VSH connects.

Technical manual

XPress

Disclaimer:

The technical data are non-binding and do not reflect the warranted characteristics of the products. They are subject to change. Please consult our General Terms and Conditions. Additional information is available upon request. It is the designer's responsibility to select products suitable for the intended purpose and to ensure that pressure ratings and performance data are not exceeded. The installation instructions should always be read and followed. The system must always be depressurized and drained before any components, whether defective or otherwise, are removed, modified or corrected.

Index

VSH

An international company

VSH is a leading Dutch manufacturer of piping systems and accessories suitable for gas, water, heating, cooling, solar and sprinkler systems. Our full range of products means that we always have the right solution for systems in residential buildings, utilities, shipbuilding and industry.

VSH is a totally Dutch company and part of the Aalberts Industries Group, which has its advantages. It means that we are able to use the latest technologies to develop innovative products and systems. We do this on the basis of demand and market trends, which makes close contact with our customers indispensable. With over 80 years of experience and a wealth of knowledge, we have become a partner that you can trust to meet your needs. We are happy to do so both now and to continue to do so in the future. Our promise is more than just a slogan: VSH Connects!

As with all VSH product lines, VSH XPress stands for quality, innovation, easy installation and reliability. Furthermore, you can always count on sound technical advice thanks to our many years of experience.

VSH connects.

1 VSH XPress system

The VSH XPress product range is made up of three pipe systems: stainless steel “press fittings” and tubes, galvanized steel press fittings and tubes, and copper press fittings. VSH XPress fittings incorporate an “M” profile.

VSH XPress system products are manufactured using unique, modern machinery. Our completely automated factory guarantees you safe, high-quality products. All welded products undergo a “leak test” in order to avoid any problems afterwards when installed.

The advantages of the VSH XPress system

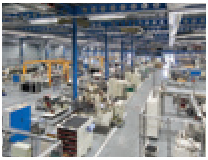
+ BIM ready
+ Professional and appropriate pressure tools
+ Simple, fast connection technology
+ Complete pipe in 3 materials
+ Fittings and pipes from 12 to 108 mm (incl. intermediate sizes: 64 and 66.7 mm for copper, and 66.7 mm for galvanized steel)
+ Systems: galvanized steel, stainless steel, stainless steel for gas, copper, copper for gas and cunifer
+ Pre-marked insertion depth
+ Clear identification of materials and dimensions
+ Leak Before Pressed function

The VSH XPress system offers installers a complete solution with great flexibility. The VSH XPress system consists of fittings, tools and tubes and the tubes of other manufacturers may, under certain circumstances, also be used*. Furthermore, the VSH XPress fittings can also be used in conjunction with various brands of press tools.

** See section 2.1*

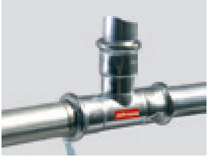
Advantages of VSH XPress

Performance guaranteed:



We guarantee consistent quality and supply, with all fittings being manufactured in the Netherlands. In order to ensure high-value manufacturing, we employ laser-welding technology and all welded fittings (100%) undergo leak testing. The leak testing is fully automated and incorporated in the laser-welding process. All straight connectors with a threaded end and reducers are made from a single piece so that there is no risk of leakage and it is more compact for recessed pipe work. Good performance is guaranteed. The smooth outer surface of the pipes and fittings means that the flow characteristics are better than with traditional connection systems. The quality of our fittings is also testified by the large number of national and international tests. A wide range available of system and product tests is available, with certificates for potable water, gas installations, shipbuilding and also sprinkler systems.

Reliable:



With VSH XPress systems, the quality of the connection is mainly determined by the tool and not the installer, thereby considerably reducing the risk of errors during installation. All fittings are fitted with a “Leak Before Pressed” (LBP) function, which reduces the risk even further. This LBP function ensures that fittings, which have not been pressed, will leak during the initial pressure test. The installer can immediately see which fittings he forgot to press. Once pressed, the system is guaranteed airtight and watertight.

Insertion depth marking

Safe and secure connections depend on the insertion depth being correct. However, marking the insertion depth is a very time-consuming task and for that reason, all stainless steel and galvanized steel couplings with tube ends supplied by VSH are marked with a clearly visible insertion depth mark (12 to 54 mm). This means that 25% of all VSH XPress fittings no longer have to be marked by you. A smart plus from VSH XPress, which makes installations much easier, saves a lot of time and results in greater safety.

Easy and clean:

Compared to other “cold” connection methods, VSH XPress is an extremely user-friendly solution:

- the use of VSH XPress dispenses with the need for complicated clamping techniques, time-consuming preparations and drying times – the installation is faster and cleaner;
- no need to thread the tubes;
- no lubrication needed for installation;
- easy insertion of the tube in the fitting due to the special design of the fittings; and
- short radius bends ensure compact and space-saving installation.

The above features ensure that no special skills are required for an installation and that the work can be carried out in a pleasant and safe environment.

Safe:

The installation of the VSH XPress system does not require any heat source (as, for example, with welding or soldering) or other heavy and potentially dangerous

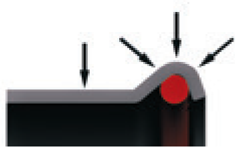
tools. This feature makes VSH XPress the ideal solution for repairs or renovation projects, since you can ensure a minimum of disturbances at the site. Moreover, the light weight of the precision steel tubes means labour conditions are still further improved and a contribution made to a healthier way of working.

Fast:

This simple, fast connection technology and the short preparation times for the tube result in further considerable cost savings in the installation. As the connection is only achieved using press tools, no other materials, such as gases, adhesives, threading machines, etc., need to be purchased or hired.

VSH XPress “an imPRESSive solution!”

Advantages of M-profile:



- The O-ring is pressed perpendicularly into the tube. This results in a seamless transition between fitting and tube that prevents leakages and any dust or dirt from getting into the joint.
- The O-ring bead creates an extra mechanical connection between fitting and tube.
- During the pressing, pressure is applied to the O-ring from three angles, which results in a robust deformation of the O-ring bead and an extremely secure connection.
- Due to the positioning of the O-ring at the beginning of the fitting, the O-ring can be clearly seen by the installer. This results in a safer installation process as any damage can be immediately spotted; the same is true if the ring is wrongly placed.
- No chances of leakage due to a very accurate press profile (M-profile).

Advantages of VSH XPress

The VSH XPress system is a complete range of fittings, tubes and tools. The fittings and tubes are easily recognisable due to the markings on them. The VSH XPress jaws and slings can be recognized by the “X” symbol that appears on the surface of the fitting after pressing. There are major benefits to be gained by using the complete VSH XPress system (fittings, tubes and tools).

- You are always ensured that the combination of fittings, tubes and tools are an optimal match and ensure high quality connections.
- The “X” immediately shows you that the jaws and slings used are the correct choice for the job. It gives you a 100% guarantee that those jaws and slings match the VSH XPress system.
- It offers the possibility of having higher working pressures depending on the application (25 bar or even higher).
- The areas where VSH XPress can be used are in the process of being greatly extended: sprinklers, shipbuilding, high-pressure applications, etc.
- In order to prevent dirt from getting into the tubes and so that the different types can rapidly be distinguished, all VSH XPress tubes are delivered with coloured end-caps (stainless and galvanized steel).

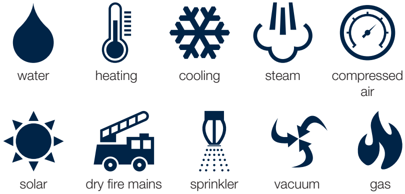
References

VSH XPress is being used all over the world in the widest range of applications and types of buildings.




2 Technical data

2.1 Areas for using the VSH XPress system



Potable water installation

VSH XPress Stainless Steel fittings with stainless steel tubes that fulfil EN10312, DVGW worksheet W534 - GW541 and, for Switzerland, SVGW W/TPW 132 (10/04).

O-rings:	EPDM* (black)
Operating temperature:	-35°C to +135°C
Max. temperature (short term):	150°C
Operating pressure:	Max. 16 bar

VSH XPress Copper fittings with copper tubes that satisfy EN1057.

O-rings:	EPDM (black)
Operating temperature:	-20°C to +110°C
Max. temperature (short term):	135°C
Operating pressure:	Max. 16 bar

In potable water installations with VSH XPress Stainless Steel fittings and tubes, the content of water-soluble chloride ions may not exceed 250 mg/l.

** Ethylene Propylene Diene Monomer*

Central heating installation

VSH XPress galvanized steel fittings with galvanized steel precision tubes that satisfy EN 10305-3 or VSH XPress Stainless Steel fittings with stainless steel tube that satisfy EN 10312.

O-rings:	EPDM (black)
Operating temperature:	-35°C to +135°C
Max. temperature (short term):	150°C
Operating pressure:	Max. 16 bar

VSH XPress copper fittings with copper tubes that satisfy EN1057.

O-rings:	EPDM (black)
Operating temperature:	-20°C to +110°C
Max. temperature (short term):	130°C
Operating pressure:	Max. 16 bar

Gas installation

VSH XPress stainless steel GAS fittings with stainless steel tubes that satisfy DVGW worksheet VP614, SVGW Data sheet G1/01 and ÖVGW PG 314.

O-rings:	HNBR* (yellow)
Operating temperature:	-20°C to +70°C
Operating pressure:	Max. 5 bar inside and outside
Application:	Inside (HTC**, proven tightness of the connection at 650°C for 30 min) or outside buildings. During construction and in concrete, above and under screed within buildings, no other corrosion protection is required. Outside of buildings, only lay above ground. Local regulations must always be observed.

** Hydrogenated Nitrile Butadiene Rubber*
*** Higher Thermal Capacity*

VSH XPress Copper GAS fittings with copper tubes that satisfy EN1057.

O-rings:	NBR*** (yellow)
Operating temperature:	-20°C to +70°C
Operating pressure:	Max. 5 bar inside and outside
Application:	Inside (HTC, proven tightness of the connection at 650°C for 30 min) or outside buildings. During construction and in concrete, no other corrosion protection is required. Outside of buildings, only lay above ground. Local regulations must always be observed.

Note: For tools approved for gas installations, please visit **www.vsh.nl/presstool**

Cooling water installations

VSH XPress Galvanized Steel fittings with galvanized steel precision tubes that satisfy EN 10305-3 in closed-loop systems or VSH XPress Stainless steel fittings with stainless steel tubes that satisfy EN10312 in closed-loop and open systems.

O-rings:	EPDM (black)
Operating temperature:	-35°C to +135°C
Max. temperature (short term):	150°C
Operating pressure:	Max. 16 bar

VSH XPress Copper fittings with copper tubes that satisfy EN1057 in closed and open systems.

O-rings:	EPDM (black)
Operating temperature:	-20°C to +110°C
Max. temperature (short term):	135°C
Operating pressure:	Max. 16 bar

In cooling water installations with VSH XPress Stainless steel fittings and tubes, the content of water-soluble chloride ions may not exceed 250 mg/l.

**** Nitrile Butadiene Rubber*

Sprinkler installations

VSH XPress Galvanized Steel fittings with VSH XPress Sendzimir Galvanized Steel precision tubes that satisfy EN 10305-3 or VSH XPress Stainless Steel fittings with VSH XPress Stainless tubes, which are VdS, FM, UL, ULc and LPCB approved.

O-rings:	EPDM (black)
Operating temperature:	-35°C to +135°C
Max. temperature (short term):	150°C
Operating pressure:	Max. 16 bar (depending on application and dimensions)

VSH XPress Sprinkler is suitable for both wet and dry fixed sprinkler systems. For more information regarding VSH XPress Sprinkler, please consult the technical manual “VSH Fire Protection”, which is available upon request or can be downloaded from our website www.vsh.nl.

Industrial installations

VSH XPress Galvanized Steel fittings with VSH XPress Galvanized Steel precision tubes that satisfy EN 10305-3 in closed-loop systems or VSH XPress Stainless Steel fittings with VSH XPress Stainless Steel tubes that satisfy EN10312 in closed-loop and open systems.

O-rings:	EPDM (black)
Operating temperature:	-35°C to +135°C
Max. temperature (short term):	150°C
Tubes:	only VSH XPress
Operating pressure:	Max. 25 bar (higher pressure available depending on application and dimensions) for galvanized steel press fittings up to 54 mm and stainless steel press fittings up to 108 mm.

It may be possible to have higher working pressures depending on the different applicable safety factors that may apply in industrial applications. For pressures higher than 16 bars, the tools and machines must be according to the prescribed tools for the VSH XPress Sprinkler range. Please see the “VSH Fire Protection” technical manual, which is available upon request and can be downloaded from our website www.vsh.nl.

VSH XPress Galvanized Steel, Copper and Stainless Steel are suitable for vacuum applications with a (relative) pressure down to -0.85 bar.

For applications where a medium other than water is transported, such as oil, fuel and hydrocarbons, the (green) FPM O-ring must be used.

Solar installations

VSH XPress Galvanized Steel fittings with galvanized steel precision tubes that satisfy EN 10305-3 or VSH XPress Stainless Steel fittings with stainless steel tubes that satisfy EN10312.

O-rings:	FPM* (green)
Operating temperature:	-20°C to +200°C
Max. temperature (short term):	230°C
Operating pressure:	Max. 16 bar
Application:	VSH XPress Galvanized Steel for closed-loop systems inside buildings; VSH XPress Stainless Steel for both closed-loop systems and systems with return.

VSH XPress Copper fittings with copper tubes that satisfy EN1057 R250/R290.

O-rings:	FPM (green)
Operating temperature:	-20°C to +200°C
Max. temperature (short term):	230°C
Operating pressure:	Max. 10 bar

** Fluorpropylene Monomer*

Compressed air installations

VSH XPress Galvanized Steel fittings with galvanized steel precision tubes that satisfy EN 10305-3 or VSH XPress Stainless Steel fittings with stainless steel tube that satisfy EN 10312.

VSH XPress Galvanized steel fittings with galvanized steel precision tubes can be used for compressed air under the following conditions:

Water content:	max. 880 mg/m^3, class 3, ISO 8573 part 1
Oil content:	max. 25 mg/m^3, class 5, ISO 8573 part 1

Class	Water content [mg/m^3]	Oil content [mg/m^3]	O-ring
1	3	0.01	EPDM
2	120	0.1	EPDM
3	880	1	EPDM
4	6000	5	EPDM
5	7800	25	EPDM
6	9400	>25	FPM (green)

TABLE 1: COMPRESSED AIR AND ISO CLASSIFICATION - O-RING TO BE USED

If the maximum water content is exceeded, copper or stainless steel must be used. If the compressed air contains mineral or vegetable oil, then FPM O-rings are to be used. EPDM O-rings may only be used for synthetic oil or dry compressed air (not exceeding 25 mg/m^3).

O-rings:	EPDM (black)
Operating temperature:	-35°C to +135°C
Operating pressure:	12-54 mm max. 16 bar 66.7 - 108 mm max. 10 bar

O-rings:	FPM (green)
Operating temperature:	-20°C to +200°C
Max. temperature (short term):	230°C
Operating pressure:	12-54 mm max. 16 bar 66.7 - 108 mm max. 10 bar

VSH XPress copper fittings with copper tubes that satisfy EN 1057.

O-rings:	EPDM (black)
Operating temperature:	-20°C to +110°C
Operating pressure:	Max. 10 bar

O-rings:	FPM (green)
Operating temperature:	-20°C to +200°C
Max. temperature (short term):	230°C
Operating pressure:	Max. 10 bar

Compressed air pipeline systems must be properly tested as soon as the installation work is finished. The system designer and installation contractor must ensure safe methods are selected for testing the system. The methods must comply with all current health and safety regulations. They may include testing compressed air lines with fluids or compressed air at a specific pressure, or a combination of both. We recommend that the maximum working pressure of the product not be exceeded under any circumstances during this process.

Since 30 May 2002, most pressure equipment and installations on the market have had to comply with the Pressure Equipment Directive (PED) 1999. The Directive concerns items such as vessels, pressurized storage containers, heat exchangers, steam generators, boilers, industrial piping, safety equipment and pressure accessories.

Please note that Article 3(3) of the PED applies to VSH XPress. This means that only sound design and safe instructions for use and maintenance are required.

Steam installations

VSH XPress Stainless Steel fittings with stainless steel tubes that satisfy EN10312.

O-rings:	FPM (grey)
Operating temperature:	-20°C to +175°C
Max. temperature (short term):	190°C
Operating pressure:	Max. 9 bar

High pressure dry fire mains

VSH XPress Stainless Steel fittings with VSH XPress Stainless steel tubes, which have been approved by KIWA for pressures up to 40 bars.

O-rings:	EPDM (black)
Operating temperature:	-35°C to +135°C
Max. temperature (short term):	150°C
Dimensions:	22-35 mm (other dimensions available upon request)
Operating pressure:	40 bar

High pressure dry fire mains are an application where quick couplings are combined with the VSH XPress Sprinkler system as an alternative to standard dry fire mains. For more information regarding VSH XPress Sprinkler, please consult the “VSH Fire Protection” technical manual, which is available upon request or can be downloaded from our website: www.vsh.nl

Shipbuilding

VSH XPress Galvanized Steel fittings with VSH XPress Galvanized Steel precision tubes that satisfy EN10305-3 or VSH XPress Stainless Steel fittings with VSH XPress Stainless Steel tubes that satisfy EN10312, certified by RINA, DNV-GL and LR.

O-rings:	EPDM (black)
Operating temperature:	-35°C to +135°C
Max. temperature (short term):	150°C
Operating pressure:	Max. 16 bar (operating pressures depending on application and dimensions)

O-rings:	FPM (green)
Operating temperature:	-20°C to +200°C
Max. temperature (short term):	230°C
Operating pressure:	Max. 16 bar

VSH XPress CuNi fittings with VSH XPress CuNi tube that satisfy O-UNS C 70600 USA standard, which are RINA, DNV and GL approved.

O-rings:	NBR (brown)
Max. Operating temperature:	-20°C tot +95°C
Max. temperature (short term):	110°C
Operating pressure:	Max. 16 bar

VSH XPress Copper fittings, certified by DNV, with copper tubes that satisfy EN1057 in closed and open systems.

O-rings:	EPDM (black)
Operating temperature:	-24°C to +120°C
Max. temperature (short term):	135°C
Operating pressure:	Max. 16 bar

The shipbuilding applications are valid only if the pressing machines, jaws and slings used are in accordance with the VSH XPress Sprinkler range. Please contact VSH for further information on VSH XPress in shipbuilding applications.

2.2 VSH XPress tubes

2.2.1 VSH XPress Stainless Steel tubes

VSH XPress Stainless steel tubes are thin-walled precision steel tubes. The outer and inner surfaces of the tubes are blank, free of discoloration and are supplied free of manufacturing residue that could otherwise cause corrosion. The possibility of any dirt or dust getting into the tubes during transport or when stored is avoided by caps on both ends of the tubes and correct packaging for distribution. This section gives you all technical parameters that are especially relevant when working with VSH XPress Stainless Steel tubes.

Insulation

The following regulations apply to the insulation of potable water piping systems:

- Cold water lines must be protected against condensation and overheating in accordance with DIN 1988, Part 200. For installations in the Netherlands, the “Water Work Sheets” must be followed.
- Hot water lines must be insulated to prevent heat loss in accordance with the Energy-Conservation Act (EnEG). For installations in the Netherlands, the “Water Work Sheets” must be followed.

The soluble chloride content in the insulation materials used must not exceed 0.05% by weight in accordance with DIN 1988, Part 7.

Important: AS-quality insulation materials (see also AGI Q 135) contain significantly less chloride than the maximum permissible content.

Fire characteristics

VSH XPress Stainless tubes are considered as non-combustible tubes according to German class A building materials – DIN 4102 Part 1.

VSH XPress Stainless Steel tube 1.4401 (AISI 316)

VSH XPress Stainless Steel tubes have been tested and approved for potable water installations by many international certifying bodies, for example, they comply with DVGW/DIN and DVGW – Worksheet GW 541. VSH XPress Stainless Steel tubes have also been approved for gas installations inside buildings (with higher thermal capacity, proven over 30 minutes at 650°C and PN5) and outside buildings (without HTC) above ground (not under screed or under ground).

Applications

The installations must always comply with local regulations.

- All potable water installations in accordance with international potable water institutes, such as for example the German Potable Water Decree (TrinkwV) and EU Directive 98/83/EC, DIN 50930, Part 6 and in compliance with DIN 1988
- Water supply and rain water installations
- Potable water for industrial applications
- Wet and dry fire sprinkler installations in accordance with DIN 1988, Part 6, VdS, FG, LPCB, CNBOP, SBSC ,UL, ULc and FM
- Conditioned water, such as decalcinated/softened water, partially and completely desalinated water, distilled water, water with glycol
- Compressed air
- Special installations for combustible gases: natural and liquid gases, in accordance with DVGW - Worksheet G260 I/II. Piping for gas or liquid gas, in accordance with DVGW - Worksheet G600, DVGW - TRGI 86/96 and TRF 1996
- Shipbuilding

Technical characteristics	
Material	X5CrNiMo 17 12 2 material no. 1.4401 in accordance with DIN-EN 10088
Specifications	EN 10312 – DVGW - Worksheet GW541 (2004) table 2
Approvals	DVGW, SVGW, ETA, ÖVGW, BYGGFORSK, STF, PZH, SITAC, CSTBat, WRAS, VdS, FM, FG, CNBOP, SBSC, SETSCO, LPCB, DNV-GL, RINA, UL, ULc, BV, GDV, Kiwa
Type of tubing	TIG or laser-welded
Welding seam	100% EDDY CURRENT tested in accordance with EN 10893-2:2011

Weld slag removal	Outside
Tolerances	In accordance with EN10312 - table 2
Surface finish	Matt silver
Marking	SudoXPress stainless [DN/dimension x wall thickness] Stainless steel/Edelstahl–Sanitary/Sanitär–GAS 1.4401/AISI316 EN10312 DVGW GW541 Reg.nr. [DVGW registration number] SVGW ÖVGW W1.397 WRAS VA1.22/20294 VA1.12/18769 SINTEF PZH SITAC 0168/04 ATEC 14/15-2097 CSTBat 116-2097 LPCB VdS G4080037 [operational pressure VdS/LPCB] bar <FM> [operational pressure FM] psi C(UL)US Listed 4NB1 [operational pressure UL/cUL] psi KK NDE [batch number], [supplier code] [model designation, repeated every 60 cm]
Smallest bend radius	3.5 x external diameter of the tube (max. 28 mm)
Form delivered	Tubes, length 6 m +0/-50 mm, with protective caps (green)
Heat expansion coefficient	0.0160 mm/m at $\Delta T = 1K$
Max. working pressure	16 bar

TABLE 2: TECHNICAL CHARACTERISTICS VSH XPRESS STAINLESS STEEL TUBE 1.4401

DN	Outside Ø x s [mm]	Inside Ø [mm]	Weight [kg/m]	Tube capacity [l/m]
DN 10	12 x 1,0	10,0	0,271	0,079
DN 12	15 x 1.0	13.0	0.333	0.133
DN 15	18 x 1.0	16.0	0.410	0.201
DN 20	22 x 1.2	19.6	0.624	0.302
DN 25	28 x 1.2	25.6	0.790	0.515
DN 32	35 x 1.5	32.0	1.240	0.804
DN 40	42 x 1.5	39.0	1.503	1.195
DN 50	54 x 1.5	51.0	1.972	2.043
DN 65	76.1 x 2.0	72.1	3.550	4.548
DN 80	88.9 x 2.0	84.9	4.150	5.661
DN 100	108 x 2.0	104.0	5.050	8.495

TABLE 3: DIMENSIONS AND WEIGHT VSH XPRESS STAINLESS STEEL TUBE 1.4401

VSH XPress Stainless steel tube 1.4521 (AISI 444)

The 1.4521 VSH XPress Stainless Steel tube has been tested and approved for potable water installations, in accordance with DVGW - Worksheet GW 541, Kiwa, WRAS, ETA, ÖVGW, CSTBat and SVGW.

Applications

- All potable water installations in accordance with the German Potable Water Decree(TrinkwV) and EU Directive 98/83/EC, DIN 50930 Part 6, and in accordance with DIN 1988.
- Water supply and rain water installations
- Potable water for industrial applications
- Wet and dry fire sprinkler installations in accordance with DIN 1988, Part 6, FM or LPCB.
- Conditioned water, such as decalcinated/softened water, partially and completely desalinated water, distilled water, water with glycol.
- Compressed air
- Shipbuilding

Technical characteristics	
Material	X2CrMoTi 18 2 material no. 1.4521 in accordance with DIN-EN 10088
Specifications	EN 10312 – DVGW - Work sheet GW541 (2004) Table 2
Approvals	DVGW, SVGW, ETA, ÖVGW, FM, FG, CNBOP, SBSC, SETSCO, LPCB, DNV-GL, RINA, GDV, Kiwa, WRAS, CSTBat
Type of tubing	laser-welded
Welding seam	100% EDDY CURRENT in accordance with EN 10893-2:2011
Weld slag removal	Outside
Tolerances	In accordance with EN10312 - table 2
Surface finish	Matt silver
Marking	SudoXPress stainless [DN/dimension x wall thickness] Edelstahl/Stainless steel 1.4521/AISI444 EN10312 DVGW GW541 Reg.nr. [DVGW registration number] SVGW ÖVGW W1.397 WRAS VA1.22/20294 VA1.12/18769 VdS G4080037 LPCB [operational pressure LPCB] bar <FM> [operational pressure FM] psi KK ATEC 14/15-2097 CSTBat 235-2097 Tectite 316 [batch number] [supplier code] [model designation, repeated every 60 cm]
Smallest bend radius	3.5 x external diameter of the tube (max. 28 mm)
Form delivered	Tubes, length 6 m +0/-50 mm, with protective caps (green)
Heat expansion coefficient	0.0104 mm/m at ΔT= 1K
Max. working pressure	16 bar

TABLE 4: TECHNICAL CHARACTERISTICS VSH XPRESS STAINLESS STEEL TUBE 1.4521

DN	Outside Ø x s [mm]	Inside Ø [mm]	Weight [kg/m]	Tube capacity [l/m]
DN 12	15 x 1.0	13.0	0.333	0.133
DN 15	18 x 1.0	16.0	0.410	0.201
DN 20	22 x 1.2	19.6	0.624	0.302
DN 25	28 x 1.2	25.6	0.790	0.515
DN 32	35 x 1.5	32.0	1.240	0.804
DN 40	42 x 1.5	39.0	1.503	1.195
DN 50	54 x 1.5	51.0	1.972	2.043

TABLE 5: DIMENSIONS AND WEIGHT VSH XPRESS STAINLESS STEEL TUBE 1.4521

VSH XPress Stainless Steel tube 1.4520 (AISI 439)

The 1.4520 VSH XPress Stainless Steel tube is an alternative for AISI 304 stainless steel tube, but with no nickel content, making it a cost-effective alternative for applications where potable water is not being used. The tube has been tested and approved by FM and LPCB for the use in fixed sprinkler systems.

