection 3/8 NPT	Connection 1/2" Slip-on	E Ø [in]	V̇ [gal/min] p [psi] (p_{max} = 100 psi) 20 psi	30 psi	**2 bar**	40 psi	Max. tank diameter [ft]
60°	**5M2.952.1Y**	**BF**	**TF05**	.06	5.0	6.2	**23**	7.1	-
	5M2.042.1Y	**BF**	**TF05**	.12	8.8	10.8	**40**	12.4	-
180°	**5M2.004.1Y**	**BF**	**TF05**	.04	7.0	8.6	**32**	9.9	5.9
360°	**5M2.969.1Y**	**BF**	**TF05**	.03	5.6	6.8	**25**	7.9	5.6
	5M2.049.1Y	**BF**	**TF05**	.04	8.6	10.5	**39**	12.2	5.9

Example for ordering:	Type	+	Conn.	=	Ordering no.
	5M2. 049. 1Y.	+	**BF**	=	**5M2. 049. 1Y. BF**

Please note: The nozzles with a slip-on connection type fitting may have a higher flow rate than listed due to the self-flushing design around the customer's tube which is inserted into the nozzle socket.

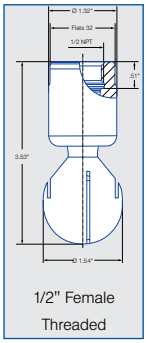
Spinners 2—
thin profiles for small openings
Series 5M1/ 5M2/ 5M3/ 5M4

ATEX version on request

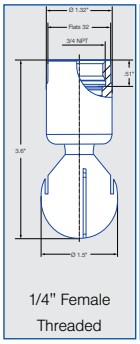


Mini Spinner 2 (5M3)

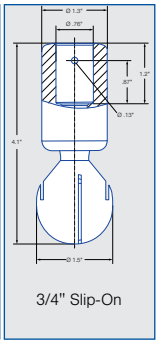
Maxi Spinner 2 (5M4)



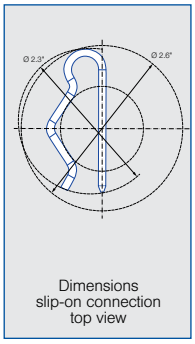
1/2" Female Threaded



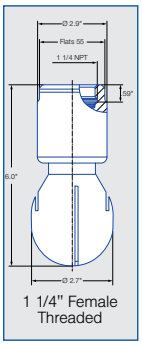
1/4" Female Threaded



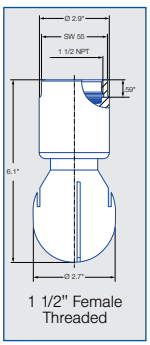
3/4" Slip-On



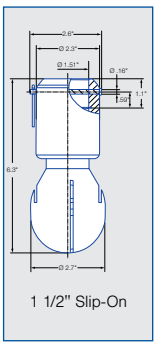
Dimensions slip-on connection top view



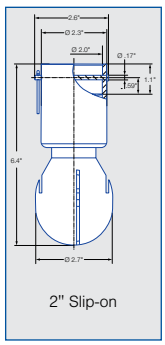
1 1/4" Female Threaded



1 1/2" Female Threaded



1 1/2" Slip-On



2" Slip-on

Spray angle	Ordering number: Type	Connection: 1/2 NPT	Connection: 3/4 NPT	Connection: 3/4" Slip-on	E Ø [in]	V̇ [gal/min] p [psi] (p_{max} = 100 psi): 20 psi	30 psi	**2 bar**	40 psi	Max. tank diameter [ft]
60°	**5M3.122.1Y**	**BH**	**-**	**TF07**	.10	13.8	16.6	**63**	19.5	-
180°	**5M3.133.1Y**	**-**	**BL**	**TF07**	.05	14.7	18.0	**67**	20.8	8.5
180°	**5M3.134.1Y**	**-**	**BL**	**TF07**	.05	14.7	18.0	**67**	20.8	8.5
360°	**5M3.999.1Y**	**-**	**BL**	**TF07**	.02	6.6	8.1	**30**	9.4	5.9
	5M3.089.1Y	**-**	**BL**	**TF07**	.03	10.8	13.2	**49**	15.2	6.9
	5M3.139.1Y	**-**	**BL**	**TF07**	.03	15.2	18.7	**69**	21.5	7.5
	5M3.209.1Y	**-**	**BL**	**TF07**	.06	21.9	26.8	**100**	30.9	8.5

Spray angle	Ordering number: Type	Connection: 1 1/4 NPT	Connection: 1 1/2 NPT	Connection: 1 1/2" Slip-on	Connection: 2" Slip-on	E Ø [in]	V̇ [gal/min] p [psi] (p_{max} = 100 psi)*: 20 psi	30 psi	**2 bar**	40 psi	Max. tank diameter [ft
360°	**5M4.279.1Y**	**BQ**	**BS**	**TF15**	**TF20**	.07	33.0	40.4	**150**	46.6	13.1
	5M4.329.1Y	**BQ**	**BS**	**TF15**	**TF20**	.08	43.9	53.8	**200**	62.1	14.8
	5M4.369.1Y	**BQ**	**BS**	**TF15**	**TF20**	.09	54.8	67.2	**250**	77.5	16.4

Stainless Steel Whirly 2— the versatile standard solution Series 5W9

Series 5W9

The Whirly 2 has a hygienic design, and provides efficient cleaning due to its powerful flat jet sprays. Also available in ATEX approved version.

Product features:
- Flat jet nozzles with improved vertical coverage
- Better balance for smoother operation
- Slip-on or thread connection available
- Free spinning, self-lubricating, and self-flushing
- FDA Compliant (see page 24)

Applications:
- For cleaning small and medium-sized tanks, e.g., in chemical, beverage, food industries

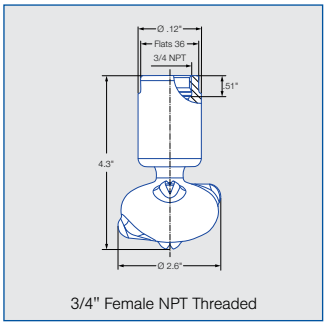
Operating pressure:
30 psi

Max. fluid temperature*:
284°F
194°F ATEX version

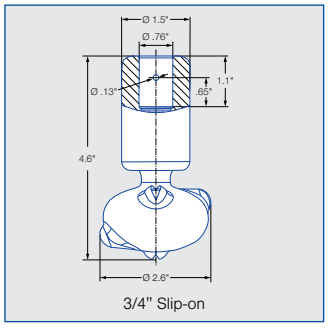
Material:
316L SS and PEEK
R-Clip made of 316L stainless steel included with the tube slip-on. For reordering: 095.022.1Y.50.60.E

Bearing:
Double ball bearing

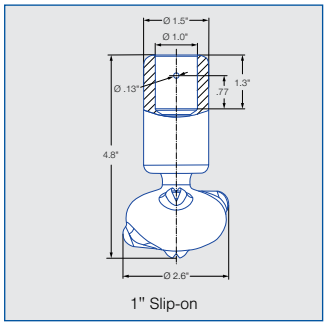
Filtration:
Line strainer with 170 mesh size



3/4" Female NPT Threaded



3/4" Slip-on



1" Slip-on

Spray angle	Ordering no. Type	Connection 3/4 NPT	Connection 3/4"- Slip-on connection	Connection 1" Slip-on connection	Narrowest free cross section Ø [in]	V̇ water [gal/min] p [psi] (p_{max} = 87 psi) 20 psi	30 psi	2 bar	40 psi	60 psi	Max. tank diameter [ft]
270°	**5W9.075.1Y**	**BL**	**TF07**	**TF10**	.79	10.6	12.9	**48**	15	18.3	5.9
	5W9.145.1Y	**BL**	**TF07**	**TF10**	.11	15.6	19.1	**71**	22	27.0	6.9
	5W9.195.1Y	**BL**	**TF07**	**TF10**	.13	21.3	26.1	**97**	30	36.9	8.5
270°	**5W9.076.1Y**	**BL**	**TF07**	**TF10**	.79	10.6	12.9	**48**	15	18.3	5.9
	5W9.106.1Y	**BL**	**TF07**	**TF10**	1.0	12.8	15.6	**58**	18	22.0	6.9
	5W9.196.1Y	**BL**	**TF07**	**TF10**	1.3	21.3	26.1	**97**	30	36.9	8.5
360°	**5W9.079.1Y**	**BL**	**TF07**	**TF10**	.06	10.6	12.9	**48**	15	18.3	5.9
	5W9.149.1Y	**BL**	**TF07**	**TF10**	.09	15.6	19.1	**71**	22	27.0	6.9
	5W9.199.1Y	**BL**	**TF07**	**TF10**	.12	21.3	26.1	**97**	30	36.9	8.5
	5W9.279.1Y	**BL**	**TF07**	**TF10**	.20	31.9	39.1	**145**	45	55.2	9.8

The maximum tank diameter shown above applies for the recommended operating pressure

Please note: We do not recommend operation of these products with compressed air, steam, or gases. To protect the products' inner workings, we suggest use of a line strainer with a 170 mesh size. For further information, please contact Lechler.

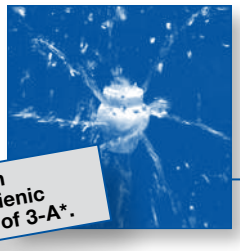
The nozzles with a slip-on connection type fitting may have a higher flow rate than listed due to the self-flushing design around the customer's tube which is inserted into the nozzle socket.

Example for ordering:	Type	+	Conn.	=	Ordering no.
	5W9. 279. 1Y.	+	**BL**	=	**5W9. 279. 1Y. BL**

ATEX version on request

For various configurations to mount your tank cleaning nozzle, see the Lances and Nozzle Headers section beginning on page 143.

PTFE Whirly — especially designed for sanitary requirements Series 583 / 573



Slip-on version fulfills the hygienic requirements of 3-A*.

Series 583 / 573

Product features:
- Corrosion resistance
- Lightweight
- Balanced rotating action
- Operates in every position
- 3/4" size fits through a 2" opening
- Slip-on version design meets 3A standards
- Smooth surface finish
- Free spinning, self-lubricating, and self-flushing
- FDA Compliant (see page 24)

Applications:
- For rinsing of small and medium-sized vessels, e.g. in the dairy, chemical, pharmaceutical or food industries

Max. tank diameter:
Rinsing: 18 ft.
Cleaning: 10 ft.

Operating pressure:
30 psi

Max. fluid temperature:**
203°F

Weight:
3/4" .32 lb.
1" .68 lb.

Material:
PTFE
R-Clip made of 316L SS included with the tube slip-on. For reordering: 095.022.1Y.50.88.E (3/4")
095.022.1Y.50.60.E (1")

Bearing: Sleeve bearing

Filtration:
Line strainer with 50 mesh size

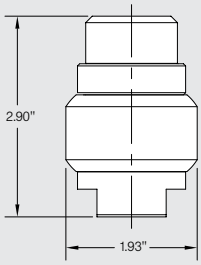
Please note: We do not recommend operation of these products with compressed air, steam, or gases. To protect the products' inner workings, we suggest use of a line strainer with a 50 mesh size. For further information, please contact Lechler.

The nozzles with a slip-on connection type fitting may have a higher flow rate than listed due to the self-flushing design around the customer's tube which is inserted into the nozzle socket.

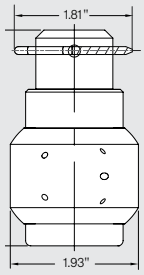
Female NPT Threaded

Female Tube Slip-on

Tri-Clamp

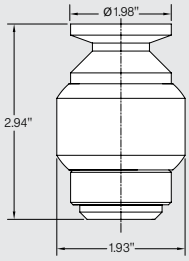


3/4" Female NPT Thread

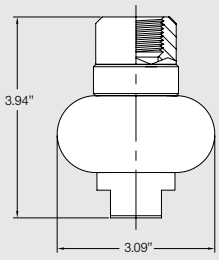


3/4" Female Tube Slip-on

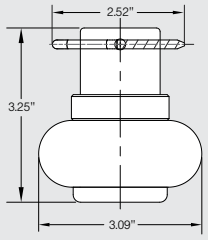
Tri-Clamp Drawing Reference 1



Fits 1" or 1-1/2" Tri-Clamp

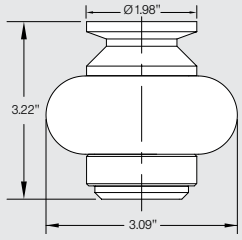


1" Female NPT Thread



1" Female Tube Slip-on

Tri-Clamp Drawing Reference 2



Fits 1" or 1-1/2" Tri-Clamp

Spray angle	R-clip	Ordering no. Type	Connection: 3/4" Female NPT	1" Female NPT	3/4" Slip-on	1" Slip-on	1 1/2" Tri-Clamp	Free Passage (in.)	Flow Rate (Gallons Per Minute): 20 psi	30 psi	liters per minute 2 bar	40 psi	60 psi
270°	1)	**583. 116. 55**	**BL**	-	**TF07***	-	**15**	.094	15	18	67	21	26
	1)	**583. 266. 55**	**BL**	-	**TF07***	-	**15**	.133	32	39	145	45	55
270°	1)	**573. 266. 55**	**BL**	-	**TF07***	-	**15**	.133	32	39	145	45	55
360°	1)	**583. 119. 55**	**BL**	-	**TF07***	-	**15**	.071	13	16	58	18	22
	1)	**583. 209. 55**	**BL**	-	**TF07***	-	**15**	.138	22	27	100	31	38
	1)	**583. 269. 55**	**BL**	-	**TF07***	-	**15**	.189	32	39	145	45	55
	2)	**583. 279. 55**	-	**BN**	-	**TF10***	**15**	.146	33	40	150	47	57
	2)	**583. 349. 55**	-	**BN**	-	**TF10***	**15**	.220	50	61	226	70	86

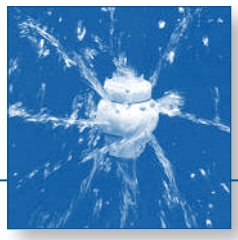
Example for ordering: **Type** **583. 266. 55.** + **Conn.** **BL** = **Ordering no.** **583. 266. 55. BL**

** Contact Lechler for maximum ambient temperature.

* The slip-on version has been authorized to use the 3-A® Symbol by the 3-A® Sanitary Symbol Council Administrative Council for Spray Cleaning Devices (78-01). See page 24.

For various configurations to mount your tank cleaning nozzle, see the Lances and Nozzle Headers section beginning on page 143.

PTFE Hi Temp Whirly — solution for high temperature cleaning Series 599



Series 599

While PTFE can withstand high temperatures, its dimensional stability limits its range as a tank cleaning device. Lechler's design incorporates Hastelloy® rings to control the expansion of the material so it can continue to operate reliably in hotter environments than normally possible. The nozzle's temperature range is actually extended, since it can perform equally well under normal conditions.

Product features:
- Balanced rotating action
- Operates in every position
- Free spinning, self-lubricating, and self-flushing
- Withstands repeated high temperature cycles
- Suitable for low pressure steam; slip-on sanitary model has been tested with steam up to 30 psig @ 274°F.
- FDA Compliant

(see page 24)

Applications:
- For small and medium-sized vessels and reactors in higher temperature processing environments
- Corrosive environments

Max. tank diameter:
Rinsing: 18 ft.
Cleaning: 10 ft.

Operating pressure:
30 psi

Max. fluid temperature:
274°F

Weight:
3/4" .36 lb.

Materials:
PTFE
Rings: Hastelloy® C-276
R-clip made of Hastelloy® C-276 included with the tube slip on. For reordering: 095.022.24.50.94.1

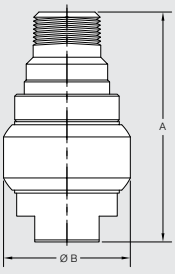
Bearing: Sleeve bearing

Filtration:
Line strainer with 50 mesh size

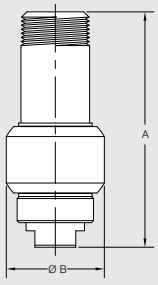
599.133

599.170

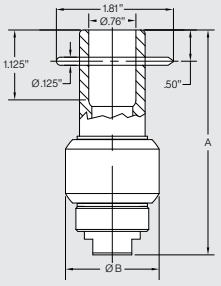
599.174



599.133



599.170



599.174 Female Tube Slip-on

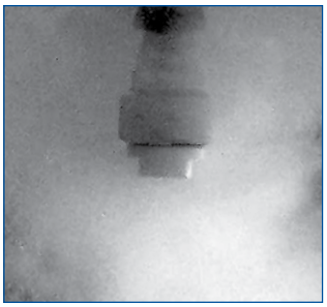
Spray angle	Ordering no.	Connection		Flow Rate (Gallons Per Minute)					Length A (in)	Width B (in)	Weight (lb)
		3/4" Male NPT	3/4" OD Female Slip-on	20 psi	30 psi	liters per minute 2 bar	40 psi	60 psi			
360°	**599. 133. 55**	**BK**	**-**	22	27	100	31	38	3.5	2.0	.35
	599. 170. 55	**BK**	**-**	19	23	84	26	32	3.6	1.5	.25
	599. 174. J7	**-**	**TF07**	19	23	84	26	32	3.6	1.5	.25

Please note: We do not recommend operation of these products with compressed air or gases. However, these products have been shown to be suitable for spraying low pressure steam (refer to *Applications* above). To protect the products' inner workings when spraying liquid, we suggest use of a line strainer with a 50 mesh size. For further information, please contact Lechler.

The nozzles with a slip-on connection type fitting may have a higher flow rate than listed due to the self-flushing design around the customer's tube which is inserted into the nozzle socket.

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

Hastelloy® is a registered trademark of Haynes International Inc.



PTFE Whirly spraying steam

For various configurations to mount your tank cleaning nozzle, see the Lances and Nozzle Headers section beginning on page 143.

XactClean® HP — solution for high impact cleaning Series 5S2 / 5S3

Series 5S2 / 5S3

Specially developed flat fan nozzles provide high impact and uniform cleaning for the XactClean® HP. The controlled rotation ensures that the XactClean® HP works extremely efficient. Thanks to the robust drive unit the XactClean® HP is very reliable and ensures increased operation liability. It is available in various spray angles and flow rates and is also compatible with the Lechler rotating monitoring sensor.

Product features:
- Controlled rotation
- Powerful flat jet nozzles
- Very efficient tank cleaning nozzle
- FDA Compliant (see page 24)

Materials:
316L SS, 316 SS, 632 SS, PEEK, PEEK ESD (ATEX version only) PTFE, Zirconium oxide, EPDM

Max. temperature:
203°F/ 95°C

Max. tank dimension:
11.5-26 ft.

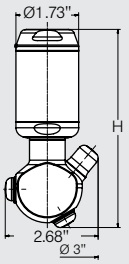
Recommended operating pressure:
75 psi

Installation:
Operation in every direction is possible

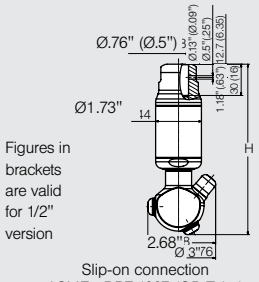
Filtration:
Line strainer with a mesh size of 0.3 mm/50 mesh

Bearing:
Double ball bearing

Rotation monitoring sensor:
Sensor compatible, Info: see page 42



Female thread



Slip-on connection ASME - BPE 1997 (OD-Tube)

Nozzle dimensions [in]

Connection	H
BF	5.83
BH	5.87
BL	5.47
BN	5.47
TF05	5.91
TF07	6.46

ATEX version on request

Spray angle	Ordering no. Type	Connection ⅜" Female NPT	½" Female NPT	¾" Female NPT	1" Female NPT	½" OD Slip-on	¾" OD Slip-on	Free Passage (in.)	Flow Rate (Gallons Per Minute) 2 bar	30 psi	40 psi	75 psi	145 psi
270°	**5S2. 955. 1Y**	**BF**	**BH**	**-**	**-**	**TF05**	**-**	.08	25	6.6	7.8	10.6	15.1
	5S3. 055. 1Y	**-**	**BH**	**-**	**-**	**TF05**	**-**	.08	41	10.8	12.8	17.2	24.3
	5S3. 115. 1Y	**-**	**BH**	**BL**	**-**	**-**	**TF07**	.08	60	15.9	18.4	24.8	35.1
	5S3. 185. 1Y	**-**	**-**	**BL**	**-**	**-**	**TF07**	.08	89	23.5	27.7	37.3	52.6
	5S3. 235. 1Y	**-**	**-**	**BL**	**-**	**-**	**TF07**	.08	111	29.3	34.3	46.2	65.5
	5S3. 265. 1Y	**-**	**-**	**BL**	**BN**	**-**	**TF07**	.08	135	35.7	41.8	56.3	79.5
270°	**5S2. 956. 1Y**	**BF**	**BH**	**-**	**-**	**TF05**	**-**	.08	25	6.6	7.8	10.6	15.1
	5S3. 056. 1Y	**-**	**BH**	**-**	**-**	**TF05**	**-**	.08	41	10.8	12.8	17.2	24.3
	5S3. 116. 1Y	**-**	**BH**	**BL**	**-**	**-**	**TF07**	.08	60	15.9	18.4	24.8	35.1
	5S3. 186. 1Y	**-**	**-**	**BL**	**-**	**-**	**TF07**	.08	89	23.5	27.7	37.3	52.6
	5S3. 236. 1Y	**-**	**-**	**BL**	**-**	**-**	**TF07**	.08	111	29.3	34.3	46.2	65.5
	5S3. 266. 1Y	**-**	**-**	**BL**	**BN**	**-**	**TF07**	.08	135	35.7	41.8	56.3	79.5
360°	**5S2. 959. 1Y**	**BF**	**BH**	**-**	**-**	**TF05**	**-**	.07	25	6.6	7.8	10.6	15.1
	5S3. 059. 1Y	**-**	**BH**	**-**	**-**	**TF05**	**-**	.08	41	10.8	12.8	17.2	24.3
	5S3. 119. 1Y	**-**	**BH**	**BL**	**-**	**-**	**TF07**	.08	60	15.9	18.4	24.8	35.1
	5S3. 189. 1Y	**-**	**-**	**BL**	**-**	**-**	**TF07**	.08	89	23.5	27.7	37.3	52.6
	5S3. 239. 1Y	**-**	**-**	**BL**	**-**	**-**	**TF07**	.08	111	29.3	34.3	46.2	65.5
	5S3. 269. 1Y	**-**	**-**	**BL**	**BN**	**-**	**TF07**	.08	135	35.7	41.8	56.3	79.5

Example for ordering:	Type	+	Conn.	=	Ordering no.
	5S2. 956. 1Y	+	**BF**	=	**5S2. 956. 1Y. BF**

For various configurations to mount your tank cleaning nozzle, see the Lances and Nozzle Headers section beginning on page 143.

Please note: We do not recommend operation of these products with compressed air. In order to protect the bearing, a line strainer with a 50 mesh size should be used. Operation without a line strainer may result in damage to the nozzle. For further information, please contact Lechler.

The nozzles with a slip-on connection type fitting may have a higher flow rate than listed due to the self-flushing design around the customer's tube which is inserted into the nozzle socket.

High impact tank cleaning machine “IntenseClean Hygienic” Series 5TA / 5TB

Product features:
- Gear-controlled
- Particularly powerful solid jets
- Two different sizes for a variety of container sizes
- Operating pressures up to 362 psi possible
- FDA Compliant (see page 24)

Applications:
For cleaning of:
- Systems
- Machines
- Tankers
- Large tanks

Max. tank diameter:
See table

Operating pressure:
75 psi

Temperature:
203°F, 266°F (Environment)

Weight:
5TA approx. 2 lb.
5TB approx. 8.8 lb.

Materials:
AISI 316L SS,
AISI 632, PTFE, PEEK,
Zirconium oxide, EPDM,
32 RA surface finish is included with every material

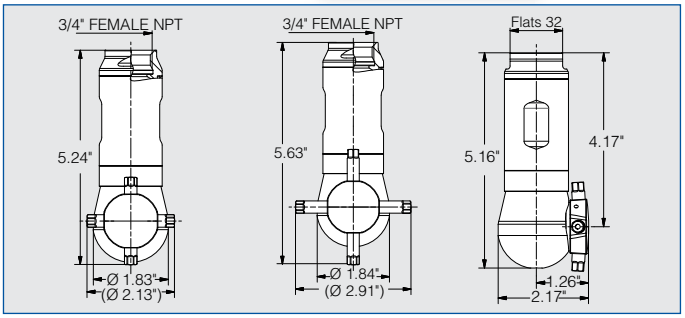
Bearing:
Ball bearing

Required prefiltration:
Line filter with 0.2 mm/ 80 mesh

Installation:
Operation in every direction is possible

Rotation monitoring sensor:
This series is qualified for rotation monitoring with the Lechler sensor. Please see page 42 for more information.

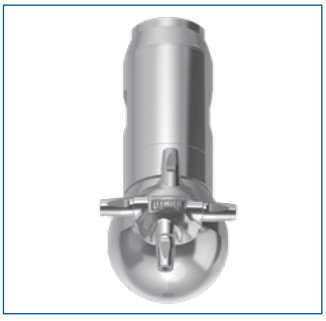
5TA

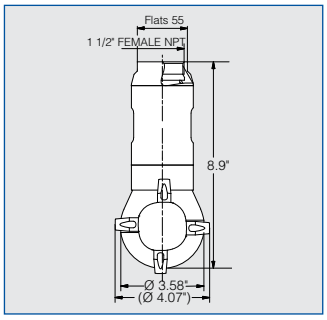


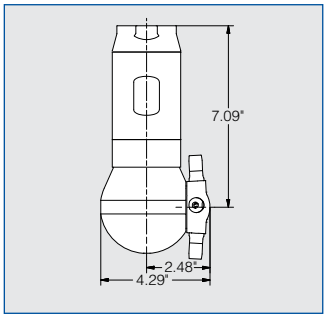
5TA.403.1Y.AL and 5TA.404.1Y.AL 5TA.405.1Y.AL

Spray Angle	Ordering no.	Free Passage (in.)	Number, Ø of nozzles (mm)	Flow Rate (Gallons Per Minute) liters per minute 2 bar	30 psi	40 psi	75 psi	145 psi	Max. tank Ø (ft.)	Max. pressure (psi)
360°	**5TA. 403. 1Y. BL**	.059	4 x 3.0 mm	24	6	7	10	14	39	217
	5TA. 404. 1Y. BL	.059	4 x 4.0 mm	35	9	11	15	21	41	217
	5TA. 405. 1Y. BL	.059	4 x 5.0 mm	50	13	16	21	30	43	217

5TB







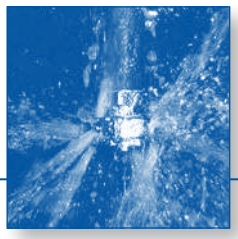
Spray Angle	Ordering no.	Free Passage (in.)	Number, Ø of nozzles (mm)	Flow Rate (Gallons Per Minute) liters per minute 2 bar	30 psi	40 psi	75 psi	145 psi	Max. tank Ø (ft.)	Max. pressure (psi)
360°	**5TB. 406. 1Y. BS**	.236	4 x 6.0 mm	107	29	33	45	63	46	362
	5TB. 407. 1Y. BS	.236	4 x 7.0 mm	132	35	41	56	78	46	362
	5TB. 408. 1Y. BS	.236	4 x 8.0 mm	150	40	47	64	89	46	362

ATEX version on request

The new Lechler rotating jet cleaner enables containers and systems to be cleaned very efficiently. Thanks to the powerful solid jets, it also performs even the most difficult cleaning tasks.

Its high-quality and hygienic design makes it especially well suited for use in the chemicals and pharmaceuticals industry.

Gyro — heavy duty, high capacity Series 577



Series 577

With our largest capacity free spinning designs, the Gyro family is the high flow work horse of our tank cleaning nozzle line.

Product features:
- Highest flow rates of all our tank cleaning nozzles
- High cleaning performance at low pressures
- PTFE bearings easily replaced to extend the service life
- Free spinning, self-lubricating, and self-flushing
- FDA Compliant (see page 24)

Applications:
- Medium to large tanks
- Ethanol fermenters
- Paper machine headboxes
- Chemical storage
- Breweries

Max. tank diameter:

Inlet Size	Tank Diameter
1"	11'
2"	18'

Operating pressure:
40 psi

Max. fluid temperature*:
194°F

Weight:

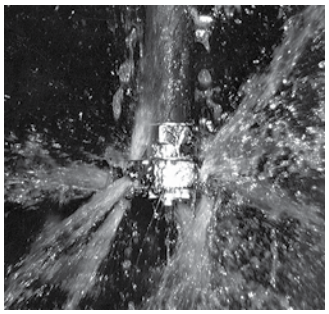
1"	1.65 lb.
2"	4 lb.

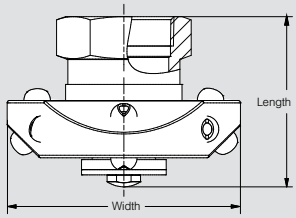
Material:
316 stainless steel
PTFE

Bearing: Sleeve bearing

Filtration:
Line strainer with 20 mesh size

Series 577





Female NPT Threaded

Spray Angle	Ordering no. Type	Connection 1" Female NPT	Connection 2" Female NPT	Flow Rate (Gallons Per Minute) 20 psi	liters per minute 2 bar	40 psi	60 psi	Length (in.)	Width (in.)
180° down	**577. 284. 1Y**	**BN**	-	35	161	50	61	2.7	4.6
	577. 364. 1Y	**BN**	-	56	258	80	98	2.7	4.6
	577. 494. 1Y	-	**BW**	120	538	170	208	4.0	5.9
270° up	**577. 285. 1Y**	**BN**	-	35	161	50	61	2.7	4.6
	577. 405. 1Y	-	**BW**	70	322	100	123	4.0	5.9
360°	**577. 289. 1Y**	**BN**	-	35	161	50	61	2.7	4.6
	577. 369. 1Y	**BN**	-	57	258	80	98	2.7	4.6
	577. 409. 1Y	-	**BW**	70	322	100	123	4.0	5.9
	577. 439. 1Y	-	**BW**	85	387	120	147	4.0	5.9
	577. 499. 1Y	-	**BW**	120	548	170	208	4.0	5.9

The PTFE bearings and other wear parts can be replaced easily to extend the life of the unit. A rebuild kit contains: Bearing sleeves, bolt, nut, spacer, and complete instructions.

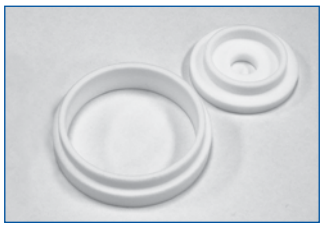
Size	Product code
1"	057.701 .55.01
2"	057.702.55.01

Please note: We do not recommend operation of these products with compressed air, steam, or gases. For further information, please contact Lechler.

Example for ordering:	Type	+	Conn.	=	Ordering no.
	577. 284. 1Y	+	**BN**	=	**577. 284. 1Y. BN**

* Contact Lechler for maximum ambient temperature.

Contents of Gyro rebuild kit



High impact tank cleaning machine — for the largest tanks and the toughest cleaning jobs Series 5TM

Series 5TM

For the largest tanks and most difficult applications, this gear-driven tank washing machine is our most powerful.

Product features:
- Very high cleaning performance at low pressures
- Requires no lubricants
- Systematically sweeps the entire tank interior (360°)
- Regular maintenance by replacement of wetted parts ensures long product life
- Can be mounted in any orientation

Applications:
- Large tanks
- Tough cleaning tasks, e.g., wine and beer fermenters, tank trucks, rail cars, chemical processing

Max. tank diameter:
Cleaning: 50 ft.

Operating pressure:
75 psi

Max. fluid temperature*:
5TM: 203°F/95°C

Weight: Approx. 16.5 lb.

Material:
316L stainless steel
PTFE and carbon fiber

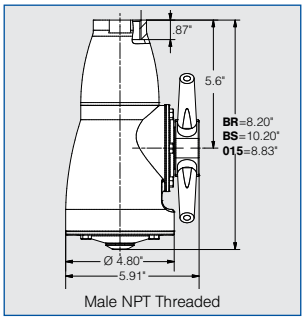
Bearing:
Ball and slide bearings

Filtration:
Line strainer with 80 mesh size

Opening requirement:
(Round hole diameter)
2 nozzle 5.9 inches
4 nozzle 7.8 inches

Rotation monitoring sensor:
This series is qualified for rotation monitoring with the Lechler sensor. Please see page 42 for more information.

Series 5TM

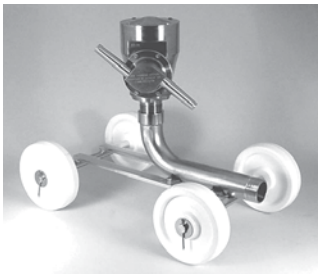


Male NPT Threaded

Ordering no. Type	Connection 1 1/2" Male NPT	1 1/2" Female NPT	1 1/2" CL150 Flange	Free Passage (in.)	No. of Nozzles x Diameter		Operating Pressure 40 psi	60 psi	80 psi	100 psi
5TM. 208. 1Y	**BR**	**BS**	**015**	.314	2x8mm	Flow Rate	40 gpm	49 gpm	56 gpm	59 gpm
5TM. 209. 1Y	**BR**	**BS**	**015**	.354	2x9mm	Flow Rate	45 gpm	54 gpm	60 gpm	65 gpm
5TM. 210. 1Y	**BR**	**BS**	**015**	.394	2x10mm	Flow Rate	50 gpm	62 gpm	69 gpm	72 gpm
5TM. 211. 1Y	**BR**	**BS**	**015**	.433	2x11mm	Flow Rate	57 gpm	68 gpm	78 gpm	**80** gpm
5TM. 407. 1Y	**BR**	**BS**	**015**	.276	4x7mm	Flow Rate	53 gpm	70 gpm	78 gpm	**82** gpm
5TM. 408. 1Y	**BR**	**BS**	**015**	.315	4x8mm	Flow Rate	62 gpm	74 gpm	**84** gpm	**92** gpm
5TM. 410. 1Y	**BR**	**BS**	**015**	.394	4x10mm	Flow Rate	**80** gpm	**95** gpm	**107** gpm	**110** gpm

Bold type under operating pressure column indicates flows in excess of 80 gpm, which exceeds the normal maximum flow through the machine. Operating beyond this point can cause excessive speed and premature wear to the internal gear train. If you require this high a flow rate, contact us to discuss modifications to your unit. The operating **Cycle Time** is typically the minimum required for a full cleaning of a tank 30' in diameter or smaller. Larger tanks or difficult cleaning situations may require longer cycle times.

A special mounting attachment allows the 5TM version to double the spray volume to the end bulkheads of long, horizontal tanks or tankers. That part number is **099.164.17.00**.



If you have multiple large tanks to clean, Lechler offers a portable cart for easier transporting and operation of your 5TM from tank to tank. The cart part number is **M20.000.17.BR**. *For use with "BR" connection only.*

Please note: We do not recommend operation of these products with compressed air, steam, or gases. To protect the products' inner workings, we suggest use of a line strainer with a 80 mesh size. For further information, please contact Lechler.

The previous M20/M29 series has been replaced with the 5TM series. 5TM components are compatible with all existing M20/M29 tank cleaning machines.

* Contact Lechler for maximum ambient temperature.

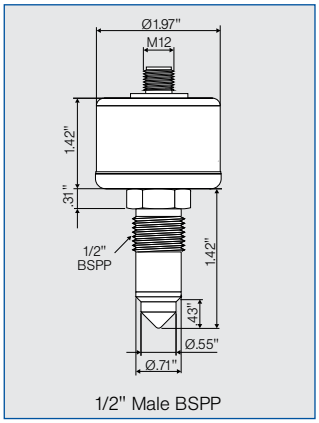
Example for ordering:	Type	+	Conn.	=	Ordering no.
	5TM. 208. 17	+	BR	=	5TM. 208. 17. BR

Special tank cleaning configurations and accessories

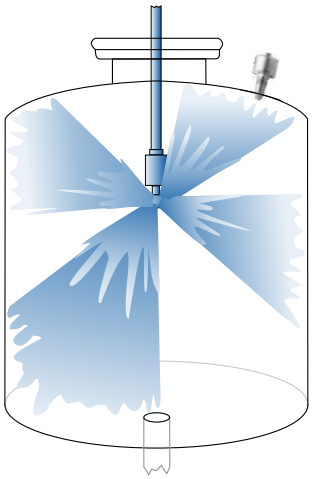
Rotation Monitoring Sensor

The new Rotation Monitoring Sensor is a reliable way to confirm that your rotating tank cleaning nozzle is actually moving inside the tank. This is especially important for enclosed tanks where the operator has no access to view the interior of the tank.

The sensor is mounted from outside the tank with a weld-in sleeve that allows the probe tip to fit directly inside the tank so that cascading liquid can come in direct contact with the probe tip. Special software monitors the flow of cascading liquid intervals to determine if the nozzle is rotating. It will show a green light when proper rotation is detected and a red light when it is not.



1/2" Male BSPP



Product features:
- Reliable detection for rotating spray devices
- Free software, easy to configure for installation
- PC is no longer required after configuration
- Can be integrated into a PLC via M12 connector
- FDA Compliant
(see page 24)

Applications:
- Tank and vessel cleaning

Material:
Socket: 316L stainless steel
Body: 303 stainless steel
Probe Tip: PEEK

Electrical: 18 up to 32 VDC

Power: <20 mA

Output signal: PNP, 50 mA short circuit protected

Process internal temperature:
32° up to +212°F

Ambient internal temperature:
-14°F up to 140°F

Ordering Numbers:

050.040.00.00.00.0
Rotation Monitoring Sensor with Weld-In Sleeve

050.040.00.00.01.0
Cable Set for first-time operation

Lances

A common way to insert a tank cleaning nozzle into a tank for cleaning is by way of a lance. As with any inlet connection for a tank cleaning product, nozzles may be connected to a lance in these ways:
- Threaded
- Tri-Clamp
- Slip-on (secured with an R-clip)
- Welded
- Flanged

There are two types of lances that can be used for tank cleaning:
- Standard (or fixed length)
- Retractable

Either can simply be bolted to the tank wall while the lance end is inserted into the tank.

The standard lance **(see Figures 1-3)** has a fixed length so care must be taken to ensure the lance is of the proper length for the size of the tank. On the retractable lance **(see Figure 4)**, the shaft actually retracts, returning the nozzle back into the flange portion of the assembly so it only comes out when cleaning is performed.

Whatever your tank cleaning lance needs, even for something special like **Figure 3**, Lechler can fabricate one specifically for your application, be it for food, pharmaceutical, chemical processing or any other industry.


Figure 1


Figure 2


Figure 3


Figure 4

Adapter »HygienicFit« Series 05C

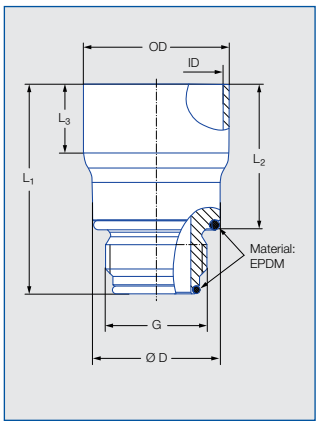
The HygienicFit ensures a hygienic connection between your tank cleaning nozzle and the supply line. The adaptor is welded onto the connection pipe, while the Lechler tank cleaning nozzle is screwed onto it. The O-rings on the adapter completely encapsulate the thread, thereby providing a perfectly hygienic connection to the system. Through the use of the O-rings, the HygienicFit also offers a reliable thread lock.

Materials:
316L SS;
EPDM (O-Ring)

Max temperature:
302°F

Installation:

Operation in every direction is possible



Ordering no.	Connection thread BSPP male	Dimensions [in]				Dimensions OD = Outer diameter ID = Inner diameter [in]		Pipe standard
		L_1	L_2	L_3	Ø D	OD	ID	
05C.190.1Y.AE.16	3/8	1.89	1.41	.71	.85	.75	.62	DIN EN 10357 series D
05C.230.1Y.AE.15	3/8	1.89	1.41	.71	.85	.91	.79	DIN EN 10357 series A
05C.250.1Y.AE.12	3/8	1.89	1.41	.67	.85	.98	22,6	DIN EN 10357 series D
05C.250.1Y.AG.12	1/2	2.20	1.54	.71	1.22	.98	.89	DIN EN 10357 series D
05C.350.1Y.AK.15	3/4	2.17	1.49	.83	1.32	1.38	1.26	DIN EN 10357 series A
05C.380.1Y.AK.12	3/4	2.17	1.49	.71	1.32	1.50	1.40	ISO 2037
05C.381.1Y.AK.15	3/4	2.17	1.49	.71	1.32	1.50	1.39	DIN EN 10357 series D
05C.381.1Y.AM.16	1	2.32	1.54	.91	1.59	1.50	1.37	DIN EN 10357 series D
05C.508.1Y.AP.15	1 1/4	2.24	1.50	.87	1.94	2.00	1.88	DIN EN 10357 series D
05C.635.1Y.AR.16	1 1/2	2.48	1.73	.87	2.20	2.50	2.37	DIN EN 10357 series D

Spare parts set of O-rings, EPDM

Thread type BSPP	Ordering no.
3/8	**05C.000.E9.AE.00**
1/2	**05C.000.E9.AG.00**
3/4	**05C.000.E9.AK.00**
1	**05C.000.E9.AM.00**
1 1/4	**05C.000.E9.AP.00**
1 1/2	**05C.000.E9.AR.00**

O-ring set is also available on request in FKM.

1-800-777-2926

Pneumatic atomizing nozzles

Atomization of viscous liquids
Cooling
Gas cooling
Humidification of air
Humidification of goods
Lubrication
Web dampening
and many others...

1-800-777-2926

Pneumatic atomizing nozzles are available in various designs to generate specific spray and flow requirements:

- Pressure principle (supply from a pressurized source)
- Gravity principle (supply located above the nozzle)
- Siphon principle (self-aspirating)
- Internal or external mix
- Full cone or flat fan spray pattern
- Optional pneumatic valve (with Series 136) or standard pneumatic valve (on Series 176)

The Series 136 atomizing nozzles have a number of optional nozzle control attachments which can be used to adjust the liquid flow; affect droplet size; flush the nozzle (to prevent clogging); or control on-off operation of the flow. These accessories are listed on page 53.

Criteria for selecting pneumatic atomizing nozzles

1. Spray pattern

Pneumatic flat fan atomizing nozzles are appropriate for humidifying and cooling of product, for web dampening, or for whenever a broad linear coverage is required (such as applying paint or food toppings). Pneumatic full cone atomizing nozzles are appropriate when circular impact or coverage is required (such as for fluid injection into a duct or pipe).

2. Liquid supply source

Whenever liquid can be supplied under pressure, it is most appropriate to use nozzles which function by the liquid pressure principle. Use of pneumatic atomizing nozzles operating by the siphon or gravity principle is more appropriate when liquid is to be sprayed in very low quantities (such as spraying disinfectants) and little pressure is required.

3. Internal vs. external mix

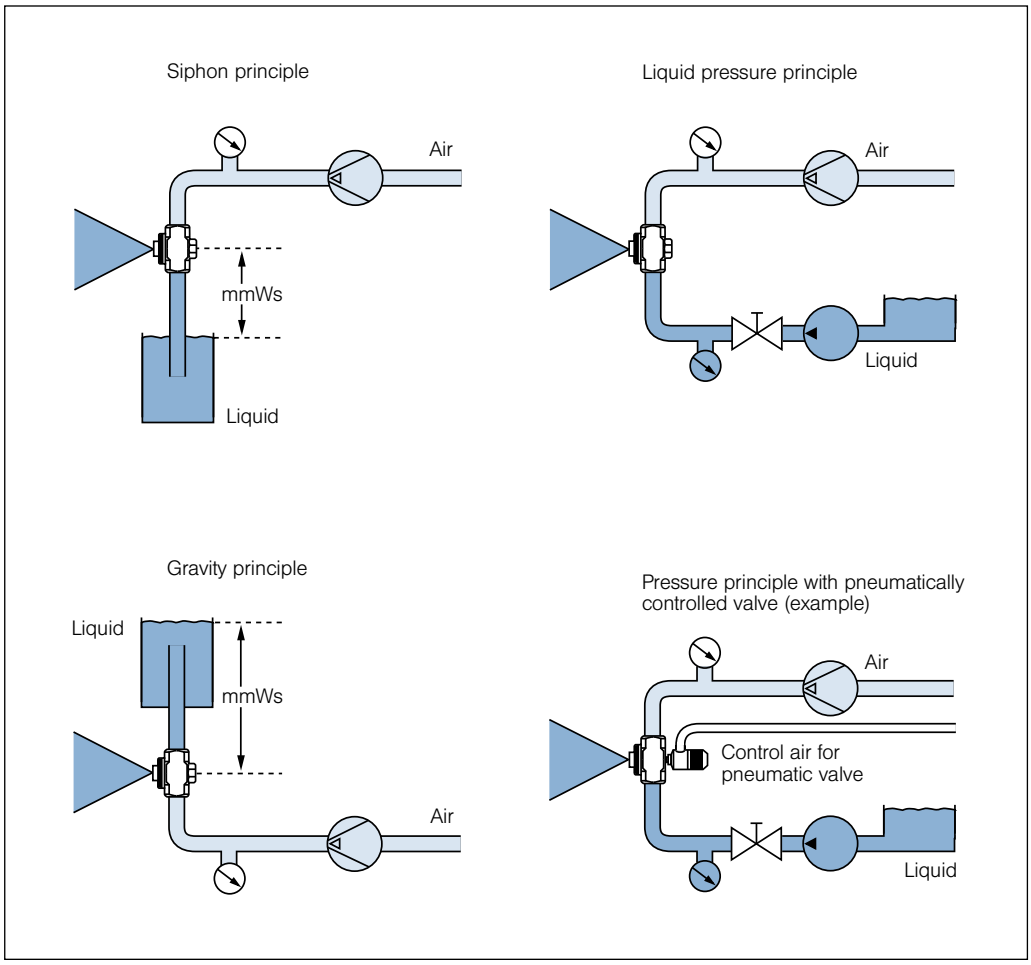
In pneumatic nozzles, the supply of air or gas mixes with the liquid flow, breaking up the fluid into the smallest droplet particles, either inside (internal mix) or outside (external mix) the nozzle chamber. An internal mix nozzle is appropriate when water, low viscosity liquids, or liquids without solid matter are to be atomized. An external mix nozzle is more appropriate for atomizing viscous liquids which might otherwise tend to clog the nozzle. Low liquid pressures should be used with this type of nozzle due to its design.

4. Style of nozzle

Series 136 nozzles (AirMists) are most appropriate when there is a need to finely atomize low viscous fluids, such as water. These are also able to have any of the various attachments on page 53 applied to them. This includes the pneumatic valve, which can separately and remotely control on-off operations, especially when intermittent spraying is required. Series 176 nozzles (ViscoMists) are external mix nozzles only and are most appropriate for spraying more viscous fluids (such as syrups and heavy oils) than AirMists are designed for.

Series 166 AirMists include a solenoid for electronic activation of the nozzle through operation of a needle valve. This could be more appropriate if metered air is limited.

Lechler also offers additional atomizing nozzles which are not featured in this catalog. Please refer to page 59 for more information on the 150, 166, 170, 171 and 180 (Supersonic) series of Pneumatic atomizing nozzles.

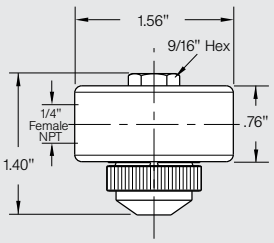


AirMist pneumatic atomizing nozzles
Full cone, pressurized liquid supply, internal mix
Series 136.1

Fine full cone atomization and fogging with air or gas. Liquid pressure principle. Internal mixing of fluids.

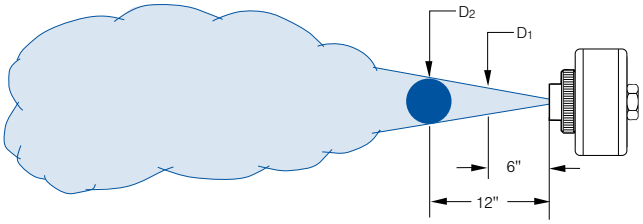
Applications:
- Humidification of air
- Cooling

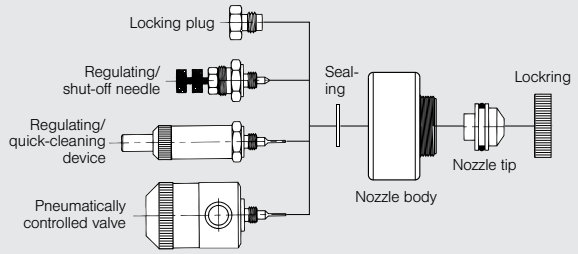
Series 136.1



Weight brass: .44 lb.

Additional flow rate data available upon request. The body is also available in a rectangular design.





For accessories for series 136, please refer to page 53.

Spray angle	Ordering no. Type	Mat. no. 316L SS 1Y	Mat. no. 303 SS 16	Maximum Free Passage (in.)	Liquid Flow GPH (Gallons Per Hour) at Indicated Liquid Pressure / Air Flow SCFM (Standard Cubic Feet Per Minute) 10 psi Air psi	10 psi GPH	10 psi SCFM	20 psi Air psi	20 psi GPH	20 psi SCFM	40 psi Air psi	40 psi GPH	40 psi SCFM	60 psi Air psi	60 psi GPH	60 psi SCFM	Spray Dimensions Air psi	Liq. psi	D1 (in.)	D2 (in.)
20°	**136. 115. xx. B2**	○	○	.020	6	1.6	.18	20	1.5	.47	35	2.4	.65	44	2.9	.71	12	10	2	4
					12	1.0	.35	26	1.1	.59	41	2.0	.71	49	2.5	.82	26	20	2	4
					17	.45	.53	32	.58	.82	46	1.6	.88	55	2.2	.94	38	30	2	4
								38	.32	1.0	52	1.2	1.1	61	1.8	1.1	46	40	2	4
											64	.53	1.5	73	1.1	1.5	64	60	2	4
											75	.11	1.8	84	.55	1.8				
	136. 125. xx. B2	○	○	.020	12	1.2	.88	17	1.8	1.1	41	2.4	1.9	49	2.8	2.3	20	10	2	4
					17	1.2	1.1	23	1.7	1.3	46	2.3	2.2	55	2.7	2.5	32	20	2	4
					23	1.1	1.4	29	1.6	1.5	52	2.2	2.4	61	2.6	2.7	41	30	2	4
					29	.92	1.5	35	1.5	1.8	58	2.1	2.6	73	2.5	3.2	49	40	2	4
					35	.79	1.8	41	1.4	2.0	64	2.0	2.8	78	2.4	3.4	61	60	2	4
					41	.71	1.9	46	1.3	2.2	70	1.9	3.1	84	2.3	3.6				
	136. 134. xx. B2	○	○	.028	17	3.5	1.6	29	5.1	2.3	44	7.5	3.1	55	8.6	3.6	26	10	2	4
					23	3.3	1.9	35	4.8	2.6	49	7.3	3.4	61	8.5	4.0	41	20	2	4
					29	3.1	2.3	41	4.6	2.9	55	7.1	3.7	67	8.3	4.3	55	30	2	4
					35	3.0	2.6	46	4.4	3.2	61	6.8	4.0	73	8.1	4.6	75	40	3	4
					41	2.9	2.9	52	4.3	3.5	67	6.6	4.3	78	7.9	4.9	87	60	3	4
					46	2.9	3.2	58	4.1	3.8	73	6.4	4.6	84	7.7	5.2				
	136. 142. xx. B2	○	○	.098	20	6.4	3.0	23	14	2.8	46	19	4.7	55	25	5.4	12	10	2	4
					26	5.4	3.7	29	11	3.5	52	17	5.4	61	22	5.9	23	20	3	4
					32	5.3	4.2	35	9.3	4.2	58	15	6.2	67	20	6.7	44	30	2	4
					38	5.1	4.8	41	8.0	4.9	64	13	6.9	73	18	7.4	58	40	3	4
					44	4.6	5.5	46	7.6	5.6	70	12	7.6	78	17	8.1	87	60	3	4
					49	4.4	6.1	52	7.4	6.2	75	11	8.3	84	15	8.8				

Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	136. 115. xx. B2	+	1Y	=	136. 115. 1Y. B2

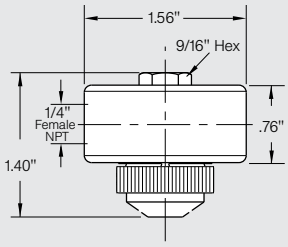
For accessories and spare parts, see page 53 of this section.
For various configurations to mount your pneumatic air nozzles, see the Lances and Nozzle Headers section beginning on page 143.

