PNR

SPRAY NOZZLES FOR INDUSTRIAL APPLICATIONS

SPRAY NOZZLES & ASSEMBLY FITTINGS

GENERAL CATALOGUE

PNR ITALIA

PNR Italy, founded in 1968, has always dedicated itself to the design and manufacturing of industrial spray nozzles and systems. In all these years PNR made major investments both in machinery and human resources to develop top quality products and today is one of the most modern spray nozzles manufacturing facilities in the world. We manifacture thousands of different products to offer our customers one of the most complete product ranges in the world, and keep focused on research plus innovation. Our machine tool park includes all high quality and latest model CNC machines, many of these built to our requirements to accomplish special manifacturing jobs. All products and their performance are strictly controlled and our Quality control system is certified by DNV according to ISO 9001 norms.Our nozzles design requires expertise in hydrodynamics and fluids handling technology as well as a deep manufacturing know-how to give the best performances. It's not just a matter of mechanical processing.
Nozzles play an important role in industry and only the use of reliable quality products prevent the risk of damage and serious losses in production processes.PNR has extended it sales network to 55 Countries all over the world in 2015. Our sales engineers, fully trained in all industrial applications of our products and with a high technical knowledge, can help customers in finding the best solution for their needs, from process planning to production facilities improvement. We do not supply products only but also provide integrated services and technical assistance.

DISCLAIMER

Our products are manufactured with the best care and according to the latest developments of the technology available. However we cannot assure that every one of our products is perfectly fit for every specific application. The information in this catalogue is provided “as seen” and so we offer no warranty of any kind with respect to the subject matter or accuracy of the information contained herein. This publication may include technical inaccuracies or typographical errors and changes may be periodically made to the information herein without prior notice.As a result of continuous product improvement our documentation is regularly updated: please visit our website www.pnr.eu to be always updated.

PRODUCT WARRANTY

PNR products will be replaced or repaired at the option of PNR and free of charges if found defective in manufacturing, labelling and packaging. The above conditions will apply if notice of defects is received by PNR within 30 days from date of product installations or one year from date of shipment. The cost of above said replacement or repair shall be the exclusive remedy for any breach of any warranty, and PNR shall not be held liable for any damage due to personal injuries or commercial losses coming from product malfunction.
It is self-understood that no warranty may apply in case our products have been operated under nonacceptable conditions, like for example (but not limited to):
– Operation at pressures exceeding those shown in catalogue performance table
– Operation with or exposure to liquids containing abrasive particles
– Operation with or exposure to liquids producing a chemical attack on the nozzle material
– Mechanical damages to nozzle orifices, nozzle spray edge or body due to careless handling or assembling.
In all above cases, the costumer must accept a nozzle life reduction below life expected, or performance parameters below the values in the catalogue.
The guarantee may be exercised as follows:
– By sending a precautionary report to PNR on the detected damages. This report can also be sent by email to this address: quality@pnr.it
– If PNR ascertains that the manufacturing faults are actually subject to the warranty, the product shall have be returned to the manufacturer in its original packaging prior request of authorization to the manufacturer and receipt of manufacturer’s written authorization.
– The rejected goods shall have be returned by the means that PNR will communicate to the customer and the transportation costs of returned merchandise will be entirely borne by the manufacturer.

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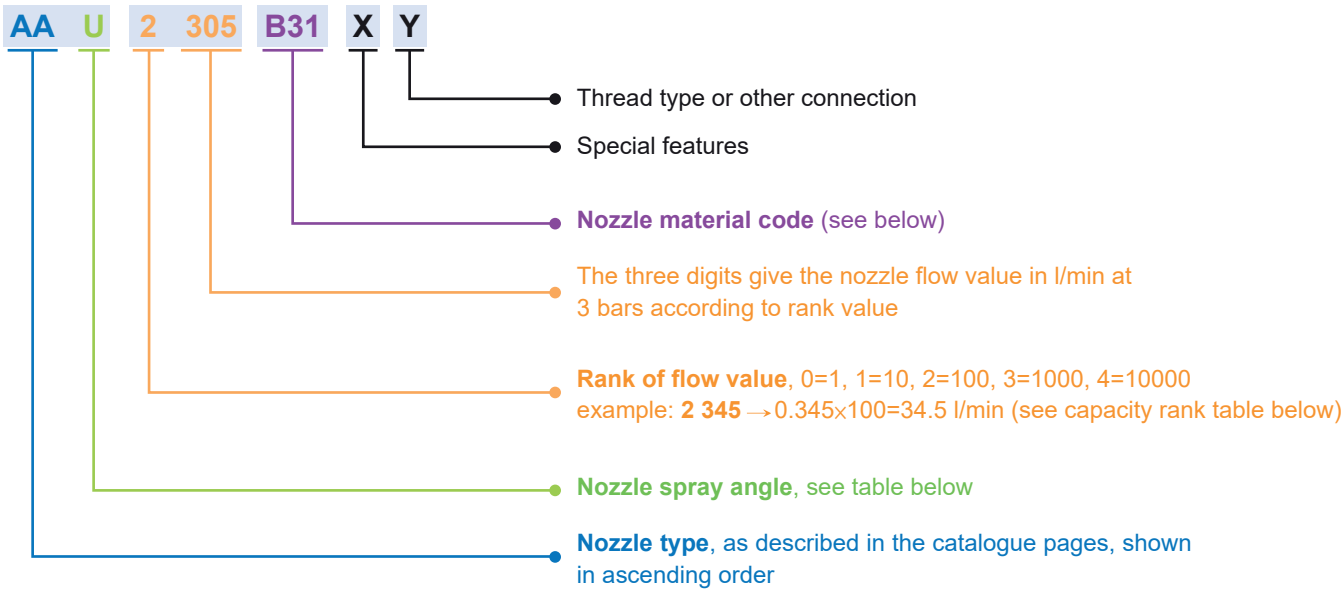
Our Quality System is certified ISO 9001:2015
COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV GL = ISO 9001:2015 =

NOZZLE IDENTIFICATION CODES

As any other industrial product, spray nozzles need to be precisely identified by means of a code in order to avoid mistakes.
PNR coding system was created bearing in mind the following requirements:
- Codes must be easily processed by a computer, in ascending order.
- Codes must be self-explaining with no need of additional descriptions.
- Codes must give the basic nozzle specifications so to be easily found in the catalogue.

Therefore, we have created our coding system as described here below:



Capacity rank

Nozzles nominal flow rate, measured at 3.0 bar are highlighted on a yellow background in the catalogue tables. Flow values were calculated at different pressures.

Rank	Flow digits	Actual flow (l/min)
0	0 490	0.49
1	1 490	4.90
2	2 490	49.0
3	3 490	490
4	4 490	4900

Some spray angle codes (degrees)

These codes serve as an indication only. Based on different types of nozzles, their significance can be occasionally different.

Code	Spray angle	Code	Spray angle	Code	Spray angle
A	0°	L	40°	T	80°
B	15°	M	45°	U	90°
C	20°	N	50°	J	110°
D	25°	Q	60°	W	120°
F	30°	R	65°	Y	130°
H	35°	S	75°	Z	180°

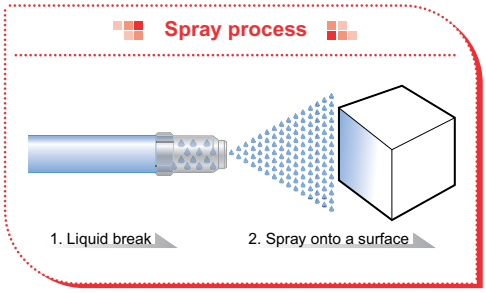
Nozzle material codes

A1	Carbon steel
A2	High speed steel
A8	Zinc coated steel
A9	Nickel coated steel
B1	AISI 303 Stainless steel
B2	AISI 304 Stainless steel
B21	AISI 304L Stainless steel
B3	AISI 316 Stainless steel
B31	AISI 316L Stainless steel
C2	AISI 416 Stainless steel, hardened
D1	Polyvinylchloride (PVC)
D2	Polypropylene (PP)
D3	Polyamide (PA)
D4	Nylon, Glassfibers reinforced
D5	Talcum filled Polypropylene
D6	Glassfibre reinforced PP
D7	High density polyethilene
D8	Polyvinylidenefluoride (PVDF)
D82	PVDF, Injection molded
E0	EPDM
E1	Polytetrafluorethylene (PTFE)
E2	PTFE (15% glassfibers)
E31	Acetalic resin (POM)
E6	LUCITE ® (PMMA)
E7	Viton
E8	Synthetic rubber (NBR)
F5	Ceramic
F30	Ruby insert, 303 body
F31	Ruby insert, 316 body
F32	Diamond insert, 303 body
F33	Diamond insert, 316 body
G1	Cast iron
H1	Titanium
L1	Monel 400
L2	Incolloy 825
L8	Hastelloy C276
P6	Acr. But. Styrene (ABS)
P8	EPDM 40 Shore
T1	Brass
T2	Brass, chrome plated
T3	Copper
T5	Bronze
T8	Brass, nickel plated
T81	Brass, electroless nickel plated
V1	Aluminum
V7	Aluminum, electroless n. plated

THE PROCESS OF ATOMIZATION

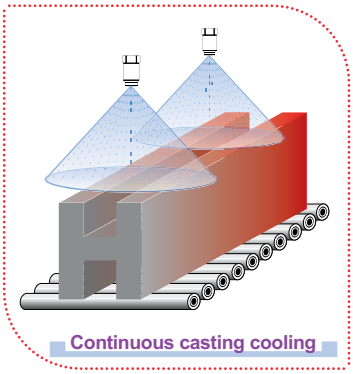
A liquid spraying process can be described as consisting of two phases, namely:
1. breaking of the liquid into separate droplets
2. directing the liquid drops onto a surface or an object, to achieve the desired result.

Modern technology allows for a strict control of different parameters of a liquid spray; for example precise information can be obtained about droplet size spectrum, droplets speed and liquid distribution onto the spray target. In recent years we've supported our customers in improving their productivity and market share by providing them cutting edge industrial techniques.
PNR is you best partner to help you enhance your productivity and quality.

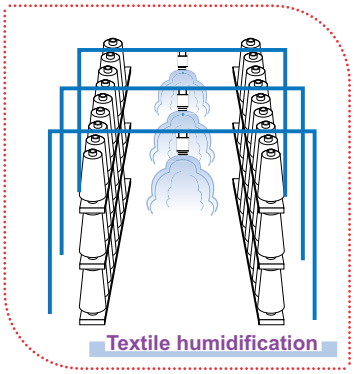


APPLICATIONS

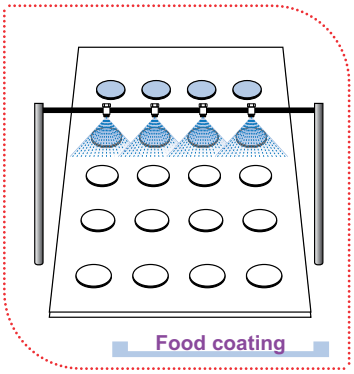
Spraying a liquid through a spray nozzle can serve different purposes, among which the most important are the following:



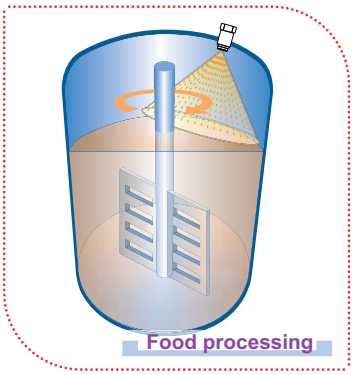
Cooling: heat transfer by spraying liquids onto the products surface for a rapid cooling, such as continuous casting cooling in steelworks.



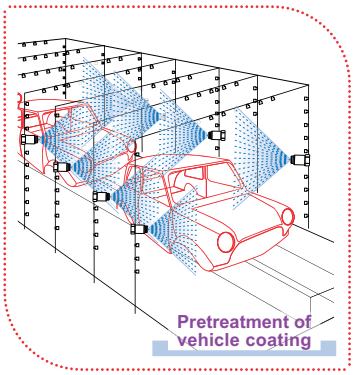
Humidification: spray of very little quantities of liquid onto the products surface into special chambers or rooms to raise relative humidity. A typical application is textiles humidification.



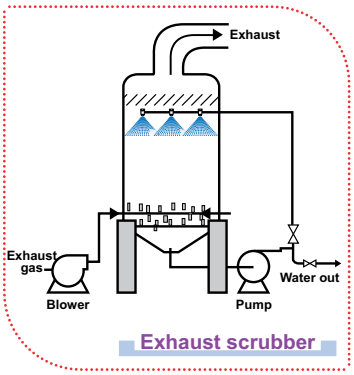
Coating: application of coatings or liquids on the food products surface. For example: oil-spraying on bread.



Food processing: spray to add specific ingredients or substances to speed up chemical reactions.
For ex.: addition of fructose in fruit juices, etc.



Washing: remove dirt from the product surface spraying liquids at high pressure, like in vehicles pre-wash treatment.



Pollution control: use of atomized scrubbing liquids to capture particulate matter and/or gaseous pollutants in liquid droplets, like in web scrubbers and spray towers.

How to choose the most suitable nozzle among those listed?

This is the first question most customers ask themselves. Do not be afraid to choose the wrong one. Contact us, tell us what you need and we will help you to make the right choice explaining how our nozzles work in a simple and user-friendly way.

SPRAY NOZZLES TECHNICAL FEATURES

Several technical features must be taken into account to select the proper nozzle. This will be dealt with on the following page.

1. NOZZLE EFFICIENCY

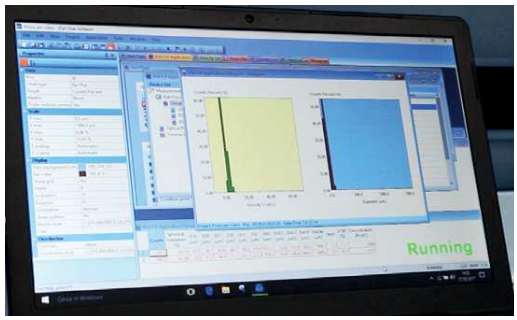
A spray nozzle is a device that turns the pressure energy of a liquid flow into kinetic energy. The nozzle efficiency can be defined as the ratio between the energy available at the nozzle inlet and the energy wich is actually used to increase the liquid speed and create the spray, the difference being the energy lost during the process because of friction. Depending on the nozzle type and for a good quality machining, the nozzle efficiency varies between 55% and 95% for the types that are commonly used in industrial processes. What above stated is not valid for air-assisted atomizers which require a much higher energy because of the losses inherent in the energy transfer from compressed air to liquid surface.

2. DROPLETS SIZE

The droplets size depends on the structure of the atomizer, intensity of the liquids energy, liquid surface tension and density. The size of the atomized droplets is not uniform. Therefore, the average droplets size becomes an important factor. For example, the droplets size in gas quenching towers is extremely important. If their size is too big, they do not fully evaporate leading to dust bag failure. On the contrary, if the droplets size is too small, it's not possible to lower the temperature to the desired level and high temperature may cause the dust bags burn out.

There are four ways to express the droplets size:

The Sauter Mean Diameter (SMD) is the most commonly used. It refers to the drop volume/surface area ratio and it's often shown as D_{32}, µm(Micron) unit. (1µm=10^{-3}mm)



ARITHMETIC MEAN DIAMETER

This is a diameter value which, multiplied by the local number of droplets in the sample, equals the addition of all droplets diameters.

SURFACE MEAN DIAMETER

This is a diameter of such a droplet whose surface, multiplied by the total droplets number, equals the sum of all droplets surfaces.

1 2

3 4

VOLUME MEAN DIAMETER

This is the diameter of such a droplet whose volume, multiplied by the total droplets number, equals the sum of all droplets volumes.

SAUTER MEAN DIAMETER (D_{32})

This is the diameter of such a droplet whose volume/area ratio, equals the ratio between the sum of all droplet volumes divided by the sum of all droplet surfaces.

MEASUREMENT METHODS

SMD is tested using pure water at 30°C

Method by immersion

A glass dish containing 60% of silicone oil is passed quickly under the spraying nozzle. Silicon oil is heavier so the water droplets float on the oil surface. Every droplet diameter is recorded and the resulting average is the SMD. This is a difficult method to perform and for this reason it's rarely used.

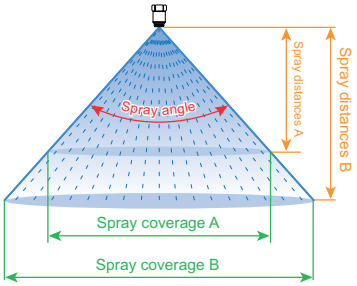
Laser interpherometer test

As different droplets have different PI, they produce different refraction angles. Therefore laser light can be used to measure their size. This type of method is fast and precise. PNR can perform this test with technologically advanced equipments and provide complete documentation containing test reports. Please contact us for more information.