Applications

- Compressed air
- Solar installations
- Cooling and heating installations
- Fixed sprinkler installations in accordance with FM or LPCB (wet only)
- Shipbuilding

Technical characteristics	
Material	X2CrTi 18 2 material no. 1.4520 in accordance with DIN-EN 10088,
Specifications	EN 10296-2
Approvals	FM, FG, LPCB, RINA
Type of tubing	Laser-welded
Welding seam	100% EDDY CURRENT in accordance with EN 10893-2:2011
Weld slag removal	Outside
Tolerances	In accordance with EN10296-2
Surface finish	Matt silver
Marking	SudoXPress stainless [DN/dimension x wall thickness] Stainless steel/Edelstahl 1.4520/AISI439 Heating/ Compressed air-Heizung/Druckluft LPCB [operational pressure LPCB] bar <FM> [operational pressure FM] psi NDE [batch number] [supplier code] [model designation, repeated every 60 cm]
Smallest bend radius	3.5 x external diameter of the tube (max. 28 mm)
Form delivered	Tubes, length 6 m +0/-50 mm, with protective caps (black)
Heat expansion coefficient	0.0104 mm/m at ΔT= 1K
Max. working pressure	16 bar

TABLE 6: TECHNICAL CHARACTERISTICS VSH XPRESS STAINLESS STEEL TUBE 1.4520

DN	Outside Ø x s [mm]	Inside Ø [mm]	Weight [kg/m]	Tube capacity [l/m]
DN 12	15 x 1.0	13.0	0.333	0.133
DN 15	18 x 1.0	16.0	0.410	0.201
DN 20	22 x 1.2	19.6	0.624	0.302
DN 25	28 x 1.2	25.6	0.790	0.515
DN 32	35 x 1.5	32.0	1.240	0.804
DN 40	42 x 1.5	39.0	1.503	1.195
DN 50	54 x 1.5	51.0	1.972	2.043

TABLE 7: DIMENSIONS AND WEIGHT VSH XPRESS STAINLESS STEEL TUBE 1.4520

2.2.2 VSH XPress Galvanized Steel tubes

VSH XPress Galvanized Steel tubes are thin-walled precision tubes. The VSH XPress Galvanized Steel tubes are protected against external corrosion by a coating of zinc-plating and a passivating chrome layer. The zinc layer is applied thermally, which results in good adhesion between the zinc layer and the tube. The VSH XPress Galvanized Steel tubes for sprinkler applications are made from cold rolled steel, which is galvanized using the Sendzimir process.

This section gives you all technical parameters that are especially relevant when working with VSH XPress Galvanized Steel tubes.

Insulation

The following must be observed when insulating VSH XPress Galvanized Steel tubing systems:

- Cold water lines should be protected against condensation and overheating in accordance with DIN 1988, Part 200.
- Hot water lines must be insulated to prevent heat loss in accordance with the Energy-Conservation Act (EnEG).

Fire characteristics

VSH XPress Galvanized Steel tubes are considered as non-combustible tubes according to German class A building materials – DIN 4102, Part 1. VSH XPress Galvanized Steel tubes with a polypropylene coating are considered as inflammable tubes according to German class B2 building materials – DIN 4102 Part 1 i.e. burning without producing drops. Metallic tubes with a synthetic coating of up to 2 mm are considered to be a non-flammable product in accordance with German building regulations.

** Anti-freeze additives must be compatible with EPDM O-rings.*
Written consent is required in this case.

VSH XPress Galvanized Steel tubes

VSH XPress Galvanized Steel tubes are thin-walled precision tubes manufactured in accordance with EN 10305-3 (formerly DIN 2394/ NEN 1982) from a special kind of steel that has a very low carbon content. The resulting product is very easy to bend. The tubes are also tested for leaks in accordance with EN 10246-1, so that all tubes are guaranteed to be leak-free.

Applications

- Closed heating installations in accordance with DIN 4751
- Closed cooling installations with water/glycol mixture
- Compressed air
- Solar installations (closed-loop systems)
- Shipbuilding

Technical characteristics	
Material	Non-alloyed ULC ('Ultra Light Carbon') Galvanized Steel, RSt 34-2 Mat. no. 1.0034 in accordance with EN 10305-3
Specifications	EN 10305-3 (formerly DIN 2394)
Approvals	CSTBat, DNV, GL, RINA
Type of tubing	HF-welded
Welding seam	100% EDDY CURRENT in accordance with EN 10893-2:2011
Weld slag removal	Outside flat, inside max. rise 0.5 mm
Tolerances	In accordance with EN10305-3
Finish	Zinc coating of 8-15µm. The tube welding seam is subsequently galvanized on the outside. The inside of the tube is protected by a thermally applied oil film
Surface finish	Silver
Marking	SudoXPress galvanized [DN/dimension x wall thickness] EN10305-3 CSTBat 116-2059 ATEC 14/15-2059 [batch number] [supplier code] [model designation, repeated every 60 cm]
Smallest bend radius	3.5 x external diameter of the tube (max. 28 mm)
Form delivered	Tubes, length 6 m +0/-50 mm, with protective caps (red)
Heat expansion coefficient	0.0108 mm/m at ΔT= 1K
Max. working pressure	16 bar

TABLE 8: TECHNICAL CHARACTERISTICS VSH XPRESS GALVANIZED STEEL TUBE

DN	Outside Ø x s [mm]	Inside Ø [mm]	Weight [kg/m]	Tube capacity [l/m]
DN 10	12 x 1.2	7.6	0.271	0.045
DN 12	15 x 1.2	12.6	0.420	0.125
DN 15	18 x 1.2	15.6	0.494	0.191
DN 20	22 x 1.5	19.0	0.761	0.284
DN 25	28 x 1.5	25.0	0.980	0.491
DN 32	35 x 1.5	32.0	1.241	0.804
DN 40	42 x 1.5	39.0	1.542	1.195
DN 50	54 x 1.5	51.0	1.999	2.043
DN 65	66.7 x 1.5	63.7	2.411	3.187
DN 65	76.1 x 2.0	72.1	3.503	4.083
DN 80	88.9 x 2.0	84.9	4.412	5.661
DN 100	108 x 2.0	104.0	5.382	8.495

TABLE 9: DIMENSIONS AND WEIGHT VSH XPRESS GALVANIZED STEEL TUBE

VSH XPress Galvanized Steel tubes with synthetic coating

VSH XPress Galvanized Steel tubes with a synthetic coating (polypropylene-coated tubes are marked “Galvanized - Polypropylene coated”) can be used for the same applications as VSH XPress Galvanized Steel tubes and are coated with a layer of polypropylene (PP) for protection against outer corrosion. The PP-coating has a smooth surface and offers good resistance to tearing and impact.

For a safe press-fitting connection **it is essential that, prior to any assembly, the polypropylene coating be removed from the tube using a stripper** to the insertion depth of the fitting concerned. Only in this way can a good press connection can be achieved.

Technical characteristics	
Material	Unalloyed ULC ('Ultra Light Carbon Steel') Galvanized Steel, RSt 34-2 mat. no. 1.0034 according to EN 10305-3
Specifications	EN 10305-3 (formerly DIN 2394)
Approvals	CSTBat, DNV-GL, RINA
Type of tubing	HF-welded
Weld slag check	100% EDDY CURRENT in accordance with EN 10893-2:2011
Weld slag removal	Outside flat, inside max. rise 0.5 mm
Tolerances	In accordance with EN10305-3
Finish	Zinc coating of 8-15µm. The tube welding seam is subsequently galvanized on the outside. Inside of the tube is protected by a thermally applied oil film.
Surface finish	High-heat stabilized polypropylene PP (B2) thickness ±1 mm, RAL 9001
Marking	SudoXPress galvanized [DN/dimension x wall thickness] polypropylene coated EN10305-3 CSTBat 116-2059 ATEC 14/15-2059 [batch number] [supplier code] [model designation, repeated every 60 cm]
Smallest bend radius	3.5 x external diameter of the tube (max. 28 mm)
Form delivered	Tubes, length 6 m +0/-50 mm, with protective caps (red)
Heat expansion coefficient	0.0108 mm/m at ΔT= 1K
Max. working pressure	16 bar
Thermal load	120°C permanent load
Heat conductivity	0.22 W/mK

TABLE 10: TECHNICAL CHARACTERISTICS VSH XPRESS GALVANIZED STEEL TUBE WITH PP-COATING

DN	Outside Ø x s [mm]	Outside Ø incl. coating [mm]	Weight [kg/m]	Tube capacity [l/m]
DN 12	15 x 1.2	17	0.420	0.125
DN 15	18 x 1.2	20	0.494	0.191
DN 20	22 x 1.5	24	0.761	0.284
DN 25	28 x 1.5	30	0.980	0.491
DN 32	35 x 1.5	37	1.241	0.804
DN 40	42 x 1.5	44	1.542	1.195
DN 50	54 x 1.5	56	1.999	2.043

TABLE 11: DIMENSIONS AND WEIGHT VSH XPRESS GALVANIZED STEEL TUBE WITH PP-COATING

VSH XPress Galvanized Steel tubes with polypropylene coating are not to be confused with “white liaan” tube, which is used in the Netherlands. White liaan tubes are welded steel thin-walled precision tubes manufactured in accordance with EN 10305-3 from St 34-2. The outside is finished with a coating of white paint (RAL9010). This tube is suitable to be used in press installations for the dimensions 15 x 1.5 and 22 x 1.5 where the fitting is pressed without removing the paint coating.

VSH XPress Sprinkler Galvanized Steel tubes

The VSH XPress Galvanized Steel sprinkler tubes for wet sprinkler systems are thin-walled precision steel tubes. The tubes are made from cold rolled steel, galvanized using the Sendzimir process. In this process, the metal strip is simultaneously coated on both sides in a zinc bath. The tube is protected on both the inside and outside with a zinc layer of a thickness of 15-27 μm (275 g/m^2). After welding, the welding seam is then zinc-plated. The Sendzimir process guarantees good adhesion of the zinc layer and high resistance to corrosion.

Applications

- Wet fixed sprinkler installations in accordance with DIN 1988, Part 6, VdS, FM, LPCB, FG, SBSC, UL, ULc and CNBOP
- Compressed air
- Shipbuilding

Technical characteristics	
Material	Unalloyed ULC ('Ultra Light Carbon') carbon steel, E190 mat. no. 1.0031 in accordance with EN 10305-3
Specifications	EN 10305-3 (formerly DIN 2394)
Approvals	VdS, FM, LPCB, FG, CNBOP, STETSCO, SBSC, DNV-GL, LR, RINA, UL, ULc
Type of tubing	HF-welded
Welding seam	100% EDDY CURRENT in accordance with EN 10893-2:2011
Weld slag removal	Outside flat, inside raise max. 0.5 mm, >54 mm 0.8 mm
Tolerances	In accordance with EN10305-3
Finish	Zinc coating of 15-27µm (275g/m²). The tube welding seam is subsequently galvanized on the outside.
Surface finish	Matt silver
Marking	XPress Sprinkler galvanized [DN/dimension x wall thickness LPCB VdS G4080007 [operational pressure VdS/LPCB] bar <FM> [operational pressure FM] psi C(UL)US Listed 4NB1 [operational pressure UL/cUL] psi CRR UL [value CRR UL] CRR cUL [value CRR cUL] NDE [batch number] [supplier code] [model designation, repeated every 60 cm]
Smallest bend radius	3.5 x external diameter of the tube (max. 28 mm)
Form delivered	Tubes, length 6 m +0/-50 mm, with protective caps (Lilac)
Heat expansion coefficient	0.0108 mm/m at ΔT= 1K
Max. working pressure	16 bar

TABLE 12: TECHNICAL CHARACTERISTICS VSH XPRESS GALVANIZED STEEL SPRINKLER TUBE

DN	Outside Ø x s [mm]	Inside Ø [mm]	Weight [kg/m]	Tube capacity [l/m]
DN 20	22 x 1.5	19.0	0.761	0.284
DN 25	28 x 1.5	25.0	0.980	0.491
DN 32	35 x 1.5	32.0	1.241	0.804
DN 40	42 x 1.5	39.0	1.542	1.195
DN 50	54 x 1.5	51.0	1.999	2.043
DN 65	76.1 x 2.0	72.1	3.503	4.083
DN 80	88.9 x 2.0	84.9	4.412	5.661
DN 100	108 x 2.0	104.0	5.382	8.495

TABLE 13: DIMENSIONS AND WEIGHT VSH XPRESS GALVANIZED STEEL SPRINKLER TUBES

2.2.3 Copper tubes

The copper tubes that may be used for the VSH XPress copper system for water applications must comply with the norm EN 1057 R220/R250/R290. The copper tubes that may be used for the VSH XPress system for gas applications must comply with the norm EN 1057 R250/R290. EN 1057 is the norm for seamless copper and copper alloyed tubes for potable water, gas- and heating installations. A distinction is made between soft, medium-hard and hard alloy tubes, identified R220, R250 and R290. The higher the figure, the harder the metal. The values refer to the tube's tensile strength (220, 250 and 290 N/mm^2).

Flammability

Uninsulated copper tubes certified according EN 1057/DVGW are considered as non-combustible tubes according to German class A building materials – DIN 4102, Part 1.

Insulation

Hot water lines must be insulated to prevent heat loss in accordance with the Energy-Conservation Act (EnEG).

For regulations regarding heating installations, please see the manufacturer's guidelines. In order to avoid any corrosion on the outside, you must ensure that the insulating materials do not contain any traces of ammonia or nitrates (page 90). In order to minimize the risk of corrosion on the outside of the tube, insulation materials should, as far as possible, be used in conjunction with a moisture barrier. Possible solutions include the use of materials, such as Densopaste or a synthetic layer, between the outside of the copper tube and the insulation material. For installations in the Netherlands, the "Water Work Sheets" must be followed.

Applications

- All potable water installations in accordance with the German Potable Water Decree (TrinkwV) and EU Directive 98, DIN 50930, Part 6 and in compliance with DIN 1988.
- Cold- and hot water installations
- Heating installations
- District heating installations
- Solar installations
- Compressed air
- Cooling water/industrial water installations
- Industrial rainwater installations
- Gas installations*
- Heating oil EL (extra light) installations*
- Shipbuilding

Technical characteristics for approved copper tubes	
Material	DHP Copper material no. CW 024A in accordance with DIN EN 1412
Outside Ø tolerance	EN 1057
Tensile strength	R220 - soft - 220 N/mm^2 R250 - medium-hard - 250 N/mm^2 R290 - hard - 290 N/mm^2
Smallest bend radius	3.5 x external diameter of the tube (down to -10°C)

TABLE 14-A: COPPER PIPES

** Special O-rings are required (see section 2.1)*

Copper tubes in accordance with EN1057										
Outside Ø (mm)	Wall thickness (mm)									
	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.5	2.0	2.5
12	R250				R220					
15		R250			R220 R250 R290					
18					R250 R290					
22				R250	R250 R290	R220				
28				R250	R290		R250	R290		
35					R290		R250 R290	R290		
42					R290		R250 R290	R290		
54					R290		R250 R290		R290	
64							R250 R290		R290	
66.7							R250 R290		R290	
76.1								R250 R290	R290	
88.9									R290	
108								R250 R290		R290

TABLE 14-B: COPPER PIPES

2.3 VSH XPress fittings

2.3.1 Approvals

Approvals	VSH XPress Galvanized Steel	VSH XPress Stainless Steel	VSH XPress Copper	VSH XPress CuNi
ARGB-KVGB	-	15-54 mm	15-28 mm	-
ATG	-	-	12-108 mm	-
BSI/Advantica	-	15-54 mm	15-54 mm	-
CSTBat	12-108 mm	12-108 mm	12-108 mm	-
CNBOP	22-108 mm*	22-108 mm	-	-
Cobrti	-	-	12-54 mm	-
DG	-	-	15-28 mm	-
DNV-GL	12-108 mm*	15-108 mm	12-108 mm	15-108 mm
DVGW DW-8511BR0536	-	12-108 mm for water 15-108 mm for gas	12-108 mm for water 15-54 mm for gas	-
ÉMI	-	15-108 mm	12-108 mm	-
ETA	-	12-108 mm	12-54 mm	-
FG	22-108 mm*	22-108 mm	-	-
FM	22-54 mm*	22-108 mm	-	-
GASTEC	-	-	15-54 mm	-
GL Industrial	-	-	15-54mm for gas	-
KIWA	-	12-108 mm	12-54 mm	-
LPCB	22-54 mm	22-54 mm	-	-
LR	12-108 mm*	15-108 mm	-	-
ÖVGW	-	12-108 mm for water 15-54 mm for gas	12-108 mm for water 15-54 mm for gas	-
PZH	-	12-108 mm	-	-
RINA	12-108 mm*	15-108 mm	-	15-108 mm
SBSC	22-108 mm	22-108 mm	-	-
SINTEF	-	12-108 mm	12-108 mm	-
SITAC	12-108 mm*	12-108 mm	12-108 mm	-
STETSCO	22-54 mm	22-54 mm	-	-

** 66.7 mm is not certified*

Approvals	VSH XPress Galvanized Steel	VSH XPress Stainless Steel	VSH XPress Copper	VSH XPress CuNi
SVGW	-	12-108 mm for water 15-108 mm for gas	-	-
TA-Luft	-	15-108 mm	-	-
UL/ULc	22-88.9 mm*	22-108 mm	-	-
VdS	22-108 mm*	22-108 mm	-	-
WRAS	-	15-108 mm	12-108 mm	-

TABLE 15: APPROVALS

VSH XPress fittings are tested and approved for potable water installations, gas installations, sprinkler applications and many more applications. The applications for which VSH XPress fittings are currently approved are listed in the above table.

2.3.2 Technical characteristics

VSH XPress Stainless Steel fittings are produced from 1.4404 materials and fitted with a “Leak Before Pressed” (LBP) function. The sizes 12-54 VSH XPress Stainless Steel fittings are fitted with an EPDM “Leak Before Pressed” (LBP) O-ring (for more detailed information, please the “O-rings” page). Fittings in sizes 76.1 -108 are fitted with a standard EPDM O-ring.

VSH XPress Stainless Steel GAS fittings are produced from 1.4404 materials, in accordance with DIN 10088 and are fitted with a “yellow” HNBR O-ring.

VSH XPress Galvanized Steel fittings are produced from RSt 34-2 steel and protected against corrosion by a layer of zinc that has been applied thermally. The zinc coating provides limited protection against short term exposure to moisture if the fittings are able to dry out again quickly afterwards. The sizes 12-54 VSH XPress Galvanized Steel fittings are fitted with an EPDM "Leak Before Pressed" (LBP) O-ring. Sizes 66.7 -108 fittings are fitted with a standard EPDM O-ring.

VSH XPress Copper fittings are produced from CU-DHP copper, CW024A materials and 2.109 bronze materials and fitted with an EPDM O-ring as standard.

VSH XPress Copper GAS fittings are produced from CU-DHP copper, CW024A materials and 2.109 bronze materials and fitted with a "yellow" NBR O-ring.

VSH XPress CuNI fittings are produced from a copper-nickel alloy (90/10) and fitted with an NBR O-ring (brown)

The sizes 15-108 mm VSH XPress Stainless Steel GAS and Copper GAS fittings for gas installations must be pressed using Novopress or Klauke press jaws/press slings. The sizes 76.1-108 mm VSH XPress Stainless Steel GAS fittings must be pressed using a Novopress ECO301, ACO401 or Klauke UAP100(L). Press tools, jaws and slings of other suppliers, such as Rems, may be authorized under local approvals, such as Gastec and KVGB.

When using VSH XPress Stainless Steel and Galvanized Steel for sprinkler installations, please make sure to follow the guidelines for installation and use approved tools. They can be found in the technical manual 'VSH Fire Protection', which is available upon request or can be downloaded from our website www.vsh.nl.

Threaded fittings

The VSH XPress product range also includes components with inner and outer threads. VSH XPress Stainless Steel, Galvanized Steel and Copper fittings with Inner and outer threads are manufactured in accordance with DIN 2999/ISO 7/1. Hemp or other chloride-free sealants are suitable for the threads of VSH XPress Stainless Steel fittings. PTFE sealing tape may not be used in conjunction with stainless steel due to the water soluble chloride ions it contains. With threaded couplings, we recommend that the sealing be executed before the pressing, in order not to stress the press connection.

Screw fittings (copper)

The manufacturers of gas heating appliances supply their products with the respective screw connections in place. G6360-type “half screw fittings” may, therefore, be used as press connections to already-present screw connections. The half screw fitting (G6360), as well as the G6340 screw fitting with a double-sided press end, is also approved in accordance with DIN 3436 HTC.

Bronze threaded transition fittings

Threaded transition fittings are generally manufactured from gun metal. A distinction is made in this case between strand or continuous casting (straight joints) and mould casting (bends, T-pieces and wall plates). Tests have shown that mould cast (sand cast) press fittings are less suitable for gas installations for the following reasons: mould casting joints can never be as leak-proof (homogenous) as strand cast or copper ones. There is always, in particular, a danger of air cavities despite 100% impermeability testing. Additionally, the mechanical load of the pressing heightens these dangers as it may cause cavities to burst open. Therefore, for safety reasons, we have decided not to include any mould-cast parts in the range of copper gas press fittings.

VSH XPress fittings markings

VSH XPress Stainless Steel fittings

Marking	Packaging label
Green ring or sticker	Type R.....
XPress	Dimension
316L	Description
Certificates	EAN no.
Dimension	Art. no.
	Approvals
	Quantity

VSH XPress Stainless Steel GAS fittings

Marking	Packaging label
Yellow marking	Type R.....G
GAS, GT5/PN5	Dimension
316L	Description
XPress	EAN no.
Dimension	Art. no.
DVGW	Approvals
	Quantity

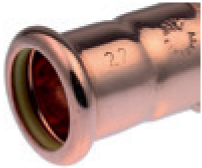
VSH XPress Galvanized Steel fittings

Marking	Packaging label
Red ring or sticker	Type C.....
XPress	Dimension
Galvanized	Description
Approvals	EAN no.
Dimension	Art. no.
	Certificates
	Quantity

VSH XPress Copper fittings

Marking	Packaging label
RYW	Type .....
Dimension	Dimension
KIWA	Description
DVGW	EAN no.
	Art. no.
	Approvals
	Quantity

VSH XPress Copper GAS fittings



Marking	Packaging label
Yellow marking GAS, GT1/PN5 RYW Dimension DVGW Gastec Qa	Type G..... Dimension Description EAN no. Art. no. Approvals Quantity

VSH XPress CuNi fittings

Marking	Packaging label
Marking Dimension	Type CUN..... Dimension Description EAN no. Art. no. Approvals Quantity

O-rings

The standard fittings for potable water and central heating are fitted with EPDM O-rings. The type of O-ring which has to be used depends on the application and the medium. That is why gas press fittings are fitted with (H)NBR O-rings. For special applications, such as media containing oil or high temperatures, an FPM O-ring has to be fitted. If your application is not listed in the table below, please contact us to find out whether the medium is suitable for use in combination with the type of press fitting you are using.

EPDM "leak before pressed" (LBP) - black

Temperature	Applications
-35°C to +135°C Short period 150°C	KTW recommended. For all installations for potable water and conditioned water, hot water, circulation tubes, fire mains, etc.

EPDM (Copper only) - black

Temperature	Applications
-20°C to +110°C Short period 135°C	KTW recommended. For all installations for potable water and conditioned water, hot water, circulation tubes, fire mains, etc.

EPDM - black

Temperature	Applications
-35°C to +135°C Short period 135°C	KTW recommended. For all installations for potable water and conditioned water, hot water, circulation tubes, fire mains, etc.

FPM “leak before pressed” (LBP) - green

Temperature	Applications
-20°C to +200°C Short period 230°C	Installations for compressed air, fuel oil, vegetable oil, fuels, greases and industrial purposes, ozone-resistant (industrial design). Not suitable for hot water applications.

FPM “leak before pressed” (LBP) - grey

Temperature	Applications
-20°C to +175°C Short period 190°C	Steam installations

HNBR - yellow

Temperature	Applications
-20°C to +70°C	Installations for combustible gases: natural gases and liquid gases in accordance with Worksheet DVGW-G260 I/II. Installations for natural gas in accordance with Worksheet DVGW-G600 TRGI 86/96, and liquid gases in accordance with TRF(1996).

NBR - yellow

Temperature	Applications
-20°C to +70°C	Installations for combustible gases: natural gases and liquid gases in accordance with Worksheet DVGW Gas TRGI 86/89, and for liquid gases in accordance with TRF(1996)

NBR - brown

Temperature	Applications
-20°C to +95°C	Installations for sea water, brackish water, cooling, ballast, fire protection desalination and other fluids such as oil and fuels

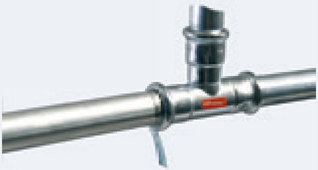
VSH XPress "Leak Before Pressed" function

VSH XPress Galvanized Steel, VSH XPress Stainless Steel and VSH XPress Copper fittings are delivered with a "Leak Before Pressed function" (LBP). Fittings with a Leak Before Pressed function have the advantage that connections that have not been pressed will leak water during pressure testing. This means that an incomplete press connection can easily be identified. If correctly assembled, the press fittings will be water and air tight after being pressed.

The VSH XPress LBP-function is either incorporated into the O-ring (12-54 mm) or is achieved by means of the special geometry of the fitting (66.7-108 mm).

How the VSH XPress Galvanized- and Stainless Steel LBP O-rings (12-54 mm) works

The design of the VSH XPress LBP O-ring is based upon the creation of a leak path on the O-ring itself. Small grooves have been created at 3 strategic points on the surface of the O-ring by adding additional material. This results in an exceptionally strong O-ring without any weak points.



Advantages

- **Additional safety:** (installation) mistakes prevented, as it will leak until pressed.
- **Easy:** Easy to recognize non pressed connections because of guaranteed water leakage during pressure test.
- **Warranty:** Guaranteed water and airtight once fitting has been pressed.
- **Strength:** Extra material for leak function results in a strong O-ring in contrast to solutions where material is removed.