AirMist pneumatic atomizing nozzles
Wide full cone, pressurized liquid supply, internal mix
Series 136.2

Fine full cone atomization and fogging with air or gas. Especially wide spray angle at 60°.

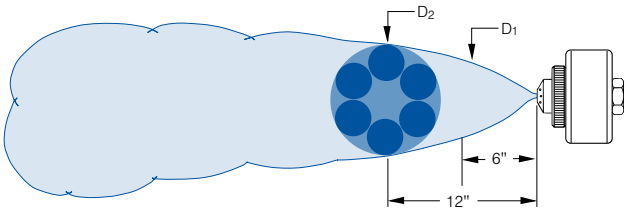
Applications:
- Humidification of air
- Cooling

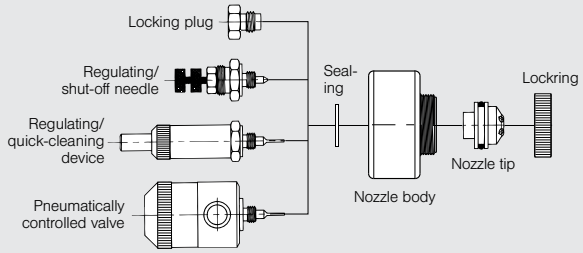
Series 136.2



Weight brass: .44 lb.

Additional flow rate data available upon request. The body is also available in a rectangular design.





For accessories for series 136, please refer to page 53.

Spray angle	Ordering no. Type	Mat. no. 316L SS 1Y	Mat. no. 303 SS 16	Maximum Free Passage (in.)	Liquid Flow GPH (Gallons Per Hour) at Indicated Liquid Pressure / Air Flow SCFM (Standard Cubic Feet Per Minute) 10 psi Air psi	10 psi GPH	10 psi SCFM	20 psi Air psi	20 psi GPH	20 psi SCFM	40 psi Air psi	40 psi GPH	40 psi SCFM	60 psi Air psi	60 psi GPH	60 psi SCFM	Spray Dimensions Air psi	Liq. psi	D1 (in.)	D2 (in.)
60°	**136. 215. xx. B2**	○	○	.020	15	.79	.77	23	1.5	1.0	41	2.2	1.4	55	2.5	1.8	15	10	8	12
					17	.48	.88	26	1.3	1.1	46	1.9	1.6	61	2.2	2.1	23	20	9	15
					20	.18	1.1	29	1.0	1.2	52	1.5	1.9	67	1.8	2.3	35	30	9	15
								32	.74	1.4	58	1.1	2.1	73	1.4	2.5	46	40	10	15
								35	.45	1.5	64	.58	2.4	78	1.0	2.8	61	60	10	16
								38	.21	1.6	70	.21	2.6	84	.61	3.1				
											73	.11	2.7	87	.37	3.3				
	136. 222. xx. B2	○	○	.039	12	4.6	1.6	23	6.8	2.4	44	11	3.4	55	15	3.8	12	10	10	18
					15	1.6	2.5	26	3.9	3.1	46	8.3	4.1	58	12	4.3	23	20	10	18
								29	1.8	3.9	49	5.9	4.8	61	9.9	5.0	33	30	10	18
								32	.50	4.8	52	3.9	5.6	64	7.8	5.7	46	40	10	18
											55	2.2	6.5	67	5.7	6.6	61	60	10	18
											58	1.2	7.2	70	4.0	7.3				
														73	2.6	8.1				
	136. 231. xx. B2	○	○	.055	23	6.8	3.0	38	12	4.1	52	25	4.6	61	35	4.3	29	10	9	15
					29	4.7	3.6	44	8.7	4.8	58	21	5.5	67	31	5.3	38	20	10	16
					35	3.0	4.2	49	6.5	5.4	64	17	6.2	73	27	6.1	35	30	10	17
					41	1.8	4.8	55	4.8	6.0	70	15	7.0	78	23	6.9	52	40	10	17
								61	3.5	6.6	75	12	7.7	84	20	7.8	61	60	10	17
								67	2.5	7.1	81	10	8.3	87	19	8.1				

Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	136. 215. xx. B2	+	1Y	=	136. 215. 1Y. B2

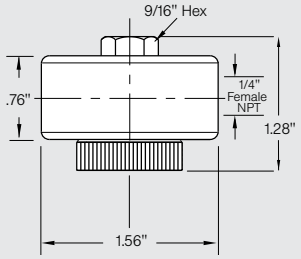
For accessories and spare parts, see page 53 of this section.
For various configurations to mount your pneumatic air nozzles, see the Lances and Nozzle Headers section beginning on page 143.

AirMist pneumatic atomizing nozzles
Full cone, gravity/siphon liquid supply, external mix
Series 136.3

Particularly fine full cone atomization with air or gas.
Siphon principle.
External mixing of fluids.

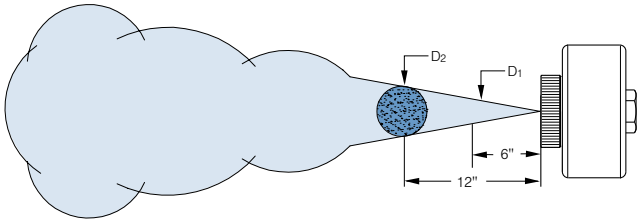
Applications:
- Chemical industry
- Cooling
- Atomization of viscous liquids

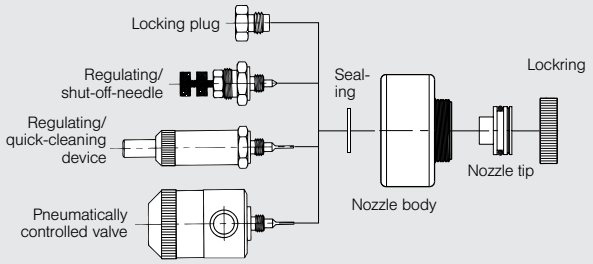
Series 136.3



Weight brass: .44 lb.

Additional flow rate data available upon request. The body is also available in a rectangular design.





For accessories for series 136, please refer to page 53.

Spray angle	Ordering no. Type	Mat. no. 316L SS 1Y	Mat. no. 303 SS 16	Maximum Free Passage (in.)	Flow Rate (Gallons Per Hour) Air Pressure psi	Air Capacity SCFM	Gravity Head 6"	Gravity Head 12"	Gravity Head 18"	Siphon Height 4"	Siphon Height 8"	Siphon Height 12"	Siphon Height 24"	Siphon Height 36"	Spray Dimensions Air psi	Siphon Height (in.)	D1 (in.)	D2 (in.)
20°					9	.50		.36	.35						20	12	2	4
					20	.75	.40	.44	.43	.30	.25	.17			46	12	2	5
	136. 316. xx. B2	○	○	.016	29	1.0	.44	.49	.47	.35	.31	.25			70	12	3	5
					46	1.4	.52	.55	.52	.44	.40	.36	.25	.13	87	12	3	5
					70	2.0	.59	.62	.60	.51	.49	.47	.40	.30				
					87	2.4	.52	.55	.52	.41	.40	.33						
					17	.70				.82	.67	.49			17	12	2	5
					26	1.0				.99	.85	.71			46	12	3	5
	136. 324. xx. B2	○	○	.028	35	1.1				1.1	.99	.85	.37		70	12	3	5
					46	1.4	1.5			1.3	1.1	1.0	.59		87	12	3	5
					70	2.0	1.7	1.7	1.8	1.6	1.4	1.4	1.0	.51				
					87	2.4	1.4	1.5	1.6	1.3	1.2	1.1	.51					
					12	.90				.70	.60	.38	.00		12	12	3	5
					26	1.1	1.4			1.1	1.0	.93	.57		46	12	3	5
	136. 334. xx. B2	○	○	.028	35	1.5	1.5	1.7	1.8	1.3	1.2	1.1	.87	.38	70	12	3	5
					46	2.2	1.7	1.8	1.9	1.5	1.4	1.3	1.1	.67	87	12	3	5
					70	3.0	2.2	2.3	2.4	1.9	1.8	1.8	1.5	1.3				
					87	3.7	2.1	2.2	2.2	1.9	1.9	1.8	1.6	1.5				
					26	2.6				2.5	2.2	2.0	1.4	.90	26	12	3	5
					35	3.3	3.2			2.7	2.5	2.3	1.8	1.4	44	12	3	5
	136. 342. xx. B2	○	○	.059	44	4.0	3.2	3.5	3.7	2.8	2.7	2.5	2.0	1.7	61	12	3	5
					55	4.6	3.3	3.5	3.7	3.0	2.9	2.8	2.5	2.2	87	12	3	5
					61	5.0	3.5	3.7	3.8	3.2	3.1	3.0	2.8	2.6				
					87	7.0	3.2	3.4		2.9	2.8	2.7	2.3	1.9				
					52	7.0				12	11		8.8		55	12	4	5
					55	8.0				13	12	11	9.3		67	12	4	6
	136. 351. xx. B2	○	○	.098	61	9.0				14	13	12	10	7.9	78	12	4	6
					70	10.0		17		15	14	14	12	9.2	87	12	4	6
					78	11.0	16	17	18	15	15	14	13	1.0				
					87	12.0	16	17	17	15	14	14	12	9.8				

Example for ordering:	Type	+	Material code (xx)	=	Ordering no.
	136. 324 xx. B2	+	1Y	=	136. 324. 1Y. B2

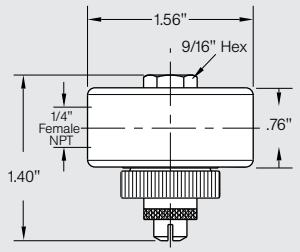
For accessories and spare parts, see page 53 of this section.
For various configurations to mount your pneumatic air nozzles, see the Lances and Nozzle Headers section beginning on page 143.

AirMist pneumatic atomizing nozzles
Wide flat fan, pressurized liquid supply, internal mix
Series 136.4

Particularly fine flat fan atomization with air or gas. Liquid pressure principle. Internal mixing of fluids.

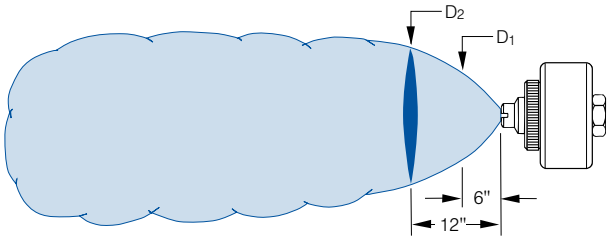
Applications:
- Web dampening
- Cooling
- Humidification of goods

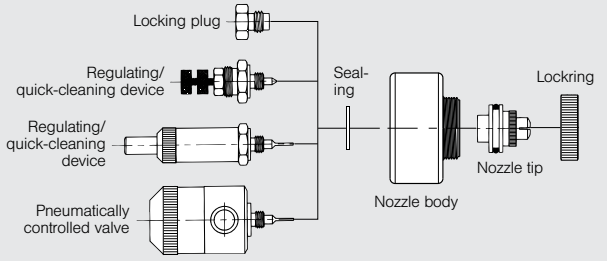
Series 136.4



Weight brass: .44 lb.

Additional flow rate data available upon request. The body is also available in a rectangular design.





For accessories for series 136, please refer to page 53.

Spray angle	Ordering no. Type	Mat. no. 316L SS 1Y	Mat. no. 303 SS 16	Maximum Free Passage (in.)	Liquid Flow GPH (Gallons Per Hour) at Indicated Liquid Pressure / Air Flow SCFM (Standard Cubic Feet Per Minute)												Spray Dimensions			
					10 psi			20 psi			40 psi			60 psi						
					Air psi	GPH	SCFM	Air psi	GPH	SCFM	Air psi	GPH	SCFM	Air psi	GPH	SCFM	Air psi	Liq. psi	D1 (in.)	D2 (in.)
45°	**136. 414. xx. B2**	○	○	.028	15	2.0	.77	20	3.8	.88	32	5.9	1.2	44	6.6	1.5	20	10	3	5
					17	1.6	.88	23	3.4	.94	38	5.3	1.4	49	6.1	1.6	35	20	4	6
					20	1.1	1.0	26	3.1	1.1	44	4.7	1.5	55	5.5	1.8	46	30	4	6
					23	.71	1.1	29	2.7	1.2	49	4.1	1.8	61	5.0	2.1	55	40	5	7
					26	.34	1.2	32	2.4	1.3	55	3.5	2.0	67	4.5	2.2				
								35	2.0	1.4	61	2.9	2.2	73	3.9	2.5				
								38	1.6	1.5	67	2.3	2.4	78	3.4	2.7				
								41	1.2	1.6	73	1.7	2.6	84	2.9	2.9				
								46	.55	1.9	84	.66	3.1							
	136. 443. xx. B2	○	○	.039	17	3.7	.88	23	7.0	.94	44	9.8	1.5	52	12	1.7	17	10	4	6
					20	3.1	1.0	26	6.4	1.1	49	8.7	1.8	58	11	1.9	29	20	5	7
					23	2.5	1.1	29	5.8	1.2	55	7.8	2.0	64	10	2.2	41	30	6	7
					26	2.1	1.2	32	5.3	1.3	61	6.9	2.2	70	9.2	2.4	55	40	6	8
								35	4.8	1.4	67	6.1	2.5	75	8.4	2.6				
								38	4.3	1.5	73	5.3	2.7	81	7.7	2.9				
								41	3.8	1.6	78	4.6	2.9	87	6.9	3.1				
								46	3.0	1.9	87	3.7	3.2							
								52	2.3	2.1										
	136. 462. xx. B2	○	○	.059	17	5.0	1.5	29	5.8	1.2	44	16	2.4	55	20	2.7	17	10	5	6
					23	3.2	2.0	35	4.8	1.4	49	14	2.8	58	19	3.0	35	20	5	7
					29	2.5	2.4	41	3.8	1.6	55	12	3.4	61	17	3.2	46	30	5	7
					35	1.9	2.8	46	3.0	1.9	61	10	3.9	64	16	3.5	55	40	6	8
					41	1.5	3.2	52	2.3	2.1	67	8.8	4.4	67	15	3.8				
					46	1.3	3.5	58	2.1	2.3	73	7.8	4.8	70	14	3.9				
					52	.95	3.9	64	1.6	2.5	78	6.7	5.2	73	14	4.2				
					58	.85	4.2	70	1.2	2.7	84	5.8	5.7	75	13	4.5				
					64	.58	4.6	75	.85	2.9	87	5.4	5.8	78	12	4.8				
								84	.21	3.2				84	12	5.1				

Continued on next page.

Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	136. 414. xx. B2	+	1Y	=	136. 414. 1Y. B2

For accessories and spare parts, see page 53 of this section.
For various configurations to mount your pneumatic air nozzles, see the Lances and Nozzle Headers section beginning on page 143.

AirMist pneumatic atomizing nozzles
Wide flat fan, pressurized liquid supply, internal mix
Series 136.4

Spray angle	Ordering no. Type	Mat. no. 316L SS 1Y	Mat. no. 303 SS 16	Maximum Free Passage (in.)	Liquid Flow GPH (Gallons Per Hour) at Indicated Liquid Pressure / Air Flow SCFM (Standard Cubic Feet Per Minute) 10 psi Air psi	10 psi GPH	10 psi SCFM	20 psi Air psi	20 psi GPH	20 psi SCFM	40 psi Air psi	40 psi GPH	40 psi SCFM	60 psi Air psi	60 psi GPH	60 psi SCFM	Spray Dimensions Air psi	Liq. psi	D1 (in.)	D2 (in.)
60°	136. 425. xx. B2	○	○	.020	12	1.7	.71	20	2.5	1.0	35	3.5	1.5	35	4.3	1.5	17	10	6	8
					17	1.5	.94	26	2.3	1.2	38	3.4	1.6	41	4.1	1.7	32	20	6	10
					23	1.2	1.1	32	2.1	1.4	44	3.2	1.8	46	4.0	1.9	44	30	7	10
					29	1.1	1.4	38	1.9	1.6	49	3.1	2.0	52	3.8	2.1	49	40	8	13
					35	.85	1.5	44	1.7	1.8	55	2.9	2.2	58	3.7	2.2				
					41	.69	1.7	49	1.5	2.0	61	2.7	2.4	64	3.5	2.4				
					44	.58	1.8	55	1.3	2.2	67	2.6	2.5	70	3.4	2.6				
								58	1.3	2.3	73	2.4	2.7	75	3.2	2.8				
								64	1.1	2.5	78	2.3	2.9	81	3.1	3.0				
								70	.95	2.6	84	2.1	3.1	87	3.0	3.2				
								75	.74	2.8	87	2.1	3.2							
								81	.58	3.0										
								87	.42	3.2										
	136. 452. xx. B2	○	○	.059	15	5.0	2.3	26	8.2	3.1	46	13	4.5	55	19	4.8	15	10	5	7
					20	2.3	3.4	29	6.7	3.7	52	10	5.5	61	15	5.7	26	20	6	9
					26	2.0	4.1	32	5.3	4.2	58	8.3	6.6	67	13	6.6	38	30	6	10
					32	1.1	4.9	35	4.1	4.7	64	6.3	7.6	73	11	7.7	52	40	7	11
					38	.26	5.8	38	3.3	5.2	70	4.7	8.5	78	8.9	8.7				
					41	.03	6.1	41	2.7	5.7	75	3.5	9.4	84	7.3	9.7				
											81	2.8	10	87	6.4	10				
											87	2.3	11							
80°	136. 433. xx. B2	○	○	.016	15	3.1	1.2	26	4.8	1.6	44	8.2	2.2	55	9.9	2.6	20	10	6	8
					17	2.1	1.4	29	4.0	1.9	49	6.7	2.6	61	8.6	2.9	32	20	7	10
					20	1.4	1.6	32	3.2	2.1	55	5.4	3.0	67	7.3	3.4	44	30	8	12
					23	.98	1.9	35	2.6	2.4	61	4.3	3.5	73	6.2	3.8	55	60	12	19
					38	2.0	2.5	67	3.3	3.9	78	5.1	4.2							
								41	1.6	2.8	73	2.5	4.3	84	4.2	4.6				
								44	1.2	2.9	78	1.7	4.7	87	3.8	4.9				

Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	136. 425. xx. B2	+	1Y	=	136. 425. 1Y. B2

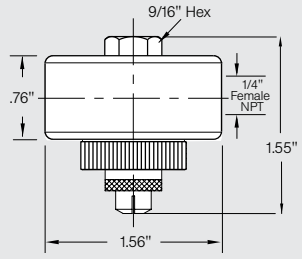
For accessories and spare parts, see page 53 of this section.
For various configurations to mount your pneumatic air nozzles, see the Lances and Nozzle Headers section beginning on page 143.

AirMist pneumatic atomizing nozzles
Wide flat fan, gravity/siphon liquid supply, internal mix
Series 136.5

Particularly fine flat fan atomization with air or gas.
Siphon principle.
Internal mixing of fluids.

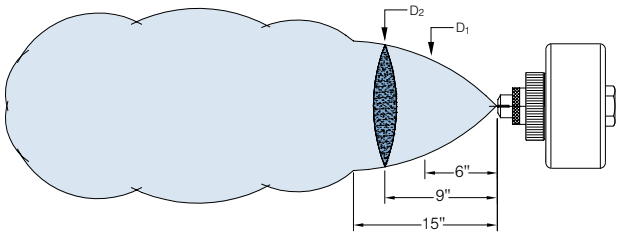
Applications:
- Web dampening
- Cooling
- Humidification of goods

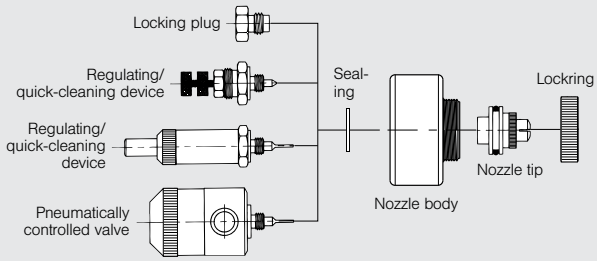
Series 136.5



Weight brass: .44 lb.

Additional flow rate data available upon request. The body is also available in a rectangular design.





For accessories for series 136, please refer to page 53.

Spray angle	Ordering no. Type	Mat. no. 316L SS 1Y	Mat. no. 303 SS 16	Maximum Free Passage (in.)	Flow Rate (Gallons Per Hour) Air Pressure psi	Air Capacity SCFM	Gravity Head 6"	Gravity Head 12"	Gravity Head 18"	Siphon Height 4"	Siphon Height 8"	Siphon Height 12"	Siphon Height 24"	Siphon Height 36"	Spray Dimensions Air psi	Siphon Height (in.)	D1 (in.)	D2 (in.)
60°					20	1.4	.52	.57	.59	.49	.48	.44	.39	.32	15	12	5	6
					26	1.7	.52	.59	.62	.50	.49	.47	.40	.33	44	12	6	8
					29	1.8	.52	.58	.61	.50	.48	.44	.40	.33	67	12	7	9
					38	2.2	.48	.59	.59	.46	.45	.42	.38	.31	87	12	7	9
					46	2.6	.45	.51	.57	.44	.43	.42	.42	.36				
	136. 516. xx. B2	○	○	.016	55	3.0	.51	.48	.55	.49	.49	.48	.45	.39				
					61	3.2	.52	.54	.58	.51	.48	.48	.44	.45				
					64	3.3	.52	.54	.58	.50	.49	.48	.46	.47				
					70	3.6	.53	.54	.57	.53	.53	.54	.54	.52				
					78	4.0	.61	.62	.60	.59	.59	.57	.54	.49				
					81	4.1	.61	.60	.59	.58	.57	.55	.53	.48				
					87	4.3	.59	.59	.59	.55	.55	.54	.51	.47				
					20	1.5	.75	.77	.81	.70	.66	.64	.56	.48	15	12	6	9
					26	1.8	.78	.80	.83	.73	.70	.68	.58	.50	44	12	8	12
					29	1.9	.78	.80	.83	.72	.71	.68	.58	.48	67	12	8	12
					38	2.3	.75	.76	.80	.66	.65	.61	.51	.43	87	12	10	16
					46	2.7	.65	.66	.72	.55	.52	.50	.46	.50				
	136. 525. xx. B2	○	○	.020	55	3.1	.62	.63	.67	.59	.59	.57	.52	.49				
					61	3.4	.62	.62	.64	.58	.56	.56	.51	.48				
					64	3.5	.61	.61	.64	.58	.55	.54	.52	.48				
					70	3.8	.59	.59	.64	.56	.54	.55	.50	.56				
					78	4.2	.67	.59	.62	.69	.67	.66	.60	.55				
					81	4.3	.66	.65	.68	.68	.67	.63	.57	.53				
					87	4.6	.68	.69	.73	.63	.63	.58	.51	.48				

Example for ordering:	Type	+	Material code (xx)	=	Ordering no.
	136. 525. xx. B2	+	1Y	=	136. 525. 1Y. B2

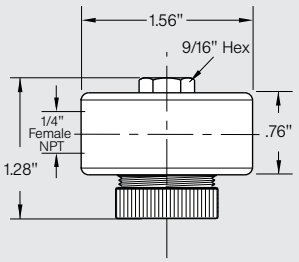
For accessories and spare parts, see page 53 of this section.
For various configurations to mount your pneumatic air nozzles, see the Lances and Nozzle Headers section beginning on page 143.

AirMist pneumatic atomizing nozzles
Flat fan, pressurized liquid supply, external mix
Series 136.6

Fine flat fan atomization with air or gas.
Liquid pressure principle.
External mixing of fluids.

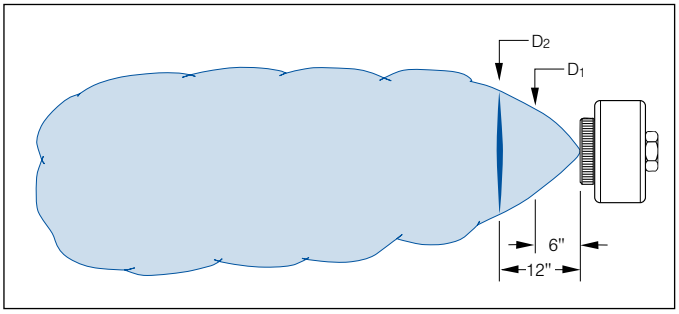
Applications:
- Web dampening
- Cooling
- Humidification of goods
- Atomization of viscous liquids

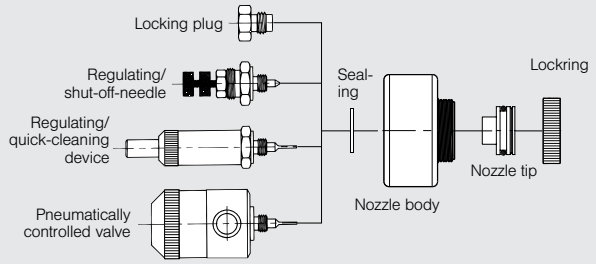
Series 136.6



Weight brass: .44 lb.

Additional flow rate data available upon request. The body is also available in a rectangular design.





For accessories for series 136, please refer to page 53.

Spray angle	Ordering no. Type	Mat. no. 316L SS 1Y	Mat. no. 303 SS 16	Maximum Free Passage (in.)	Liquid Flow GPH (Gallons Per Hour) at Indicated Liquid Pressure / Air Flow SCFM (Standard Cubic Feet Per Minute) 1 psi Air psi	1 psi GPH	1 psi SCFM	2 psi Air psi	2 psi GPH	2 psi SCFM	4 psi Air psi	4 psi GPH	4 psi SCFM	5 psi Air psi	5 psi GPH	5 psi SCFM	Spray Dimensions Air psi	Liq. psi	D1 (in.)	D2 (in.)
45°	**136. 616. xx. B2**	○	○	.016	12	.44	1.4	12	.64	1.4	12	.90	1.5	15	.97	1.6	20	1	3	5
					23	.51	2.2	20	.68	2.1	23	.93	2.2	26	1.0	2.4	32	2	4	5
					35	.55	2.9	32	.73	2.8	35	.96	2.9	38	1.0	3.1	46	3	4	5
					46	.58	3.6	44	.72	3.5	46	.96	3.6	49	1.0	3.8	58	4	4	6
					58	.59	4.3	58	.73	4.3	58	.97	4.3	61	1.0	4.5	73	5	4	6
					70	.59	5.0	70	.73	5.0	70	.97	5.0	72	1.0	5.2				
	136. 635. xx. B2	○	○	.020	12	.63	1.4	12	.91	1.4	12	1.3	1.4	15	1.4	1.6	20	1	3	5
					23	.75	2.2	23	.97	2.2	23	1.3	2.2	26	1.4	2.4	32	2	4	5
					35	.82	2.9	35	1.0	2.9	35	1.4	2.9	38	1.5	3.1	46	3	4	5
					47	.85	3.6	47	1.0	3.6	46	1.4	3.6	49	1.5	3.8	58	4	4	6
					58	.85	4.3	58	1.0	4.3	58	1.4	4.3	61	1.5	4.4	73	5	4	6
					70	.85	5.0	70	1.0	5.0	70	1.4	5.0	73	1.5	5.1				
	136. 654. xx. B2	○	○	.028	12	1.4	1.4	12	1.9	1.4	17	2.7	1.8	23	2.9	2.2	20	1	4	5
					23	1.5	2.2	23	2.0	2.2	29	2.7	2.5	35	3.0	2.9	32	2	4	6
					35	1.6	2.9	35	2.1	2.9	41	2.8	3.2	46	3.0	3.6	46	3	4	6
					46	1.7	3.6	46	2.1	3.6	52	2.8	3.9	58	3.0	4.3	58	4	4	6
					58	1.7	4.2	58	2.1	4.3	64	2.8	4.6	69	3.0	4.9	73	5	4	6
					70	1.7	5.0	70	2.1	4.9	75	2.8	5.3	81	3.0	5.6				

Continued on next page.

Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	136. 616. xx. B2	+	1Y	=	136. 616. 1Y. B2

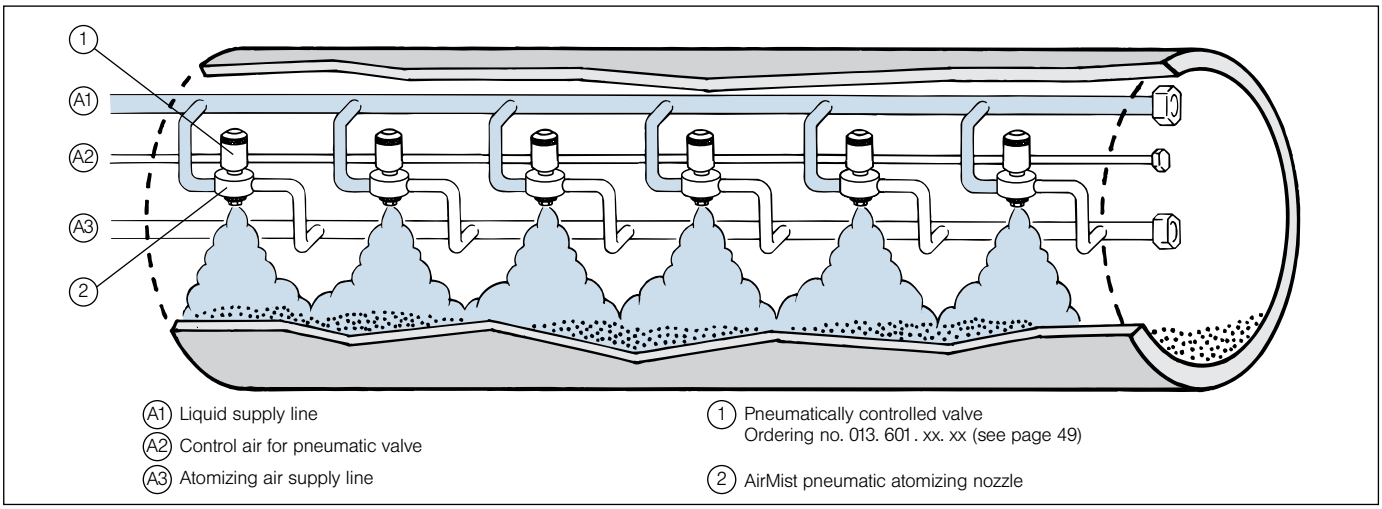
For accessories and spare parts, see page 53 of this section.
For various configurations to mount your pneumatic air nozzles, see the Lances and Nozzle Headers section beginning on page 143.

AirMist pneumatic atomizing nozzles
Flat fan, pressurized liquid supply, external mix
Series 136.6

Spray angle	Ordering no. Type	Mat. no. 316L SS 1Y	Mat. no. 303 SS 16	Maximum Free Passage (in.)	Liquid Flow GPH (Gallons Per Hour) at Indicated Liquid Pressure / Air Flow SCFM (Standard Cubic Feet Per Minute)												Spray Dimensions			
					1 psi			2 psi			4 psi			5 psi						
					Air psi	GPH	SCFM	Air psi	GPH	SCFM	Air psi	GPH	SCFM	Air psi	GPH	SCFM	Air psi	Liq. psi	D1 (in.)	D2 (in.)
60°	**136. 626. xx. B2**	○	○	.016	12	.48	1.7	12	.66	1.7	12	.92	1.6	12	1.00	1.7	23	1	3	5
					23	.55	2.5	23	.71	2.5	23	.97	2.5	23	1.0	2.5	35	2	4	6
					35	.59	3.3	35	.75	3.3	35	.97	3.3	35	1.0	3.3	46	3	4	6
					46	.61	4.1	46	.76	4.1	46	1.00	4.1	46	1.1	4.1	58	4	4	6
					58	.63	4.9	58	.78	4.9	58	1.0	4.9	58	1.1	4.9	75	5	4	6
					70	.63	5.7	70	.78	5.7	70	1.0	5.7	70	1.1	5.7				
	136. 645. xx. B2	○	○	.020	12	.72	1.7	12	.97	1.7	15	1.4	1.9	14	1.5	1.9	23	1	4	6
					23	.82	2.5	23	1.1	2.5	26	1.4	2.7	26	1.5	2.7	35	2	4	6
					35	.89	3.3	35	1.1	3.3	38	1.4	3.5	38	1.5	3.5	46	3	5	6
					46	.91	4.1	46	1.1	4.1	49	1.5	4.3	49	1.6	4.3	58	4	5	6
					58	.93	4.9	58	1.1	4.9	61	1.5	5.1	61	1.6	5.1	75	5	5	6
					70	.94	5.7	70	1.2	5.7	72	1.5	5.9	73	1.6	5.9				
	136. 664. xx. B2	○	○	.028	12	1.4	1.6	15	2.0	1.9	15	2.8	1.9	14	3.0	1.9	23	1	4	6
					23	1.6	2.5	26	2.1	2.7	26	2.9	2.7	26	3.1	2.7	35	2	5	6
					35	1.8	3.3	38	2.2	3.5	38	2.9	3.5	38	3.1	3.5	46	3	6	7
					46	1.8	4.1	49	2.3	4.3	49	3.0	4.3	49	3.2	4.3	58	4	6	7
					58	1.9	4.9	61	2.3	5.1	61	3.0	5.1	61	3.2	5.1	75	5	6	8
					70	1.9	5.7	73	2.3	5.9	72	3.0	5.9	73	3.2	5.9				
	136. 673. xx. B2	○	○	.039	15	3.8	4.5	20	4.9	5.5	29	6.5	6.9	35	7.0	7.9	23	1	5	6
					26	3.7	6.5	32	4.7	7.4	41	6.2	8.9	46	6.5	9.8	35	2	5	6
					38	3.6	8.3	44	4.4	9.4	52	5.6	11	58	5.8	12	46	3	5	6
					49	3.4	10	55	4.0	11	64	5.0	13	70	5.1	14	58	4	5	6
					61	3.2	12	67	3.7	13	75	4.4	15	81	4.5	16	75	5	5	7
					73	2.9	14	78	3.2	15	84	4.0	16							
	136. 682. xx. B2	○	○	.059	15	5.9	4.4	20	7.6	5.5	26	11	6.5	29	12	6.9	23	1	4	6
					26	5.0	6.5	32	6.3	7.4	38	8.8	8.4	41	9.3	8.9	35	2	5	6
					38	4.5	8.3	44	5.6	9.3	49	7.5	10	52	8.0	11	46	3	5	6
					49	4.2	10	55	5.1	11	61	6.7	12	64	7.1	13	58	4	5	6
					61	4.2	12	67	4.9	13	73	6.1	14	75	6.4	15	75	5	5	7
					73	4.0	14	78	4.6	15	84	5.6	16	87	5.9	16				
	136. 691. xx. B2	○	○	.098	26	13	9.6	35	17	12	43	23	14	44	26	14	23	1	6	8
					38	13	13	46	16	15	55	21	17	55	23	17	35	2	6	8
					49	12	15	58	15	18	67	20	20	67	21	20	46	3	6	8
					61	11	18	70	14	20	78	18	23	78	20	22	58	4	6	8
					73	11	21	81	13	23	87	17	25	87	18	25	75	5	6	8
					78	10	23	87	12	25										

Example for ordering:	**Type**	**+**	**Material no. (xx)**	**=**	**Ordering no.**
	136. 626. xx. B2	**+**	**1Y**	**=**	**136. 626. 1Y. B2**

For accessories and spare parts, see page 53 of this section.
For various configurations to mount your pneumatic air nozzles, see the Lances and Nozzle Headers section beginning on page 143.



(A1) Liquid supply line
(A2) Control air for pneumatic valve
(A3) Atomizing air supply line

(1) Pneumatically controlled valve
Ordering no. 013. 601. xx. xx (see page 49)

(2) AirMist pneumatic atomizing nozzle

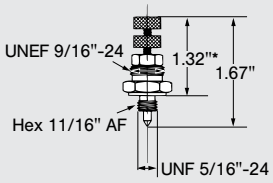
Cereal dampening in a mixing drum

Accessories
for the AirMist pneumatic atomizing nozzles
Series 136

Regulating device and shut-off needle:

Shuts off flow and controls liquid supply — manually operated

1A



* max. opened

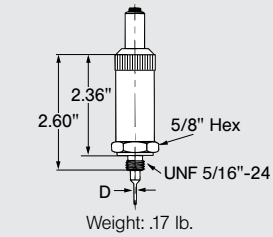
Weight: .07 lb.

Ordering no.		
Assembly part no.	Mat. no. 303 SS **16**	For all 136 series nozzles
015. 600	○	

Regulating device with quick-cleaning needle:

Combines orifice cleaning with liquid flow control — manually operated

1B



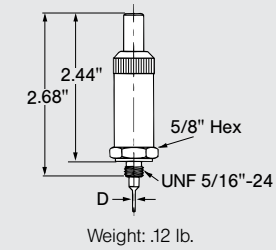
Weight: .17 lb.

Ordering no.			Use the 6th digit to determine appropriate accessory Example: 136.41**4**.1Y.B2	Needle diameter D (in.)
Assembly part no.	Mat. no. 303 SS **16**	Brass Nickel Plate **35**		
013. 601. xx. 30	○	○	136. xx**1**. xx. B2	.085
013. 602. xx. 30	○	○	136. xx**2**. xx. B2	.048
013. 603. xx. 30	○	○	136. xx**3**. xx. B2	.034
013. 604. xx. 30	○	○	136. xx**4**. xx. B2	.024
013. 605. xx. 30	○	○	136. xx**5**. xx. B2	.016
013. 606. xx. 30	○	○	136. xx**6**. xx. B2	.012

Quick-cleaning device:

Does orifice cleaning with push-button pin — manually operated

1C



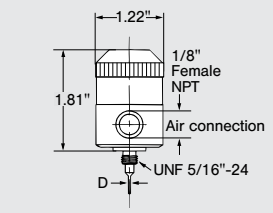
Weight: .12 lb.

013. 601. xx. 20	○	○	136. xx**1**. xx. B2	.085
013. 602. xx. 20	○	○	136. xx**2**. xx. B2	.048
013. 603. xx. 20	○	○	136. xx**3**. xx. B2	.034
013. 604. xx. 20	○	○	136. xx**4**. xx. B2	.024
013. 605. xx. 20	○	○	136. xx**5**. xx. B2	.016
013. 606. xx. 20	○	○	136. xx**6**. xx. B2	.012

Pneumatically controlled valve:

Opening pressure 30 psi, max. 180 cycles/min. Connects to separate air inlet for fast on/off operation — externally controlled

1D



Weight: .27 lb.

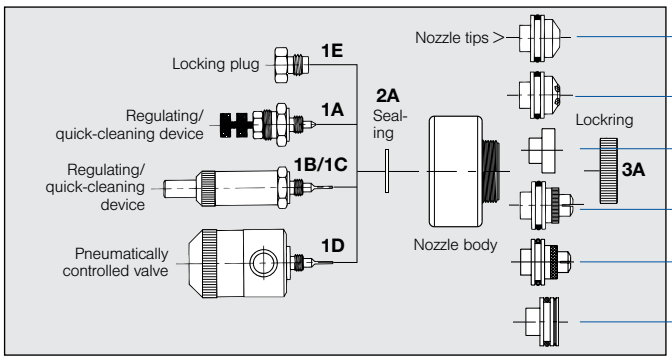
013. 601. xx. 10	○	○	136. xx**1**. xx. B2	.085
013. 602. xx. 10	○	○	136. xx**2**. xx. B2	.048
013. 603. xx. 10	○	○	136. xx**3**. xx. B2	.034
013. 604. xx. 10	○	○	136. xx**4**. xx. B2	.024
013. 605. xx. 10	○	○	136. xx**5**. xx. B2	.016
013. 606. xx. 10	○	○	136. xx**6**. xx. B2	.012

Example for ordering:	**Type**	**+**	**Material no. (xx)**	**=**	**Ordering no.**
	013. 602. xx. 20	**+**	**16**	**=**	**013. 602. 16. 20**

1E for Series 136/166
Locking plug
136. 000. 1Y. 00. 04

2A for Series 136
Seal
095. 015. 7A. 03. 04

3A for Series 136/166
Lockring
136. 000. 1Y. 00. 07



Nozzle tips*

Series 136.1/166.1
136. xxx. 1Y. 00. 03

Series 136.2/166.2
136. xxx. 1Y. 00. 03

Series 136.3/166.3
136. xxx. 1Y. 00. 03

Series 136.4/166.4
136. xxx. 1Y. 00. 03

Series 136.5/166.5
136. xxx. 1Y. 00. 03

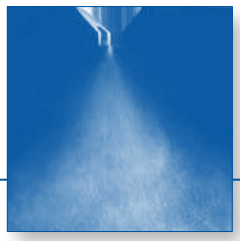
Series 136.6/166.6
136. xxx. 1Y. 00. 03

* Use the 3 digits from the full nozzle assembly for the spare tip part number

Example: 136.**414**.17.B2

1-800-777-2926

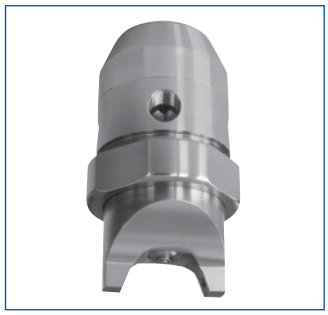
Pneumatic atomizing nozzles
ViscoMist™ flat fan, external mix
Series 176

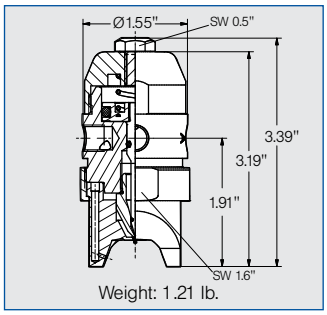


Versatile design with built-in pneumatic needle valve for liquid flow control and automatic clean-out. Three nozzle body configurations offer flexible tailoring to your specific application needs. Models feature individual controls for on-off operation, atomizing air, and fan air, allowing adjustments to droplet size and spray pattern as appropriate without compromising required flow. Has been newly redesigned for greater anti-bearding.

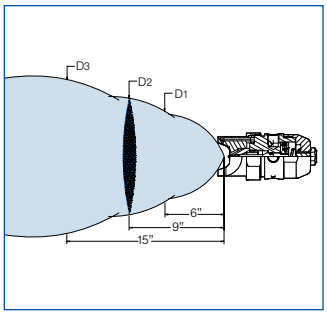
Applications:
- Spraying viscous fluids
- Coating
- Glazing
- Sanitizing
- Humidification
- Recirculating liquids

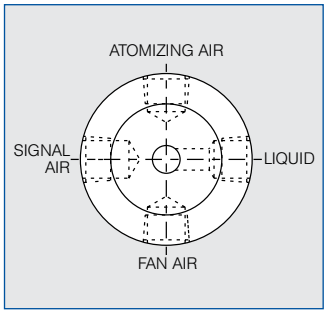
All nozzle inlet connections: 1/8" female NPT





Weight: 1.21 lb.





* For additional body styles, contact Lechler.

Nozzle Body 4*
This configuration has four process connections: one for liquid, and three for air. One air connection controls atomizing air, one controls fan air, and the third controls signal air for on-off operations, so each aspect can be individually adjusted. Therefore, atomizing air can be set at less than 40 psi if desired without affecting the on-off operation, for instance.

The ViscoMist™ has greatly minimized the following problem, but it is still a situation to be aware of:

Bearding/Caking
- *What is it*—Build-up of material around the inside or outside of the orifice due to evaporation of the liquid being sprayed. This dried solid material blocks all or part of the nozzle orifice or internal flow passages.
- *Symptoms*
  — Reduced flow rate
  — Reduced spray angle
  — Irregular spray pattern
- *Solution*—Thoroughly clean nozzle, if necessary, using cleansers and solvents which will not affect the nozzle material.

Description of inlet ports and their symbols
The ViscoMist™ has three Nozzle Body styles available. For all styles, next to each inlet port on the nozzle is stamped one or more letters representing the spray aspect(s) that port controls. These spray aspects and the letter representing each are as follows:

Atomizing Air (A)
The Atomizing Air Port influences the atomization of the liquid into either small or large droplet sizes, simultaneously affecting spray distribution in the center of the spray pattern. To achieve finer liquid atomization, increase the atomizing air pressure.

Fan Air (F)
The Fan Air Port flattens the atomized liquid, thus giving it a flat fan spray distribution. With the appropriate nozzle body configuration, this distribution can be adjusted independently to control the liquid spray width. To achieve a wider spray distribution, increase the fan air pressure.

Liquid(M)
The liquid flow rate is directly proportional to the liquid pressure rate. Subsequently, the higher the liquid pressure rate is, the higher the liquid flow rate will be. The liquid "On" or "Off" cycle is dependent on the Piston-controlled Signal Air supply.

Signal Air (P)
Air supplied to this port actuates a piston located within the nozzle to retract or extend the Clean-Out/Liquid Shut-Off Needle. Retracting the needle allows the liquid to flow from the nozzle. A minimum of 40 psi air pressure to this port is required to operate the nozzle.

For ViscoMist replacement kits, see page 58.

Pneumatic atomizing nozzles
ViscoMist flat fan, external mix
Series 176

Nozzle Body Configuration (see pg. 54)	Ordering no.	Orifice diam. (in.)	Liq. Capacity* Inlet Press. (psi)	Liq. Capacity* Liq. Flow (GPH)	Air Capacity* Inlet Press. (psi)	Air Capacity* Atom. Air (SCFM)	Air Capacity* Fan Air (SCFM)	Spray Coverage (in.) at Indicated Distance from Nozzle: Atom. Air (psi)	Liq. Flow (psi)	Fan Air Pressure (psi) 0# D1	0# D2	0# D3	5 D1	5 D2	5 D3	10 D1	10 D2	10 D3	20 D1	20 D2	20 D3
4	176. 401. 1Y. 01	.015	2.2	.50	2.2	.44	.59	5	5	2	3	5	5	5	8	5	7	9	7	8	9
			3.6	.66	3.6	.57	.76		10	2	2	4	4	7	9	7	9	13	10	12	14
			4.4	.74	4.4	.64	.85		20	-	-	-	6	8	12	9	13	15	11	13	16
			5	.80	5	.67	.91	10	5	2	3	4	5	6	7	6	7	10	8	10	13
			10	1.2	10	.96	1.3		10	2	3	4	4	5	7	6	8	10	9	11	14
			15	1.5	15	1.2	1.7		20	-	-	-	5	7	8	7	10	14	10	13	17
			20	1.7	20	1.4	2.0	20	5	2	3	4	3	4	6	4	5	7	6	8	10
			30	2.1	30	1.8	2.7		10	2	3	4	2	4	5	4	5	7	6	8	10
			40	2.4	40	2.3	3.3		20	-	-	-	3	4	6	5	7	8	7	10	13
			50	2.7	50	2.7	4.0	40	5	2	2	4	2	2	4	2	4	5	7	6	7
			58	3.0	58	3.1	4.5		10	2	3	5	2	3	5	3	4	5	5	7	8
									20	1	2	3	2	3	5	3	4	6	5	7	9

Nozzle Body Configuration (see pg. 54)	Ordering no.	Orifice diam. (in.)	Liq. Capacity* Inlet Press. (psi)	Liq. Capacity* Liq. Flow (GPH)	Air Capacity* Inlet Press. (psi)	Air Capacity* Atom. Air (SCFM)	Air Capacity* Fan Air (SCFM)	Spray Coverage (in.) at Indicated Distance from Nozzle: Atom. Air (psi)	Liq. Flow (psi)	Fan Air Pressure (psi) 0# D1	0# D2	0# D3	5 D1	5 D2	5 D3	10 D1	10 D2	10 D3	20 D1	20 D2	20 D3
4	176. 402. 1Y. 01	.023	2.2	1.1	2.2	.46	.59	5	5	2	2	3	6	7	9	6	8	9	8	9	10
			3.6	1.4	3.6	.59	.76		10	-	-	-	5	7	9	8	10	15	12	14	20
			4.4	1.6	4.4	.65	.85		20	-	-	-	-	-	-	9	12	15	14	16	20
			5	1.7	5	.69	.91	10	5	2	3	4	4	6	7	5	7	9	7	9	10
			10	2.5	10	.98	1.3		10	2	2	4	5	7	8	6	7	10	10	11	14
			15	3.0	15	1.2	1.7		20	-	-	-	-	-	-	7	9	12	11	13	16
			20	3.5	20	1.4	2.0	20	5	2	3	4	3	4	4	5	6	8	5	7	9
			30	4.3	30	1.9	2.7		10	2	2	3	4	5	7	5	6	8	7	8	11
			40	5.1	40	2.3	3.3		20	-	-	-	4	5	8	5	7	9	8	9	13
			50	5.7	50	2.7	4.0	40	5	2	2	3	2	3	4	3	4	5	5	6	7
			58	6.2	58	3.1	4.5		10	1	2	4	2	3	4	4	4	5	5	6	8
									20	2	3	4	3	4	6	4	5	7	6	8	12

Nozzle Body Configuration (see pg. 54)	Ordering no.	Orifice diam. (in.)	Liq. Capacity* Inlet Press. (psi)	Liq. Capacity* Liq. Flow (GPH)	Air Capacity* Inlet Press. (psi)	Air Capacity* Atom. Air (SCFM)	Air Capacity* Fan Air (SCFM)	Spray Coverage (in.) at Indicated Distance from Nozzle: Atom. Air (psi)	Liq. Flow (psi)	Fan Air Pressure (psi) 0# D1	0# D2	0# D3	5 D1	5 D2	5 D3	10 D1	10 D2	10 D3	20 D1	20 D2	20 D3
4	176. 403. 1Y. 01	.031	2.2	2.2	2.2	.28	.59	5	5	-	-	-	7	10	12	12	15	18	13	16	20
			3.6	2.9	3.6	.38	.76		10	-	-	-	8	10	12	13	15	19	18	21	27
			4.4	3.3	4.4	.42	.85		20	-	-	-	-	-	-	12	15	21	17	22	27
			5	3.5	5	.46	.91	10	5	1	2	3	6	8	11	11	14	18	12	15	19
			10	5.1	10	.68	1.3		10	-	-	-	7	9	13	11	14	18	15	18	23
			15	6.3	15	.86	1.7		20	-	-	-	-	-	-	11	13	18	14	18	23
			20	7.3	20	.97	2.0	20	5	2	2	3	5	6	8	7	9	10	9	11	13
			30	9.0	30	1.3	2.7		10	-	-	-	5	7	10	7	9	12	10	12	14
			40	1.4	40	1.6	3.3		20	-	-	-	-	-	-	9	11	16	12	14	20
			50	11.7	50	1.9	4.0	40	5	2	2	4	4	5	7	6	7	9	8	9	12
			58	12.7	58	2.2	4.5		10	-	-	-	5	6	8	6	8	10	9	11	15
									20	-	-	-	-	-	-	7	9	13	9	12	16

*These pressures are independently controlled so any combination of liquid, atomizing air, and fan air pressures can be selected. Total SCFM output is the sum of the separate atomized air and fan air amounts for the individual inlet pressures used.

Continued on next page.

A cone-shaped spray is most likely to be produced if the fan air function is not utilized.

Material: 316L SS — We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 1Y.

For ViscoMist replacement kits, see page 58.
For various configurations to mount your pneumatic air nozzles, see the Lances and Nozzle Headers section beginning on page 143.