SPRAY NOZZLES TECHNICAL FEATURES

3. SPRAY ANGLE

A spray angle is the angle formed by the cone of liquid leaving a nozzle orifice.
The spray angle and the distance between the nozzle orifice and the target surface to be covered determine the spray coverage. (See page 116)



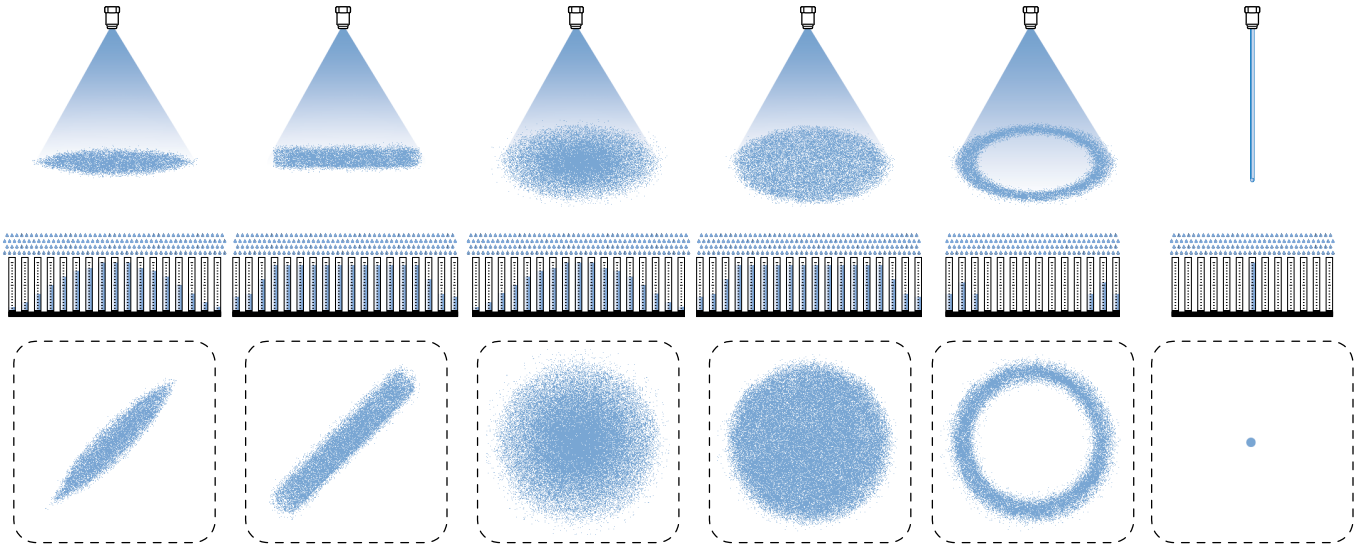
4. IMPACT FORCE

The impact force is the force generated by the jet of water deflected by the impact surface and its strength can be expressed as a force in kg or pounds or as a pressure in a given point in kg/mm^2 or lb/inch^2. The uniformity of a jet impact force and distribution influence the washing effect. Under the same operating conditions (same pressure and capacity), different types of nozzles can be used to perform an impact force test and the results are shown here below.

Straight nozzles > Flat fan nozzles > Hollow cone nozzles > Full cone and square nozzles

5. DISTRIBUTION

Engineers design nozzles with different spray distribution patterns. Patterns can be solid stream, full cone, hollow cone, flat spray, spoon flat fan. The nozzle design aims at the uniformity and impact force of the jet sprayed whether nozzles are used individually or overlapping. Below figures show detailed information for a variety of capacities and spray sections. We mark distribution on every page for your convenience.



Flat fan
convex distribution

Flat fan
even distribution

Full cone
convex distribution

Full cone
even distribution

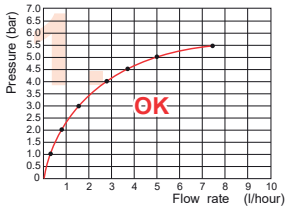
Hollow cone
concave distribution

Straight
single-point distribution

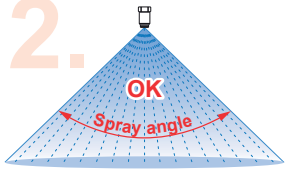
SPRAY NOZZLE

Although nozzles are used to atomize liquids, the atomization precision and effect are deeply influenced by their quality. With our expertise we fully understand our customers needs and expectations and our engineers set high quality control standards not only for the operating precision of our nozzles but also for product inspection. PNR ensures the best atomizing effects and provides capacity and spray angle accuracy with a tolerance of ±10% guarantee. Below highlights of quality inspection.

1. Check if liquid flow and pressure are in direct proportion.
2. Check if spray angle is as required.
3. Check if capacity is as required.
4. Check if distribution is uniform.
5. Check if droplets diameter is uniform

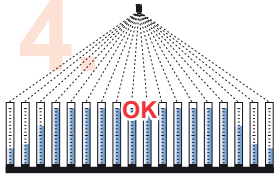


Check if liquid flow and pressure are in direct proportion.



Check if spray angle is as required.

Check if capacity is as required.



Check if distribution is uniform.

Check if droplets diameter is uniform

TECHNIQUES FOR SPRAY PRODUCTION

Many different hydrodynamics techniques can be used to produce a spray and most of them are used today for nozzles to be applied in industrial processes.

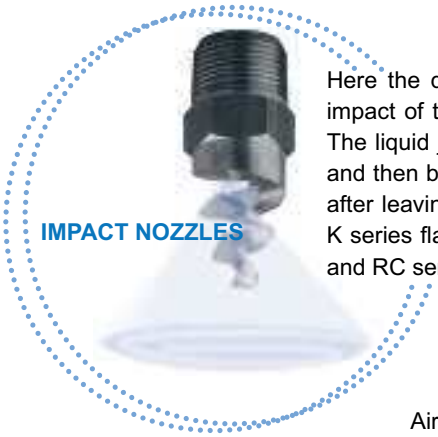
PRESSURE NOZZLES

This is the simplest type of nozzle where an orifice is opened into a chamber where the liquid to be sprayed is fed under pressure.
A spray is produced through the orifice with spray pattern, flow rate and spray angle depending upon the orifice edge profile and the design of the inside pressure chamber. Typical pressure nozzles are J series straight nozzles and F series high pressure flat fan nozzles.

Turbulence nozzles use specially shaped vanes which force the pressurized liquid into a whirl chamber producing its high-speed rotation. This breaks up the liquid which exists the nozzle orifice atomized at high-speed. Different nozzle structures and flow rates produce hollow cone, full cone and full square cone spray patterns. Typical turbulence nozzles are RA series hollow cone and D series full cone nozzles.

TURBULENCE NOZZLES

TECHNIQUES FOR SPRAY PRODUCTION



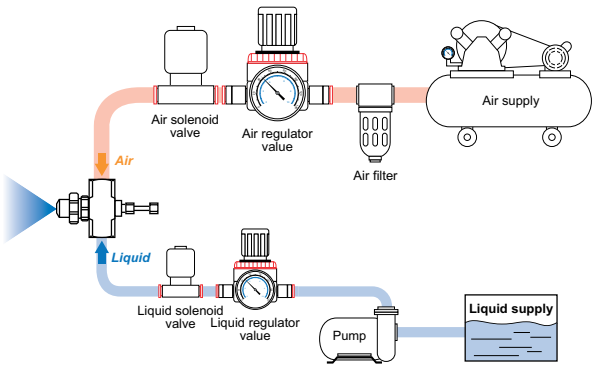
IMPACT NOZZLES

Here the desired spray shape is obtained producing an impact of the liquid jet onto a properly designed surface. The liquid jet is subsequently changed into a fluid lamina and then broken into drops with the desired spray pattern after leaving the nozzle edge. Typical impact nozzles are K series flat fan nozzles, E series spiral full cone nozzles and RC series hollow cone nozzles.

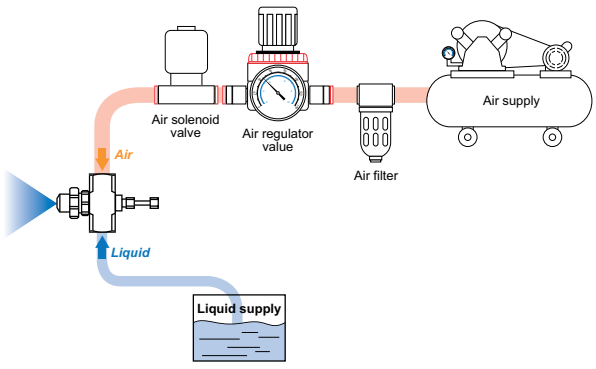
Air-assisted atomizers use their special design and pressurized gas to atomize a liquid and break it into tiny droplets (the smallest average particle size: 10 micron). Please refer to catalogue CTG AZ and contact us.

Air-assisted nozzles - Depending on the liquid supply, these nozzles are of two types: Pressure nozzles and Siphon nozzles.

PRESSURE NOZZLES



SIPHON NOZZLES



Ultrasonic atomizers are sister products of air-assisted atomizers. The front-end has a titanium ultrasonic generator. It uses the energy of the high-speed impact to produce a high-frequency oscillation that micro-atomizes the liquid droplets. The special design produces tiny and uniform droplets (the average smallest particle size: 7 Micron). The advantages are vital to many applications. Ultrasonic atomizers have two phases of atomization. Phase one: liquids mix with pressured air and produce tiny droplets to spray. Phase two: when the atomized droplets hit the ultrasonic generator they get micro-atomized generating smaller droplets. Please contact us for catalogue CTG AZ and more information.

FULL CONE PATTERN

The shape of the tip determines the spray range of full cone nozzles. A typical application of these nozzles is continuous casting cooling when it's necessary to spray the same volume of liquids onto a surface to cool objects.
Our engineers design a series of full cone nozzles to satisfy different needs.
No matter what kind of full cone nozzles they are, they have unique applications.

STANDARD FULL CONE (Turbulence nozzle)

These nozzles use a specially shaped vane placed at the nozzle inlet to give a rotational speed to the fluid flowing through the nozzle.
Because of the rotational speed of the fluid, water exiting the nozzle orifice is subjected to centrifugal force and opens up in the shape of a full cone.
The extent of the angle of the cone is a function of both exit speed (created from the inlet pressure) and the internal design of the nozzle. It can vary in practice from 15° to 120°.

These nozzles can be also produced as square full cone nozzles where the square shape of the pyramidal spray is obtained by a special design of the outlet orifice.
Two important details have to be noted from the system designer when using these type of nozzles:

1. The spray angle is measured on the side of the square section.
2. The square section of the spray rotates within the distance from the nozzle orifice to the target area.

SPIRAL FULL CONE (Impact nozzle)

This is not properly a full cone but rather a continuous liquid curtain evolving with the shape of a spiral inside a conical volume. The disadvantage of a scarcely even distribution is compensated by an exceptionally good resistance to clogging, large orifice and vaneless which make this nozzle the best choice in those applications such as wet scrubber, fire-fighting systems, etc.

MULTIPLE FULL CONE (Turbulence nozzle)

Several nozzles are grouped in a cluster with different spray directions. These nozzles produce large capacity of watermist.
If you need both large capacity and mist, multi-orifice full cone nozzles are the best option.

FLAT FAN SPRAY PATTERN

A flat fan spray nozzle serves the purpose of spraying onto a surface or an object moving in a transverse direction with respect to the one of the jet surface, a typical example being the nozzles in a car washing tunnel. The vast majority of flat spray nozzles used in the industry work according to one of the following principles.

IN LINE FLAT FAN (Pressure nozzle)

This is the general purpose flat fan nozzle where the liquid enters the nozzle in line with the axis length and is fed to a pressure chamber from where it is ejected through the nozzle orifice. Flow value and spray angle are determined respectively from the orifice cross section and the orifice edge profile.

IN LINE STRAIGHT JET (Pressure nozzle)

Straight nozzles can be considered as flat fan nozzles as the only difference is the spray angle which is zero degrees in straight nozzles. These nozzles are often used in high-pressure operating environments where the wear resistance of the nozzles is very important. It ensures optimum service life and spray orientation. PNR offers a wide range of material selection.

- 416 hardened stainless steel
- Ruby nozzle + stainless steel body
- Tungsten carbide nozzle tip + stainless steel body

SPOON FLAT FAN (Impact nozzle)

These nozzles feature a flat fan spray. According to the different arc design, these spoon flat fan nozzles can be of two types: high impact with narrow spray angle or low pressure with wide spray angle.

- Under the same operating conditions, narrow angle high impact nozzles produce a higher impact force than standard flat fan nozzles. They are suitable for cleaning environments that need strong impact force.
- Low pressure nozzles with wider spray angle produce a 130° spray angle and a large area of water curtain effect. Low-impact spray nozzles are widely used in various applications such as foam removal, water curtain for gas separation, fruits and vegetables cleaning.

High impact types

Large spray angle

HOLLOW CONE SPRAY PATTERN

A hollow cone spray pattern is made of droplets concentrated on a ring-shaped impact area, with no droplets falling inside the conic volume. Under the same operating conditions, hollow cone nozzles produce a very fine atomized liquid mist and can capture a higher rate of suspended particles than other nozzles. They are widely used in exhaust scrubbers and gas cooling.

HOLLOW CONE (Turbulence nozzle)

These nozzles use a tangential injection of liquid into a whirling chamber to generate centrifugal forces which break up the liquid vein as soon as it leaves the orifice. Precisely designed orifice profiles, making use of the Coanda effect, provide the ability to obtain very large spray angles.

HOLLOW CONE (Deflection nozzle)

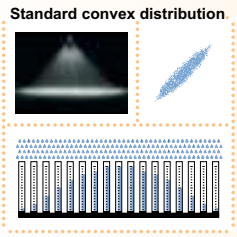
A hollow cone can also be obtained taking a liquid flow to change direction onto a properly designed surface in order to break the liquid into droplets and distributes them as a hollow cone spray pattern with clog resistance. This kind of nozzle is mainly used for applications in fire-fighting systems.

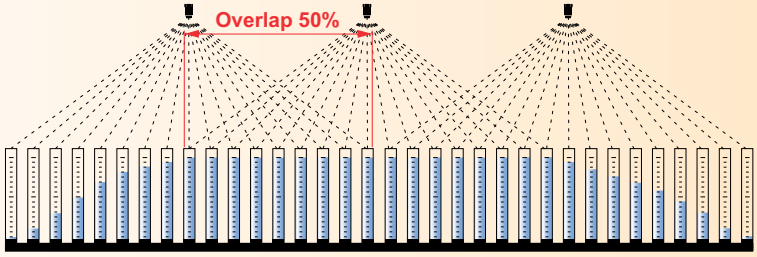
Correct overlapping

When several nozzles are used to spray, it's very important to produce a uniform spray distribution. The correct sprays overlapping methods are shown here below.

Standard convex distribution

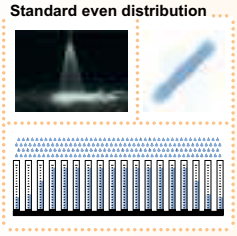
In a standard convex spray distribution the medium section has a larger capacity than the two lateral sections. It's necessary to overlap 50% of the spray range.

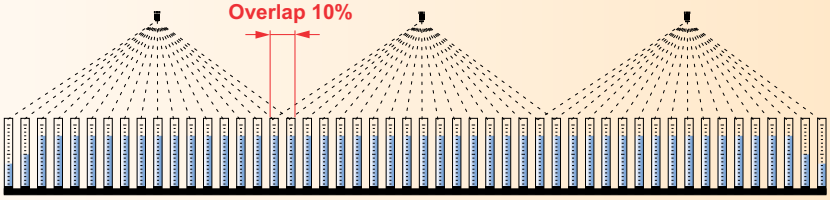




Standard even distribution

An equal distribution provides a uniform spray and 10% of the spray range overlaps.

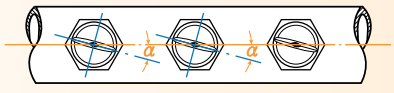


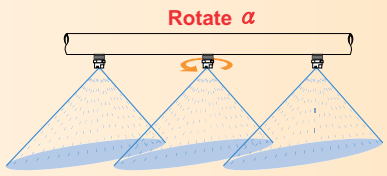


Offset

Spray angle	Offset (α)
15°~60°	5°~10°
60°~120°	10°~15°

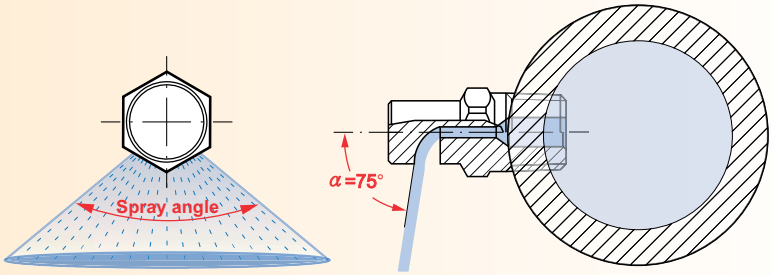
A flat fan nozzle produces a high impact jet with a 5°-15° offset angle to avoid overlapping and interference. The offset angle depends on the spray range of the flat fan nozzle.





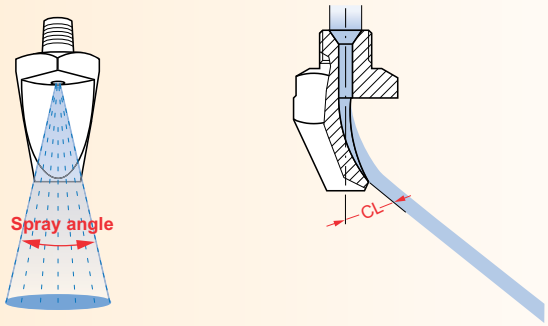
Flat fan nozzles - low pressure, wide angle

K series nozzles work on the principle of jet deflection, conveying the liquid against an accurately machined sloping surface to change the flow direction and produce a fan-shaped mist with a 75° spray angle. Medium-sized droplets and medium/low impact values.

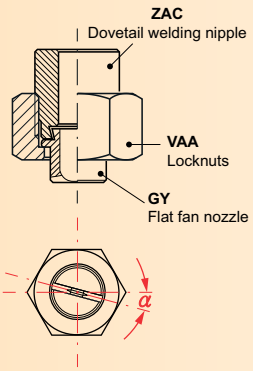


Flat fan nozzles - high impact

K nozzles high-impact type work on the principle of jet deflection. The liquid flow is conveyed onto a deflection sloping surface specially designed to produce a high impact narrow flat fan and medium-sized droplets. They are widely used in operating environments requiring high impact spray jets. Moreover, their rounded orifice and free inside passage minimize the risk of clogging. There is a specific angle that must be kept to ensure spray direction (see below picture ~ CL).