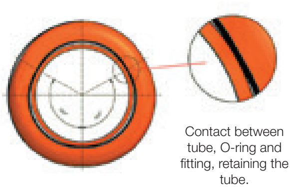
There are a pair of small bumps on the surface of the O-ring and the water will flow between them so long as the fitting is not pressed. When the pressure is increased, the fitting will begin to leak. When pressed the O-ring is deformed and, as a result, the rubber from the raised surfaces fills the gaps between them. This creates a fully water and airtight connection.

VSH XPress Copper with LBP function

The mechanical properties of copper differ from those of galvanized steel and stainless steel. Copper is a softer material, which makes it possible to create a LBP function in the material itself (O-ring bead) instead on the O-ring. The LBP function on the VSH XPress Copper is created by a triangle shaped O-ring bead, which will leak as long as the joint has not been pressed. The function of this design is the same as the function of the LBP O-ring for galvanized steel and stainless steel, which is to localize forgotten pressings and prevent errors in the installation process.

How the VSH XPress copper LBP function works

The triangle shaped O-ring bead leaves a space between the tube and the fitting at 3 points in the O-ring bead. These gaps allow water to flow through as long as the fitting has not pressed. The advantage of this design is that there is still enough contact between the tube and the O-ring to ensure that the tube stays in place once assembled.



Contact between tube, O-ring and fitting, retaining the tube.

FIGURE 1: VSH XPRESS COPPER LBP

The pressing changes the shape of the O-ring bead so that it becomes round again (given the mechanical properties of copper, it is very easy to change its triangular shape into a perfect round shape again). This gives a water and air-tight connection, once pressed.

2.3.3 Alternative VSH XPress applications

The choice of fittings and tubes depends on what the purpose of the system is, the medium and the operating conditions. Please contact VSH regarding approval for the use of VSH XPress fittings for applications other than for water, compressed air and gas. Installations must comply with local regulations.

2.3.4 Electrical heat tracing

VSH XPress Stainless Steel, Galvanized Steel and Copper may be used with electrical heat tracing in order to maintain the temperature of the piping. In the case of VSH XPress Stainless Steel, electrical heat tracing may be used to maintain the temperature of the piping provided the medium does not continuously exceed 60°C. Thermal disinfection, e.g. temperatures of 70°C for short periods (max. 1 hour per day), is permitted (see DVGW - Worksheet W552). Sealed tubes must not be heated because of the danger posed by the excessive and inadmissible increase in pressure in the tubes.

2.3.5 (Main) Equipotential bonding in residential premises

All metal tubing systems using equipotential bonding must comply with equipotential bonding requirements. Continuity checks must be conducted by a qualified electrician in accordance with the regulations, once the installation work has been finished. VSH XPress Galvanized Steel, Stainless Steel and copper tubes that satisfy EN 1057 used in combination with the respective fittings are electrical conductive tube systems and, therefore, must be included in the equipotential bonding. VSH XPress Galvanized Steel with polypropylene coating is not an electrical conductive system and so does not need to be included in the equipotential bonding.

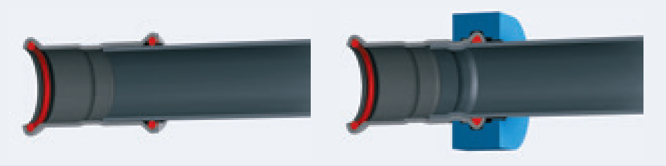
2.4 Press tools

Press tools consist of a press machine and the corresponding press jaws or slings. The press machine can be either battery or electrically powered. Figure 2 shows a battery-powered version. The corresponding press jaws and slings must be used for each diameter of tube in the system in order to achieve a perfect connection. Figure 3 shows a cross-section of the press profile before and after pressing.

FIGURE 2: ACO 202

All VSH XPress fittings with a diameter from 12 mm to 108 mm can be pressed using the appropriate press tools listed in our product range. You must use the **M-profile** jaws or slings that correspond to the diameter to be installed. A special adaptor may also be required for diameters of 35 to 108 mm, in addition to the press slings.

NB: VSH XPress GAS press fittings may only be pressed with the press jaws/slings stated in the certificate. The same applies for sprinkler installations.



Before pressing	After pressing

FIGURE 3: BEFORE AND AFTER PRESSING

2.4.1 Press tools approved for VSH XPress Stainless Steel and VSH XPress Galvanized Steel

You will find all approved press tools to fit the right product in our online tool selector which is available on our website: **www.vsh.nl/presstool**

2.4.2 Maintenance and correct usage of press tools

Correct pressing with the VSH XPress systems is guaranteed when the press tools listed on our website (**www.vsh.nl/presstool**) are used correctly. Regular maintenance and lubrication of the press jaws, slings and tools is necessary. Please observe the manufacturer‘s instructions for use and maintenance.
When jointing VSH XPress Copper and VSH XPress Copper GAS fittings larger than 35 mm, it is essential that the grooves in the press jaw/sling be lubricated with Dri-slide lubricant! The jaws/slings should be lubricated in this way after every 50 joints for sizes 42 mm to 76.1 mm and after every 5 joints for size 108 mm.
Note that care must be taken to avoid any contact between lubricant and ‘O-rings’
Badly maintained and/or damaged press jaws pose a potential risk. Damaged jaws can damage the fittings, leaving metal particles behind in the jaw as a result. If the same jaw is then used to press a stainless steel fitting, these metal particles will be pressed into the fitting, which could lead to pitting and further corrosion. Therefore, always make sure that press jaws and slings are properly cleaned when switching between materials.

2.5 Installation guidelines

FIGURE 4: CUTTING THE TUBE

2.5.1 Cut the tube to length

After measuring, the tubes can be cut to length using a tube cutter (see fig. 4), a fine-toothed handsaw or a mechanical saw with electrical motor suitable for the tube material. The tube must always be cut completely through. Never partially cut the tube and break it off as this could cause corrosion. **Do not use oil-cooled saws, grinding wheels or flame cutters.**

VSH XPress Galvanized Steel tubes with PP coating and coated copper tubes (Wicu)

To ensure the safe connection of a press fitting, the tube's PP coating must be removed using a stripper up to the insertion depth before assembling the press fitting. With Wicu copper tubes, a support sleeve must be used to maintain the rigidity of the press connection.

FIGURE 5: DEBURRING THE TUBE

2.5.2 Deburring the tube

The tube ends must be carefully and thoroughly deburred inside and out after being cut to length. This is in order to avoid any damage to the O-ring when inserting the tube into the press fitting. Deburring the inside of tubes prevents pitting and corrosion. A hand deburrer suitable for the material or an electrical tube deburrer may be used to deburr both the inside and outside of the tube. Burrs sticking to the tube must be removed.

2.5.3 Calibration

Always ensure the tube ends are radial and evenly rounded-off. The tube ends must be calibrated before pressing, especially in the case of copper tubes coated in accordance with DIN EN1057 R220, e.g. Wicu tubes.

FIGURE 6: MARKING INSERTION DEPTH

2.5.4 Marking insertion depth

The required insertion depth (see table 22) must be marked on the tube or the press fitting (the latter for fittings with tube ends) in order to guarantee a safe and proper joint. VSH XPress Galvanized Steel and Stainless Steel 12-54 mm fittings already have the required insertion depth marked on them, thereby rendering any marking unnecessary.
Mark the insertion depth using the insertion depth marker for VSH XPress. Reliable pressing with the corresponding tensile strengths can only be achieved if the elements are correctly installed. The pressing operation behind the bead is of crucial importance for the tensile strength.
The marking on the tube must remain visible (but close to the fitting) after the connection is pressed to identify any movement before or after pressing.

FIGURE 7: CHECKING FITTING/TUBE

2.5.6 Check the fitting and tube

Before assembly, the fitting must be checked to ensure that the O-rings are present and correctly positioned. The tube, fitting and O-ring must be examined for any foreign materials (e.g. dirt, burrs), which must be removed, if present.

FIGURE 8: ASSEMBLY OF FITTING/TUBE

2.5.7 Assembly of fitting and tube

Insert the tube carefully into the press fitting up to the marked insertion depth, simultaneously rotating and pushing it in the direction of the axis. The insertion depth marking must remain visible. In the case of fittings without a stop the fittings should be inserted at least as far as the marked insertion depth. Rough and careless insertion of the tube into the press fitting may result in damage to the O-ring and is therefore not permitted.

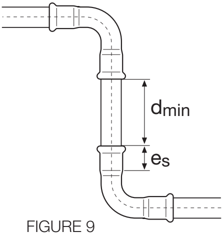


FIGURE 9

If assembly is difficult because of the permitted tolerances in size, a lubricant, such as water or soap, may be used. **Under no circumstances may oils, fats or grease be used as lubricants.** To optimize the installation time, time may be saved by first assembling a number of connections and then pressing the various tube connections one after the other. Marking the distance (e_S) provides a check that the tube has not been pushed out of the fitting during the pressing process. Before starting the final pressing process of the various tube connections, it is also important to check the minimum required distances for the installation (see table 16).

	Insertion depth			Minimum distance	Minimum tube length		
Ø [mm]	e_S (mm)			dmin (mm)	2x e_S + dmin (mm)		
	VSH XPress Stainless Steel (GAS)	VSH XPress Galvanized Steel	VSH XPress Copper (GAS)	VSH XPress Stainless Steel (GAS), Galvanized Steel, Copper	VSH XPress Stainless Steel (GAS)	VSH XPress Galvanized Steel	VSH XPress Copper (GAS)
12	17	17	17	10	44	44	44
15	20	20	20	10	50	50	50
18	20	20	20	10	50	50	50
22	21	21	21	10	52	52	52
28	23	23	23	10	56	56	56
35	26	26	26	10	62	62	62
42	30	30	30	20	80	80	80
54	35	35	35	20	90	90	90
64	-	-	50	30	-	-	130
66.7	-	50	50	30	-	130	130
76.1	55	55	50	55	165	165	165
88.9	63	63	64	65	191	191	193
108	77	77	64	80	234	234	208

TABLE 16: MINIMUM DISTANCES BETWEEN PRESSINGS

Table 17 below gives the minimum required working space so that the pressing of the fittings can be carried out correctly using the appropriate press tools. These distances relate to the general installation configurations that are schematically depicted in figures 10-12.

Outside-Ø	Fig. 10		Fig. 11				Fig. 12
	a	b	a	b	c	d	Tube depth
12-15 mm	56	20	75	25	28	131	40 mm
18 mm	60	20	75	25	28	131	40 mm
22 mm	65	25	80	31	35	150	40 mm
28 mm	75	25	80	31	35	150	60 mm
35 mm	75	30	80	31	44	170	70 mm
42 mm	140/115*	60/75*	140/115*	60/75*	75	265	70 mm
54 mm	140/120*	60/85*	140/120*	60/85*	85	290	70 mm
64 mm	145*	110*	145*	100*	100	345	70 mm
66.7 mm	145*	110*	145*	100*	100	345	70 mm
76.1 mm	140*	110*	165*	115*	115	395	80 mm
88.9 mm	150*	120*	185*	125*	125	435	90 mm
108 mm	170*	140*	200*	135*	135	470	100 mm

TABLE 17: SPACE NEEDED FOR INSTALLATION (* SLINGS)

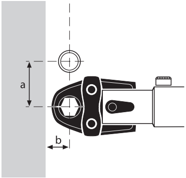


FIGURE 10

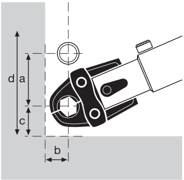


FIGURE 11

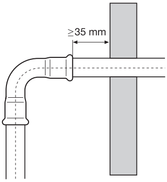


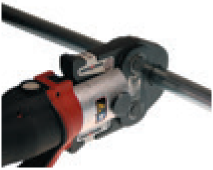
FIGURE 12

2.5.8 Pressing

Before starting to press, the press jaws and slings must be checked for dirt, which must be removed if present. Furthermore, the press machine must be in good condition and the instructions for operating the device, maintenance and the manufacturer's instructions must be observed.

Also make sure that you are using the correct press jaws and slings for the application. In order to create a correctly pressed connection, the groove of the press tool must enclose the press fitting O-ring bead. Once the pressing has started, always complete the press cycle and under no circumstances interrupt the process. You will find all the approved machines, press jaws and slings to fit the right product in our online tool selector which is available on our website: **www.vsh.nl/presstool**

It is not permitted to press a connection more than once.



Pressing gas installations

VSH XPress Stainless GAS and VSH XPress Copper GAS are suitable for gases of the second and the third gas family (natural- and liquid gases) in accordance with DVGW Worksheet G 260 and are installed inside buildings (with HTC) and outside buildings (without HTC).

A combination of VSH XPress Stainless Steel GAS and VSH XPress Copper GAS is not permitted for new installations. Connections to gas fittings and gas parts in brass, bronze, ductile grey cast iron and diecast aluminium may be connected with gas thread/press fittings or flanges. If renovations or repairs are being carried out, make sure the tubes are in accordance with the DIN-EN/DVGW standards, have perfect, undamaged outer surfaces and have not been painted.

Local regulations must always be observed (e.g. DVGW TRGI 2008):

1. Gas tubes and fittings should be marked yellow to avoid confusion.
2. Tubes must be protected during construction against mechanical damage.
3. Carry out tests according to G1 Gas Guidelines (e.g. check covered tubes).
4. When laid under screed (above the reinforcement), place in concrete slots.
5. Operating temperature: -20ºC to +70ºC

2.5.9 Bending tubes

It may be necessary to bend a tube in order to carry out the installation. Normal hand, hydraulic or electrically-operated pipe benders with the corresponding bend formers can be used for this. The manufacturer will determine the suitability of the bending tool. VSH XPress Stainless Steel, Galvanized Steel and copper tubes may be bent cold, in accordance with DIN EN 1057.

The tube may not be bent when warm due to the danger of corrosion.

The smallest bending radius is as follows:

Stainless Steel (12 - 28 mm)	$r_{min} = 3.5 \times d$
Galvanized Steel (12 - 28 mm)	$r_{min} = 3.5 \times d$
Copper tubes (12 - 54 mm) in accordance with EN 1057 and DVGW-GW 392	$r_{min} = 3.5 \times d$

A smaller bend radius is not permitted.

2.5.10 Mixed metal installation

VSH XPress Stainless Steel fittings and tubes can easily be combined with accessories and fittings in stainless steel and non-ferrous metals. However, connections with hot-dip galvanized steel, galvanized steel or other non-stainless steel fittings or accessories can give rise to contact corrosion. This can be prevented by using synthetic or non-ferrous metal fittings or spacers that are at least 50 mm long (DIN 1988, Part 7). For more information on corrosion, see 2.8, page 78. Table 18 shows the possible combinations.

The combinations given below are valid only when the connections are made using a mechanical connection that can be dismantled (e.g. threaded or grooved connection).

VSH XPress fittings			Copper	Bronze/ Brass	Galvanized Steel	Stainless Steel
		System				
Tube type	Copper tube	Closed-loop	allowed	allowed	allowed	allowed
		Open	allowed	allowed	not allowed	allowed
	Galvanized Steel	Closed-loop	allowed	allowed	allowed	allowed
		Open	not allowed	not allowed	not allowed	not allowed
	Stainless Steel	Closed-loop	allowed	allowed	allowed	allowed
		Open	allowed	allowed	not allowed	allowed

TABLE 18: FITTING AND TUBE TYPES

We recommend using bronze or brass fittings, such as VSH XPress gun metal straight union, for the transition from copper/stainless steel to steel. Combinations must be avoided in the case of gas installations (see 2.5.8 “Pressing gas installations”).

2.6 General installation information

2.6.1 Thermal expansion (in the tubing system)

The level of thermal expansion within tubing systems depends on the type of materials used. This linear expansion needs to be taken into account during the installation. Small changes in length can be accommodated by having adequate space for expansion as well as by the elastic properties of the tubing system itself. More substantial changes in length need to be offset by other means; e.g. installation of special expansion compensation devices, fixed anchoring points and brackets.

Expansion can be offset by the use of a pipe segment (figure 13), U-bend (figure 15) or compensators. The level of expansion to be offset can be determined beforehand by calculating the changes in length. The equation for calculating the changes in length is as follows:

$$\boxed{\Delta l = l \times \alpha \times \Delta T}$$

Δl = total linear expansion [mm]

l = length of the segment in question [m]

ΔT = temperature difference [K]

α = linear expansion coefficient, where:

for VSH XPress Stainless Steel tube 1.4401 α = 0.0166 mm/mK

for VSH XPress Stainless Steel tube 1.4521/1.4520 α = 0.0104 mm/mK

for VSH XPress Galvanized Steel tubes α = 0.0108 mm/mK

for copper tube α = 0.0170 mm/mK

Tables 19a, 19b, 19c and 19d show the expansion of the various pipelines depending on the length of the tube and the rise in temperature.

Calculation of the expansion length to be allowed for

In the case of major expansion, expansion compensators or, in complicated cases, Ω-shaped compensation loops will need to be determined and fitted. The compensation is calculated in mm using the following formula:

$$B_d = k \times \sqrt{(d_e \times \Delta l)}$$

Bd = expansion length to be allowed for

k = material constant

= 45 for VSH XPress Stainless Steel and Galvanized Steel tubes

= 35 for copper tubes

de = external diameter of the tube [mm]

Δl = linear expansion that needs to be compensated [mm]

l [m]										ΔT [K]
	10	20	30	40	50	60	70	80	90	100
1	0.16	0.32	0.48	0.64	0.80	0.96	1.12	1.28	1.44	1.60
2	0.32	0.64	0.96	1.28	1.60	1.92	2.24	2.56	2.88	3.20
3	0.48	0.96	1.44	1.92	2.40	2.88	3.36	3.84	4.32	4.80
4	0.64	1.28	1.92	2.56	3.20	3.84	4.48	5.12	5.76	6.40
5	0.80	1.60	2.40	3.20	4.00	4.80	5.60	6.40	7.20	8.00
6	0.96	1.92	2.88	3.84	4.80	5.76	6.72	7.68	8.64	9.60
7	1.12	2.24	3.36	4.48	5.60	6.72	7.84	8.96	10.08	11.20
8	1.28	2.56	3.84	5.12	6.40	7.68	8.96	10.24	11.52	12.80
9	1.44	2.88	4.32	5.76	7.20	8.64	10.08	11.52	12.96	14.40
10	1.60	3.20	4.80	6.40	8.00	9.60	11.20	12.80	14.40	16.00
12	1.92	3.84	5.76	7.68	9.60	11.52	13.44	15.36	17.28	19.20
14	2.24	4.48	6.72	8.96	11.20	13.44	15.68	17.92	20.16	22.40
16	2.56	5.12	7.68	10.24	12.80	15.36	17.92	20.48	23.04	25.60
18	2.88	5.76	8.64	11.52	14.40	17.28	20.16	23.04	25.92	28.80
20	3.20	6.40	9.60	12.80	16.00	19.20	22.40	25.60	28.80	32.00

TABLE 19A: TOTAL LINEAR EXPANSION Δl [mm]. ONLY FOR VSH XPRESS STAINLESS STEEL 1.4401.

l [m]	ΔT [K]									
	10	20	30	40	50	60	70	80	90	100
1	0.10	0.21	0.31	0.42	0.52	0.62	0.73	0.83	0.94	1.04
2	0.21	0.42	0.62	0.83	1.04	1.25	1.46	1.66	1.87	2.08
3	0.31	0.62	0.94	1.25	1.56	1.87	2.18	2.50	2.81	3.12
4	0.42	0.83	1.25	1.66	2.08	2.50	2.91	3.33	3.74	4.16
5	0.52	1.04	1.56	2.08	2.60	3.12	3.64	4.16	4.68	5.20
6	0.62	1.25	1.87	2.50	3.12	3.74	4.37	4.99	5.62	6.24
7	0.73	1.46	2.18	2.91	3.64	4.37	5.10	5.82	6.55	7.28
8	0.83	1.66	2.50	3.33	4.16	4.99	5.82	6.66	7.49	8.32
9	0.94	1.87	2.81	3.74	4.68	5.62	6.55	7.49	8.42	9.36
10	1.04	2.08	3.12	4.16	5.20	6.24	7.28	8.32	9.36	10.40
12	1.25	2.50	3.74	4.99	6.24	7.49	8.74	9.98	11.23	12.48
14	1.46	2.91	4.37	5.82	7.28	8.74	10.19	11.65	13.10	14.56
16	1.66	3.33	4.99	6.66	8.32	9.98	11.65	13.31	14.98	16.64
18	1.87	3.74	5.62	7.49	9.36	11.23	13.10	14.98	16.85	18.72
20	2.08	4.16	6.24	8.32	10.40	12.48	14.56	16.64	18.72	20.80

TABLE 19B: TOTAL LINEAR EXPANSION Δl [mm]. ONLY FOR VSH XPRESS STAINLESS STEEL 1.4520/1.4521

l [m]	ΔT [K]									
	10	20	30	40	50	60	70	80	90	100
1	0.11	0.22	0.32	0.43	0.54	0.65	0.76	0.86	0.97	1.08
2	0.22	0.43	0.65	0.86	1.08	1.30	1.51	1.73	1.94	2.16
3	0.32	0.65	0.97	1.30	1.62	1.94	2.27	2.59	2.92	3.24
4	0.43	0.86	1.30	1.73	2.16	2.59	3.02	3.46	3.89	4.32
5	0.54	1.08	1.62	2.16	2.70	3.24	3.78	4.32	4.86	5.40
6	0.65	1.30	1.94	2.59	3.24	3.89	4.54	5.18	5.83	6.48
7	0.76	1.51	2.27	3.02	3.78	4.54	5.29	6.05	6.80	7.56
8	0.86	1.73	2.59	3.46	4.32	5.18	6.05	6.91	7.78	8.64
9	0.97	1.94	2.92	3.89	4.86	5.83	6.80	7.78	8.75	9.72
10	1.08	2.16	3.24	4.32	5.40	6.48	7.56	8.64	9.72	10.80
12	1.30	2.59	3.89	5.18	6.48	7.78	9.07	10.37	11.66	12.96
14	1.51	3.02	4.54	6.05	7.56	9.07	10.58	12.10	13.61	15.12
16	1.73	3.46	5.18	6.91	8.64	10.37	12.10	13.82	15.55	17.28
18	1.94	3.89	5.83	7.78	9.72	11.66	13.61	15.55	17.50	19.44
20	2.16	4.32	6.48	8.64	10.80	12.96	15.12	17.28	19.44	21.60

TABLE 19C: TOTAL LINEAR EXPANSION Δl [mm]. ONLY FOR VSH XPRESS GALVANIZED STEEL.

l [m]										ΔT [K]
	10	20	30	40	50	60	70	80	90	100
1	0.17	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70
2	0.34	0.68	1.02	1.36	1.70	2.04	2.38	2.72	3.06	3.40
3	0.51	1.02	1.53	2.04	2.55	3.06	3.57	4.08	4.59	5.10
4	0.68	1.36	2.04	2.72	3.40	4.08	4.76	5.44	6.12	6.80
5	0.85	1.70	2.55	3.40	4.25	5.10	5.95	6.80	7.65	8.50
6	1.02	2.04	3.06	4.08	5.10	6.12	7.14	8.16	9.18	10.20
7	1.19	2.38	3.57	4.76	5.95	7.14	8.33	9.52	10.71	11.90
8	1.36	2.72	4.08	5.44	6.80	8.16	9.52	10.88	12.24	13.60
9	1.53	3.06	4.59	6.12	7.65	9.18	10.71	12.24	13.77	15.30
10	1.70	3.40	5.10	6.80	8.50	10.20	11.90	13.60	15.30	17.00
12	2.04	4.08	6.12	8.16	10.20	12.24	14.28	16.32	18.36	20.40
14	2.38	4.76	7.14	9.52	11.90	14.28	16.66	19.04	21.42	23.80
16	2.72	5.44	8.16	10.88	13.60	16.32	19.04	21.76	24.48	27.20
18	3.06	6.12	9.18	12.24	15.30	18.36	21.42	24.48	27.54	30.60
20	3.40	6.80	10.20	13.60	17.00	20.40	23.80	27.20	30.60	34.00

TABLE 19D: TOTAL LINEAR EXPANSION Δl [mm]. ONLY FOR COPPER

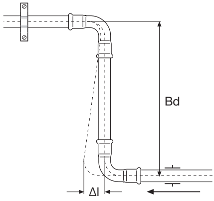


FIGURE 13

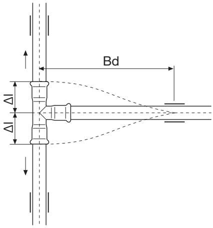


FIGURE 14

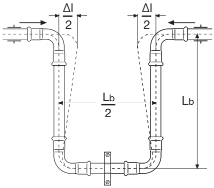
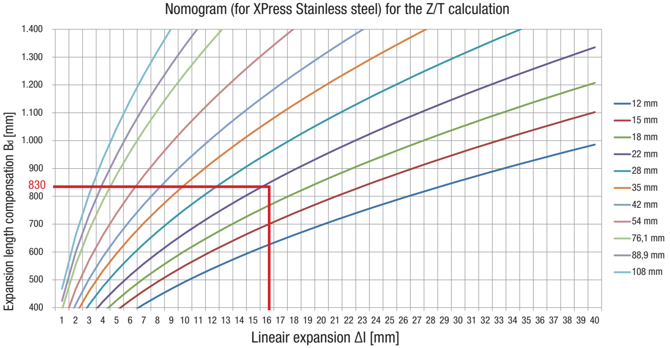
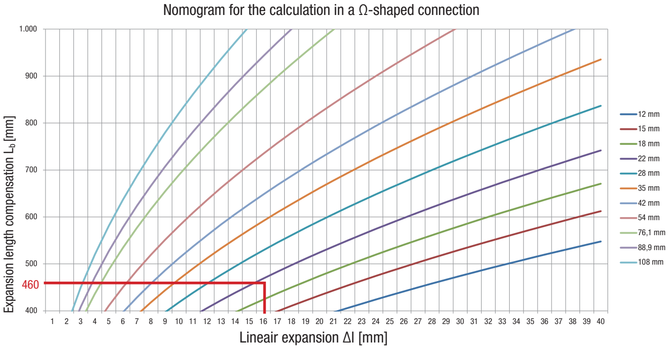


FIGURE 15



GRAPH 1: NOMOGRAM (FOR VSH XPRESS STAINLESS STEEL) FOR CALCULATING THE SITUATIONS IN FIGURES 13 AND 14. EXPANSION B_d [mm]



GRAPH 2: NOMOGRAM FOR CALCULATING THE SITUATION IN FIGURE 15. COMPENSATOR L_b [mm]

The nomogram in graph 1 enables the expansion bend length [Bd] to be rapidly and accurately determined by taking account of the respective tube types and the expansion to be compensated [Δl]. Graph 2 shows the values [L_b] for the installation situation illustrated in figure 15.