Pneumatic atomizing nozzles
ViscoMist flat fan, external mix
Series 176

Nozzle Body Configuration (see pg. 54)	Ordering no.	Orifice diam. (in.)	Liq. Capacity*		Air Capacity*			Spray Coverage (in.) at Indicated Distance from Nozzle													
										Fan Air Pressure (psi)											
										0#			5			10			20		
			Inlet Press. (psi)	Liq. Flow (GPH)	Inlet Press. (psi)	Atom. Air (SCFM)	Fan Air (SCFM)	Atom. Air (psi)	Liq. Flow (psi)	D1	D2	D3	D1	D2	D3	D1	D2	D3	D1	D2	D3
4	176. 404. 1Y. 01	.042	2.2	4.5	2.2	1.4	1.2	5	5	-	-	-	7	10	13	12	15	18	14	16	21
			3.6	5.8	3.6	1.8	1.6		10	-	-	-	7	10	14	12	15	20	18	21	26
			4.4	6.4	4.4	2.0	1.7		20	-	-	-	-	-	-	10	15	18	17	21	29
			5	6.9	5	2.2	1.9	10	5	-	-	-	5	7	10	8	10	13	11	13	17
			10	9.9	10	3.3	2.7		10	-	-	-	5	6	9	8	10	15	13	16	20
			15	12.1	15	4.3	3.4		20	-	-	-	-	-	-	7	9	13	12	15	23
			20	14.0	20	5.2	4.1	20	5	2	3	4	4	5	7	5	7	9	8	10	13
			30	17.2	30	6.8	5.3		10	-	-	-	4	5	7	5	7	9	9	11	15
			40	2.0	40	8.4	6.6		20	-	-	-	4	5	7	6	8	11	8	11	16
			50	22.4	50	1.1	7.8	40	5	2	3	4	3	4	6	4	5	7	6	7	10
			58	24.2	58	11.5	8.9		10	2	3	4	3	4	6	4	5	7	6	8	10
									20	-	-	-	3	4	6	4	5	7	6	8	12

Nozzle Body Configuration (see pg. 54)	Ordering no.	Orifice diam. (in.)	Liq. Capacity*		Air Capacity*			Spray Coverage (in.) at Indicated Distance from Nozzle													
										Fan Air Pressure (psi)											
										0#			5			10			20		
			Inlet Press. (psi)	Liq. Flow (GPH)	Inlet Press. (psi)	Atom. Air (SCFM)	Fan Air (SCFM)	Atom. Air (psi)	Liq. Flow (psi)	D1	D2	D3	D1	D2	D3	D1	D2	D3	D1	D2	D3
4	176. 405. 1Y. 01	.052	2.2	6.5	2.2	1.3	1.2	5	5	-	-	-	9	11	17	13	17	22	18	21	28
			3.6	8.4	3.6	1.7	1.6		10	-	-	-	-	-	-	14	18	24	19	23	22
			4.4	9.3	4.4	1.9	1.7		20	-	-	-	-	-	-	10	14	21	15	22	32
			5	1.0	5	2.0	1.9	10	5	-	-	-	6	9	13	9	13	18	13	16	21
			10	14.4	10	3.0	2.7		10	-	-	-	-	-	-	10	12	19	14	18	24
			15	17.7	15	4.0	3.4		20	-	-	-	-	-	-	9	13	17	13	18	27
			20	20.2	20	4.7	4.1	20	5	-	-	-	4	6	8	6	8	11	9	11	15
			30	25	30	6.1	5.3		10	-	-	-	4	6	8	6	8	12	9	12	15
			40	29	40	7.5	6.6		20	-	-	-	-	-	-	5	8	11	9	12	17
			50	33	50	8.9	7.8	40	5	2	3	4	3	4	6	4	5	8	6	7	11
			58	35	58	1.1	8.9		10	-	-	-	3	4	6	4	5	8	6	8	12
									20	-	-	-	3	4	6	4	5	8	6	8	12

Nozzle Body Configuration (see pg. 54)	Ordering no.	Orifice diam. (in.)	Liq. Capacity*		Air Capacity*			Spray Coverage (in.) at Indicated Distance from Nozzle													
										Fan Air Pressure (psi)											
										10			15			20			30		
			Inlet Press. (psi)	Liq. Flow (GPH)	Inlet Press. (psi)	Atom. Air (SCFM)	Fan Air (SCFM)	Atom. Air (psi)	Liq. Flow (psi)	D1	D2	D3	D1	D2	D3	D1	D2	D3	D1	D2	D3
4	176. 406. 1Y. 01	.067	2.2	11.0	2.2	.90	1.2	20	5	8	11	17	10	14	20	12	15	23	12	15	20
			3.6	14.1	3.6	1.2	1.6		10	8	11	17	10	13	20	12	15	22	-	-	-
			4.4	15.7	4.4	1.3	1.7		20	8	11	17	10	13	20	12	16	24	-	-	-
			5	16.8	5	1.4	1.9	30	5	6	9	13	8	11	16	9	12	18	10	13	17
			10	24	10	2.0	2.7		10	7	9	12	8	10	15	9	12	18	11	14	20
			15	30	15	2.6	3.4		20	6	9	13	7	10	14	9	11	17	11	14	20
			20	34	20	3.0	4.1	40	5	6	7	11	7	9	12	7	10	14	8	11	17
			30	42	30	4.0	5.3		10	6	8	12	7	9	13	7	10	15	9	12	16
			40	48	40	4.9	6.6		20	5	7	10	6	8	13	7	10	15	9	13	19
			50	54	50	5.8	7.8	50	5	6	8	12	7	8	13	7	10	14	8	11	16
			58	58	58	6.6	8.9		10	5	7	10	6	8	13	7	9	14	8	11	17
									20	5	7	11	6	8	12	7	9	14	9	11	17

*These pressures are independently controlled so any combination of liquid, atomizing air, and fan air pressures can be selected. Total SCFM output is the sum of the separate atomized air and fan air amounts for the individual inlet pressures used.

Continued on next page.

A cone-shaped spray is most likely to be produced if the fan air function is not utilized.

Material: 316L SS — We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 1Y.

For ViscoMist replacement kits, see page 58.
For various configurations to mount your pneumatic air nozzles, see the Lances and Nozzle Headers section beginning on page 143.

Pneumatic atomizing nozzles
ViscoMist flat fan, external mix
Series 176

Nozzle Body Configuration (see pg. 54)	Ordering no.	Orifice diam. (in.)	Liq. Capacity* Inlet Press. (psi)	Liq. Capacity* Liq. Flow (GPH)	Air Capacity* Inlet Press. (psi)	Air Capacity* Atom. Air (SCFM)	Air Capacity* Fan Air (SCFM)	Spray Coverage (in.) at Indicated Distance from Nozzle: Atom. Air (psi)	Liq. Flow (psi)	Fan Air Pressure (psi) 10 D1	10 D2	10 D3	15 D1	15 D2	15 D3	20 D1	20 D2	20 D3	30 D1	30 D2	30 D3
4	176. 407. 1Y. 01	.081	2.2	15.6	2.2	2.1	2.0	20	5	5	8	12	8	10	14	10	12	18	13	16	21
			3.6	20	3.6	2.8	2.6		10	5	7	11	7	10	15	9	12	17	12	16	24
			4.4	22	4.4	3.1	2.9		20	-	-	-	6	9	14	9	12	17	11	15	22
			5	24	5	3.4	3.1	30	5	4	6	9	6	8	11	7	9	14	10	13	19
			10	34	10	5.0	4.6		10	4	6	9	6	8	11	7	10	15	10	13	19
			15	42	15	6.4	5.9		20	-	-	-	-	-	-	6	9	13	9	12	17
			20	49	20	7.6	7.2	40	5	4	5	7	5	7	10	6	8	12	8	11	15
			30	60	30	1.0	9.4		10	4	5	8	5	7	10	6	8	12	8	11	16
			40	69	40	12.3	11.6		20	4	5	8	5	6	10	6	8	12	8	11	15
			50	78	50	14.6	13.7	50	5	4	5	6	5	6	9	6	8	10	7	10	16
			58	84	58	16.4	15.5		10	4	5	7	4	6	9	5	8	12	7	10	14
									20	3	5	8	4	6	9	5	7	10	7	10	14

Nozzle Body Configuration (see pg. 54)	Ordering no.	Orifice diam. (in.)	Liq. Capacity* Inlet Press. (psi)	Liq. Capacity* Liq. Flow (GPH)	Air Capacity* Inlet Press. (psi)	Air Capacity* Atom. Air (SCFM)	Air Capacity* Fan Air (SCFM)	Spray Coverage (in.) at Indicated Distance from Nozzle: Atom. Air (psi)	Liq. Flow (psi)	Fan Air Pressure (psi) 10 D1	10 D2	10 D3	15 D1	15 D2	15 D3	20 D1	20 D2	20 D3	30 D1	30 D2	30 D3
4	176. 408. 1Y. 01	.093	2.2	20	2.2	1.6	2.0	20	5	7	10	14	9	12	18	10	14	21	15	19	28
			3.6	26	3.6	2.3	2.6		10	6	8	14	8	11	17	11	15	22	15	21	30
			4.4	28	4.4	2.5	2.9		20	-	-	-	-	-	-	9	12	15	14	16	20
			5	30	5	2.7	3.1	30	5	5	8	12	7	10	14	8	11	16	11	18	22
			10	43	10	4.0	4.6		10	5	7	10	7	9	14	9	11	16	11	15	21
			15	53	15	5.1	5.9		20	-	-	-	6	8	13	8	11	15	11	15	22
			20	61	20	6.0	7.2	40	5	5	7	9	6	8	11	7	10	14	10	14	18
			30	74	30	7.9	9.4		10	4	6	9	6	8	12	7	10	14	9	13	19
			40	86	40	9.6	11.6		20	4	5	8	5	7	11	6	9	14	9	13	18
			50	95	50	11.3	13.7	50	5	4	6	7	5	7	9	6	8	11	8	12	17
			58	103	58	12.8	15.5		10	4	5	7	5	7	10	6	8	12	8	11	18
									20	3	5	8	5	6	9	6	8	13	8	12	18

Nozzle Body Configuration (see pg. 54)	Ordering no.	Orifice diam. (in.)	Liq. Capacity* Inlet Press. (psi)	Liq. Capacity* Liq. Flow (GPH)	Air Capacity* Inlet Press. (psi)	Air Capacity* Atom. Air (SCFM)	Air Capacity* Fan Air (SCFM)	Spray Coverage (in.) at Indicated Distance from Nozzle: Atom. Air (psi)	Liq. Flow (psi)	Fan Air Pressure (psi) 10 D1	10 D2	10 D3	15 D1	15 D2	15 D3	20 D1	20 D2	20 D3	30 D1	30 D2	30 D3
4	176. 409. 1Y. 01	.100	2.2	22	2.2	1.1	2.0	20	5	7	10	16	9	12	18	11	16	21	15	20	27
			3.6	29	3.6	1.9	2.6		10	6	9	14	9	12	18	10	14	22	16	21	31
			4.4	32	4.4	2.2	2.9		20	-	-	-	-	-	-	10	14	21	16	21	31
			5	34	5	2.4	3.1	30	5	5	8	12	7	10	15	8	11	18	11	14	22
			10	48	10	3.9	4.6		10	5	7	11	7	9	14	8	11	18	11	15	24
			15	58	15	5.0	5.9		20	-	-	-	-	-	-	8	10	17	10	15	22
			20	68	20	6.0	7.2	40	5	4	6	9	6	8	13	7	9	16	10	14	20
			30	83	30	7.7	9.4		10	4	6	9	6	8	12	7	10	16	9	14	22
			40	96	40	9.6	11.6		20	4	6	8	6	8	12	7	10	16	9	13	20
			50	107	50	11.3	13.7	50	5	4	6	9	5	7	11	6	8	13	9	12	18
			58	115	58	12.9	15.6		10	4	6	9	6	8	12	6	8	14	9	12	17
									20	4	5	8	5	7	10	6	8	13	9	12	18

*These pressures are independently controlled so any combination of liquid, atomizing air, and fan air pressures can be selected. Total SCFM output is the sum of the separate atomized air and fan air amounts for the individual inlet pressures used.

A cone-shaped spray is most likely to be produced if the fan air function is not utilized.

Material: 316L SS — We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 1Y.

For ViscoMist replacement kits, see page 58.
For various configurations to mount your pneumatic air nozzles, see the Lances and Nozzle Headers section beginning on page 143.

Replacement kits for the ViscoMist pneumatic atomizing nozzles Series 176

Replacement Kits for the ViscoMist

For replacing the basic wear parts for the ViscoMist, order from the following list:

Ordering no.	Fluid nozzle orifice size (in.)	Description Includes: ① Needle assembly ② O-ring ③ Fluid nozzle
017. 601. 1Y. 01	.015	Wear Replacement Kit, Nozzle #1, 316 SS
017. 602. 1Y. 01	.023	Wear Replacement Kit, Nozzle #2, 316 SS
017. 603. 1Y. 01	.031	Wear Replacement Kit, Nozzle #3, 316 SS
017. 604. 1Y. 01	.042	Wear Replacement Kit, Nozzle #4, 316 SS
017. 605. 1Y. 01	.052	Wear Replacement Kit, Nozzle #5, 316 SS
017. 606. 1Y. 01	.067	Wear Replacement Kit, Nozzle #6, 316 SS
017. 607. 1Y. 01	.081	Wear Replacement Kit, Nozzle #7, 316 SS
017. 608. 1Y. 01	.093	Wear Replacement Kit, Nozzle #8, 316 SS
017. 609. 1Y. 01	.100	Wear Replacement Kit, Nozzle #9, 316 SS

Material: 316L SS

Note: Instructions for changing out any and all ViscoMist component parts come with each Replacement Kit purchased.

Nozzle fluid tips and spreaders (air caps) are interchangeable to provide various set-up combinations.

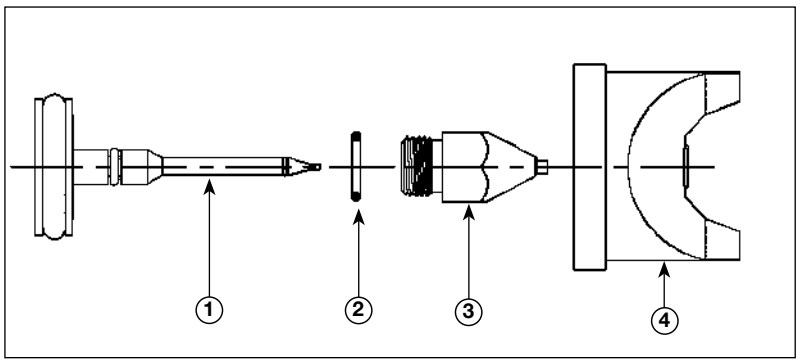
For replacing the wear parts and the spreader of the ViscoMist, order the following:

Ordering no.	Fluid nozzle orifice size (in.)	Description Includes: ① Needle assembly ② O-ring ③ Fluid nozzle ④ Spreader (air cap)
017. 601. 1Y. 00	.015	Capacity Replacement Kit, Nozzle #1
017. 602. 1Y. 00	.023	Capacity Replacement Kit, Nozzle #2
017. 603. 1Y. 00	.031	Capacity Replacement Kit, Nozzle #3
017. 604. 1Y. 00	.042	Capacity Replacement Kit, Nozzle #4
017. 605. 1Y. 00	.052	Capacity Replacement Kit, Nozzle #5
017. 606. 1Y. 00	.067	Capacity Replacement Kit, Nozzle #6
017. 607. 1Y. 00	.081	Capacity Replacement Kit, Nozzle #7
017. 608. 1Y. 00	.093	Capacity Replacement Kit, Nozzle #8
017. 609. 1Y. 00	.100	Capacity Replacement Kit, Nozzle #9

To just replace the o-ring in the ViscoMist, order the following:

Ordering no.			Description
Type	Mat. no.*		
	Viton **7A**	EPDM **6C**	
017. 600. xx. 01. 03	○	○	O-ring Replacement Kit

* 7A (Viton) is the standard material for the O-ring while 6C (EPDM) is optional.



Position #	Description
①	Needle Assembly
②	O-ring
③	Fluid Nozzle
④	Spreader

For various configurations to mount your pneumatic air nozzles, see the Lances and Nozzle Headers section beginning on page 143.

Additional pneumatic atomizing nozzles

Lechler offers several other atomizing nozzles besides those in this catalog which may be appropriate for your application. If a nozzle in either of the styles below is specified for a job of yours or you would just like more information about either one, please contact Lechler.

Spray pattern	Mode of liquid supply	Occurence of atomization		**Series**	Spray angle	Flow rate range	Application	More information
Full cone	Pressure principle	External mix		**150**	20°–30°	.13–17 gph	Chemical process engineering Cooling Atomization of viscous liquids	**Please ask for our "Chemical" brochure** 
Flat fan	Pressure principle	Internal mix		**166**	20°–80°	.11–25 gph	Web dampening Cooling Humidification of goods Atomization of viscous liquids	**Please ask for our "Food and Beverage" brochure** 
Flat fan	Pressure principle	Internal mix		**166H**	20°–140°	.11–25 gph	Coating and cleaning Surface treatment Humidification Lubrication processes	**Please ask for our "Food and Beverage" brochure** 
Full cone	Pressure principle	Internal mix		**170** **171** **180**	15°	2.25–77 gph	Gas cooling FGD Exhaust gas conditioning Dust control	**Please ask for our "Chemical" brochure** 

Pneumatic atomizing

Hollow cone nozzles

- Absorption
- Chemical process engineering
- Cooling
- Disinfection
- Desuperheating
- Dust control
- Fire protection
- Foam destruction
- Gas treatment
- Humidification of air, goods, or textiles
- Oil spraying
- Protection of storage tanks
- Spraying onto filters
- Spraying over germinating boxes
- Water recooling
- and many others...

1-800-777-2926

Hollow cone nozzles

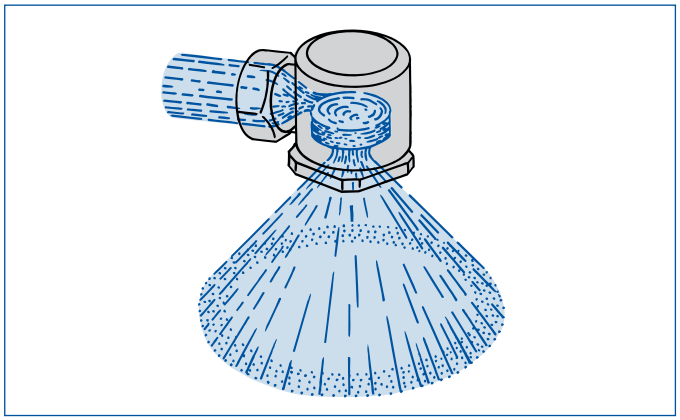
Axial hollow cone nozzles

Hollow cone nozzles produce the smallest average droplet sizes of any purely hydraulic nozzle. Axial hollow cones create the smallest droplets of any type of hollow cone nozzle. The spiral grooves in the swirl inserts of these nozzles ensure an efficient whirling of the liquid which creates uniform droplets throughout and maximizes the total exposed surface area. Creation of such a spray means that the liquid can be absorbed faster, cool quicker, and moisturize better for more effective application spraying. As a result, these nozzles are suitable for applications where fine, uniform spray is required, such as for cooling and cleaning of gas, absorption processes, dust control, product dampening, oil spraying, and air humidifying.

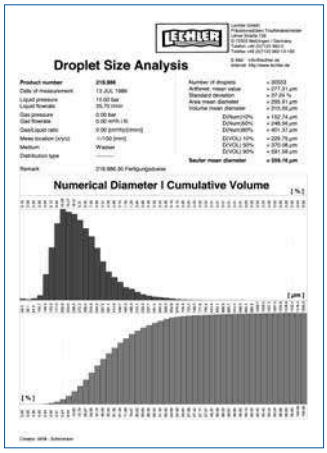
- Finest droplet particles
- Narrow free cross-sections
- Maximum spray angle: 90°

Tangential hollow cone nozzles

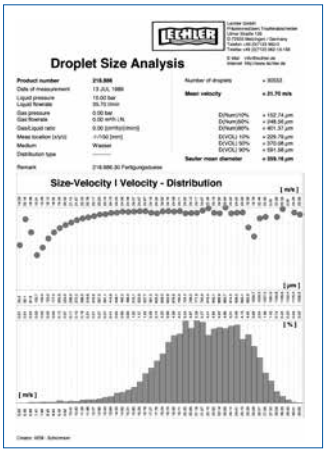
Tangential hollow cone nozzles also provide a very uniform hollow cone spray. This is due to the right-angle flow the fluid takes inside the nozzle body. An off-center inlet combines with the 90° turn the fluid makes to create a whirling rotation of the liquid within the nozzle chamber, ultimately resulting in smaller droplets and a consistent distribution upon discharge. With tangential hollow cones, spray angles up to 130° can be achieved. Due to their insert-free interiors, tangential hollow cone nozzles are basically self-cleaning and resistant to clogging, even with rather poor water conditions. Typical applications for tangential hollow cone nozzles include: air humidification in air conditioning systems, spray pond cooling, cooling of plastic pipes after extrusion, and gas cleaning in chemical and environmental engineering installations.



- Coarser droplets than axial hollow cone nozzles
- Large free cross-sections
- Wide spray angles up to 130°
- Self-cleaning, clog-resistant



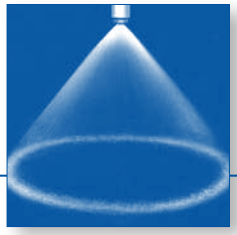
Cumulated volume distribution



Velocity distribution by number

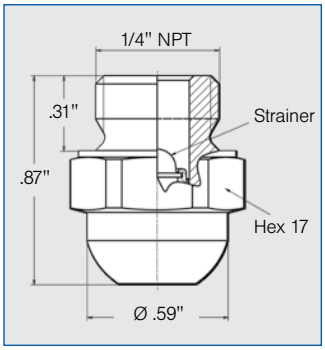
Hollow cone

Hollow cone nozzles
Axial-low flow
Series 220



Extremely fine, fog-like hollow cone spray.

Applications:
- Disinfection
- Humidification
- Cooling



Nozzles of series 220 replace series 212 which are still available on request.

Spray angle	Ordering no. Type	Material no. AISI 430F 11	Material no. AISI 316L* 1Y	Connection Male 1/4" NPT	Orifice diam. (in.)	Free Passage (in.)	Mesh size Strainer (in.)	Flow Rate (Gallons Per Minute) 30 psi	45 psi	liters per minute 5 bar	75 psi	100 psi	150 psi	300 psi	Spray Diam. D (in.) @ 72 psi H=4"	Theoretical Spray Width @ 72.5 psi (5 bar) H=100mm
60°	220. 004	○	○	BC	.004	.004	.002	-	-	.013	.003	.004	.005	.007	4	100
	220. 014	○	○	BC	.006	.006	.002	-	.004	.019	.005	.006	.007	.010	4	100
80°	220. 085	○	○	BC	.010	.010	.004	.007	.008	.040	.011	.012	.015	.021	6	140
	220. 125	○	○	BC	.014	.014	.004	.010	.013	.062	.016	.019	.023	.033	6	140
	220. 145	○	○	BC	.016	.016	.004	.014	.017	.082	.022	.026	.031	.043	6	140
	220. 165	○	○	BC	.018	.018	.004	.017	.021	.103	.027	.032	.039	.054	6	140

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	220. 004	+	1Y	+	BC	=	220. 004. 1Y. BC

The integrated strainer avoids clogging of the nozzle and increases its service life.

* Materials

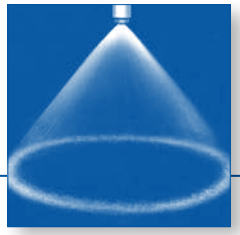
Mat. no.	Housing	Nozzle insert	Strainer
11	AISI 430F	AISI 430F	AISI 316L
1Y	AISI 316L	AISI 316L	AISI 316L

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page 12 for symbol definitions.)

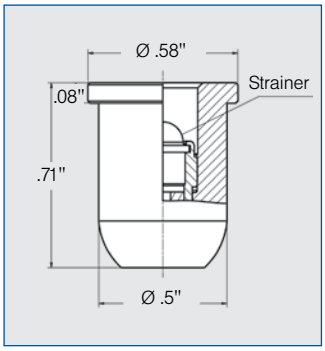
1-800-777-2926

Hollow cone nozzles
Axial-low flow for retaining nut
Series 226



Hollow cone nozzle for assembly with retaining nut. Extremely fine, fog-like hollow cone spray.

Applications:
- Disinfection
- Humidification
- Cooling



Spray angle	Ordering no. Type	Material no. AISI 303* 16	Orifice diam. (in.)	Free Passage (in.)	Mesh size Strainer (in.)	Flow Rate (Gallons Per Minute) 30 psi	45 psi	liters per minute 5 bar	75 psi	100 psi	150 psi	300 psi	Spray Diam. D (in.) @ 72 psi H=4"	Theoretical Spray Width @ 72.5 psi (5 bar) H=100mm
60°	**226. 004**	○	.004	.004	.002	-	-	.013	.003	.004	.005	.007	4	100
	226. 014	○	.006	.006	.002	-	.004	.019	.005	.006	.007	.010	4	100
80°	**226. 085**	○	.010	.010	.004	.007	.008	.040	.011	.012	.015	.021	6	140
	226. 125	○	.014	.014	.004	.010	.013	.062	.016	.019	.023	.033	6	140
	226. 145	○	.016	.016	.004	.014	.017	.082	.022	.026	.031	.043	6	140
	226. 165	○	.018	.018	.004	.017	.021	.103	.027	.032	.039	.054	6	140

Example for ordering: **Type** **226. 004** + **Material no.** **16** = **Ordering no.** **220. 004. 16**

The integrated strainer avoids clogging of the nozzle and increases its service life.

* Materials

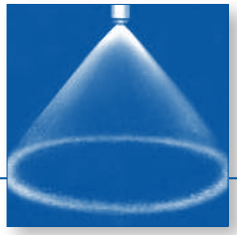
Mat. no.	Housing	Nozzle insert	Strainer
16	AISI 303	AISI 430F	AISI 316L

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page 62 for symbol definitions.)

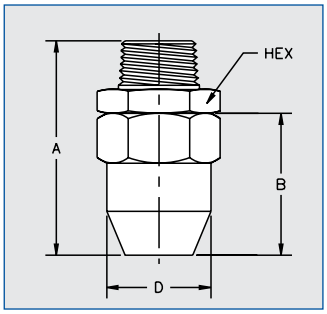
Hollow cone

Hollow cone nozzles
Axial-low flow
Series 214 / 216



Precision axial design offers fine atomization and uniform distribution. Swirl insert removable for cleaning.

Applications:
- Gas cooling or cleaning
- Steam de-superheating
- Spray drying
- Dust suppression



Ordering no.	Dimensions (in.) Thread Size Male NPT	Hex Size	A	B	D	Approx. Wt. (lb.) Brass
214. xxx. YY. BA	1/8	11/16	1.531	.718	.625	.15
214. xxx. YY. BC	1/4	11/16	1.593	.718	.625	.20
216. xxx. YY. BC	1/4	7/8	1.468	1.156	.843	.25
216. xxx. YY. BE	3/8	7/8	1.468	1.156	.843	.25

Spray angle A	Ordering no. Type	Material no. 316 SS 17	Material no. Brass 30	Connection Male NPT 1/8" 1/4" 3/8"	Orifice diam. (in.)	Free Passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Diam. D (in.) @ 40 psi H=10"
60°	**214. 184**	○	○	**BA BC -**	.020	.020	.01	.02	.08	.02	.03	.04	.04	8
80°	**214. 245**	○	○	**BA BC -**	.039	.020	.02	.04	.16	.05	.06	.07	.08	18
	214. 305	○	○	**BA BC -**	.071	.020	.05	.07	.32	.10	.12	.14	.16	18
60°	**216. 324**	○	○	**- BC BE**	.039	.039	.06	.09	.40	.12	.15	.18	.20	8
	216. 364	○	○	**- BC BE**	.055	.055	.10	.14	.63	.20	.24	.28	.31	8
	216. 404	○	○	**- BC BE**	.079	.079	.16	.22	1.0	.31	.38	.44	.49	8
90°	**216. 496**	○	○	**- BC BE**	.118	.079	.26	.37	1.7	.53	.65	.75	.83	20
	216. 566	○	○	**- BC BE**	.158	.079	.39	.55	2.5	.78	.95	1.1	1.2	20
	216. 646	○	○	**- BC BE**	.138	.079	.62	.88	4.0	1.2	1.5	1.8	2.0	20
	216. 686	○	○	**- BC BE**	.158	.079	.78	1.1	5.0	1.6	1.9	2.2	2.5	20
	216. 726	○	○	**- BC BE**	.197	.079	.98	1.4	6.3	2.0	2.4	2.8	3.1	20
	216. 776	○	○	**- BC BE**	.236	.079	1.3	1.9	8.5	2.6	3.2	3.7	4.2	20

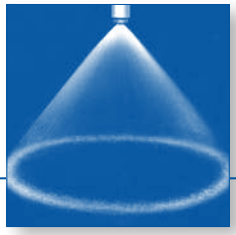
Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	216. 496	+	**17**	+	**BC**	=	**216. 496. 17. BC**

This product line is also available in larger capacities up to 5 gpm @ 40 psi. Please contact Lechler if you require a larger size.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

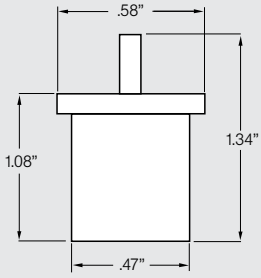
(See page 12 for symbol definitions.)

Hollow cone nozzles
Axial-flow
Series 2TR



Hollow cone nozzle with fine uniform spray. Assembly with retaining nut.

Applications:
- Humidification of air
- Cooling of gases
- Dust control
- Spraying onto filters



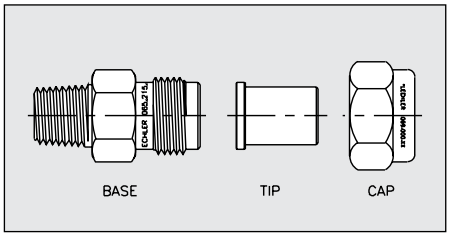
Material: Housing POM
Insert: Ceramic
Weight: .007 lb.

Spray angle ∢	Ordering no.	Color	Orifice diam. (in.)	Free Passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Diam. D (in.) @ 40 psi H=10"
80°	**2TR. 245. C8**	Magenta	.026	.022	.02	.04	.16	.05	.06	.07	.08	18
	2TR. 275. C8	Black	.032	.028	.03	.05	.22	.07	.08	.10	.11	18
	2TR. 305. C8	Orange	.035	.032	.05	.07	.32	.10	.12	.14	.16	18
	2TR. 345. C8	Green	.043	.035	.07	.11	.48	.15	.18	.21	.24	18
	2TR. 365. C8	Yellow	.055	.037	.10	.14	.63	.20	.24	.28	.31	18
	2TR. 405. C8	Blue	.067	.043	.15	.21	.96	.30	.36	.42	.47	18
	2TR. 445. C8	Red	.079	.047	.20	.28	1.3	.39	.48	.55	.62	18
	2TR. 485. C8	Brown	.087	.051	.24	.34	1.6	.49	.60	.69	.77	18

Materials		
Material no.	**Nozzle housing**	**Nozzle insert**
C8	POM	Zirconium Oxide

Bases and Caps for Mounting

Inlet NPT Male	Outlet Male	Part No.	
1/4"	**11/16 x 16**	**065. 215. XX. 10**	**Standard Materials:**
3/8"	**11/16 x 16**	**065. 211. XX. 10**	17 316 SS
1/4"	**3/8 BSPP**	**065. 215. XX. 11**	30 Brass
3/8"	**3/8 BSPP**	**065. 215. XX. 12**	
Caps			
To fit 11/16x16		**069. 000. XX. 00**	Other materials available. See Accessories beginning on page 127.
To fit 3/8 BSPP		**065. 200. XX. 00**	



A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

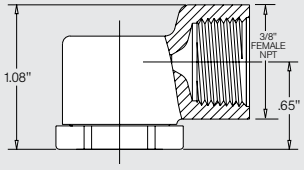
(See page 12 for symbol definitions.)

Hollow cone

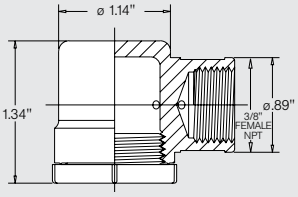
Hollow cone nozzles
Tangential-flow
Series 302 Plastic version

Uniform hollow cone spray using a clog-resistant design

Applications:
- Humidification
- Air washing
- Dust collectors
- Pasteurizer cooling lines
- Tunnel coolers



302. 32x – 302. 48x
Weight: .03 lb.



302. 52x – 302. 96x
Weight: .04 lb.

Spray angle	Ordering no. Type	Material no. Nylon 51	Material no. PP 53	Connection Female 3/8" NPT	Connection Female 3/8" BSPP	Orifice diam. (in.)	Free Passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	Spray Diameter D (in.) @ 30 psi H=10"	H=20"
90°	302. 326	○	-	-	00	.047	.035	.06	.09	.40	.11	.12	.15	.18	.20	16	28
	302. 366	○	-	-	00	.050	.051	.10	.14	.63	.17	.20	.24	.28	.31	16	28
	302. 406	○	-	-	00	.102	.055	.16	.22	1.0	.27	.31	.38	.44	.49	16	35
	302. 526	○	○	BF	-	.197	.079	.31	.44	2.0	.54	.62	.76	.88	.98	16	35
	302. 606	○	○	BF	-	.197	.126	.49	.69	3.2	.86	.98	1.2	1.4	1.5	18	37
	302. 766	○	-	BF	-	.355	.169	1.2	1.8	8.0	2.2	2.5	3.0	3.5	3.9	20	41
	302. 846	○	○	BF	-	.433	.205	1.9	2.7	12.5	3.4	3.9	4.8	5.5	6.1	22	45
	302. 886	○	○	BF	-	.433	.252	2.5	3.5	16.0	4.3	5.0	6.1	7.0	7.8	22	45
	302. 966	○	-	BF	-	.433	.339	3.9	5.5	25.0	6.7	7.8	9.5	11.0	12.3	22	45
130°	302. 408	○	-	-	00	.144	.051	.16	.22	1.0	.27	.31	.38	.44	.49	28	54
	302. 528	○	-	BF	-	.197	.079	.31	.44	2.0	.54	.62	.76	.88	.98	28	54
	302. 608	○	-	BF	-	.197	.126	.49	.69	3.2	.86	.98	1.2	1.4	1.5	31	60
	302. 648	-	○	BF	-	.296	.118	.62	.88	4.0	1.1	1.2	1.5	1.8	2.0	37	73
	302. 728	○	-	BF	-	.296	.162	.98	1.4	6.3	1.7	2.0	2.4	2.8	3.1	37	73
	302. 768	○	-	BF	-	.355	.169	1.2	1.8	8.0	2.2	2.5	3.0	3.5	3.9	37	73
	302. 848	○	-	BF	-	.433	.205	1.9	2.7	12.5	3.7	3.9	4.8	5.5	6.1	37	73
	302. 888	○	-	BF	-	.433	.252	2.5	3.5	16.0	4.3	5.0	6.1	7.0	7.9	37	73

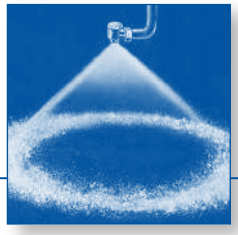
Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	302. 566	+	51	+	BF	=	302. 566. 51. BF

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

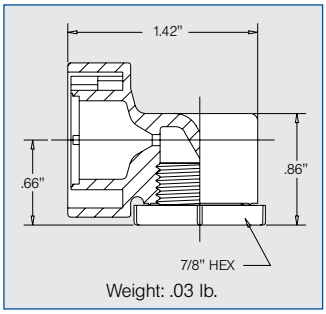
(See page 12 for symbol definitions.)

Hollow cone nozzles
Tangential-flow TWISTLOC quick release mount
Series 302 Plastic version

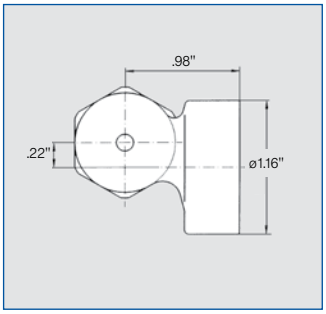


Uniform hollow cone spray using a clog-resistant design. Connects by hand with a quick twist.

Applications:
- Humidification
- Air washing
- Dust collectors
- Pasteurizer cooling lines
- Tunnel coolers



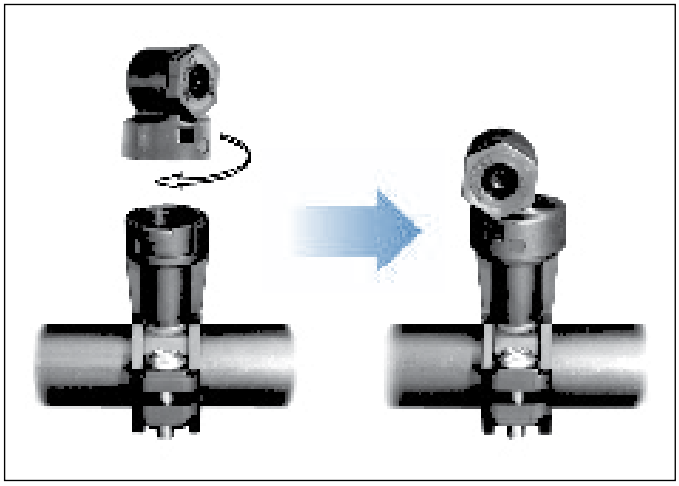
Weight: .03 lb.



Spray angle ∢	Ordering no. Type	Material no. Nylon 51	Material no. POM 56	Conn. Twistloc	Orifice diam. (in.)	Free Passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	Spray Diameter D (in.) @ 30 psi H=10"	H=20"
45°	302.503	○	-	KB	.193	.081	.28	.39	1.8	.48	.56	.68	.79	.88	9	22
60°	302.464	-	○	KB	.150	.077	.22	.31	1.4	.38	.43	.53	.61	.69	12	22
80°	302.545	-	○	KB	.193	.091	.35	.49	2.2	.59	.70	.85	.98	1.10	16	28
90°	302.326	○	○	KB	.055	.041	.06	.09	.40	.11	.12	.15	.18	.20	16	28
	302.406	○	○	KB	.150	.061	.16	.22	1.0	.27	.31	.38	.44	.49	16	35
	302.486	○	-	KB	.150	.083	.25	.35	1.6	.43	.50	.61	.70	.78	16	35
	302.606	○	-	KB	.209	.116	.49	.69	3.2	.86	.98	1.2	1.4	1.5	19	35
130°	302.368	-	○	KB	.083	.051	.10	.14	.63	.17	.20	.24	.28	.31	28	54
	302.408	○	○	KB	.083	.079	.16	.22	1.0	.27	.31	.38	.44	.49	28	54
	302.468	○	-	KB	.110	.095	.22	.31	1.4	.38	.43	.53	.61	.69	28	54
	302.488	○	-	KB	.110	.108	.25	.35	1.6	.43	.50	.61	.70	.78	28	54

Example for ordering:	Type 302. 408	+	Material no. 51	+	Conn. KB	=	Ordering no. 302. 408. 51. KB

Plastic TWISTLOC mounting system
These nozzles mount by hand with a quarter turn using Lechler's TWISTLOC bases and accessories.



Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

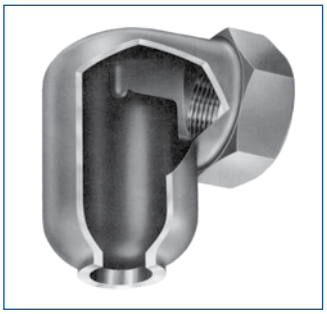
(See page 12 for symbol definitions.)

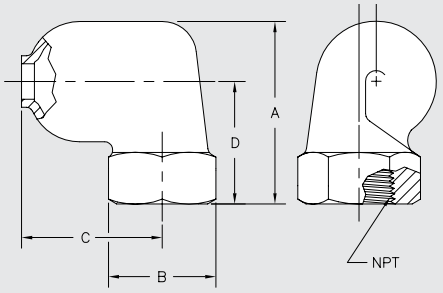
Hollow cone

Hollow cone nozzles
Tangential-flow Ramp Bottom®
Series 373

Hollow cone spray with fine droplets and uniform distribution even at low pressure. Patented swirl chamber design with built-in ramp extends service life.

Applications:
- Wet scrubbers
- Gas cooling and conditioning
- Dust suppression
- Chemical reactors
- Spray pond cooling





Inlet (Female NPT)	Dimensions (in.) A	B (Hex)	C	D	Wt. (lb.)
1	2.62	1-5/8	2.05	1.78	.8
1-1/4	3.03	1-7/8	2.56	2.00	1.4
1-1/2	3.81	2-3/16	3.19	2.56	2.4
2	4.25	2-13/16	3.69	2.81	3.1
3	6.03	4	4.62	4.50	17

Ordering no. Type	Mat. no. 316 SS 17	Connection Female NPT 1"	1¼"	1½"	2"	3"	Orifice diam. (in.)	Flow Rate (Gallons Per Minute) 5 psi	10 psi	15 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Angle in degrees at 5 psi	15 psi	40 psi
373. 115	○	**BN**	-	-	-	-	0.45	6.6	9.3	11	13	60	19	23	26	29	64	64	71
373. 175	○	**BN**	-	-	-	-	0.52	9.4	13	16	19	85	27	32	37	42	80	80	82
373. 235	○	-	**BQ**	-	-	-	0.64	13	19	23	27	121	38	46	53	59	66	66	75
373. 285	○	-	**BQ**	-	-	-	0.74	18	26	32	37	167	52	63	73	82	80	80	84
373. 325	○	-	-	**BS**	-	-	0.8	21	30	37	43	196	61	74	86	96	80	80	85
373. 365	○	-	-	**BS**	-	-	0.95	27	39	47	54	248	77	94	109	122	74	74	77
373. 445	○	-	-	-	**BW**	-	1.14	45	63	77	89	406	126	154	178	199	77	77	80
373. 465	○	-	-	-	**BW**	-	1.21	51	72	88	101	461	143	175	202	226	82	82	90
373. 514	○	-	-	-	-	**MB**	1.45	65	92	112	129	590	183	224	259	289	56*	62**	-
373. 554	○	-	-	-	-	**MB**	1.62	81	115	141	163	741	230	282	325	364	62*	68**	-

* degree is for 3 psi
** degree is for 7 psi

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	373. 325	+	**17**	+	**BS**	=	**373. 325. 17. BS**

This product line is also available in larger capacities with inlets up to 6" in size. Please contact Lechler if you have an application requiring a larger size.

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

See page 12 for symbol definitions.)

1-800-777-2926

Hollow cone

Full cone nozzles

- Absorption
- Chemical process engineering
- Chlorine precipitation
- Cleaning
- Cooling
- Desuperheating
- Dust control
- Fire protection
- Foam control
- Gas treatment
- Spraying onto mats in air washers
- Spraying over packings
- Surface spraying
- Water treatment
- and many others...

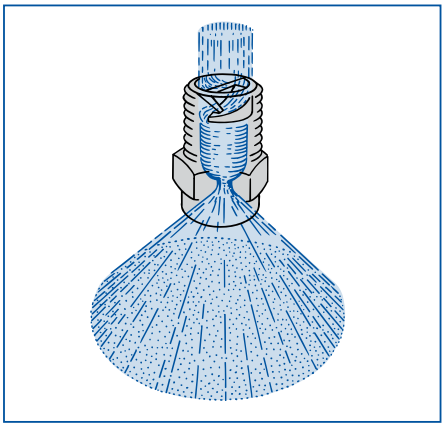
1-800-777-2926

Full cone nozzles

Full cone nozzles spray completely within the interior of a circular area. They are especially appropriate for cleaning, coating, dust suppression, or any application where the target is static. There are two different styles of full cone nozzles: **Axial** and **Tangential**.

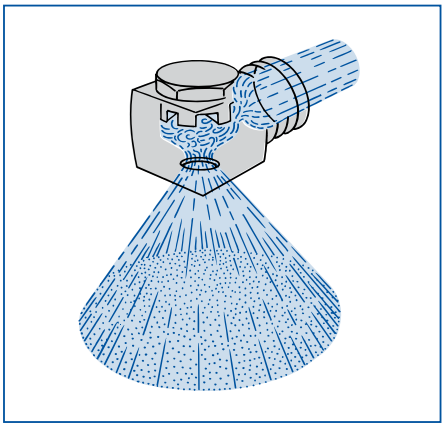
Axial full cone nozzles
Axial full cone nozzles spray on the same axis as the inlet fluid. Lechler axial full cone nozzles evenly distribute liquid spray over the whole circular impact area. This high precision of distribution is due to internal vanes which create swirl chambers inside the nozzle. These vanes break up the inlet flow so that the liquid exits the orifice in a circular mass of droplets. While an axial full cone nozzle's vane typically has a smaller free passage than the nozzle's orifice diameter, the Series 460's x-style swirl insert has larger free cross-sections, making it easier to spray particle-filled fluid. Axial full cone nozzles are available with several different spray angles and in a wide range of flow rates. Consequently, matching a specific axial full cone to your application can more easily be made. Therefore, axial full cones offer these advantages:

- Even liquid distribution
- Wide flow rate range
- Large number of available spray angles



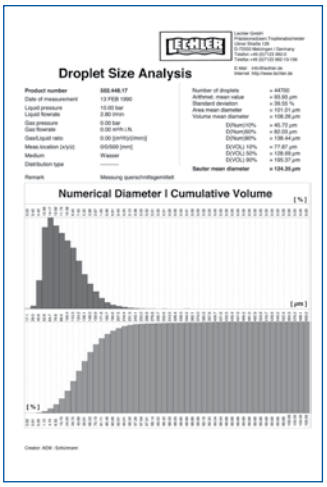
Tangential full cone nozzles
Tangential full cone nozzles spray at a 90° angle (or tangent) to the inlet fluid. Tangential full cone nozzles are particularly suited for spraying liquids with a high amount of particulate matter or for fire fighting applications. This is because unlike axial full cones, tangential full cone nozzles have no internal vanes, making them much less prone to clogging. The inlet fluid is tangentially supplied to a swirl chamber where it is put into rotation, much like in a tangential hollow cone nozzle. However, in this case the full cone spray is obtained when a sufficient amount of the fluid is disturbed by specially-arranged grooves, milled into the nozzle bottom, which cause a portion of the rotating liquid flow to diverge to the center of the swirl chamber. The result is a liquid spray which exits the nozzle orifice in an evenly distributed full cone pattern. Tangential full cone nozzles offer these advantages:

- Clog resistant, as they have no internal vanes
- Uniform liquid distribution
- Stable spray angles at various liquid pressures

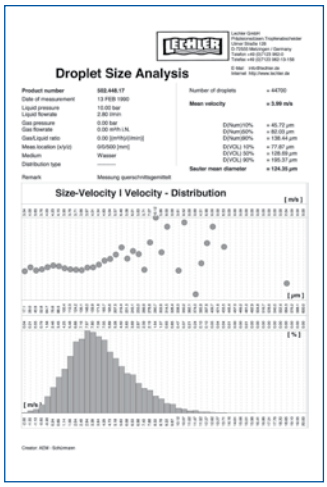


Cluster head nozzles
Lechler cluster head nozzles create a full cone spray of finely atomized droplets. This makes it particularly appropriate for applications in which a fine, fog-like, full cone atomized spray with a relatively large flow rate is necessary (e.g., gas exchange processes, steam cooling, or dust suppression). The cluster head nozzle achieves this pattern by overlapping seven separate hollow cones to form a full cone pattern with a larger droplet surface area compared to a similar standard full cone. It therefore creates the best of both worlds: it has the smaller droplet size and increased surface area of a hollow cone nozzle but with the overall coverage of a full cone. Such droplet sizes cannot be achieved by a single-orifice full cone spray nozzle with the same flow rate. The increased droplet surface area of the atomized liquid provides great efficiency in gas treatment and cooling applications. Cluster head nozzles offer these advantages:

- Large droplet surface area (i.e., fine or small droplet sizes)
- Full cone spray pattern
- Largest flow rates for the average droplet size produced



Cumulated volume distribution



Velocity distribution by number

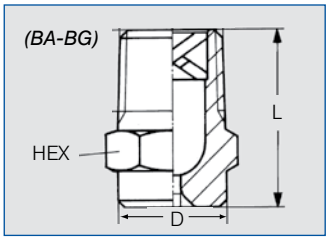
Full cone nozzles
Axial-flow
Series 460 / 461

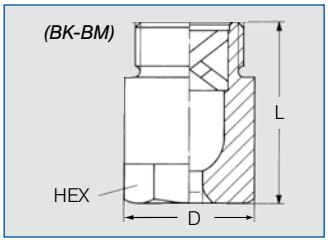
Uniform spray pattern. Offered in a wide range of spray angles and flow rates.

Applications:
- Washing and cleaning
- Dust suppression
- Mist eliminator washing
- Chemical reactors
- Surface spraying
- Chemical injection

Dimensions (in.)					
Connection Code	Inlet (Male NPT)	L	D	Hex	Weight Brass (lb.)
BA	1/8	.71	.51	9/16	.03
BC	1/4	.87	.51	9/16	.04
BE	3/8	1.18	.63	11/16	.07
BG	1/2	1.65	.83	7/8	.15
BK	3/4	1.97	1.09	1-1/8	.38
BM	1	2.20	1.32	1-3/8	.79

Subject to technical modifications





Spray angle	Ordering no. Type	Mat. no. PVDF 5E	Mat. no. Polypro 53	Connection Male NPT 1/8"	1/4"	3/8"	1/2"	3/4"	1"	Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	Spray Diam. D (in.) @ 30 psi H=8"	H=20"
60°	460. 644	○	-	-	BC	BE	-	-	-	.095	.075	.69	.91	4.0	1.1	1.2	1.4	1.6	1.7	2.0	9	22
	460. 964	○	-	-	-	-	-	BK	-	.229	.193	4.3	5.7	25	6.7	7.5	8.8	9.9	10.8	12.7	9	22
90°	460. 326	○	-	BA	-	-	-	-	-	.032	.022	.07	.09	0.4	.11	.12	.14	.16	.17	.20	15	34
	460. 406	○	-	BA	-	-	-	-	-	.047	.033	.17	.23	1.0	.27	.30	.35	.40	.43	.51	15	34
	460. 486	○	-	BA	-	-	-	-	-	.057	.047	.28	.36	1.6	.43	.48	.57	.63	.69	.82	15	34
	460. 526	○	-	BA	-	-	-	-	-	.065	.051	.35	.46	2.0	.54	.60	.71	.79	.87	1.0	15	34
	460. 606	○	-	BA	-	BE	-	-	-	.081	.057	.54	.72	3.2	.84	.95	1.1	1.2	1.4	1.6	15	34
	460. 646	○	-	-	BC	BE	-	-	-	.091	.071	.69	.91	4.0	1.1	1.2	1.4	1.6	1.7	2.0	15	38
	460. 726	○	-	-	-	BE	-	-	-	.116	.079	1.1	1.4	6.3	1.7	1.9	2.2	2.5	2.7	3.2	15	38
	460. 746	○	-	-	-	BE	-	-	-	.130	.075	1.2	1.6	7.1	1.9	2.1	2.5	2.8	3.1	3.6	15	38
	460. 766	○	-	-	-	BE	-	-	-	.130	.095	1.4	1.8	8.0	2.1	2.4	2.8	3.2	3.5	4.1	15	38
	460. 806	○	-	-	-	BE	-	-	-	.146	.106	1.7	2.3	10.0	2.7	3.0	3.5	4.0	4.3	5.1	15	38
	460. 846	○	-	-	-	BE	-	-	-	.160	.126	2.2	2.8	12.5	3.3	3.8	4.4	5.0	5.4	6.4	15	38
	460. 886	○	-	-	-	BE	BG	-	-	.185	.122	2.8	3.6	16.0	4.3	4.8	5.7	6.3	6.9	8.2	15	38
	460. 926	○	-	-	-	-	BG	-	-	.205	.150	3.5	4.6	20	5.4	6.0	7.1	7.9	8.7	10.2	15	38
	460. 966	○	-	-	-	-	BG	BK	-	.229	.150	4.3	5.7	25	6.7	7.5	8.8	9.9	10.8	12.7	15	38
	461. 006	○	-	-	-	-	BG	-	-	.252	.150	5.4	7.2	32	8.4	9.5	11.1	12.5	13.7	16.1	15	38
	461. 046	-	○	-	-	-	-	BK	-	.284	.209	6.9	9.1	40	10.7	12.0	14.1	15.9	17.3	20	15	38
	461. 086	○	-	-	-	-	-	BK	-	.323	.209	8.6	11.4	50	13.4	15.0	17.7	19.8	22	25	15	38
	461. 126	○	-	-	-	-	-	-	BM	.366	.256	10.9	14.3	63	16.9	18.9	22	25	27	32	15	38
	461. 146	○	-	-	-	-	-	-	BM	.390	.264	12.3	16.2	71	19.0	21	25	28	31	36	15	38
120°	460. 408	○	-	BA	-	-	-	-	-	.047	.033	.17	.23	1.0	.27	.30	.35	.40	.43	.51	27	48
	460. 488	○	-	BA	-	-	-	-	-	.059	.039	.28	.36	1.6	.43	.48	.57	.63	.69	.82	27	48
	460. 528	○	-	BA	-	-	-	-	-	.065	.047	.35	.46	2.0	.54	.60	.71	.79	.87	1.0	27	48
	460. 608	○	-	BA	-	-	-	-	-	.083	.055	.54	.72	3.2	.84	.95	1.1	1.2	1.4	1.6	27	48
	460. 648	○	-	-	BC	BE	-	-	-	.097	.063	.69	.91	4.0	1.1	1.2	1.4	1.6	1.7	2.0	27	52
	460. 728	○	-	-	-	BE	-	-	-	.122	.075	1.1	1.4	6.3	1.7	1.9	2.2	2.5	2.7	3.2	27	52
	460. 748	○	-	-	-	BE	-	-	-	.130	.075	1.2	1.6	7.1	1.9	2.1	2.5	2.8	3.1	3.6	27	52
	460. 768	○	-	-	-	BE	-	-	-	.138	.075	1.4	1.8	8.0	2.1	2.4	2.8	3.2	3.5	4.1	27	52
	460. 808	○	-	-	-	BE	-	-	-	.150	.095	1.7	2.3	10.0	2.7	3.0	3.5	4.0	4.3	5.1	27	52
	460. 848	○	-	-	-	BE	-	-	-	.165	.106	2.2	2.8	12.5	3.3	3.8	4.4	5.0	5.4	6.4	27	52
	460. 888	○	-	-	-	BE	BG	-	-	.181	.122	2.8	3.6	16.0	4.3	4.8	5.7	6.3	6.9	8.2	27	52
	460. 968	○	-	-	-	-	BG	-	-	.232	.162	4.3	5.7	25	6.7	7.5	8.8	9.9	10.8	12.7	27	52
	461. 048	-	○	-	-	-	-	BK	-	.299	.193	6.9	9.1	40	10.7	12.0	14.1	15.9	17.3	20	27	52

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	460. 728	+	5E	+	BE	=	460. 728. 5E. BE

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 * \left(\frac{P_2}{P_1}\right)^{0.4}$
(≤ 150 psi)

(See page 12 for symbol definitions.)