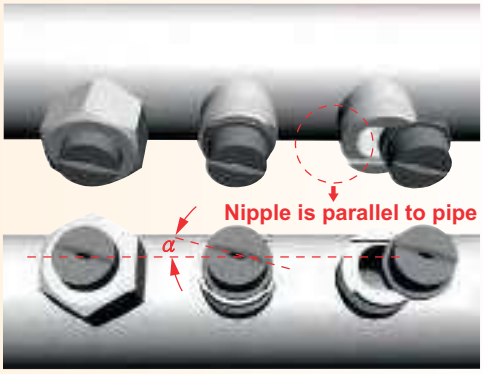


Dovetail flat fan nozzle



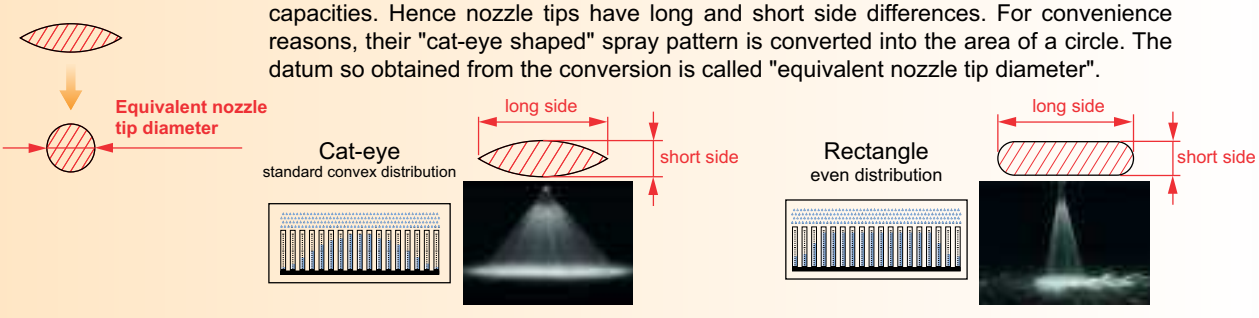
Flat fan nozzle tips provide a high impact spray. Adjacent nozzles must rotate with a specific offset angle to avoid interference and produce a uniform spray coverage when their jets overlap. For the GY series nozzle tips an offset angle ~α must be set between the spray plane and their dovetail guide.

Their specific dove-tail design ensures the correct spray direction and allows time saving as spray angles must not be adjusted each time. For thread size 3/8" offset angle is 5°. For thread size 3/4" offset angle is 15°. The picture to the right shows an offset angle ~α between the spray plane and the dovetail.



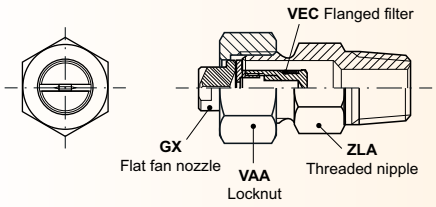
Equivalent nozzle tip diameter

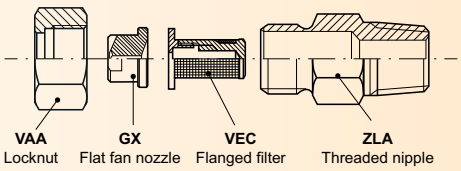
Flat fan nozzles produce cat-eye shaped or parabolic distribution patterns with different capacities. Hence nozzle tips have long and short side differences. For convenience reasons, their "cat-eye shaped" spray pattern is converted into the area of a circle. The datum so obtained from the conversion is called "equivalent nozzle tip diameter".



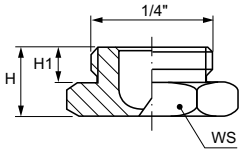
Flanged nozzle

Flanged nozzles have no thread. The nozzle tip is installed on a welding nipple and fastened with a locknut.
The scope of their design is:
1. Easy adjustment of the spray direction
2. Easy maintenance

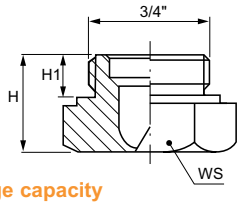




GA (FLAT FAN NOZZLES / SHORT BODY)



1/4" Standard capacity

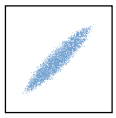


3/4" Large capacity

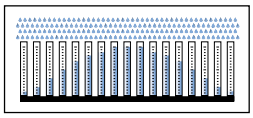
SHORT BODY

The special short body design of the GA nozzles makes it possible to use nozzle spray pipes in such machines or systems where the available space is very limited. (for ex., tight turns in traps and elbows).
They allow an even jet distribution and a proper force of impact. GA nozzles are available in two types: 1/4" standard capacity and 3/4" large capacity. They are made in brass, stainless steel or in plastic materials to suit different working environments. GA nozzles in plastic materials are made with a longer thread and bigger front for higher efficiency and longer service life.

- **Thread specification**: BSP



Spray section



Convex distribution

Typical applications

Washing
Filter cleaning in paper making machines and dryers.
Cooling
Continuous casting
Product cooling
Other applications
Spray of chemicals
Water curtains for toxic gases suppression
Excellent for pipe, sewer and drain cleaning

1/4" BSP THREAD

GAM 45°	GAQ 60°	GAU 90°	GAW 120°	Capacity code	D mm	Capacity at different pressure values (l/min) (bar)								
						0.5	1.0	1.5	2.0	3.0	4.0	5.0	7.0	10
•	•	•	•	**1310**	1.70	1.27	1.79	2.19	2.53	3.10	3.58	4.00	4.74	5.66
•	•	•	•	**1385**	1.80	1.57	2.22	2.72	3.14	3.85	4.45	4.97	5.88	7.03
•	•	•	•	**1490**	2.10	2.00	2.83	3.46	4.00	4.90	5.66	6.33	7.48	8.95
•	•	•	•	**1780**	2.70	3.18	4.50	5.52	6.37	7.80	9.01	10.1	11.9	14.2
•	•	•	•	**2124**	3.40	5.06	7.16	8.77	10.1	12.4	14.3	16.0	18.9	22.6
•	•	•	•	**2153**	3.80	6.25	8.83	10.8	12.5	15.3	17.7	19.8	23.4	27.9
•	•	•	•	**2194**	4.30	7.92	11.2	13.7	15.8	19.4	22.4	25.0	29.6	35.4

3/4" BSP THREAD

GAM 45°	GAQ 60°	GAU 90°	GAW 120°	Capacity code	D mm	Capacity at different pressure values (l/min) (bar)								
						0.5	1.0	1.5	2.0	3.0	4.0	5.0	7.0	10
•	•	•	•	**2195**	4.30	7.96	11.3	13.8	15.9	19.5	22.5	25.2	29.8	35.6
•	•	•	•	**2246**	4.80	10.0	14.2	17.4	20.1	24.6	28.4	31.8	37.6	44.9
•	•	•	•	**2311**	5.40	12.7	18.0	22.0	25.4	31.1	35.9	40.1	47.5	56.8
•	•	•	•	**2490**	6.40	20.0	28.2	34.6	40.0	49.0	56.6	63.3	74.8	89.5
•	•	•	•	**2610**	7.50	24.9	35.2	43.1	49.8	61.0	70.4	78.8	93.2	111
•	•	•	•	**2760**	8.30	31.0	43.9	53.7	62.1	76.0	87.8	98.1	116	139

Longer thread and bigger front design for short-body nozzles in plastic to ensure safer operating performances and longer service life.

GA series nozzle metal design

GA series nozzle plastic design

Material	Dimensions (mm) Small size (1/4") H	H1	WS	Large size (3/4") H	H1	WS
B1 - AISI 303 SS	12	7	17	15	8	32
B31 - AISI 316L SS						
T1 - Brass						
D2 - PP	17	7	17	23	11	32
E1 - PTFE						
D1 - PVC						

HOW TO MAKE UP THE **NOZZLE CODE**

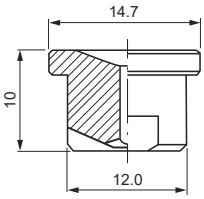
EX.: GAM 1490 B1

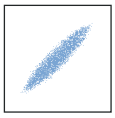
GA M 1490 xx

- NOZZLE TYPE: GA
- SPRAY ANGLE: M
  - M - 45°
  - Q - 60°
  - U - 90°
  - W - 120°
- CAPACITY: 1490
- MATERIAL: xx
  - • **B1** - AISI 303 Stainless steel
  - • **B31** - AISI 316L Stainless steel
  - • **T1** - Brass
  - ○ **D1** - PVC (optional)
  - ○ **D2** - PP (optional)
  - ○ **E1** - PTFE (optional)

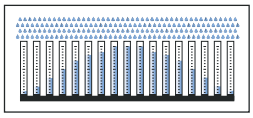
LOW CAPACITY

Flat fan nozzle tips are usually mounted onto a pipe by means of a welded nipple or a clamp, and secured in place with a retaining nut. They can be easily replaced and the jet can be conveniently oriented in the desired direction.
The tips models shown on this page delivery very low flow values. Their precisely machined small orifices can be protected from clogging by means of a filter assembled inside our nipples and clamps that are designed for this purpose. Please find more information on page 44.





Spray section



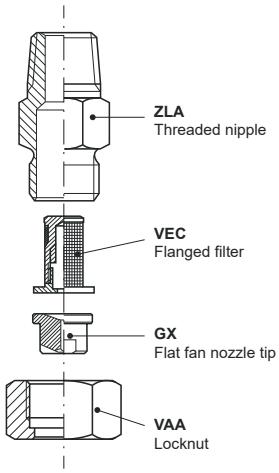
Convex distribution

- **Connection**: Flange
- **Typical applications**

Washing: semiconductor and precision parts cleaning
Cooling: continuous casting, product cooling
Lubrication: spray of lubricating oils and release agents
Other applications: spray of flavouring agents, cooling oil and antifoulant chemicals

GXD 25°	GXL 40°	GXN 50°	GXR 65°	Capacity code	D mm	Capacity at different pressure values (l/min) (bar)								
						0.5	1.0	1.5	2.0	3.0	4.0	5.0	7.0	10
			•	0060	0.28	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.11
			•	0100	0.34	0.05	0.06	0.07	0.08	0.10	0.12	0.13	0.15	0.18
			•	0130	0.38	0.06	0.08	0.09	0.11	0.13	0.15	0.17	0.20	0.24
•	•	•	•	0150	0.40	0.07	0.09	0.11	0.12	0.15	0.17	0.19	0.23	0.27
•	•	•	•	0200	0.46	0.08	0.12	0.14	0.16	0.20	0.23	0.26	0.31	0.37
•	•	•	•	0260	0.53	0.11	0.15	0.18	0.21	0.26	0.30	0.34	0.40	0.47
•	•	•	•	0390	0.66	0.16	0.23	0.28	0.32	0.39	0.45	0.50	0.60	0.71
•	•	•	•	0590	0.79	0.24	0.34	0.42	0.48	0.59	0.68	0.76	0.90	1.08

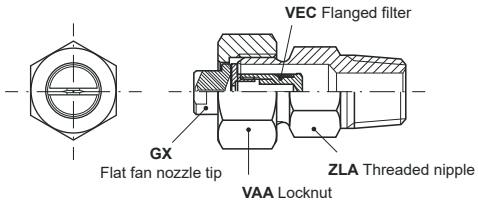
GXS 75°	GXT 80°	GXV 95°	GXJ 110°	Capacity code	D mm	Capacity at different pressure values (l/min) (bar)								
						0.5	1.0	1.5	2.0	3.0	4.0	5.0	7.0	10
•				0100	0.34	0.05	0.06	0.07	0.08	0.10	0.12	0.13	0.15	0.18
•				0130	0.38	0.06	0.08	0.09	0.11	0.13	0.15	0.17	0.20	0.24
•	•	•	•	0150	0.40	0.07	0.09	0.11	0.12	0.15	0.17	0.19	0.23	0.27
•	•	•	•	0200	0.46	0.08	0.12	0.14	0.16	0.20	0.23	0.26	0.31	0.37
•	•	•	•	0260	0.53	0.11	0.15	0.18	0.21	0.26	0.30	0.34	0.40	0.47
•	•	•	•	0390	0.66	0.16	0.23	0.28	0.32	0.39	0.45	0.50	0.60	0.71
•	•	•	•	0590	0.79	0.24	0.34	0.42	0.48	0.59	0.68	0.76	0.90	1.08



Assembly fittings

MATERIAL PROCESSING

Because of the extreme difficulty of working hard materials such as stainless steels with very small profile drills, not all the capacity sizes shown in the nozzle table are available in all materials. The table below shows the minimum capacity values we can produce for each given material. Please contact our sales for more information.



Material	0060	0100	0130	0150	0200	0260	0390	0590	0780
B31 - AISI 316L SS					•	•	•	•	•(1)
B1 - AISI 303 SS	•	•	•	•	•	•	•	•	•(2)
T1 - Brass	•	•	•	•	•	•	•	•	•(2)

(1) Low capacity body
(2) Standard capacity body

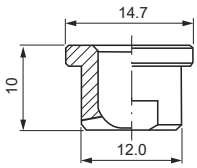
HOW TO MAKE UP THE NOZZLE CODE

EX.: GXD 0390 B1

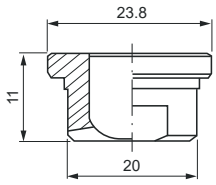
GX D 0390 xx

- NOZZLE TYPE
- SPRAY ANGLE: • D - 25° • S - 73° • L - 40° • T - 80° • N - 50° • V - 95° • R - 65° • J - 110°
- CAPACITY
- MATERIAL: • B1 - AISI 303 Stainless steel • B31 - AISI 316L Stainless steel • T1 - Brass

GX (FLAT FAN NOZZLE TIPS)



3/8" Standard capacity



3/4" Large capacity

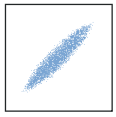
STANDARD AND LARGE CAPACITIES

Flat fan nozzle tips are usually mounted onto a pipe by means of a welded 3/8" nipple or a clamp, and secured in place with a retaining nut. They can be easily replaced and their jet can be conveniently oriented in the desired direction.These nozzle are available in two types: 3/8" standard capacity and 3/4" large capacity. The tip is assembled with a pipe clamp, a welding nipple and a locknut. Please find more information on page 44.

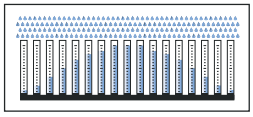
- **Typical applications**

Washing: filter cloth cleaning, parts cleaning, vehicles cleaning
Cooling: steel cooling, product cooling
Lubrication: spray of lubricating oil and release agents
Other applications: spray of antifoulant chemicals, etc.

- **Connection**: Flange



Spray section



Convex distribution

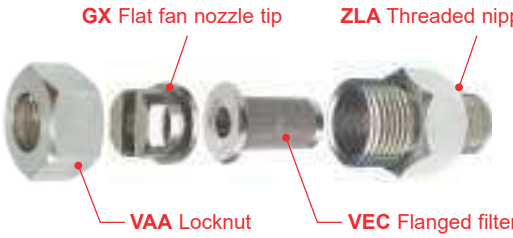
NEW Also available in high quality PVDF

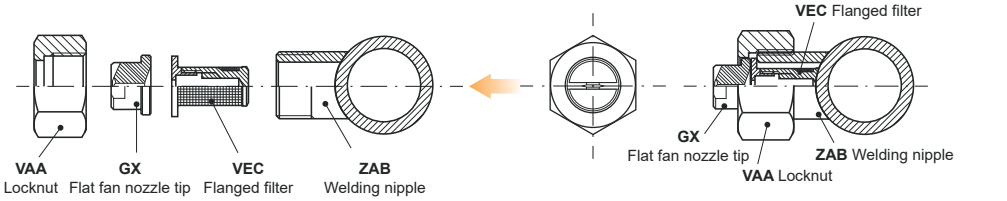
In the table you can check the available 3/8" GX tips, manufactured in plastic material (D82 - molded PVDF).