The following is an example of an analytical calculation: A tube network with a length of 16 m consisting of VSH XPress Stainless Steel 1.4401 tubing with a diameter of 22 mm subject to a temperature difference of 60 K. If we use the equation for calculating the expansion, the result is:

$$\Delta l = 16 \times 0{,}0166 \times 60 = 15{,}936 \text{ mm}$$

We would get the same result through interpolation of the data in table 23a without have to perform the calculation. In addition to the expansion for the respective section of the pipeline, we need to calculate the length of the expansion compensator required for its compensation – see figures 13 and 14. Using the nomogram in graph 1, we obtain approx. 830 mm. The analytical calculation gives the following result:

$$B_d = 45 \times \sqrt{(22 \times 15{,}936)} = 827{,}2 \text{ mm}$$

In case of an Ω-shaped expansion connection, the calculated value of an expansion equalizer as in figure 15 has to be halved as it is actually two expansion sections. The value [Bd] does not have to be divided exactly by two, but should be divided by a factor of 1.8:

$$L_b = 25 \times \sqrt{(22 \times 15{,}936)} = 468{,}1 \text{ mm}$$

or otherwise

$$L_b = B_d/1{,}8 = 842{,}58/1{,}8 = 468{,}1 \text{ mm}$$

Graph 2 shows a value for Lb of approx. 460 mm.

As can be seen clearly in figures 13-15, the correct compensation of the expansion depends also on the placement of fixing devices, such as brackets and anchoring points. Never plan to or actually place fixed tube mounting clips close to a tube connection. The clips should be positioned so that they do not act as a fixed restraint. When there are straight segments of tube, without expansion compensation, use only one saddle clip to prevent possible deformation. Position it as close to the middle of the straight segment as possible. in this way, any expansion will be distributed in both directions and the length of the expansion equalizer required will be halved. It is recommended that tube clips with a rubber inlay be used as this will muffle any possible noise and vibrations and better distribute stresses.

2.6.2 Pressure drop

Every fluid that flows through a piping system experiences continuous and local flow resistances, the so-called pressure drops. There is a difference between the continuous and the local pressure drop. A continuous pressure drop is mainly caused by the flow resistance in straight tube sections, which essentially is a result of the friction between the fluid and the tube wall. Local pressure drops, on the contrary, are those flow resistances that are created by, for instance, a change in the internal tube diameter, a tube branch, an elbow, etc.

Continuous pressure drop

To calculate the resistance of a fluid flow in a straight section of a piping system, first determine the resistance in a unit of length and then multiply the total length by this value. This value can be determined analytically using the Hazen-Williams formula.

$$\boxed{p = \frac{6{,}05 \times 10^5}{C^{1{,}85} \times di^{4{,}87}} \times Q^{1{,}85}}$$

p	= pressure drop in the tube [bar/m]
Q	= flow through the tube [l/min]
di	= mean internal diameter of the tube [mm]
C	= constant for type and condition of the tube
	= 140 for VSH XPress Stainless and Galvanized Steel

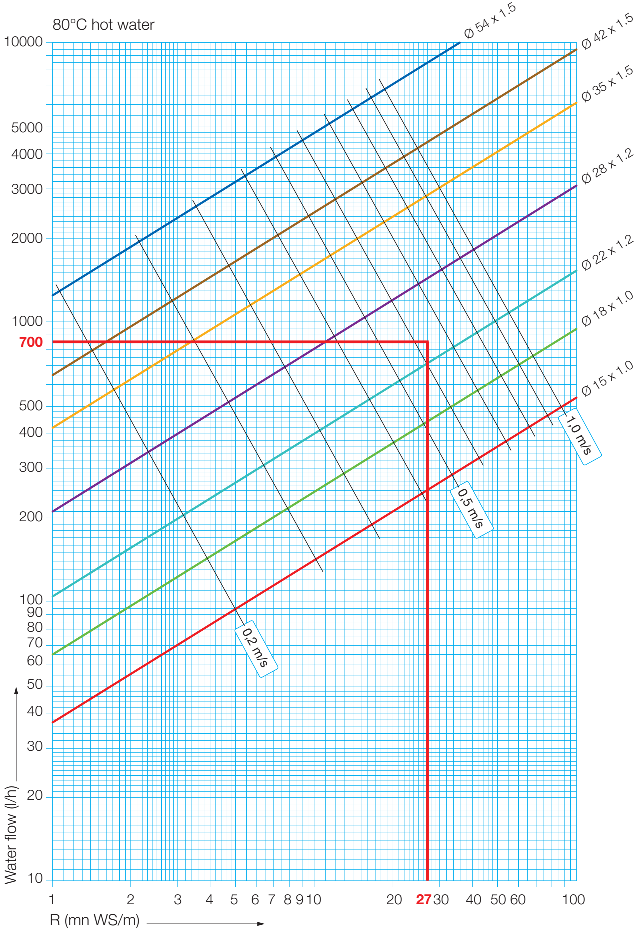
If you wish to perform these calculations, please consult the relevant specialized literature. For the normal installation calculations, the appropriate diagrams, such as those given in figure 16, can be used to solve this problem. The unit pressure drop [R] and the flow velocity [m/s] for a given water flow rate can be determined simply and quickly in this way.

Once [R] and the actual or equivalent length of the tubing system are known, the total pressure drop over the particular segment can be calculated. Figure 16 gives the values that apply to water with a temperature of 80°C. It can be seen that [R] changes with temperature and, as such, a correction is needed. Graphs can be prepared for the different operating temperatures and various velocity ranges.

In addition to the temperature, water additives e.g. anti-freeze, will affect the value [R] and will need to be corrected accordingly. It would be too complex to use several diagrams to perform a calculation for each temperature. That is why the nomogram in figure 16 can be used. It gives the correction factor [Kc] that needs to be applied to [R] for the actual temperature of the fluids.

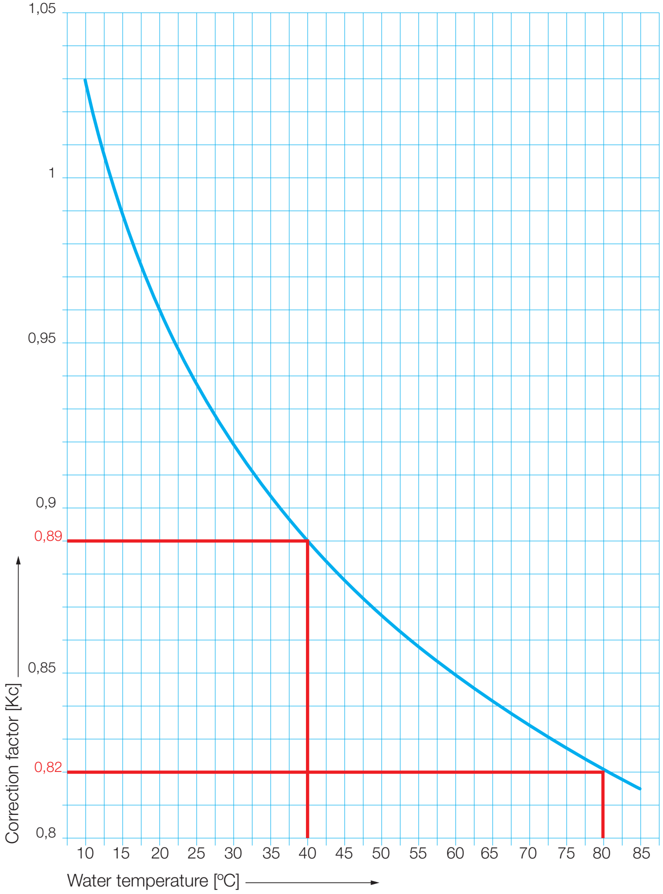
The following example explains the use of the nomogram. If we assume a flow rate of 700 l/h for a tube of 22 x 1.2 mm, the value of R is 27 WS/m (± 270 Pa/m) for a temperature of 80°C. Imagine that we want to calculate the value of [R] for a water temperature of 40°C. We must first find the value of [R] for this temperature and then multiply that value by the correction factor [Kc] for a temperature of 40°C.

R = (27/0,82) x 0,89 = 29,3 mm WS/m 293 [Pa/m]



80°C hot water
10000
5000
4000
3000
2000
1000
700
500
400
300
200
100
90
80
70
60
50
40
30
20
10
Water flow (l/h)
1
2
3
4
5
6
7
8
9
10
20
27
30
40
50
60
100
R (mn WS/m)
Ø 54 x 1.5
Ø 42 x 1.5
Ø 35 x 1.5
Ø 28 x 1.2
Ø 22 x 1.2
Ø 18 x 1.0
Ø 15 x 1.0
0,2 m/s
0,5 m/s
1,0 m/s

FIGURE 16



1,05
1
0,95
0,9
0,89
0,85
0,82
0,8
Correction factor [Kc]
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
Water temperature [ºC]

FIGURE 17

Local pressure drops

A local pressure drop is, as mentioned at the start of this section, the resistance to flow that results from changes in the flow direction and cross-sectional area, flow splitting over several channels, etc. There are, in general, two ways of calculating such flow resistances: the direct analytical method and the method that uses “equivalent lengths”.

Equivalent length method

This method assumes that the pressure drop at a particular point can be considered to be the same as an equivalent increase in the length of a straight tubing system with the same internal diameter. The final result is a pressure drop that is equal to the real pressure drop. In other words, the actual length of the tubing system is added to all the equivalent lengths of the individual joints (from table 20). The actual length is then multiplied by the pressure drop per unit-length [R] in order to be able to calculate the total pressure drop of the system. This method is not as accurate as the direct method but has the advantage that the calculation can be carried out faster.

ζ direct analytical method / equivalent length method (m)

															
OD	DN	ζ	(m)	ζ	(m)	ζ	(m)	ζ	(m)	ζ	(m)	ζ	(m)	ζ	(m)
12	10	1.29	0.38	0.61	0.18	0.30	0.09	0.90	0.27	0.26	0.08	0.09	0.09	-	-
15	12	1.02	0.49	0.69	0.33	0.40	0.19	1.13	0.55	0.36	0.17	0.52	0.25	0.64	0.31
18	15	0.93	0.58	0.77	0.48	0.50	0.32	1.41	0.89	0.46	0.29	1.06	0.67	0.96	0.60
22	20	0.44	0.35	0.38	0.30	0.15	0.12	1.05	0.84	0.11	0.08	0.73	0.59	1.29	1.04
28	25	0.35	0.38	0.28	0.32	0.13	0.28	0.93	1.01	0.05	0.06	0.65	0.72	0.82	0.92
35	32	0.31	0.43	0.29	0.40	0.08	0.11	0.93	1.34	0.03	0.04	0.53	0.79	1.47	2.19
42	40	0.25	0.48	0.22	0.42	0.11	0.20	1.20	2.27	0.06	0.11	0.46	0.85	-	-
54	50	0.30	0.79	0.19	0.49	0.09	0.24	1.15	3.06	0.06	0.14	0.36	1.43	-	-
76.1	65	0.25	1.04	0.15	0.62	0.08	0.31	1.07	4.42	0.04	0.17	0.32	1.68	-	-
88.9	80	0.24	1.22	0.13	0.66	0.07	0.36	1.06	5.38	0.04	0.20	0.27	2.10	-	-
108	100	0.23	1.51	0.12	0.76	0.07	0.43	1.05	6.90	0.03	0.20	-	-	-	-

TABLE 20: TABLE WITH EQUIVALENT LENGTHS AND VALUES OF LOCAL PRESSURE DROPS

Direct analytical method

The local pressure drop can be calculated using the following equation:

$$\Delta p_L = \Sigma\zeta \times v2 \times \gamma/2 \times 10^{-5} \text{ [bar]}$$

v = flow velocity of the fluid [m/s]
γ = specific density of the fluid [kg/m^3]
ζ = local flow resistance coefficient

Table 20 gives the [ζ] values for each type of fitting. We can assume that [ζ] is velocity-independent for those velocities that occur in domestic installations or in other normal applications; this is supported by the fact that the change in [ζ] as a function of the Reynolds number in these velocity ranges is only minimal. Once the [ζ] value is known, you can read the corresponding local pressure drop off directly.

2.6.3 Heat losses

Just as with all other types of tubes made from metal or synthetic materials, adequate measures must be taken with VSH XPress tubes to limit heat losses. Please consult the relevant regulations on minimum insulation thicknesses and the insulation standards.

Figures 18, 19, 20 and 21 show the linear heat losses of the tubes according to their diameter and temperature difference. The temperature difference is the difference between the temperature of the liquid inside the tubing system and the surrounding air temperature. This applies to uninsulated tubing that is laid against the walls or partitions of the building.

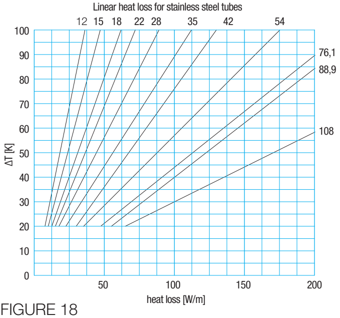


FIGURE 18

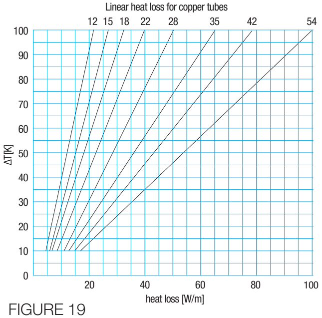


FIGURE 19

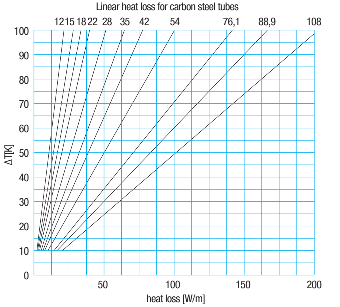


FIGURE 20

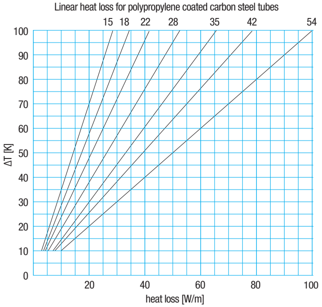


FIGURE 21

2.6.4 VSH XPress tubes

Table 26 on the following pages gives the friction loss R in the tube as a function of the flow rate Q and the flow velocity at a temperature of 10°C for VSH XPress Stainless Steel tubes in accordance with DVGW - Worksheet GW 541 (2004), Series 2, with a wall roughness [k] of 0.0015 mm. The tables for VSH XPress Galvanized Steel tubes and copper tube, as well as the tables for other situations (for example other temperatures or other applications), are available from VSH or can be downloaded from: www.vsh.nl.

Maximum flow-rate Qs [l/s]	12 x 1.0 mm		15 x 1.0 mm		18 x 1.0 mm		22 x 1.2 mm		28 x 1.2 mm	
	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]
0.01	0.5	0.1	0.2	0.1	0.1	-	-	-	-	-
0.02	1.6	0.3	0.5	0.2	0.2	0.1	0.1	0.1	-	-
0.03	3.2	0.4	0.9	0.2	0.4	0.1	0.1	0.1	0.1	-
0.04	5.3	0.5	1.5	0.3	0.6	0.2	0.2	0.1	0.1	0.1
0.05	7.7	0.6	2.2	0.4	0.8	0.2	0.3	0.2	0.1	0.1
0.10	25.4	1.3	7.3	0.8	2.7	0.5	1.0	0.3	0.3	0.2
0.15	51.5	1.9	14.8	1.1	5.5	0.7	1.9	0.5	0.7	0.3
0.20	85.4	2.5	24.5	1.5	9.1	1.0	3.3	0.6	1.1	0.4
0.25	126.6	3.2	36.2	1.9	13.5	1.2	4.8	0.8	1.6	0.5
0.30	175.0	3.8	49.9	2.3	18.5	1.6	6.5	1.0	2.1	0.6
0.35	230.3	4.5	65.8	2.8	24.3	1.7	8.6	1.1	2.8	0.7
0.40	292.2	5.1	83.1	3.0	30.8	2.0	10.8	1.3	3.5	0.8
0.45	360.8	5.7	102.4	3.4	37.9	2.2	13.4	1.4	4.4	0.9
0.50	435.8	6.4	123.8	3.8	45.7	2.5	16.0	1.5	5.3	1.0
0.55			146.5	4.1	54.1	2.7	19.0	1.8	6.2	1.1
0.60			171.1	4.5	63.2	3.0	22.2	1.9	7.3	1.2
0.65			197.5	4.9	72.9	3.2	25.5	2.1	8.3	1.3
0.70			225.5	5.3	83.2	3.5	29.1	2.2	9.5	1.4
0.75					94.1	3.7	33.0	2.4	10.8	1.5
0.80					105.6	4.0	37.0	2.5	12.0	1.6
0.85					117.6	4.2	41.2	2.7	13.5	1.7
0.90					130.3	4.5	45.6	2.9	14.8	1.8
0.95					143.6	4.7	50.3	3.0	15.4	1.9
1.00					157.4	5.0	55.1	3.2	17.9	2.0
1.05							60.1	3.3	19.6	2.1
1.10							65.3	3.5	21.2	2.2
1.15							70.7	3.7	23.0	2.3
1.20							76.3	3.8	24.8	2.4
1.25							82.1	4.0	26.7	2.5
1.30							86.1	4.1	28.6	2.6
1.35							94.2	4.3	30.7	2.8
1.40							100.8	4.5	32.7	2.9
1.45							107.1	4.6	34.8	3.0

Maximum flow-rate Qs [l/s]	12 x 1.0 mm		15 x 1.0 mm		18 x 1.0 mm		22 x 1.2 mm		28 x 1.2 mm	
	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]
1.50							113.9	4.8	37.0	3.1
1.55							120.8	4.9	39.2	3.2
1.60							127.9	5.1	41.5	3.3
1.65									43.8	3.4
1.70									46.3	3.5
1.75									48.7	3.6
1.80									51.2	3.7
1.85									53.8	3.8
1.90									56.5	3.9
1.95									59.3	4.0
2.00									62.0	4.1
2.05									64.8	4.2
2.10									67.6	4.3
2.15									70.5	4.4
2.20									73.5	4.5
2.25									76.5	4.6
2.30									79.6	4.7
2.35									82.8	4.8
2.40									86.0	4.9

Maximum flow rate Qs [l/s]	35 x 1.5 mm		42 x 1.5 mm		54 x 1.5 mm	
	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]
0.2	0.3	0.2	0.1	0.2	0.0	0.1
0.4	1.1	0.5	0.4	0.3	0.1	0.2
0.6	2.3	0.7	0.9	0.5	0.3	0.3
0.8	3.8	1.0	1.5	0.7	0.5	0.4
1.0	5.7	1.2	2.2	0.8	0.7	0.5
1.2	7.8	1.5	3.1	1.0	0.9	0.6
1.4	10.3	1.7	4.0	1.2	1.2	0.7
1.6	13.1	2.0	5.1	1.3	1.6	0.8
1.8	16.2	2.2	6.3	1.5	1.9	0.9
2.0	19.5	2.5	7.6	1.7	2.3	1.0

Maximum flow rate Qs [l/s]	35 x 1.5 mm		42 x 1.5 mm		54 x 1.5 mm	
	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]
2.2	23.1	2.7	9.0	1.8	2.6	1.1
2.4	27.0	3.0	10.5	2.0	3.1	1.2
2.6	31.2	3.2	12.1	2.2	3.6	1.3
2.8	35.7	3.5	13.8	2.3	4.1	1.4
3.0	40.4	3.7	15.6	2.5	4.6	1.5
3.2	45.3	4.0	17.5	2.7	5.2	1.6
3.4	50.6	4.2	19.5	2.8	5.8	1.7
3.6	56.1	4.5	21.6	3.0	6.5	1.8
3.8	61.8	4.7	23.8	3.2	7.1	1.9
4.0	67.8	5.0	26.2	3.3	7.7	2.0
4.2	74.1	5.2	28.6	3.5	8.4	2.1
4.4			31.0	3.7	9.2	2.2
4.6			33.6	3.9	10.0	2.3
4.8			36.3	4.0	10.8	2.4
5.0			39.1	4.2	11.6	2.5
5.2			42.0	4.4	12.5	2.6
5.4			44.9	4.5	13.3	2.8
5.6			48.0	4.7	14.2	2.9
5.8			51.1	4.9	15.0	3.0
6.0			54.4	5.0	16.1	3.1
6.2					17.1	3.2
6.4					18.0	3.3
6.6					19.1	3.4
6.8					20.2	3.5
7.0					21.3	3.6
7.2					22.3	3.7
7.4					23.5	3.8
7.6					24.7	3.9
7.8					25.9	4.0
8.0					27.0	4.1
8.2					28.3	4.2
9.0					33.5	4.6
10.0					40.6	5.1

Maximum flow rate Qs [l/s]	76.1 x 2.0 mm		88.9 x 2.0 mm		108 x 2.0 mm	
	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]
1	0.1	0.2	0.1	0.2	0.0	0.1
2	0.4	0.5	0.2	0.4	0.1	0.2
3	0.8	0.7	0.4	0.5	0.1	0.4
4	1.4	1.0	0.6	0.7	0.2	0.5
5	2.0	1.2	0.9	0.9	0.4	0.6
6	2.8	1.5	1.3	1.1	0.5	0.7
7	3.7	1.7	1.7	1.2	0.6	0.8
8	4.7	2.0	2.2	1.4	0.8	0.9
9	5.9	2.2	2.7	1.6	1.0	1.1
10	7.1	2.5	3.2	1.8	1.2	1.2
11	8.4	2.7	3.8	1.9	1.4	1.3
12	9.9	2.9	4.5	2.1	1.7	1.4
13	11.4	3.2	5.2	2.3	2.0	1.5
14	13.0	3.4	5.9	2.5	2.2	1.7
15	14.8	3.7	6.7	2.7	2.5	1.8
16	16.6	3.9	7.5	2.8	2.8	1.9
17	18.5	4.2	8.4	3.0	3.2	2.0
18	20.6	4.4	9.3	3.2	3.5	2.1
19	22.7	4.7	10.3	3.4	3.9	2.2
20	24.9	4.9	11.3	3.5	4.3	2.4
21	27.2	5.1	12.4	3.7	4.6	2.5
22			13.4	3.9	5.1	2.6
23			14.6	4.1	5.5	2.7
24			15.7	4.2	5.9	2.8
25			17.0	4.4	6.4	3.0
26			18.2	4.6	6.8	3.1
27			19.6	4.8	7.3	3.2
28			20.9	5.0	7.8	3.3
29			22.2	5.1	8.4	3.4
30					8.9	3.5
31					9.5	3.7
32					10.0	3.8
33					10.6	3.9

Maximum flow rate Qs [l/s]	76.1 x 2.0 mm		88.9 x 2.0 mm		108 x 2.0 mm	
	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]	R [mbar/m]	v [m/s]
34					11.1	4.0
35					12.3	4.2
36					12.9	4.3
37					13.6	4.4
38					14.3	4.6
39					15.0	4.7
40					15.7	4.8
41					16.4	4.9
42					17.1	5.0
43					17.9	5.2

TABLE 21: FRICTION COEFFICIENTS (ONLY FOR STAINLESS STEEL TUBES)

2.7 Built-in

2.7.1. Recommendations

For esthetical and practical reasons it is rare that tubes are installed uncovered in modern installations other than in technical spaces, such as cellars and garages. Several precautionary measures, depicted schematically in figures 21 and 22, are necessary if tubes are to be built-in/recessed in walls or floors. The following systems can be built in/recessed:

- VSH XPress Stainless Steel without corrosion protection*
- VSH XPress Stainless Steel GAS without corrosion protection*
- VSH XPress Galvanized Steel with polypropylene coating (fittings must be protected against corrosion)
- VSH XPress Copper with corrosion protection (e.g. coated/protective sleeve)
- VSH XPress Copper GAS with corrosion-protection (e.g. coating/protective sleeve).

Important: tubes for water that are built in (e.g. walls or floors) must always have a suitable coating/sleeve made from a suitable material in order to ensure that there is no contact between the tube and the building structure (in connection with noise issues).

** In building materials that contain chloride, stainless steel tubes must be protected accordingly.*

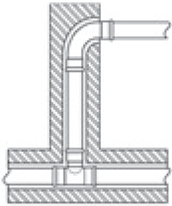


FIGURE 22

Figure 22 shows a cross-section of a tube installed inside a wall. The tubes and fittings have to be wrapped by an elastic and pliable coating that separates the installation completely from the building so that there is no direct contact. Prescribed by DIN1988 insulation materials are a good solution for this purpose and also provide heat-insulation.

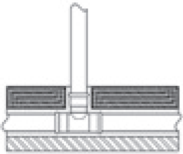


FIGURE 23

Similarly for tubes installed inside floors, even sprung floors, the horizontal stretches must be isolated by a protective sleeve, such as shown in figure 23. An adequate elastic sleeve must be used where the tube exits the floor so that the tube does not come into contact with the cement, should the tube expand (see figure 23).

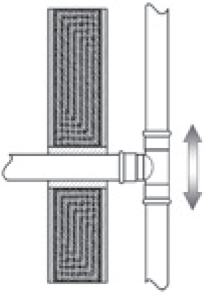


FIGURE 24

Figure 24 shows a classical situation of branching from the outside riser to a point in the building. In such a case, you must make sure that the tee-piece is not subjected to any stresses as a result of a change in the direction of the axis of the fitting. In this context, the mounting brackets, as fixed mounting points and clips, are therefore very important. Tubes and fittings, in all installations, should always as a general rule be enclosed in a soft material in order to allow for expansion. We must emphasize once again that great care must be taken when selecting insulation materials for stainless steel tubes and materials for surrounding such tubes so as to ensure that they do not ever allow any chloride ions to come into contact with the tubes. In the case of copper, harmful substances from the environment, such as ammonia or nitrates, must be prevented from penetrating the insulating material.