Full cone nozzles
Axial-flow
Series 490 / 491

NEW Patent pending

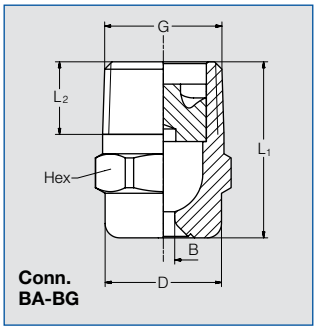
Excellent uniform full cone distribution and thorough atomization. Non-clogging nozzle design. Stable spray angle and particularly even liquid distribution.

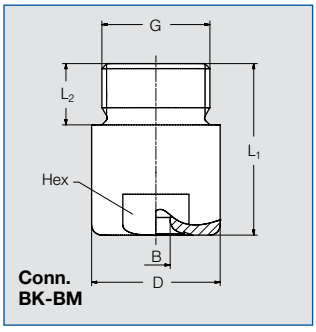
Applications:
Cleaning and washing processes, surface spraying, container cleaning, foam precipitation, degassing of liquids.

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).





Conn.	Dimensions (in.)] G	L_1	L_2	D	Hex	Weight Brass
BA	1/8 NPT	0.71	0.26	0.39	7/16	.03
BC	1/4 NPT	0.87	0.39	0.51	9/16	.04
BE	3/8 NPT	0.96	0.39	0.63	11/16	.07
BE	3/8 NPT	1.18	0.39	0.63	11/16	.11
BG	1/2 NPT	1.28	0.51	0.83	14/16	.13
BG	1/2 NPT	1.71	0.51	0.83	14/16	.19
BK	3/4 NPT	1.65	0.59	1.26	1-1/16	.42
BK	3/4 NPT	1.97	0.59	1.26	1-1/16	.44
BM	1 NPT	2.20	0.67	1.57	1-7/16	.77

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

Spray angle	Ordering no. Type	Mat. no. 316 L 1Y	Mat. no. Brass 30	Connection Male NPT 1/8"	1/4"	3/8"	1/2"	3/4"	1"	Orifice diam. (in.)	Free Passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	Spray Diam. D (in.) @ 30 psi H=8"	H=20"
60°	**490. 404**	○	○	**BA**	-	-	-	-	-	.045	.045	.17	.23	1.00	.27	.30	.35	.40	.43	0.51	9	22
	490. 444	○	-	**BA**	-	-	-	-	-	.049	.049	.22	.29	1.25	.33	.38	.44	.49	.54	0.64	9	22
	490. 524	○	○	**BA**	-	-	-	-	-	.063	.063	.35	.46	2.00	.54	.60	.71	.79	.87	1.02	9	22
	490. 644	○	○	-	**BC**	**BE**	-	-	-	.091	.091	.69	.91	4.00	1.07	1.20	1.41	1.59	1.73	2.04	9	22
	490. 724	○	○	-	**BC**	**BE**	-	-	-	.112	.110	1.09	1.43	6.30	1.69	1.89	2.23	2.50	2.73	3.21	9	22
	490. 804	○	○	-	-	**BE**	-	-	-	.146	.146	1.72	2.28	10.00	2.68	3.00	3.53	3.97	4.34	5.10	9	22
	490. 844	○	○	-	-	-	**BG**	-	-	.159	.159	2.16	2.85	12.50	3.35	3.76	4.42	4.96	5.42	6.37	9	22
	490. 884	○	○	-	-	-	**BG**	-	-	.183	.183	2.76	3.64	16.00	4.28	4.81	5.65	6.34	6.94	8.16	9	22
	490. 964	○	○	-	-	-	-	**BK**	-	.228	.228	4.31	5.69	25.00	6.70	7.51	8.83	9.91	10.84	12.74	9	22
	491. 084	○	○	-	-	-	-	-	**BM**	.321	.321	8.63	11.38	50.00	13.39	15.02	17.67	19.82	21.67	25.49	9	22
90°	**490. 406**	○	○	**BA**	-	-	-	-	-	.047	.047	.17	.23	1.00	.27	.30	.35	.40	.43	.51	15	34
	490. 486	○	○	**BA**	-	-	-	-	-	.057	.057	.28	.36	1.60	.43	.48	.57	.63	.69	.82	15	34
	490. 526	○	○	**BA**	-	-	-	-	-	.067	.067	.35	.46	2.00	.54	.60	.71	.79	.87	1.02	15	34
	490. 606	○	○	**BA**	-	-	-	-	-	.081	.081	.54	.72	3.15	.84	.95	1.11	1.25	1.37	1.61	15	34
	490. 646	○	○	-	**BC**	-	-	-	-	.094	.094	.69	.91	4.00	1.07	1.20	1.41	1.59	1.73	2.04	15	38
	490. 726	○	○	-	**BC**	**BE**	-	-	-	.126	.110	1.09	1.43	6.30	1.69	1.89	2.23	2.50	2.73	3.21	15	38
	490. 806	○	○	-	-	**BE**	-	-	-	.154	.154	1.72	2.28	10.00	2.68	3.00	3.53	3.97	4.34	5.10	15	38
	490. 846	○	○	-	-	**BE**	-	-	-	.183	.157	2.16	2.85	12.50	3.35	3.76	4.42	4.96	5.42	6.37	15	38
	490. 886	○	○	-	-	-	**BG**	-	-	.215	.177	2.76	3.64	16.00	4.28	4.81	5.65	6.34	6.94	8.16	15	38
	490. 926	○	○	-	-	-	**BG**	-	-	.232	.177	3.45	4.56	20.00	5.36	6.01	7.07	7.93	8.67	10.20	15	38
	490. 966	○	○	-	-	-	BG	-	-	.258	.191	4.31	5.69	25.00	6.70	7.51	8.83	9.91	10.84	12.74	15	38
	491. 086	○	○	-	-	-	-	-	**BM**	.372	.285	8.63	11.38	50.00	13.39	15.02	17.67	19.82	21.67	25.49	15	38

Continued on next page.

Conversion formula for the above series: $V_2 = V_1 * \left(\frac{P_2}{P_1}\right)^{0.4}$ **(< 150 psi)**

Full cone nozzles
Axial-flow
Series 490 / 491

Spray angle	Ordering no. Type	Mat. no. 316 L 1Y	Mat. no. Brass 30	Connection Male NPT 1/8"	1/4"	3/8"	1/2"	3/4"	1"	Orifice diam. (in.)	Free Passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	Spray Diam. D (in.) @ 30 psi H=8"	H=20"
120°	**490. 368**	○	○	**BA**	-	-	-	-	-	.033	.026	.11	.14	.63	.17	.19	.22	.25	.27	.32	27	48
	490. 408	○	○	**BA**	-	-	-	-	-	.047	.047	.17	.23	1.00	.27	.30	.35	.40	.43	.51	27	48
	490. 488	○	○	**BA**	-	-	-	-	-	.057	.057	.28	.36	1.60	.43	.48	.57	.63	.69	.82	27	48
	490. 568	○	○	**BA**	-	-	-	-	-	.075	.075	.43	.57	2.50	.67	.75	.88	.99	1.08	1.27	27	48
	490. 648	○	○	-	**BC**	**BE**	-	-	-	.094	.094	.69	.91	4.00	1.07	1.20	1.41	1.59	1.73	2.04	27	52
	490. 728	○	○	-	**BC**	**BE**	-	-	-	.126	.110	1.09	1.43	6.30	1.69	1.89	2.23	2.50	2.73	3.21	27	52
	490. 748	○	-	-	-	**BE**	-	-	-	.126	.126	1.23	1.62	7.10	1.90	2.13	2.51	2.82	3.08	3.62	27	52
	490. 808	○	○	-	-	**BE**	-	-	-	.154	.154	1.72	2.28	10.00	2.68	3.00	3.53	3.97	4.34	5.10	27	52
	490. 848	○	○	-	-	BE	-	-	-	.185	.157	2.16	2.85	12.50	3.35	3.76	4.42	4.96	5.42	6.37	27	52
	490. 928	○	○	-	-	-	**BG**	-	-	.228	.187	3.45	4.56	20.00	5.36	6.01	7.07	7.93	8.67	10.20	27	52
	490. 968	○	○	-	-	-	BG	**BK**	-	.262	.191	4.31	5.69	25.00	6.70	7.51	8.83	9.91	10.84	12.74	27	52
	491. 048	○	○	-	-	-	-	**BK**	-	.362	.230	6.90	9.11	40.00	10.71	12.02	14.14	15.86	17.34	20.39	27	52
	491. 148	○	-	-	-	-	-	-	**BM**	.449	.301	12.25	16.17	71.00	19.01	21.33	25.09	28.15	30.78	36.20	27	52

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	490. 368	+	**1Y**	+	**BA**	=	**490. 368. 1Y. BA**

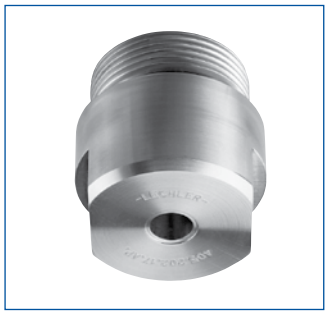
Conversion formula for the above series: $V_2 = V_1 * \left(\frac{P_2}{P_1}\right)^{0.4}$
(≤150 psi)

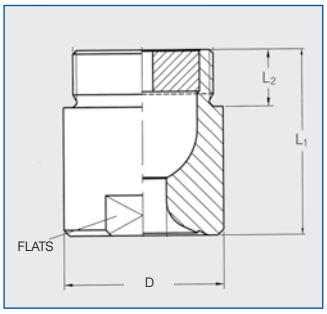
(See page 12 for symbol definitions.)

Full cone nozzles
Axial-flow
Series 405

Uniform spray pattern. Large free passage cross-sections due to optimized x-style swirl insert.

Applications:
- Surface spraying
- Spraying over packings
- Cleaning and washing processes
- Chemical process engineering
- Cooling of gaseous fluids and solids
- Water treatment





Dimensions (in.)

Inlet (Male NPT)	L1	L2	D	Flats
1-1/4	1.97	.75	1.93	1-5/8
1-1/2	2.36	.75	2.32	2
2	3.07	.94	2.68	2-3/8

Spray angle	Ordering no. Type	Material no. 316L SS 1Y	Connection Male NPT 1 1/4"	1 1/2"	2"	Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 5 psi	10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	Spray Diam. D (in.) @ 30 psi H=20"	H=40"
90°	**405. 206**	○	**BP**	-	-	.473	.197	13	17	23	100	27	30	35	31	57
	405. 286	○	-	**BR**	-	.599	.244	21	28	36	160	43	48	57	31	61
	405. 326	○	-	-	**BV**	.678	.303	26	35	46	200	54	60	71	33	63
	405. 366	○	-	-	**BV**	.768	.343	33	43	57	250	67	75	88	33	63
	405. 406	○	-	-	**BV**	.867	.374	41	54	72	315	85	95	111	33	63
120°	**405. 208**	○	**BP**	-	-	.500	.197	13	17	23	100	27	30	35	57	102
	405. 288	○	-	**BR**	-	.630	.260	21	28	36	160	43	48	57	59	106
	405. 328	○	-	-	**BV**	.701	.311	26	35	46	200	54	60	71	59	110
	405. 368	○	-	-	**BV**	.792	.347	33	43	57	250	67	75	88	59	110
	405. 408	○	-	-	**BV**	.883	.359	41	54	72	315	85	95	111	59	110

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	405. 204	+	1Y	+	BP	=	405. 204. 1Y. BP

Conversion formula for the above series: $V_2 = V_1 * \left(\frac{P_2}{P_1}\right)^{0.4}$ (≤150 psi) See page 12 for symbol definitions.)

Full cone

Full cone nozzles
Axial-flow
Series 419

Particularly insensitive to clogging thanks to very large free cross sections. Stable spray angle. Uniform spray pattern

Applications:
- Gas washing
- Spraying over packings
- Dust control
- Absorption
- Distillation

Figure 1

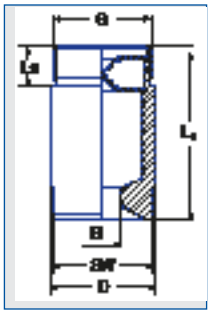


Figure 2

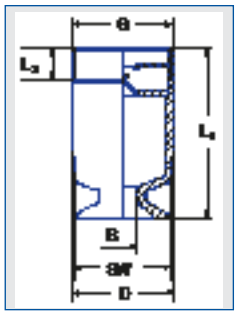
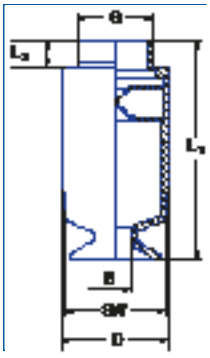
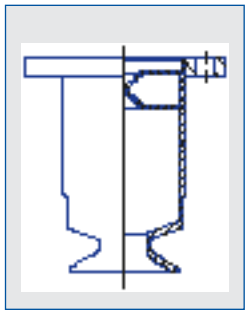


Figure 3





Other materials and flange versions are available on request

Spray Angle	Type	Code	Figure	Dimensions [in]					Weight (lbs)
				G NPT Male	L_1	L_2	D	Flats	
90° + 120°	419.3XX	**BR**	3	1 1/2	5.20	.87	2.52	2.36	3.31
		BV	1	2	4.49	.94	2.52	2.36	2.65
	419.4XX	**BV**	3	2	6.42	1.06	3.15	2.95	4.41
		BY	2	2 1/2	5.28	.94	3.15	2.95	3.75
	419.51X 419.54X	**BV**	3	2	7.83	1.06	4.02	3.74	8.16
		BY	3	2 1/2	7.95	1.18	4.02	3.74	8.38
		MA	3	3	8.07	1.26	4.02	3.74	11.46
		MC	2	3 1/2	6.65	1.06	4.02	3.74	7.05
	419.57X	**BY**	3	2 1/2	9.09	1.18	4.53	4.13	11.46
		MA	3	3	9.17	1.42	4.53	4.13	11.46
		ME	2	4	7.64	36	4.53	4.13	9.70
	419.6XX	**MA**	3	3	9.92	30	4.41	4.53	11.90
		MC	3	3 1/2	10.00	32	4.41	4.53	12.13

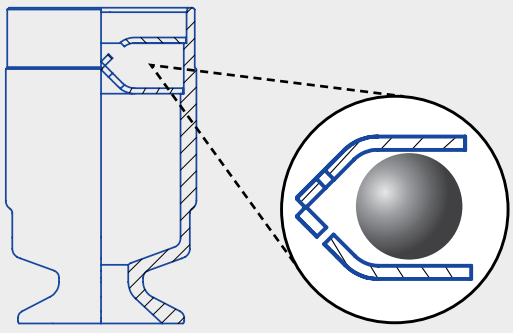
Conversion formula for the above series: $V_2 = V_1 * \left(\frac{P_2}{P_1}\right)^{0.4}$
(≤150 psi) (See page 12 for symbol definitions.)

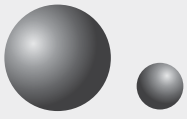
Full cone nozzles
Axial-flow
Series 419

Spray angle*	Ordering no.										B Ø [in]	E Ø [in]	Flow Rate (Gallons Per Minute)					Spray Diameter D [in] at p = 15 psi	
	Type	Mat.-Nr. 1Y 316L SS	Mat.-Nr. 2P 904 L	Code 1 1/2 Male NPT	2 Male NPT	2 1/2 NPT male	3 NPT male	3 1/2 NPT male	4 NPT male				5 psi	10 psi	15 psi	30 psi	75 psi	H = 20 in	D = 40 in
90°	**419.366**	○	○	**BR**	**BV**	**-**	**-**	**-**	**-**		.70	.69	33	43	51	67	97	39	79
	419.396	○	○	**BR**	**BV**	**-**	**-**	**-**	**-**		.81	.69	39	52	61	80	116	39	79
	419.446	○	○	**-**	**BV**	**BY**	**-**	**-**	**-**		.91	.81	52	69	81	107	155	39	79
	419.486	○	○	**-**	**BV**	**BY**	**-**	**-**	**-**		1.10	.81	65	86	101	134	193	39	79
	419.516	○	○	**-**	**BV**	**BY**	**MA**	**MC**	**-**		1.07	.95	78	104	122	161	232	39	79
	419.546	○	○	**-**	**BV**	**BY**	**MA**	**MC**	**-**		1.30	.95	93	124	144	190	274	39	79
	419.576	○	○	**-**	**-**	**BY**	**MA**	**-**	**ME**		1.34	1.07	111	147	172	228	328	39	79
	419.606	○	○	**-**	**-**	**-**	**MA**	**MC**	**-**		1.48	1.19	131	172	203	268	386	39	79
	419.626	○	○	**-**	**-**	**-**	**MA**	**MC**	**-**		1.69	1.19	163	216	254	335	483	39	79
120°	**419.368**	○	○	**BR**	**BV**	**-**	**-**	**-**	**-**		.81	.69	33	43	51	67	97	67	114
	419.398	○	○	**BR**	**BV**	**-**	**-**	**-**	**-**		.93	.69	39	52	61	80	116	67	114
	419.448	○	○	**-**	**BV**	**BY**	**-**	**-**	**-**		.96	.81	52	69	81	107	155	67	114
	419.488	○	○	**-**	**BV**	**BY**	**-**	**-**	**-**		1.16	.81	65	86	101	134	193	67	114
	419.518	○	○	**-**	**BV**	**BY**	**MA**	**MC**	**-**		1.07	.95	78	104	122	161	232	67	114
	419.548	○	○	**-**	**BV**	**BY**	**MA**	**MC**	**-**		1.34	.95	93	124	144	190	274	67	114
	419.578	○	○	**-**	**-**	**BY**	**MA**	**-**	**ME**		1.34	1.13	111	147	172	228	328	67	114
	419.608	○	○	**-**	**-**	**-**	**MA**	**MC**	**-**		1.50	1.27	131	172	203	268	386	67	114
	419.628	○	○	**-**	**-**	**-**	**MA**	**MC**	**-**		1.71	1.27	163	216	254	335	483	67	114

B = Orifice diameter-Ø · E = Free passage · * Spray angle at 15 psi

Example for ordering:	Type	+	Material-Nr.	+	Code	=	Ordering no.
	419.366	+	**1Y**		**BR**	=	**419.366.1Y.BR**





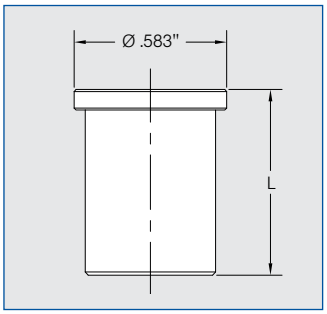
Comparison of the large FreeFlow cross-section with the cross-section of a similar full cone nozzle.

Full cone

Full cone tips
Axial-flow
Series 468

Excellent uniform full cone distribution and thorough atomization. Spray angles are consistent over the full capacity range.

Applications:
- Washing and cleaning
- Mist eliminator washing
- Chemical reactors
- Surface spraying

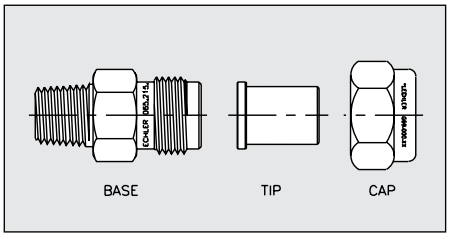


Dimensions (in.)		
Capacity	Length (L)	Wt. brass (lb.)
468.36X- 468.60X	.71	.04
468.64X- 468.84X	.97	.04

Spray angle	Ordering no. Type	Material no. 316 SS 17[1]	Brass 30	PVDF 5E	Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2.0 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	L (in.)	Spray Diam. D (in.) @ 30 psi H=8"	H=20"
60°	468. 604	-	○	-	.081	.055	.54	.72	3.2	.84	.95	1.1	1.2	1.4	1.6	.71	9	22
	468. 644	-	○	○	.095	.075	.69	.91	4.0	1.1	1.2	1.4	1.6	1.7	2.0	.97	9	22
	468. 684	-	○	-	.102	.079	.86	1.1	5.0	1.3	1.5	1.8	2.0	2.2	2.5	.97	9	22
	468. 724	○	○	-	.114	.079	1.1	1.4	6.3	1.7	1.9	2.2	2.5	2.7	3.2	.97	9	22
90°	468. 526	○	○	○	.065	.051	.35	.46	2.0	.54	.60	.71	.79	.87	1.0	.71	15	34
	468. 846	-	○	-	.160	.126	2.2	2.9	12.5	3.4	3.8	4.4	5.0	5.4	6.4	.97	15	34
120°	468. 368	-	○	-	.037	.028	.11	.14	.60	.17	.19	.22	.25	.27	.32	.71	27	61
	468. 408	○	○	-	.047	.033	.17	.23	1.0	.27	.30	.35	.40	.43	.51	.71	27	61
	468. 488	○	○	-	.059	.039	.28	.36	1.6	.43	.48	.57	.63	.69	.82	.71	27	61
	468. 528	○	○	-	.065	.047	.35	.46	2.0	.54	.60	.71	.79	.87	1.0	.71	27	61

Bases and Caps for Mounting

Inlet NPT Male	Outlet Male	Part No.	
1/4" 3/8"	11/16 x 16 11/16 x 16	065. 215. XX. 10 065. 211. XX. 10	**Standard Materials:** 17 316 SS 30 Brass
1/4" 3/8"	3/8 BSPP 3/8 BSPP	065. 215. XX. 11 065. 215. XX. 12	
Caps			
To fit 11/16x16 To fit 3/8 BSPP		069. 000. XX. 00 065. 200. XX. 00	Other materials available. See Accessories beginning on page 127.



Example for ordering:	Type	+	Material no.	=	Ordering no.
	468. 526	+	17	=	468. 526. 17

1) We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 17.

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

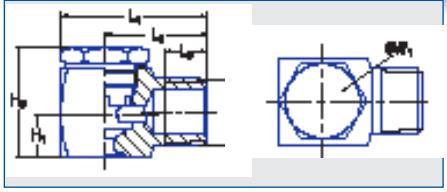
Conversion formula for the above series: $V_2 = V_1 * \left(\frac{P_2}{P_1}\right)^{0.4}$
(<150 psi) (See page 12 for symbol definitions.)

Full cone nozzles
Tangential-flow
Series 422 / 423 Metal version

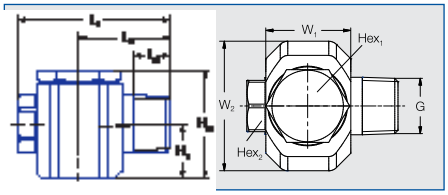
Tangential design has no internal swirl device for maximum clog resistance. Spray distribution and angle are stable over a wide range of pressures.

Applications:
- Cleaning and washing processes
- Mist eliminator washing
- Scrubber towers
- Chemical reactors
- Chemical injection

1/4, 3/8 versions



1/2 - 1 versions



Dimensions [in]

G (male NPT)	L_1	L_2	L_3	H_1	H_2	W_1	W_2	Hex_1	Hex_2	Weight (lb.)
1/4"	1.1	.79	.38	.31	.83	.61	.63	.43	-	.097
3/8"	1.42	.98	.4	.43	1.05	.91	.87	.75	-	.222
1/2"	2.2	1.32	.52	.79	1.57	1.26	1.89	1.06	0.75	.816
3/4"	2.58	1.52	.57	.93	2.24	1.5	2.48	1.42	1.06	1.83
1"	3.35	1.91	.66	1.07	2.6	2.17	3.07	1.61	1.42	3.49

Spray angle	Ordering no. Type	Mat. no. AISI 316L 1Y	Mat. no. Brass 30	Connection Male NPT 1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Diam. D (in.) @ 40 psi H=8"	H=20"
60°	422. 644	○	○	-	BE	-	-	-	-	-	-	.118	.118	.62	.88	4.0	1.2	1.5	1.8	2.0	9	20
90°	422. 406	○	○	BC	-	-	-	-	-	-	-	.059	.057	.16	.22	1.0	.31	.38	.44	.49	15	34
	422. 486	○	-	BC	-	-	-	-	-	-	-	.075	.071	.25	.35	1.6	.50	.61	.70	.78	15	34
	422. 566	○	○	BC	-	-	-	-	-	-	-	.091	.087	.39	.55	2.5	.78	.95	1.1	1.2	15	34
	422. 606	○	○	-	BE	-	-	-	-	-	-	.102	.099	.49	.69	3.2	.98	1.2	1.4	1.6	15	34
	422. 646	○	○	-	BE	-	-	-	-	-	-	.118	.114	.62	.88	4.0	1.2	1.5	1.8	2.0	15	38
	422. 766	○	-	-	BE	-	-	-	-	-	-	.164	.162	1.2	1.8	8.0	2.5	3.0	3.5	3.9	15	38
	422. 886	○	○	-	BE	-	-	-	-	-	-	.230	.230	2.5	3.5	16.0	5.0	6.1	7.0	7.9	15	38
	422. 966	○	-	-	-	BG	-	-	-	-	-	.315	.315	3.9	5.5	25	7.8	9.5	11.0	12.3	15	38
	423. 006	○	-	-	-	BG	-	-	-	-	-	.343	.343	4.8	6.8	31	9.6	11.8	13.6	15.2	15	38
	423. 046	○	-	-	-	-	BK	-	-	-	-	.426	.402	6.2	8.8	40	12	15	18	20	15	38
	423. 086	○	-	-	-	-	BK	-	-	-	-	.449	.433	7.8	11.0	50	15.5	19.0	22	25	15	38
	423. 126	○	-	-	-	-	BK	-	-	-	-	.500	.485	9.8	13.8	63	19.5	24	28	31	15	38
	423. 146	○	-	-	-	-	-	BM	-	-	-	.552	.532	11.0	15.6	71	22	27	31	35	15	38
	423. 206	○	-	-	-	-	-	BM	-	-	-	.670	.630	15.5	21.9	100	31	38	44	49	15	38
	423. 286	○	-	-	-	-	-	-	BP	-	-	.748	.748	25.0	35.0	160	50	61	71	79	15	38
	423. 366	○	-	-	-	-	-	-	-	BR	-	.875	-	38.0	54.0	246	76	93	107	120	15	38
	423. 406	○	-	-	-	-	-	-	-	-	BV	-	-	49.0	69.0	315	98	120	139	155	15	38
	423. 446	○	-	-	-	-	-	-	-	-	BV	-	-	62.0	88.0	400	124	152	175	196	27	38
120°	422. 568	○	○	BC	-	-	-	-	-	-	-	.091	.087	.39	.55	2.5	.78	.95	1.1	1.2	27	48
	422. 728	○	○	-	BE	-	-	-	-	-	-	.146	.142	.98	1.4	6.3	2.0	2.4	2.8	3.1	27	63
	422. 808	○	-	-	BE	-	-	-	-	-	-	.183	.181	1.6	2.2	10.0	3.1	3.8	4.4	4.9	27	63
	422. 848	○	○	-	BE	-	-	-	-	-	-	.205	.201	1.9	2.7	12.5	3.9	4.8	5.5	6.1	27	63
	422. 888	○	○	-	BE	-	-	-	-	-	-	.229	.225	2.5	3.5	16.0	5.0	6.1	7.0	7.9	27	63
	422. 928	○	-	-	-	BG	-	-	-	-	-	.288	.288	3.1	4.4	20	6.2	7.6	8.8	9.8	27	63
	422. 968	○	○	-	-	BG	-	-	-	-	-	.315	.315	3.9	5.5	25	7.8	9.5	11.0	12.3	27	63
	423. 008	○	-	-	-	BG	-	-	-	-	-	.343	.343	4.8	6.8	31	9.6	11.8	13.6	15.2	27	63
	423. 128	○	-	-	-	-	BK	-	-	-	-	.500	.485	9.8	13.8	63	19.5	24	28	31	27	63
	423. 208	○	-	-	-	-	-	BM	-	-	-	.670	.630	15.5	21.9	100	31	38	44	49	27	63

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	422. 846	+	1Y	+	BE	=	422. 846. 1Y. BE

Different metallurgies may be available upon request.

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

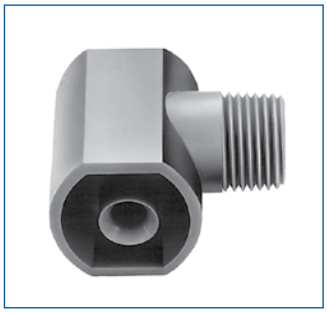
Conversion formula for the above series: $V_2 = V_1 * \sqrt{\frac{P_2}{P_1}}$

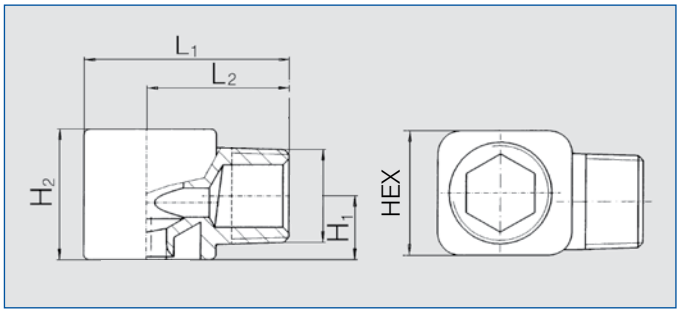
(See page 12 for symbol definitions.)

Full cone nozzles
Tangential-flow
Series 422 / 423 Plastic version

Vaneless tangential design combined with PVDF construction offers an excellent nozzle for critical environmental and chemical processing uses.

Applications:
- Mist eliminator washing
- Chemical reactors
- Scrubbers





Dimensions (in.)						
Inlet (Male NPT)	L1	L2	H1	H2	Hex	Wt. (lb.)
1/4	1.10	.79	.31	.63	5/8	.02
3/8	1.42	.98	.44	.91	7/8	.04
1/2	1.95	1.32	.76	1.50	1-5/16	.09
3/4	2.30	1.52	.96	1.97	1-5/8	.11

Spray angle	Ordering no. Type	Mat. no. PVDF 5E	Connection Male NPT 1/4"	Male NPT 3/8"	Male BSPT 1/2"	Male BSPT 3/4"	Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Diameter D (in.) @ 40 psi H=8"	H=20"
60°	422. 724	○	-	BE	-	-	.142	.142	.98	1.4	6.3	2.0	2.4	2.8	3.1	9	20
90°	422. 406	○	BC	-	-	-	.059	.057	.16	.22	1.0	.31	.38	.44	.49	15	34
	422. 486	○	BC	-	-	-	.075	.071	.25	.35	1.6	.50	.61	.70	.78	15	34
	422. 566	○	BC	-	-	-	.091	.087	.39	.55	2.5	.78	.95	1.1	1.2	15	34
	422. 606	○	-	BE	-	-	.102	.099	.49	.69	3.2	.98	1.2	1.4	1.6	15	34
	422. 646	○	-	BE	-	-	.118	.114	.62	.88	4.0	1.2	1.5	1.8	2.0	15	38
	422. 726	○	-	BE	-	-	.146	.142	.98	1.4	6.3	2.0	2.4	2.8	3.1	15	38
	422. 806	○	-	BE	-	-	.183	.181	1.6	2.2	10.0	3.1	3.8	4.4	4.9	15	38
	422. 846	○	-	BE	-	-	.205	.201	1.9	2.7	12.5	3.9	4.8	5.5	6.1	15	38
	422. 886	○	-	BE	-	-	.229	.225	2.5	3.5	16.0	5.0	6.1	7.0	7.9	15	38
	422. 926	○	-	-	CG	-	.288	.288	3.1	4.4	20	6.2	7.6	8.8	9.8	15	38
	422. 966	○	-	-	CG	-	.315	.315	3.9	5.5	25	7.8	9.5	11.0	12.3	15	38
	423. 006	○	-	-	CG	-	.343	.343	4.8	6.8	31	9.6	11.8	13.6	15.2	15	38
	423. 126	○	-	-	-	CK	.473	.473	9.8	13.8	63	19.5	24	28	31	15	38
120°	422. 408	○	BC	-	-	-	.059	.057	.16	.22	1.0	.31	.38	.44	.49	27	63
	422. 448	○	BC	-	-	-	.065	.063	.19	.26	1.2	.37	.46	.53	.59	27	63
	422. 488	○	BC	-	-	-	.075	.071	.25	.35	1.6	.50	.61	.70	.78	27	63
	422. 568	○	BC	-	-	-	.091	.087	.39	.55	2.5	.78	.95	1.1	1.2	27	63
	422. 728	○	-	BE	-	-	.146	.142	.98	1.4	6.3	2.0	2.4	2.8	3.1	27	63
	422. 888	○	-	BE	-	-	.229	.225	2.5	3.5	16.0	5.0	6.1	7.0	7.9	27	63
	423. 008	○	-	-	CG	-	.343	.343	4.8	6.8	31	9.6	11.8	13.6	15.2	27	63
	423. 128	○	-	-	-	CK	.500	.485	9.8	13.8	63	19.5	24	28	31	27	63

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	422. 888	+	5E	+	BE	=	422. 888. 5E. BE

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 * \sqrt{\frac{P_2}{P_1}}$

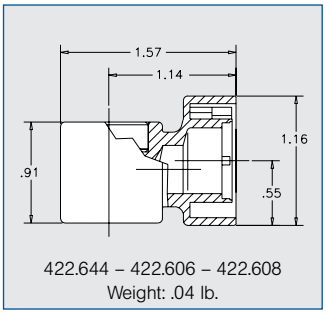
(See page 12 for symbol definitions.)

1-800-777-2926

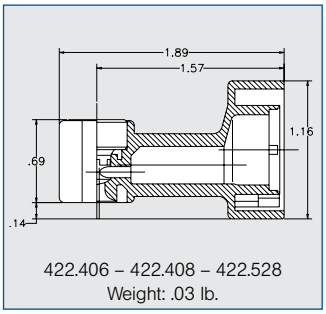
Full cone nozzles
Tangential-flow TWISTLOC quick release mount
Series 422

Bayonet PVDF nozzles mount by hand with a quick twist. Lechler's vaneless full cone design paired with a quick-disconnect offers an unbeatable combination where nozzles may need to be changed, cleaned, or inspected quickly.

Applications:
- Mist eliminator washing
- Critical cleaning operations
- Chemical reactors
- Scrubbers



422.644 – 422.606 – 422.608
Weight: .04 lb.

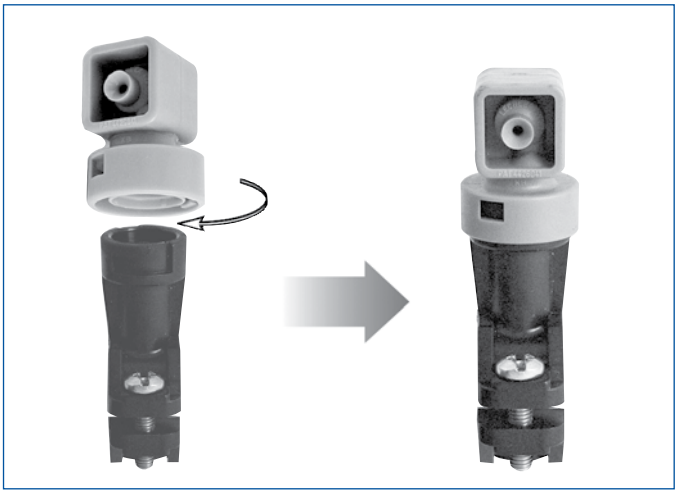


422.406 – 422.408 – 422.528
Weight: .03 lb.

Spray angle	Ordering no. Type	Mat. no. PVDF 5E	Mat. no. Polypro 53	Conn. Bayonet	Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Diameter D (in.) @ 40 psi H=8"	H=20"
60°	**422. 644**	-	○	**KB**	.114	.114	.62	.88	4.0	1.2	1.5	1.8	2.0	9	20
90°	**422. 406**	○	-	**KB**	.059	.057	.16	.22	1.0	.31	.38	.44	.49	15	34
	422. 606	○	-	**KB**	.102	.099	.49	.69	3.2	.98	1.2	1.4	1.6	15	34
120°	**422. 408**	○	-	**KB**	.059	.057	.16	.22	1.0	.31	.38	.44	.49	27	48
	422. 528	○	-	**KB**	.083	.079	.32	.44	2.0	.62	.76	.88	.98	27	48
	422. 608	○	-	**KB**	.102	.099	.49	.69	3.2	.98	1.2	1.4	1.6	27	63

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	422. 608	+	**5E**	+	**KB**	=	**422. 608. 5E. KB**

Simple assembly – with just a twist



A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 * \sqrt{\frac{P_2}{P_1}}$

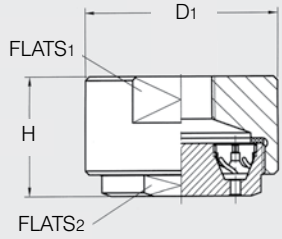
(See page 12 for symbol definitions.)

Full cone nozzles
Cluster head
Series 502 / 503

Each unit uses seven individual hollow cone orifices to generate small droplets. Sprays overlap into one wide angle full cone pattern.

Applications:
- Gas cooling
- Steam de-superheating
- Chemical reactors

∢ 70°

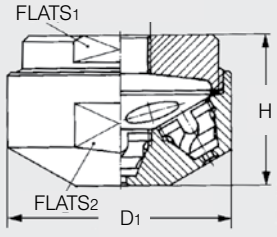


70° Version

Dimensions (in.)

	1/2"	3/4"
FLATS1	1.8	2.6
FLATS2	1.5	2.2
H	1.0	1.8
D	2.0	3.0
Weight (Brass)	.55 lb.	1.92 lb.

∢ 130°



130° Version

Dimensions (in.)

	1/2"	3/4"
FLATS1	1.1	2.0
FLATS2	1.4	2.2
H	1.1	2.1
D	1.6	2.4
Weight (Brass)	.33 lb.	.90 lb.

Spray angle ∢	Ordering no. Type	Material no. 316 SS 17	Material no. Brass 30	Connection Female NPT 1/2" 3/4"	Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	Spray Diam. D (in.) @ 30 psi H=40"	H=80"
70°	502. 445	-	○	BH -	.035	.020	.19	.27	1.3	.35	.39	.48	.55	.61	16	16
	502. 985	○	-	- BL	.129	.079	4.3	6.1	28	7.5	8.7	10.6	12.3	13.7	47	59
	503. 065	○	-	- BL	.193	.079	7.0	9.9	45	12.1	14.0	17.1	19.8	22	47	70
	503. 115	○	○	- BL	.236	.079	9.2	13.1	60	16.1	18.7	23	26	29	51	78
130°	502. 448	○	○	BH BL	.035	.020	.19	.27	1.3	.35	.39	.48	.55	.61	20	20
	502. 548	○	○	BH BL	.071	.020	.35	.49	2.2	.59	.70	.86	.99	1.1	27	27
	502. 588	○	○	- BL	.039	.039	1.6	2.3	2.8	.87	.87	1.1	1.2	1.4	32	35
	502. 748	○	○	- BL	.075	.079	1.2	1.6	7.1	1.9	2.2	2.7	3.1	3.5	43	47
	502. 798	○	-	- BL	.114	.079	1.5	2.1	9.5	2.6	3.0	3.6	4.2	4.7	47	51
	502. 838	○	○	- BL	.118	.079	1.8	2.6	11.8	3.2	3.7	4.5	5.2	5.8	55	63
	502. 908	○	○	- BL	.157	.079	2.8	3.9	18.0	4.8	5.6	6.8	7.9	8.8	59	70
	503. 028	○	○	- BL	.165	.079	5.5	7.7	36	9.7	11.0	13.5	15.6	17.4	63	70
	503. 118	○	○	- BL	.256	.079	9.2	13.1	60	16.1	18.7	23	26	29	79	118

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	503. 028	+	17	+	BL	=	503. 028. 17. BL

Diagram of spray diameter

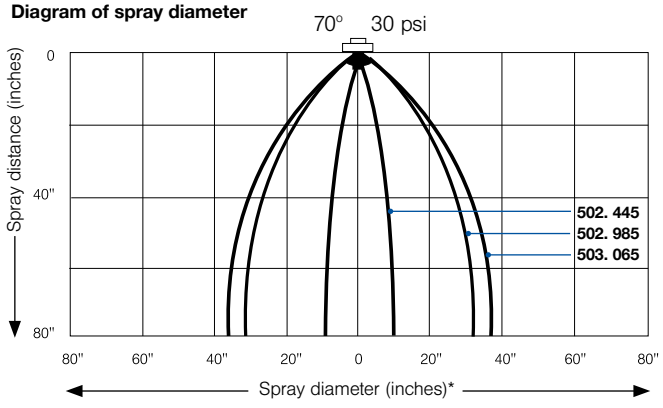
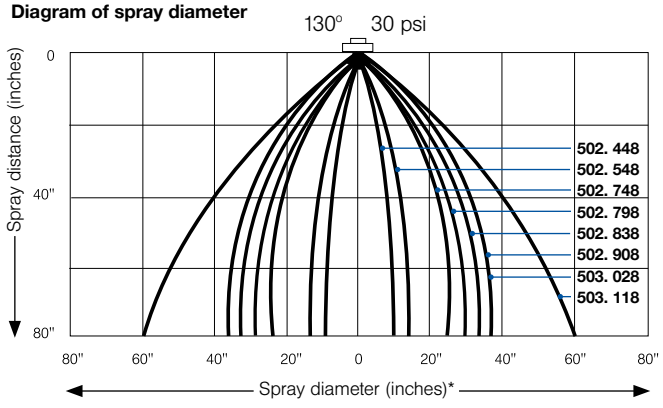


Diagram of spray diameter



* Spray diameter coordinates represent distance from zero (0) coordinate.For each curve, add both coordinate values to obtain spray diameter.

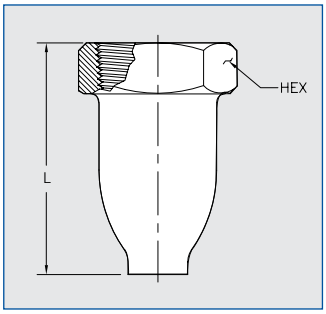
Conversion formula for the above series: $V_2 = V_1 * \sqrt{\frac{P_2}{P_1}}$

(See page 121 for symbol definitions.)

Full cone nozzles
Axial-flow CenterJet™
Series 459

Turbine-style vane for uniform atomization and distribution.

Applications:
- Surface spraying
- Quench cooling
- Fire suppression
- Chemical processing



Dimensions (in.) Inlet (Female NPT)	L	HEX	Wt. (lb.)
1-1/2	4.31	2-3/16	1.8
2	5.45	2-3/4	2.4
2-1/2	6.00	3-1/4	4.18
3	6.89	3-7/8	6.0

Ordering no. Type	Mat. no. 316 SS 17	Connection Female NPT 1½"	2"	2½"	3"	Orifice diam. (in.)	Flow Rate (Gallons Per Minute) 5 psi	10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Angle in degrees @ 40 psi (* = 15 psi)
STANDARD ANGLE															
459. 244	○	**BS**	-	-	-	.500	14	20	27	124	38	47	54	60	**62**
459. 284	○	**BS**	-	-	-	.625	18	25	36	165	50	62	71	79	**62**
459. 355	○	**BS**	-	-	-	.687	26	37	52	233	72	86	100	112	**70**
459. 356	○	**BS**	-	-	-	.687	26	37	52	233	72	86	100	112	**84**
459. 343	○	-	**BW**	-	-	.500	25	35	48	222	68	82	94	105	**43**
459. 365	○	-	**BW**	-	-	.656	28	39	53	242	72	86	98	110	***80**
459. 415	○	-	**BW**	-	-	.796	38	53	74	339	105	125	144	160	**66**
459. 455	○	-	**BW**	-	-	.906	48	68	95	434	132	160	183	205	**68**
459. 475	○	-	-	**BZ**	-	.910	54	75	104	475	143	172	200	221	**83**
459. 515	○	-	-	**BZ**	-	1.06	68	94	132	603	185	225	260	290	**67**
459. 584	○	-	-	-	**MB**	1.31	103	144	200	925	285	345	400	440	**57**
WIDE ANGLE															
459. 238	○	**BS**	-	-	-	.562	15	20	27	124	37	45	51	56	**120**
459. 266	○	**BS**	-	-	-	.500	14	19	26	117	35	42	48	53	**98**
459. 286	○	**BS**	-	-	-	.625	18	25	36	165	50	62	71	79	**94**
459. 288	○	**BS**	-	-	-	.625	19	26	36	162	49	58	66	73	**120**
459. 348	○	**BS**	-	-	-	.781	26	36	49	226	69	83	95	105	**120**
459. 378	○	-	**BW**	-	-	.781	33	45	61	273	82	98	110	122	**118**
459. 386	○	-	**BW**	-	-	.796	37	50	68	311	92	111	129	141	***99**
459. 408	○	-	**BW**	-	-	.937	40	55	74	332	100	118	135	147	**118**
459. 488	○	-	-	**BZ**	-	1.03	64	86	117	521	157	187	212	232	**119**
459. 496	○	-	-	**BZ**	-	0.98	63	87	119	543	165	200	233	259	***86**
459. 575	○	-	-	-	**MB**	1.31	110	150	205	938	275	330	380	421	***90**
459. 608	○	-	-	-	**MB**	1.43	146	200	274	1255	372	450	520	590	**120**

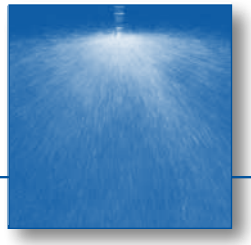
This product line is also available in larger capacities with inlets up to 6" in size.
Please contact Lechler if you have an application requiring a larger size.

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	459. 455	+	**17**	+	**BW**	=	**459. 455. 17. BW**

Conversion formula for the above series: $V_2 = V_1 * \sqrt{\frac{P_2}{P}}$
(See page 12 for symbol definitions.)

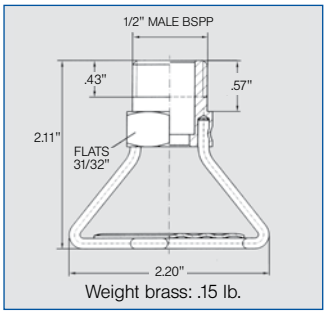
Deflector-plate nozzles

Series 524 / 525



Full cone spray has no swirl insert for greater clog resistance.

Applications:
- Fire fighting
- Broadcast spraying
- Wide area spraying
- Tank cleaning



Weight brass: .15 lb.

Spray angle	Ordering no. Type	Material no. 316 SS	Material no. Brass	Orifice diam. (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	150 psi	Spray Diameter D (ft.) @ 45 psi H=40"	H=120"
	Connection: 1/2" Male BSPP	**17**	**30**											
180°	**524. 809**	○	○	.158	1.6	2.2	10	3.1	3.8	4.4	4.9	6.0	18	21
	525. 049	○	○	.315	6.2	8.8	40	12.4	15.2	17.6	19.6	24	33	43
	525. 109	-	○	.366	8.8	12.5	57	17.7	22	25	28	34	33	44
	525. 169	-	○	.429	12.6	17.8	81	25	31	36	40	49	35	44
	525. 229	-	○	.481	17.4	25	112	35	43	49	55	67	22	34
	525. 269	○	○	.485	22	31	140	43	53	61	69	84	17	33

Example for ordering:	Type	+	Material no.	=	Ordering no.
	525. 049	+	**30**	=	**525. 049. 30**

Conversion formula for the above series: $V_2 = V_1 * \sqrt{\frac{P_2}{P_1}}$

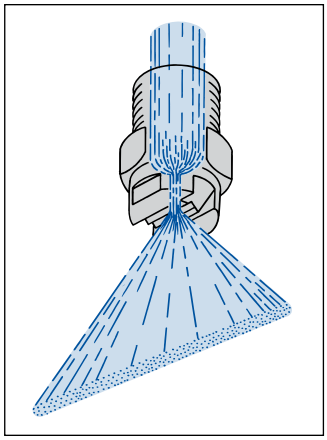
(See page 12 for symbol definitions.)

Flat fan nozzles

Belt cleaning
Coating
Steam cleaning
Degreasing
High pressure cleaning
Gravel washing
Cooling
Surface treatment
Phosphating
Rain curtains
Foam control
Foam spraying
Lubrication
Filter cleaning
Spray cleaning
Washing processes
and many others...

1-800-777-2926

Flat fans are commonly-used nozzles, appropriate for many spray applications. When higher impact is required, powerful jets can be generated for spray angles up to 60°. Nozzles with low flow rates are suitable for humidifying. The flat fan pattern itself is most conducive for spraying items on a moving conveyor. The flow geometry of the nozzle allows the production of accurate, compact jets, available with different distribution patterns.

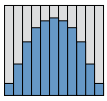


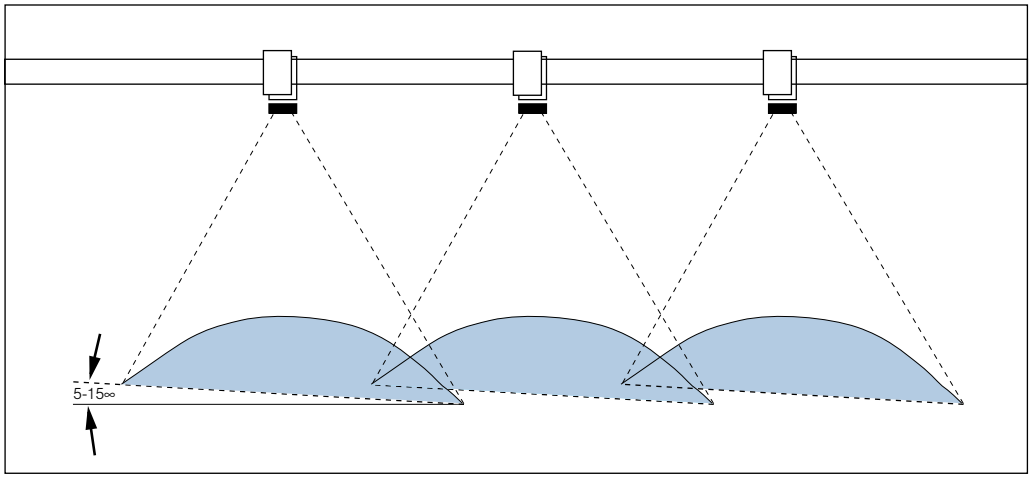
Deflector nozzles
The tongue-type nozzle design represents a special kind of flat fan nozzle. With this nozzle type, the flat fan spray pattern is produced by a solid stream deflecting upon an attached tongue plate. There are two such styles. In one, fluid is channeled into a powerful narrow angle jet (see photo at right). In the other, fluid is spread to create a wide angle spray. Due to large free passage sections, tongue-type nozzles are more resistant to clogging.