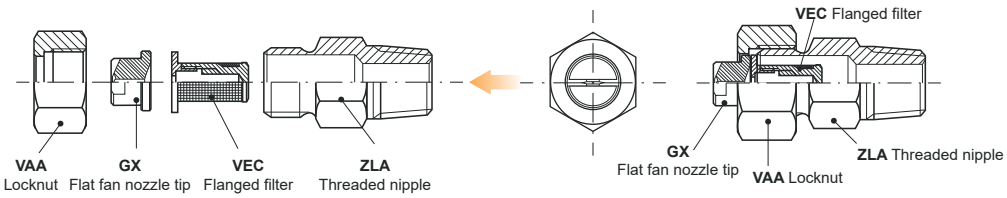
3/8" PLASTIC TIPS

GXQ 60°	GXU 90°	GXJ 110°	Capacity Code	D mm	Capacity at different pressure values (l/min) (bar)								
					0.5	1.0	1.5	2.0	3.0	4.0	5.0	7.0	10
		•	0780	0.91	0.32	0.45	0.55	0.64	0.78	0.90	1.01	1.19	1.42
•		•	1120	1.10	0.49	0.69	0.85	0.98	1.20	1.39	1.55	1.83	2.19
•	•	•	1233	1.50	0.95	1.35	1.65	1.90	2.33	2.69	3.01	3.56	4.25
	•	•	1310	1.70	1.27	1.79	2.19	2.53	3.10	3.58	4.00	4.74	5.66
	•		1490	2.10	2.00	2.83	3.46	4.00	4.90	5.66	6.33	7.48	8.95

ASSEMBLY FITTINGS







HOW TO MAKE UP THE NOZZLE CODE

EX.: GXA 1310 B1

GX A 1310 xx

- NOZZLE TYPE: GX
- SPRAY ANGLE: A
- CAPACITY: 1310
- MATERIAL: xx

SPRAY ANGLE
- A - 0°
- F - 30°
- M - 45°
- Q - 60°
- U - 90°
- W - 120°

MATERIAL
- B1 - AISI 303 Stainless steel
- B31 - AISI 316L Stainless steel
- T1 - Brass
- D82 - PVDF (molded)

3/8" STANDARD CAPACITY TIPS

GXA 0°	GXF 30°	GXM 45°	GXQ 60°	GXU 90°	GXW 120°	Code	D mm	Capacity at different pressure values (l/min) (bar) 0.5	1.0	1.5	2.0	3.0	4.0	5.0	7.0	10
•	•	•	•	•	•	**0780**	0.91	0.32	0.45	0.55	0.64	0.78	0.90	1.01	1.19	1.42
•	•	•	•	•	•	**1120**	1.10	0.49	0.69	0.85	0.98	1.20	1.39	1.55	1.83	2.19
•	•	•	•	•	•	**1160**	1.30	0.65	0.92	1.13	1.31	1.60	1.85	2.07	2.44	2.92
•	•	•	•	•	•	**1190**	1.30	0.78	1.10	1.34	1.55	1.90	2.19	2.45	2.90	3.47
•	•	•	•	•	•	**1233**	1.50	0.95	1.35	1.65	1.90	2.33	2.69	3.01	3.56	4.25
•	•	•	•	•	•	**1310**	1.70	1.27	1.79	2.19	2.53	3.10	3.58	4.00	4.74	5.66
•	•	•	•	•	•	**1385**	1.80	1.57	2.22	2.72	3.14	3.85	4.45	4.97	5.88	7.03
•	•	•	•	•	•	**1490**	2.10	2.00	2.83	3.46	4.00	4.90	5.66	6.33	7.48	8.95
•	•	•	•	•	•	**1581**	2.30	2.37	3.35	4.11	4.74	5.81	6.71	7.50	8.87	10.6
•	•	•	•	•	•	**1780**	2.70	3.18	4.50	5.52	6.37	7.80	9.01	10.1	11.9	14.2
•	•	•	•	•	•	**1980**	3.00	4.00	5.66	6.93	8.00	9.80	11.3	12.7	15.0	17.9
•	•	•	•	•	•	**2124**	3.40	5.06	7.16	8.77	10.1	12.4	14.3	16.0	18.9	22.6
•	•	•	•	•	•	**2153**	3.80	6.25	8.83	10.8	12.5	15.3	17.7	19.8	23.4	27.9
•	•	•	•	•	•	**2194**	4.30	7.92	11.2	13.7	15.8	19.4	22.4	25.0	29.6	35.4
•	•	•	•	•	•	**2245**	4.80	10.0	14.1	17.3	20.0	24.5	28.3	31.6	37.4	44.7

IMPORTANT: nozzle GXx 0780 B31 is made with "low capacity" body, while when it's fabricated with other materials is made with "standard capacity" body.

3/4" LARGE CAPACITY TIPS

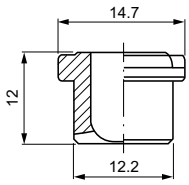
GXA 0°	GXF 30°	GXM 45°	GXQ 60°	GXU 90°	GXW 120°	Code	D mm	Capacity at different pressure values (l/min) (bar) 0.5	1.0	1.5	2.0	3.0	4.0	5.0	7.0	10
•	•	•	•	•	•	**1781**	2.70	3.18	4.50	5.52	6.37	7.80	9.01	10.1	11.9	14.2
•	•	•	•	•	•	**1981**	3.00	4.00	5.66	6.93	8.00	9.80	11.3	12.7	15.0	17.9
•	•	•	•	•	•	**2125**	3.40	5.06	7.16	8.77	10.1	12.4	14.3	16.0	18.9	22.6
•	•	•	•	•	•	**2154**	3.80	6.25	8.83	10.8	12.5	15.3	17.7	19.8	23.4	27.9
•	•	•	•	•	•	**2195**	4.30	7.92	11.2	13.7	15.8	19.4	22.4	25.0	29.6	35.4
•	•	•	•	•	•	**2246**	4.80	10.0	14.1	17.3	20.0	24.5	28.3	31.6	37.4	44.7
•	•	•	•	•	•	**2311**	5.40	12.7	18.0	22.0	25.4	31.1	35.9	40.1	47.5	56.8
•	•	•	•	•	•	**2490**	6.40	20.0	28.3	34.6	40.0	49.0	56.6	63.3	74.8	89.5
•	•	•	•	•	•	**2610**	7.50	24.9	35.2	43.1	49.8	61.0	70.4	78.8	93.2	111
•	•	•	•	•	•	**2760**	8.30	31.0	43.9	53.7	62.1	76.0	87.8	98.1	116	139
•	•	•	•	•	•	**3122**	12.5	49.8	70.4	86.3	99.6	122	141	158	186	223

ASSEMBLY FITTINGS CODING

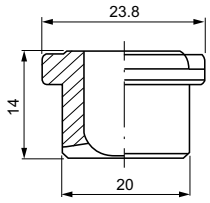
Name	Code and material	Appearance	Standard size 3/8"	Large size 3/4"
Locknut P.88	**B1** - AISI 303 SS **B31** - AISI 316L SS **T1** - Brass **D6** - Fiberglass reinforced PP		VAA 0380 **xx**B	VAA 0750 **xx**B
Welding nipple P.89	**B1** - AISI 303 SS **B31** - AISI 316L SS		ZAA C018 **xx**G	ZAA E027 **xx**G
Threaded nipple P.89	**B1** - AISI 303 SS **B31** - AISI 316L SS **T1** - Brass		ZLA 2538 **xx**B	ZLA 7575 **xx**B
Metal pipe clamp P.87	**B1** - AISI 303 SS **T1** - Brass		ZPM	–
Plastic pipe clamp P.86	**D6** - Fiberglass reinforced PP		ZPB 0050 D6	–
Plastic bayonet pipe clamp P.86	**D82** - PVDF		ZPC 0500 D82P	–
Flanged filter P.92	**B1** - AISI 303 SS **B31** - AISI 316L SS **T1** - Brass **D3** - Polyamide		VEC 0138 **xx**	–

GY (DOVETAIL FLAT FAN TIPS)

3/8" Standard capacity



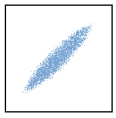
3/4" Large capacity



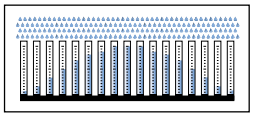
STANDARD AND LARGE CAPACITIES

GY flat fan nozzle tips are usually mounted onto a pipe by means of a welding nipple and secured in place with a retaining nut. Therefore, they can be easily replaced and their dovetail connection assures an always precise assembly as the nozzle can be assembled only when the flat fan is properly oriented. They are available in three types: 3/8" standard capacity, 3/4" large capacity and 1" extra-large capacity. The tip models shown on this page deliver the most popular capacity values, while GY flat fan tips with bigger capacities and sizes can be manufactured on request and supplied with matching dovetail nipples and retaining nuts. Please find information about instalment and accessories on page 89.

Connection: Dovetail flat fan tips
Typical applications
Washing: steel cleaning
filter cloth cleaning
parts cleaning
Cooling: steel cooling, product cooling



Spray section



Convex distribution

SPRAY ANGLE CODES

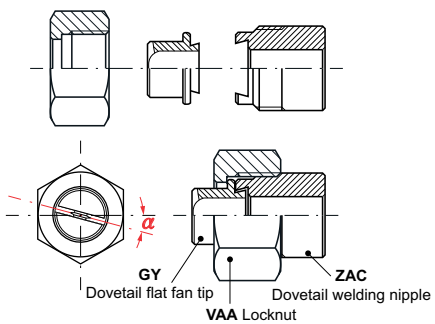
GYA	GYF	GYM	GYQ	GYU	GYW
0°	30°	45°	60°	90°	120°

ASSEMBLY FITTINGS

The picture below shows a GY nozzle tip (in the middle) assembled with a dovetail nipple (right) and a locknut (left).

Locknut | **Dovetail flat fan tip** | **Dovetail welding nipple**

GY ASSEMBLY FITTINGS



DOVETAIL NIPPLES

GY nozzle tips are assembled onto their own series of matching dovetail nipples, to assure perfect alignment: the two tip sizes require nipples and caps as shown in the table below.
The orientation of the spray jets, properly inclined to avoid their interfering, is automatically obtained welding the nipples in place with their dovetail aligned along the pipe axis. This is easily done by running a stright rule across the dovetail profile machined on the nipple.

POS.2 **POS.1**

See values for jet deviation angle (**α**) beside capacity tables next page.

HOW TO MAKE UP THE **NOZZLE CODE**

EX.: GYF 1190 B1

GY F 1190 xx

- **MATERIAL**
  - **B1** - AISI 303 Stainless steel
  - **B31** - AISI 316L Stainless steel
  - **T1** - Brass
- **CAPACITY**
- **SPRAY ANGLE**
  - **A** - 0°
  - **F** - 30°
  - **M** - 45°
  - **Q** - 60°
  - **U** - 90°
  - **W** - 120°
- **NOZZLE TYPE**

STANDARD AND LARGE CAPACITIES

3/8" STANDARD CAPACITY TIPS

Jet deviation angle α = 5°

GYF 30°	GYM 45°	GYQ 60°	GYU 90°	GYW 120°	Capacity code	D mm	Capacity at different pressure values (l/min) (bar)								
							0.5	1.0	1.5	2.0	3.0	4.0	5.0	7.0	10
•	•	•	•	•	**1190**	1.30	0.78	1.10	1.34	1.55	1.90	2.19	2.45	2.90	3.47
•	•	•	•	•	**1233**	1.50	0.95	1.35	1.65	1.90	2.33	2.69	3.01	3.56	4.25
•	•	•	•	•	**1310**	1.70	1.27	1.79	2.19	2.53	3.10	3.58	4.00	4.74	5.66
•	•	•	•	•	**1385**	1.80	1.57	2.22	2.72	3.14	3.85	4.45	4.97	5.88	7.03
•	•	•	•	•	**1490**	2.10	2.00	2.83	3.46	4.00	4.90	5.66	6.33	7.48	8.95
•	•	•	•	•	**1581**	2.30	2.37	3.35	4.11	4.74	5.81	6.71	7.50	8.87	10.6
•	•	•	•	•	**1780**	2.70	3.18	4.50	5.52	6.37	7.80	9.01	10.1	11.9	14.2
•	•	•	•	•	**1980**	3.00	4.00	5.66	6.93	8.00	9.80	11.3	12.7	15.0	17.9
•	•	•	•	•	**2124**	3.40	5.06	7.16	8.77	10.1	12.4	14.3	16.0	18.9	22.6
•	•	•	•	•	**2153**	3.80	6.25	8.83	10.8	12.5	15.3	17.7	19.8	23.4	27.9
•	•	•	•	•	**2194**	4.30	7.96	11.3	13.8	15.9	19.5	22.5	25.2	29.8	35.6

3/4" LARGE CAPACITY TIPS

Jet deviation angle α = 15°

GYA 0°	GYF 30°	GYM 45°	GYQ 60°	GYU 90°	GYW 120°	Capacity code	D mm	Capacity at different pressure values (l/min) (bar)							
								0.5	1.0	1.5	2.0	3.0	4.0	5.0	7.0	10
	•	•	•	•	•	**1781**	2.70	3.18	4.50	5.52	6.37	7.80	9.01	10.1	11.9	14.2
	•	•	•	•	•	**1981**	3.00	4.00	5.66	6.93	8.00	9.80	11.3	12.7	15.0	17.9
•	•	•	•	•	•	**2125**	3.40	5.06	7.16	8.77	10.1	12.4	14.3	16.0	18.9	22.6
•	•	•	•	•	•	**2154**	3.80	6.25	8.83	10.8	12.5	15.3	17.7	19.8	23.4	27.9
•	•	•	•	•	•	**2195**	4.30	7.92	11.2	13.7	15.8	19.4	22.4	25.0	29.6	35.4
•	•	•	•	•	•	**2246**	4.80	10.0	14.2	17.4	20.1	24.6	28.4	31.8	37.6	44.9
•	•	•	•	•	•	**2311**	5.40	12.7	18.0	22.0	25.4	31.1	35.9	40.1	47.5	56.8
•	•	•	•	•	•	**2490**	6.40	20.0	28.3	34.6	40.0	49.0	56.6	63.3	74.8	89.5
•	•	•	•	•	•	**2610**	7.50	24.9	35.2	43.1	49.8	61.0	70.4	78.8	93.2	111
	•	•	•	•	•	**2760**	8.30	31.0	43.9	53.7	62.1	76.0	87.8	98.1	116	139
	•	•	•			**3122**	12.5	49.8	70.4	86.3	99.6	122	141	158	186	223

ASSEMBLY FITTINGS CODING

Name	Code and material	Appearance	Model no.	
			Standard size 3/8"	Large size 3/4"
Locknut P.88	**B1** - AISI 303 SS **B31** - AISI 316L SS **T1** - Brass		VAA 0381 **xx**B	VAA 0750 **xx**B
Dovetail welding nipple P.89	**B1** - AISI 303 SS **B31** - AISI 316L SS		ZAC C018 **xx**	ZAC E027 **xx**

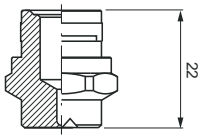
HOW TO MAKE UP THE **NOZZLE CODE**

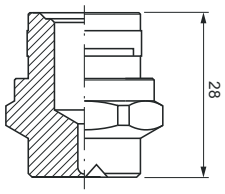
EX.: GYF 1190 B1

GY F 1190 xx

- NOZZLE TYPE
- SPRAY ANGLE: • **A** - 0° • **F** - 30° • **M** - 45° • **Q** - 60° • **U** - 90° • **W** - 120°
- CAPACITY
- MATERIAL: • **B1** - AISI 303 Stainless steel • **B31** - AISI 316L Stainless steel • **T1** - Brass

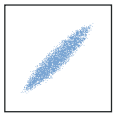
HT (QUICK-CONNECT FLAT FAN NOZZLES)



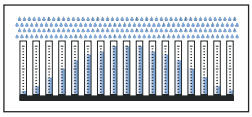


STANDARD AND LARGE CAPACITY

The HT series flat fan nozzles offer the same quality and technical characteristics of the standard types but also the additional convenience of a bayonet coupling which allows a simple assembly with no need of tools and an automatic spray pattern alignment. The optimum performance of your system or machine is then conveniently safeguarded, with a noticeable reduction in service cost and production loss for system downtime. HT series are widely applied to working environments that are easy to clog. HT nozzles are available with low, standard and large capacity.



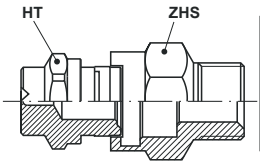
Spray section



Convex distribution

Quick-connect nozzles

HT + ZHS



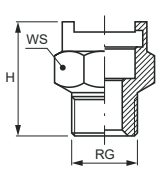
HTA 0°	HTL 40°	HTN 50°	HTR 65°	HTT 80°	HTV 95°	HTJ 110°	Code	D mm	Capacity at different pressure values (l/min) (bar) 0.5	1.0	1.5	2.0	3.0	5.0	7.0	10
Low capacity tips																
	•	•	•	•	•	•	**0260**	0.53	0.11	0.15	0.18	0.21	0.26	0.34	0.40	0.47
	•	•	•	•	•	•	**0390**	0.66	0.16	0.23	0.28	0.32	0.39	0.50	0.60	0.71
	•	•	•	•	•	•	**0590**	0.79	0.24	0.34	0.42	0.48	0.59	0.76	0.90	1.08
	•	•	•	•	•	•	**0780**	0.91	0.32	0.45	0.55	0.64	0.78	1.01	1.19	1.42
	•	•	•	•	•	•	**1120**	1.10	0.49	0.69	0.85	0.98	1.20	1.55	1.83	2.19
	•	•	•	•	•	•	**1160**	1.30	0.65	0.92	1.13	1.31	1.60	2.07	2.44	2.92
	•	•	•	•	•	•	**1190**	1.30	0.78	1.10	1.34	1.55	1.90	2.45	2.90	3.50
	•	•	•	•	•	•	**1200**	1.40	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65
	•	•	•	•	•	•	**1230**	1.50	0.94	1.33	1.63	1.88	2.30	2.97	3.51	4.20
Standard capacity tips																
•	•	•	•	•	•	•	**1310**	1.70	1.27	1.79	2.19	2.53	3.10	4.00	4.74	5.66
•	•	•	•	•	•	•	**1385**	1.80	1.57	2.22	2.72	3.14	3.85	4.97	5.88	7.03
•	•	•	•	•	•	•	**1490**	2.10	2.00	2.83	3.46	4.00	4.90	6.33	7.48	8.95
•	•	•	•	•	•	•	**1581**	2.30	2.37	3.35	4.11	4.74	5.81	7.50	8.87	10.6
•	•	•	•	•	•	•	**1780**	2.70	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2
•	•	•	•	•	•	•	**1980**	3.00	4.00	5.66	6.93	8.00	9.80	12.7	15.0	17.9
•	•	•	•	•	•	•	**2124**	3.40	5.06	7.16	8.77	10.1	12.4	16.0	18.9	22.6
•	•	•	•	•	•	•	**2153**	3.80	6.25	8.83	10.8	12.5	15.3	19.8	23.4	27.9
•	•	•	•	•	•	•	**2194**	4.30	7.96	11.3	13.8	15.9	19.5	25.2	29.8	35.6
High capacity tips																
•	•	•	•	•	•	•	**2310**	5.40	12.7	17.9	21.9	25.3	31.0	40.0	47.4	56.6
•	•	•	•	•	•	•	**2390**	6.00	15.9	22.5	27.6	31.8	39.0	50.3	59.6	71.2
•	•	•	•	•	•	•	**2470**	6.60	19.2	27.1	33.2	38.4	47.0	60.7	71.8	85.8
•	•	•	•	•	•	•	**2590**	7.50	24.1	34.1	41.7	48.2	59.0	76.2	90.1	108
•	•	•	•	•	•	•	**2780**	8.70	31.8	45.0	55.2	63.7	78.0	101	119	142

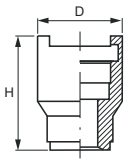
ACCESSORIES We offer various specification and materials of nipples. Please see below ordering code.