Guidelines for distances of mounting brackets

Ø tube diameter [mm]	Max. distance [m]
12 x 1.0	1.00
15 x 1.0	1.25
18 x 1.0	1.50
22 x 1.2	2.00
28 x 1.2	2.25
35 x 1.5	2.75
42 x 1.5	3.00
54 x 1.5	3.50
64 x 1.5	4.25
66.7 x 1.5	4.25
76.1 x 2.0	4.25
88.9 x 2.0	4.75
108 x 2.0	5.00

TABLE 22: DISTANCES BETWEEN MOUNTING BRACKETS IN ACCORDANCE WITH EN 806, PART 4

Observance of the above distances between attachment points is not sufficient in itself. Heat expansion also needs to be appropriately compensated for in horizontal stretches and, therefore, the distances above may need to be adjusted.

2.7.2 Mounting tubes

When securing the tubes, the following must be borne in mind: The load-bearing capacity of the mounting brackets must correspond to the weight of the pipelines and also withstand expansion and torsion forces. Mounting brackets, such as fixed mounting points and clips, must therefore be correctly placed and assembled.

Attachment points may only be fitted onto straight tube sections. Mounting directly onto fittings is not allowed.

2.7.3 Pressure test

As soon as a tubing system has installed, it must be checked for leaks before being covered up and concealed. With potable water and heating installations, the pressure test can be carried out with water, air or inert gases. The test medium and the results of the pressure test must be documented in a so-called pressure test report.

Important: VSH XPress stresses that a pressure test of the tubing system must be carried out in all cases. Before being covered up, insulated, painted or walled in, a tubing system must first undergo a pressure test in order to be certain that there are no leaks. Pressure tests must always be performed in accordance with local regulations. As a rule of thumb, a pressure of 1.5 times the operating pressure is used for pressure tests with water.

Important: When testing an VSH XPress Galvanized Steel installation, make sure that no water remains in the system afterwards, in order to avoid the risk of corrosion, unless the system is going to be put into service shortly afterwards.

Pressure test of potable water systems

Pressure test with water

Important: The pressure test with water of potable water tubing that has already been laid is performed in accordance with the ZVSHK/BHKS technical bulletins. The medium used for the pressure test with water must be of potable water quality (free of oil and other impurities) in order to avoid any contamination of the piping system. After being filled with pure water, the pipe must be properly bled.

Pressure test with air

Important: The pressure test with air or inert gases can be carried out in accordance with the ZVSHK/BHKS technical bulletins, “Pressure Test with Air or Inert Gases”, (at 100 l tube capacity a leak tightness test at 110 mbar for at least 30 minutes. For every additional 100 l, the time must be increased by 10 minutes. After the leak tightness test, the strength of the connection is to be tested during

10 minutes at: a maximum of 3 bars up to DN50, maximum of 1 bar >DN50). For safety reasons, the maximum test pressure is set at 3 bars. This maximum test pressure applies also for gas piping.

Pressure test for heating systems and cooling systems

Important: As a rule, the pressure test for tubing that has already been laid is carried out with water in accordance with DIN-VOB 18380.

- The test pressure at each point of the system must be 1.3 times the operating pressure and at least 1 bar overpressure.
- Immediately after the cold water pressure test, the water must be heated up to the highest hot water temperature on which the calculations were based in order to be certain that the system remains tight at high temperatures.
- During the test there must be no drop in pressure.
- The pressure test must be adequately documented.

Pressure test for natural gas systems

Important: The pressure test for natural gas and liquid gas systems must be performed in accordance with local regulations.

Pressure test of sprinkler systems

The tubes of the sprinkler system must be subjected to a pressure test in accordance with valid guidelines, such as CEA 4001, no. 17.1.1. (VdS) for at least two hours. A pressure (measured at the alarm valves) corresponding to 1.5 times the permitted positive operating pressure – but of at least 15 bars – must be maintained during the test. This pressure test is a check of both the strength and tightness of the system. The system must be monitored for 24 hours for any pressure drop due, for example, to temperature changes. Dry sprinkler systems must also be tested pneumatically to a pressure of not less than 2.5 bars for at least 24 hours. Any leakage, which occurs and results in a pressure drop of more than 0.15 bar over the 24 h, must be corrected. Any faults identified, such as permanent deformations, ruptures or leakages must be corrected and the pressure test repeated.

2.7.4 Flushing the network

Each tubing system must be flushed thoroughly before being put into use so that any foreign matter is removed from the inside of the tube surface and so that hygiene problems and corrosion damage are largely prevented. Potable water tubing must be flushed as soon as possible after installing the pipelines and after the pressure test. The cold and hot water pipelines should be flushed separately, intermittently and under pressure with an air-water mixture (EN 806, Part 4). Installation regulations, such as the Potable Water Act and worksheets, must be followed. In exceptional cases, it may be necessary to flush the system with a disinfecting substance.

When flushing with a disinfectant substance, special care must be taken to ensure that no chlorides remain on the inside of the tubes. Always make sure to flush with clean potable water.

2.8 Corrosion

There are different kinds of corrosion: chemical corrosion, electro-chemical corrosion, internal and external local corrosion, stray current corrosion, etc. All these kinds of corrosion have very particular chemical or mechanical causes. The following paragraphs provide some simple hints on how to avoid such problems.

Electro-chemical corrosion

Electro-chemical corrosion occurs under the following circumstances:

- an electrochemical potential difference between both parts
- the presence of a conductive fluid (electrolyte), such as water
- the presence of oxygen (O_2)

A distinction must be made between heating installations and water supply installations. There are no significant amounts of oxygen in heating installations, when they are properly installed and operated and there will thus be very little corrosion. In potable water installations, however, the oxygen content is very high, nearly at the saturation point. It is of primary importance that the VSH XPress System components be installed only downstream of other, metallurgically inferior (less noble), components that are possibly present in these kinds of installations. For example, it is possible to install branches with VSH XPress stainless steel tubes from a tube system consisting of galvanized steel tubes. In such a case, a non-ferrous metal or synthetic connection piece must be used (see DIN1988).

Another important factor is the ratio between the surface of the noble metal and that of the less noble metal. The higher this ratio, the greater the corrosion rate may be. It is, therefore, recommended that you avoid, as far as possible, using extensions or connection pieces of galvanized steel and instead stainless steel or brass fittings.

Stray currents
Corrosion by stray currents rarely occurs in practice and is immediately recognisable as it starts on the outside of the tube with a cone-shaped crater to the inside. Stray current corrosion requires a direct current that turns the metal into an anode. The current, which in practice and despite insulation measures penetrates into the earth and from there goes into other neighbouring metal structures, such as a water supply installation, runs through a particular stretch of the system before it returns to earth again. In order to penetrate into the tubing system, the earth current must have an entry point at a spot where the normal protective cover of the tube or connection is damaged or missing.

For this reason, metal pipelines must be earthed (see EU Regulations). Direct current installations are generally not used in domestic households and no real problems occur with alternating current. Research over decades has shown that problems by stray currents only occur sporadically and do not depend on the type of metal.

2.8.1 Stainless steel

Internal corrosion

VSH XPress Stainless tubes and press fittings are completely passive when in contact with potable water and, therefore, not at risk from corrosion. Potable water is considered to be water with properties that comply with current regulations on physical-chemical tolerances.
The tubes and fittings also react in a safe and problem-free manner as regards a water chlorine content if 1.34 mg/l is added for disinfection purposes. The VSH XPress Stainless system can also be used for all water treatment plants for domestic purposes (e.g. for water softeners).

It is corrosion-resistant as regards demineralized and distilled water, and water containing glycol. Hygiene problems regarding heavy metal contamination do not occur with VSH XPress Stainless Steel. Point or crack corrosion can only occur if the maximum values for the water chloride content, as defined in the applicable regulations, are significantly exceeded.

External corrosion

External corrosion of the VSH XPress Stainless Steel components can only occur when wet potable water tubes come into contact with mortar, droplets or covering materials that contain or cause chlorides to be created. Ensure that the outer insulating layer of the tubes and fittings is continuous and that, if necessary, sufficient corrosion-protective insulation tape is applied. Correctly applied closed-cell insulation is an effective protection against corrosion.

2.8.2 Galvanized Steel

Internal corrosion

Internal corrosion cannot occur with closed-loop water heating systems. The oxygen in the water in closed-loop systems creates a layer of iron oxide on the inside of the tube thereby preventing any further corrosion. When the heating system is not in use, it must be kept filled at all times or, alternatively, be completely drained and subsequently dried out, to avoid the presence of water and oxygen in the system at the same time.

The necessary additives should be added to prevent frost damage, calcification or corrosion. We are always happy to answer enquiries about the use of additives. Please observe the applicable legislation, regulations and local rules regarding corrosion.

External corrosion

Galvanized Steel systems are generally installed in such a way that the outer surfaces do not come into contact with corrosive media. VSH XPress Galvanized Steel tubes must, however, not be permanently exposed to moisture. VSH XPress Galvanized Steel tubes with PP coating offer good protection against corrosion.

2.8.3 Prevention of corrosion

Instructions will be found in the following paragraphs on how to prevent corrosion problems in the most usual places. A distinction is made between inner and outer corrosion, and the area of application. We shall also examine the various application possibilities of various materials that can be combined in an installation (combi-installations).

A. Internal corrosion

A.1 Heating installations

The penetration of oxygen in **closed-loop** heating installations will be prevented if high-quality accessories and compensators with closed membranes are used. When filling the installation, the small quantity of oxygen contained in the water is directly absorbed into the inner tube surface, in the process of which a thin layer of iron oxide is formed and after which there is no longer any possibility of corrosion. The loss in wall thickness can be disregarded. The heating-circuit water is practically oxygen-free after this reaction.

Stainless Steel

Tubes and fittings of stainless steel are suitable for all **open** and **closed-loop** heating installations. **Combi-installations:** Stainless steel can be used in combi-installations with other materials in any sequence.

Galvanized Steel

Internal corrosion is normally impossible in **closed-loop** heating installations with VSH XPress Galvanized Steel tubes and fittings as oxygen from outside cannot penetrate the installation. **Combi-installations:** Unalloyed galvanized steel can be used without any problems and can be combined with other metals in any sequence in closed-loop systems.

Copper

Copper is suitable for all **open** and **closed-loop** heating systems. **Combi-installations:** Copper can be used with other metals in any sequence in combi-installations.

Other combination possibilities

Galvanized steel – copper – stainless steel. **Combi-installations:** These materials can be combined in all **closed-loop** systems.

Water additives

Oxygen scavengers and corrosion inhibitors can be added to the heating-circuit water as a preventive measure against inadmissible oxygen absorption. Observe the supplier's instructions for use.

A.2 (Potable) water installations

Stainless steel

VSH XPress Stainless Steel fittings and tubes have the advantage that stainless steel is passive in potable water. The physical and chemical properties of the potable water are not affected by stainless steel. In this passive state, no internal corrosion will take place. The danger of heavy metal contamination is avoided and the growth of bacteria countered by the use of stainless steel tubes and connection pieces. Pitting or ring corrosion can only occur if the chloride content of the water is significantly higher than the maximum level allowed under current regulations. VSH XPress Stainless Steel system components are suitable for all water treatment methods (water softening) for potable water and are also corrosion-resistant as regards demineralized and distilled water, and water containing glycol. VSH XPress Stainless Steel fittings and tubes are, however, not suitable for operation in dosing systems for e.g. disinfectants, which are added to the potable water. VSH XPress Stainless Steel fittings and tubes are also suitable for all other open and closed-loop water systems (e.g. cooling water). **Combi-installations:** The corrosion behaviour of stainless steel is not influenced by its use in combi-installations independent of the direction of the flow of water (no flow rule). Stainless steel can be used in any sequence in combi-installations. Discolouration from a deposit of foreign corrosion products does not indicate corrosion on the stainless steel. Stainless steel can be used with all copper alloys (bronze, copper or brass) in a combi-installation. There is no risk of contact corrosion with stainless steel.

Galvanized Steel

Galvanized Steel tubes and fittings are **not permitted** in potable water installations. Contact corrosion will occur with galvanized steel if it enters into direct contact with stainless steel.

The possibility of contact corrosion is negligibly small if bronze, copper or brass fittings are used between the galvanized steel tube and the stainless steel. Contact corrosion on a Galvanized Steel tube can also be prevented by using 50 mm couplings made of bronze, copper or brass.

Copper

The physical and chemical properties of potable water can be affected by copper in the event of inner corrosion. An unfavourable potable water composition can also lead to corrosion.

The limit values for the use of copper material with respect to the salt content of the potable water must, therefore, correspond to the legal requirements for potable water. If these limit values are adhered to and the potable water composition does not deteriorate, copper is suitable for potable water installations. **Combi-installations with copper and galvanized steel:** the following rule is important if copper and galvanized steel tubes are used in water systems, including open water systems, because of the various properties of the metals:

Flow from base metal to noble metal	
Base	Galvanized Steel
↓	Copper
Noble	Stainless steel

Copper must always be used downstream of couplings or tubes of galvanized steel.

B. External corrosion

B.1 General

There are few situations in which outer corrosion occurs in buildings. It is, however, possible in many cases that installations are exposed for a longer period to undesired penetration of rain, humidity or dampness and this can lead to problems. Responsibility for taking relevant measures rests, however, with the user and the installer. Only suitable corrosion protection can offer permanent certainty against corrosion. One way of doing so is to use “closed cell” insulation, which must be applied in a guaranteed waterproof condition.
Suitable primers - or metallic paints may offer minimal corrosion protection. It is advisable to always use corrosion protection on the tubing in situations where corrosion is likely to occur (damp room, crawl spaces, etc.).

B.2 Stainless steel

Outer corrosion can only occur in the following circumstances:

- If stainless steel heat-conducting tubing (50°C) comes into contact with building and insulating materials containing chlorides (as the result of humidity);
- If water vapour on stainless steel heat-conducting pipelines leads to a local chloride concentration; and
- If VSH XPress stainless steel tubing (including cold water tubing) comes into contact with chlorine gas, saltwater or brine or (oxygen-saturated) water with a high chlorine content.

If there is the danger of building materials coming into contact over a long period with highly chlorinated water, suitable corrosion protection must be used. VSH XPress Stainless Steel tubes in cement floors will not be subject to electrolytic outer corrosion in connection with potential equalisation.

B.3 Galvanized Steel

Special attention must be paid to preventing outer corrosion where an environment remains humid for longer periods. Only in cases of sporadic short-term corrosion stress caused by humidity will Galvanized Steel also be resistant against corrosion for a longer period. VSH XPress Galvanized Steel fitting connections must be protected in cases of increased risk of corrosion due to electrolytic outer corrosion (or longer periods of humidity). A polypropylene coating offers galvanized steel tubes effective corrosion protection.

B.4 Copper

Copper's high resistance to corrosion renders corrosion-protection measures superfluous. Copper tubes in cement floors will not be subject to outer electrolytic outer corrosion in connection with potential equalisation. However, copper tubing must sometimes also be protected from the impact of outer corrosion, such as sulphites, nitrites and ammonia. Gas tubes must be protected against corrosion in accordance with local guidelines, such as e.g. NEN 1078-NPR 3378-10.

C. Impact of application and processing

C.1 General

Corrosion may occur due to incorrectly designed installations and faulty applications. The following points must be observed:

C.2 Stainless steel

Cutting Stainless steel

Cutting through stainless steel tubes is not allowed due to the amount of heat developed.

Bending stainless steel tubes

Stainless steel tubes may not be bent warm. The heating of the stainless steel tubes alters the structure of the material (sensitisation) and inter-crystalline corrosion can take place.

Heat transfer (e.g. with a heating band)

Heat transfer from outside inwards must be prevented as this can lead to the build-up of film on the inside of the tube wall. This film can cause an increase in the concentration of chloride ions, which cause pitting in critical concentrations.

Connections

Welding of stainless steel tubes may cause pitting or ring corrosion. In the case of TIG welding of stainless steel, discolouration occurs at the welding joints, which may lead to corrosion on contact with salt water. This discolouration, mainly on the inside of the tube, can only be removed by staining, which is not practical with tubing that has already been installed.

C.3 Stainless steel – Galvanized Steel – Copper

With all 3 materials (stainless steel, galvanized steel, copper), waterline corrosion can occur as a result of interaction between three actors (water – metal – gas (air). This corrosion can be prevented if the tubing installation remains permanently filled once filled for the first time. Partial filling will take place, for example, if the tubes are emptied again after a pressure test with water, in which case a pressure test using gas/air is to be recommended.

D. Effect of insulation

D.1 General

Insulation does not, as a rule, offer any protection against corrosion except in the case of “closed cell insulation” (sealed watertight), which offers effective protection against corrosion. The installation instructions of the supplier of the insulation material must always be followed carefully. Remove dust, dirt, oil or water from the tubing prior to insulating.

The different sections of the insulation material must be carefully joined, taking care that no moisture or water can enter the material.

Also take care that the water barrier of the insulation material is not damaged during installation as moisture could otherwise penetrate under the insulation material.

D.2 Insulating stainless steel

Insulating materials that release chloride ions in water or which could cause a local increase in chloride ions are not permitted. The weight ratio of water-solution chloride ions in the thermal insulation of the tubes may note exceed 0.05% (AS quality).

D.3 Insulating galvanized steel

No corrosion can occur if there is no humidity between the insulation material and the tube. If there is a possibility of humidity (condensation) occurring under the insulation, the outside of the tube will corrode.

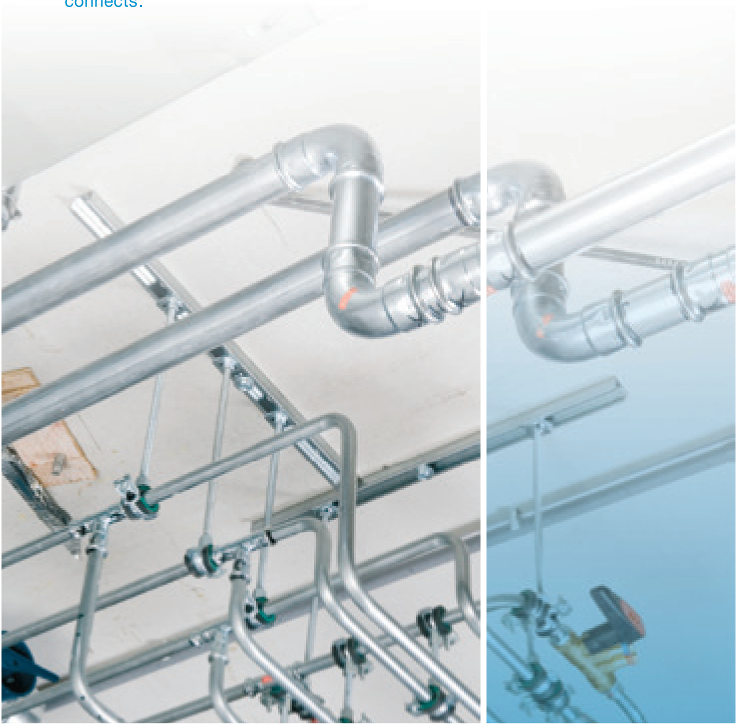
D.4 Insulating copper

Insulation materials for copper must be nitrate-free and may not contain more than 0.02% nitrate.

3 Warranty

Please contact VSH for the most recent warranty conditions that apply to VSH XPress.

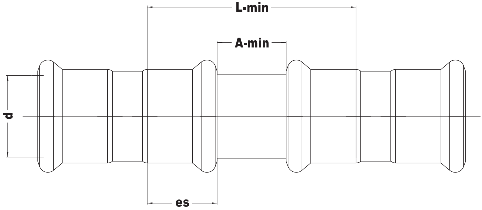
VSH connects.



4 Combined press connections

XPress

Minimum distance between pressings



Stainless Steel / Stainless Steel GAS

DN	d	Tube length L-min	Min distance between fittings A-min	Insertion depth es
10	12	44	10	17
12	15	50	10	20
15	18	50	10	20
20	22	52	10	21
25	28	56	10	23
32	35	62	10	26
40	42	80	20	30
50	54	90	20	35
65	76.1	150	40	55
80	88.9	176	50	63
100	108	204	50	77

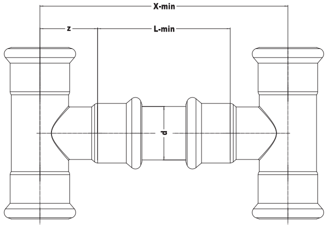
Galvanized Steel

DN	d	Tube length L-min	Min distance between fittings A-min	Insertion depth es
10	12	44	10	17
12	15	50	10	20
15	18	50	10	20
20	22	52	10	21
25	28	56	10	23
32	35	62	10	26
40	42	80	20	30
50	54	90	20	35
60	66.7	130	30	50
65	76.1	150	40	55
80	88.9	176	50	63
100	108	204	50	77

Copper

DN	d	Tube length L-min	Min distance between fittings A-min	Insertion depth es
10	12	44	10	17
12	15	50	10	20
15	18	50	10	20
20	22	52	10	21
25	28	56	10	23
32	35	62	10	26
40	42	84	20	32
50	54	94	20	37
60	64	130	30	50
6`0	66.7	130	30	50
65	76.1	140	40	50
80	88.9	174	50	62
100	108	186	50	68

T-pieces with equal outlet



Stainless steel

DN	d	Tube length L-min	X-min	z
10	12	44	87	21
12	15	50	88	19
15	18	50	91	21
20	22	52	97	23
25	28	56	107	26
32	35	62	120	29
40	42	80	143	32
50	54	90	165	37
65	76.1	150	270	60
80	88.9	176	304	64
100	108	204	360	78

Stainless Steel GAS

DN	d	Tube length L-min	X-min	z
12	15	50	78	14
15	18	50	78	14
20	22	52	86	17
25	28	56	98	21
32	35	62	118	28
40	42	80	138	29
50	54	90	160	35

DN	d	Tube length L-min	X-min	z
65	76.1	150	270	60
80	88.9	176	312	68
100	108	204	360	78

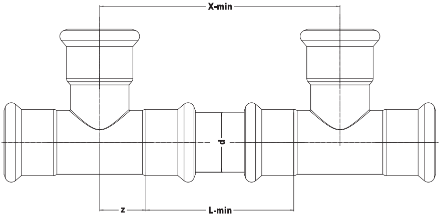
Galvanized Steel

DN	d	Tube length L-min	X-min	z
10	12	44	89	23
12	15	50	98	24
15	18	50	101	26
20	22	52	107	28
25	28	56	117	31
32	35	62	130	34
40	42	80	154	37
50	54	90	175	43
60	66.7	130	232	51
65	76.1	150	260	55
80	88.9	176	306	65
100	108	204	356	76

Copper

DN	d	Tube length L-min	X-min	z
10	12	44	66	11
12	15	50	74	12
15	18	50	78	14
20	22	52	84	16
25	28	56	94	19
32	35	62	110	24
40	42	84	140	28
50	54	94	162	34
60	64	130	298	84
60	66.7	130	254	62
65	76.1	140	278	69
80	88.9	174	374	100
100	108	186	370	92

Minimum distance between 2 t-pieces with equal and reduced outlet



Stainless steel

DN	d	Tube length L-min	X-min	z
10	12	44	66	11
12	15	50	80	15
15	18	50	83	17
20	22	52	89	19
25	28	56	99	22
32	35	62	112	25
40	42	80	139	30
50	54	90	161	36
65	76.1	150	272	61
80	88.9	176	312	68
100	108	204	362	79

Stainless Steel GAS

DN	d	Tube length L-min	X-min	z
12	15	50	82	16
15	18	50	88	19
20	22	52	88	18
25	28	56	100	22
32	35	62	110	24
40	42	80	134	27
50	54	90	158	34

DN	d	Tube length L-min	X-min	z
65	76.1	150	272	61
80	88.9	176	312	68
100	108	204	362	79

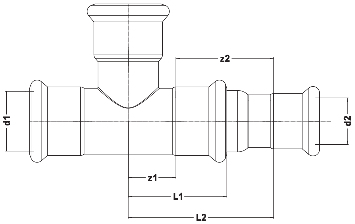
Galvanized Steel

DN	d	Tube length L-min	X-min	z
10	12	44	71	14
12	15	50	80	15
15	18	50	83	17
20	22	52	89	19
25	28	56	100	22
32	35	62	113	26
40	42	80	141	31
50	54	90	162	36
60	66.7	130	228	49
65	76.1	150	270	60
80	88.9	176	310	67
100	108	204	360	78

Copper

DN	d	Tube length L-min	X-min	z
10	12	44	66	11
12	15	50	74	12
15	18	50	78	14
20	22	52	84	16
25	28	56	94	19
32	35	62	110	24
40	42	84	140	28
50	54	94	162	34
60	64	130	296	83
60	66.7	130	220	45
65	76.1	140	242	51
80	88.9	174	374	100
100	108	186	370	92

Reduction of Tees



Stainless steel

DN	d1	d2	L2	L1	z1	z2
12-15	15	12	35	50	33	15
15-12	18	15	57	37	40	17
20-12	22	15	59	40	41	19
20-15	22	18	56	40	38	19
25-12	28	15	69	45	47	22
25-15	28	18	67	45	45	22
25-20	28	22	63	45	42	22
32-12	35	15	84	51	59	25
32-15	35	18	82	51	57	25
32-20	35	22	76	51	51	25
32-25	35	28	71	51	46	25
40-12	42	15	98	60	68	30
40-15	42	18	96	60	67	30
40-20	42	22	94	60	65	30
40-25	42	28	88	60	59	30
40-32	42	35	80	60	51	30
50-12	54	15	109	71	79	30
50-15	54	18	116	71	81	36
50-20	54	22	114	71	79	36
50-25	54	28	109	71	74	36

DN	d1	d2	L2	L1	z1	z2
50-32	54	35	103	71	68	36
50-40	54	42	101	71	65	36
65-40	76.1	42	182	116	121	61
65-50	76.1	54	166	116	105	61
80-50	88.9	54	189	131	121	68
80-65	88.9	76.1	169	131	101	68
100-50	108	54	248	156	169	79
100-65	108	76.1	220	156	141	79
100-80	108	88.9	206	156	127	79

Stainless Steel GAS

DN	d1	d2	L2	L1	z1	z2
15-12	18	15	54	35	35	19
20-10	22	12	58	40	40	18
20-15	22	18	70	40	52	18
25-12	28	15	59	45	37	22
25-15	28	18	79	45	57	22
25-20	28	22	68	45	46	22
32-20	35	22	86	55	62	24
32-25	35	28	74	55	50	24
40-25	42	28	102	61	75	27
40-32	42	35	103	61	76	27
50-25	54	28	87	72	53	34
50-32	54	35	136	72	102	34
50-40	54	42	101	72	67	34
65-40	76.1	42	182	116	121	61
65-50	76.1	54	166	116	105	61
80-50	88.9	54	189	131	121	68
80-65	88.9	76.1	169	131	101	68
100-50	108	54	248	156	169	79
100-65	108	76.1	220	156	141	79
100-80	108	88.9	206	156	127	79