Distribution

Flat fan designs fall into two categories: **Parabolic** and **Even**. These terms describe the distribution of liquid across the width of the spray coverage.

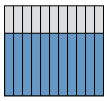
Parabolic
Most flat fans are this type. These designs have heavier flow in the center of the pattern which tapers off toward the edges due to the elliptical shape of the orifice. This requires the overlapping on a header to achieve a totally even spray distribution. The diagram shows how the coverage should be overlapped for optimum performance. The 5-15° offset ensures the sprays won't collide. Parabolic distribution nozzle series are indicated by this symbol:

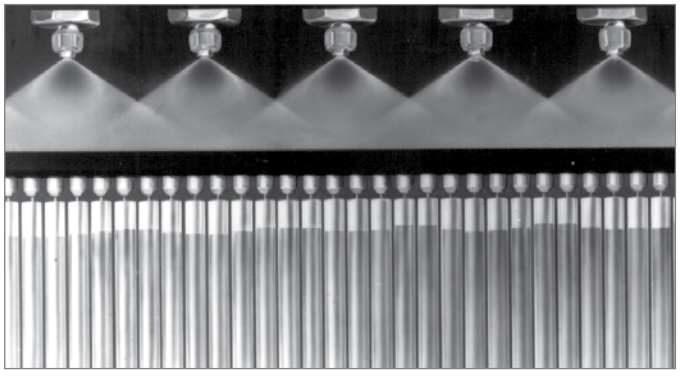




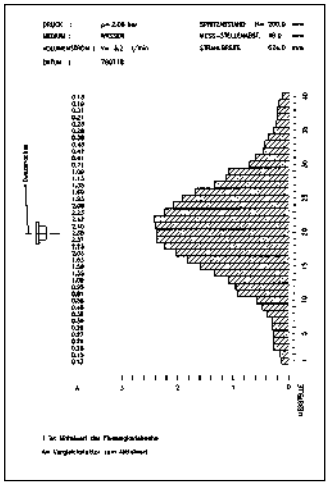
Arrangement of nozzles

Even
These designs distribute the liquid evenly across the full width of the spray, most commonly by deflector nozzles. This is best when using only one or two nozzles for a specific application. When designing headers, the overlap should either be 0% or 50% on each side. Even distribution nozzle series are indicated by this symbol:





Total liquid distribution



Liquid distribution for single flat fan nozzle

Flat fan nozzles

Series 632 / 633

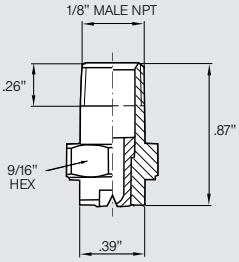
Precision standard design axial flat fan nozzles. Stable spray angles at a wide range of pressures. Uniform parabolic distribution. Most capacities use Lechler's insert design.

Applications:
- Spray cleaning
- Lubricating
- Board and web rinsing
- Parts washing

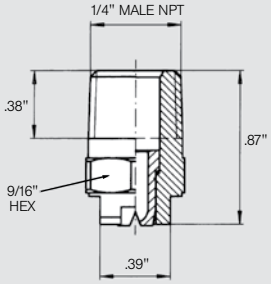
∢ 20°–75° ∢ 90°–120°
Stainless Steel or Brass

PVDF

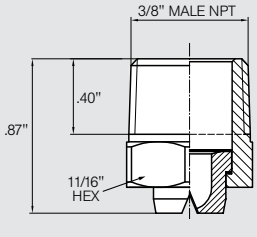
3/8"–1/2"



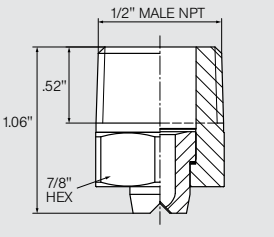
Weight brass: .04 lb.



Weight brass: .05 lb.



Weight brass: .07 lb.



Weight brass: .09 lb.

Spray angle ∢	Ordering no. Type	Material no. 303 SS 16[1]	316 SS 17[2]	Brass 30	PVDF 5E	Connection Male NPT 1/8"	1/4"	3/8"	1/2"	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Coverage @ 30 psi H=10"	H=20"
20°	632. 301	○	○	○	○	BA	BC	-	-	.028	.024	.05	.07	.32	.10	.12	.14	.16	3	5
	632. 361	○	○	○	○	BA	BC	-	-	.039	.032	.10	.14	.63	.20	.24	.28	.31	3	5
	632. 441	○	○	○	○	BA	BC	-	-	.053	.043	.19	.27	1.3	.39	.48	.55	.61	3	6
	632. 481	○	○	○	○	BA	BC	-	-	.059	.047	.25	.35	1.6	.50	.61	.70	.78	3	6
30°	632. 302	○	○	○	-	BA	BC	-	-	.024	.020	.05	.07	.32	.10	.12	.14	.16	5	9
	632. 362	○	○	○	○	BA	BC	-	-	.039	.028	.10	.14	.63	.20	.24	.28	.31	5	9
	632. 402	○	○	○	○	BA	BC	-	-	.047	.035	.16	.22	1.0	.31	.38	.44	.49	5	9
	632. 482	○	○	○	○	BA	BC	-	-	.059	.043	.25	.35	1.6	.50	.61	.70	.78	5	9
	632. 562	○	○	○	○	BA	BC	-	-	.079	.059	.39	.55	2.5	.78	.95	1.1	1.2	5	9
	632. 642	○	○	○	-	-	BC	-	-	.099	.071	.62	.88	4.0	1.2	1.5	1.8	2.0	5	9
	632. 722	○	○	○	-	-	BC	-	-	.118	.095	.98	1.4	6.3	2.0	2.4	2.8	3.1	5	9
	632. 762	○	○	○	-	-	BC	-	-	.138	.091	1.2	1.8	8	2.5	3	3.5	3.9	5	9
	632. 802	○	○	○	-	-	BC	-	-	.158	.122	1.6	2.2	10.0	3.1	3.8	4.4	4.9	5	10
	632. 882	○	○	○	-	-	-	-	BG	.197	.157	2.5	3.5	16.0	5.0	6.1	7.0	7.9	5	10
	632. 922	○	○	○	-	-	-	-	BG	.217	.165	3.1	4.4	20.0	6.2	7.6	8.8	9.8	5	10
	632. 962	○	○	○	-	-	-	-	BG	.236	.185	3.9	5.5	25.0	7.8	9.5	11.0	12.3	5	10
	633. 002	○	-	-	-	-	-	-	BG	.276	.220	4.9	6.9	31.5	9.8	12.0	13.9	15.5	5	10

Continued on next page.

Other sizes available upon request.

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	632. 402	+	16	+	BA	=	632. 402. 16. BA

1) We reserve the right to deliver AISI 303 or AISI 304 under the material no. 16.
2) We reserve the right to deliver AISI 316L under the material no. 17.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page 14 for symbol definitions.)

Flat fan nozzles

Series 632 / 633

Spray angle	Type	Ordering no. Material no. 303 SS 16[1]	316 SS 17[2]	Brass 30	PVDF 5E	Connection Male NPT 1/8"	1/4"	3/8"	1/2"	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Coverage @ 30 psi H=10"	H=20"
45°	632. 303	○	○	○	-	BA	BC	-	-	.028	.020	.05	.07	.32	.10	.12	.14	.16	6	11
	632. 363	○	○	○	○	BA	BC	-	-	.039	.024	.10	.14	.63	.20	.24	.28	.31	6	11
	632. 403	○	○	○	○	BA	BC	-	-	.047	.035	.16	.22	1.0	.31	.38	.44	.49	7	13
	632. 483	○	○	○	○	BA	BC	-	-	.059	.043	.25	.35	1.6	.50	.61	.70	.78	7	13
	632. 563	○	○	○	○	BA	BC	-	-	.079	.055	.39	.55	2.5	.78	.95	1.1	1.2	7	14
	632. 603	○	○	○	-	BA	BC	-	-	.087	.067	.49	.69	3.2	.98	1.2	1.4	1.5	7	14
	632. 643	○	○	○	○	BA	BC	-	-	.099	.063	.62	.88	4.0	1.2	1.5	1.8	2	7	14
	632. 673	○	○	○	-	-	BC	BE	-	.106	.083	.74	1.0	4.8	1.5	1.8	2.1	2.3	8	15
	632. 723	○	○	○	-	-	BC	BE	-	.118	.095	.98	1.4	6.3	2.0	2.4	2.8	3.1	8	15
	632. 763	○	○	○	-	-	BC	BE	-	.138	.091	1.2	1.8	8.0	2.5	3	3.5	3.9	8	15
	632. 803	○	○	○	-	-	BC	BE	BG	.158	.118	1.6	2.2	10.0	3.1	3.8	4.4	4.9	8	15
	632. 843	○	○	○	-	-	-	-	BG	.177	.138	1.9	2.7	12.5	3.9	4.8	5.5	6.1	8	15
	632. 883	○+	○+	○+	○*	-	BC	-	BG	.197	.157	2.5	3.5	16.0	5.0	6.1	7.0	7.9	9	17
	632. 923	○	○	○	-	-	-	-	BG	.217	.165	3.1	4.4	20.0	6.2	7.6	8.8	9.8	9	17
	632. 963	○	○	○	-	-	-	-	BG	.236	.185	3.9	5.5	25.0	7.8	9.5	11.0	12.3	9	17
60°	632. 304	○	○	○	○	BA	BC	-	-	.028	.016	.05	.07	.32	.10	.12	.14	.16	8	17
	632. 334	○	○	○	○	BA	BC	-	-	.035	.020	.07	.10	.45	.14	.17	.20	.22	9	17
	632. 364	○	○	○	○	BA	BC	-	-	.039	.024	.10	.14	.63	.20	.24	.28	.31	9	18
	632. 404	○	○	○	○	BA	BC	-	-	.047	.032	.16	.22	1.0	.31	.38	.44	.49	10	19
	632. 444	○	○	○	○	BA	BC	-	-	.053	.035	.19	.27	1.3	.39	.48	.55	.61	10	19
	632. 484	○	○	○	○*	BA	BC	-	-	.059	.039	.25	.35	1.6	.50	.61	.70	.78	10	20
	632. 514	○	○	○	○	BA	BC	-	-	.065	.043	.29	.42	1.9	.59	.72	.83	.93	11	20
	632. 564	○	○	○	○	BA	BC	-	-	.079	.051	.39	.55	2.5	.78	.95	1.1	1.2	11	21
	632. 604	○	○	○	○	BA	BC	-	-	.087	.059	.49	.69	3.2	.98	1.2	1.4	1.5	11	22
	632. 644	○	○	○	○*	-	BC	BE	-	.099	.063	.62	.88	4.0	1.2	1.5	1.8	2.0	12	22
	632. 674	○	○	○	○*	-	BC	BE	-	.106	.071	.74	1.0	4.8	1.5	1.8	2.1	2.3	12	23
	632. 724	○	○	○	○*	-	BC	BE	-	.118	.083	.98	1.4	6.3	2.0	2.4	2.8	3.1	12	23
	632. 764	○	○	○	-	-	BC	BE	-	.138	.091	1.2	1.8	8.0	2.5	3.0	3.5	3.9	12	23
	632. 804	○+	○+	○+	○*	-	BC	-	BG	.158	.102	1.6	2.2	10.0	3.1	3.8	4.4	4.9	12	23
	632. 844	○+	○+	○+	○*	-	BC	-	BG	.177	.118	1.9	2.7	12.5	3.9	4.8	5.5	6.1	12	23
	632. 884	○+	○+	○+	○*	-	BC	-	BG	.197	.134	2.5	3.5	16.0	5.0	6.1	7.0	7.9	12	22
	632. 924	○	○	○	-	-	-	-	BG	.217	.165	3.1	4.4	20.0	6.2	7.6	8.8	9.8	13	25
	632. 964	○	○	○	-	-	-	-	BG	.236	.185	3.9	5.5	25.0	7.8	9.5	11.0	12.3	13	25
	633. 004	○	○	-	-	-	-	-	BG	.276	.205	4.9	6.9	31.5	9.8	12.0	13.9	15.5	13	25
	633. 044	○	○	○	-	-	-	-	BG	.315	.217	6.2	8.8	40.0	12.4	15.2	17.6	19.6	13	23
	633. 084	○	○	○	-	-	-	-	BG	.354	.268	7.7	11.0	50.0	15.5	19.0	21.9	24.5	13	25
75°	632. 145	○	-	○	-	BA	BC	-	-	.006	.012	.008	.011	.05	.016	.019	.022	.025	11	22
	632. 165	○	-	○	-	BA	BC	-	-	.008	.013	.011	.015	.07	.022	.027	.031	.034	11	22
	632. 185	○	-	○	-	BA	BC	-	-	.014	.008	.012	.018	.08	.025	.030	.035	.039	12	23
	632. 215	○	-	○	-	BA	BC	-	-	.016	.008	.017	.024	.11	.034	.042	.048	.054	12	23
	632. 245	○	-	○	-	BA	BC	-	-	.020	.012	.025	.035	.16	.05	.06	.07	.08	12	23
	632. 275	○	-	○	-	BA	BC	-	-	.024	.012	.03	.05	.22	.07	.08	.10	.11	12	23

* Only available in connection BC
\+ Only available in connection BG

Continued on next page.

Other sizes available upon request.

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	632. 403	+	16	+	BA	=	632. 403. 16. BA

1) We reserve the right to deliver AISI 303 or AISI 304 under the material no. 16.
2) We reserve the right to deliver AISI 316L under the material no. 17.

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page 12 for symbol definitions.)

Flat fan nozzles

Series 632 / 633

Spray angle	Ordering no. Type	Material no. 303 SS 16[1]	Material no. 316 SS 17[2]	Material no. Brass 30	Material no. PVDF 5E	Connection Male NPT 1/8"	1/4"	3/8"	1/2"	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Coverage @ 30 psi H=10"	H=20"
90°	632. 216	○	-	○	-	BA	BC	-	-	.016	.008	.017	.024	.11	.034	.042	.048	.054	15	28
	632. 276	○	-	○	-	BA	BC	-	-	.024	.012	.034	.05	.22	.07	.08	.10	.11	15	29
	632. 306	○	○	○	○	BA	BC	-	-	.028	.016	.05	.07	.32	.10	.12	.14	.16	15	29
	632. 336	○	○	○	○	BA	BC	-	-	.035	.020	.07	.10	.45	.14	.17	.20	.22	16	31
	632. 366	○	○	○	○	BA	BC	-	-	.039	.020	.10	.14	.63	.20	.24	.28	.31	17	32
	632. 406	○	○	○	○	BA	BC	-	-	.047	.028	.16	.22	1.0	.31	.38	.44	.49	17	32
	632. 446	○	○	○	○	BA	BC	-	-	.053	.032	.19	.27	1.3	.39	.48	.55	.61	17	33
	632. 486	○	○	○	○	BA	BC	-	-	.059	.032	.25	.35	1.6	.50	.61	.70	.78	17	33
	632. 516	○	○	○	○	BA	BC	-	-	.065	.035	.29	.42	1.9	.59	.72	.83	.93	17	33
	632. 566	○	○	○	○	BA	BC	-	-	.079	.043	.39	.55	2.5	.78	.95	1.1	1.2	18	33
	632. 606	○	○	○	○	BA	BC	-	-	.087	.047	.49	.69	3.2	.98	1.2	1.4	1.5	18	34
	632. 646	○	○	○	○*	-	BC	BE	-	.099	.051	.62	.88	4.0	1.2	1.5	1.8	2.0	18	34
	632. 676	○	○	○	○*	-	BC	BE	-	.106	.055	.74	1.0	4.8	1.5	1.8	2.1	2.3	18	34
	632. 726	○	○	○	○*	-	BC	BE	-	.118	.067	.98	1.4	6.3	2.0	2.4	2.8	3.1	19	35
	632. 766	○	○	○	○*	-	BC	BE	-	.138	.067	1.2	1.8	8.0	2.5	3.0	3.5	3.9	19	35
	632. 806	○+	○+	○+	○*	-	BC	-	BG	.158	.095	1.6	2.2	10.0	3.1	3.8	4.4	4.9	19	35
	632. 846	○+	○+	○+	○*	-	BC	-	BG	.177	.095	1.9	2.7	12.5	3.9	4.8	5.5	6.1	19	35
	632. 886	○+	○+	○+	○*	-	BC	-	BG	.197	.122	2.5	3.5	16.0	5.0	6.1	7.0	7.9	19	36
	632. 926	○+	○+	○+	○*	-	BC	-	BG	.217	.165	3.1	4.4	20.0	6.2	7.6	8.8	9.8	21	40
	632. 966	○	○	○	-	-	-	-	BG	.236	.185	3.9	5.5	25.0	7.8	9.5	11.0	12.3	21	40
120°	632. 187	○	-	○	-	BA	BC	-	-	.014	.008	.012	.018	.08	.025	.030	.035	.039	25	47
	632. 217	○	-	○	-	BA	BC	-	-	.016	.008	.017	.024	.11	.034	.042	.048	.054	25	48
	632. 247	○	-	○	-	BA	BC	-	-	.020	.008	.025	.035	.16	.05	.06	.07	.08	26	48
	632. 277	○	-	○	-	BA	BC	-	-	.024	.012	.034	.05	.22	.07	.08	.10	.11	26	49
	632. 307	○	○	○	○	BA	BC	-	-	.028	.012	.05	.07	.32	.10	.12	.14	.16	26	49
	632. 337	○	○	○	○	BA	BC	-	-	.035	.016	.07	.10	.45	.14	.17	.20	.22	26	50
	632. 367	○	○	○	○	BA	BC	-	-	.039	.020	.10	.14	.63	.20	.24	.28	.31	26	50
	632. 407	○	○	○	○	BA	BC	-	-	.047	.024	.16	.22	1.0	.31	.38	.44	.49	26	50
	632. 447	○	○	○	○	BA	BC	-	-	.053	.024	.19	.27	1.3	.39	.48	.55	.61	27	50
	632. 487	○	○	○	○	BA	BC	-	-	.059	.024	.25	.35	1.6	.50	.61	.70	.78	27	50
	632. 517	○	○	○	○	BA	BC	-	-	.065	.035	.29	.42	1.9	.59	.72	.83	.93	27	50
	632. 567	○	○	○	○	BA	BC	-	-	.079	.035	.39	.55	2.5	.78	.95	1.1	1.2	27	51
	632. 607	○	○	○	○	BA	BC	-	-	.087	.043	.49	.69	3.2	.98	1.2	1.4	1.5	27	51
	632. 647	○	○	○	-	-	BC	BE	-	.099	.051	.62	.88	4.0	1.2	1.5	1.8	2.0	27	51
	632. 677	○	○	○	○*	-	BC	BE	-	.106	.055	.74	1.0	4.8	1.5	1.8	2.1	2.3	28	52
	632. 727	○	○	○	○*	-	BC	BE	-	.118	.063	.98	1.4	6.3	2.0	2.4	2.8	3.1	29	54
	632. 767	○	○	○	○*	-	BC	BE	-	.138	.067	1.2	1.8	8.0	2.5	3.0	3.5	3.9	30	55
	632. 807	○	○	○	-	-	BC	-	BG	.158	.079	1.6	2.2	10.0	3.1	3.8	4.4	4.9	31	57
	632. 847	○+	○+	○+	○*	-	BC	-	BG	.177	.091	1.9	2.7	12.5	3.9	4.8	5.5	6.1	31	57
	632. 887	○	○	○	-	-	-	-	BG	.197	.102	2.5	3.5	16.0	5.0	6.1	7.0	7.9	31	57
	632. 927	○	○	○	-	-	-	-	BG	.217	.114	3.1	4.4	20.0	6.2	7.6	8.8	9.8	31	57

* Only available in connection BC
\+ Only available in connection BG

Other sizes available upon request.

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	632. 406	+	16	+	BA	=	632. 406. 16. BA

1) We reserve the right to deliver AISI 303 or AISI 304 under the material no. 16.
2) We reserve the right to deliver AISI 316L under the material no. 17.

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

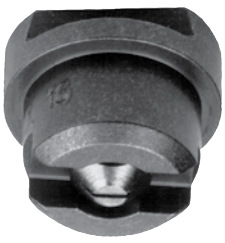
Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page 14 for symbol definitions.)

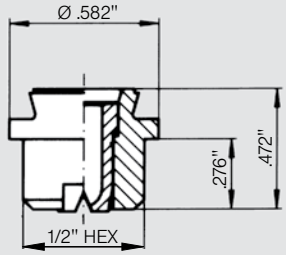
Flat fan nozzle tips with dovetail guide Series 660

Automatic jet alignment due to dovetail guide (this tip requires dovetail base). Stable spray angle. Uniform parabolic distribution of liquid. With appropriate spray height and distance between centers on spray bar, provides an even total liquid distribution. Assembles with 3/8" retaining nut.

∢ 20°–75°



∢ 90°–120°



Weight brass: .05 lb.

Orifice offset from dovetail by 5°

Applications:
- Cleaning installations
- Cooling headers
- Spray pipes

Spray angle ∢	Ordering no. Type	Material no. 303 SS 16	316 SS 17	Brass 30	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Coverage @ 30 psi H=10"	H=20"
20°	660. 301	○	○	○	.028	.024	.05	.07	.32	.10	.12	.14	.16	2	4
	660. 361	○	○	○	.039	.032	.10	.14	.63	.20	.24	.28	.31	3	5
	660. 441	○	○	○	.053	.043	.19	.27	1.3	.39	.48	.55	.61	3	5
	660. 481	○	○	○	.059	.047	.25	.35	1.6	.50	.61	.70	.78	3	5
30°	660. 302	○	○	○	.024	.020	.05	.07	.32	.10	.12	.14	.16	4	8
	660. 362	○	○	○	.039	.028	.10	.14	.63	.20	.24	.28	.31	4	8
	660. 402	○	○	○	.047	.035	.16	.22	1.0	.31	.38	.44	.49	4	8
	660. 482	○	○	○	.059	.043	.25	.35	1.6	.50	.61	.70	.78	4	8
	660. 562	○	○	○	.079	.059	.39	.55	2.5	.78	.95	1.1	1.2	4	8
45°	660. 303	○	○	○	.028	.020	.05	.07	.32	.10	.12	.14	.16	7	13
	660. 363	○	○	○	.039	.024	.10	.14	.63	.20	.24	.28	.31	7	13
	660. 403	○	○	○	.047	.035	.16	.22	1.0	.31	.38	.44	.49	7	13
	660. 483	○	○	○	.059	.043	.25	.35	1.6	.50	.61	.70	.78	7	13
	660. 563	○	○	○	.079	.055	.39	.55	2.5	.78	.95	1.1	1.2	7	14
	660. 643	○	○	○	.099	.071	.62	.88	4.0	1.2	1.5	1.8	2.0	7	14
60°	660. 304	○	○	○	.028	.016	.05	.07	.32	.10	.12	.14	.16	11	21
	660. 334	○	○	○	.035	.020	.07	.10	.45	.14	.17	.20	.22	11	21
	660. 364	○	○	○	.039	.024	.10	.14	.63	.20	.24	.28	.31	11	21
	660. 404	○	○	○	.047	.032	.16	.22	1.0	.31	.38	.44	.49	11	21
	660. 444	○	○	○	.053	.035	.19	.27	1.3	.39	.48	.55	.61	11	21
	660. 484	○	○	○	.059	.039	.25	.35	1.6	.50	.61	.70	.78	11	21
	660. 514	○	○	○	.065	.043	.29	.42	1.9	.59	.72	.83	.93	11	21
	660. 564	○	○	○	.079	.051	.39	.55	2.5	.78	.95	1.1	1.2	11	21
	660. 604	○	○	○	.087	.059	.49	.69	3.2	.98	1.2	1.4	1.5	11	21
	660. 644	○	○	○	.099	.063	.62	.88	4.0	1.2	1.5	1.8	2.0	11	21
	660. 724	○	○	○	.118	.083	.98	1.4	6.3	2.0	2.4	2.8	3.1	11	20
	660. 804	-	○	○	.158	.102	1.6	2.2	10.0	3.1	3.8	4.4	4.9	11	20
75°	660. 145	○	-	○	.008	.005	.008	.011	.05	.016	.019	.022	.025	13	24
	660. 165	○	-	○	.008	.003	.011	.015	.07	.022	.027	.031	.034	13	24
	660. 185	○	-	○	.008	.006	.012	.018	.09	.025	.030	.035	.039	13	25
	660. 215	○	-	○	.020	.008	.017	.024	.11	.034	.042	.048	.054	13	25
	660. 245	○	-	○	.020	.300	.025	.035	.16	.05	.06	.07	.08	14	25
	660. 275	○	-	○	.024	.300	.034	.05	.22	.07	.08	.10	.11	14	25

Continued on next page.

Example for ordering:	Type	+	Material no.	=	Ordering no.
	660. 304	+	16	=	660. 304. 16

1) We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 17.

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page V2 for symbol definitions.)

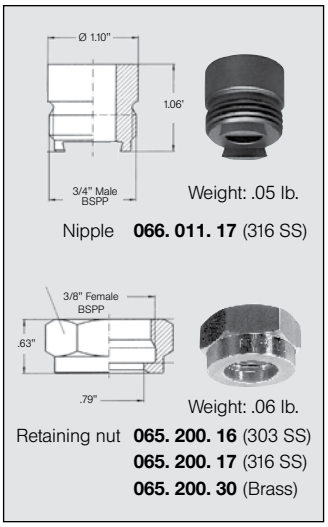
Flat fan nozzle tips with dovetail guide Series 660

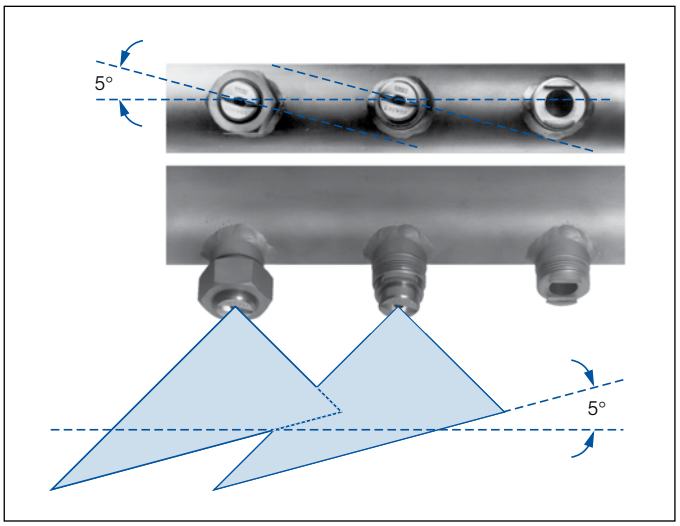
Spray angle	Ordering no. Type	Material no. 303 SS 16	316 SS 17	Brass 30	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Coverage @ 30 psi H=10"	H=20"
90°	660. 216	○	-	○	.016	.200	.017	.024	.11	.034	.042	.048	.054	20	35
	660. 276	○	-	○	.024	.300	.034	.05	.22	.07	.08	.10	.11	20	35
	660. 306	○	○	○	.028	.016	.05	.07	.32	.10	.12	.14	.16	20	37
	660. 336	○	○	○	.035	.020	.07	.10	.45	.14	.17	.20	.22	20	37
	660. 366	○	○	○	.039	.020	.10	.14	.63	.20	.24	.28	.31	20	37
	660. 406	○	○	○	.047	.028	.16	.22	1.0	.31	.38	.44	.49	20	37
	660. 446	○	○	○	.053	.032	.19	.27	1.3	.39	.48	.55	.61	20	36
	660. 486	○	○	○	.059	.032	.25	.35	1.6	.50	.61	.70	.78	20	36
	660. 516	○	○	○	.065	.035	.29	.42	1.9	.59	.72	.83	.93	20	36
	660. 566	○	○	○	.079	.043	.39	.55	2.5	.78	.95	1.1	1.2	20	36
	660. 606	○	○	○	.087	.047	.49	.69	3.2	.98	1.2	1.4	1.5	20	36
	660. 646	○	○	○	.099	.051	.62	.88	4.0	1.2	1.5	1.8	2.0	20	36
	660. 676	○	○	○	.106	.055	.74	1.0	4.8	1.5	1.8	2.1	2.3	19	36
	660. 726	○	○	○	.118	.067	.98	1.4	6.3	2.0	2.4	2.8	3.1	19	35
	660. 806	○	○	○	.158	.095	1.6	2.2	10.0	3.1	3.8	4.4	4.9	19	34
120°	660. 187	○	-	○	.014	.008	.012	.018	.08	.025	.030	.035	.039	26	48
	660. 217	○	-	○	.016	.008	.017	.024	.11	.034	.042	.048	.054	26	48
	660. 247	○	-	○	.020	.008	.025	.035	.16	.05	.06	.07	.08	26	49
	660. 277	○	-	○	.024	.012	.034	.05	.22	.07	.08	.10	.11	26	49
	660. 307	○	-	○	.028	.012	.05	.07	.32	.10	.12	.14	.16	26	50
	660. 337	○	○	○	.035	.016	.07	.10	.45	.14	.17	.20	.22	26	50
	660. 367	○	○	○	.039	.016	.10	.14	.63	.20	.24	.28	.31	26	50
	660. 407	○	○	○	.047	.024	.16	.22	1.0	.31	.38	.44	.49	26	50
	660. 447	○	○	○	.053	.024	.19	.27	1.3	.39	.48	.55	.61	26	50
	660. 487	○	○	○	.059	.024	.25	.35	1.6	.50	.61	.70	.78	27	50
	660. 517	○	○	○	.065	.035	.29	.42	1.9	.59	.72	.83	.93	27	50
	660. 567	○	○	○	.079	.035	.39	.55	2.5	.78	.95	1.1	1.2	27	50
	660. 607	○	○	○	.087	.043	.49	.69	3.2	.98	1.2	1.4	1.5	27	51
	660. 647	○	○	○	.099	.051	.62	.88	4.0	1.2	1.5	1.8	2.0	28	51
	660. 727	○	○	○	.118	.063	.99	1.4	6.4	2.0	2.4	2.8	3.1	29	52
	660. 807	○	-	○	.158	.079	1.6	2.2	10.0	3.1	3.8	4.4	4.9	31	53

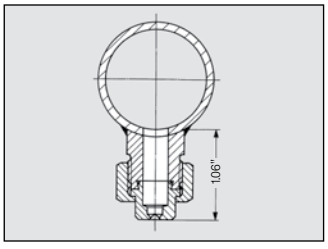
Example for ordering:	Type	+	Material no.	=	Ordering no.
	660. 306	+	16	=	660. 306. 16

1) We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 17.

Accessories







Standard accessories, alignment, and installation for the Series 660 dovetail nozzle tip

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

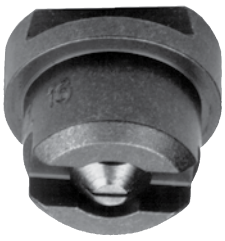
Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page 14 for symbol definitions.)

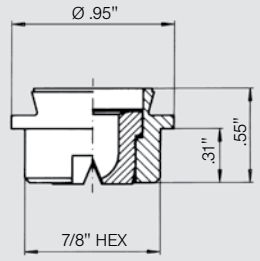
Flat fan nozzle tips with dovetail guide Series 664 / 665

Automatic jet alignment due to dovetail guide (this tip requires dovetail base). Stable spray angle. Uniform parabolic distribution of liquid. With appropriate spray height and distance between centers on spray bar, provides an even total liquid distribution. Assembles with 3/4" retaining nut.

∢ 20°–75°



∢ 90°–120°



Weight brass: .08 lb.

Orifice offset from dovetail by 15°

Applications:
- Cleaning installations
- Cooling headers
- Spray pipes
- Roll cooling
- Cooling of rolled stock

∢ Spray angle	Ordering no. Type	Material no. 303 SS 16	316 SS 17[1]	Brass 30 (in.)	Equivalent Orifice diam. (in.)	Free passage psi	Flow Rate (Gallons Per Minute) 10 psi	20 bar	liters per minute 2 psi	40 psi	60 psi	80 psi	100 H=10"	Spray Coverage @ 30 psi H=20"	
20°	664. 721	○	○	○	.118	.099	.98	1.4	6.3	2.0	2.4	2.8	3.1	4	8
	664. 801	○	○	○	.158	.126	1.6	2.2	10.0	3.1	3.8	4.4	4.9	4	8
	664. 881	○	○	○	.197	.158	2.5	3.5	16.0	5.0	6.1	7.0	7.8	4	8
	664. 921	○	○	○	.217	.173	3.1	4.4	20.0	6.2	7.6	8.8	9.8	4	8
	664. 961	○	○	○	.236	.201	3.9	5.5	25.0	7.8	9.5	11.0	12.3	4	8
30°	664. 722	○	○	○	.118	.095	.98	1.4	6.3	2.0	2.4	2.8	3.1	6	11
	664. 762	○	○	○	.138	.106	1.2	1.8	8.0	2.5	3.0	3.5	3.9	6	11
	664. 802	○	○	○	.158	.122	1.6	2.2	10.0	3.1	3.8	4.4	4.9	6	11
	664. 882	○	○	○	.197	.158	2.5	3.5	16.0	5.0	6.1	7.0	7.8	6	11
	664. 922	○	○	○	.217	.173	3.1	4.4	20.0	6.2	7.6	8.8	9.8	6	11
	664. 962	○	○	○	.236	.197	3.9	5.5	25.0	7.8	9.5	11.0	12.3	6	11
	665. 042	○	-	○	.315	.252	6.2	8.8	40.0	12.4	15.2	17.6	19.6	6	11
	665. 122	-	-	○	.394	.323	9.8	13.8	63.0	19.5	23.9	27.6	30.9	6	11
45°	664. 723	○	○	○	.118	.095	.98	1.4	6.3	2.0	2.4	2.8	3.1	10	19
	664. 763	○	○	○	.138	.102	1.2	1.8	8.0	2.5	3.0	3.5	3.9	10	19
	664. 803	○	○	○	.158	.118	1.6	2.2	10.0	3.1	3.8	4.4	4.9	10	19
	664. 843	○	○	○	.177	.134	1.9	2.7	12.5	3.9	4.8	5.5	6.1	10	19
	664. 883	○	○	○	.197	.150	2.5	3.5	16.0	5.0	6.1	7.0	7.8	10	20
	664. 923	○	○	○	.217	.165	3.1	4.4	20.0	6.2	7.6	8.8	9.8	11	20
	664. 963	○	○	○	.236	.043	3.9	5.5	25.0	7.8	9.5	11.0	12.3	11	20
	665. 043	-	-	○	.315	.232	6.2	8.8	40.0	12.4	15.2	17.6	19.6	11	20
60°	664. 724	○	○	○	.118	.083	.98	1.4	6.3	2.0	2.4	2.8	3.1	12	22
	664. 764	○	○	○	.138	.091	1.2	1.8	8.0	2.5	3.0	3.5	3.9	12	22
	664. 804	○	○	○	.158	.102	1.6	2.2	10.0	3.1	3.8	4.4	4.9	12	22
	664. 844	○	○	○	.177	.118	1.9	2.7	12.5	3.9	4.8	5.5	6.1	12	22
	664. 884	○	○	○	.197	.134	2.5	3.5	16.0	5.0	6.1	7.0	7.8	12	22
	664. 924	○	○	○	.217	.162	3.1	4.4	20.0	6.2	7.6	8.8	9.8	12	23
	664. 964	○	○	○	.236	.165	3.9	5.5	25.0	7.8	9.5	11.0	12.3	12	23
	665. 044	○	○	○	.315	.217	6.2	8.8	40.0	12.4	15.2	17.6	19.6	12	23
	665. 084	○	○	○	.355	.244	7.8	11.0	50.0	15.5	19.0	21.9	24.5	13	23
	665. 124	-	-	○	.394	.292	9.8	13.8	63.0	19.5	23.9	27.6	30.9	13	24

Continued on next page.

Example for ordering:	Type	+	Material no.	=	Ordering no.
	664. 721	+	16	=	664. 721. 16

1) We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 17.

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

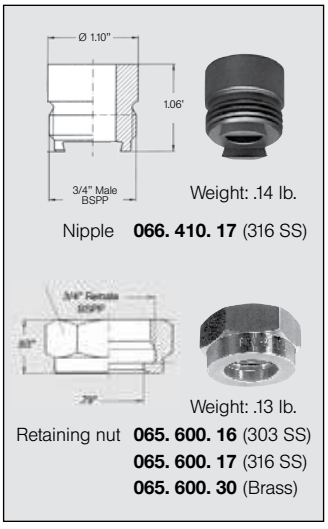
Flat fan nozzle tips with dovetail guide Series 664 / 665

Spray angle	Ordering no. Type	Material no. 303 SS 16	316 SS 17[1]	Brass 30	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Coverage @ 30 psi H=10"	H=20"
90°	664. 726	○	○	○	.118	.200	.98	1.4	6.3	2.0	2.4	2.8	3.1	17	31
	664. 766	○	○	○	.138	.300	1.2	1.8	8.0	2.5	3.0	3.5	3.9	17	31
	664. 806	○	○	○	.158	.095	1.6	2.2	10.0	3.1	3.8	4.4	4.9	17	31
	664. 846	○	○	○	.177	.095	1.9	2.7	12.5	3.9	4.8	5.5	6.1	17	31
	664. 886	○	○	○	.197	.122	2.5	3.5	16.0	5.0	6.1	7.0	7.8	17	31
	664. 926	○	○	○	.217	.142	3.1	4.4	20.0	6.2	7.6	8.8	9.8	17	31
	664. 966	○	○	○	.236	.154	3.9	5.5	25.0	7.8	9.5	11.0	12.3	17	31
	665. 046	-	-	○	.315	.193	6.2	8.8	40.0	12.4	15.2	17.6	19.6	17	31
	665. 126	-	-	○	.394	.252	9.8	13.8	63.0	19.5	23.9	27.6	30.9	17	31
120°	664. 727	○	○	○	.118	.063	.98	1.4	6.3	2.0	2.4	2.8	3.1	49	85
	664. 767	○	○	○	.138	.067	1.2	1.8	8.0	2.5	3.0	3.5	3.9	49	85
	664. 807	○	○	○	.158	.079	1.6	2.2	10.0	3.1	3.8	4.4	4.9	49	85
	664. 887	○	○	○	.197	.102	2.5	3.5	16.0	5.0	6.1	7.0	7.8	49	85
	664. 927	○	○	○	.217	.114	3.1	4.4	20.0	6.2	7.6	8.8	9.8	49	85
	664. 967	-	-	○	.236	.126	3.9	5.5	25.0	7.8	9.5	11.0	12.3	49	85
	665 .047	-	-	○	.315	.173	6.2	8.8	40.0	12.4	15.2	17.6	19.6	49	85

Example for ordering:	Type	+	Material no.	=	Ordering no.
	664. 727	+	16	=	664. 727. 16

1) We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 17.

Accessories

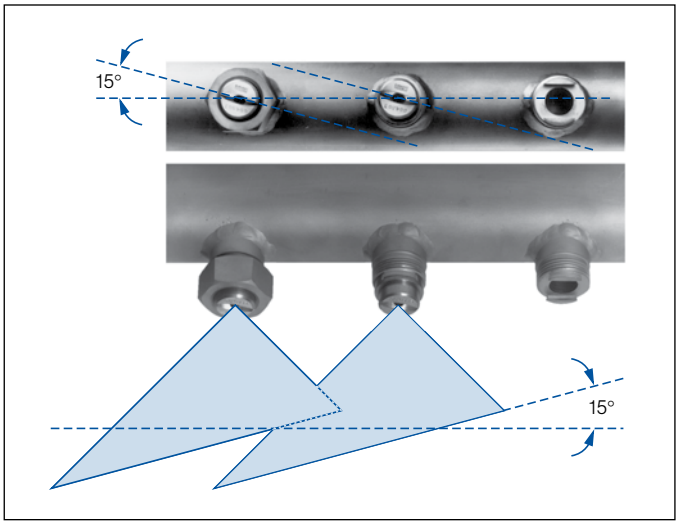


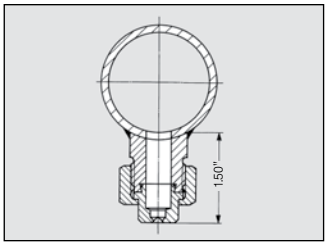
Weight: .14 lb.

Nipple **066. 410. 17** (316 SS)

Weight: .13 lb.

Retaining nut **065. 600. 16** (303 SS)
065. 600. 17 (316 SS)
065. 600. 30 (Brass)





Standard accessories, alignment, and installation for the Series 664 dovetail nozzle tip

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page 14 for symbol definitions.)

Flat fan nozzle tips

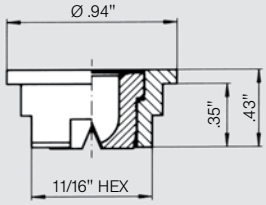
Series 656 / 657

Easy nozzle changing, simple jet alignment. Uniform, parabolic distribution of liquid. Increased non-clogging features, more jet power, less fog. Assembles with 3/4" retaining nut.

Applications:
- Cleaning installations
- Gravel washing
- Cooling headers
- Spray pipes
- Roll cooling
- Cooling of rolled stock

∢ 20°–75°

∢ 90°–120°



Weight brass: .05 lb.

Spray angle ∢	Ordering no. Type	Material no. 303 SS 16	316 SS 17[1]	Brass 30	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Coverage @ 30 psi H=10"	H=20"
20°	656. 721	○	○	○	.118	.099	.98	1.4	6.3	2.0	2.4	2.8	3.1	4	8
	656. 801	○	○	○	.158	.126	1.6	2.2	10.0	3.1	3.8	4.4	4.9	4	8
	656. 881	○	○	○	.197	.158	2.5	3.5	16.0	5.0	6.1	7.0	7.8	4	8
	656. 921	○	○	○	.217	.173	3.1	4.4	20	6.2	7.6	8.8	9.8	4	8
	656. 961	○	○	○	.236	.209	3.9	5.5	25	7.8	9.5	11.0	12.3	4	8
30°	656. 722	○	○	○	.118	.095	.98	1.4	6.3	2.0	2.4	2.8	3.1	6	11
	656. 762	○	○	○	.138	.106	1.2	1.8	8.0	2.5	3.0	3.5	3.9	6	11
	656. 802	○	○	○	.158	.122	1.6	2.2	10.0	3.1	3.8	4.4	4.9	6	11
	656. 882	○	○	○	.197	.158	2.5	3.5	16.0	5.0	6.1	7.0	7.8	6	11
	656. 922	○	○	○	.217	.173	3.1	4.4	20	6.2	7.6	8.8	9.8	6	11
	656. 962	○	-	○	.236	.197	3.9	5.5	25	7.8	9.5	11.0	12.3	6	11
45°	656. 723	○	○	○	.118	.095	.98	1.4	6.3	2.0	2.4	2.8	3.1	11	20
	656. 763	○	○	○	.138	.102	1.2	1.8	8.0	2.5	3.0	3.5	3.9	11	20
	656. 803	○	○	○	.158	.118	1.6	2.2	10.0	3.1	3.8	4.4	4.9	11	20
	656. 843	○	○	○	.177	.134	1.9	2.7	12.5	3.9	4.8	5.5	6.1	11	20
	656. 883	○	○	○	.197	.150	2.5	3.5	16.0	5.0	6.1	7.0	7.8	11	20
	656. 923	○	○	○	.217	.165	3.1	4.4	20	6.2	7.6	8.8	9.8	11	20
	656. 963	○	○	○	.236	.173	3.9	5.5	25	7.8	9.5	11.0	12.3	11	20
60°	656. 724	○	○	○	.118	.083	.98	1.4	6.3	2.0	2.4	2.8	3.1	13	23
	656. 764	○	○	○	.138	.091	1.2	1.8	8.0	2.5	3.0	3.5	3.9	13	23
	656. 804	○	○	○	.158	.102	1.6	2.2	10.0	3.1	3.8	4.4	4.9	13	23
	656. 844	○	○	○	.177	.118	1.9	2.7	12.5	3.9	4.8	5.5	6.1	13	23
	656. 884	○	○	○	.197	.134	2.5	3.5	16.0	5.0	6.1	7.0	7.8	13	23
	656. 924	○	○	○	.217	.162	3.1	4.4	20	6.2	7.6	8.8	9.8	13	23
	656. 964	○	○	○	.236	.165	3.9	5.5	25	7.8	9.5	11.0	12.3	13	23
	657. 044	-	○	○	.315	.217	6.2	8.8	40	12.4	15.2	17.6	19.6	13	23

Example for ordering:	Type	+	Material no.	=	Ordering no.
	656. 721	+	16	=	656. 721. 16

Continued on next page.

1) We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 17.

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page V2 for symbol definitions.)

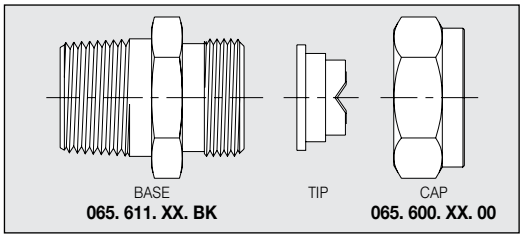
Flat fan nozzle tips

Series 656 / 657

Spray angle	Ordering no. Type	Material no. 303 SS 16	316 SS 17[1]	Brass 30	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Coverage @ 30 psi H=10"	H=20"
90°	656. 726	○	○	○	.118	.067	.98	1.4	6.3	2.0	2.4	2.8	3.1	17	31
	656. 766	○	○	○	.138	.075	1.2	1.8	8.0	2.5	3.0	3.5	3.9	17	31
	656. 806	○	○	○	.158	.095	1.6	2.2	10.0	3.1	3.8	4.4	4.9	17	31
	656. 846	○	○	○	.177	.095	1.9	2.7	12.5	3.9	4.8	5.5	6.1	17	31
	656. 886	○	○	○	.197	.122	2.5	3.5	16.0	5.0	6.1	7.0	7.8	17	31
	656. 926	○	○	○	.217	.142	3.1	4.4	20	6.2	7.6	8.8	9.8	17	31
	656. 966	○	○	○	.236	.154	3.9	5.5	25	7.8	9.5	11.0	12.3	17	31
	657. 046	-	-	○	.315	.193	6.2	8.8	40	12.4	15.2	17.6	19.6	17	31
120°	656. 727	○	○	○	.118	.063	.98	1.4	6.3	2.0	2.4	2.8	3.1	27	53
	656. 767	○	○	○	.138	.067	1.2	1.8	8.0	2.5	3.0	3.5	3.9	31	63
	656 .807	○	○	○	.158	.079	1.6	2.2	10.0	3.1	3.8	4.4	4.9	29	58
	656. 887	○	○	○	.197	.102	2.5	3.5	16.0	5.0	6.1	7.0	7.8	31	61
	656. 927	○	○	○	.217	.114	3.1	4.4	20	6.2	7.6	8.8	9.8	32	64

Base and Cap for Mounting

Inlet Male NPT	Outlet Male	Part No.	
3/4" BK	3/4" BSPP	065. 611. XX.	**Standard Materials:** 17 316 SS 30 Brass
Cap			
To fit 3/4" BSPP		065. 600. XX. 00	Other materials available. See Accessories beginning on page 127.



Example for ordering:	Type	+	Material no.	=	Ordering no.
	656. 727	+	16	=	656. 727. 16

1) We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 17.

Flat fan

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page 14 for symbol definitions.)

Flat fan nozzle tips

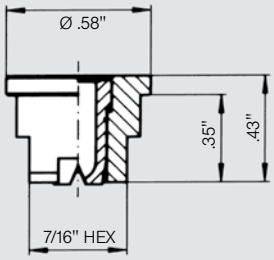
Series 652

Precision standard design axial flat fan nozzle tips. Stable spray angles at a wide range of pressures. Uniform parabolic distribution. Most capacities use Lechler's insert design. For use with nozzle base and cap.

Applications:
- Spray cleaning
- Lubricating
- Board and web rinsing
- Parts washing

∢ 20°–75° ∢ 90°–120° PVDF

Stainless Steel or Brass



Weight brass: .02 lb.

Spray angle ∢	Ordering no. Type	Material no. 303 SS 16	316 SS 17[1]	Brass 30	PVDF 5E	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Coverage @ 30 psi H=10"	H=20"
20°	652. 301	○	○	○	○	.028	.024	.05	.07	.32	.10	.12	.14	.16	3	5
	652. 361	○	○	○	○	.039	.032	.10	.14	.63	.20	.24	.28	.31	3	5
	652. 441	○	○	○	○	.053	.043	.19	.27	1.3	.39	.48	.55	.61	3	5
	652. 481	○	○	○	○	.059	.047	.25	.35	1.6	.50	.61	.70	.78	3	5
	652. 511	-	-	-	○	.065	.055	.29	.42	1.9	.59	.72	.83	.93	3	5
30°	652. 302	○	○	○	○	.024	.020	.05	.07	.32	.10	.12	.14	.16	5	9
	652. 362	○	○	○	○	.039	.028	.10	.14	.63	.20	.24	.28	.31	5	9
	652. 402	○	○	○	○	.047	.035	.16	.22	1.0	.31	.38	.44	.49	5	9
	652. 442	○	○	○	○	.053	.039	.19	.27	1.3	.39	.48	.55	.61	5	9
	652. 482	○	○	○	○	.059	.043	.25	.35	1.6	.50	.61	.70	.78	5	9
	652. 562	○	○	○	○	.079	.059	.39	.55	2.5	.78	.95	1.1	1.2	5	9
	652. 602	○	○	○	-	.087	.067	.49	.69	3.2	.98	1.2	1.4	1.5	5	9
	652 .642	○	○	○	-	.099	.071	.62	.88	4.0	1.2	1.5	1.8	2.0	5	9
	652. 722	○	○	○	-	.118	.095	.98	1.4	6.3	2.0	2.4	2.8	3.1	5	9
	652. 762	○	○	○	-	.138	.106	1.2	1.8	8.0	2.5	3.0	3.5	3.9	5	9
	652. 802	○	○	○	-	.158	.122	1.6	2.2	10.0	3.1	3.8	4.4	4.9	5	9
45°	652. 303	○	○	○	-	.028	.020	.05	.07	.32	.10	.12	.14	.16	7	13
	652. 363	○	○	○	○	.039	.024	.10	.14	.63	.20	.24	.28	.31	7	13
	652. 403	○	○	○	-	.047	.035	.16	.22	1.0	.31	.38	.44	.49	7	13
	652. 443	○	○	○	-	.053	.039	.19	.27	1.3	.39	.48	.55	.61	7	13
	652. 483	○	○	○	○	.059	.043	.25	.35	1.6	.50	.61	.70	.78	7	13
	652. 513	○	○	○	-	.065	.047	.29	.42	1.9	.59	.72	.83	.93	7	13
	652. 563	○	○	○	○	.079	.055	.39	.55	2.5	.78	.95	1.1	1.2	7	13
	652. 603	○	○	○	-	.087	.067	.49	.69	3.2	.98	1.2	1.4	1.5	7	13
	652. 643	○	○	○	○	.099	.071	.62	.88	4.0	1.2	1.5	1.8	2.0	7	14
	652. 723	○	○	○	-	.118	.095	.98	1.4	6.3	2.0	2.4	2.8	3.1	7	14
	652. 763	○	○	○	-	.138	.102	1.2	1.8	8.0	2.5	3.0	3.5	3.9	7	14
	652. 803	○	○	○	-	.158	.118	1.6	2.2	10.0	3.1	3.8	4.4	4.9	8	14
60°	652. 304	○	○	○	○	.028	.016	.05	.07	.32	.10	.12	.14	.16	11	21
	652. 334	○	○	○	○	.035	.020	.07	.10	.45	.14	.17	.20	.22	11	21
	652. 364	○	○	○	○	.039	.024	.10	.14	.63	.20	.24	.28	.31	11	21
	652. 404	○	○	○	○	.047	.032	.16	.22	1.0	.31	.38	.44	.49	11	21
	652. 444	○	○	○	○	.053	.035	.19	.27	1.3	.39	.48	.55	.61	11	21
	652. 484	○	○	○	○	.059	.039	.25	.35	1.6	.50	.61	.70	.78	11	21
	652. 514	○	○	○	○	.065	.043	.29	.42	1.9	.59	.72	.83	.93	11	21
	652. 564	○	○	○	○	.079	.051	.39	.55	2.5	.78	.95	1.1	1.2	11	21
	652. 604	○	○	○	○	.087	.059	.49	.69	3.2	.98	1.2	1.4	1.5	11	20
	652. 644	○	○	○	○	.099	.063	.62	.88	4.0	1.2	1.5	1.8	2.0	11	20
	652. 674	○	○	○	○	.106	.071	.74	1.0	4.8	1.5	1.8	2.1	2.3	11	20
	652. 724	○	○	○	○	.118	.083	.98	1.4	6.3	2.0	2.4	2.8	3.1	11	20
	652. 764	○	○	○	-	.138	.091	1.2	1.8	8.0	2.5	3.0	3.5	3.9	11	20
	652. 804	○	○	○	○	.158	.102	1.6	2.2	10.0	3.1	3.8	4.4	4.9	11	20
	652. 844	○	-	○	○	.177	.118	1.9	2.7	12.5	3.9	4.8	5.5	6.1	11	20
	652. 884	○	-	○	-	.197	.134	2.5	3.5	16.0	5.0	6.1	7.0	7.8	11	20
	652. 944	○	○	○	-	.225	.173	3.5	4.9	22	7.0	8.5	9.8	11.0	11	20

Continued on next page.