	Thread size (RG) inch	Standard size	Large size	H mm	WS mm	D mm
Male nipple	1/4"	ZHS 0025 **xx**Q1	-	29	22	-
	3/8"	ZHS 0038 **xx**Q1	-	29	22	-
	1/2"	-	ZHS 0050 **xx**Q2	35	30	-
Female nipple	3/8"	ZHT 0038 **xx**Q1	-	29	22	-
Welding nipple	-	ZHU 0038 **xx**Q1	ZHU 0050 **xx**Q2	32	-	28
Seal (Viton) for SS nipples	-	VDH BQ10 E7	VDH BQ20 E7	-	-	-
Seal (BUNA) for brass nipples	-	VDH BQ10 E8	VDH BQ20 E8	-	-	-

Typical applications

Washing
Steel and PCB cleaning
Filter cloth cleaning
Cooling
Steel cooling
Product cooling
Other applications
Pre-treatment for coating process
Sewage treatment system





ZHU 0038 xxQ1

ZHS 0025 xxQ1

ZHS 0050 xxQ2

HOW TO MAKE UP THE **NOZZLE CODE**

EX.: HTA 1310 B1

HT A 1310 xx

- NOZZLE TYPE: HT
- SPRAY ANGLE: A -0° · L -40° · N -50° · R -65° · T -80° · V -95° · J -110°
- CAPACITY: 1310
- MATERIAL: xx
  - **B1** - AISI 303 Stainless steel
  - **B31** - AISI 316L Stainless steel
  - **T1** - Brass

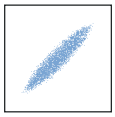
LOW FLOW FLAT FAN NOZZLES

These standard flat fan nozzles are available in a wide range of capacities, spray angles and materials. Nozzles shown on this page cover the low to minimal capacity range from 0.06 to 1.60 litres per minute. The tiny outlet orifices, machined with high precision, may required to be protected from clogging by means of an adequate filter positioned inside the supply line, depending upon the quantity and type of the solid particles suspended in the liquid. These nozzles can be made with a customized inner thread for a VEF filter (*optional). We suggest to buy these nozzles with their related VEF filter.

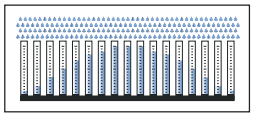
J nozzles series are also available with NPT thread: the code becomes H.

- **Thread specification**: BSPT, NPT
- **Typical applications**

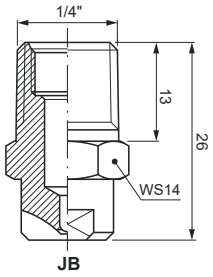
Washing: steel and PCB cleaning
glass substrate cleaning
Cooling: steel cooling, product cooling
Other applications: pre-treatment for coating process, sewage treatment system



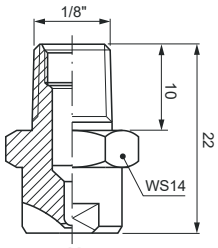
Spray section



Convex distribution



JB



JA

	25°	40°	50°	65°	75°	80°	95°	110°	Capacity code	D mm	Capacity at different pressure values (l/min) (bar)							
1/8"	JAD	JAL	JAN	JAR	JAS	JAT	JAV	JAJ										
1/4"	JBD	JBL	JBN	JBR	JBS	JBT	JBV	JBJ			0.7	1.0	1.5	2.0	3.0	5.0	7.0	10
0100				•					0100	0.34	0.048	0.06	0.07	0.08	0.10	0.13	0.15	0.18
0130				•					0130	0.38	0.06	0.08	0.09	0.11	0.13	0.17	0.20	0.24
0150	•	•	•	•	•	•	•	•	0150	0.40	0.07	0.09	0.11	0.12	0.15	0.19	0.23	0.27
0200	•	•	•	•	•	•	•	•	0200	0.46	0.096	0.12	0.14	0.16	0.20	0.26	0.31	0.37
0260	•	•	•	•	•	•	•	•	0260	0.53	0.10	0.15	0.18	0.21	0.26	0.34	0.40	0.47
0390	•	•	•	•	•	•	•	•	0390	0.66	0.19	0.23	0.28	0.32	0.39	0.50	0.60	0.71
0590	•	•	•	•	•	•	•	•	0590	0.79	0.28	0.34	0.42	0.48	0.59	0.76	0.90	1.08

LIMIT OF MATERIALS PROCESSING

Hard materials such as stainless steel are extremely difficult to work with small profile drills, therefore not all nozzle sizes are available in all materials. Our sales office will offer you the best choice according to the materials and specifications you require.

Material	0100	0130	0150	0200	0260	0390	0590	0780
B31 - AISI 316L SS				•	•	•	•	•(1)
B1 - AISI 303 SS	•	•	•	•	•	•	•	•(2)
T1 - Brass	•	•	•	•	•	•	•	•(2)

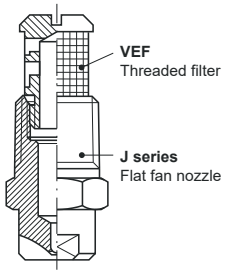
(1) Low capacity body
(2) Standard capacity body

VEF THREADED FILTERS (OPTIONAL)

J series small capacity nozzles have a small diameter and can work with clean liquids. So, if you order small capacity nozzles, we suggest you to order VEF threaded filters too, to avoid clogging. Please see page 91 for more information.

Nozzle type	Thread filter code	Thread size
JA (1/8")	VEF 0411 xx	M7
JB (1/4")	VEF 0138 xx	3/8"UNF

VEF Threaded filter

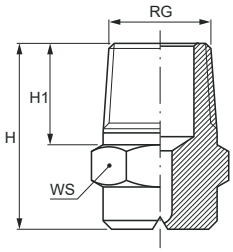


HOW TO MAKE UP THE **NOZZLE CODE**

EX.: JAD 0130 B1

J A D 0130 xx

- NOZZLE TYPE
- CONNECTION • A - 1/8" • B - 1/4"
- SPRAY ANGLE • D - 25° • L - 40° • N - 50° • R - 65° • S - 75° • V - 80° • V - 95° • J - 110°
- CAPACITY
- MATERIAL • **B1** - AISI 303 Stainless steel • **B31** - AISI 316L Stainless steel • **T1** - Brass



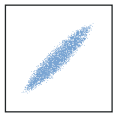
STANDARD CAPACITY FLAT FAN NOZZLES

Standard flat fan nozzles are available in a wide range of different capacities, spray angles, thread sizes and materials. Used in several industrial applications, they produce a mist spray and supply an appropriate force of impact.

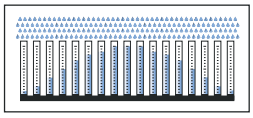
- **Typical applications**

Washing: parts cleaning, food cleaning, filter cloth cleaning
Spray: spray of chemicals, disinfectant and lubricating fluids
Cooling: metal parts and vehicles cooling
Other applications: water curtain for toxic gases separation, cleaning systems
In steelworks they are used in the pickling process to remove surface oxides layers formed during the hot metalwork.

- **Thread specification**: BSPT, NPT



Spray section



Convex distribution

Spray angle codes

JxA	0°
JxC	20°
JxF	30°
JxM	45°
JxQ	60°
JxU	90°
JxW	120°

Thread size codes (RG)

JA	1/8"
JB	1/4"
JC	3/8"

	JAA 1/8"	JBA 1/4"	JCA 3/8"	Capacity code	D mm	Capacity at different pressure values (l/min) (bar) 0.5	1.0	2.0	3.0	4.0	5.0	7.0	10	20
0°	•	•		**0780**	0.91	0.32	0.45	0.64	0.78	0.90	1.01	1.19	1.42	2.01
	•	•		**1120**	1.10	0.49	0.69	0.98	1.20	1.39	1.55	1.83	2.19	3.10
	•	•		**1160**	1.30	0.65	0.92	1.31	1.60	1.85	2.07	2.44	2.92	4.13
	•	•		**1190**	1.30	0.78	1.10	1.55	1.90	2.19	2.45	2.90	3.47	4.91
	•	•		**1233**	1.50	0.95	1.35	1.90	2.33	2.69	3.01	3.56	4.25	6.02
	•	•		**1310**	1.70	1.27	1.79	2.53	3.10	3.58	4.00	4.74	5.66	8.00
	•	•		**1385**	1.80	1.57	2.22	3.14	3.85	4.45	4.97	5.88	7.03	9.94
	•	•		**1490**	2.10	2.00	2.83	4.00	4.90	5.66	6.33	7.48	8.95	12.7
	•	•		**1581**	2.30	2.37	3.35	4.74	5.81	6.71	7.50	8.87	10.6	15.0
	•	•	•	**1780**	2.70	3.18	4.50	6.37	7.80	9.01	10.1	11.9	14.2	20.1
	•	•	•	**1980**	3.00	4.00	5.66	8.00	9.80	11.3	12.7	15.0	17.9	25.3
	•	•	•	**2124**	3.40	5.06	7.16	10.1	12.4	14.3	16.0	18.9	22.6	32.0
	•	•	•	**2153**	3.80	6.25	8.83	12.5	15.3	17.7	19.8	23.4	27.9	39.5
		•	•	**2195**	4.30	7.96	11.3	15.9	19.5	22.5	25.2	29.8	35.6	50.3
		•	•	**2245**	4.80	10.0	14.1	20.0	24.5	28.3	31.6	37.4	44.7	63.3
		•	•	**2274**	5.20	11.2	15.8	22.4	27.4	31.6	35.4	41.9	50.0	70.7
		•	•	**2310**	5.40	12.7	17.9	25.3	31.0	35.8	40.0	47.4	56.6	80.0
		•	•	**2390**	6.00	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
		•	•	**2470**	6.20	19.2	27.1	38.4	47.0	54.3	60.7	71.8	85.8	121

DIMENSIONS AND WEIGHTS

Code	Size (RG)	H	H1	WS	W
unit	inch	mm	mm	mm	gram
JA	1/8"	19.5	11	12	9
JB	1/4"	22.0	12	14	18
JC	3/8"	25.0	14	17	34

IMPORTANT: the nozzle Jxx 0780 B31 is made with “low capacity” body, while when it’s fabricated with other materials is made with “standard capacity” body.

HOW TO MAKE UP THE **NOZZLE CODE**

EX.: JAA 1153 B1

J A A 1153 xx

- NOZZLE TYPE: J
- CONNECTION: A - 1/8", B - 1/4", C - 3/8"
- SPRAY ANGLE: A - 0°, C - 20°, F - 30°, M - 45°, Q - 60°, U - 90°, W - 120°
- CAPACITY: 1153
- MATERIAL: B1 - AISI 303 Stainless steel; B31 - AISI 316L Stainless steel; T1 - Brass; D1 - PVC (optional); E1 - PTFE (optional)

	JAC 1/8"	JBC 1/4"	JCC 3/8"	Capecity code	D mm	Capacity at different pressure values (l/min) (bar) 0.5	1.0	2.0	3.0	4.0	5.0	7.0	10	20
20°	•	•		0780	0.91	0.32	0.45	0.64	0.78	0.90	1.01	1.19	1.42	2.01
	•	•		1120	1.10	0.49	0.69	0.98	1.20	1.39	1.55	1.83	2.19	3.10
	•	•		1160	1.30	0.65	0.92	1.31	1.60	1.85	2.07	2.44	2.92	4.13
	•	•		1190	1.30	0.78	1.10	1.55	1.90	2.19	2.45	2.90	3.47	4.91
	•	•		1233	1.50	0.95	1.35	1.90	2.33	2.69	3.01	3.56	4.25	6.02
	•	•		1310	1.70	1.27	1.79	2.53	3.10	3.58	4.00	4.74	5.66	8.00
	•	•		1385	1.80	1.57	2.22	3.14	3.85	4.45	4.97	5.88	7.03	9.94
	•	•		1490	2.10	2.00	2.83	4.00	4.90	5.66	6.33	7.48	8.95	12.7
	•	•		1581	2.30	2.37	3.35	4.74	5.81	6.71	7.50	8.87	10.6	15.0
	•	•	•	1780	2.70	3.18	4.50	6.37	7.80	9.01	10.1	11.9	14.2	20.1
	•	•	•	1980	3.00	4.00	5.66	8.00	9.80	11.3	12.7	15.0	17.9	25.3
	•	•	•	2124	3.40	5.06	7.16	10.1	12.4	14.3	16.0	18.9	22.6	32.0
	•	•	•	2153	3.80	6.25	8.83	12.5	15.3	17.7	19.8	23.4	27.9	39.5
		•	•	2195	4.30	7.96	11.3	15.9	19.5	22.5	25.2	29.8	35.6	50.3
		•	•	2245	4.80	10.0	14.1	20.0	24.5	28.3	31.6	37.4	44.7	63.3
		•	•	2274	5.20	11.2	15.8	22.4	27.4	31.6	35.4	41.9	50.0	70.7
		•	•	2310	5.40	12.7	17.9	25.3	31.0	35.8	40.0	47.4	56.6	80.0
		•	•	2390	6.00	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
			•	2470	6.20	19.2	27.1	38.4	47.0	54.3	60.7	71.8	85.8	121

	JAF	JBF	JCF	Code	D	0.5	1.0	2.0	3.0	4.0	5.0	7.0	10	20
30°	•	•		0780	0.91	0.32	0.45	0.64	0.78	0.90	1.01	1.19	1.42	2.01
	•	•		1120	1.10	0.49	0.69	0.98	1.20	1.39	1.55	1.83	2.19	3.10
	•	•		1160	1.30	0.65	0.92	1.31	1.60	1.85	2.07	2.44	2.92	4.13
	•	•		1190	1.30	0.78	1.10	1.55	1.90	2.19	2.45	2.90	3.47	4.91
	•	•		1233	1.50	0.95	1.35	1.90	2.33	2.69	3.01	3.56	4.25	6.02
	•	•		1310	1.70	1.27	1.79	2.53	3.10	3.58	4.00	4.74	5.66	8.00
	•	•		1385	1.80	1.57	2.22	3.14	3.85	4.45	4.97	5.88	7.03	9.94
	•	•		1490	2.10	2.00	2.83	4.00	4.90	5.66	6.33	7.48	8.95	12.7
	•	•		1581	2.30	2.37	3.35	4.74	5.81	6.71	7.50	8.87	10.6	15.0
	•	•	•	1780	2.70	3.18	4.50	6.37	7.80	9.01	10.1	11.9	14.2	20.1
	•	•	•	1980	3.00	4.00	5.66	8.00	9.80	11.3	12.7	15.0	17.9	25.3
	•	•	•	2124	3.40	5.06	7.16	10.1	12.4	14.3	16.0	18.9	22.6	32.0
	•	•	•	2153	3.80	6.25	8.83	12.5	15.3	17.7	19.8	23.4	27.9	39.5
		•	•	2195	4.30	7.96	11.3	15.9	19.5	22.5	25.2	29.8	35.6	50.3
		•	•	2245	4.80	10.0	14.1	20.0	24.5	28.3	31.6	37.4	44.7	63.3
		•	•	2274	5.20	11.2	15.8	22.4	27.4	31.6	35.4	41.9	50.0	70.7
		•	•	2310	5.40	12.7	17.9	25.3	31.0	35.8	40.0	47.4	56.6	80.0
		•	•	2390	6.00	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
			•	2470	6.20	19.2	27.1	38.4	47.0	54.3	60.7	71.8	85.8	121

	JAM	JBM	JCM	Code	D	0.5	1.0	2.0	3.0	4.0	5.0	7.0	10	20
45°	•	•		0780	0.91	0.32	0.45	0.64	0.78	0.90	1.01	1.19	1.42	2.01
	•	•		1120	1.10	0.49	0.69	0.98	1.20	1.39	1.55	1.83	2.19	3.10
	•	•		1160	1.30	0.65	0.92	1.31	1.60	1.85	2.07	2.44	2.92	4.13
	•	•		1190	1.30	0.78	1.10	1.55	1.90	2.19	2.45	2.90	3.47	4.91
	•	•		1233	1.50	0.95	1.35	1.90	2.33	2.69	3.01	3.56	4.25	6.02
	•	•		1310	1.70	1.27	1.79	2.53	3.10	3.58	4.00	4.74	5.66	8.00
	•	•		1385	1.80	1.57	2.22	3.14	3.85	4.45	4.97	5.88	7.03	9.94
	•	•		1490	2.10	2.00	2.83	4.00	4.90	5.66	6.33	7.48	8.95	12.7
	•	•		1581	2.30	2.37	3.35	4.74	5.81	6.71	7.50	8.87	10.6	15.0
	•	•	•	1780	2.70	3.18	4.50	6.37	7.80	9.01	10.1	11.9	14.2	20.1
	•	•	•	1980	3.00	4.00	5.66	8.00	9.80	11.3	12.7	15.0	17.9	25.3
	•	•	•	2124	3.40	5.06	7.16	10.1	12.4	14.3	16.0	18.9	22.6	32.0
	•	•	•	2153	3.80	6.25	8.83	12.5	15.3	17.7	19.8	23.4	27.9	39.5
		•	•	2195	4.30	7.96	11.3	15.9	19.5	22.5	25.2	29.8	35.6	50.3
		•	•	2245	4.80	10.0	14.1	20.0	24.5	28.3	31.6	37.4	44.7	63.3
		•	•	2274	5.20	11.2	15.8	22.4	27.4	31.6	35.4	41.9	50.0	70.7
		•	•	2310	5.40	12.7	17.9	25.3	31.0	35.8	40.0	47.4	56.6	80.0
			•	2390	6.00	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
			•	2470	6.20	19.2	27.1	38.4	47.0	54.3	60.7	71.8	85.8	121

Spray angle codes

JxA	0°
JxC	20°
JxF	30°
JxM	45°
JxQ	60°
JxU	90°
JxW	120°

Thread size codes (RG)

JA	1/8"
JB	1/4"
JC	3/8"

IMPORTANT: the nozzle Jxx 0780 B31 is made with "low capacity" body, while when it's fabricated with other materials is made with "standard capacity" body.