Reduction of Tees

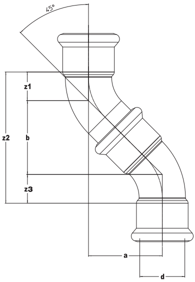
Galvanized Steel

DN	d1	d2	L2	L1	z1	z2
12-10	15	12	54	35	39	15
15-10	18	12	56	37	39	17
15-12	18	15	55	37	39	17
20-10	22	12	62	40	43	19
20-12	22	15	60	40	41	19
20-15	22	18	59	40	40	19
25-12	28	15	70	45	48	22
25-15	28	18	68	45	46	22
25-20	28	22	67	45	45	22
32-20	35	22	76	52	51	26
32-25	35	28	73	52	47	26
40-20	42	22	93	61	62	31
40-25	42	28	91	61	60	31
40-32	42	35	85	61	54	31
50-15	54	18	113	71	77	36
50-20	54	22	112	71	76	36
50-25	54	28	105	71	69	36
50-32	54	35	105	71	69	36
50-40	54	42	102	71	66	36
60-25	66.7	28	163	99	114	49
60-32	66.7	35	145	99	96	49
60-40	66.7	42	143	99	94	49
60-50	66.7	54	134	99	85	49
65-40	76.1	42	176	115	116	60
65-50	76.1	54	165	115	105	60
65-65	76.1	66.7	149	115	89	60
80-50	88.9	54	187	130	120	67
80-65	88.9	66.7	173	130	106	67
80-65	88.9	76.1	170	130	103	67
100-65	108	66.7	214	155	136	78
100-65	108	76.1	211	155	133	78
100-80	108	88.9	201	155	123	78

Copper

DN	d1	d2	L2	L1	z1	z2
12-10	15	12	39	32	27	12
15-10	18	12	44	34	30	14
15-12	18	15	41	34	27	14
20-12	22	15	49	37	33	16
20-15	22	18	46	37	30	16
25-12	28	15	60	42	41	19
25-15	28	18	59	42	40	19
25-20	28	22	53	42	34	19
32-20	35	22	72	50	48	24
32-25	35	28	63	50	39	24
40-20	42	22	81	58	53	28
40-25	42	28	76	58	48	28
40-32	42	35	74	58	46	28
50-25	54	28	82	42	63	19
50-32	54	35	96	69	62	34
50-40	54	42	90	69	56	34
60-50	64	54	164	133	81	83
60-25	66.7	28	131	95	86	45
60-32	66.7	35	128	95	83	45
60-40	66.7	42	125	95	80	45
60-50	66.7	54	122	95	77	45
65-32	76.1	35	138	101	87	51
65-40	76.1	42	134	101	83	51
65-50	76.1	54	132	101	81	51
65-60	76.1	64	135	101	84	51
65-65	76.1	66.7	127	101	76	51
80-40	88.9	42	133	58	105	28
80-50	88.9	54	197	162	97	100
80-65	88.9	66.7	197	162	97	100
80-65	88.9	76.1	190	162	90	100
100-40	108	42	215	159	123	92
100-50	108	54	214	159	122	92
100-65	108	66.7	208	159	116	92
100-65	108	76.1	204	159	112	92
100-80	108	88.9	196	159	104	92

Bend 45° (2 x press) on bend 45° (press x male)



Stainless steel

DN	d	a	z1	z2	z3	b
12	15	34	11	55	10	34
15	18	36	12	60	12	36
20	22	40	14	68	14	40
25	28	44	17	79	17	44
32	35	51	21	91	20	51
40	42	63	26	116	26	63
50	54	74	32	136	30	74
65	76.1	113	43	199	43	113
80	88.9	127	49	225	49	127
100	108	152	61	274	61	152

Stainless Steel GAS

DN	d	a	z1	z2	z3	b
12	15	45	16	77	16	45
15	18	44	17	78	17	44
20	22	52	21	94	21	52
25	28	62	27	116	27	62
32	35	69	32	133	32	69
40	42	88	45	178	45	88
50	54	105	51	207	51	105

DN	d	a	z1	z2	z3	b
65	76.1	113	43	199	43	113
80	88.9	127	49	225	49	127
100	108	152	61	274	61	152

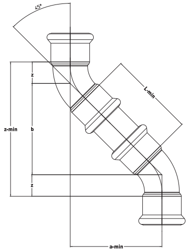
Galvanized Steel

DN	d	a	z1	z2	z3	b
12	15	34	11	55	11	34
15	18	36	12	60	12	36
20	22	40	14	68	14	40
25	28	44	17	79	17	44
32	35	51	20	91	20	51
40	42	63	26	115	26	63
50	54	74	32	138	32	74
60	66.7	112	48	207	48	112
65	76.1	113	46	206	46	113
80	88.9	130	53	236	53	130
100	108	155	62	280	62	155

Copper

DN	d	a	z1	z2	z3	b
10	12	27	6	39	6	27
12	15	32	8	48	8	32
15	18	34	9	52	9	34
20	22	40	12	63	11	40
25	28	45	16	75	14	45
32	35	54	18	89	17	54
40	42	65	21	107	21	65
50	54	77	27	131	27	77
60	66.7	87	35	157	35	87
65	76.1	100	45	185	40	100
80	88.9	115	46	208	47	115
100	108	138	59	247	50	138

2 x bend 45° (2 x press) with tube



Stainless steel

DN	d	Tube length L-min	a-min	b	z	z-min
12	15	50	50	50	11	71
15	18	50	52	52	12	77
20	22	52	57	57	14	85
25	28	56	64	64	17	98
32	35	62	73	73	21	114
40	42	80	94	94	26	146
50	54	90	109	109	32	173
65	76.1	165	177	177	43	263
80	88.9	186	201	201	49	299
100	108	234	252	252	61	374

Stainless Steel GAS

DN	d	Tube length L-min	a-min	b	z	z-min
12	15	50	58	58	16	90
15	18	50	59	59	17	93
20	22	52	66	66	21	108
25	28	56	78	78	27	132
32	35	62	89	89	32	153
40	42	80	120	120	45	210
50	54	90	136	136	51	238

DN	d	Tube length L-min	a-min	b	z	z-min
65	76.1	165	177	177	43	263
80	88.9	186	201	201	49	299
100	108	234	252	252	61	374

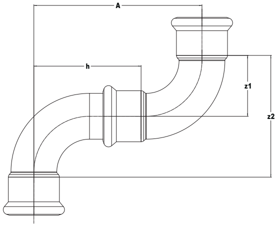
Galvanized Steel

DN	d	Tube length L-min	a-min	b	z	z-min
12	15	50	50	50	11	71
15	18	50	52	52	12	77
20	22	52	57	57	14	85
25	28	56	64	64	17	98
32	35	62	73	73	20	113
40	42	80	93	93	26	146
50	54	90	109	109	32	173
60	66.7	130	159	159	48	254
65	76.1	165	182	182	46	275
80	88.9	186	206	206	53	312
100	108	234	254	254	62	379

Copper

DN	d	Tube length L-min	a-min	b	z	z-min
10	12	44	51	51	14.4	80
12	15	50	59	59	17	93
15	18	50	66	66	22	110
20	22	52	74	74	26	126
25	28	56	88	88	34	156
32	35	62	103	103	42	187
40	42	80	127	127	50	227
50	54	90	156	156	65	286
60	66.7	130	215	215	87	389
65	76.1	140	229	229	92	413
80	88.9	193	286	286	106	498
100	108	208	338	338	135	608

Bend 90° (2 x press) on bend 90° (press x male)



Stainless steel

DN	d	A	h	z1	z2
10	12	68	48	20	41
12	15	74	42	21	42
15	18	76	50	25	50
20	22	90	60	30	60
25	28	103	74	37	74
32	35	121	76	45	95
40	42	149	93	56	119
50	54	180	111	70	145
65	76.1	260	165	95	205
80	88.9	301	190	111	238
100	108	376	238	138	299

Stainless Steel GAS

DN	d	A	h	z1	z2
12	15	83	56	27	54
15	18	94	62	32	64
20	22	105	68	37	74
25	28	127	80	47	94
32	35	153	93	60	120
40	42	208	125	83	166
50	54	254	149	105	210

DN	d	A	h	z1	z2
65	76.1	260	165	95	205
80	88.9	301	190	111	238
100	108	376	238	138	299

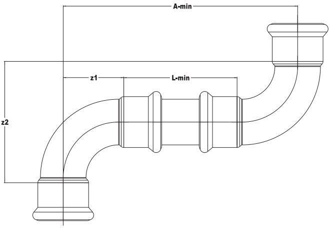
Galvanized Steel

DN	d	A	h	z1	z2
10	12	43	25	18	36
12	15	50	29	21	42
15	18	56	31	25	50
20	22	67	37	30	60
25	28	80	43	38	75
32	35	95	50	46	91
40	42	119	63	57	113
50	54	146	76	70	140
60	66.7	202	107	95	189
65	76.1	213	113	100	200
80	88.9	246	130	116	231
100	108	295	156	139	277

Copper

DN	d	A	h	z1	z2
10	12	59	45	14	28
12	15	67	50	17	33
15	18	75	53	22	44
20	22	84	58	26	53
25	28	98	64	34	68
32	35	124	82	42	86
40	42	151	101	50	102
50	54	185	120	65	131
60	66.7	262	175	87	165
65	76.1	242	150	92	185
80	88.9	284	178	106	218
100	108	394	259	135	276

2 x bend 90° (2 x press) with tube



Stainless steel

DN	d	A-min	L-min	z1	z2
10	12	95	44	20	41
12	15	92	50	21	50
15	18	100	50	25	56
20	22	112	52	30	69
25	28	130	56	37	80
32	35	152	62	45	95
40	42	193	80	56	119
50	54	229	90	70	145
65	76.1	355	165	95	205
80	88.9	408	186	111	238
100	108	510	234	138	299

Stainless Steel GAS

DN	d	A-min	L-min	z1	z2
12	15	104	50	27	54
15	18	114	50	32	64
20	22	126	52	37	74
25	28	150	56	47	94
32	35	182	62	60	120
40	42	246	80	83	166
50	54	300	90	105	210

DN	d	A-min	L-min	z1	z2
65	76.1	355	165	95	190
80	88.9	408	186	111	222
100	108	510	234	138	276

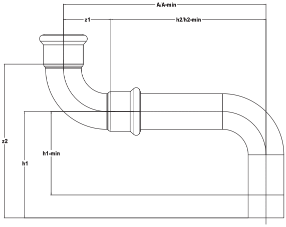
Galvanized Steel

DN	d	A-min	L-min	z1	z2
10	12	80	44	18	36
12	15	92	50	21	42
15	18	100	50	25	50
20	22	112	52	30	60
25	28	131	56	38	75
32	35	153	62	46	91
40	42	193	80	57	113
50	54	230	90	70	140
60	66.7	319	130	95	189
65	76.1	365	165	100	200
80	88.9	417	186	116	231
100	108	511	234	139	277

Copper

DN	d	A-min	L-min	z1	z2
10	12	80	44	18	36
12	15	92	50	21	42
15	18	100	50	25	50
20	22	112	52	30	60
25	28	131	56	38	75
32	35	153	62	46	91
40	42	193	80	57	113
50	54	230	90	70	140
60	66.7	319	130	95	189
65	76.1	340	140	100	200
80	88.9	424	193	116	231
100	108	485	208	139	277

Bend 90° (2 x press) on bend tube 90° (long side)



Stainless steel

DN	d	A/A-min	h1	h1-min	h2/h2-min	z1	z2
12	15	141	70	50	120	21	91
15	18	145	70	50	120	25	95
20	22	150	72	51	120	30	102
25	28	157	82	59	120	37	119
32	35	245	120	94	200	45	165
40	42	306	150	120	250	56	206
50	54	370	200	165	300	70	270

Stainless Steel GAS

DN	d	A/A-min	h1	h1-min	h2/h2-min	z1	z2
12	15	147	70	50	120	27	97
15	18	152	70	50	120	32	102
20	22	157	72	51	120	37	109
25	28	167	82	59	120	47	129
32	35	260	120	94	200	60	180
40	42	333	150	120	250	83	233
50	54	405	200	165	300	105	305

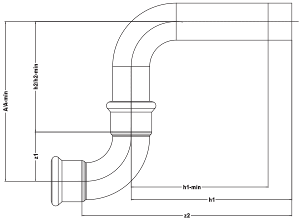
Galvanized Steel

DN	d	A/A-min	h1	h1-min	h2/h2-min	z1	z2
10	12	140	72	55	122	18	90
12	15	143	72	52	122	21	93
15	18	147	72	52	122	25	97
20	22	152	74	53	122	30	104
25	28	159	84	61	122	38	121
32	35	247	122	96	202	46	167
40	42	308	152	122	252	57	208
50	54	372	202	167	302	70	272

Copper

DN	d	A/A-min	h1	h1-min	h2/h2-min	z1	z2
12	15	137	70	50	120	17	87
15	18	142	70	50	120	22	92
20	22	146	70	49	120	26	96
25	28	154	80	57	120	34	114

Bend 90° (2 x press) on bend tube 90° (short side)



Stainless steel

DN	d	A/A-min	z1	z2	h1	h1-min	h2/h2-min
12	15	91	21	141	120	100	70
15	18	95	25	145	120	100	70
20	22	102	30	150	120	99	72
25	28	119	37	157	120	97	82
32	35	165	45	245	200	174	120
40	42	206	56	306	250	220	150
50	54	270	70	370	300	265	200

Stainless Steel GAS

DN	d	A/A-min	z1	z2	h1	h1-min	h2/h2-min
12	15	97	27	147	120	100	70
15	18	102	32	152	120	100	70
20	22	109	37	157	120	99	72
25	28	129	47	167	120	97	82
32	35	180	60	260	200	174	120
40	42	233	83	333	250	220	150
50	54	305	105	405	300	265	200

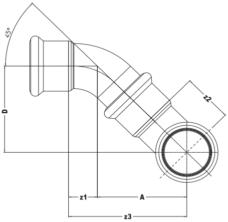
Galvanized Steel

DN	d	A/A-min	z1	z2	h1	h1-min	h2/h2-min
10	12	90	18	140	122	105	72
12	15	93	21	143	122	102	72
15	18	97	25	147	122	102	72
20	22	104	30	152	122	106	74
25	28	121	38	159	122	99	84
32	35	167	46	247	202	176	122
40	42	208	57	308	252	222	152
50	54	272	70	372	302	267	202

Copper

DN	d	A/A-min	z1	z2	h1	h1-min	h2/h2-min
12	15	87	17	137	120	100	70
15	18	92	22	142	120	100	70
20	22	96	26	146	120	99	70
25	28	114	34	154	120	97	80

Bend 45° (press x male) on T-lateral



Stainless steel

DN	d	A	z1	z2	z3	D
12	15	40	10	19	50	40
15	18	42	12	21	54	42
20	22	46	14	23	60	46
25	28	50	17	26	67	50
32	35	57	20	29	77	57
40	42	67	26	32	93	67
50	54	78	30	37	108	78
65	76.1	125	43	60	168	125
80	88.9	138	49	64	187	138
100	108	164	61	78	225	164

Stainless Steel GAS

DN	d	A	z1	z2	z3	D
12	15	44	16	14	60	44
15	18	42	17	14	59	42
20	22	49	21	17	70	49
25	28	57	27	21	84	57
32	35	66	32	28	98	66
40	42	77	45	29	122	77
50	54	93	51	35	144	93

DN	d	A	z1	z2	z3	D
65	76.1	125	43	60	168	125
80	88.9	141	49	68	190	141
100	108	164	61	78	225	164

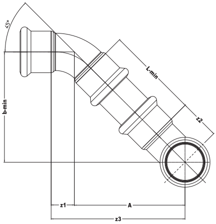
Galvanized Steel

DN	d	A	z2	z2	z3	D
12	15	17	11	24	27	17
15	18	45	12	26	57	45
20	22	47	14	28	61	47
25	28	51	17	31	69	51
32	35	56	20	34	77	56
40	42	62	26	37	89	62
50	54	74	32	43	106	74
60	66.7	87	48	51	135	87
65	76.1	90	46	55	136	90
80	88.9	124	53	65	177	124
100	108	134	62	76	197	134

Copper

DN	d	A	z2	z2	z3	D
10	12	6	35	35	41	17
12	15	8	42	42	50	22
15	18	9	46	46	55	26
20	22	11	55	55	66	34
25	28	14	63	63	77	42
32	35	17	76	76	93	50
40	42	21	96	96	117	65
50	54	27	144	144	171	122
60	66.7	35	124	124	159	87
65	76.1	40	134	134	174	92
80	88.9	47	157	157	204	106
100	108	50	192	192	242	135

Bend 45° (2 x press) on T-lateral with tube



Stainless steel

DN	d	A	b-min	L-min	z1	z2	z3
12	15	64	64	50	19	21	85
15	18	68	68	50	21	25	93
20	22	74	74	52	23	30	104
25	28	84	84	56	26	37	121
32	35	96	96	62	29	45	141
40	42	119	119	80	32	56	175
50	54	139	139	90	37	70	209
65	76.1	226	226	165	60	95	321
80	88.9	255	255	186	64	111	366
100	108	318	318	234	78	138	456

Stainless Steel GAS

DN	d	A	b-min	L-min	z1	z2	z3
12	15	57	57	50	14	16	73
15	18	57	57	50	14	17	74
20	22	64	64	52	17	21	85
25	28	74	74	56	21	27	101
32	35	86	86	62	28	32	118
40	42	109	109	80	29	45	154
50	54	124	124	90	35	51	175

DN	d	A	b-min	L-min	z1	z2	z3
65	76.1	190	190	165	60	43	233
80	88.9	214	214	186	68	49	263
100	108	264	264	234	78	61	325

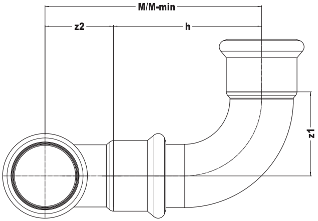
Galvanized Steel

DN	d	A	b-min	L-min	z1	z2	z3
12	15	60	60	50	24	11	70
15	18	62	62	50	26	12	74
20	22	66	66	52	28	14	80
25	28	73	73	56	31	17	90
32	35	82	82	62	34	20	103
40	42	101	101	80	37	26	127
50	54	116	116	90	43	32	148
60	66.7	162	162	130	51	48	209
65	76.1	188	188	165	55	46	235
80	88.9	215	215	186	65	53	268
100	108	263	263	234	76	62	326

Copper

DN	d	A	b-min	L-min	z1	z2	z3
10	12	49	49	44	11	14	63
12	15	56	56	50	12	17	73
15	18	61	61	50	14	22	83
20	22	66	66	52	16	26	92
25	28	77	77	56	19	34	111
32	35	91	91	62	24	42	133
40	42	112	112	80	28	50	162
50	54	134	134	90	34	65	199
60	66.7	197	197	130	62	87	284
65	76.1	213	213	140	69	92	305
80	88.9	282	282	193	100	106	388
100	108	308	308	208	92	135	443

Bend 90° (press x male) on Tee-lateral



Stainless steel

DN	d	M/M-min	h	z1	z2
12	15	68	49	21	19
15	18	72	51	25	21
20	22	83	60	30	23
25	28	91	66	37	26
32	35	105	76	45	29
40	42	124	93	56	32
50	54	148	111	70	37
65	76.1	225	165	95	60
80	88.9	254	190	111	64
100	108	316	238	138	78

Stainless Steel GAS

DN	d	M/M-min	h	z1	z2
12	15	70	56	27	14
15	18	76	62	32	14
20	22	85	68	37	17
25	28	101	80	47	21
32	35	121	93	60	28
40	42	154	125	83	29
50	54	184	149	105	35

DN	d	M/M-min	h	z1	z2
65	76.1	225	165	95	60
80	88.9	258	190	112	68
100	108	316	238	138	78

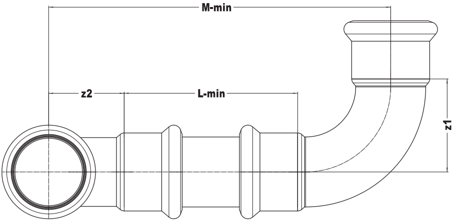
Galvanized Steel

DN	d	M/M-min	h	z1	z2
10	12	65	42	18	23
12	15	73	49	21	24
15	18	77	51	25	26
20	22	86	58	30	28
25	28	96	66	38	31
32	35	110	76	46	34
40	42	130	93	57	37
50	54	153	111	70	43
60	66.7	208	157	95	51
65	76.1	223	168	100	55
80	88.9	258	193	116	65
100	108	309	233	139	76

Copper

DN	d	M/M-min	h	z1	z2
10	12	56	45	14	11
12	15	62	50	16	12
15	18	67	53	22	14
20	22	74	58	27	16
25	28	83	64	34	19
32	35	106	82	44	24
40	42	129	101	52	28
50	54	154	120	66	34
60	66.7	237	175	78	62
65	76.1	219	150	93	69
80	88.9	278	178	112	100
100	108	351	259	141	92

Bend 90° (2 x press) on T-lateral with tube



Stainless steel

DN	d	M-min	L-min	z1	z2
10	12	77	44	20	13
12	15	90	50	21	19
15	18	96	50	25	21
20	22	105	52	30	23
25	28	119	56	37	26
32	35	136	62	45	29
40	42	168	80	56	32
50	54	197	90	70	37
65	76.1	320	165	95	60
80	88.9	361	186	111	64
100	108	450	234	138	78

Stainless Steel GAS

DN	d	M-min	L-min	z1	z2
12	15	91	50	27	14
15	18	96	50	32	14
20	22	106	52	37	17
25	28	124	56	47	21
32	35	150	62	60	28
40	42	192	80	83	29
50	54	230	90	105	35

DN	d	M-min	L-min	z1	z2
65	76.1	320	165	95	60
80	88.9	361	186	111	64
100	108	450	234	138	78

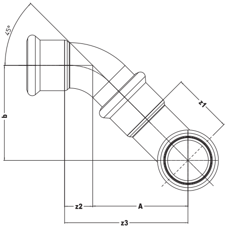
Galvanized Steel

DN	d	M-min	L-min	z1	z2
10	12	85	44	18	23
12	15	95	50	21	24
15	18	101	50	25	26
20	22	110	52	30	28
25	28	124	56	38	31
32	35	142	62	46	34
40	42	174	80	57	37
50	54	203	90	70	43
60	66.7	276	130	95	51
65	76.1	320	165	100	55
80	88.9	367	186	116	65
100	108	449	234	139	76

Copper

DN	d	M-min	L-min	z1	z2
10	12	69	44	14	11
12	15	79	50	17	12
15	18	86	50	22	14
20	22	94	52	26	16
25	28	109	56	34	19
32	35	128	62	42	24
40	42	158	80	50	28
50	54	189	90	65	34
60	64	336	130	122	84
60	66.7	279	130	87	62
65	76.1	301	140	92	69
80	88.9	399	193	106	100
100	108	435	208	135	92

Bend 90° (2 x press) on bend 45° (press x male) offset



Stainless steel

DN	d	A	z1	z2	z3	b
12	15	41	21	10	52	41
15	18	45	25	12	57	45
20	22	51	30	14	65	51
25	28	58	37	17	75	58
32	35	68	45	20	88	68
40	42	84	56	26	110	84
50	54	100	70	30	130	100
65	76.1	150	95	43	193	150
80	88.9	171	111	49	220	171
100	108	206	138	61	267	206

Stainless Steel GAS

DN	d	A	z1	z2	z3	b
12	15	53	27	16	69	53
15	18	54	32	17	71	54
20	22	64	37	21	85	64
25	28	76	47	27	103	76
32	35	89	60	32	121	89
40	42	115	83	45	160	115
50	54	143	105	51	194	143

DN	d	A	z1	z2	z3	b
65	76.1	150	95	43	193	150
80	88.9	171	111	49	220	171
100	108	206	138	61	267	206

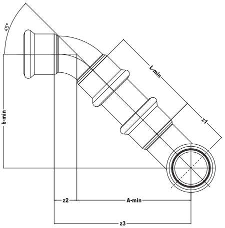
Galvanized Steel

DN	d	A	z1	z2	z3	b
12	15	42	21	11	52	42
15	18	45	25	12	57	45
20	22	51	30	14	65	51
25	28	59	38	17	76	59
32	35	68	46	20	89	68
40	42	84	57	26	110	84
50	54	101	70	32	133	101
60	66.7	145	95	48	192	145
65	76.1	152	100	46	198	152
80	88.9	174	116	53	227	174
100	108	209	139	62	271	209

Copper

DN	d	A	z1	z2	z3	b
10	12	35	17	6	41	35
12	15	42	22	8	50	42
15	18	46	26	9	55	46
20	22	55	34	11	66	55
25	28	63	42	14	77	63
32	35	76	50	17	93	76
40	42	96	65	21	117	96
50	54	144	122	27	171	144
60	66.7	124	87	35	159	124
65	76.1	134	92	40	174	134
80	88.9	157	106	47	204	157
100	108	192	135	50	242	192

Bend 90° (2 x press) on tube on bend 45° (2 x press) offset



Stainless steel

DN	d	L-min	A-min	z1	z2	z3-min	b-min
12	15	50	58	11	21	68	58
15	18	50	62	12	25	74	62
20	22	52	68	14	30	82	68
25	28	56	78	17	37	95	78
32	35	62	90	21	45	111	90
40	42	80	115	26	56	141	115
50	54	90	135	32	70	167	135
65	76,1	165	214	43	95	257	214
80	88,9	186	245	49	111	294	245
100	108	234	306	61	138	367	306

Stainless Steel GAS

DN	d	L-min	A-min	z1	z2	z3-min	b-min
12	15	50	66	16	27	82	66
15	18	50	70	17	32	87	70
20	22	52	78	21	37	99	78
25	28	56	92	27	47	119	92
32	35	62	109	32	60	141	109
40	42	80	147	45	83	192	147
50	54	90	174	51	105	225	174

DN	d	L-min	A-min	z1	z2	z3-min	b-min
65	76,1	165	214	43	95	257	214
80	88,9	186	245	49	111	294	245
100	108	234	306	61	138	367	306