Example for ordering:	Type	+	Material no.	=	Ordering no.
	652. 403	+	30	=	652. 403. 30

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

1) We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 17.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

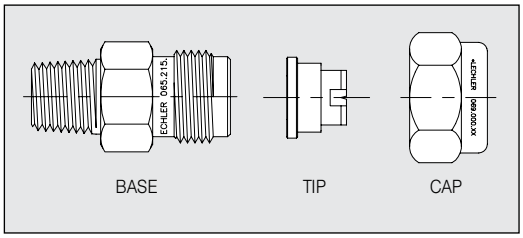
Flat fan nozzle tips

Series 652

Spray angle	Ordering no. Type	Material no. 303 SS 16	316 SS 17[1]	Brass 30	PVDF 5E	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Coverage @ 30 psi H=10"	H=20"
75°	652. 145	○	-	○	-	.008	.005	.008	.011	.05	.016	.019	.022	.025	11	22
	652. 165	○	-	○	-	.008	.003	.011	.015	.07	.022	.027	.031	.034	11	22
	652. 185	○	-	○	-	.008	.006	.012	.018	.08	.025	.030	.035	.039	11	22
	652. 215	○	-	○	-	.016	.008	.017	.024	.11	.034	.042	.048	.054	11	22
	652. 245	○	-	○	-	.020	.012	.025	.035	.16	.05	.06	.07	.08	11	22
	652. 275	○	-	○	-	.024	.012	.034	.05	.22	.07	.08	.10	.11	11	22
90°	652. 216	○	-	○	-	.016	.008	.017	.024	.11	.034	.042	.048	.054	15	30
	652. 276	○	-	○	-	.024	.012	.034	.05	.22	.07	.08	.10	.11	18	31
	652. 306	○	○	○	○	.028	.016	.05	.07	.32	.10	.12	.14	.16	18	31
	652. 336	○	○	○	○	.035	.020	.07	.10	.45	.14	.17	.20	.22	18	31
	652. 366	○	○	○	○	.039	.020	.10	.14	.63	.20	.24	.28	.31	18	31
	652. 406	○	○	○	○	.047	.028	.16	.22	1.0	.31	.38	.44	.49	18	31
	652. 446	○	○	○	○	.053	.032	.19	.27	1.3	.39	.48	.55	.61	18	31
	652. 486	○	○	○	○	.059	.032	.25	.35	1.6	.50	.61	.70	.78	18	31
	652. 516	○	○	○	○	.065	.035	.29	.42	1.9	.59	.72	.83	.93	18	31
	652. 566	○	○	○	○	.079	.043	.39	.55	2.5	.78	.95	1.1	1.2	18	32
	652. 606	○	○	○	○	.087	.047	.49	.69	3.2	.98	1.2	1.4	1.5	18	32
	652. 646	○	○	○	○	.099	.051	.62	.88	4.0	1.2	1.5	1.8	2.0	18	32
	652. 676	○	○	○	○	.106	.055	.74	1.0	4.8	1.5	1.8	2.1	2.3	18	32
	652. 726	○	○	○	○	.118	.067	.98	1.4	6.3	2.0	2.4	2.8	3.1	18	32
	652. 766	○	○	○	-	.138	.075	1.2	1.8	8.0	2.5	3.0	3.5	3.9	18	32
	652. 806	○	○	○	○	.158	.095	1.6	2.2	10.0	3.1	3.8	4.4	4.9	18	32
	652. 846	-	-	○	○	.177	.095	1.9	2.7	12.5	3.9	4.8	5.5	6.1	18	32
	652. 886	○	-	○	○	.197	.122	2.5	3.5	16.0	5.0	6.1	7.0	7.8	18	33
120°	652. 187	○	-	○	-	.014	.008	.012	.018	.08	.025	.030	.035	.039	25	48
	652. 217	○	-	○	-	.016	.008	.017	.024	.11	.034	.042	.048	.054	26	48
	652. 247	○	-	○	-	.020	.008	.025	.035	.16	.05	.06	.07	.08	26	49
	652. 277	○	-	○	-	.024	.012	.034	.05	.22	.07	.08	.10	.11	26	49
	652. 307	○	-	○	○	.028	.012	.05	.07	.32	.10	.12	.14	.16	26	50
	652. 337	○	○	○	○	.035	.016	.07	.10	.45	.14	.17	.20	.22	26	50
	652. 367	○	○	○	○	.039	.020	.10	.14	.63	.20	.24	.28	.31	26	50
	652. 407	○	○	○	○	.047	.024	.16	.22	1.0	.31	.38	.44	.49	26	50
	652. 447	○	○	○	○	.053	.024	.19	.27	1.3	.39	.48	.55	.61	26	50
	652. 487	○	○	○	○	.059	.024	.25	.35	1.6	.50	.61	.70	.78	26	50
	652. 517	○	○	○	○	.065	.035	.29	.42	1.9	.59	.72	.83	.93	26	50
	652. 567	○	○	○	○	.079	.035	.39	.55	2.5	.78	.95	1.1	1.2	26	50
	652. 607	○	○	○	○	.087	.043	.49	.69	3.2	.98	1.2	1.4	1.5	27	51
	652. 647	○	○	○	-	.099	.051	.62	.88	4.0	1.2	1.5	1.8	2.0	27	51
	652. 677	○	○	○	-	.106	.055	.74	1.0	4.8	1.5	1.8	2.1	2.3	27	51
	652. 727	○	○	○	○	.118	.063	.98	1.4	6.3	2.0	2.4	2.8	3.1	27	52
	652. 767	○	○	○	-	.138	.067	1.2	1.8	8.0	2.5	3.0	3.5	3.9	28	52
	652. 807	○	○	○	-	.158	.079	1.6	2.2	10.0	3.1	3.8	4.4	4.9	28	52
	652. 847	-	-	-	○	.177	.091	1.9	2.7	12.5	3.9	4.8	5.5	6.1	31	57
	652. 887	-	-	-	○	.197	.102	2.5	3.5	16.0	5.0	6.1	7.0	7.8	31	57

Bases and Caps for Mounting

Inlet NPT Male	Outlet Male	Part No.	
1/4" 3/8"	11/16 x 16 11/16 x 16	065. 215. XX. 10 065. 211. XX. 10	**Standard Materials:** 17 316 SS
1/4" 3/8"	3/8 BSPP 3/8 BSPP	065. 215. XX. 11 065. 215. XX. 12	30 Brass
Caps			
To fit 11/16x16 To fit 3/8 BSPP		069. 000. XX. 00 065. 200. XX. 00	Other materials available. See Accessories beginning on page 127.



Example for ordering:	Type	+	Material no.	=	Ordering no.
	652. 407	+	30	=	652. 407. 30

1) We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 17.

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

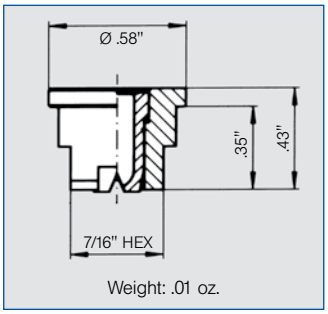
(See page 14 for symbol definitions.)

Flat fan nozzle tips for conveyor lubrication

Series 652. xxx. 8H. 03

Especially low flow rates. Parabolic liquid distribution

Applications:
- Belt lubrication
- Spraying of food products
- Oiling of metal sheets



Weight: .01 oz.

Operating pressure range:
14.5 to 72.5 psi

Recommended operating pressure:
45 psi

Viscosity:
The nozzles can be operated with viscous media, e.g. transmission fluid (max. approx. 200 mPas). However the spray angle decreases.

Return valve with gauze filter:
- Prevents dripping and saves medium
- Size of filter mesh: .003 in. (200 mesh)
- **095.016.53.11.00** Opening pressure: approx. 7 psi Closing pressure: approx. 4 psi
- **095.016.53.14.63** Opening pressure: approx. 40 psi Closing pressure: approx. 23 psi

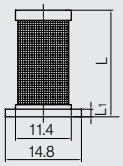
Spray angle	Ordering no. Type	Mat. no. 303 SS 16	POM/303 SS 8H.03*	POM 56.03	Color	Free Passage (in.)	Flow Rate (Gallons Per Minute) 15 psi	liters per minute 2 bar	45 psi	75 psi
75°	652. 145	○	○	○	green	.012	.011	.050	.016	.021
	652. 165	○	○	○	black	.013	.013	.070	.023	.030
	652. 185	○	○	○	red	.008	.016	.080	.026	.034
	652. 215	○	○	○	blue	.008	.021	.110	.036	.050
	652. 245	○	○	○	orange	.012	.032	.160	.050	.070
	652.275	○	○	○	brown	.012	.042	.220	.070	.090
120°	652. 187	○	○	○	grey	.008	.060	.080	.026	.034
	652. 247	○	○	○	black	.008	.120	.160	.050	.070
	652. 277	○	○	○	black	.012	.160	.220	.070	.090

* Housing POM, nozzle insert 303 SS

Pos.	Name	Ordering no.	Material	Dimensions (in.) L	L1	Hex/ Flats	** (in.)
1	Gauze filter with return valve	095. 016. 53. 11. 00	PP	.83	.06	-	.003
		095. 016. 53. 14. 63	PP	.83	.06	-	.003
2	Gasket	065. 240. 55	PTFE	-	-	-	-
		065. 240. 72	EWP 210	-	-	-	-
3	Nozzle	Ordering no. see flow tables	303 SS	11	9	.39	-
			POM/303 SS*	12	10	.32	-
4	Cap nut	065. 200. 16	303 SS	13	10	.32	-
		065. 200. 56	POM	14.5	11.5	.87	-

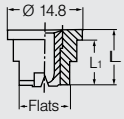
* Housing POM, Nozzle insert 303 SS
** Size of mesh

Position 1
Gauze filter with return valve

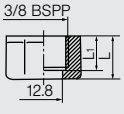


Position 2
Gasket

Position 3
Nozzle



Position 4
Cap nut



Conversion formula for the above series: $V_2 = V \sqrt{\frac{P_2}{P}}$

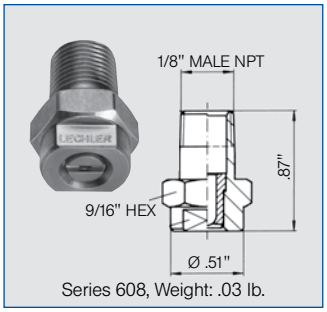
(see page 12 for symbol definitions.)

Flat fan nozzles
High pressure
Series 602 / 608 / 652

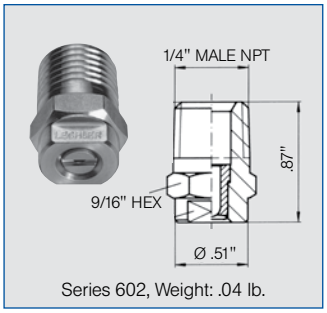
Sharp uniform flat fan for high pressure usage.

Applications:
- High pressure cleaners
- Steam jet cleaners

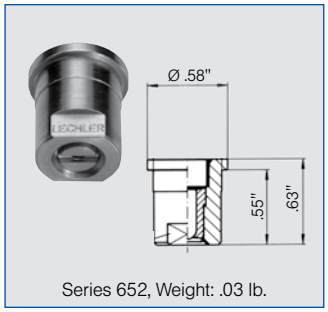
Materials:
Nozzle body: 303 SS
Insert: Hardened stainless steel



Series 608, Weight: .03 lb.



Series 602, Weight: .04 lb.



Series 652, Weight: .03 lb.

Nozzle Code			Flow Rate Code				Equivalent Orifice diam.	Flow Rate (Gallons Per Minute)							
			Spray Angle									liters per minute			
1/8"	1/4"	nut	20°	30°	45°	60°	(in.)	40 psi	600 psi	1000 psi	1500 psi	100 bar	2000 psi	3000 psi	4500 psi
608	**602**	**652**	**361**	**362**	**363**	**364**	.039	.20	.77	.99	1.2	4.5	1.4	1.7	2.1
608	**602**	**652**	**381**	**382**	**383**	**384**	.043	.25	.95	1.2	1.5	5.6	1.7	2.1	2.6
608	**602**	**652**	**401**	**402**	**403**	**404**	.046	.30	1.2	1.5	1.8	6.8	2.1	2.6	3.2
608	**602**	**652**	**411**	**412**	**413**	**414**	.051	.34	1.3	1.7	2.1	7.8	2.4	3.0	3.6
608	**602**	**652**	**451**	**452**	**453**	**454**	.053	.40	1.6	2.0	2.5	9.2	2.8	3.5	4.3
608	**602**	**652**	**471**	**472**	**473**	**474**	.055	.45	1.7	2.3	2.8	10.3	3.2	3.9	4.8
608	**602**	**652**	**481**	**482**	**483**	**484**	.061	.51	2.0	2.5	3.1	11.5	3.6	4.4	5.4
608	**602**	**652**	**501**	**502**	**503**	**504**	.063	.55	2.1	2.8	3.4	12.6	3.9	4.8	5.9
608	**602**	**652**	**521**	**522**	**523**	**524**	.067	.60	2.3	3.0	3.7	13.8	4.3	5.2	6.4
608	**602**	**652**	**531**	**532**	**533**	**534**	.070	.65	2.5	3.3	4.0	14.8	4.6	5.6	6.9
608	**602**	**652**	**541**	**542**	**543**	**544**	.070	.70	2.7	3.5	4.3	15.9	4.9	6.0	7.4
608	**602**	**652**	**551**	**552**	**553**	**554**	.074	.75	2.9	3.7	4.6	17.0	5.3	6.5	7.9
608	**602**	**652**	**571**	**572**	**573**	**574**	.080	.80	3.1	4.0	4.9	18.2	5.6	6.9	8.4
608	**602**	**652**	**591**	**592**	**593**	**594**	.082	.90	3.5	4.5	5.5	21	6.4	7.8	9.6
608	**602**	**652**	**601**	**602**	**603**	**604**	.090	1.0	3.9	5.0	6.1	23	7.1	8.7	10.6
-	**602**	**652**	**641**	**642**	**643**	**644**	.098	1.2	4.8	6.2	7.6	28	8.7	10.7	13.1
-	**602**	**652**	**671**	**672**	**673**	**674**	.106	1.5	5.7	7.4	9.1	34	10.5	12.8	15.7
-	**602**	**652**	**701**	**702**	**703**	**704**	.118	1.7	6.7	8.7	10.6	40	12.3	15.0	18.4
-	**602**	**652**	**-**	**-**	**723**	**724**	.120	2.0	7.8	10.0	12.3	46	14.2	17.3	21
-	**602**	**652**	**-**	**-**	**793**	**-**	.154	2.9	11.4	14.7	18.0	67	21	25	31

Connection Code	Connection	Maximum pressure
A3. 00	Male BSPT	Approx. 5000 psi
A3. 07	Male NPT	Approx. 5000 psi
A3. 29	Retainer cap	Approx. 3000 psi

Example for ordering:	**Nozzle code** **602.**	**+**	**Flow rate code** **361**	**+**	**Connection code** **A3. 07**	**=**	**Ordering no.** **602. 361. A3. 07**
(see bolded column headings above)							**(.99 gpm & 20° spray angle @ 1000 psi; 1/4" Male NPT)**

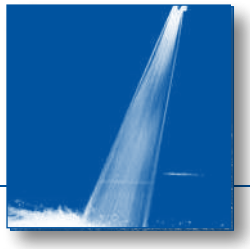
Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page 12 for symbol definitions.)

1-800-777-2926

Flat fan

Flat fan nozzles
Tongue-type impactor deflector
Series 688 / 689

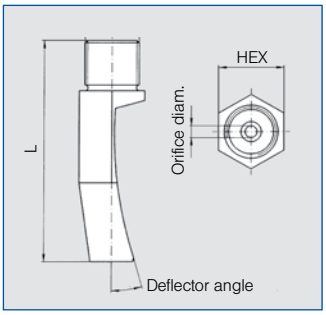


Deflector design provides clog resistance and high impact at low pressures. Even distribution.

Applications:
- Heavy impact washing
- Drum filter cleaning
- Knock-off showers
- Phosphating lines

Series 688, Stainless Steel

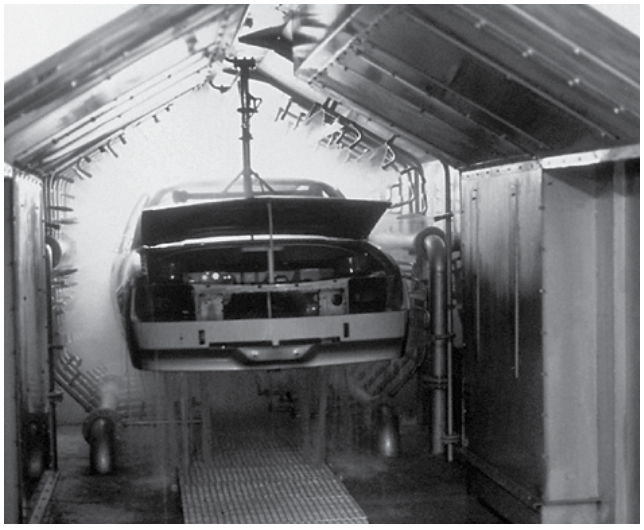
Series 689, PVDF



Spray angle	Deflector angle	Ordering no. Type	Material no. 303 SS 16	Material no. PVDF 5E	Connection Male NPT 3/8"	Connection Male NPT 3/4"	Orifice diam. (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	Dimensions (in.) L	Hex	Weight 303 SS (lb.)	Spray Width B (in.) @ 30 psi H=10"	H=20"
45°	35°	**688. 763**	○	-	**BE**	-	.118	1.2	1.8	8.0	2.1	2.5	3.0	3.5	3.9	1.7	3/4	.25	9	17
	30°	**688. 843**	○	-	**BE**	-	.150	1.9	2.7	12.5	3.4	3.9	4.8	5.5	6.1	2.0	3/4	.29	9	17
	29°	**688. 923**	○	-	**BE**	-	.189	3.1	4.4	20	5.4	6.2	7.6	8.8	9.8	2.3	7/8	.54	9	17
	35°	**689. 003**	○	○	-	**BK**	.236	4.9	6.9	32	8.6	9.8	12.0	13.8	15.5	3.1 3.1*	1-1/4 15/16*	.67 .07*	10	19

* Measurement for PVDF model

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	688. 923	+	**16**	+	**BE**	=	**688. 923. 16. BE**



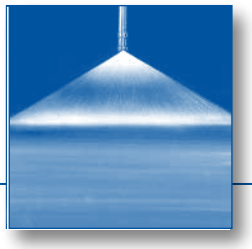
Phosphating line

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

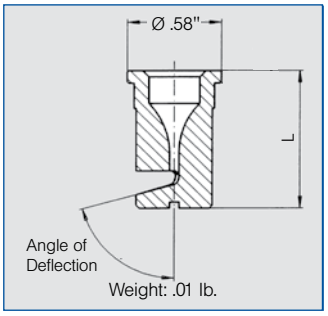
(see page 12 for symbol definitions.)

Flat fan nozzle tips
Tongue-type deflector wide angle
Series 684



Deflector produces moderate impact with a very wide spray angle. Clog resistant. Even distribution. Assembles with 3/8" retaining nut.

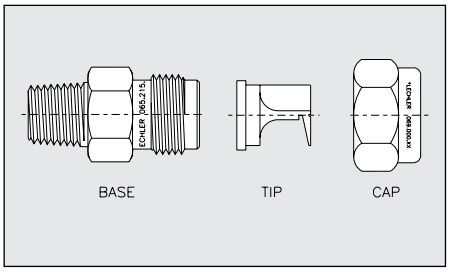
Applications:
- Foam control for storage tanks, wastewater treatment plants
- Dust suppression
- Light washing
- Spray cooling
- Degreasing and phosphating



Spray angle A	Deflector angle	Ordering no. Type	Material no. POM 56	Material no. PVDF 5E	Color for version 56 POM *version 5E PVDF is blue	Orifice diam. (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	Length (L) (in.)	Spray Width B (in.) @ 30 psi H=10"
140°	75°	**684. 348**	○	-	Green	.028	.08	.11	.50	.13	.16	.19	.22	.25	.8	54
		684. 368	○	○	Yellow	.032	.10	.14	.63	.17	.20	.24	.28	.31	.8	54
		684. 408	○	-	Blue	.039	.16	.22	1.0	.27	.31	.38	.44	.49	.8	54
		684. 448	○	-	Red	.047	.19	.27	1.3	.35	.39	.48	.55	.61	.8	54
		684. 488	○	○	Brown	.051	.25	.35	1.6	.43	.50	.61	.70	.78	.8	54
		684. 528	○	-	Grey	.059	.31	.44	2.0	.54	.62	.76	.88	.98	.8	54
		684. 568	○	○	White	.067	.39	.55	2.5	.67	.78	.95	1.1	1.2	.7	54
		684. 608	○	-	Light blue	.075	.49	.69	3.2	.86	.98	1.2	1.4	1.5	.7	54
		684. 688	○	-	Green	.095	.78	1.1	5.0	1.3	1.6	1.9	2.2	2.5	.7	54
		684. 728	○	○	Black*	.106	.98	1.4	6.3	1.7	2.0	2.4	2.8	3.1	.7	54
		684. 808	○	-	Purple	.134	1.6	2.2	10.0	2.7	3.1	3.8	4.4	4.9	.6	54

Bases and Caps for Mounting

Inlet NPT Male	Outlet Male	Part No.	
1/4"	11/16 x 16	065. 215. XX. 10	**Standard Materials:**
3/8"	11/16 x 16	065. 211. XX. 10	17 316 SS
1/4"	3/8 BSPP	065. 215. XX. 11	30 Brass
3/8"	3/8 BSPP	065. 215. XX. 12	
Caps			
To fit 11/16x16		069. 000. XX. 00	Other materials available. See Accessories beginning on page 127.
To fit 3/8 BSPP		065. 200. XX. 00	



Deflector tip nozzle with split eyelet connector. See pages 130, 133, 137.

Example for ordering:	Type	+	Material no.	=	Ordering no.
	684. 608	+	56	=	684. 608. 56

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

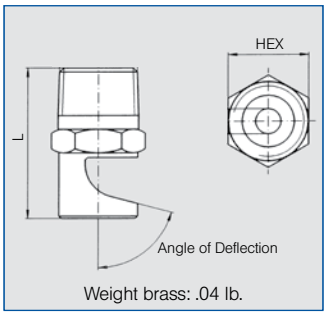
Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page 12 for symbol definitions.)

Flat fan nozzles
Tongue-type deflector wide angle
Series 686

Deflector produces moderate impact with a very wide spray angle. Clog resistant. Even distribution.

Applications:
- Foam control for storage tanks, wastewater treatment plants
- Dust suppression
- Light washing
- Spray cooling
- Degreasing and phosphating



Weight brass: .04 lb.

Dimensions (in.)			
Inlet (NPT)	L	HEX	Wt. (lb.)
1/8	.91	7/16	.03
1/4	1.10	9/16	.06
3/8	1.26	11/16	.09
1/2	1.58	7/8	.20

Spray angle	Deflector angle	Ordering no. Type	Material no. 316 SS 17	Brass 30	PVDF 5E	Connection Male NPT 1/8"	1/4"	3/8"	1/2"	Orifice diam. (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	Spray Width B (in.) @ 30 psi H=10"
90°	53°	**686. 366**	-	○	-	**BA**	-	-	-	.031	.10	.14	.63	.17	.20	.24	.28	.31	20
	75°	**686. 406**	-	○	-	**BA**	-	-	-	.039	.16	.22	1.0	.27	.31	.38	.44	.49	21
	40°	**686. 686**	-	○	-	-	**BC**	-	-	.094	.78	1.1	5.0	1.3	1.6	1.9	2.2	2.5	21
	40°	**686. 726**	-	○	-	**BA**	-	-	-	.106	.98	1.4	6.3	1.7	2.0	2.4	2.8	3.1	21
	40°	**686. 806**	-	○	-	-	**BC**	-	-	.133	1.6	2.2	10.0	2.7	3.1	3.8	4.4	4.9	21
	40°	**686. 886**	○	-	-	-	**BC**	-	-	.165	2.5	3.5	16.0	4.3	5.0	6.1	7.0	7.8	21
	40°	**686. 926**	○	-	-	-	-	**BE**	-	.185	3.1	4.4	20	5.4	6.2	7.6	8.8	9.8	21
140°	75°	**686. 368**	○	○	-	**BA**	-	-	-	.032	.10	.14	.63	.17	.20	.24	.28	.31	54
		686. 408	○	○	-	**BA**	-	-	-	.039	.16	.22	1.0	.27	.31	.38	.44	.49	54
		686. 448	○	○	-	**BA**	**BC**	-	-	.047	.19	.27	1.3	.35	.39	.48	.55	.61	54
		686. 488	○	○	-	**BA**	**BC**	-	-	.051	.25	.35	1.6	.43	.50	.61	.70	.78	54
		686. 528	○	○	-	**BA**	**BC**	-	-	.059	.31	.44	2.0	.54	.62	.76	.88	.98	54
		686. 568	○	○	○	**BA**	**BC***	-	-	.067	.39	.55	2.5	.67	.78	.95	1.1	1.2	54
		686. 608	○	○	-	**BA**	**BC**	-	-	.075	.49	.69	3.2	.86	.98	1.2	1.4	1.5	54
		686. 648	○	○	-	-	**BC**	-	-	.087	.62	.88	4.0	1.1	1.2	1.5	1.8	2.0	54
		686. 688	○	○	-	**BA**	**BC**	-	-	.095	.78	1.1	5.0	1.4	1.6	1.9	2.2	2.5	54
		686. 728	-	○	-	**BA**	**BC**	-	-	.106	.98	1.4	6.3	1.7	2.0	2.4	2.8	3.1	54
		686. 768	○	○	-	**BA***	**BC**	-	-	.118	1.2	1.8	8.0	2.2	2.5	3.0	3.5	3.9	54
		686. 808	○	○	-	**BA**	**BC**	-	-	.134	1.6	2.2	10.0	2.7	3.1	3.8	4.4	4.9	54
		686. 828	○	○	-	**BA**	**BC**	-	-	.142	1.7	2.5	11.2	3.0	3.5	4.3	4.9	5.5	54
		686. 848	○	○	-	**BA***	**BC**	-	-	150	1.9	2.7	12.5	3.4	3.9	4.8	5.5	6.1	54
		686. 868	○	○	-	-	**BC**	-	-	.158	2.2	3.1	14.0	3.8	4.3	5.3	6.1	6.9	54
		686. 888	○	○	-	-	**BC**	-	-	165	2.5	3.5	16.0	4.3	5.0	6.1	7.0	7.8	54
		686. 908	○	○	-	-	**BC**	-	-	.177	2.8	3.9	18.0	4.8	5.6	6.8	7.9	8.8	54
		686. 928	○	-	-	-	-	**BE**	-	.185	3.1	4.4	20	5.4	6.2	7.6	8.8	9.8	54
		686. 968	○	○	-	-	-	**BE**	**BG**	.209	3.9	5.5	25	6.7	7.8	9.5	11.0	12.3	54
		686. 988	○	○	-	-	-	**BE**	**BG**	.221	4.3	6.1	28	7.5	8.7	10.6	12.3	13.7	54

* Only available in 316 SS (material no. 17)

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	686. 908	+	**17**	+	**BC**	=	**686. 908. 17. BC**

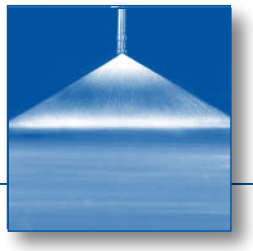
A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

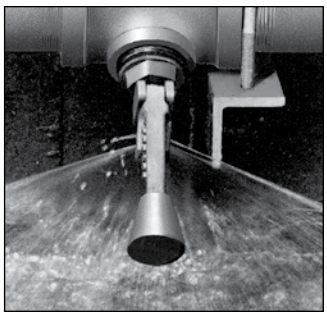
(see page 12 for symbol definitions.)

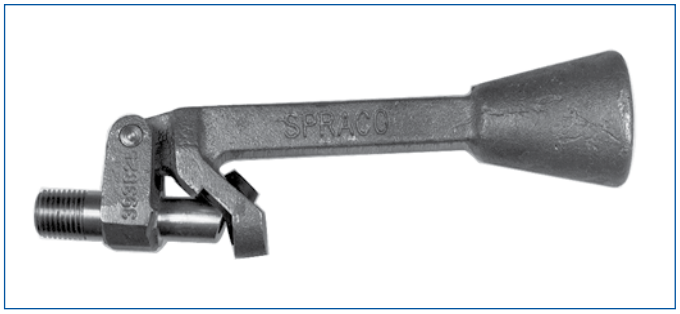
Easy Flush foam control nozzles

Series 564



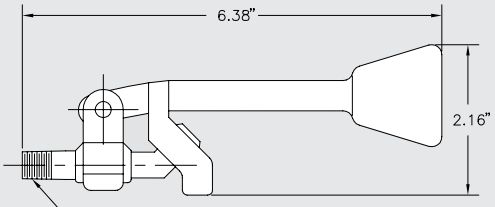
Designed to control foam within aeration tanks in waste treatment plants, the Easy Flush nozzle has a unique orifice configuration which produces an efficient flat fan spray. The Easy Flush nozzle also utilizes a Buna N deflector insert for quick removal upon wear, without complete nozzle replacement.





Easy Flush nozzles feature larger free passage than conventional flood type nozzles which limits clogging. They utilize low pressure liquid flow, for reduced pumping costs. In the event of a clog, simply lift the counterweight to flush the nozzle clean.

Select the Easy Flush nozzle size that provides maximum coverage at the lowest possible pressure and flow rate. Typical installation uses .3 to .4 GPM per foot of coverage, with nozzles mounted on 3 to 5 foot centers.



Weight: 1.25 lb.

Spray angle	Ordering no. Connection: 1/4" NPT	Stamp	Flow and Coverage Data (Gallons Per Minute) Pressure psi	Flow rate gpm	Width of spray coverage at elevation of nozzle above water line 12"	18"	24"	30"	36"
90°	564. 846. 32. BC	1	3	1.1	22"	30"	39"	46"	54"
			5	1.4	25"	35"	44"	53"	62"
			7	1.7	27"	38"	48"	58"	68"
			10	2.0	29"	43"	53"	64"	73"
120°	564. 847. 32. BC	2	3	1.1	34"	45"	56"	66"	75"
			5	1.4	36"	49"	62"	72"	82"
			7	1.7	40"	54"	67"	79"	90"
			10	2.0	44"	60"	73"	86"	–
140°	564. 848. 32. BC	3	3	1.1	41"	57"	72"	85"	–
			5	1.4	50"	66"	82"	–	–
			7	1.7	56"	74"	92"	–	–
			10	2.0	65"	84"	–	–	–
90°	564. 916. 32. BC	4	3	1.7	23"	31"	39"	47"	56"
			5	2.1	27"	36"	45"	54"	63"
			7	2.5	29"	39"	50"	60"	70"
			10	2.9	31"	42"	54"	65"	76"
120°	564. 917. 32. BC	5	3	1.7	38"	49"	60"	70"	81"
			5	2.1	43"	57"	69"	81"	93"
			7	2.5	48"	64"	79"	93"	–
			10	2.9	56"	71"	86"	100"	–
140°	564. 918. 32. BC	6	3	1.7	50"	62"	74"	86"	–
			5	2.1	60"	73"	87"	–	–
			7	2.5	65"	78"	92"	–	–
			10	2.9	–	–	–	–	–
90°	564. 946. 32. BC	7	3	2.1	24"	33"	41"	50"	58"
			5	2.6	27"	37"	48"	58"	68"
			7	3.0	29"	40"	52"	63"	73"
			10	3.5	32"	44"	57"	69"	80"
120°	564. 947. 32. BC	8	3	2.1	45"	60"	76"	90"	–
			5	2..6	50"	66"	84"	98"	–
			7	3.0	54"	71"	90"	–	–
			10	3.5	59"	78"	100"	–	–
140°	564. 948. 32. BC	9	3	2.1	54"	67"	80"	–	–
			5	2.6	62"	75"	88"	–	–
			7	3.0	–	–	–	–	–
			10	3.5	–	–	–	–	–

Material: Stainless Steel

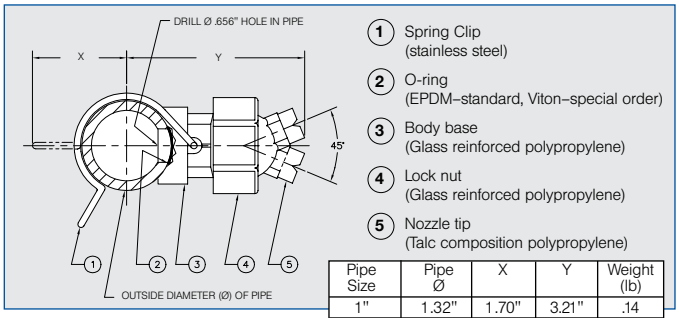
Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page 124 for symbol definitions.)

Flat fan nozzles
Easy Clip ball joint nozzle assembly
Series 676

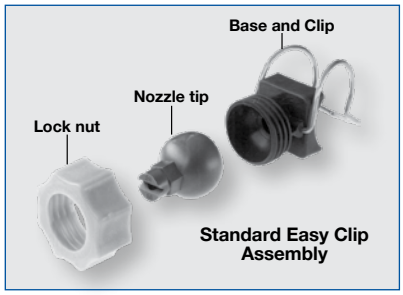
Excellent for quick and easy header construction. These spring mounting bases allow flexible nozzle alignment and a wide range of angles and flow rates. Drill .656" hole in the pipe for mounting. Assembly clamps to pipe. Nozzle ball tip adjusts as needed. No welding or threading. Maximum pressure 60 psi.

Applications:
- Parts washing and degreasing
- Phosphating lines
- Pre-painting processing



1. Spring Clip (stainless steel)
2. O-ring (EPDM–standard, Viton–special order)
3. Body base (Glass reinforced polypropylene)
4. Lock nut (Glass reinforced polypropylene)
5. Nozzle tip (Talc composition polypropylene)

Pipe Size	Pipe Ø	X	Y	Weight (lb)
1"	1.32"	1.70"	3.21"	.14
1 1/4"	1.66"	1.89"	3.41"	.15
1 1/2"	1.90"	2.02"	3.50"	.15
2"	2.38"	2.25"	3.74"	.17



Easy Clip complete nozzle assembly

Spray angle	Ordering no. Type	Mat. no. PP 53	To Mount on Pipe size 1"	1 1/4"	1 1/2"	2"	Flow Rate (Gallons Per Minute) 10 psi	20 psi	40 psi	60 psi	80 psi	Color	Item 5 (see top chart) Replacement Nozzle Tip Ordering no.
60°	**676. 724**	○	30	31	32	33	.98	1.4	2	2.4	2.8	Gray	**676. 724. 53. 30. 01**
	676. 764	○	30	31	32	33	1.2	1.8	2.5	3	3.5	Brown	**676. 764. 53. 30. 01**
	676. 804	○	30	31	32	33	1.6	2.2	3.1	3.8	4.4	Purple	**676. 804. 53. 30. 01**
	676. 844	○	30	31	32	33	1.9	2.7	3.9	4.8	5.5	Yellow	**676. 844. 53. 30. 01**
	676. 884	○	30	31	32	33	2.5	3.5	5	6.1	7	Red	**676. 884. 53. 30. 01**
	676. 904	○	30	31	32	33	2.8	4.0	5.7	6.9	8.0	Blue	**676. 904. 53. 30. 01**
	676. 924	○	30	31	32	33	3.1	4.4	6.2	7.6	8.8	Green	**676. 924. 53. 30. 01**

Replacement parts

Item no. (see top chart)	Type	Ordering no.	For Pipe Size
1 and 3	**Base and Clip**	**092. 080. 53. 00. 00**	1"
		092. 081. 53. 00. 00	1 1/4"
		092. 082. 53. 00. 00	1 1/2"
		092. 083. 53. 00. 00	2"
4	**Lock nut**	**092. 080. 53. 00. 02**	
2	**O-ring**	**092. 015. 6C. 04. 32**	

Example for ordering:	Type	+	Material no.	+	Pipe Size	=	Ordering no.	
	676. 884	+	53	+	32	=	676. 884. 53. 32	(Nozzle assembly to mount on 1 1/2" pipe)

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

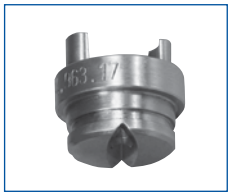
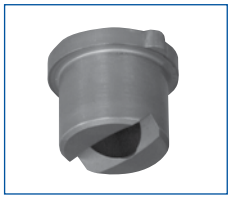
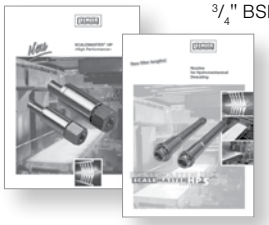
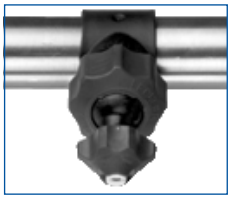
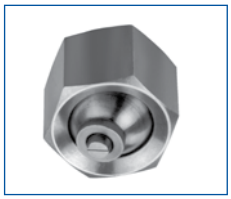
Additional flat fan nozzles available from Lechler

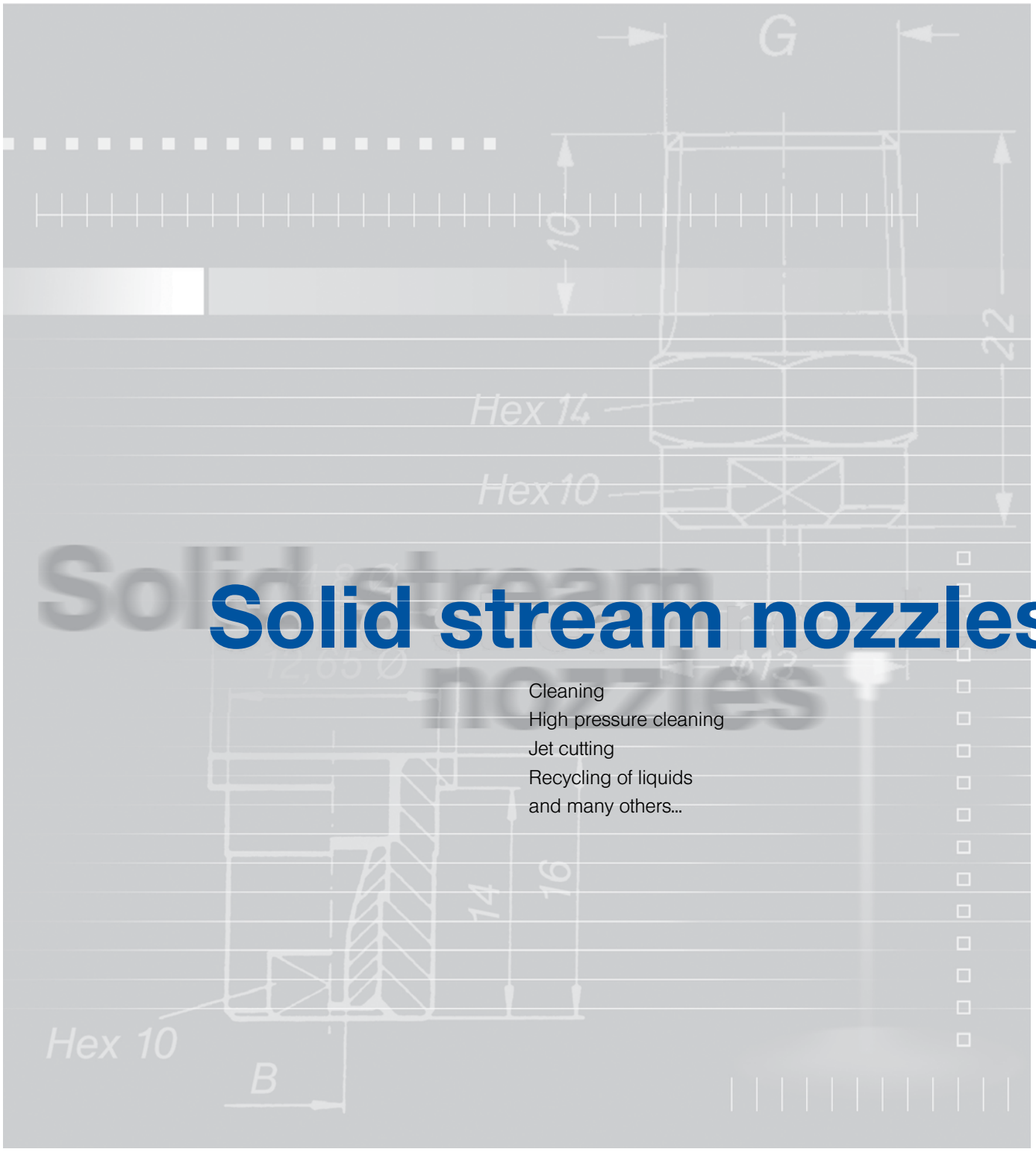
Lechler offers several other flat fan nozzles besides those in this catalog which may be appropriate for your application. If a nozzle in the series below is specified for a job of yours or you would just like more information about any of these products, please contact Lechler.

Low-pressure nozzles	Nozzle Series	Spray angles	Flow range (gpm @ 30psi)	Connection	Application/ Design
	**610**	20° 30° 45° 60° 75° 90° 120°	0.01 – 1.06	$^{1}/_{8}$" Male BSPP	Cleaning installations, cooling headers, spray pipes. **Compact design, suited for narrow installation conditions.**
	**612**	20° 30° 45° 60° 75° 90° 120°	0.01 – 4.23	$^{1}/_{4}$" Male BSPP	Cleaning installations, cooling headers, spray pipes. **Compact design, suited for narrow installation conditions.**
	**616** **617**	20° 30° 45° 60° 90° 120°	1.66 – 16.6	$^{3}/_{4}$" Male BSPP	Cleaning installations, rain curtains, gravel washing, spray pipes, foam spraying, roll cooling, cooling of rolled stock. **Compact design, suited for narrow installation conditions.**
	**612.xxx.5E.03**	90° 120°	0.17 – 1.06	For pressing into pipe	Cleaning and rinsing operations, dish washing machines. **For pressing into pipes.**
	**669**	20° 30° 45° 60°	10.5 – 42	Tip	Cooling. **Self-aligning dovetail connection ensures correct spray offset.**
	**672 cleaning**	15° 25° 40° 50° 80° 110°	0.62 – 12.2	Tip	Cooling, lubricating. **Socket alignment flats.**

Continued on next page.

Additional flat fan nozzles available from Lechler

Low-pressure nozzles	Nozzle Series	Spray angles	Flow range (gpm @ 30psi)	Connection	Application/ **Design**
	**6F**	20° 30° 45° 60°	1.6 – 26	Tip	Cooling. **Automatic self-aligning feature ensures correct spray offset angle.**
	**6E**	20° 30° 45° 60°	1.6 – 26	Tip	Cooling. **No welding nipple is required because the tip geometry can be machined directly into a header.**
	**Descaling nozzles SCALEMASTER®** The standard in descaling technology		¾" BSPP	Descaling. **Please ask for our brochures "Scalemaster HP" and "Nozzles for Hydromechanical Descaling"**	
	**646**	20° 30° 45° 60° 90° 120°	0.08 – 0.83	Assembly with bayonet quick release system	Belt cleaning, surface treatment, cleaning, coating processes. **Quick and easy assembly, adjusted spray direction.**
	**676 / 677 MEMO-SPRAY®**	30° 60° 90° 120°	1.06 – 13.2 	¾" BSPP Assembly with clamp for the following sizes: ¼", 1¼", 1½", 2" **Please ask for our brochure "Surface Technology"**	Cleaning problems, phosphating, degreasing, rinsing in surface treatment techniques. Ball joint, multi-directional swivelling range of 20°. Simple, quick assembly. **Easy adjusting and cleaning.** **Retains orientation upon replacement.**
	**676**	20° 30° 45° 60° 75° 90° 120°	0.01 – 2.64	⅜" Female BSPP Weld base	Cleaning, cooling, and lubricating processes. **Swivelling nozzle to meet exact jet alignment requirements. Multi-directional swivelling range of 30°.**



Solid stream nozzles

Cleaning
High pressure cleaning
Jet cutting
Recycling of liquids
and many others...

1-800-777-2926

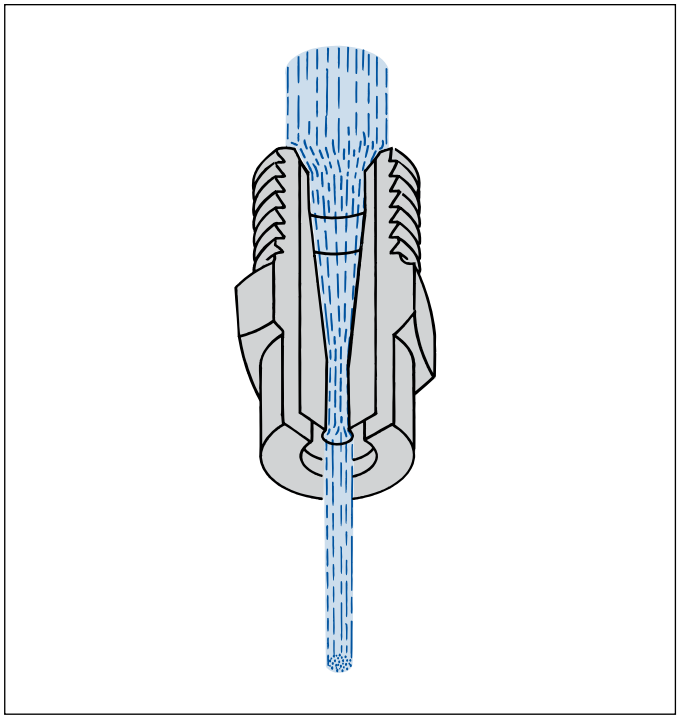
Solid stream nozzles

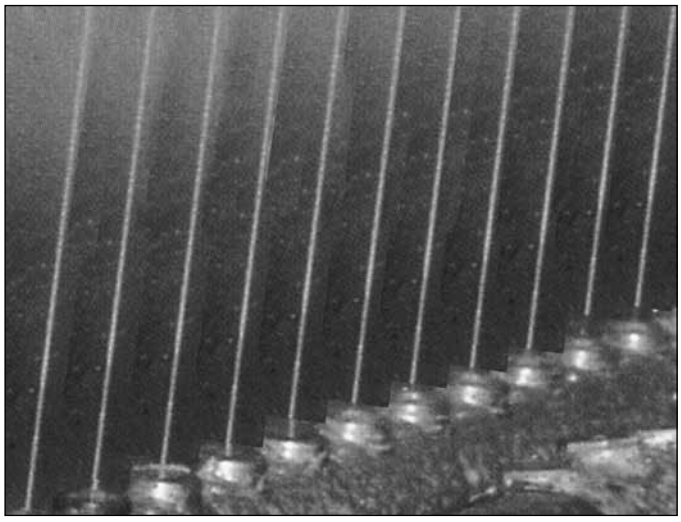
Thanks to optimum flow geometries, Lechler solid stream nozzles produce compact, solid stream jets of defined lengths. The almost turbulence-free liquid inflow results in excellent spray efficiency, even without jet stabilizer inserts.

Solid stream nozzles provide the greatest impact per square inch of any other type of nozzle, all other factors being equal (such as flow rate, pressure, and spray distance). A solid stream nozzle is considered a 0° flat fan nozzle, and a flat fan nozzle's impact per square inch increases as the spray angle decreases. That is why a 0° nozzle (i.e., a solid stream nozzle) provides the greatest impact.

So for all cleaning processes, cutting operations, and applications requiring perfect columnar impacts in order to generate concentrated jet power, the precision and power of Lechler solid stream nozzles enhance the productivity and performance of your plant.

For applications requiring high pressure, Lechler has a comprehensive range of solid stream nozzles in stainless steel with special hardening. **Lechler high pressure solid stream nozzles** create tight, stable, and powerful solid jets which do not break apart even when operating at high pressures.





Solid stream header in use at a paper mill

Solid stream

Solid stream nozzles

Series 544

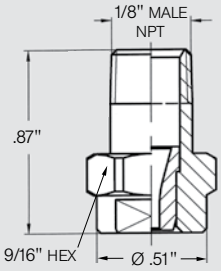
Solid stream with excellent stability offers the highest impact. Orifice design maintains integrity over long distances.

Applications:
- Concentrated cleaning
- Paper trimming

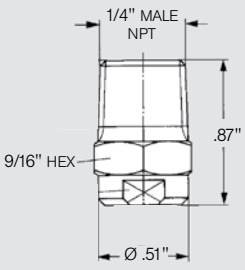
Series 544.110 – 544.400

Series 544.480 – 544.800

Series 544.480 – 544.800



Weight brass: .03 lb.



Weight brass: .04 lb.

Ordering no. Type	Mat. no. 303 SS 16	Mat. no. Brass 30	Connection Male NPT 1/8" BA	Connection Male NPT 1/4" BC	Orifice diam. (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	150 psi
544. 110	○	○	**BA**	**BC**	.009	.006	.009	.04	.012	.015	.018	.020	.023
544. 160	○	-	**BA**	**BC**	.013	.009	.013	.06	.019	.023	.026	.029	.034
544. 200	○	○	**BA**	**BC**	.015	.016	.022	.10	.031	.038	.044	.049	.058
544. 240	○	-	**BA**	**BC**	.020	.025	.035	.16	.05	.06	.07	.08	.10
544. 280	○	-	**BA**	**BC**	.025	.04	.05	.25	.08	.10	.11	.12	.15
544. 320	○	○	**BA**	**BC**	.031	.06	.09	.40	.12	.15	.18	.20	.24
544. 360	○	○	**BA**	**BC**	.033	.10	.14	.63	.20	.24	.28	.31	.37
544. 400	○	○	**BA**	**BC**	.041	.16	.22	1.0	.31	.38	.44	.49	.59
544. 480	○	○	**BA**	**BC**	.052	.25	.35	1.6	.50	.61	.70	.78	.95
544. 560	○	○	**BA**	**BC**	.065	.39	.55	2.5	.78	.95	1.1	1.2	1.5
544. 640	○	○	**BA**	**BC**	.082	.62	.88	4.0	1.2	1.5	1.8	2.0	2.4
544. 720	○	○	**BA**	**BC**	.105	.98	1.4	6.3	2.0	2.4	2.8	3.1	3.7
544. 800	○	○	**BA**	**BC**	.130	1.6	2.2	10.0	3.1	3.8	4.4	4.9	5.9

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	544. 720	+	**30**	+	**BC**	=	**544. 720. 30. BC**

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P}}$

(See page 12 for symbol definitions.)

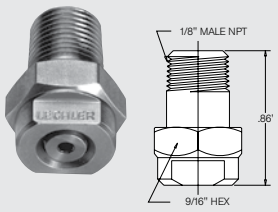
1-800-777-2926

Solid stream nozzles
High pressure
Series 546 / 548 / 550

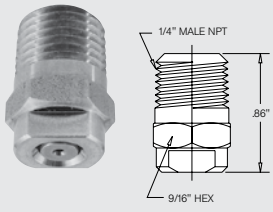
Exceptionally tight solid stream nozzles for pressures up to 4500 psi. Available in 1/8" NPT or BSPT, 1/4" NPT or BSPT, or tip version.

Applications:
- High pressure cleaning
- Trimming
- Jet cutting

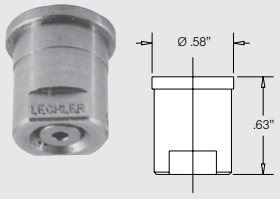
Materials:
Nozzle body: 303 SS
Insert: Hardened stainless steel



Series 550, Weight: .03 lb.