HOW TO MAKE UP THE **NOZZLE CODE**

EX.: JAC 1153 B1

J A C 1153 xx

- NOZZLE TYPE
- CONNECTION: • A - 1/8" • B - 1/4" • C - 3/8"
- SPRAY ANGLE: • A - 0° • C - 20° • F - 30° • M - 45° • Q - 60° • U - 90° • W - 120°
- CAPACITY
- MATERIAL: • B1 - AISI 303 Stainless steel • B31 - AISI 316L Stainless steel • T1 - Brass ○ D1 - PVC (optional) ○ E1 - PTFE (optional)

Spray angle codes

JxA	0°
JxC	20°
JxF	30°
JxM	45°
JxQ	60°
JxU	90°
JxW	120°

Thread size codes (RG)

JA	1/8"
JB	1/4"
JC	3/8"

IMPORTANT: the nozzle Jxx 0780 B31 is made with "low capacity" body, while when it's fabricated with other materials is made with "standard capacity" body.

	JAQ 1/8"	JBQ 1/4"	JCQ 3/8"	Capacity code	D mm	Capacity at different pressure values (l/min) (bar) 0.5	1.0	2.0	3.0	4.0	5.0	7.0	10	20
60°	•	•		0780	0.91	0.32	0.45	0.64	0.78	0.90	1.01	1.19	1.42	2.01
	•	•		1120	1.10	0.49	0.69	0.98	1.20	1.39	1.55	1.83	2.19	3.10
	•	•		1160	1.30	0.65	0.92	1.31	1.60	1.85	2.07	2.44	2.92	4.13
	•	•		1190	1.30	0.78	1.10	1.55	1.90	2.19	2.45	2.90	3.47	4.91
	•	•		1233	1.50	0.95	1.35	1.90	2.33	2.69	3.01	3.56	4.25	6.02
	•	•		1310	1.70	1.27	1.79	2.53	3.10	3.58	4.00	4.74	5.66	8.00
	•	•		1385	1.80	1.57	2.22	3.14	3.85	4.45	4.97	5.88	7.03	9.94
	•	•		1490	2.10	2.00	2.83	4.00	4.90	5.66	6.33	7.48	8.95	12.7
	•	•		1581	2.30	2.37	3.35	4.74	5.81	6.71	7.50	8.87	10.6	15.0
	•	•	•	1780	2.70	3.18	4.50	6.37	7.80	9.01	10.1	11.9	14.2	20.1
	•	•	•	1980	3.00	4.00	5.66	8.00	9.80	11.3	12.7	15.0	17.9	25.3
	•	•	•	2124	3.40	5.06	7.16	10.1	12.4	14.3	16.0	18.9	22.6	32.0
	•	•	•	2153	3.80	6.25	8.83	12.5	15.3	17.7	19.8	23.4	27.9	39.5
		•	•	2195	4.30	7.96	11.3	15.9	19.5	22.5	25.2	29.8	35.6	50.3
		•	•	2245	4.80	10.0	14.1	20.0	24.5	28.3	31.6	37.4	44.7	63.3
		•	•	2274	5.20	11.2	15.8	22.4	27.4	31.6	35.4	41.9	50.0	70.7
		•	•	2310	5.40	12.7	17.9	25.3	31.0	35.8	40.0	47.4	56.6	80.0
			•	2390	6.00	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
			•	2470	6.20	19.2	27.1	38.4	47.0	54.3	60.7	71.8	85.8	121

	JAU	JBU	JCU	Codice	D	0.5	1.0	2.0	3.0	4.0	5.0	7.0	10	20
90°	•	•		0780	0.91	0.32	0.45	0.64	0.78	0.90	1.01	1.19	1.42	2.01
	•	•		1120	1.10	0.49	0.69	0.98	1.20	1.39	1.55	1.83	2.19	3.10
	•	•		1160	1.30	0.65	0.92	1.31	1.60	1.85	2.07	2.44	2.92	4.13
	•	•		1190	1.30	0.78	1.10	1.55	1.90	2.19	2.45	2.90	3.47	4.91
	•	•		1233	1.50	0.95	1.35	1.90	2.33	2.69	3.01	3.56	4.25	6.02
	•	•		1310	1.70	1.27	1.79	2.53	3.10	3.58	4.00	4.74	5.66	8.00
	•	•		1385	1.80	1.57	2.22	3.14	3.85	4.45	4.97	5.88	7.03	9.94
	•	•		1490	2.10	2.00	2.83	4.00	4.90	5.66	6.33	7.48	8.95	12.7
	•	•		1581	2.30	2.37	3.35	4.74	5.81	6.71	7.50	8.87	10.6	15.0
	•	•	•	1780	2.70	3.18	4.50	6.37	7.80	9.01	10.1	11.9	14.2	20.1
	•	•	•	1980	3.00	4.00	5.66	8.00	9.80	11.3	12.7	15.0	17.9	25.3
	•	•	•	2124	3.40	5.06	7.16	10.1	12.4	14.3	16.0	18.9	22.6	32.0
	•	•	•	2153	3.80	6.25	8.83	12.5	15.3	17.7	19.8	23.4	27.9	39.5
		•	•	2195	4.30	7.96	11.3	15.9	19.5	22.5	25.2	29.8	35.6	50.3
		•	•	2245	4.80	10.0	14.1	20.0	24.5	28.3	31.6	37.4	44.7	63.3
		•	•	2274	5.20	11.2	15.8	22.4	27.4	31.6	35.4	41.9	50.0	70.7
		•	•	2310	5.40	12.7	17.9	25.3	31.0	35.8	40.0	47.4	56.6	80.0
			•	2390	6.00	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
			•	2470	6.20	19.2	27.1	38.4	47.0	54.3	60.7	71.8	85.8	121

	JAW	JBW	JCW	Codice	D	0.5	1.0	2.0	3.0	4.0	5.0	7.0	10	20
120°	•	•		0780	0.91	0.32	0.45	0.64	0.78	0.90	1.01	1.19	1.42	2.01
	•	•		1120	1.10	0.49	0.69	0.98	1.20	1.39	1.55	1.83	2.19	3.10
	•	•		1160	1.30	0.65	0.92	1.31	1.60	1.85	2.07	2.44	2.92	4.13
	•	•		1190	1.30	0.78	1.10	1.55	1.90	2.19	2.45	2.90	3.47	4.91
	•	•		1233	1.50	0.95	1.35	1.90	2.33	2.69	3.01	3.56	4.25	6.02
	•	•		1310	1.70	1.27	1.79	2.53	3.10	3.58	4.00	4.74	5.66	8.00
	•	•		1385	1.80	1.57	2.22	3.14	3.85	4.45	4.97	5.88	7.03	9.94
	•	•		1490	2.10	2.00	2.83	4.00	4.90	5.66	6.33	7.48	8.95	12.7
	•	•		1581	2.30	2.37	3.35	4.74	5.81	6.71	7.50	8.87	10.6	15.0
	•	•	•	1780	2.70	3.18	4.50	6.37	7.80	9.01	10.1	11.9	14.2	20.1
	•	•	•	1980	3.00	4.00	5.66	8.00	9.80	11.3	12.7	15.0	17.9	25.3
	•	•	•	2124	3.40	5.06	7.16	10.1	12.4	14.3	16.0	18.9	22.6	32.0
	•	•	•	2153	3.80	6.25	8.83	12.5	15.3	17.7	19.8	23.4	27.9	39.5
		•	•	2195	4.30	7.96	11.3	15.9	19.5	22.5	25.2	29.8	35.6	50.3
		•	•	2245	4.80	10.0	14.1	20.0	24.5	28.3	31.6	37.4	44.7	63.3
		•	•	2274	5.20	11.2	15.8	22.4	27.4	31.6	35.4	41.9	50.0	70.7
		•	•	2310	5.40	12.7	17.9	25.3	31.0	35.8	40.0	47.4	56.6	80.0
			•	2390	6.00	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
			•	2470	6.20	19.2	27.1	38.4	47.0	54.3	60.7	71.8	85.8	121

HOW TO MAKE UP THE **NOZZLE CODE**

EX.: JAQ 1153 B1

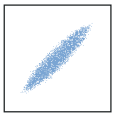
J A Q 1153 xx

- NOZZLE TYPE: J
- CONNECTION: A
  - A - 1/8"
  - B - 1/4"
  - C - 3/8"
- SPRAY ANGLE: Q
  - A - 0°
  - C - 20°
  - F - 30°
  - M - 45°
  - Q - 60°
  - U - 90°
  - W - 120°
- CAPACITY: 1153
- MATERIAL: xx
  - B1 - AISI 303 Stainless steel
  - B31 - AISI 316L Stainless steel
  - T1 - Brass
  - D1 - PVC (optional)
  - E1 - PTFE (optional)

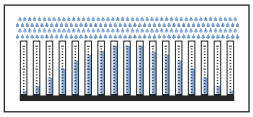
LARGE CAPACITY FLAT FAN NOZZLES

J series standard flat fan nozzles are available in a wide range of different capacities, spray angles, thread sizes and materials. The large capacity models produce a high-impact spray jet with a mist effect and a powerful washing action.

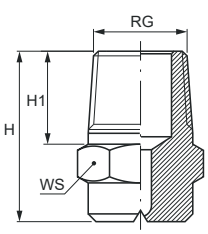
- **Thread specification**: BSPT, NPT



Spray section



Convex distribution



	1/2"	3/4"	1"	Code	Capacity at different pressure values (l/min) (bar) 0.5	1.0	2.0	3.0	4.0	5.0	7.0	10	20
0°	•			JDA 2590 xx	24.1	34.1	48.2	59.0	68.1	76.2	90.1	108	152
	•			JDA 2780 xx	31.8	45.0	63.7	78.0	90.1	101	119	142	201
		•		JEA 3134 xx	54.7	77.4	109	134	155	173	205	245	346
		•		JEA 3275 xx	112	159	225	275	318	355	420	502	710
			•	JFA 3390 xx	159	225	318	390	450	503	596	712	1007
			•	JFA 3435 xx	178	251	355	435	502	562	664	794	1123
15°	•			JDB 2195 xx	7.96	11.3	15.9	19.5	22.5	25.2	29.8	35.6	50.3
	•			JDB 2274 xx	11.2	15.8	22.4	27.4	31.6	35.4	41.9	50.0	70.7
	•			JDB 2390 xx	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
		•		JEB 2990 xx	40.4	57.2	80.8	99.0	114	128	151	181	256
25°	•			JDD 2390 xx	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
	•			JDD 2590 xx	24.1	34.1	48.2	59.0	68.1	76.2	90.1	108	152
	•			JDD 2780 xx	31.8	45.0	63.7	78.0	90.1	101	119	142	201
			•	JFD 3195 xx	79.6	113	159	195	225	252	298	356	503
40°	•			JDL 2195 xx	7.96	11.3	15.9	19.5	22.5	25.2	29.8	35.6	50.3
	•			JDL 2240 xx	9.80	13.9	19.6	24.0	27.7	31.0	36.7	43.8	62.0
	•			JDL 2274 xx	11.2	15.8	22.4	27.4	31.6	35.4	41.9	50.0	70.7
	•			JDL 2390 xx	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
	•			JDL 2590 xx	24.1	34.1	48.2	59.0	68.1	76.2	90.1	108	152
50°	•			JDN 2274 xx	11.2	15.8	22.4	27.4	31.6	35.4	41.9	50.0	70.7
	•			JDN 2390 xx	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
	•			JDN 2590 xx	24.1	34.1	48.2	59.0	68.1	76.2	90.1	108	152
	•			JDN 2780 xx	31.8	45.0	63.7	78.0	90.1	101	119	142	201
		•		JEN 3158 xx	64.5	91.2	129	158	182	204	241	288	408
			•	JFN 3195 xx	79.6	113	159	195	225	252	298	356	503
			•	JFN 3230 xx	93.9	133	188	230	266	297	351	420	594
65°	•			JDR 2195 xx	7.96	11.3	15.9	19.5	22.5	25.2	29.8	35.6	50.3
	•			JDR 2240 xx	9.80	13.9	19.6	24.0	27.7	31.0	36.7	43.8	62.0
	•			JDR 2274 xx	11.2	15.8	22.4	27.4	31.6	35.4	41.9	50.0	70.7
	•			JDR 2390 xx	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
	•			JDR 2590 xx	24.1	34.1	48.2	59.0	68.1	76.2	90.1	108	152
			•	JFR 2780 xx	31.8	45.0	63.7	78.0	90.1	101	119	142	201
80°	•			JDT 2195 xx	7.96	11.3	15.9	19.5	22.5	25.2	29.8	35.6	50.3
	•			JDT 2240 xx	9.80	13.9	19.6	24.0	27.7	31.0	36.7	43.8	62.0
	•			JDT 2274 xx	11.2	15.8	22.4	27.4	31.6	35.4	41.9	50.0	70.7
	•			JDT 2390 xx	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
	•			JDT 2590 xx	24.1	34.1	48.2	59.0	68.1	76.2	90.1	108	152
	•			JDT 2780 xx	31.8	45.0	63.7	78.0	90.1	101	119	142	201
		•		JET 2780 xx	31.8	45.0	63.7	78.0	90.1	101	119	142	201
		•		JET 3158 xx	64.5	91.2	129	158	182	204	241	288	408
95°	•			JDV 2195 xx	7.96	11.3	15.9	19.5	22.5	25.2	29.8	35.6	50.3
	•			JDV 2240 xx	9.80	13.9	19.6	24.0	27.7	31.0	36.7	43.8	62.0
	•			JDV 2274 xx	11.2	15.8	22.4	27.4	31.6	35.4	41.9	50.0	70.7
	•			JDV 2390 xx	15.9	22.5	31.8	39.0	45.0	50.3	59.6	71.2	101
	•			JDV 2590 xx	24.1	34.1	48.2	59.0	68.1	76.2	90.1	108	152

SPRAY ANGLE CODES

Nozzle code	Spray angle
JDA	0°
JDB	15°
JDD	25°
JDL	40°
JDN	50°
JDR	65°
JDT	80°
JDV	95°

DIMENSIONS AND WEIGHTS

Below are dimensions and specifications for use.

Code	Size	H	H1	WS	W
	inch	mm	mm	mm	gram
JD	1/2"	33	17	22	65
JE	3/4"	41	20	27	130
JF	1"	61	22	27	215

Typical applications

Washing
Tanks, large parts and vehicles cleaning
Spray
Spray of chemicals
Disinfectants and lubricating fluids
Cooling
Parts cooling
Steel cooling
Other applications
Water curtain to separate toxic gases
Fire-fighting systems

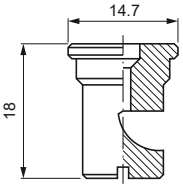
HOW TO MAKE UP THE NOZZLE CODE

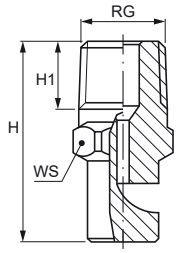
EX.: JDA 2590 B1

J D A 2590 xx

- NOZZLE TYPE: J
- CONNECTION: D - 1/2", E - 3/4", F - 1"
- SPRAY ANGLE: A - 0°, B - 15°, D - 25°, L - 40°, N - 50°, R - 65°, T - 80°, V - 95°
- CAPACITY: 2590
- MATERIAL: B1 - AISI 303 Stainless steel; B31 - AISI 316L Stainless steel; T1 - Brass

KX

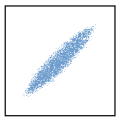




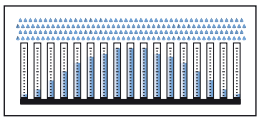
LARGE SPRAY ANGLE

K flat fan nozzles work on the deflection principle conveying a water vein onto a machined deflection surface, and produce a jet with a wide angle flat spray pattern, medium impact value and medium size droplets. Between their inlet orifice and spray orientation there is a 75° angle (see below). Their round outlet orifice and free inside passage minimize the risk of clogging. In addition, compared to standard flat fan nozzles working with a limited operating pressure, the K series models with large spray angles produce an excellent mist effect. These K nozzles are available with threaded connections, for capacities from 0390 and 3350, and also as tips to be assembled onto a nipple by means of a retaining nut. An alternative option are the KX types.