Galvanized Steel

DN	d	L-min	A-min	z1	z2	z3-min	b-min
12	15	50	58	11	21	68	58
15	18	50	62	12	25	74	62
20	22	52	68	14	30	82	68
25	28	56	78	17	38	95	78
32	35	62	90	20	46	111	90
40	42	80	115	26	57	141	115
50	54	90	136	32	70	168	136
60	66,7	130	192	48	95	240	192
65	76,1	165	220	46	100	267	220
80	88,9	186	251	53	116	304	251
100	108	234	308	62	139	370	308

Copper

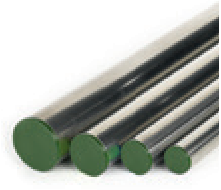
DN	d	L-min	A-min	z1	z2	z3-min	b-min
10	12	44	51	14	14	66	51
12	15	50	59	17	17	76	59
15	18	50	66	22	22	88	66
20	22	52	74	26	26	100	74
25	28	56	88	34	34	122	88
32	35	62	103	42	42	145	103
40	42	80	127	50	50	177	127
50	54	90	156	65	65	221	156
60	66,7	130	215	87	87	302	215
65	76,1	140	229	92	92	321	229
80	88,9	193	286	106	106	392	286
100	108	208	338	135	135	473	338

5.1 Stainless Steel

XPress

R2750 Stainless steel tube 1.4401 (AISI 316)

(6m length)



Dimension	DN	Article No.
12 x 1,0	10	6118046
15 x 1.0	12	6117914
18 x 1.0	15	6117925
22 x 1.2	20	6117936
28 x 1.2	25	6117947
35 x 1.5	32	6117958
42 x 1.5	40	6117969
54 x 1.5	50	6117971
76.1 x 2.0	65	6117980
88.9 x 2.0	80	6117991
108 x 2.0	100	6118002

R2752 Stainless steel tube 1.4521 (AISI 444)

(6m length)

Dimension	DN	Article No.
15 x 1.0	12	6194001
18 x 1.0	15	6194012
22 x 1.2	20	6194023
28 x 1.2	25	6194034
35 x 1.5	32	6194045
42 x 1.5	40	6194056
54 x 1.5	50	6194067

R2753 Stainless steel tube 1.4520 (AISI 439)

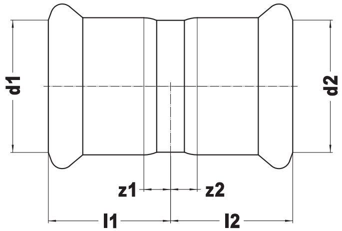
(6m length)

Dimension	DN	Article No.
15 x 1.0	12	6193000
18 x 1.0	15	6193011
22 x 1.2	20	6193022
28 x 1.2	25	6193033
35 x 1.5	32	6193044
42 x 1.5	40	6193055
54 x 1.5	50	6193066
76.1 x 2.0*	65	6118178
88.9 x 2.0*	80	6118189
108 x 2.0*	100	6118200

*76,1 - 108 in 1.4301 (AISI304)

R2701 Straight coupling

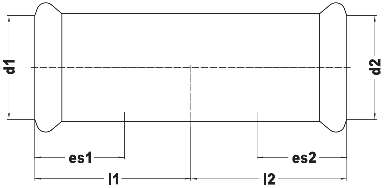
(2 x press)



Dimension	Article No.	l1/l2	z1/z2
12	6198874	21	4
15	6190943	25	5
18	6190954	25	5
22	6190965	26	5
28	6190976	28	5
35	6190987	31	5
42	6190998	36	6
54	6191009	41	6
76.1	6204154	71	16
88.9	6204165	82	19
108	6204176	96	19

R2703 Slip coupling

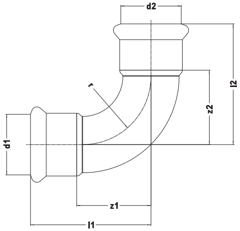
(2 x press)



Dimension	Article No.	l1/l2	es1/es2
15	6191284	40	25
18	6191295	40	25
22	6191306	42	25
28	6191317	46	30
35	6191328	51	30
42	6191339	60	40
54	6191341	70	40
76.1	6204286	115	60
88.9	6204297	129	70
108	6204308	153	80

R2708 Bend 90°

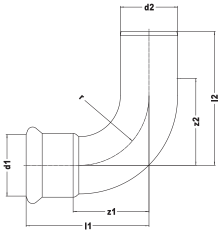
(2 x press)



Dimension	Article No.	l1/l2	z1/z2	r
12	6198885	37	20	14
15	6190206	41	21	18
18	6190217	45	25	22
22	6190228	51	30	27
28	6190239	60	37	34
35	6190241	71	45	42
42	6190250	86	56	51
54	6190261	105	70	65
76.1	6230004	150	95	91
88.9	6230015	174	111	107
108	6230026	215	138	130

R2711 Bend 90°

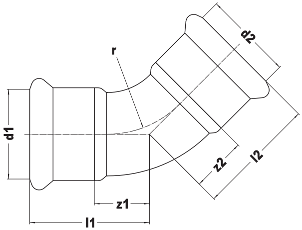
(press x male)



Dimension	Article No.	l1	l2	z1	z2	r
12	6198896	37	48	20	31	14
15	6190349	41	53	21	33	18
18	6190351	45	51	25	31	22
22	6190360	51	60	30	39	27
28	6190371	60	66	37	43	34
35	6190382	71	76	45	50	42
42	6190393	86	93	56	63	51
54	6190404	105	111	70	76	65
76.1	6230037	150	165	95	110	91
88.9	6230048	175	190	112	127	107
108	6230059	216	238	139	161	130

R2713 Bend 45°

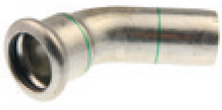
(2 x press)

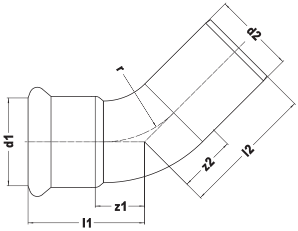


Dimension	Article No.	l1/l2	z1/z2	r
15	6190041	31	11	18
18	6190052	32	12	22
22	6190063	35	14	27
28	6190074	40	17	34
35	6190085	47	21	42
42	6190096	56	26	51
54	6190107	67	32	65
76.1	6230061	98	49	91
88.9	6230070	112	61	107
108	6230081	138	61	130

R2712 Bend 45°

(press x male)

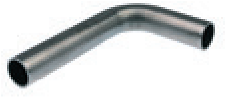


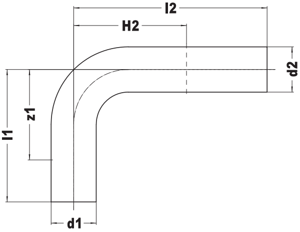


Dimension	Article No.	l1	l2	z1	z2	r
15	6190118	30	38	10	18	18
18	6190129	32	39	12	19	22
22	6190131	35	42	14	21	27
28	6190140	40	46	17	23	34
35	6190151	46	51	20	25	42
42	6190162	56	63	26	33	51
54	6190173	65	73	30	38	65
76.1	6230092	98	117	43	62	91
88.9	6230103	112	131	49	68	107
108	6230114	138	154	61	77	130

R2725 Bend tube 90°

(2 x male)

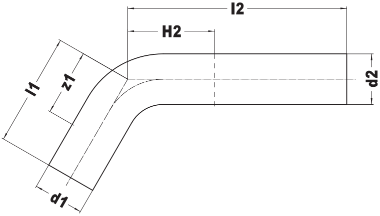




Dimension	Article No.	l1	l2	z1	H2
Ø15	6190272	70	120	50	58
Ø18	6190283	70	120	50	63
Ø22	6190294	72	120	51	70
Ø28	6190305	82	120	59	80
Ø35	6190316	120	200	94	100
Ø42	6190327	150	250	120	120
Ø54	6190338	200	300	165	145

R2724 Bend tube 60°

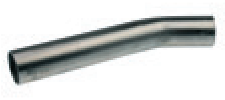
(2 x male)

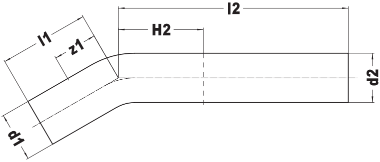


Dimension	Article No.	l1	l2	z1	H2
Ø28	6190184	63	121	40	66
Ø35	6190195	97	203	71	77
Ø42	6191878	102	256	72	90
Ø54	6191889	162	306	127	107

R2723 Bend tube 30°

(2 x male)

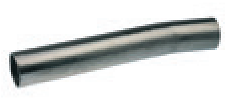


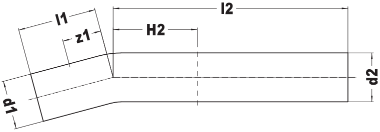


Dimension	Article No.	l1	l2	z1	H2
Ø28	6190021	51	130	28	54
Ø35	6190030	73	214	47	60
Ø42	6191856	99	272	69	69
Ø54	6191867	134	326	99	79

R2722 Bend tube 15°

(2 x male)

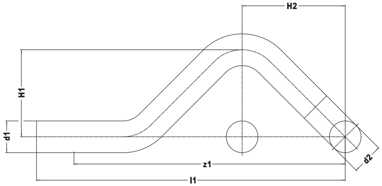




Dimension	Article No.	l1	l2	z1	H2
Ø28	6190008	45	134	22	48
Ø35	6190019	73	222	47	53
Ø42	6191834	89	280	59	59
Ø54	6191845	122	337	87	67

R2717 Crossover

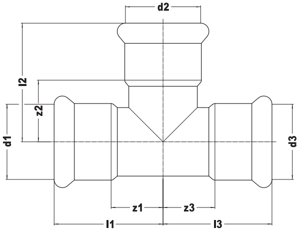
(2 x male)



Dimension	Article No.	l1	z1	H1	H2
Ø15	6191086	158	138	37	57
Ø18	6191097	165	145	40	60
Ø22	6191108	178	157	44	65
Ø28	6191119	210	187	50	74

R2714 Tee

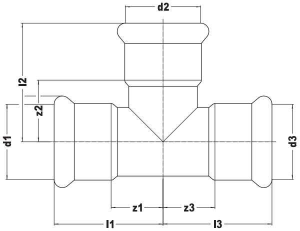
(3 x press)



Dimension	Article No.	l1/l3	l2	z1/z3	z2
12	6198907	28	32	17	17
15	6191350	35	39	15	19
18	6191372	37	41	17	21
22	6191405	40	44	19	23
28	6191449	45	49	22	26
35	6191493	51	55	25	29
42	6191537	60	62	30	32
54	6191581	71	72	36	37
76.1	6204319	116	115	61	60
88.9	6204321	156	156	68	68
108	6204330	231	231	79	78

R2715 T-reduced

(3 x press)

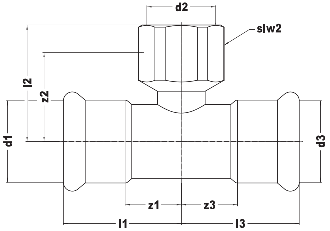


Dimension	Article No.	l1/l3	l2	z1/z3	z2
18 x 15 x 18	6191361	37	41	17	21
22 x 15 x 22	6191383	40	43	19	23
22 x 18 x 22	6191394	40	43	17	23
28 x 15 x 28	6191416	45	46	22	26
28 x 18 x 28	6191427	45	46	22	26
28 x 22 x 28	6191438	45	47	22	26
35 x 15 x 35	6191451	51	49	25	29
35 x 18 x 35	6191460	51	49	25	29
35 x 22 x 35	6191471	51	50	25	29
35 x 28 x 35	6191482	51	52	25	29
42 x 22 x 42	6191504	60	53	30	32
42 x 28 x 42	6191515	60	55	30	32
42 x 35 x 42	6191526	60	58	30	32
54 x 22 x 54	6191548	71	59	36	38
54 x 28 x 54	6191559	71	61	36	38
54 x 35 x 54	6191561	71	64	36	38
54 x 42 x 54	6191570	71	58	36	28
76.1 x 22 x 76.1	6204341	116	68	61	45
76.1 x 28 x 76.1	6204352	116	71	61	74
76.1 x 35 x 76.1	6204363	116	75	61	48

Dimension	Article No.	l1/l3	l2	z1/z3	z2
76,1 x 42 x 76,1	6204374	116	79	61	47
76.1 x 54 x 76.1	6204385	116	80	61	43
88.9 x 22 x 88.9	6204396	131	76	68	53
88.9 x 28 x 88.9	6204407	131	76	68	52
88.9 x 35 x 88.9	6204418	131	83	68	56
88.9 x 42 x 88.9	6204429	131	85	68	53
88.9 x 54 x 88.9	6204431	131	93	68	56
88.9 x 76.1 x 88.9	6204440	131	116	68	61
108 x 22 x 108	6204451	156	85	79	62
108 x 28 x 108	6204462	156	88	79	64
108 x 35 x 108	6204473	156	94	79	67
108 x 42 x 108	6204484	156	96	79	64
108 x 54 x 108	6204495	156	102	79	65
108 x 76.1 x 108	6204506	156	125	79	70
108 x 88.9 x 108	6204517	156	135	79	72

R2718 Tee female branch

(press x female thread x press)

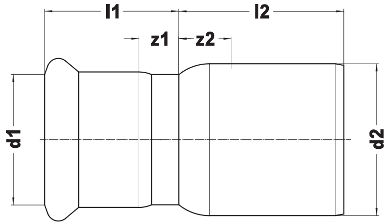


Dimension	Article No.	l1/l3	l2	z1/z3	z2	slw2
15 x Rp1/2 x 15	6191592	35	34	15	24	24
18 x Rp1/2 x 18	6191603	37	35	17	25	24
18 x Rp3/4 x 18	6191614	37	37	17	26	30
22 x Rp1/2 x 22	6191625	40	37	19	27	24
22 x Rp3/4 x 22	6191636	40	39	19	28	30
28 x Rp1/2 x 28	6191647	45	40	22	30	24
28 x Rp3/4 x 28	6191658	45	42	22	31	30
28 x Rp1 x 28	6198599	51	44	25	34	24
35 x Rp1/2 x 35	6191669	51	46	25	35	30
35 x Rp3/4 x 35	6191671	60	46	30	36	24
35 x Rp1 x 35	6198601	60	48	30	37	30
42 x Rp1/2 x 42	6191680	71	52	36	42	24
42 x Rp3/4 x 42	6191691	71	65	36	47	67
42 x Rp1 x 42	6198610	71	54	36	43	30
54 x Rp1/2 x 54	6191702	45	46	22	33	38
54 x Rp3/4 x 54	6191724	51	50	25	37	38
54 x Rp1 x 54	6198621	60	52	30	39	38
54 x Rp2 x 54	6191713	71	58	36	45	38
76.1 x Rp3/4 x 76.1	6204528	116	68	61	55	30
76.1 x Rp2 x 76.1	6204550	131	87	68	74	30

Dimension	Article No.	l1/l3	l2	z1/z3	z2	slw2
88.9 x Rp3/4 x 88.9	6204539	156	86	79	73	30
88.9 x Rp2 x 88.9	6204561	116	81	61	59	65
108 x Rp3/4 x 108	6204541	131	88	68	66	65
108 x Rp2 x 108	6204572	156	98	79	76	65

R2707 Reducer

(male x press)

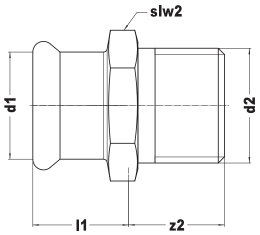


Dimension	Article No.	l1	l2	z1	z2
Ø15 x 12	6198951	23	27	6	7
Ø18 x 15	6191121	27	33	7	13
Ø22 x 15	6191130	28	33	8	12
Ø22 x 18	6191141	28	30	8	9
Ø28 x 15	6191152	28	40	8	17
Ø28 x 18	6191163	28	38	8	15
Ø28 x 22	6191174	29	34	8	11
Ø35 x 15	6192221	32	47	12	21
Ø35 x 18	6191185	32	46	12	20
Ø35 x 22	6191196	29	42	8	16
Ø35 x 28	6191207	31	38	8	12
Ø42 x 15	6192230	32	57	12	27
Ø42 x 18	6192241	32	55	15	25
Ø42 x 22	6191218	33	53	12	23
Ø42 x 28	6191229	31	51	8	21
Ø42 x 35	6191231	34	42	8	12
Ø54 x 15	6192252	32	68	12	33
Ø54 x 18	6192263	32	66	12	43
Ø54 x 22	6191240	33	66	12	31
Ø54 x 28	6191251	34	62	11	27

Dimension	Article No.	l1	l2	z1	z2
Ø54 x 35	6191262	34	60	8	24
Ø54 x 42	6191273	40	55	10	20
Ø76.1 x 42	6204211	79	72	49	17
Ø76.1 x 54	6204220	42	98	7	43
Ø88.9 x 54	6204231	42	114	7	51
Ø88.9 x 76.1	6204242	68	88	13	25
Ø108 x 54	6204253	66	138	31	61
Ø108 x 76.1	6204264	69	127	14	50
Ø108 x 88.9	6204275	77	113	14	36

R2705 Straight connector

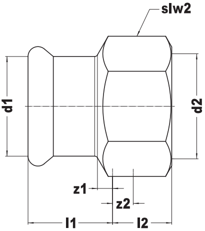
(press x male thread)



Dimension	Article No.	l1	z2	slw2
12 x R3/8	6198918	17	15	22
12 x R1/2	6198929	17	18	24
15 x R1/2	6190580	20	18	24
15 x R3/4	6190591	20	21	27
18 x R1/2	6190602	20	18	27
18 x R3/4	6190613	20	21	27
22 x R1/2	6190635	21	28	34
22 x R3/4	6190646	21	21	32
22 x R1	6190624	21	22	32
28 x R3/4	6190679	23	25	38
28 x R1	6190657	23	29	43
28 x R1 1/4	6190668	23	22	38
35 x R1	6190681	26	27	54
35 x R1 1/4	6190701	26	30	49
35 x R1 1/2	6190690	26	29	54
42 x R1 1/4	6190723	30	29	54
42 x R1 1/2	6190712	30	29	54
54 x R1 1/2	6190734	35	30	67
54 x R2	6190745	35	34	67
76.1 x R2 1/2	6204759	55	75	92
88.9 x R3	6204761	63	74	109

R2702 Straight connector

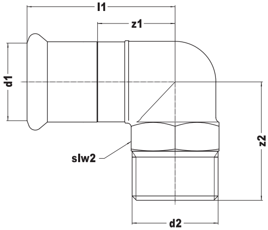
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
12 x Rp3/8	6198931	19	13	3	4	24
12 x Rp1/2	6198942	19	15	2	4	24
15 x Rp1/2	6190415	22	15	2	5	24
15 x Rp3/4	6190426	23	17	3	6	30
18 x Rp1/2	6190437	22	15	2	5	27
18 x Rp3/4	6190448	22	17	2	6	30
22 x Rp1/2	6190461	24	20	3	7	38
22 x Rp3/4	6190470	21	15	0	5	32
22 x Rp1	6190459	23	17	2	6	32
28 x Rp1/2	6193308	26	12	3	1	38
28 x Rp3/4	6190503	23	17	0	6	38
28 x Rp1	6190481	25	20	2	7	38
28 x Rp1 1/4	6190492	25	22	2	7	46
35 x Rp1	6190514	27	20	1	7	46
35 x Rp1 1/4	6190536	28	22	2	8	54
35 x Rp1 1/2	6190525	28	22	2	7	46
42 x Rp1 1/4	6190558	32	22	2	8	54
42 x Rp1 1/2	6190547	30	22	0	0	54
54 x Rp1 1/2	6190569	36	22	1	8	67
54 x Rp2	6190571	37	26	2	8	67

R2728 Angle adapter 90°

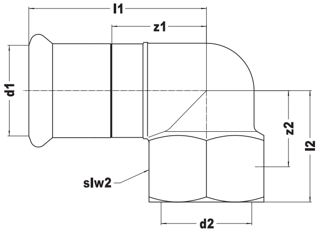
(press x male thread)



Dimension	Article No.	l1	z1	z2	slw2
15 x R1/2	6190877	43	23	31	22
18 x R1/2	6190888	44	24	32	24
22 x R3/4	6190899	49	28	39	30
28 x R1	6190901	53	30	46	34
35 x R1 1/4	6190910	60	34	52	43
42 x R1 1/2	6190921	69	39	58	49
54 x R2	6190932	82	47	68	62

R2709 Angle adapter 90°

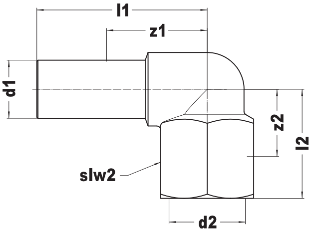
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
15 x Rp1/2	6190822	44	28	24	13	24
18 x Rp1/2	6190833	44	28	24	13	24
22 x Rp1/2	6198456	49	33	28	17	30
22 x Rp3/4	6190844	55	37	32	24	38
28 x Rp1/2	6198467	62	42	36	27	46
28 x Rp3/4	6198478	45	31	24	16	24
28 x Rp1	6190855	48	35	25	20	24
35 x Rp1/2	6198489	51	35	28	19	30
35 x Rp3/4	6198491	56	35	30	20	24
35 x Rp1	6198500	58	37	32	21	30
35 x Rp1 1/4	6190866	58	41	32	28	38

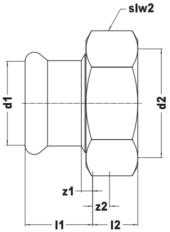
R2710 Angle adapter 90°

(male x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
15 x Rp1/2	6192274	44	28	24	13	24

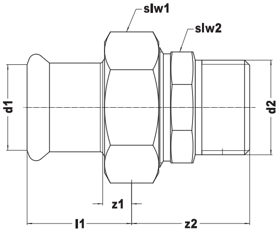
R2704 Coupling with nut
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
15 x G3/4	6191735	29	8	9	2	30
18 x G3/4	6191746	29	8	9	2	30
22 x G1	6191757	30	10	9	2	37
28 x G1 1/4	6191768	31	10	8	2	46
35 x G1 1/2	6191779	34	11	8	2	52
42 x G1 3/4	6191781	41	11	11	2	58
54 x G2 3/8	6191790	47	11	12	3	75

R2735 Straight union

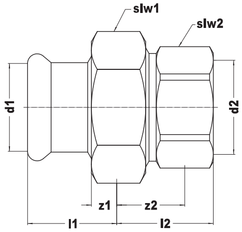
(press x male thread)



Dimension	Article No.	l1	z1	z2	slw1	slw2
15 x R1/2	6192120	62	9	33	30	25
15 x R3/4	6192131	65	9	36	30	32
18 x R1/2	6192142	62	9	33	30	25
18 x R3/4	6192153	65	9	36	30	32
22 x R1/2	6192164	63	9	33	37	25
22 x R3/4	6192175	69	9	29	37	32
22 x R1	6192186	72	9	42	37	39
28 x R1	6192197	73	8	42	46	39
35 x R1 1/4	6192208	78	8	44	52	49
42 x R1 1/2	6192219	85	11	44	58	51
54 x R2	6192296	100	12	53	75	65

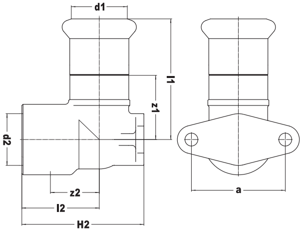
R2738 Straight union

(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw1	slw2
15 x Rp1/2	6192021	57	28	9	18	30	24
15 x Rp3/4	6192032	60	31	9	20	30	30
18 x Rp1/2	6192043	57	28	9	18	30	24
18 x Rp3/4	6192054	60	31	9	20	30	30
22 x Rp3/4	6192065	63	33	9	22	37	30
22 x Rp1	6192076	66	36	9	23	37	38
28 x Rp1	6192087	65	34	8	21	46	38
35 x Rp1 1/4	6192098	73	39	8	24	52	46
42 x Rp1 1/2	6192109	82	41	11	27	58	54
54 x Rp2	6192111	91	44	12	26	75	67

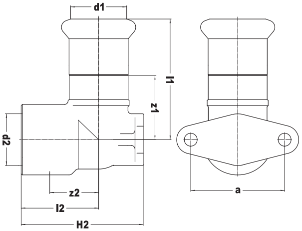
R2716 Wallplate 90°
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	H2	a
15 x Rp1/2	6191801	45	28	25	13	41	34
18 x Rp1/2	6191812	45	28	25	13	44	34
22 x Rp3/4	6191823	49	33	28	17	52	40

R2737 Wallplate 90° long

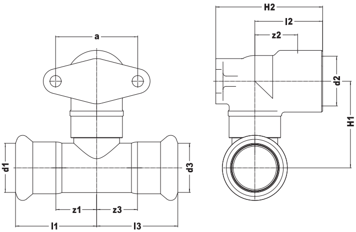
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	H2	a
15 x Rp1/2	6191999	45	28	25	13	63	40
18 x Rp1/2	6192001	45	28	25	13	63	40
22 x Rp3/4	6192010	49	33	28	17	64	40

R2719 Wallplate 90°

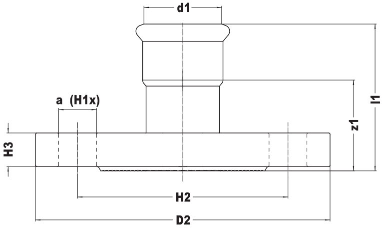
(2 x press x female thread)



Dimension	Article No.	l1/l3	l2	z1/z3	z2	H1	H2	a
15 x Rp1/2 x 15	6192285	35	28	15	13	31	41	34

R2726 Flanged connector PN 10/16

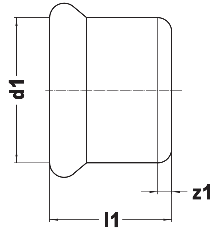
(1 x press)



Dimension	Article No.	l1	z1	H1	H2	H3	D2	a	holes
15	6190756	56	36	4	65	11	95	14	4
18	6190767	57	37	4	65	11	95	14	4
22	6190778	59	38	4	75	12	105	14	4
28	6190789	65	42	4	85	14	115	14	4
35	6190791	69	43	4	100	15	140	18	4
42	6190800	77	47	4	110	16	150	18	4
54	6190811	87	52	4	125	16	165	18	4
76.1	6204121	126	71	4	145	18	185	18	4
88.9	6204132	147	84	8	160	20	200	18	8
108	6204143	167	90	8	180	20	220	18	8

R2729 Stop end

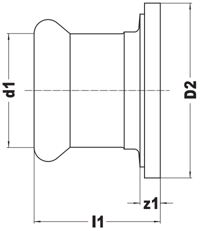
(1 x press)



Dimension	Article No.	l1	z1
15	6191011	23	3
18	6191020	23	3
22	6191031	24	3
28	6191042	26	3
35	6191053	29	3
42	6191064	37	7
54	6191075	42	7
76.1	6204187	95	40
88.9	6204198	107	44
108	6204209	127	50

R2736 Pump coupling

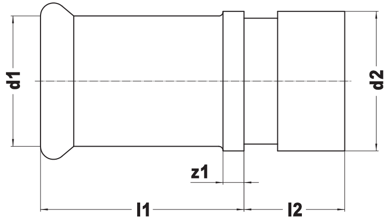
(press x flat seal)



Dimension	Article No.	l1	z1	D2
15 x 1 1/8	6191891	30	10	34
15 x 1 1/2	6191900	30	10	44
18 x 1 1/4	6191911	29	9	39
18 x 1 1/2	6191922	29	9	44
22 x 1 1/4	6191933	28	7	39
22 x 1 1/2	6191944	28	7	44
28 x 1 1/2	6191955	31	8	44
35 x 2	6191966	33	7	56
42 x 2 1/4	6191977	37	7	62
54 x 2 3/4	6191988	44	9	78

R2748 Transition for grooved couplings

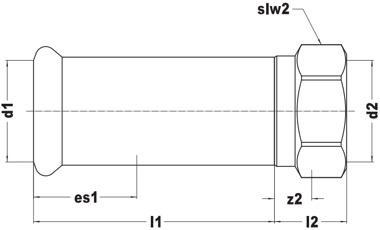
(press x groove)



Dimension	Article No.	l1	l2	z1
28 x Ø33.7	6198555	49	24	26
35 x Ø42.4	6198566	54	24	28
42 x Ø48.3	6198577	61	24	31
54 x Ø60.3	6198588	73	24	38
76.1 x Ø73.0	6198841	76	37	21
76.1 x Ø76.1	6193319	76	24	21
88.9 x Ø88.9	6193321	86	24	23
108 x Ø114	6193330	84	26	7

R2741 Slip coupling

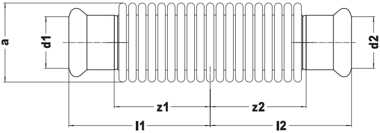
(press x female thread)



Dimension	Article No.	l1	l2	z2	slw2	Δl
22 x Rp1/2	6198511	70	19	15	28	40
22 x Rp3/4	6198522	70	24	17	32	40
28 x Rp1/2	6198533	70	21	15	34	40
28 x Rp3/4	6198544	70	21	17	34	40

R2747 Axial compensator

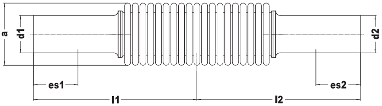
(2 x press)



Dimension	Article No.	l1/l2	z1/z2	a	Δl
15	6198302	55	35	24	-14
18	6198313	53	33	27	-16
22	6198324	60	39	37	-20
28	6198335	65	42	44	-22
35	6198346	70	44	50	-24
42	6198357	77	47	60	-24
54	6198368	90	55	54	-30

The axial compensators do not carry any potable water approvals

R2756 Axial compensator
(2 x male)



Dimension	Article No.	l1/l2	z1/z2	a	Δl
76.1	6198379	138	61	92.0	-30.0
88.9	6198381	145	90	106.0	-30.0
108	6198390	173	110	130.0	-30.0

The axial compensators are not approved for potable water.