Series 546, Weight: .04 lb.



Series 548, Weight: .03 lb.

Nozzle Code			Flow Rate Code	Orifice diam.	Flow Rate (Gallons Per Minute)								
									liters per minute				
1/8" Male NPT or BSPT	1/4" Male NPT or BSPT	Tip		(in.)	300 psi	450 psi	725 psi	1000 psi	100 bar	1500 psi	2000 psi	3000 psi	4500 psi
550	**546**	**548**	**360**	.033	.54	.67	.84	.99	4.5	1.2	1.4	1.7	2.1
550	**546**	**548**	**400**	.041	.82	1.0	1.3	1.5	6.8	1.8	2.1	2.6	3.2
550	**546**	**548**	**410**	.042	.90	1.1	1.4	1.6	7.5	2.0	2.3	2.8	3.5
550	**546**	**548**	**420**	.044	.96	1.2	1.5	1.8	8.0	2.1	2.5	3.0	3.7
550	**546**	**548**	**450**	.047	1.1	1.3	1.7	2.0	9.2	2.5	2.8	3.5	4.3
550	**546**	**548**	**470**	.050	1.2	1.5	1.9	2.3	10.3	2.8	3.2	3.9	4.8
550	**546**	**548**	**480**	.052	1.4	1.7	2.2	2.5	11.5	3.1	3.6	4.4	5.4
550	**546**	**548**	**500**	.055	1.5	1.9	2.4	2.8	12.6	3.4	3.9	4.8	5.9
550	**546**	**548**	**520**	.058	1.7	2.0	2.6	3.0	13.8	3.7	4.3	5.2	6.4
550	**546**	**548**	**570**	.067	2.2	2.7	3.4	4.0	18.2	4.9	5.6	6.9	8.4
550	**546**	**548**	**600**	.074	2.7	3.3	4.2	5.0	23	6.1	7.0	8.6	10.5
550	**546**	**548**	**670**	.091	4.1	5.0	6.4	7.5	34	9.2	10.6	13.0	15.9
550	**546**	**548**	**720**	.105	5.5	6.7	8.5	10.0	46	12.3	14.2	17.3	21

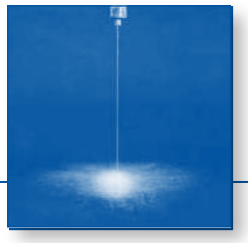
Connection Code	Connection	Maximum pressure
A3. 00	Male BSPT	Approx. 5000 psi
A3. 07	Male NPT	Approx. 5000 psi
A3. 29	Retainer cap	Approx. 3000 psi

Example for ordering: (see bolded column headings above)
Nozzle code 550. + Flow rate code 360. + Connection code A3. 07 = Ordering no. 550. 360. A3. 07
(.99 gpm & 0° spray angle @ 1000 psi; 1/8" Male NPT)

Conversion formula for the above series: $V_2 = V_1 \sqrt{P_2}$
(See page 121 for conversion definitions.)

Solid stream

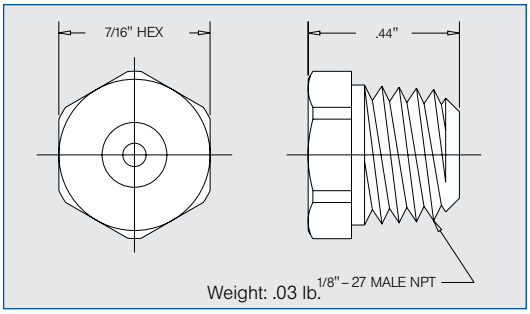
Solid stream nozzles
High pressure
Series 599



For tight clearance installation, these small nozzles create a very precise, collimated stream at a wide range of pressures. The rear orifice position helps minimize clogging and facilitates cleaning.

Applications:
- Paper production
- High pressure cleaning

Material:
316 SS



Ordering no.	Orifice Diameter
599. 040. 17. 00. 15	.015" (0.38 mm)
599. 040. 17. 00. 25	.025" (0.64 mm)
599. 040. 17. 00. 31	.031" (0.79 mm)
599. 040. 17. 00. 40	.040" (1.0 mm)

Solid stream nozzles
Trimming
Series 599

Second only to a diamond in wear resistance, the ruby orifice offers amazing precision, performance consistency and long operational-life.

Applications:
- Paper production
- Trimming
- High pressure cleaning
- Jet cuttings

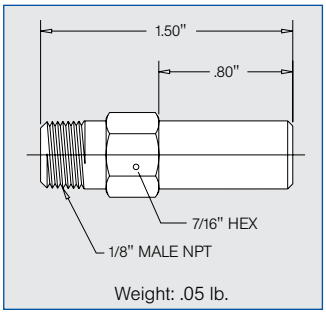
If you're tired of poor trims, replacing worn nozzles, and sheet breaks, it's time to move up to Lechler's ruby orifice trimming nozzles. It's another step in Lechler's 130 year tradition of innovation and technological development.

Materials:
Nozzle body: Brass housing
Orifice: Ruby
Strainer: 316 SS

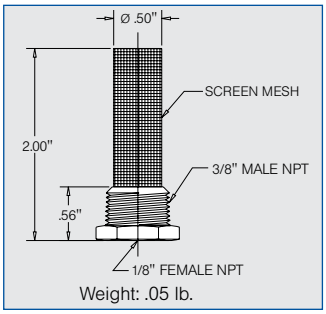
Series 599

Screen 099

The ruby orifice produces a tightly collimated solid stream for precise, predictable cutting action. The optional strainer offers a convenient way to protect against clogging caused by stray fibers or loose bits of debris in your liquid supply.



Weight: .05 lb.



Weight: .05 lb.

The ruby orifice is permanently mounted in a brass housing. The optional strainer is 316 stainless steel.

Ordering no.	Orifice diam. (in.)	Flow Rate (Gallons Per Minute) 100 psi	200 psi	300 psi	400 psi	500 psi	600 psi	800 psi	1000 psi
599. 128. 8J. BA. 15	.015	.05	.07	.09	.10	.11	.12	.14	.16
599. 128. 8J. BA. 20	.020	.09	.13	.16	.18	.20	.22	.25	.28
599. 128. 8J. BA. 25	.025	.14	.20	.24	.28	.31	.34	.40	.44
599. 128. 8J. BA. 30	.030	.20	.28	.35	.40	.45	.49	.57	.63
599. 128. 8J. BA. 35	.035	.28	.40	.48	.56	.63	.69	.79	.89
599. 128. 8J. BA. 40	.040	.36	.51	.62	.72	.80	.88	1.02	1.14
599. 128. 8J. BA. 45	.045	.45	.64	.78	.90	1.01	1.10	1.27	1.42
599. 128. 8J. BA. 50	.050	.55	.78	.95	1.10	1.23	1.35	1.56	1.74

Series 599 with Screen 099 assembled

Ordering no. Screen	Mesh size
099. 104. 17. BE. 05	50
099. 104. 17. BE. 10	100
099. 104. 17. BE. 20	200

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page 21 for symbol definitions.)

Solid stream nozzles
Needle jet
Series 599

This series is designed for use on high pressure showers.

Applications:
- Paper production
- High pressure cleaning

For longer service life, we offer this nozzle with a ruby orifice. The ruby insert resists wear and maintains a precise stream longer than stainless steel.

The alternate version, with the clog preventer, is designed for installing on showers without self-cleaning features. When the nozzle is spraying down, the extension draws fresh water from the shower above the sediment level.

Materials:
599.009.17: 316 SS

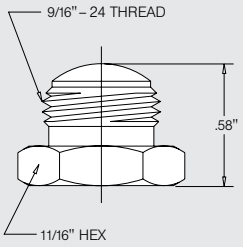
599.009.8J: 316 SS
Orifice: Ruby

599.028.17: 316 SS

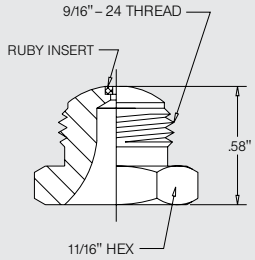
Series 599. 009. 17

Series 599. 009. 8J

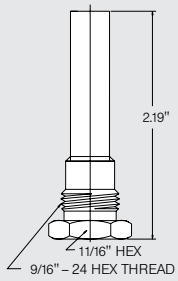
Series 599. 028. 17



Weight: .03 lb.



Weight: .03 lb.



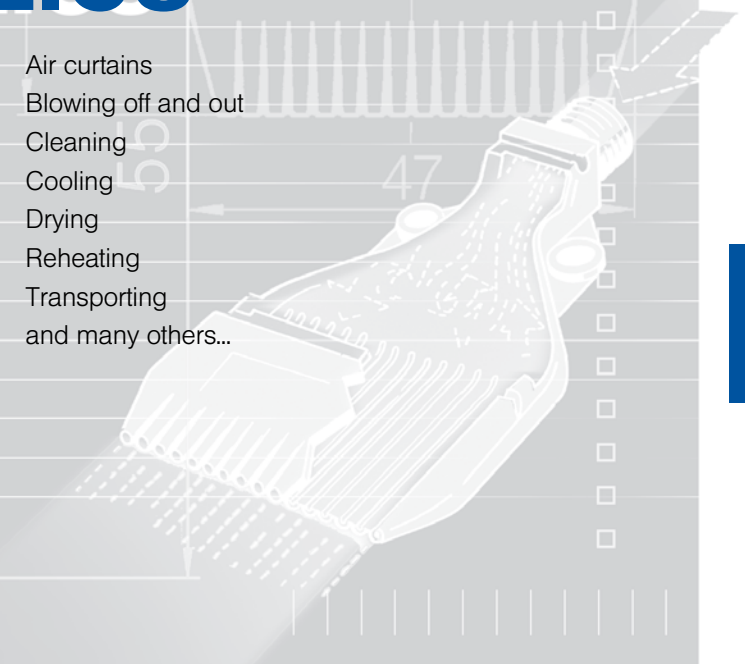
Weight: .07 lb.

Ordering no.			Orifice Diameter
Standard Nozzle	Standard with Ruby Orifice	Clog Resistant	
599. 009. 17. 00. 14	**599. 009. 8J. 00. 14**	**599. 028. 17. 00. 14**	.014" (0.36 mm)
599. 009. 17. 00. 28	**599. 009. 8J. 00. 28**	**599. 028. 17. 00. 28**	.028" (0.71 mm)
599. 009. 17. 00. 33	**599. 009. 8J. 00. 33***	**599. 028. 17. 00. 33**	.033" (0.84 mm)
599. 009. 17. 00. 40	**599. 009. 8J. 00. 40**	**599. 028. 17. 00. 40**	.040" (1.0 mm)
599. 009. 17. 00. 55	**599. 009. 8J. 00. 55**	**599. 028. 17. 00. 55**	.055" (1.40 mm)
599. 009. 17. 00. 70	**599. 009. 8J. 00. 70****	**599. 028. 17. 00. 70**	.070" (1.78 mm)
599. 009. 17. 00. 94	**599. 009. 8J. 00. 94**	**599. 028. 17. 00. 94**	.094" (2.39 mm)
599. 009. 17. 01. 25	**599. 009. 8J. 01. 25**	**599. 028. 17. 01. 25**	.125" (3.18 mm)

* Actual orifice diameter of this ruby orifice nozzle is .032".
** Actual orifice diameter of this ruby orifice nozzle is .073".

Air nozzles

Air curtains
Blowing off and out
Cleaning
Cooling
Drying
Reheating
Transporting
and many others...



1-800-777-2926

Air nozzles

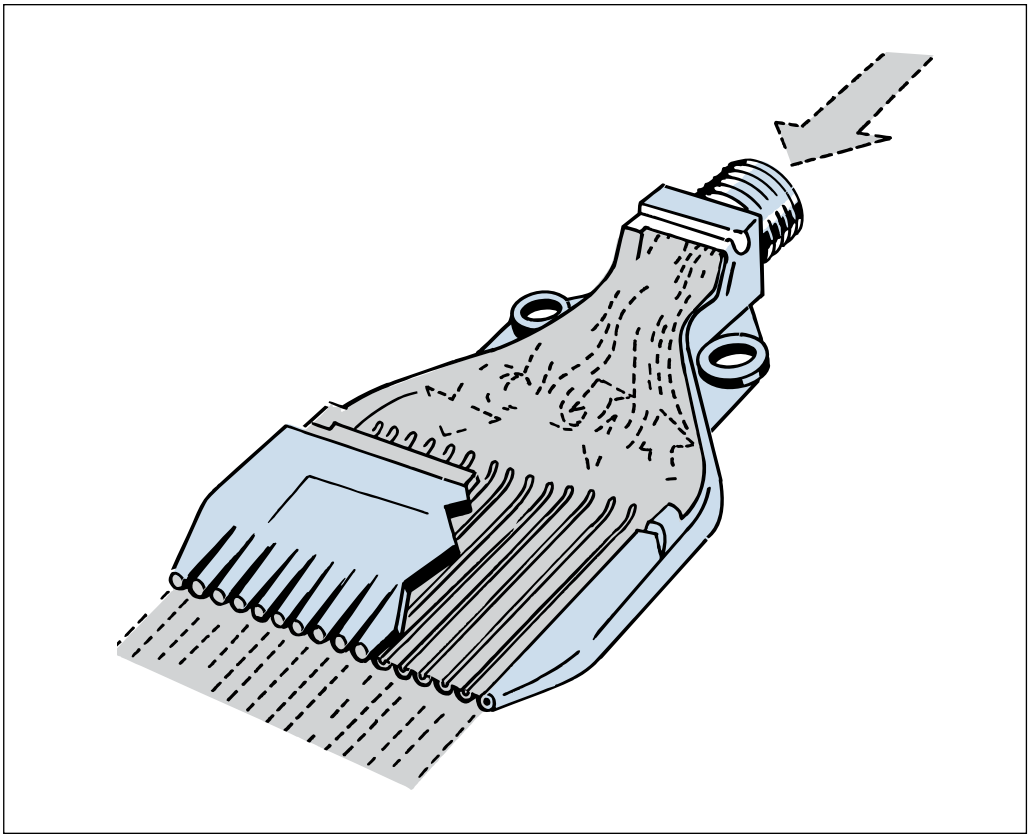
As a rule, any flat fan or solid stream nozzle can be operated with air instead of liquid. However, you'll obtain the best results using the nozzle designs we specifically engineered for compressed air or saturated steam applications. Typical applications for Lechler air nozzles include blowing off or out, cooling, drying, or cleaning.

The problem: noisy air sprayers
In many industries and workshops, compressed air is an indispensable tool.

Compressed air is needed for cleaning, drying, blowing off, and many other applications.

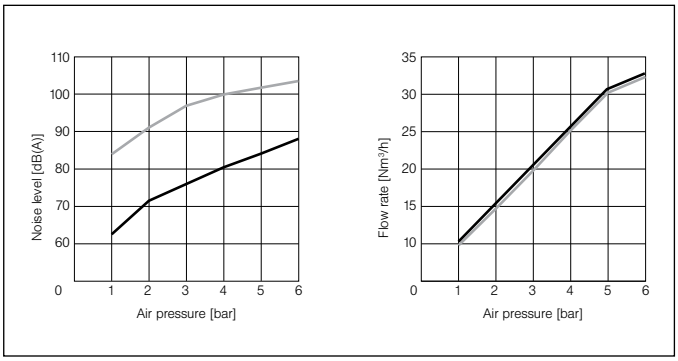
Typically, when uncontrolled compressed air is used, annoying, high-frequency hissing noises occur, which can affect or even harm hearing. These "noises" are produced by turbulences generated at the air outlet. Their intensity depends on the shape of the nozzle orifice and on the amount of inlet air pressure. Therefore, the stronger the output air jet needs to be, the higher the noise level, air consumption, and cost as a result.

The solution: Lechler multi-channel air nozzles, featuring a significantly reduced sound level, high blowing power, and low air consumption.
The performance of multi-channel air nozzles is based on partitioning the air inflow into single air jets. A total of 16 air channels, arranged to ensure optimum flow conditions, provides for a uniform, straight, and powerful overall air jet.



In comparison to single-hole air nozzles, the advantages are as follows:

- Reduction of the noise level by up to 12 dB
- Lower inlet air pressure with the same blowing force
- Lower air consumption
- Better blowing effect over a greater distance
- Lower operating costs



Comparison of a conventional, single-hole nozzle with the Lechler multi-channel round jet nozzle type 600.326

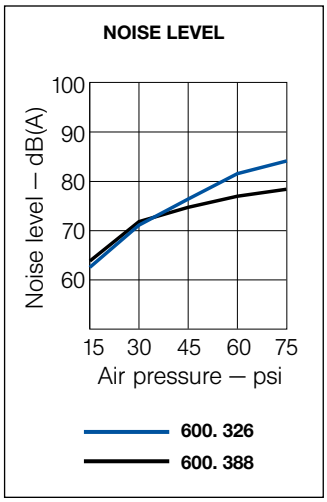
Lechler multi-channel round jet nozzle

Conventional single-hole nozzle

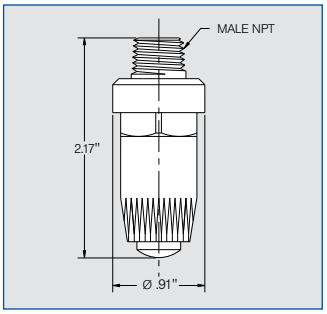
Air nozzles

WHISPERBLAST® compressed air nozzles
Round
Series 600

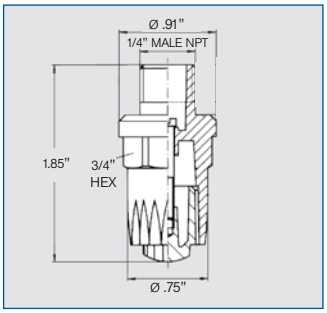
Provides focused blasting power with minimal air consumption and noise. Round configuration excellent for spot blasting, clearing holes, or use on hand guns.




600. 326. 5K. BA/BC (ABS)

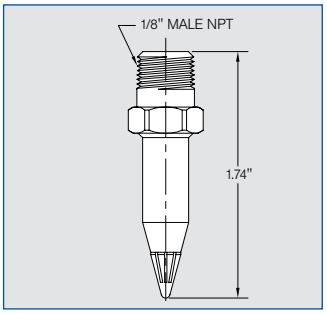



600. 326. 3W. BC (Zinc)



Round WHISPERBLAST gives a focused blast with low air consumption. Best for hand gun use.


600. 388. 30. BA



Ordering no.						Description	Capacity for Air (Standard Cubic Feet per Minute)					Approx. Wt.	Max. Pressure	Max. Temp.
Type	Material no.			Connection			15 psi	30 psi	45 psi	60 psi	75 psi	(lb.)		°F
	Brass 30	ABS 5K	Zinc 3W	Male NPT 1/8"	1/4"									
600. 326	○	○	-	**BA**	**BC**	Round WHISPERBLAST	5.3	8.8	12.4	16.0	19.5	0.05	100 psi	120
600. 326	-	-	○	-	**BC**	Round WHISPERBLAST	5.3	8.8	12.4	16.0	19.5	0.10	100 psi	200
600. 388	○	-	-	**BA**	-	MiniBlast	3.0	4.6	6.2	7.8	9.4	0.14	100 psi	120

Example for ordering:	**Type** **600. 326**	**+**	**Material no.** **5K**	**+**	**Conn.** **BC**	**=**	**Ordering no.** **600. 326. 5K. BC**

Please see the Lances and Nozzle Headers section for various configurations to mount your WHISPERBLAST air nozzles beginning on page 143.

WHISPERBLAST® compressed air nozzles
Flat
Series 600 Plastic version

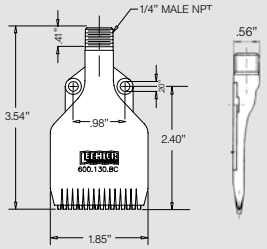
Provides focused blasting power with minimal air consumption and noise. Flat configuration can be used individually or side-by-side to create a very effective air knife.

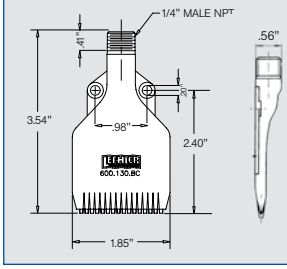
NEW: Polypropylene for the food industry (FDA-conform material)

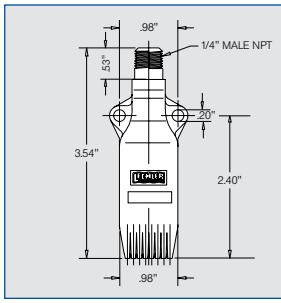
600. 130. 56. BC

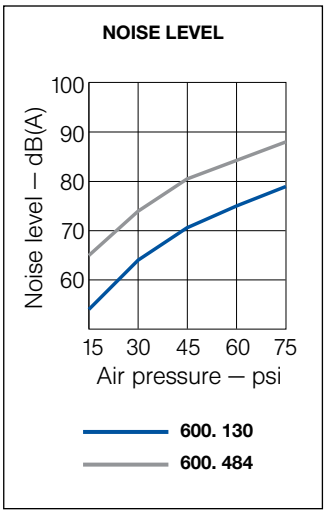
600. 130. S2. BC

600. 484 56. BC





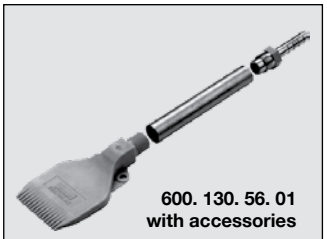




While standard plastic WHISPERBLAST nozzles come in a distinctive blue color, model 600.130.S2.BC is made from natural Polypro, a colorless material. Since no color dyes have been added to this model, it meets FDA requirements for use in food or pharmaceutical applications. See page 24.

Ordering no.					Description	Accessories	Capacity for Air (Standard Cubic Feet per Minute)				Approx. Wt.	Max. Pressure	Max. Temp.
Type	Material no.		Connection										
	Natural PP S2	POM 56	1/4" Male NPT	Hose Barb			15 psi	30 psi	45 psi	60 psi	(lb.)		°F
600. 130	○	○	**BC**	**-**	Original flat WHISPERBLAST		6.5	10.8	14.9	19.1	.05	75 psi	120
600. 130	**-**	○	**-**	**01**	Flat WHISPERBLAST (1/4" Male NPT) w/accessories	Hose nipple (5/16" barb) Steel Extension (L=3.3")	6.5	10.8	14.9	19.1	.05	75 psi	120
600. 484	**-**	○	**BC**	**-**	Flat Mini-WHISPERBLAST		3.1	4.7	6.4	8.0	.03	75 psi	120

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	600. 130	+	**56**	+	**BC**	=	**600. 130. 56. BC**



600. 130. 56. 01 with accessories

Extension tube: 600. 130. 01. 03. 00. 2

Hose barb adapter: 600. 130. 30. 04 .00. 1

Please see the Lances and Nozzle Headers section for various configurations to mount your WHISPERBLAST air nozzles beginning on page 143.

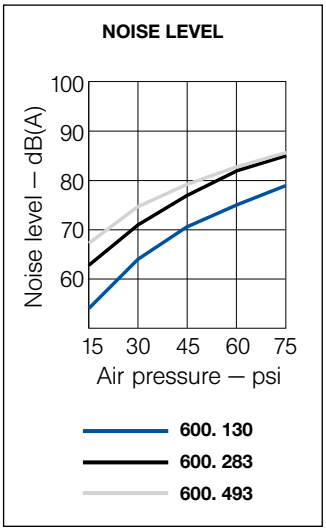
WHISPERBLAST® compressed air nozzles
Flat
Series 600 Metal version

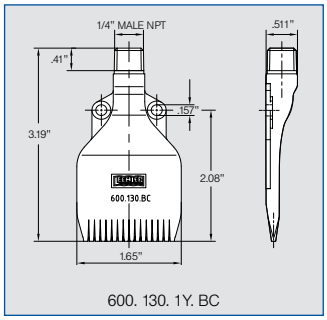
Provides focused blasting power with minimal air consumption and noise. Flat configuration can be used individually or side-by-side to create a very effective air knife.

600. 130. 1Y. BC

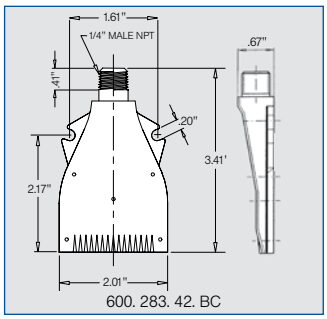
600. 283 42. BC

600. 493. 1Y. BC

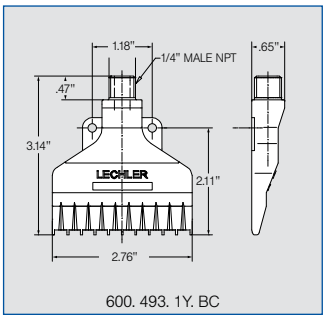




600. 130. 1Y. BC

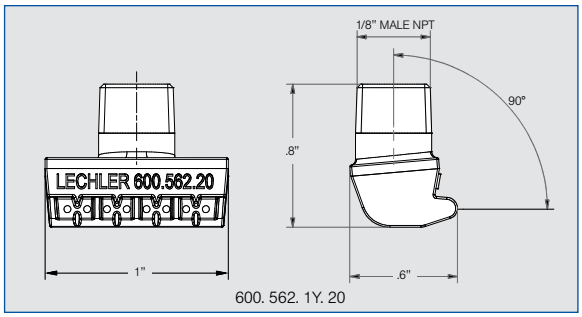


600. 283. 42. BC



600. 493. 1Y. BC

600. 562. 1Y. 20



600. 562. 1Y. 20

Ordering no. Type	Material no. 316L SS 1Y	Material no. Aluminum 42	Connection Male NPT 1/8"	Connection Male NPT 1/4"	Description	Capacity for Air (Standard Cubic Feet per Minute) 15 psi	30 psi	45 psi	60 psi	Approx. Wt. (lb.)	Max. Pressure	Max. Temp. °F
600. 130	○	-	-	**BC**	Flat WHISPERBLAST	6.5	10.8	14.9	19.1	.05	75 psi	1000
600. 283	-	○	-	**BC**	Aluminum flat WHISPERBLAST	8.5	13.5	18.6	23.8	.14	120 psi	400
600. 493	○	-	-	**BC**	Flat WHISPERBLAST	11.1	16.9	22.7	28.5	.28	150 psi	1000
600. 562	○	-	**20**	-	Tangential air nozzle	-	5.3	-	-	.06	150 psi	1022

Example for ordering:	**Type**	+	**Material no.**	+	**Conn.**	=	**Ordering no.**
	600. 130	+	**1Y**	+	**BC**	=	**600. 130. 1Y. BC**

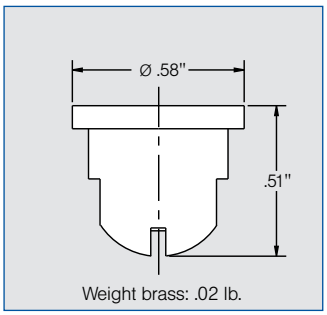
Please see the Lances and Nozzle Headers section for various configurations to mount your WHISPERBLAST air nozzles beginning on page 143.

Air nozzle tips

Series 679

Designed specifically to create a wide spray angle flat fan, with air or steam. Orifice size options allow for varying SCFM output for the same air input psi. For use with nozzle base and cap.

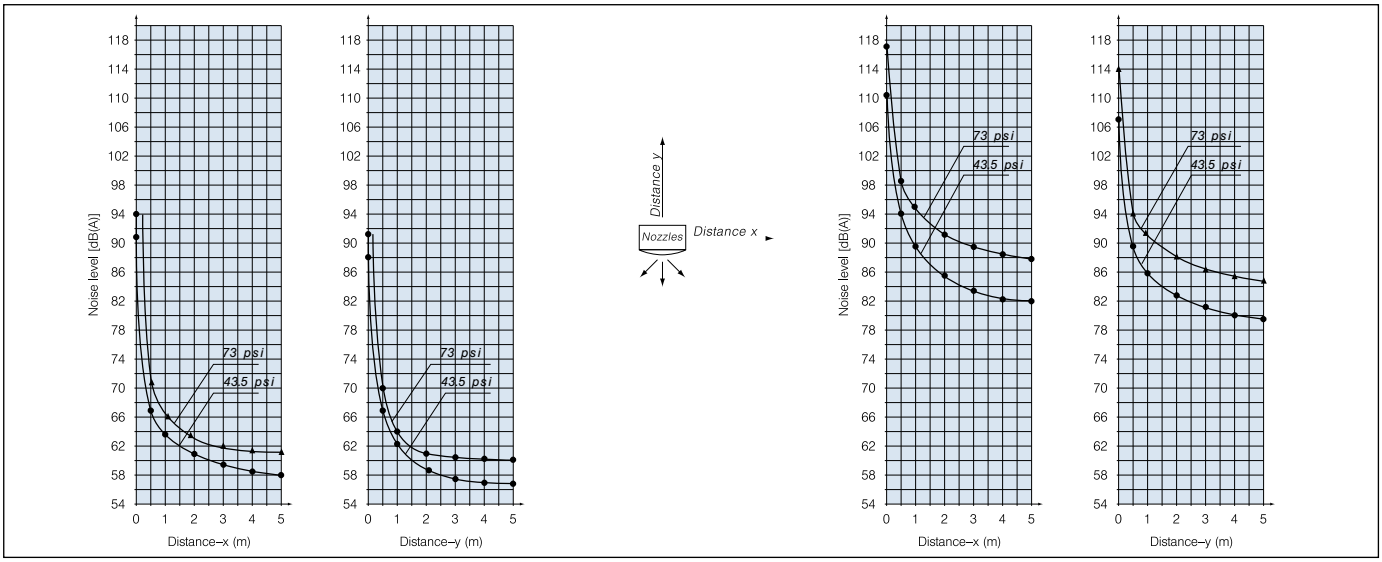
Applications:
- Strip and web drying
- Liquid blow-off
- Chip removal



Weight brass: .02 lb.

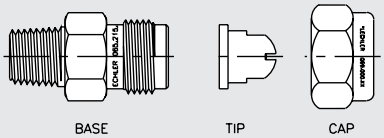
Spray angle	Ordering no. Type	Mat. no. 316 SS 17	Mat. no. Brass 30	Equiv. Orifice diam. (in.)	Capacity for Air (Standard Cubic Feet per Minute) 7 psi	29 psi	73 psi	145 psi	Capacity for Saturated Steam (lb/hr) 7 psi	29 psi	73 psi	145 psi
70°	**679. 037**	-	○	.047	.9	1.8	3.5	6.5	2.6	5.1	10.1	18.3
	679. 085	○	○	.051	1.2	2.4	4.7	8.7	3.5	6.8	13.4	24.4
	679. 117	○	○	.059	1.2	2.5	4.9	9.1	3.8	7.3	14.3	25.8
	679. 165	○	○	.071	1.5	3.0	6.1	11.1	4.4	9.0	17.6	31.5
	679. 255	○	○	.083	2.1	4.3	8.5	15.7	6.2	12.6	24.7	44.5
	679. 365	○	○	.110	3.7	7.5	15.0	27.4	11.0	22.0	43.1	77.7
	679. 415	○	○	.142	6.0	12.0	24.0	43.9	17.6	35.1	69.1	124.8
	679. 495	○	○	.169	9.2	18.3	36.6	67.1	27.3	54.6	106.8	192.6

Example for ordering:	Type	+	Material no.	=	Ordering no.
	679. 255	+	**17**	=	**679. 255. 17**



Bases and Cap for Mounting

Inlet Male NPT	Outlet Male	Part No.	
1/4"	11/16 x 16	065. 215. XX. 10	**Standard Materials:** 17 316 SS 30 Brass
3/8"	11/16 x 16	065. 211. XX. 10	
Cap			
To fit 11/16x16		069. 000. XX. 00	Other materials are available. See page 127.



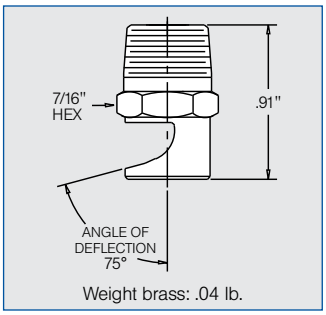

Blow-off tip with split eyelet connector

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Air or saturated steam nozzles
Deflector
Series 686

Wide-angle, powerful air jet.

Applications:
- Blowing off liquids
- Cooling
- Reheating
- Drying



Weight brass: .04 lb.

Spray angle	Ordering no. Type	Mat. no. 316 SS 17	Mat. no. Brass 30	Conn. Male NPT 1/8"	Orifice diam. (in.)	Capacity for Air (Standard Cubic Feet per Minute) 10 psi	20 psi	40 psi	60 psi	80 psi	100 psi	Capacity for Saturated Steam (lb/hr) 10 psi	20 psi	40 psi	60 psi	80 psi	100 psi
70°	**686. 408**	○	○	**BA**	.039	.4	.5	.8	1.1	1.4	1.7	1.8	2.4	3.5	4.6	5.7	6.6
	686. 488	○	○	**BA**	.051	.6	.9	1.4	1.9	2.4	2.9	2.6	3.7	5.7	7.5	9.3	11
	686. 528	○	○	**BA**	.059	.9	1.1	1.9	2.5	3.2	3.8	3.5	5.1	7.5	10	12	14
	686. 568	○	○	**BA**	.067	1.0	1.5	2.4	3.4	4.2	5.0	4.6	6.6	10	13	16	19
	686. 608	○	○	**BA**	.075	1.3	1.8	3.0	4.2	5.2	6.2	5.7	8.2	13	17	20	24
	686. 688	○	○	**BA**	.094	2.2	2.9	4.7	6.6	8.3	9.9	9.0	13	20	26	32	37
	686. 728	○	○	**BA**	.106	4.0	5.0	7.9	11	14	17	9.9	16	24	32	39	47
	686. 808	○	○	**BA**	.134	6.1	8.0	13	18	23	27	16	25	39	50	62	74

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	686. 408	+	**17**	+	**BA**	=	**686. 408. 17. BA**

A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

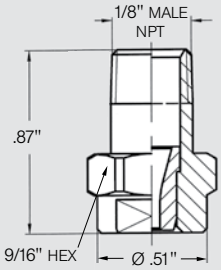
Air or saturated steam nozzles
Solid stream
Series 544

Powerful air jet, producing small but targeted impact patterns.

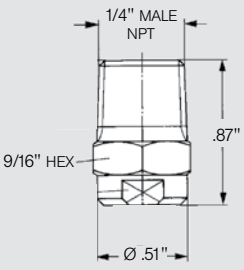
Applications:
- Targeted blowing out and blowing off

Series 544.110 – 544.400

Series 544.480 – 544.800



Weight brass: .03 lb.



Weight brass: .04 lb.

Ordering no.				Orifice diam. (in.)	Capacity for Air (Standard Cubic Feet per Minute)				Capacity for Saturated Steam (lb/hr)			
Type	Mat. no. 303 SS **16**	Conn. Male NPT 1/8"	1/4"		10 psi	25 psi	50 psi	75 psi	10 psi	25 psi	50 psi	75 psi
544. 360	○	**BA**	**BC**	.041	.5	.8	1.1	1.7	1.7	2.5	3.6	5.3
544. 400	○	**BA**	**BC**	.051	.8	1.3	1.7	2.6	2.6	3.9	5.5	8.2
544. 480	○	**BA**	**BC**	.052	1.0	1.5	2.0	3.0	3.1	4.5	6.4	9.3
544. 560	○	**BA**	**BC**	.065	1.5	2.3	3.1	4.6	4.7	7.0	9.9	14.7
544. 640	○	**BA**	**BC**	.082	2.5	3.8	5.2	7.8	7.9	11.7	16.6	24.5
544. 720	○	**BA**	**BC**	.104	4.0	6.0	8.2	12.4	12.5	18.6	26.4	39.0
544. 800	○	**BA**	**BC**	.130	6.3	9.5	12.9	19.3	19.7	29.1	41.1	60.9

Example for ordering:	**Type**	**+**	**Material no.**	**+**	**Conn.**	**=**	**Ordering no.**
	544. 360	**+**	**16**	**+**	**BC**	**=**	**544. 360. 16. BC**

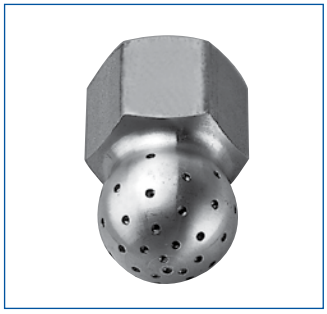
Air nozzles

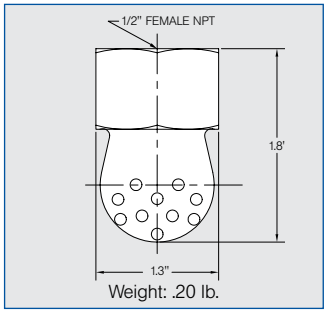
A listing of alternatives for various assembly possibilities is shown in the Accessories section beginning on page 127.

Air or saturated steam nozzles
Cluster solid stream
Series 540 / 541

Powerful air jet with 40 individual bore holes.

Applications:
- Injection of steam into liquids
- Injection of compressed air into bulk goods
- Gas injection (acid and neutralization baths)





Weight: .20 lb.

Spray angle	Ordering no. Type	Mat.no. 303 SS 16	Conn. Female NPT 1/2"	Orifice diam. (in.)	Capacity for Air (Standard Cubic Feet per Minute) 15 psi	29 psi	44 psi	73 psi	Capacity for Saturated Steam (lb/hr) 15 psi	29 psi	44 psi	73 psi
240°	**540. 909**	○	**BH**	.032	13.4	20.1	26.8	40.2	14.7	21.7	29.1	43.6
	540. 989	○	**BH**	.039	20.9	31.4	41.8	62.7	22.9	33.7	45.4	67.9
	541. 109	○	**BH**	.059	49.0	73.5	98.0	147.0	53.8	79.3	106.6	159.4
	541. 189	○	**BH**	.079	76.3	114.5	152.6	229.0	83.9	123.7	166.3	248.6
	541. 239	○	**BH**	.091	98.4	147.6	196.8	295.2	107.5	158.5	213.2	318.8

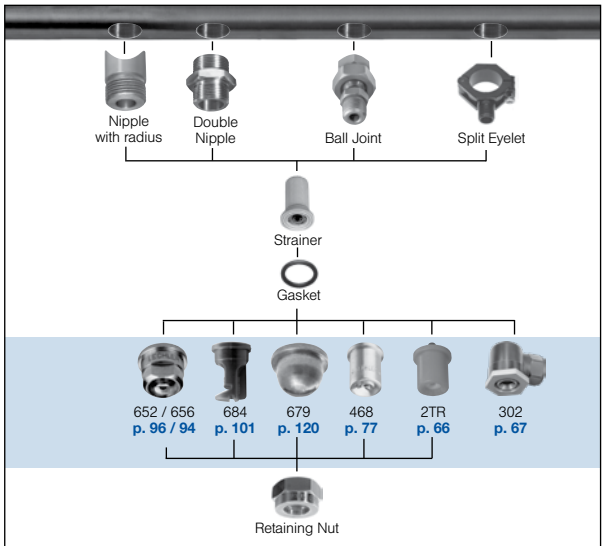
Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	540. 909	+	**16**	+	**BH**	=	**540. 909. 16. BH**

For various configurations to mount your tank cleaning nozzle, see the Lances and Nozzle Headers section beginning on page 143.

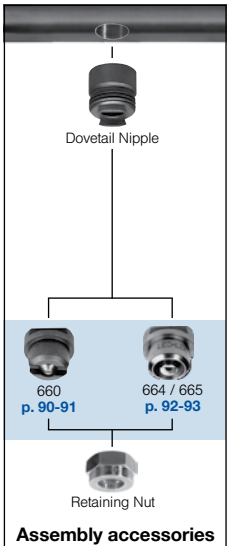
Accessories

Match the right assembly accessories to your specific application.

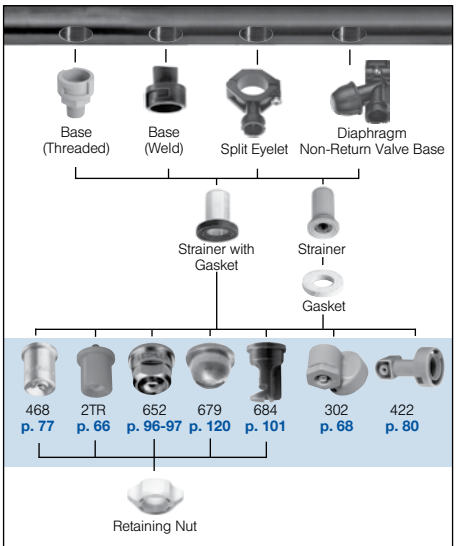
Assembly accessories for nozzle tips or nozzles with female threads



Assembly accessories for nozzle tips or nozzles with female threads.

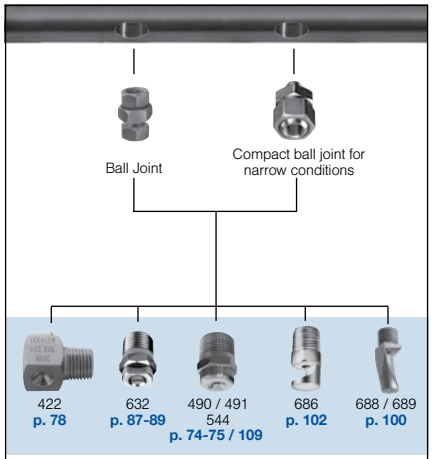


Assembly accessories for nozzle tips with dovetail design.

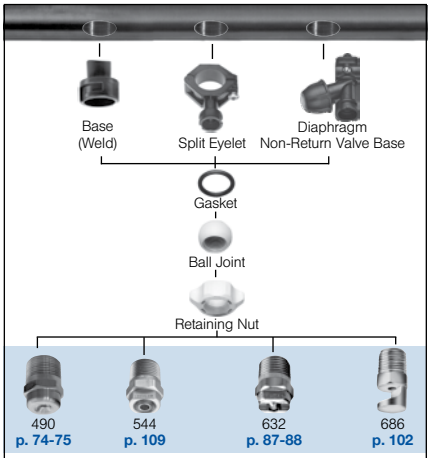


Assembly accessories for nozzle tips. Bayonet quick release system.

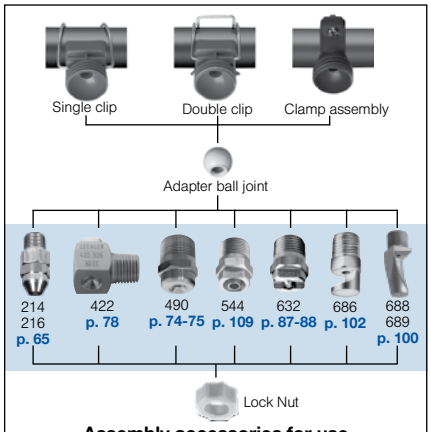
Assembly accessories for nozzles with male threads



Assembly accessories for nozzles with male threads.



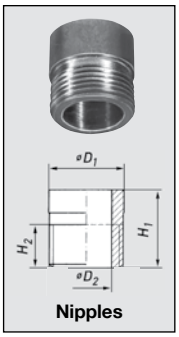
Assembly accessories for Bayonet quick release system—male threaded nozzles.



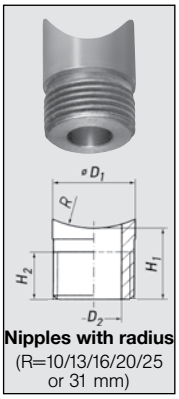
Assembly accessories for use with conventional nozzles in a ball joint.

Assembly accessories for nozzle tips or nozzles with female threads

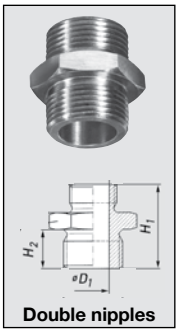
Nipples



Nipples

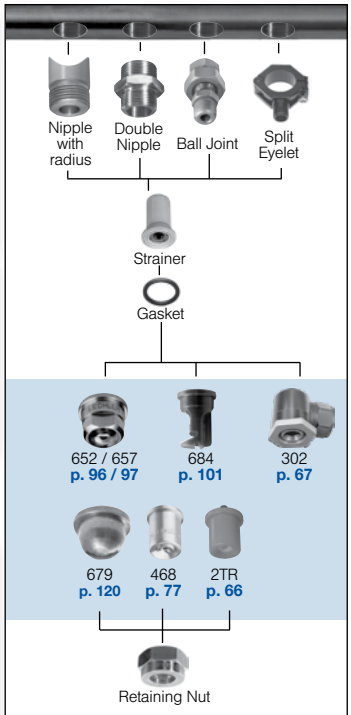


Nipples with radius
(R=10/13/16/20/25 or 31 mm)



Double nipples

For series	Type	Material no. 02 Steel	Material no. 17[1] 316 SS	Material no. 30 Brass	Material no. 53 PP	Inlet	Outlet	H_1	H_2	D_1	D_2	R	HEX	Weight (Brass) lb.
2TR 468 652 679 684	**065. 210. xx. 00**	○	○	○	○	-	3/8" Male BSPP	.71	.39	.68	.45	-	-	.04
656 657	**065. 610. xx. 00**	○	○	-	○	-	3/4" Male BSPP	1.06	.55	1.10	.71	-	-	.13
2TR 468 652 679 684	**065. 217. xx. 10**	-	○	-	-	-	3/8" Male NPT	.71	.39	.68	.45	.39	-	.04
	065. 217. xx. 13	-	○	-	-	-	3/8" Male NPT	.71	.39	.68	.45	.51	-	.04
	065. 217. xx. 16	-	○	-	-	-	3/8" Male NPT	.71	.39	.68	.45	.63	-	.04
	065. 217. xx. 20	-	○	-	-	-	3/8" Male NPT	.71	.39	.68	.45	.79	-	.04
	065. 217. xx. 25	-	○	-	-	-	3/8" Male NPT	.71	.39	.68	.45	.98	-	.04
	065. 217. xx. 31	-	○	-	-	-	3/8" Male NPT	.71	.39	.68	.45	1.22	-	.04
2TR 468 652 679 684	**065. 215. xx. 11**	-	○	○	-	1/4" Male NPT	3/8" Male NPT	1.44	.56	-	-	-	11/16	.06
	065. 215. xx. 12	-	○	○	-	3/8" Male NPT	3/8" Male NPT	1.38	.50	-	-	-	11/16	.06
	065. 215. xx. 10	-	○	○	-	1/4" Male NPT	11/16"-16 Male NPT	1.44	.56	-	-	-	11/16	.06
	065. 211. xx. 10	-	○	○	-	3/8" Male NPT	11/16"-16 Male NPT	1.25	.50	-	-	-	11/16	.06
656 657 664 665	**065. 611. xx. BK**	-	○	○	-	3/4" Male NPT	3/4" Male NPT	1.65	.55	.71	-	-	1-1/4	.20



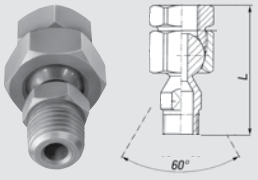
Assembly accessories for nozzle tips or nozzles with female threads.

Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	065. 215. xx. 11	+	**17**	=	**065. 215. 17. 11**

1) We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 17.

Assembly accessories for nozzle tips or nozzles with female threads

Ball joints

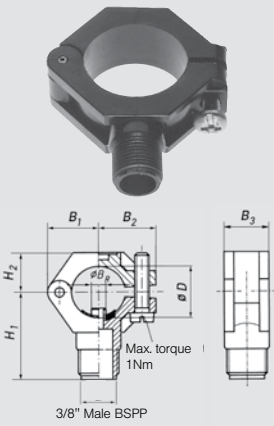


Ball joint with thread connection, female-male

For series	Ordering no. Type	Material no. 303 SS/316 SS 16	Material no. 303 SS 16	Material no. Brass 30	Dimensions (in.) Inlet	Outlet	D_1	D_2	Largest HEX	L	Weight (Brass) lb.
2TR 302 468 652 679 684	**092. 022. xx. BE. BD**	-	○	-	1/4" Female NPT	3/8" Male NPT	-	-	1-1/16	2.51	.18
	091. 124. xx. BE. BF	-	○	○	3/8" Female NPT	3/8" Male NPT	-	-	1-1/8	2.10	.19

Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	092. 022. xx. BE. BD	+	**16**	=	**092. 022. 16. BE. BD**

Split eyelet



Eyelet clamp for retaining nut

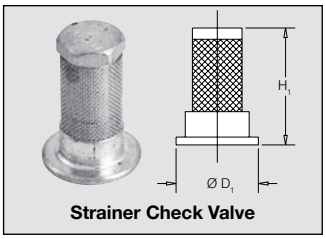
For series	Ordering no. Type	Material no. (Color) Nylon (Black) 51	PP (Clear) 53	PVDF (Blue) 5E	Screw (Material)	Dimensions (in.) Pipe ø	Drill hole diameter	B_R* ø	B** ø	B_1	B_2	B_3	H_1	H_2	Weight (Nylon)
2TR 302 468 652 679 684	**090. 053**	○	○	○	303 SS	3/8"	1/4"	.24	.24	.75	.87	.73	1.36	.57	.05
	090. 003	○	○	○		1/2"	1/4"	.24	.25	.84	.94	.73	1.44	.65	.05
	090. 013	○	○	○		3/4"	5/16"	.31	.31	.96	1.05	.87	1.56	.69	.06
	090. 023	○	○	○		1"	7/16"	.42	.43	1.18	1.22	.87	1.73	.83	.07
	090. 033	○	○	○		1 1/4"	1/2"	.51	.51	1.34	1.40	.99	1.89	.99	.09

B_R*ø = Spigot diameter
B** ø = Recommended bore diamete

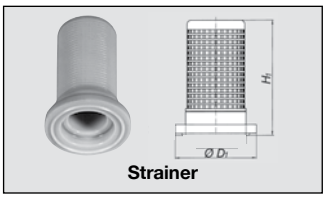
Example for ordering:	Type	+	Material no.	=	Ordering no.
	090. 053	+	**51**	=	**090. 053. 51**

Assembly accessories for nozzle tips or nozzles with female threads

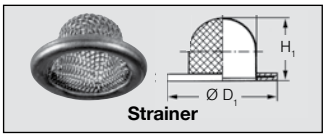
Strainers



Strainer Check Valve



Strainer

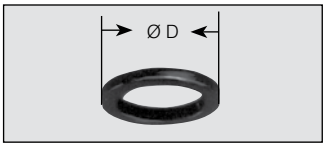


Strainer

For series	Valve option	Ordering no. Type	Material no. Monel 26	Material no. Brass 30	Material no. POM 56	Color	Opening pressure (psi)	Dimensions (in.) Mesh size	Mesh opening	H_1	D_1	Weight (Brass) lb.
xxx.32x-xxx.44x	With check valve	**065. 265**	-	-	○	Blue	8	50	.011	.81	.58	.004
xxx.32x-xxx.44x xxx.48x-xxx.56x	With check valve	**065. 266**	-	-	○	Red	8	24	.026	.81	.58	.004
xxx.32x-xxx.44x	No check valve	**065. 257**	-	-	○	Blue	-	50	.011	.81	.58	.004
xxx.32x-xxx.44x xxx.48x-xxx.56x	No check valve	**065. 256**	-	-	○	Red	-	24	.026	.81	.58	.004
xxx.32x-xxx.44x	No check valve	**065. 252**	○	-	-	-	-	80	.007	.31	.58	.004

Example for ordering: **Type** **065. 260** + **Material no.** **30** = **Ordering no.** **065. 260. 30**

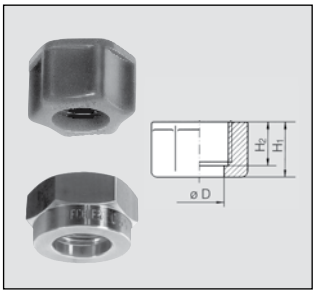
Gaskets



For series	For nozzle size	Ordering no. Type	Material no. PTFE 55	Material no. Copper-filled fiber 71	Material no. Aramid fiber 72	Material no. Soft rubber 73	Dimensions (in.) D	Weight (oz.)
468/652 679/684	retaining nut 3/8" and 11/16"	**065. 240**	○	-	○	○	.59	.005
656/657	retaining nut 3/4"	**065. 640**	-	-	○	-	.94	.018

Example for ordering: **Type** **065. 240** + **Material no.** **55** = **Ordering no.** **065. 240. 55**

Retaining nuts



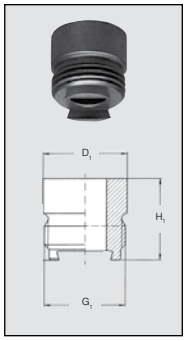
* POM and PVDF not recommended for nuts for Series 548, High Pressure Tips.