- **Thread specification**: BSPT, NPT



Spray section

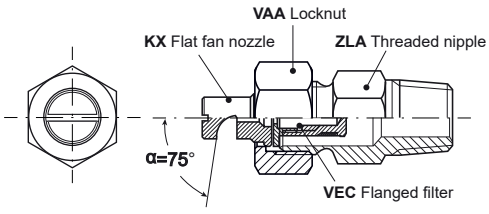


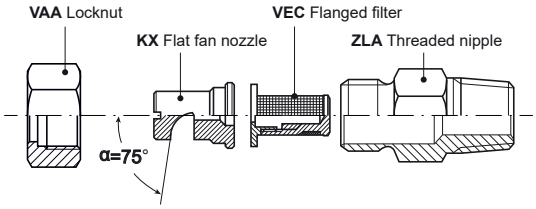
Convex distribution

THREAD SIZE AND DIMENSIONS

Here below please find available thread sizes and nozzles dimensions. Different capacities correspond to different deflection angles. The external dimensions may differ even if the thread size is the same. The table includes the largest nozzles with a given thread size. Please contact our Sales department for more information.

Code	RG inch	H mm	H1 mm	CH mm
KGW	1/8"	24,0 (from 0390 to 1120)	8,5	12
		25,0 (from 1160 to 1940)	9,0	
		31,0 (from 2117 to 2157)	10,0	14
KHW	1/4"	31,0 (from 1160 to 1940)	12,5	14
		34,0 (from 2117 to 2210)		
KIW	3/8"	44,0 (all codes)	13,0	17
KJW	1/2"	49,0 (all codes)	17,0	22
KKW	3/4"	56,0 (from 2700 to 2940)	20,0	36
		65,0 (from 3110 to 3164)		
KLW	1"	92,0 (all codes)	26,0	46





ASSEMBLY FITTINGS

The below illustration shows the assembly of a KX nozzle tip (in the middle) with a nipple and a locknut.

Locknut **Flat fan nozzle** **Welding nipple**

Typical applications

Washing: fruits, vegetables, crushed stones, other
Spray: rolling oil, release agents, coolants
Cooling: metal parts, bottles
Other applications: foam dispersion, fire-fighting systems, water curtains

HOW TO MAKE UP THE **NOZZLE CODE**

EX.: KGW 0390 B1

K G W 0390 xx

- **MATERIAL**: • **B1** - AISI 303 Stainless steel • **B31** - AISI 316L Stainless steel • **T1** - Brass
- **CAPACITY**
- **SPRAY ANGLE**: • **W** - 120°(Wide spray angle) • **X** - Ø14.7
- **CONNECTION**: • **G** -1/8" • **J** -1/2" • **H** -1/4" • **K** -3/4" • **I** -3/8" • **L** -1"
- **NOZZLE TYPE**

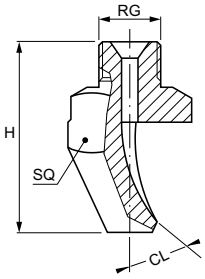
LARGE SPRAY ANGLE

KGW 1/8"	KHW 1/4"	KIW 3/8"	KJW 1/2"	KKW 3/4"	KLW 1"	KXW	D mm	Code	Capacity at different pressure values (l/min) (bar)							Spray angle (°) at pressure (bar)	
									0.5	1.0	2.0	3.0	4.0	5.0	7.0	1.5	4.0
•						•	0.6	**0390**	0.16	0.23	0.32	0.39	0.45	0.50	0.60	90°	120°
•						•	0.7	**0590**	0.24	0.34	0.48	0.59	0.68	0.76	0.90	105°	120°
•						•	0.8	**0780**	0.32	0.45	0.64	0.78	0.90	1.01	1.19	110°	125°
•						•	1.0	**1120**	0.49	0.69	0.98	1.20	1.39	1.55	1.83	105°	122°
•	•					•	1.1	**1160**	0.65	0.92	1.31	1.60	1.85	2.07	2.44	110°	130°
•	•					•	1.3	**1200**	0.82	1.15	1.63	2.00	2.31	2.58	3.06	120°	130°
•	•					•	1.4	**1230**	0.94	1.33	1.88	2.30	2.66	2.97	3.51	110°	125°
•	•					•	1.6	**1310**	1.27	1.79	2.53	3.10	3.58	4.00	4.74	120°	130°
•	•					•	1.8	**1390**	1.59	2.25	3.18	3.90	4.50	5.03	5.96	130°	140°
•	•					•	2.3	**1590**	2.41	3.41	4.82	5.90	6.81	7.62	9.01	120°	130°
•	•					•	2.6	**1780**	3.18	4.50	6.37	7.80	9.01	10.1	11.9	130°	140°
•	•					•	2.9	**1940**	3.84	5.43	7.68	9.40	10.9	12.1	14.4	140°	150°
•	•					•	3.3	**2117**	4.78	6.75	9.55	11.7	13.5	15.1	17.9	110°	120°
•	•					•	3.6	**2141**	5.76	8.14	11.5	14.1	16.3	18.2	21.5	120°	130°
•	•					•	3.8	**2157**	6.41	9.06	12.8	15.7	18.1	20.3	24.0	120°	130°
	•					•	4.0	**2172**	7.02	9.93	14.0	17.2	19.9	22.2	26.3	125°	135°
	•					•	4.1	**2188**	7.68	10.9	15.4	18.8	21.7	24.3	28.7	130°	140°
	•					•	4.4	**2210**	8.57	12.1	17.1	21.0	24.2	27.1	32.1	135°	145°
		•				•	4.5	**2230**	9.39	13.3	18.8	23.0	26.6	29.7	35.1	110°	120°
		•				•	5.0	**2270**	11.0	15.6	22.0	27.0	31.2	34.9	41.2	115°	125°
		•	•			•	5.3	**2310**	12.7	17.9	25.3	31.0	35.8	40.0	47.4	125°	135°
		•	•				5.6	**2350**	14.3	20.2	28.6	35.0	40.4	45.2	53.5	130°	140°
			•				6.0	**2390**	15.9	22.5	31.8	39.0	45.0	50.3	59.6	130°	140°
			•				6.5	**2470**	19.2	27.1	38.4	47.0	54.3	60.7	71.8	135°	140°
			•				7.1	**2550**	22.5	31.8	44.9	55.0	63.5	71.0	84.0	135°	145°
			•				7.5	**2630**	25.7	36.4	51.4	63.0	72.7	81.3	96.2	140°	150°
				•			8.0	**2700**	28.6	40.4	57.2	70.0	80.8	90.4	107	130°	140°
				•			8.4	**2780**	31.8	45.0	63.7	78.0	90.1	101	119	135°	145°
				•			8.7	**2860**	35.1	49.7	70.2	86.0	99.3	111	131	135°	145°
				•			9.3	**2940**	38.4	54.3	76.8	94.0	109	121	144	140°	150°
				•			10.3	**3110**	44.9	63.5	89.8	110	127	142	168	125°	135°
				•			11.0	**3125**	51.0	72.2	102	125	144	161	191	130°	135°
				•			11.4	**3141**	57.6	81.4	115	141	163	182	215	130°	135°
				•			12.2	**3164**	67.0	94.7	134	164	189	212	251	135°	145°
					•		14.6	**3235**	95.9	136	192	235	271	303	359	130°	135°
					•		17.9	**3350**	143	202	286	350	404	452	535	130°	135°

ASSEMBLY ACCESSORIES

KX series nozzles are assembled with pipe clamp, welding nipple and locknut.
Our assembly accessories are available in many different types and materials. Please see on page 44 for more information.

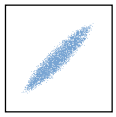
Name	Code and material	Appearance	Model no.	
			3/8" Standard size	3/4" Large size
Locknut P.88	**B1** - AISI 303 SS **B31**- AISI 316L SS **T1** - Brass **D6** - Fiberglass reinforced PP		VAA 0380 **xx**B	VAA 0750 **xx**B
Welding nipple P.89	**B1** - AISI 303 SS **B31**- AISI 316L SS		ZAA C018 **xx**G	ZAA E027 **xx**G
Threaded nipple P.89	**B1** - AISI 303 SS **B31**- AISI 316L SS **T1** - Brass		ZLA 2538 **xx**B	ZLA 7575 **xx**B
Metal pipe clamp P.87	**B1** - AISI 303 SS **T1** - Brass		ZPM	–
Plastic pipe clamp P.86	**D6** - Fiberglass reinforced PP		ZPB 0050 D6	–



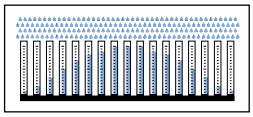
HIGH IMPACT TYPES

The K series nozzles of this type are designed with a spoon-shaped deflected surface to concentrate the liquid flow and produce a narrow-angle flat fan spray with a high impact value. For this feature they are widely used in all working environments requiring powerful jets. Compared to the standard cat-eye-shaped flat fan nozzle tips, K nozzles have a larger and free inner passage and are less subject to clogging, provide high performance cleaning efficiency and have an extended operating life. They are designed with a specific angle (see ~ CL on the left drawing) between inlet orifice and spray orientation surface. These nozzles are available with standard male threads but also with quick coupling nipples to shorten maintenance time. Please contact our Sales department for more information.

- **Thread specification**: BSPT, NPT
- **Typical applications**
  cleaning of parts, crushed stone, road, aircrafts, vehicles and tanks.



Spray section



Convex distribution

THREAD SIZE CODE

K**O**x	1/8"
K**P**x	1/4"
K**Q**x	3/8"
K**R**x	1/2"
K**S**x	3/4"
K**T**x	QC

QUICK COUPLING NIPPLES

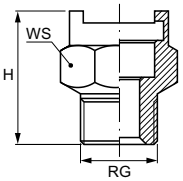
Please refer to below table for dimensions and materials suitable for different uses.

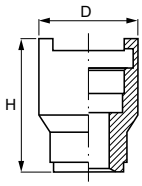
Name	Thread size (RG) inch	Standard size	Large size	H mm	WS mm	D mm
Male nipple	1/4"	ZHS 0025 xxQ1	-	29	22	-
	3/8"	ZHS 0038 xxQ1	-	29	22	-
	1/2"	-	ZHS 0050 xxQ2	35	30	-
Female nipple	3/8"	ZHT 0038 xxQ1	-	29	22	-
Welding nipple	-	ZHU 0038 xxQ1	ZHU 0050 xxQ2	32	-	28
Seal (Viton) for SS nipple	-	VDH BQ10 E7	VDH BQ20 E7	-	-	-
Seal (BUNA) for brass nipple	-	VDH BQ10 E8	VDH BQ20 E8	-	-	-

ZHS + KTH

ZHS 0025 xxQ1

ZHS 0050 xxQ2





ZHU 0038 xxQ1

HOW TO MAKE UP THE **NOZZLE CODE**

EX.: KPB 1390 B1

K P B 1390 xx

- **NOZZLE TYPE**
  - **Q** -3/8" • **T** -Quick Connect
- **CONNECTION**
  - **O** -1/8" • **R** -1/2"
  - **P** -1/4" • **S** -3/4"
- **SPRAY ANGLE**
  - **B** -15° • **L** -40°
  - **D** -25° • **N** -50°
  - **H** -35°
- **CAPACITY**
- **MATERIAL**
  - **B1** - AISI 303 Stainless steel
  - **B31** - AISI 316L Stainless steel
  - **T1** - Brass

HIGH IMPACT TYPES

	1/8"	1/4"	3/8"	1/2"	3/4"	QC	Code	D mm	Capacity at different pressure values (l/min) (bar)							CL deg	H mm	SQ mm
									2.0	3.0	4.0	5.0	6.0	7.0	10			
15°		KPB				KTB	**1390**	1.9	3.18	3.90	4.50	5.03	5.52	5.96	7.12	22°	48	15
		KPB				KTB	**1780**	2.6	6.37	7.80	9.01	10.1	11.0	11.9	14.2	19°	54	
			KQB			KTB	**2117**	3.2	9.55	11.7	13.5	15.1	16.5	17.9	21.4	25°	72	20
			KQB			KTB	**2156**	3.7	12.7	15.6	18.0	20.1	22.1	23.8	28.5	18°	92	
			KQB			KTB	**2195**	4.2	15.9	19.5	22.5	25.2	27.6	29.8	35.6	15°	90	
				KRB			**2230**	4.6	18.8	23.0	26.6	29.7	32.5	35.1	42.0	14°	125	25
				KRB			**2310**	5.3	25.3	31.0	35.8	40.0	43.8	47.4	56.6	14°	130	
				KRB	KSB		**2390**	5.9	31.8	39.0	45.0	50.3	55.2	59.6	71.2	14°	137	
					KSB		**2780**	8.4	63.7	78.0	90.1	101	110	119	142	14°	191	30
25°		KPD				KTD	**2156**	3.7	12.7	15.6	18.0	20.1	22.1	23.8	28.5	25°	65	20
35°	KOH					KTH	**1160**	1.2	1.31	1.60	1.85	2.07	2.26	2.44	2.92	40°	23	12
		KPH				KTH	**1390**	1.9	3.18	3.90	4.50	5.03	5.52	5.96	7.12	36°	37	15
		KPH	KQH			KTH	**1780**	2.6	6.37	7.80	9.01	10.1	11.0	11.9	14.2	30°	43	20
		KPH	KQH			KTH	**1980**	2.9	8.00	9.80	11.3	12.7	13.9	15.0	17.9	28°	49	
		KPH	KQH			KTH	**2117**	3.3	9.55	11.7	13.5	15.1	16.5	17.9	21.4	28°	52	
			KQH			KTH	**2156**	3.7	12.7	15.6	18.0	20.1	22.1	23.8	28.5	26°	58	
			KQH			KTH	**2195**	4.1	15.9	19.5	22.5	25.2	27.6	29.8	35.6	23°	64	
				KRH		KTH	**2230**	4.5	18.8	23.0	26.6	29.7	32.5	35.1	42.0	22°	73	25
				KRH		KTH	**2310**	5.3	25.3	31.0	35.8	40.0	43.8	47.4	56.6	24°	81	
				KRH			**2390**	5.9	31.8	39.0	45.0	50.3	55.2	59.6	71.2	19°	89	
				KRH	KSH		**2630**	7.5	51.4	63.0	72.7	81.3	89.1	96.2	115	23°	114	32
					KSH		**2780**	8.4	63.7	78.0	90.1	101	110	119	142	22°	122	
40°			KQL			KTL	**2156**	3.7	12.7	15.6	18.0	20.1	22.1	23.8	28.5	35°	60	25
			KQL			KTL	**2195**	4.1	15.9	19.5	22.5	25.2	27.6	29.8	35.6	33°	64	
			KQL			KTL	**2230**	4.5	18.8	23.0	26.6	29.7	32.5	35.1	42.0	33°	72	
			KQL			KTL	**2270**	5.0	22.0	27.0	31.2	34.9	38.2	41.2	49.3	29°	75	
			KQL			KTL	**2310**	5.2	25.3	31.0	35.8	40.0	43.8	47.4	56.6	26°	77	
			KQL			KTL	**2350**	5.7	28.6	35.0	40.4	45.2	49.5	53.5	63.9	28°	77	
			KQL			KTL	**2390**	6.0	31.8	39.0	45.0	50.3	55.2	59.6	71.2	28°	87	
50°		KPN	KQN			KTN	**1200**	1.5	1.63	2.00	2.31	2.58	2.83	3.06	3.65	50°	31	15
		KPN	KQN			KTN	**1270**	1.6	2.20	2.70	3.12	3.49	3.82	4.12	4.93	50°	31	
		KPN	KQN			KTN	**1390**	1.9	3.18	3.90	4.50	5.03	5.52	5.96	7.12	60°	31	
		KPN	KQN			KTN	**1980**	2.9	8.00	9.80	11.3	12.7	13.9	15.0	17.9	42°	41	20
		KPN	KQN			KTN	**2156**	3.7	12.7	15.6	18.0	20.1	22.1	23.8	28.5	45°	47	
		KPN	KQN			KTN	**2230**	4.5	18.8	23.0	26.6	29.7	32.5	35.1	42.0	37°	55	25
			KQN			KTN	**2390**	6.0	31.8	39.0	45.0	50.3	55.2	59.6	71.2	40°	72	30
			KQN			KTN	**2490**	6.7	40.0	49.0	56.6	63.3	69.3	74.8	89.5	38°	72	
			KQN			KTN	**2630**	7.5	51.4	63.0	72.7	81.3	89.1	96.2	115	37°	72	
			KQN			KTN	**2780**	8.4	63.7	78.0	90.1	101	110	119	142	32°	72	

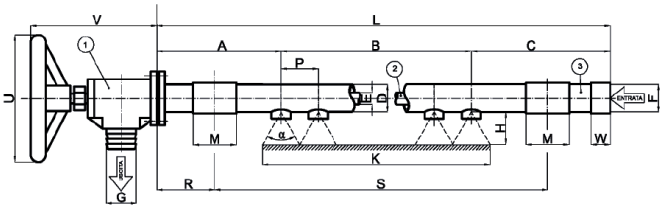
HOW TO MAKE UP THE **NOZZLE CODE**

EX.: KPB 1390 B1

K P B 1390 xx

- **NOZZLE TYPE**
- **CONNECTION** • **O** -1/8" • **R** -1/2" • **P** -1/4" • **S** -3/4" • **Q** -3/8" • **T** -Quick connect
- **SPRAY ANGLE** • **B** -15° • **L** -40° • **D** -25° • **N** -50° • **H** -35°
- **CAPACITY**
- **MATERIAL** • **B1** - AISI 303 Stainless steel • **B31** - AISI 316L Stainless steel • **T1** - Brass

SHOWER PIPE



LEGEND

A: first nozzle position
B: nozzle span
C: last nozzle position
D: external diamenter x pipe widht
E: shaft outer diameter
F: inlet connection
G: outlet connection
H: height
L: standard reference lenght
M: support lenght
N: nozzles number
P: nozzle pitch
R: support position
S: sleeve span
U: hand wheel diameter
V: valve lenght
W: nipple lenght
α: spray angle
(1): assy valve
(2): assy shaft
(3): assy pipe

SELF-CLEANING SHOWER PIPES

Self-cleaning shower pipes are used in the pulp and paper industry for washing and cleaning forming fabrics and felts. There are two kinds of pipes:

- Low pressure (2 ÷ 6 bar) fixed pipes with flat fan nozzles (PNR nozzle: GE)
- High pressure (25 ÷ 70 bar) oscillating pipes with straight jet nozzles (PNR nozzles: GEA)

Both fixed and oscillating pipes must have the following characteristics:

- presence of a cleaning system that cleans the nozzles with simultaneous discharge of impurities;
- easy and fast activation of the cleaning system, without interrupting the spray and without problems for the operators;
- usage of nozzles that allow to save water and that never get blocked, eventually after a long

Shower pipes that satisfy these three characteristics have a structure made of three main parts.

The Assy Valve must allow the passage or the stop of the discharge flux, through the opening or the closing of a lock, moved by a shaft, manually activated by a hand wheel. This movement is used to activate the Assy Shaft. The Assy Valve is connected to the Assy Pipe through a flanged connection, and to the discharge pipes through a specific connection (thread or hose fitting).

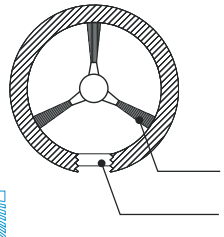
The Assy Shaft is made by a pipe with specific brushes mounted on it; thanks to the connection with the shaft of the Assy Valve, it moves radially and axially. In this way, the brushes can remove the impurities both from the nozzles and from the inner part of the Assy Pipe.

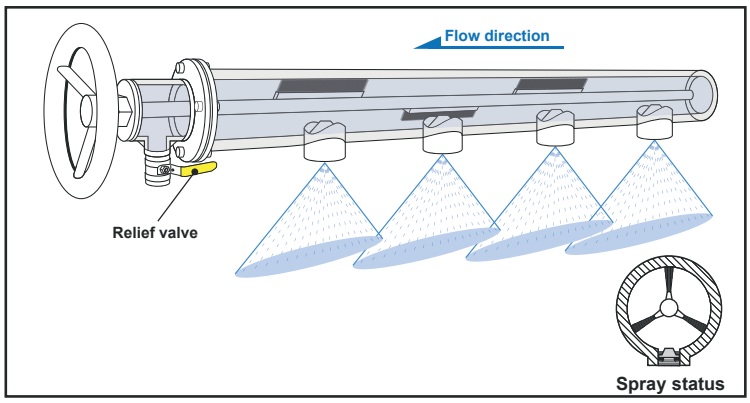
The nozzles are assembled on the Assy Pipe, which is connected to the main pipe. Nozzles can be installed with specific welding nipples or through plastic pipe clamps (PNR code: ZPH, see page 88).

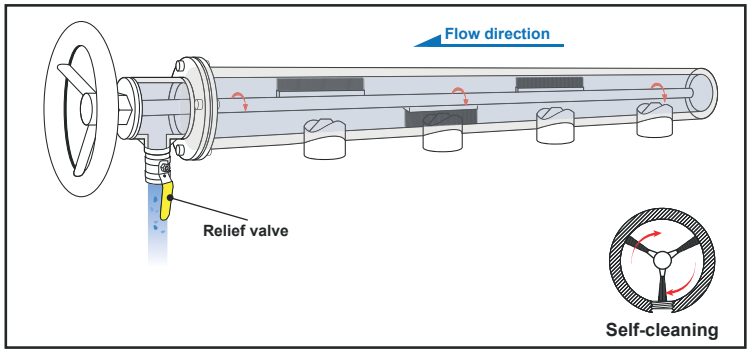
The following table table shows the minimum and the maximum values, for the pipes already produced by PNR Italia. Please contact our Technical Office for any request.

Dim.	MIN	MAX
D (mm)	Ø 50 x 1.5	Ø 73 x 3
L (mm)	600	7100
A (mm)	200	735
B (mm)	200	6000
C (mm)	200	1350
N	2	51
P (mm)	80	2950
F (inch)	1-1/2" F	2-1/2" F
G (mm)	Ø 48	Ø 60

The images shows the functioning of the self-cleaning shower pipe, while rotating the wheel.

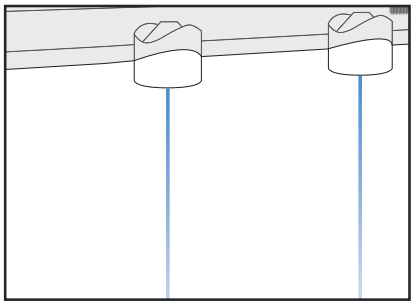




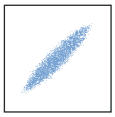


FLAT FAN NOZZLES / DISC NOZZLES

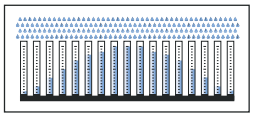
In GE series disc nozzles with thickness 1.2 mm the spray jet is close to the turbulence structure and this special design makes them very easy to clean. Within the delivery pipe these nozzles are assembled to a steel brush, that can be manually or automatically rotated, which takes off all the dirt washed out by water and then flushed out through a release valve positioned at the end of the pipe. Disc nozzles, with their special low profile design, can be easily removed for cleaning so they reduce maintenance times and costs and improve the plant efficiency.



Typical applications
washing or spraying in pulp and paper mills, mesh fabrics cleaning, water treatment systems, screen and filter (felt and wire) washing and many more.



Spray section

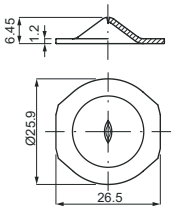


Convex distribution

	Code	D1 mm	Capacity at different pressure values (l/min) (bar)					
			3.0	4.0	6.0	10	15	20
60°	GEQ 0900 xx	1.0	0.90	1.04	1.27	1.64	2.01	2.32
	GEQ 1170 xx	1.5	1.70	1.96	2.40	3.10	3.80	4.39
	GEQ 1234 xx	1.7	2.34	2.70	3.31	4.27	5.23	6.04
	GEQ 1310 xx	2.0	3.10	3.58	4.38	5.66	6.93	8.00
	GEQ 1490 xx	2.5	4.90	5.66	6.93	8.95	11.0	12.7
	GEQ 1780 xx	3.0	7.80	9.01	11.0	14.2	17.4	20.1
	GEQ 2124 xx	4.0	12.4	14.3	17.5	22.6	27.7	32.0
	GEQ 2194 xx	5.0	19.4	22.4	27.4	35.4	43.4	50.1
	GEQ 2310 xx	7.0	23.0	26.6	32.5	42.0	51.4	59.4
75°	GES 0900 xx	1.0	0.90	1.04	1.27	1.64	2.01	2.32
	GES 1170 xx	1.5	1.70	1.96	2.40	3.10	3.80	4.39
	GES 1234 xx	1.7	2.34	2.70	3.31	4.27	5.23	6.04
	GES 1310 xx	2.0	3.10	3.58	4.38	5.66	6.93	8.00
	GES 1490 xx	2.5	4.90	5.66	6.93	8.95	11.0	12.7
	GES 1780 xx	3.0	7.80	9.01	11.0	14.2	17.4	20.1
	GES 2124 xx	4.0	12.4	14.3	17.5	22.6	27.7	32.0
	GES 2194 xx	5.0	19.4	22.4	27.4	35.4	43.4	50.1
	GES 2310 xx	7.0	23.0	26.6	32.5	42.0	51.4	59.4

FLAT FAN NOZZLES

HOW TO MAKE UP THE NOZZLE CODE EX.: GES 1310 C7MV



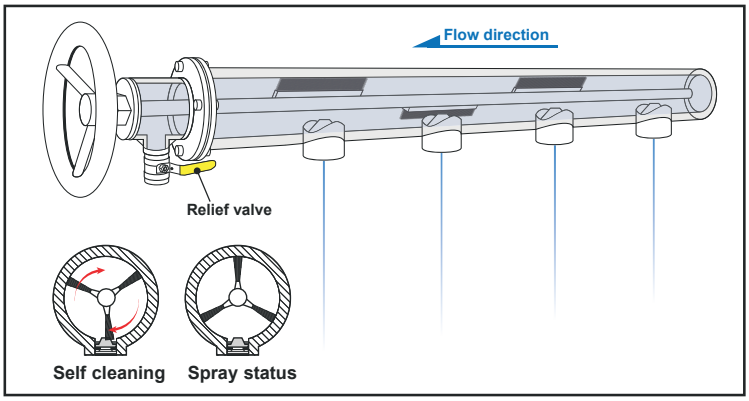
Flat fan nozzle - US
GES 1310 C7SV

GE S 1310 xx

- NOZZLE TYPE: • Q - 60° • S - 75°
- SPRAY ANGLE
- CAPACITY
- MATERIAL: • C7SV - AISI 316Ti Stainless steel

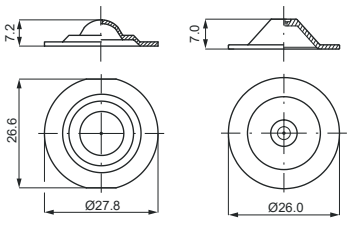
GEA SERIAL STRAIGHT NOZZLES

D mm	Nozzle type: Stainless steel	Nozzle type: Ruby insert	Code	Capacity at different pressure values (l/min) (bar)					
				3.0	4.0	6.0	10	15	20
0.40		•	0170	0.17	0.20	0.24	0.31	0.38	0.44
0.50		•	0290	0.29	0.33	0.41	0.53	0.65	0.75
0.60		•	0320	0.32	0.37	0.45	0.58	0.72	0.83
0.70		•	0420	0.42	0.48	0.59	0.77	0.94	1.08
0.80	•	•	0500	0.50	0.58	0.71	0.91	1.12	1.29
0.85		•	0620	0.62	0.72	0.88	1.13	1.39	1.60
0.90		•	0780	0.78	0.90	1.10	1.42	1.74	2.01
1.00	•	•	0900	0.90	1.04	1.27	1.64	2.01	2.32
1.10		•	1100	1.10	1.27	1.56	2.01	2.46	2.84
1.20	•	•	1130	1.30	1.50	1.84	2.37	2.91	3.36
1.50	•		1170	1.70	1.96	2.40	3.10	3.80	4.39
2.00	•		1310	3.10	3.58	4.38	5.66	6.93	8.00



STRAIGHT NOZZLES

HOW TO MAKE UP THE NOZZLE CODE EX.: GEA 0900 C7S



Metal
GEA 0900 C7S

Ruby nozzle tip
GEA 0900 F31

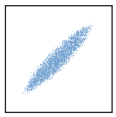
GE A 0900 xx

- NOZZLE TYPE: • A - 0°
- SPRAY ANGLE
- CAPACITY
- MATERIAL: • C7S - AISI 316Ti Stainless steel body • F30 - Ruby insert, 303 body • F31 - Ruby insert, 316L body

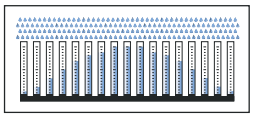
GF SERIES SELF-CLEANING NOZZLES

The self-cleaning design of the GF series nozzles allow an easy maintenance of cleaning spray bars and shower headers. The nozzle body contains a mobile piston whose opening and closure is operated by the water pressure. For example, when nozzles wash mesh fabrics with an operating pressure of 3.0 bar, this pressure is higher than a spring force of 1.0 bar. Piston and nozzle body come close producing a flat fan spray. If the inlet pressure is reduced to 0.5 bar, lower than a spring force of 1.0 bar, piston and nozzle body separate opening to the maximum distance. Water pressure remains at 0.5 bar and removes any build up when back to normal condition. In a word, to clean these nozzles it's sufficient to reduce pressure to avoid the accumulation of dirt inside. GF self-cleaning nozzles are easy to install, align and clean ensuring relevant time and costs savings. The spring force is set depending on customer's plant working pressure.

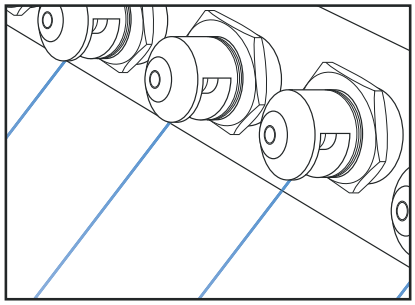
Typical applications
washing or spraying in pulp and paper mills, mesh fabrics cleaning, water treatment systems, and many more.

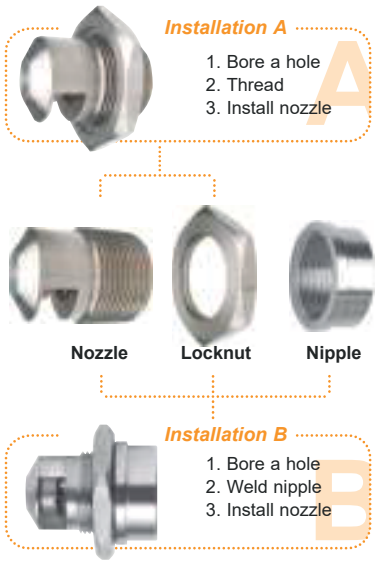


Spray section



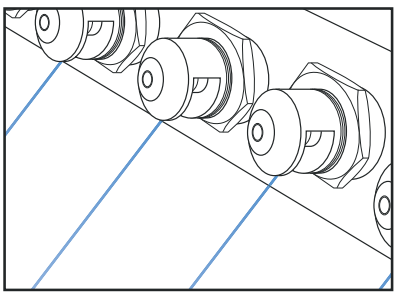
Convex distribution

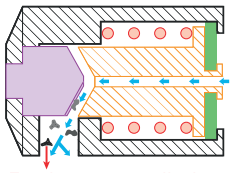
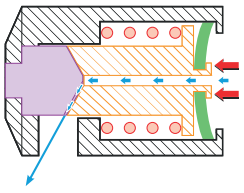




	Code	Capacity at different pressure values (l/min) (bar)								
		3.0	4.0	5.0	6.0	7.0	8.0	10	15	20
0°	GFA 1100 B31 xx	1.00	1.15	1.29	1.41	1.53	1.63	1.83	2.24	2.58
	GFA 1235 B31 xx	2.35	2.71	3.03	3.32	3.59	3.84	4.29	5.25	6.07
	GFA 1330 B31 xx	3.30	3.81	4.26	4.67	5.04	5.39	6.02	7.38	8.52
45°	GFM 1630 B31 xx	6.30	7.27	8.13	8.91	9.62	10.3	11.5	14.1	16.3
	GFM 1750 B31 xx	7.50	8.66	9.68	10.6	11.5	12.2	13.7	16.8	19.4
	GFM 1970 B31 xx	9.70	11.2	12.5	13.7	14.8	15.8	17.7	21.7	25.0
	GFM 2121 B31 xx	12.1	14.0	15.6	17.1	18.5	19.8	22.1	27.1	31.2
	GFM 2139 B31 xx	13.9	16.1	17.9	19.7	21.2	22.7	25.4	31.1	35.9
60°	GFQ 1630 B31 xx	6.30	7.27	8.13	8.91	9.62	10.3	11.5	14.1	16.3
	GFQ 1750 B31 xx	7.50	8.66	9.68	10.6	11.5	12.2	13.7	16.8	19.4
	GFQ 1970 B31 xx	9.70	11.2	12.5	13.7	14.8	15.8	17.7	21.7	25.0
	GFQ 2121 B31 xx	12.1	14.0	15.6	17.1	18.5	19.8	22.1	27.1	31.2
	GFQ 2139 B31 xx	13.9	16.1	17.9	19.7	21.2	22.7	25.4	31.1	35.9
80°	GFT 1630 B31 xx	6.30	7.27	8.13	8.91	9.62	10.3	11.5	14.1	16.3
	GFT 1750 B31 xx	7.50	8.66	9.68	10.6	11.5	12.2	13.7	16.8	19.4
	GFT 1970 B31 xx	9.70	11.2	12.5	13.7	14.8	15.8	17.7	21.7	25.0
	GFT 2121 B31 xx	12.1	14.0	15.6	17.1	18.5	19.8	22.1	27.1	31.2
	GFT 2139 B31 xx	13.9	16.1	17.9	19.7	21.2	22.7	25.4	31.1	35.9

Thread specification	M28 x 1.5	3/4"- 20 UNEF	1 1/8"- 18 UNEF	3/4" BSP
Nozzle	GFx xxxx B31SM	GFx xxxx B31SN	GFx xxxx B31SP	GFx xxxx B31SG
Nipple	XGF 2832 B31SM	XGF 2832 B31SN	XGF 2832 B31SP	XGF 2832 B31SG
Locknut	XGF 7010 B31SM	XGF 7010 B31SN	XGF 7010 B31SP	XGF 7010 B31SG



Self cleaning	Spray status
 Foreign matters discharge	

HOW TO MAKE UP THE **NOZZLE CODE**

EX.: GFA 1100 B31SM

GF A 1100 B31 xx

- NOZZLE TYPE: GF
- SPRAY ANGLE: A - 0° · M - 45° · Q - 60° · T - 80°
- CAPACITY: 1100
- MATERIAL: B31 - AISI 316L Stainless steel (Spring: AISI 302 Stainless steel)
- CONNECTION: SM - M28x1.5 · SN - 3/4" - 20 UNEF · SP - 1 1/8" - 18 UNEF · SG - 3/4" BSP