For series	Ordering no. Type	Material no. 303 SS 16	316SS 17	316L SS 1Y	Brass 30	POM 56	PVDF 5E	Dimensions (in.) For thread	H_1	H_2	D	Hex	Weight (Brass) lb.
2TR 468 548* 652 660 679 684	**065. 200**	○	○	-	○	○	○	$^3/_8$" BSPP	.57	.40	.50	.87	.06
2TR 468 548* 652 660 679 684	**069. 000**	○	-	○	○	-	-	$^{11}/_{16}$"-16	.57	.40	.50	.87	.06
656/664	**065. 600**	○	○	-	○	-	○	$^3/_4$" BSPP	.63	.51	.79	1.26	.13

Example for ordering: **Type** **065. 200** + **Material no.** **17** = **Ordering no.** **065. 200. 17**

Assembly accessories for dovetail nozzles

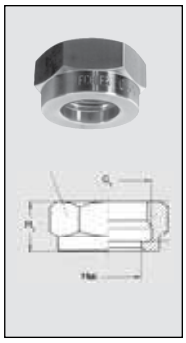
Dovetail nipples



For series	Ordering no. Type	Material no. 303 SS 16	316 SS 17	Brass 30	Dimensions (in.) For thread G_1	H_1	D_1	Hex	Weight (Brass) lb.
660	**066. 011**	-	○	-	$^3/_8$" BSPP	.71	.65	-	.05
664/665	**066. 410**	-	○	-	$^3/_4$" BSPP	1.06	1.10	-	.14

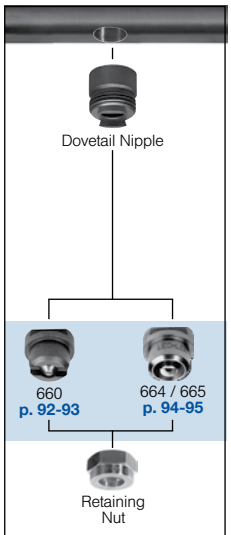
Example for ordering:	**Type** 066. 410	+	**Material no.** 17	=	**Ordering no.** 066. 410. 17

Retaining nuts



For series	Ordering no. Type	Material no. 303 SS 16	316 SS 17	Brass 30	Dimensions (in.) For thread G_1	H_1	D_1	Hex	Weight (Brass) lb.
660	**065. 200**	○	○	○	$^3/_8$" BSPP	.51	-	$^1/_2$"	.06
664/665	**065. 600**	○	○	○	$^3/_4$" BSPP	.51	-	$1^1/_4$"	.13

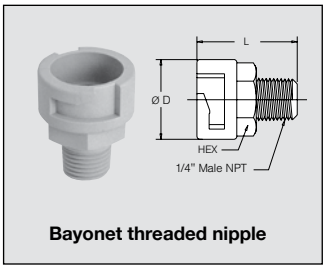
Example for ordering:	**Type** 065. 200	+	**Material no.** 17	=	**Ordering no.** 065. 200. 17



Assembly accessories for dovetail nozzles.

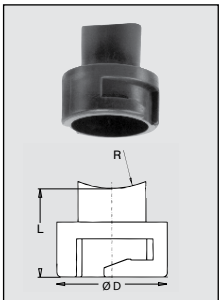
Dovetail nozzles have an automatic alignment guide which requires a matching dovetail base. Once the base is set, the nozzle can be removed and replaced without need to readjust the alignment. Nozzle is secured to the base with a retaining nut.

Bayonet bases (split eyelets, diaphragm non-return valve, threaded nipple, and welding nipple)

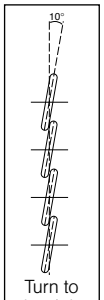


Bayonet threaded nipple

For series	Ordering no.	Material	Conn.	Dimensions (in.) L	D	HEX	Weight (lb.)
302 bay. 422 bay. 2TR 468 652 679 684	**090. 075. 53. 00**	PP	1/4" Male NPT	1.29	1.02	13/16	.01

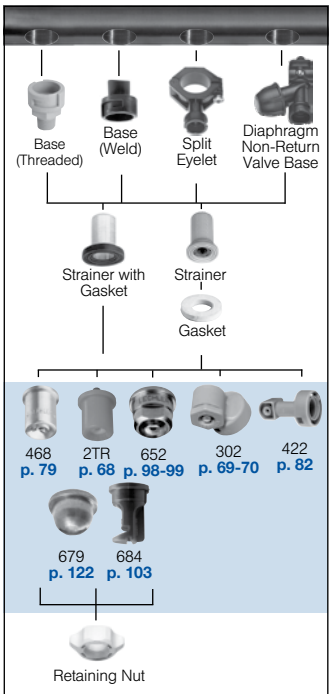


Bayonet welding nipple
Turn toward pipe axis:
Direction: right, angle: 10°

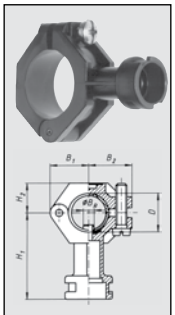


Turn to the right toward pipe axis. Angle: 10°

For series	Ordering no.	Material	Dimensions (in.) L	R	D	Weight (lb.)
302 bay. 422 bay. 2TR 468 652 679 684	**095. 016. 53. 08. 05**	PVC	.98	.63	1.02	.01
	095. 016. 50. 08. 05	PP	.98	.63	1.02	.01

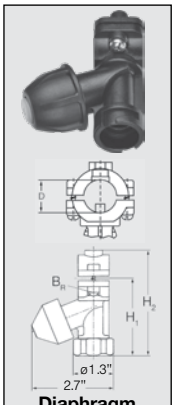


Assembly accessories for nozzle tips or nozzles with female threads. Bayonet quick release system.



Eyelet clamp with bayonet quick release

For series	Type	Ordering no. Material no. (Color) Nylon (Black) 51	PP (Clear) 53	PVDF (Blue) 5E	POM (Black) 56	Conn. Bayonet	Screw (Material)	Pipe ø	Drill hole diameter	Opening pressure (psi)	Closing pressure (psi)	Dimensions (in.) H_1	H_2	B_R* ø	B** ø	B_1	B_2	B_3	Weight (lb.)
302 bay. 422 bay. 2TR 468 652 679 684	**090. 003**	○	○	○	-	**KA**	304 SS		9/32"	-	-	1.95	.65	.24	.25	.84	.94	.73	.05
	090. 013	○	○	○	-	**KA**		3/4"	5/16"	-	-	2.07	.69	.31	.31	.97	1.04	.87	.06
	090. 023	○	○	○	-	**KA**			7/16"	-	-	2.25	.83	.42	.43	1.18	1.22	.87	.07



Diaphragm non-return valve with bayonet quick release

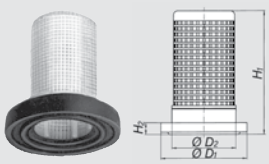
302 bay. 422 bay. 2TR 468 652 679 684	**065. 272**	-	-	-	○	**KH**	304 SS	1/2"	1/4"	12	9	2.32	3.31	.24					.11
	065. 272	-	-	-	○	**KL**		3/4"	25/64"	12	9	2.60	3.55	.38					.12

B_R*ø = Spigot diameter
B** ø = Recommended bore diameter

Example for ordering:	Type 090. 003	+	Material no. 51	+	Conn. KA	=	Ordering no. 090. 003. 51. KA

Assembly accessories for nozzle tips or nozzles with female threads
Bayonet quick release system

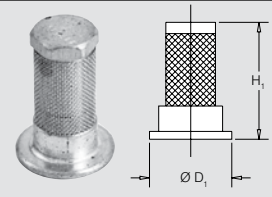
Strainers



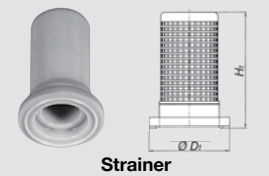
Strainer with gasket

For nozzle size	Ordering no.	Material	Strainer mesh	Color	Dimensions (in.) H_1	H_2	D_1	D_2	Weight (lb.)
xxx.32x-xxx.44x	**065. 268. 7J**	Santoprene	50	Blue	.85	.10	.71	.44	.004
xxx.48x-xxx.56x	**065. 269. 7J**	Santoprene	25	Red	.85	.10	.71	.44	.004

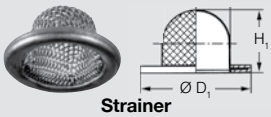
Strainers



Strainer Check Valve



Strainer



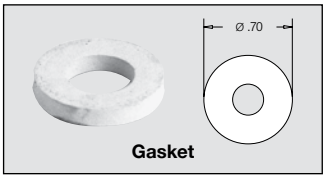
Strainer

Valve option	Ordering no. Type	Material no. Monel 26	Brass 30	POM 56	Color	Opening pressure (psi)	Dimensions (in.) Mesh size	Mesh opening	H_1	D_1	Weight (Brass) lb.
With check valve	**065. 265**	-	-	○	Blue	8	50	.011	.81	.58	.004
	065. 266	-	-	○	Yellow	8	24	.026	.81	.58	.004
No check valve	**065. 257**	-	-	○	Blue	-	50	.011	.81	.58	.004
	065. 256	-	-	○	Red	-	24	.026	.81	.58	.004
No check valve	**065. 252**	○	-	-	-	-	80	.007	.31	.58	.004

Example for ordering:	Type	+	Material no.	=	Ordering no.
	065. 260	+	30	=	065. 260. 30

Assembly accessories for nozzle tips or nozzles with female threads
Bayonet quick release system

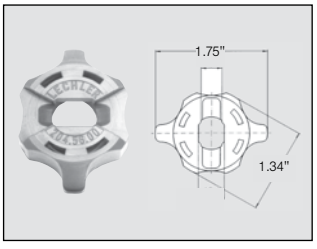
Gaskets

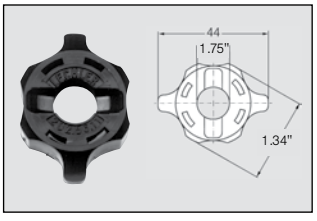


Ordering no. Type	Mat. no. Rubber 73	Mat. no. Santo-prene 7J	Description		Weight (oz.)
095. 015. 7J. 01. 65			**Santoprene**	Replacement gasket for use with strainer	.016
065. 242. 73. 00. 00			**Rubber**	Replacement gasket	.016

Bayonet quick release retainer caps

incl. gasket 065.242.73 (rubber)



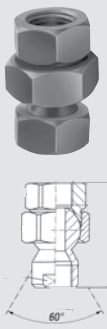


For series	Ordering no.	Material	Color	Weight (oz.)
652 679	**065. 202. 56. 00**	POM	Red	.016
	065. 202. 53. 00	PP	Gray	.016
	065. 202. 5E. 00*	PVDF	Blue	.016
2TR 468 652 684	**065. 202. 56. 11**	POM	Black	.016
	065. 202. 53. 11	PP	Gray	.016

* does not work with 090.075.53.00.0 base, incl. gasket 065.242.7A (viton)

Assembly accessories for nozzles with male threads

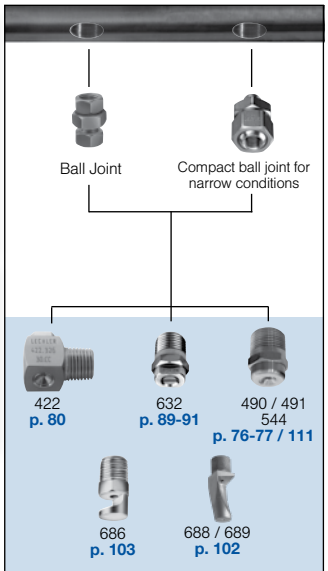
Ball joints



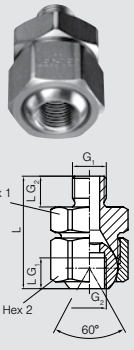
Ball joint with thread connection, female-female

For series	Type	Material no. 303 SS 16	Material no. Brass 30	Inlet	Outlet	D_1	D_2	Largest HEX	L	Weight (Brass) lb.
422 490 544 632 686 688	**092. 010. xx. BB. BB**	○	○	1/8" Female NPT	1/8" Female NPT	-	-	7/8	1.70	.09
	092. 020. xx. BD. BD	○	○	1/4" Female NPT	1/4" Female NPT	-	-	1-1/16	2.37	.13
	092. 030. xx. BF. BF	○	○	3/8" Female NPT	3/8" Female NPT	-	-	1-1/8	2.23	.18

Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	092. 010. xx. BB. BB	+	**16**	=	**092. 010. 16. BB. BB**



Assembly accessories for nozzles with male threads.



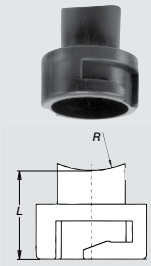
Compact ball joint for narrow conditions

For series	Type	Material no. 303 SS 16	Material no. Brass 30	Connection	G_1	G_2	LG_1	LG_2	L	Hex_1	Hex_2	Weight (Brass) lb.
For all nozzles with 1/8" thread	**092. 010**	○	○	**BA**	1/8	1/8	.31	.31	1.15	.87	.94	2.5
For all nozzles with 1/4" thread	**092. 024**	○	○	**BC**	1/4	1/4	.47	.47	1.73	1.06	1.06	4.9
For all nozzles with 3/8" thread	**092. 030**	○	○	**BE**	3/8	3/8	.47	.47	1.73	1.06	1.18	5.6

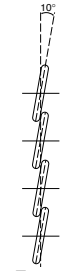
Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	092. 265	+	**16**	+	**KA**	=	**092. 265. 16. BA**

Assembly accessories for Bayonet quick release system BSPT—male threaded nozzles

Bayonet bases (split eyelets, diaphragm non-return valve, and welding nipple)

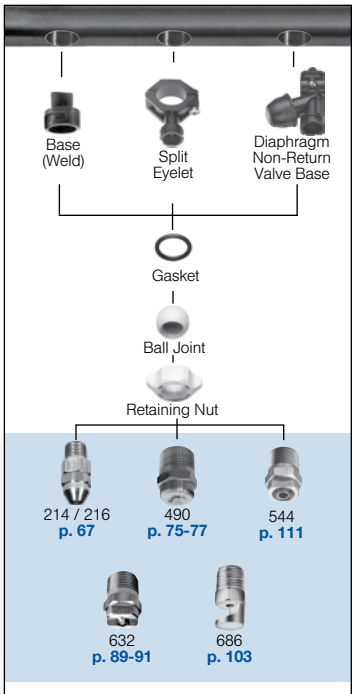


Bayonet welding nipple
Turn toward pipe axis:
Direction: right, angle: 10°

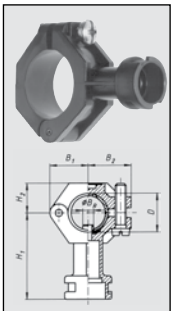


Turn to the right toward pipe axis. Angle: 10°

For series	Ordering no.	Material	Dimensions (in.) L	R	D	Weight (lb.)
302 bay. 422 bay. 2TR 468 652 679 684	**095. 016. 53. 08. 05**	PP	.98	.63	1.02	.01
	095. 016. 50. 08. 05	PVC	.98	.63	1.02	.01

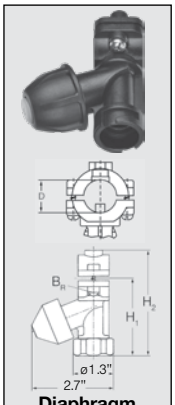


Assembly accessories for Bayonet quick release system — male threaded nozzles.



Eyelet clamp with bayonet quick release

For series	Ordering no. Type	Material no. (Color) Nylon (Black) 51	PP (Clear) 53	PVDF (Blue) 5E	POM (Black) 56	Conn. Bayonet	Screw (Material)	Pipe ø	Drill hole diameter	Opening pressure (psi)	Closing pressure (psi)	Dimensions (in.) H_1	H_2	B_R* ø	B** ø	B_1	B_2	B_3	Weight (lb.)
302 bay. 422 bay. 2TR 468 652 679 684	**090. 003**	○	○	○	-	**KA**	303 SS		9/32"	-	-	1.95	.65	.24	.25	.84	.94	.73	.05
	090. 013	○	○	○	-	**KA**		3/4"	5/16"	-	-	2.07	.69	.31	.31	.97	1.04	.87	.06
	090. 023	○	○	○	-	**KA**			7/16"	-	-	2.25	.83	.42	.43	1.18	1.22	.87	.07



Diaphragm non-return valve with bayonet quick release

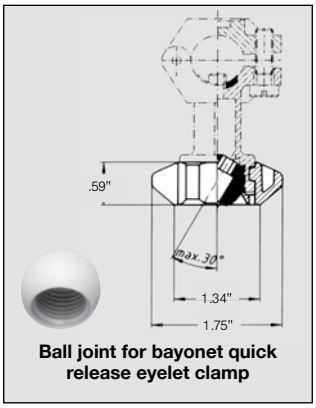
302 bay. 422 bay. 2TR 468 652 679 684	**065. 272**	-	-	-	○	**KH**	303 SS	1/2"	1/4"	12	9	2.32	3.31	.24					.11
	065. 272	-	-	-	○	**KL**		3/4"	25/64"	12	9	2.60	3.55	.38					.12

B_R*ø = Spigot diameter
B** ø = Recommended bore diameter

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	090. 003	+	**51**	+	**KA**	=	**090. 003. 51. KA**

Assembly accessories for Bayonet quick release system BSPT—male threaded nozzles

Ball joint system for nozzles with 1/8" or 1/4" female thread.

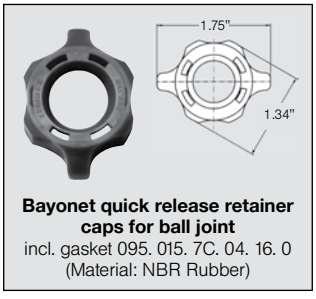


Ball joint for bayonet quick release eyelet clamp

For series	Ordering no. Type	Mat. no. PVDF	Connection Female BSPT 1/8"	Connection Female BSPT 1/4"	Color	Weight (oz.)
For all nozzles with 1/8" or 1/4" female thread	**092. 150**	○	**AB**	**AD**	Blue	.064

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	092. 150	+	**5E**	+	**AB**	=	**092. 150. 5E. AB**

Retaining nut with gasket for ball joint



Bayonet quick release retainer caps for ball joint
incl. gasket 095. 015. 7C. 04. 16. 0
(Material: NBR Rubber)

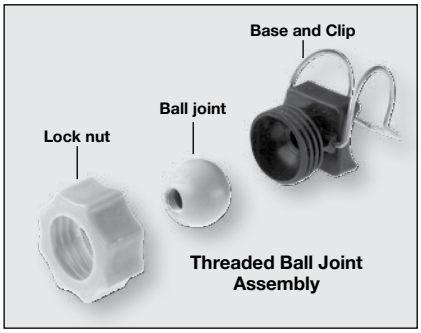
For series	Ordering no.	Material	Color	Weight (oz.)
For ball joint	**092. 150. 5E. 00**	PVDF	Blue	.16

Assembly accessories for use with conventional nozzles in a ball joint

Allows quick installation of conventional nozzles onto a metal or plastic header pipe. For pipe sizes of 1", 1-1/4", 1-1/2", and 2". Requires drilling of a 21/32" hole in the pipe, no threading required. Adapter clamps to pipe. For use with male NPT nozzles of sizes 1/8", 1/4", 3/8", and 1/2".

Easy Clip assembly nozzle tip (see page 101) can be replaced with a threaded ball joint, for added positioning flexibility for mounting 1/4" and 3/8" nozzles. Adapter and ball joint can both stand up to many acids and caustics, at temperatures up to 180°F.

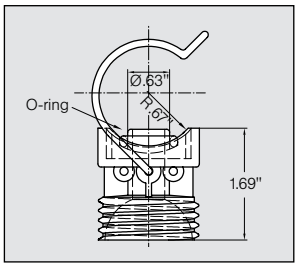
Applications:
- Phosphating lines
- Parts washers and degreasing
- Conveyor washing
- Dust suppression



Threaded Ball Joint Assembly

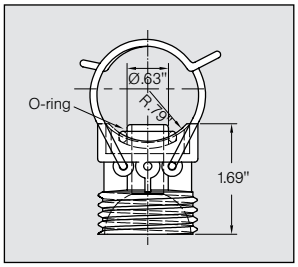
Single clip with o-ring

Ordering no.	Material	For Pipe		Weight (lb.)
		Tap Ø	Size	
092. 080. 53. 00	PP	.63"	1"	.08
092. 081. 53. 00	PP	.63"	1-1/4"	.09
092. 082. 53. 00	PP	.63"	1-1/2"	.11
092. 083. 53. 00	PP	.63"	2"	.11



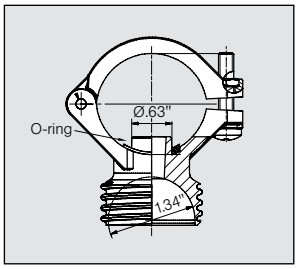
Double clip with o-ring

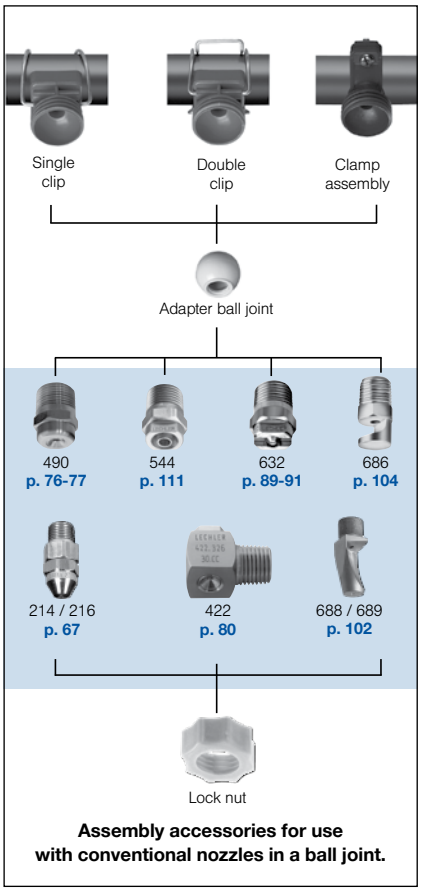
Ordering no.	Material	For Pipe		Weight (lb.)
		Tap Ø	Size	
092. 090. 53. 00	PP	.63"	1"	.08
092. 091. 53. 00	PP	.63"	1-1/4"	.09
092. 092. 53. 00	PP	.63"	1-1/2"	.11
092. 093. 53. 00	PP	.63"	2"	.11



Clamp assembly with o-ring

Ordering no.	Material	For Pipe		Weight (lb.)
		Tap Ø	Size	
090. 023. 53. 43. 10	PP	.63"	1"	.08
090. 033. 53. 43. 10	PP	.63"	1-1/4"	.09
090. 043. 53. 43. 10	PP	.63"	1-1/2"	.11





Assembly accessories for use with conventional nozzles in a ball joint.

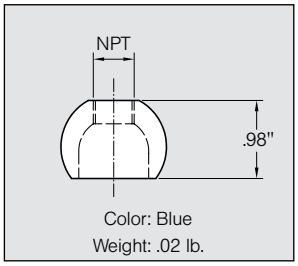
Replacement pipe o-ring

Ordering no.
092. 015. 6C. 04. 32


Weight: .02 oz.

Adapter ball joint

Ordering no.	Material	For Nozzle	
		Connection Female NPT	Series
092. 080. 53. 00. 01	PP	blind nozzle	blind nozzle
092. 080. 53. BD. 01	PP	1/4"	490, 544, 632, 686
092. 080. 53. BF. 01	PP	3/8"	490, 632, 686



Color: Blue
Weight: .02 lb.

Lock nut

Ordering no.
092. 080. 53. 00. 02


Weight: .03 lb.

Accessories

Lances and nozzle headers

Sanitary Retractable Lances
Standard Flanged Lances
Tank Cleaning Lances
STAMM® Showers
Pneumatic Atomizing
Air Blowoff
Quick Disconnect
Flat Fan
Plastic
Specialty

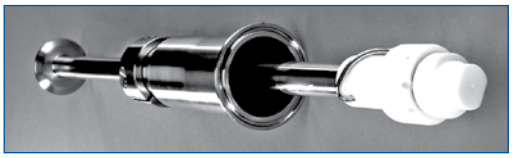
Lances

Custom fabricated for your application

Fabricated Lances

Whereas a header or spray bar is a pipe containing multiple nozzles, a lance is a pipe in which one nozzle is attached to the end of it (see photos). The lance can then be inserted into the target area. This could be a tank, a larger pipe, or a gas or fluid system. The purpose of the lance is to spray at a specific target (such as to clean a tank) or inject fluid into the system (such as gas conditioning). Lechler can fabricate a nozzle lance to perform any spray requirement you may have. Here are some examples:

Sanitary retractable lance



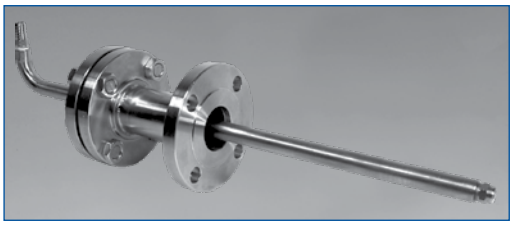
Applications

- Tank cleaning

Features

- Manually inserts and retracts into tank for a non-CIP sanitary application
- Accepts a variety of nozzle types
- Polished finish for sanitary applications

Industrial retractable lance



Applications

- Fluid injection

Features

- Manually inserts; retracts into vessel or pipe
- Flexibility; accepts a variety of nozzles, adjusts to various size flanges; has variable insertion lengths

Standard flanged lance

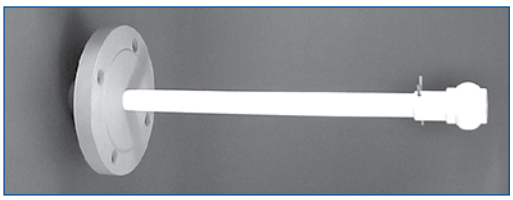
Applications

- Tank cleaning
- Fluid injection

Features

- Inserts into tank for CIP applications
- Accepts a variety of nozzle types

Standard flanged Sanitary Lance



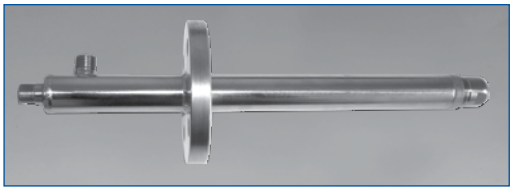
Applications

- Tank cleaning
- Fluid injection

Features

- Inserts into tank for CIP applications
- Accepts a variety of nozzle types
- Materials and connections suitable for sanitary applications

Pneumatic Twin Fluid lance



Applications

- Gas treatment
- Spray drying
- Fluidized bed granulation
- Atomizing of liquids to small droplets
- Combustion of liquids

Features

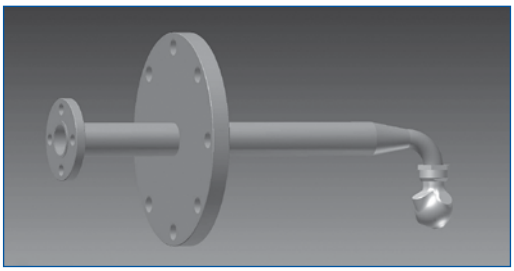
- Two styles: solid jet atomization and pre-atomization
- Solid jet atomization (for higher viscosity fluids)
  - Single atomization of solid fluid jet
  - Maximum free passage (less clogging risk)
  - Suitable for medium to high viscosity fluids
- Pre-atomization (for highest atomization efficiency)
  - Atomization of previously atomized cone spray
  - Finest droplets possible due to double atomization

CIP=Clean-in-Place

Lances

Custom fabricated for your application

ANSI flanged lance



Applications

- Tank cleaning
- CIP applications

Features

- Accepts a variety of sizes
- Flanged connection for more permanent installation of nozzle and lance
- 90° elbow allows for side entry

Tri-clamp connection lance

Applications

- Tank cleaning
- Fluid injection

Features

- Accepts a variety of nozzles
- Quick disconnect for easier use in non-CIP applications

Branched flanged lance

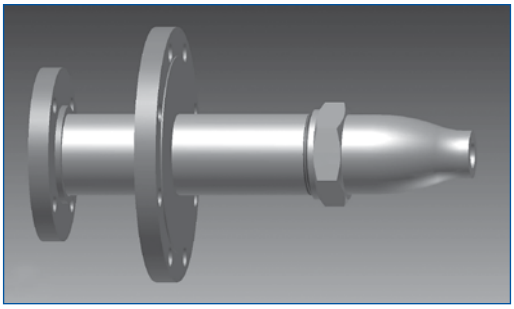
Applications

- Tank cleaning
- Chemical processing

Features

- Accepts a variety of nozzles
- Dual arms allow spraying in multiple directions

CenterJet full cone lance



Applications

- Surface spraying
- Quench cooling
- Fire suppression
- Chemical processing
- CIP applications

Features

- Accepts a variety of nozzle types
- Available in various materials for maximum chemical resistance

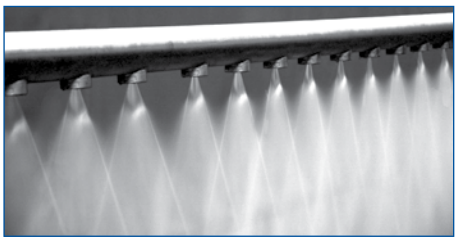
Spray headers

Custom fabricated for your application

Fabricated Headers — Our Specialty

In addition to single nozzles and accessories, Lechler can make fabricated headers in any size or shape for any application you may have in mind. With our knowledge of nozzles and applications, we can design and build a header specifically to perform the task you need for your process. Here are some examples of systems we have designed over the years:

STAMM® Headers (without a self-cleaning device)



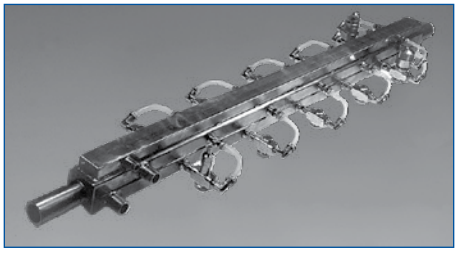
Applications

- Cleaning
- Coating

Features

- Renowned STAMM® quality
- Self-aligning nozzles
- Easy nozzle replacement

AirMist Atomizing Headers



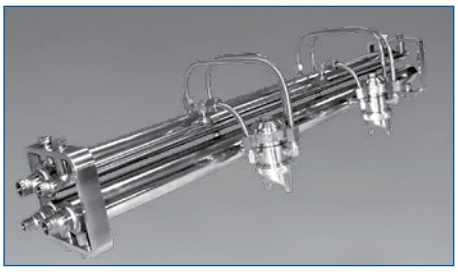
Applications

- Coating
- Lubricating
- Humidification

Features

- AirMist atomizing nozzles
- Optional pneumatic valves for operational control
- Sprays water-like fluids
- Simplifies installation

ViscoMist Atomizing Headers



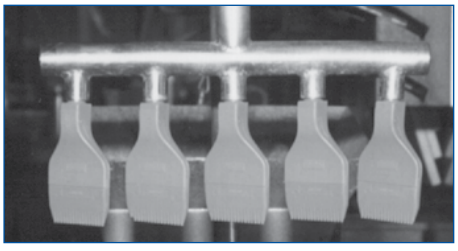
Applications

- Coating
- Lubricating

Features

- ViscoMist atomizing nozzles
- Standard pneumatic valves for operational control
- Sprays more viscous fluids (e.g. oils, syrups)
- Simplifies installation

Air Blowoff Headers



Applications

- Air blowoff
- Cooling
- Drying

Features

- WhisperBlast air nozzles
- ABS Plastic header pipe

Lances and nozzle headers

Spray headers

Custom fabricated for your application

Flat Fan Nozzle Headers

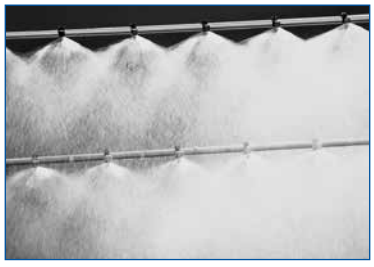
Applications

- Cleaning
- Coating
- Cooling
- Lubricating

Features

- Any style of flat fan nozzles
- Threaded tip (with base and cap)
- Split eyelet (with base and cap)

Full Cone Nozzle Headers



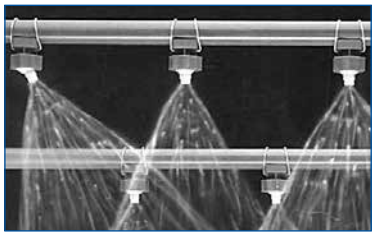
Applications

- Cleaning
- Dust suppression
- Surface spraying

Features

- Axial or tangential full cones
- Nozzles cover an area; target does not need to move through spray to get covered

Quick Disconnect Nozzle Headers



Applications

- Surface treatment
- Parts washing
- Phosphating lines

Features

- Easy Clips clamp to pipe
- Split eyelets tighten around pipe
- Twistloc nozzles apply with a hand twist

Custom Specialty Headers

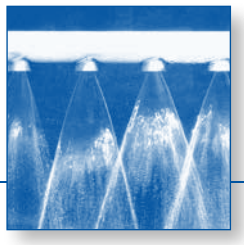
Applications

- Foam control (circular header)
- Surface spraying (inverted U header)
- Poultry processing (custom-shaped header)

Features

- Custom-made for application
- Nozzles aimed only at target regardless of header shape

STAMM® shower headers with built-in cleaning device



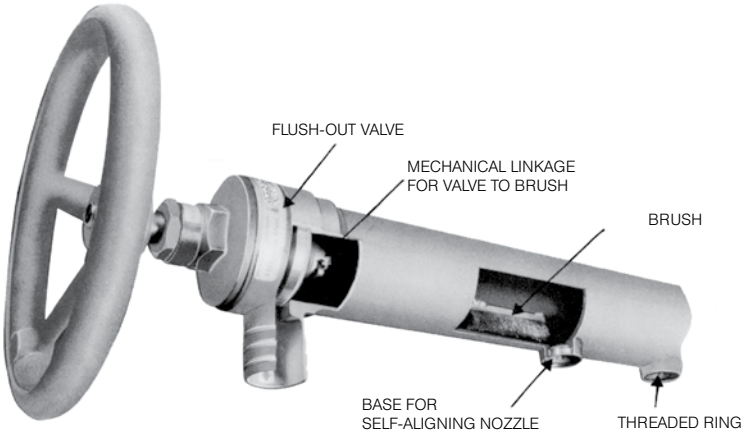
Engineered and manufactured by Lechler Inc. in the USA under license by the STAMM® Company in Germany, these shower headers with built-in cleaning device are recognized worldwide as the original "brush and flush" shower system.

Shower pipe and nozzles remain clog-free due to the unique flush system design. A simple turn of the handwheel sweeps contaminants away from the nozzle orifices and directs the debris down the flush-out valve. Since these showers eliminate costly down time for cleaning, they are especially cost-effective in applications subject to high fluid contamination.
Some features of the self-cleaning shower system are:

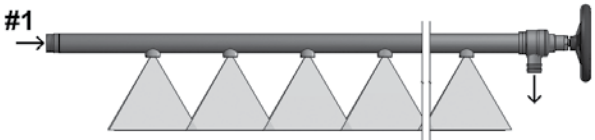
- Header pipe available in sizes from 1½" to 6" in diameter.
- Contaminants flushed via special valve, preventing them from clogging orifices or reaching showered surface.
- System accommodates wide range of flow rates.
- Stainless steel construction throughout.
- Highly efficient, interchangeable nozzles are self-aligning.
- Systems are tailored to your specific application.

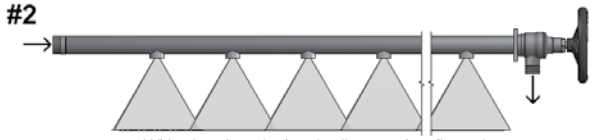
Refer to the next page for a selection of nozzles specifically designed for use in STAMM® showers.

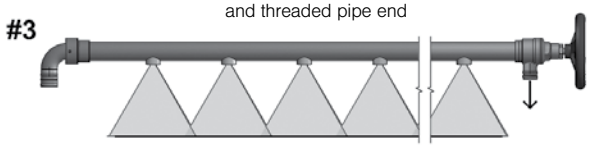
Typical applications:
- Cleaning of wires and felts
- Humidification
- Knock-off
- Lubrication

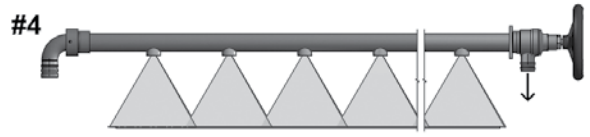


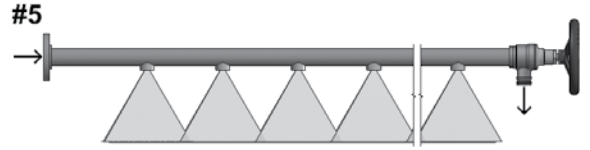
Standard shower models (Other configurations also available; note that models #7–10 have no cleaning device)

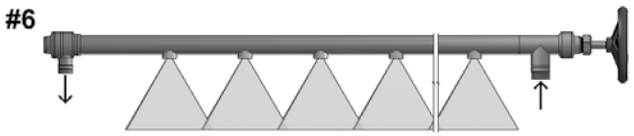
#1

With cleaning device and threaded pipe end

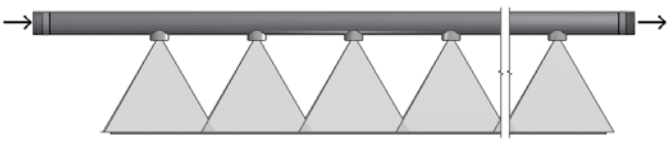
#2

With cleaning device (wall-mounting flange) and threaded pipe end

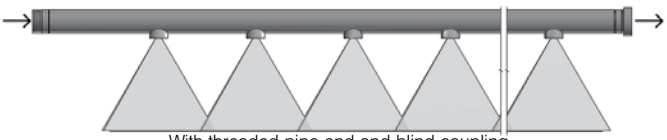
#3

With cleaning device and 90° elbow-hose-coupling

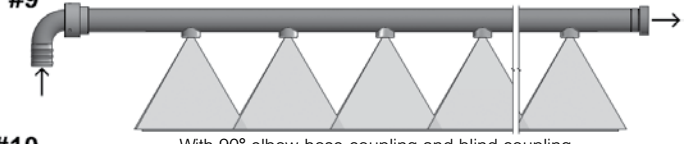
#4

With cleaning device (wall-mounting flange) and 90° elbow-hose-coupling

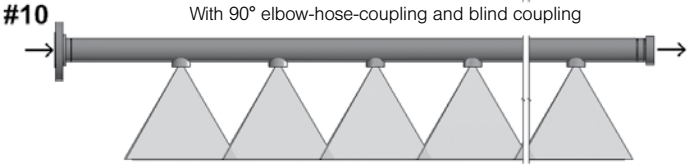
#5

With cleaning device and pipe flange

#6

With opposite cleaning device

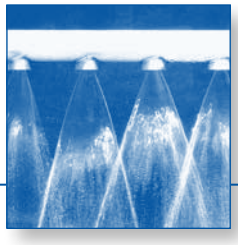
#7

With threaded pipe ends

#8

With threaded pipe end and blind coupling

#9

With 90° elbow-hose-coupling and blind coupling

#10

With pipe flange and blind coupling

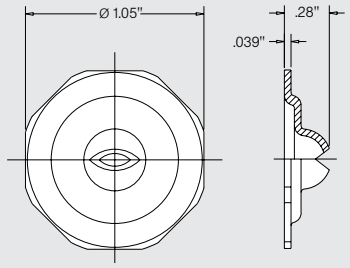
Nozzles
for STAMM® shower headers
Series 626 / 5SW



Designed specifically for STAMM® shower headers, these nozzles can serve as replacements or to change the flow rate of an existing unit. Self aligning when used with STAMM® or Lechler bases. 317 LN stainless steel construction for long service life. Available in 60°, 30°, and 15° flat fans or 0° solid stream ("needle jet") versions.

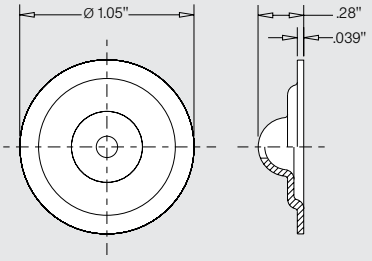
Applications:
- For use on STAMM® showers
- Paper production
- Belt filter press cleaning in wastewater treatment

∢ 15°–60°



Weight: .01 lb.

∢ 0°



Weight: .01 lb.

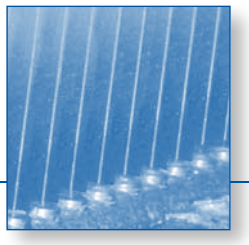
Notes: Also available upon request are: (1) nozzles with other flow rates and (2) solid stream nozzles (0°) with a ruby tip orifice. The number in the Equiv. Orifice Diam. column represents the Nozzle # and spray angle stamped on each nozzle; e.g., the nozzle stamped 1.0 / 60 refers to 626.364.1F.37. Lechler has blank shower nozzles with no orifices which can be used on STAMM® showers when a particular nozzle opening needs to be blocked. The part number for this blank nozzle is **006.261.1F.00**.

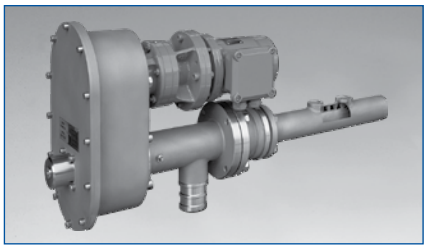
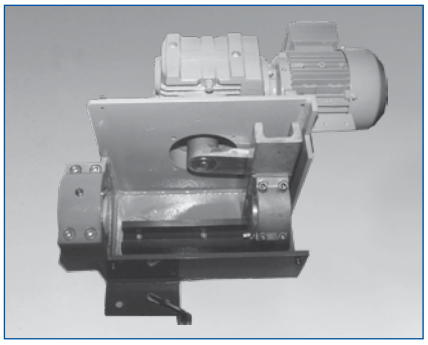
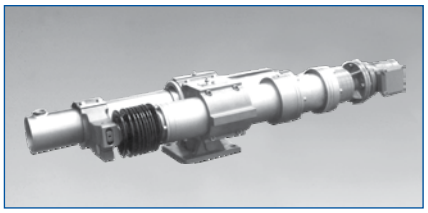
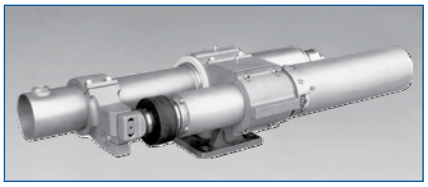
Spray angle ∢	Ordering no.	Equiv. Orifice Diam. (mm)	Flow Rate (Gallons Per Minute) 40 psi	60 psi	100 psi	150 psi	250 psi	500 psi	1000 psi
60°	**626. 364. 1F. 37**	1.0	.20	.24	.31	.38	.49	.69	.98
	626. 404. 1F. 37	1.2	.31	.38	.49	.60	.77	1.1	1.6
	626. 464. 1F. 37	1.5	.50	.61	.79	.96	1.2	1.8	2.5
	626. 564. 1F. 37	2.0	.77	.95	1.2	1.5	1.9	2.7	3.9
	626. 644. 1F. 37	2.5	1.2	1.5	2.0	2.4	3.1	4.4	6.2
	626. 724. 1F. 37	3.0	2.0	2.4	3.1	3.8	4.9	6.9	9.8
	626. 804. 1F. 37	4.0	3.1	3.8	4.9	6.0	7.8	11.0	15.5
	626. 884. 1F. 37	5.0	4.9	6.0	7.8	9.6	12.3	17.4	25
	626. 964. 1F. 37	6.0	7.8	9.5	12.3	15.0	19.4	27	39
	627. 004. 1F. 37	7.0	9.8	12.0	15.5	18.9	24	35	49
	627. 044. 1F. 37	8.0	12.4	15.2	19.6	24	31	44	62
30°	**626. 362. 1F. 37**	1.0	.20	.24	.31	.38	.49	.69	.98
	626. 482. 1F. 37	1.5	.50	.61	.79	.96	1.2	1.8	2.5
	626. 562. 1F. 37	2.0	.77	.95	1.2	1.5	1.9	2.7	3.9
	626. 642. 1F. 37	2.5	1.2	1.5	2.0	2.4	3.1	4.4	6.2
	626. 722. 1F. 37	3.0	2.0	2.4	3.1	3.8	4.9	6.9	9.8
	626. 802. 1F. 37	4.0	3.1	3.8	4.9	6.0	7.8	11.0	15.5
	626. 882. 1F. 37	5.0	4.9	6.0	7.8	9.6	12.3	17.4	25
15°	**626. 361. 1F. 37**	1.0	.20	.24	.31	.38	.49	.69	.98
	626. 561. 1F. 37	2.0	.77	.95	1.2	1.5	1.9	2.7	3.9
	626. 721. 1F. 37	3.0	2.0	2.4	3.1	3.8	4.9	6.9	9.8
0°	**5SW. 300. 1F. 00**	0.7	.09	.11	.14	.17	.22	.31	.44
	5SW. 320. 1F. 00	0.8	.13	.15	.20	.24	.32	.45	.63
	5SW. 340. 1F. 00	0.9	.15	.19	.25	.30	.39	.55	.77
	5SW. 360. 1F. 00	1.0	.20	.24	.31	.38	.49	.69	.98
	5SW. 390. 1F. 00	1.2	.31	.38	.49	.60	.77	1.1	1.6
	5SW. 460. 1F. 00	1.5	.50	.61	.79	.96	1.2	1.8	2.5
	5SW. 540. 1F. 00	2.0	.77	.95	1.2	1.5	1.9	2.7	3.9
	5SW. 620. 1F. 00	2.5	1.2	1.5	2.0	2.4	3.1	4.4	6.2
	5SW. 680. 1F. 00	3.0	2.0	2.4	3.1	3.8	4.9	6.9	9.8
	5SW. 780. 1F. 00	4.0	3.1	3.8	4.9	6.0	7.8	11.0	15.5
	5SW. 860. 1F. 00	5.0	4.9	6.0	7.8	9.6	12.3	17.4	25

Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

(See page 12 for symbol definitions.)

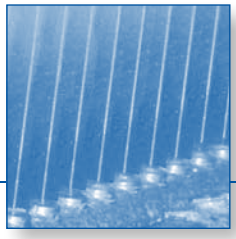
Automatic cleaning device and oscillators for STAMM® headers

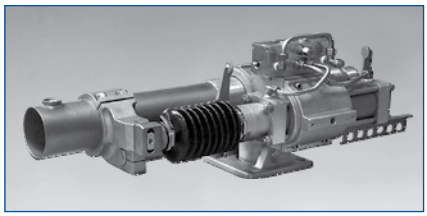
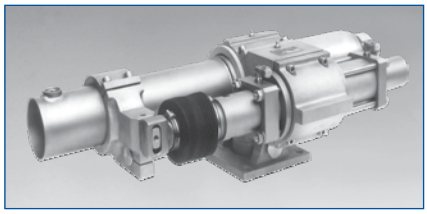
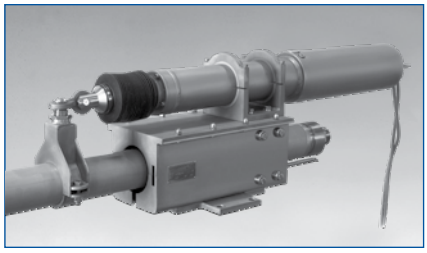


Part Number	Description	Stroke length	Shower size
10.900 **Automatic Cleaning Device** 	Automatic regular cleaning of nozzles at programmable intervals; existing showers can be retrofitted with this device.	N/A	All sizes
10.200 E **Oscillator** 	Oscillator with electro-mechanical crank drive for side-to-side movement by a sliding block and axial guide rail.	200 mm Non-adjustable	2" to 4"
10.510 LSE-R **Oscillator** 	Oscillator with electro-mechanical gear motor that rotates a double ball screw spindle which converts rotation into linear stroke movement.	2" to 3": 206.4 mm or 301.4 mm 4" to 6": 203.2 mm or 304.2 mm	One size for 2" to 3" diameter One size for 4" to 6" diameter
10.510 EC **Oscillator** 	Oscillator with electro-mechanical step motor with a planetary gear reducer to drive a ball screw spindle.	1–200 mm Infinitely adjustable	2" to 6"

Lances and nozzle headers

Automatic cleaning device and oscillators for STAMM® headers



Part Number	Description	Stroke length	Shower size
10.591 S **Oscillator** 	Oscillator with oil-hydraulic drive with infinitely adjustable stroke speed provided by micro-flow control valve.	50–200 mm Infinitely adjustable 50–300 mm Infinitely adjustable	2" to 6"
10.691 S **Osciallator** 	Oscillator with oil-hydraulic drive with electronic oil flow control for automatic adjustment of stroke speed.	1–200 mm Infinitely adjustable 1–300 mm Infinitely adjustable	2" to 6"
10.700 **Oscillator bearing** 	Wear-resistant bearing made of stainless steel; installs in any position and fits all drive alternatives.	N/A	All sizes

Lances and nozzle headers

Questionnaire Nozzle Arrangement

Name _____

Company _____ Phone _____

Address _____ Fax _____

City _____ E-mail _____

State/Province _____ Zip Code/Postal Code _____

Description of application

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Operating conditions _____

Atmosphere _____

Pressure _____ Temperature _____

_____

_____

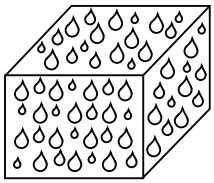
_____

_____

_____

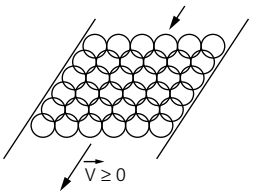
1. Distribution of liquid

1.1 Droplet distribution in space



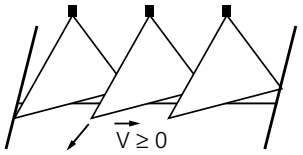
Atomization:
☐ Very fine 20µm-150µm
☐ Fine 150µm-300µm
☐ Middle 300µm-1000µm
☐ Coarse >1000µm
Space dimensions _____

1.2 Liquid distribution on surface



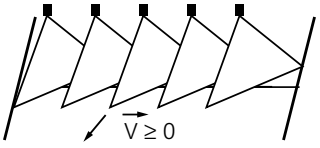
☐ Normal liquid distribution
☐ Thin film
☐ Thick film
Surface width _____
Belt speed _____

1.3 Even distribution in one line on moving belt



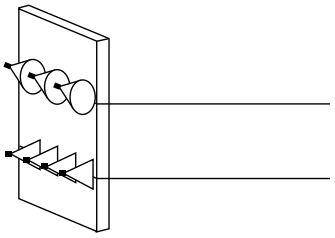
☐ Normal liquid distribution
☐ Thin film
☐ Thick film
Belt speed _____

1.4 Even distribution in one line with high power



Belt width _____
Belt speed _____

1.5 Application: Spraying on vertical surfaces



☐ Surface distribution (full cone nozzles)

☐ Distribution in line (flat fan nozzles)

1.6 Other applications

2. Kind of distribution

☐ Full cone

☐ Hollow cone

☐ Flat fan

☐ Solid stream

Spray angle ☐ 0° ☐ 15° ☐ 30° ☐ 45° ☐ 60° ☐ 90° ☐ 120°

3. Liquid to atomize _____

Volume of flow _____ gpm

Ingredients

_____

_____

_____

Density _____ Viscosity _____

Solid material content _____ in %

Liquid temperature _____ in °F

4. Further plant equipment

4.1 Liquid

Pump _____ psi _____

Volume of flow _____ gpm

4.2 Possibility of twin fluid atomization

Assisting agent

☐ Compressed air Pressure/Volume _____

☐ Steam Pressure/Volume _____

☐ Others _____

Temperature of assisting agent _____ °F

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_____

_____

_____

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_____

_____

Our address

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