C1451 O-ring Leak Before Pressed (LBP)

(black, EPDM) for Galvanized Steel and stainless steel

Dimension	Article No.
12	6222205
15	6222216
18	6222227
22	6222238
28	6222249
35	6222251
42	6222260
54	6222271

R2760 O-ring standard

(black, EPDM) for Galvanized Steel and stainless steel

Dimension	Article No.
76.1	6208015
88.9	6208026
108	6208037

C1452 Flat seal

(black, EPDM) for Galvanized Steel and stainless steel

Dimension	Article No.
15-18	6228013
22	6228024
28	6228035
35	6228046
42	6228057
54	6228068

R2764 O-ring (LBP) for special applications

(green, FPM) for Galvanized Steel and stainless steel

Dimension	Article No.
15	6119401
18	6119410
22	6119421
28	6119432
35	6119443
42	6119454
54	6119465

R2761 O-ring for special applications

(green, FPM) for Galvanized Steel and stainless steel

Dimension	Article No.
76.1	6119377
88.9	6119388
108	6119399

R2767 O-ring (LBP) for special applications

(green, FPM) for Galvanized steel and stainless steel

Dimension	Article No.
15-18	6118301
22	6118310
28	6118321
35	6118332
42	6118343
54	6118354

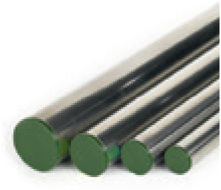
VSH connects.

5.2 Stainless Steel GAS

XPress

R2750 Stainless steel tube 1.4401

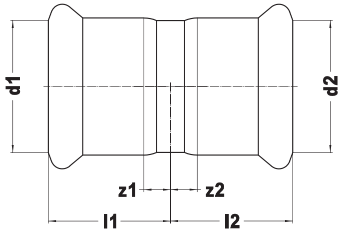
(6m length)



Dimension	DN	Article No.
15 x 1.0	12	6117914
18 x 1.0	15	6117925
22 x 1.2	20	6117936
28 x 1.2	25	6117947
35 x 1.5	32	6117958
42 x 1.5	40	6117969
54 x 1.5	50	6117971
76.1 x 2.0	65	6117980
88.9 x 2.0	80	6117991
108 x 2.0	100	6118002

R2701G Straight coupling

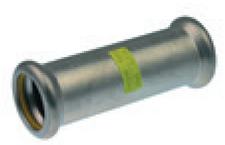
(2 x press)

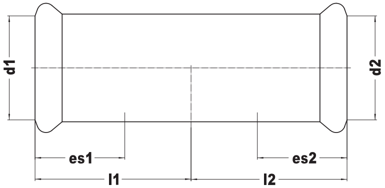


Dimension	Article No.	l1/l2	z1/z2
15	6210006	25	5
18	6210017	25	5
22	6210028	26	5
28	6210039	28	5
35	6210041	31	5
42	6210050	36	6
54	6210061	41	6
76.1	6212131	71	16
88.9	6212140	82	19
108	6212151	96	19

R2703G Slip coupling

(2 x press)

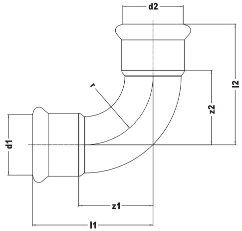




Dimension	Article No.	l1/l2	es1/es2
15	6210105	36	20
18	6210116	39	20
22	6210127	41	21
28	6210138	45	23
35	6210149	50	26
42	6210151	58	30
54	6210160	70	35

R2708G Bend 90°

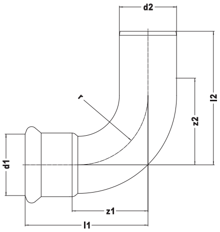
(2 x press)



Dimension	Article No.	l1/l2	z1/z2	r
15	6210171	48	27	23
18	6210182	53	32	27
22	6210193	60	37	33
28	6210204	71	47	42
35	6210215	87	60	53
42	6210226	115	83	63
54	6210237	142	105	81
76.1	6212162	150	95	91
88.9	6212173	174	111	107
108	6212184	215	138	130

R2711G Bend 90°

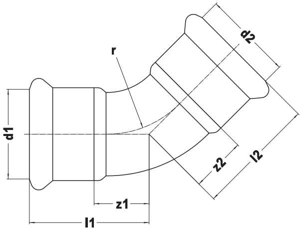
(press x male)



Dimension	Article No.	l1	l2	z1	z2	r
15 x Ø15	6210270	48	56	27	56	23
18 x Ø18	6210281	53	62	32	62	27
22 x Ø22	6210292	60	68	37	68	33
28 x Ø28	6210303	71	80	47	80	42
35 x Ø35	6210314	87	93	60	67	53
42 x Ø42	6210325	115	125	83	95	63
54 x Ø54	6210336	142	149	105	114	81
76.1 x Ø76.1	6212195	150	165	95	165	91
88.9 x Ø88.9	6212206	175	190	112	190	107
108 x Ø108	6212217	216	238	138	238	130

R2713G Bend 45°

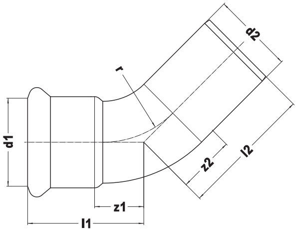
(2 x press)



Dimension	Article No.	l1/l2	z1/z2	r
15	6210371	37	16	23
18	6210380	38	17	27
22	6210391	44	21	33
28	6210402	51	27	42
35	6210413	59	32	53
42	6210424	77	45	63
54	6210435	88	51	81
76.1	6212228	98	43	91
88.9	6212239	112	49	107
108	6212241	138	61	130

R2712G Bend 45°

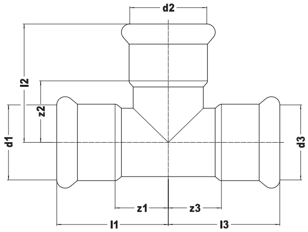
(press x male)



Dimension	Article No.	l1	l2	z1	z2	r
15 x Ø15	6210479	37	48	16	28	23
18 x Ø18	6210481	38	45	17	25	27
22 x Ø22	6210490	44	53	21	32	33
28 x Ø28	6210501	51	60	27	37	42
35 x Ø35	6210512	59	66	32	40	53
42 x Ø42	6210523	77	80	45	50	63
54 x Ø54	6210534	88	97	51	62	81
76.1 x Ø76.1	6212250	98	117	43	62	91
88.9 x Ø88.9	6212261	112	131	49	68	107
108 x Ø108	6212272	138	154	61	77	130

R2714G Tee

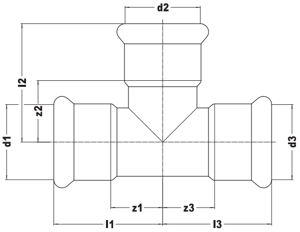
(3 x press)



Dimension	Article No.	l1/l3	l2	z1/z3	z2
15	6210787	37	35	16	14
18	6210798	40	35	19	14
22	6210809	41	40	18	17
28	6210811	46	45	22	21
35	6210820	51	55	24	28
42	6210831	59	61	27	29
54	6210842	71	72	34	35
76.1	6212283	116	115	61	60
88.9	6212294	156	156	68	68
108	6212305	231	231	79	78

R2715G T-reduced

(3 x press)

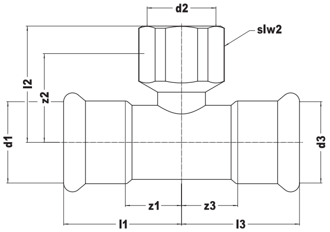


Dimension	Article No.	l1/l3	l2	z1/z3	z2
18 x 15 x 18	6210886	40	36	19	15
22 x 15 x 22	6210897	41	39	18	18
22 x 18 x 22	6210908	41	38	18	17
28 x 15 x 28	6210919	46	42	22	21
28 x 18 x 28	6210921	46	42	22	21
28 x 22 x 28	6210930	46	45	22	22
35 x 15 x 35	6210941	51	45	24	24
35 x 18 x 35	6210952	51	45	24	24
35 x 22 x 35	6210963	51	46	24	23
35 x 28 x 35	6210974	51	48	24	24
42 x 22 x 42	6210985	59	51	27	28
42 x 28 x 42	6210996	59	53	27	29
42 x 35 x 42	6211007	59	60	27	33
54 x 22 x 54	6211018	71	59	34	34
54 x 28 x 54	6211029	71	60	34	36
54 x 35 x 54	6211031	71	66	34	39
54 x 42 x 54	6211040	71	64	34	32
76.1 x 22 x 76.1	6212316	116	68	61	45
76.1 x 28 x 76.1	6212327	116	71	61	47
76.1 x 35 x 76.1	6212338	116	75	61	48

Dimension	Article No.	l1/l3	l2	z1/z3	z2
76.1 x 42 x 76.1	6212349	116	79	61	47
76.1 x 54 x 76.1	6212351	116	80	61	43
88.9 x 22 x 88.9	6212360	131	76	68	53
88.9 x 28 x 88.9	6212371	131	76	68	52
88.9 x 35 x 88.9	6212382	131	83	68	56
88.9 x 42 x 88.9	6212393	131	85	68	53
88.9 x 54 x 88.9	6212404	131	93	68	56
108 x 22 x 108	6212415	156	85	79	62
108 x 28 x 108	6212426	156	88	79	64
108 x 35 x 108	6212437	156	94	79	67
108 x 42 x 108	6212448	156	96	79	64
108 x 54 x 108	6212459	156	102	79	65

R2718G Tee

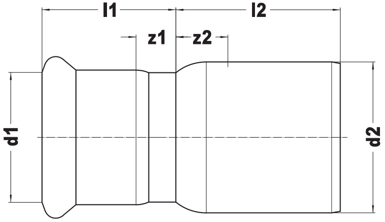
(press x female thread x press)



Dimension	Article No.	l1/l3	l2	z1/z3	z2	slw2
15 x Rp1/2 x 15	6211051	37	37	16	25	24
18 x Rp1/2 x 18	6211062	40	39	19	27	24
18 x Rp3/4 x 18	6211073	40	43	19	30	30
22 x Rp1/2 x 22	6211084	41	41	18	29	24
22 x Rp3/4 x 22	6211095	41	41	18	28	30
28 x Rp1/2 x 28	6211106	46	44	22	32	24
28 x Rp3/4 x 28	6211117	46	45	22	32	30
35 x Rp1/2 x 35	6211128	51	48	24	36	24
35 x Rp3/4 x 35	6211139	51	48	24	35	30
42 x Rp1/2 x 42	6211141	59	46	27	34	24
54 x Rp1/2 x 54	6211150	71	69	34	47	30
54 x Rp3/4 x 54	6211161	71	55	34	43	24
54 x Rp2 x 54	6211172	71	58	34	45	65
76.1 x Rp3/4 x 76.1	6212461	116	81	61	59	30
76.1 x Rp2 x 76.1	6212470	116	68	61	55	65
88.9 x Rp3/4 x 88.9	6212481	131	88	68	66	30
88.9 x Rp2 x 88.9	6212492	131	87	68	74	65
108 x Rp3/4 x 108	6212503	156	86	79	73	30
108 x Rp2 x 108	6212514	156	98	79	76	65

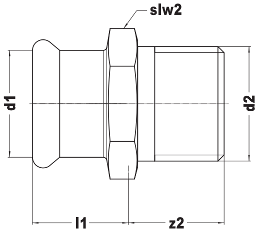
R2707G Reducer

(male x press)



Dimension	Article No.	l1	l2	z1	z2
Ø18 x 15	6210591	26	29	6	9
Ø22 x 15	6210600	26	34	6	13
Ø22 x 18	6210611	26	46	6	23
Ø28 x 15	6210622	25	32	5	11
Ø28 x 18	6210633	26	51	6	28
Ø28 x 22	6210644	29	38	8	12
Ø35 x 22	6210655	40	43	19	17
Ø35 x 28	6210666	30	43	7	17
Ø42 x 28	6210677	40	58	17	28
Ø42 x 35	6210688	40	59	17	24
Ø54 x 28	6210699	37	42	11	12
Ø54 x 35	6210701	50	78	24	43
Ø54 x 42	6210710	37	60	7	25
Ø76.1 x 42	6212525	50	101	20	46
Ø76.1 x 54	6212536	50	154	15	77
Ø88.9 x 54	6212547	50	90	15	35
Ø88.9 x 76.1	6212558	50	106	15	43
Ø108 x 54	6212569	65	131	10	54
Ø108 x 76.1	6212571	65	91	10	28
Ø108 x 88.9	6212580	78	112	15	35

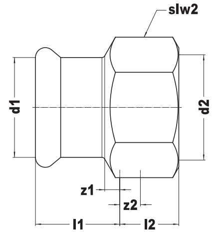
R2705G Straight connector
(press x male thread)



Dimension	Article No.	l1	z2	slw2
15 x R1/2	6211238	25	15	22
18 x R1/2	6211249	25	15	22
22 x R1/2	6211251	29	16	22
22 x R3/4	6211260	39	16	36
22 x R1	6211271	29	16	27
28 x R1	6211282	29	16	36
35 x R1	6211304	34	17	46
35 x R1 1/4	6211293	49	16	36
35 x R1 1/2	6211315	47	18	50
42 x R1 1/2	6211326	38	18	50
54 x R2	6211337	44	20	65
76.1 x R2 1/2	6212591	55	75	80
88.9 x R3	6212602	63	74	95

R2702G Straight connector

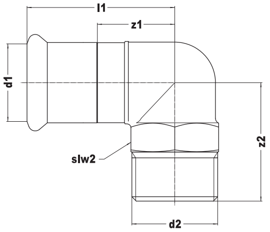
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
15 x Rp1/2	6211348	27	27	10	10	22
18 x Rp1/2	6211359	26	26	9	9	22
22 x Rp1/2	6211361	28	28	10	10	22
22 x Rp3/4	6211370	35	35	16	16	27
22 x Rp1	6211381	26	26	9	9	36
28 x Rp1	6211392	31	31	11	11	36
35 x Rp1	6211414	36	36	14	14	46
35 x Rp1 1/4	6211403	41	41	19	19	50
42 x Rp1 1/2	6211425	37	37	13	13	50
54 x Rp2	6211447	53	53	26	26	65

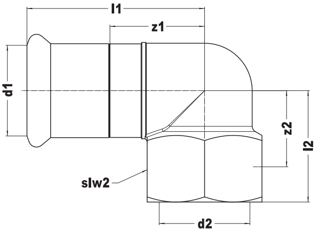
R2728G Angle adapter 90°

(press x male thread)



Dimension	Article No.	l1	z1	z2	slw2
15 x R1/2	6211458	53	32	14	22
18 x R1/2	6211469	51	30	14	22
22 x R3/4	6211471	58	35	14	28
28 x R1	6211480	63	39	15	36
35 x R1 1/4	6211491	71	44	13	46

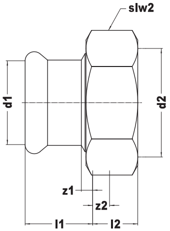
R2709G Angle adapter 90°
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
15 x Rp1/2	6211502	53	36	32	24	24
18 x Rp1/2	6211513	52	39	31	27	24
22 x Rp3/4	6211524	57	46	34	33	30
28 x Rp1	6211535	71	54	47	38	38
35 x Rp1 1/4	6211546	72	62	45	45	46

R2741G Coupling with nut

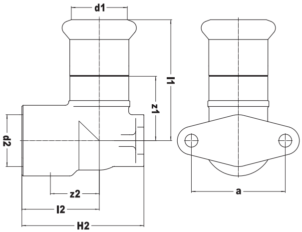
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
15 x G7/8	6211801	39	8	19	2	30
22 x G1 1/8	6211581	43	8	22	2	37
28 x G1 3/8	6211590	45	10	22	2	46

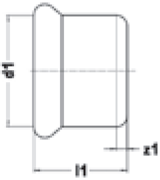
R2716G Wallplate 90°

(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	H2	a
15 x Rp1/2	6211557	46	31	25	19	43	34
18 x Rp1/2	6211568	47	31	26	19	44	34
22 x Rp3/4	6211579	52	35	29	22	51	40

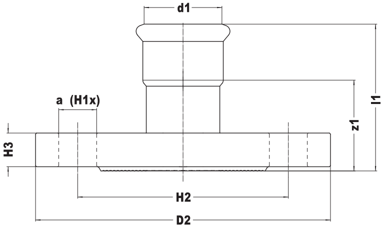
R2729G Stop end
(1 x press)



Dimension	Article No.	l1	z1
15	6212052	37	16
18	6212063	40	19
22	6212074	41	18
28	6212085	46	22
35	6212096	51	24
42	6212107	59	27
54	6212118	72	35

R2726G Flanged connector PN10/16

(1 x press)



Dimension	Article No.	l1	z1	H1	H2	H3	D2	A	holes
22	6211601	59	39	4	75	12	105	14	4
28	6211612	65	47	4	85	14	115	14	4
35	6211623	70	52	4	100	15	140	18	4
42	6211634	77	59	4	110	16	150	18	4
54	6211645	86	75	4	125	18	165	18	4
76.1	6212613	126	71	4	145	18	185	18	4
88.9	6212624	147	84	8	160	20	200	18	8
108	6212635	167	90	8	180	20	200	18	8

R2742G Flat seal for Stainless Steel GAS

(yellow, NBR) for Stainless Steel GAS

Dimension	Article No.
22	6211689
28	6211691
35	6211700
42	6211711
54	6211722

R2755G O-ring standard

(yellow, HNBR) for Stainless Steel GAS

Dimension	Article No.
15	6211911
18	6211920
22	6211931
28	6211942
35	6211953
42	6211964
54	6211975

VSH connects.

5.3 Galvanized Steel

XPress

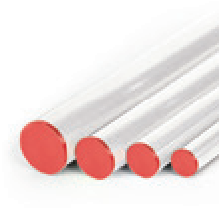
C1459 Galvanized Steel tubes

(6m length)

Dimension	DN	Article No.
12 x 1.2	10	6205144
15 x 1.2	12	6205155
18 x 1.2	15	6205166
22 x 1.5	20	6205177
28 x 1.5	25	6205188
35 x 1.5	32	6205199
42 x 1.5	40	6205201
54 x 1.5	50	6205221
66.7 x 1.5	60	6204836
76.1 x 2.0	65	6204803
88.9 x 2.0	80	6204814
108 x 2.0	100	6204825

C1460 Galvanized Steel tubes with PP-coating

(6m length) polypropylene-coated



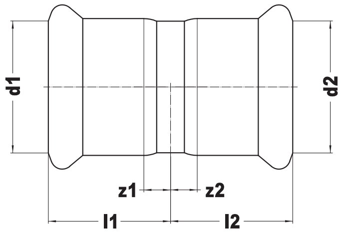
Dimension	DN	Article No.
15 x 1.2	12	6204682
18 x 1.2	15	6204693
22 x 1.5	20	6204704
28 x 1.5	25	6204715
35 x 1.5	32	6204726
42 x 1.5	40	6204737
54 x 1.5	50	6204748

C1461 VSH XPress Sprinkler Galvanized tube

(6m length)

Dimension	DN	Article No.
22 x 1.5	20	6241114
28 x 1.5	25	6241125
35 x 1.5	32	6241136
42 x 1.5	40	6241147
54 x 1.5	50	6241158
76.1 x 2.0	65	6241378
88.9 x 2.0	80	6241389
108 x 2.0	100	6241391

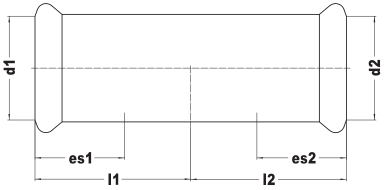
C1401 Straight coupling
(2 x press)



Dimension	Article No.	l1/l2	z1/z2
12	6201351	24	7
15	6201360	27	7
18	6201371	27	7
22	6201382	28	7
28	6201393	30	7
35	6201404	33	7
42	6201415	38	8
54	6201426	43	8
66.7	6340411	60	10
76.1	6206200	63	8
88.9	6206211	72	9
108	6206222	86	9

C1403 Slip coupling

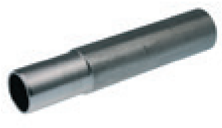
(2 x press)

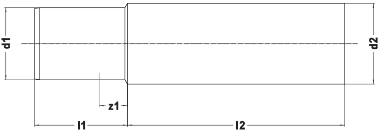


Dimension	Article No.	l1/l2	es1/es2
12	6201437	34	25
15	6201448	40	25
18	6201459	40	25
22	6201461	42	25
28	6201470	46	30
35	6201481	52	30
42	6201492	61	40
54	6201503	70	40
66.7	6341357	99	60
76.1	6206233	115	60
88.9	6206244	131	70
108	6206255	151	80

C1432 Combination tube

(ungalvanized, welding end x male)



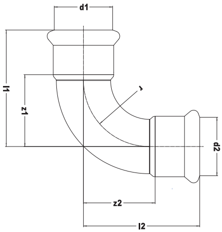


Dimension	Article No.	l1	l2	z1
Ø17 x Ø15	6207817	35	85	9
Ø20 x Ø18	6207828	40	80	10
Ø24 x Ø22	6207168	48	72	13
Ø31 x Ø28	6207179	35	85	14
Ø38 x Ø35	6201514	35	85	12
Ø44.5 x Ø42	6201525	32	88	12
Ø57 x Ø54	6201536	32	88	12
Ø80.5 x Ø76.1	6206530	100	130	45
Ø94.9 x Ø88.9	6206541	115	115	52
Ø114 x Ø108	6206552	115	115	38

After welding, a protective coating is required against corrosion!

C1408 Bend 90°

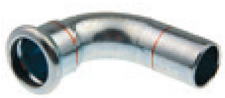
(2 x press)

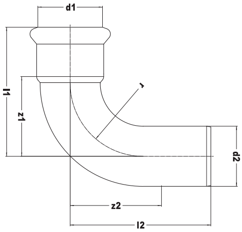


Dimension	Article No.	l1/l2	z1/z2	r
12	6201547	35	18	15
15	6201558	41	21	18
18	6201569	45	25	22
22	6201571	51	30	27
28	6201580	61	38	34
35	6201591	72	46	42
42	6201602	87	57	51
54	6201613	105	70	65
66.7	6340281	145	95	80
76.1	6208004	155	100	92
88.9	6208048	179	116	107
108	6208059	216	139	130

C1411 Bend 90°

(press x male)

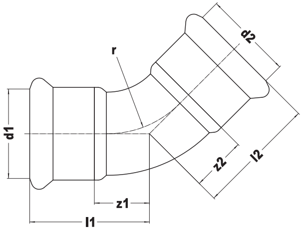




Dimension	Article No.	l1	l2	z1	z2	r
12 x Ø12	6201624	35	42	18	25	15
15 x Ø15	6201635	41	49	21	29	18
18 x Ø18	6201646	45	51	25	31	22
22 x Ø22	6201657	51	58	30	37	27
28 x Ø28	6201668	61	66	38	43	34
35 x Ø35	6201679	72	76	46	50	42
42 x Ø42	6201681	87	93	57	63	51
54 x Ø54	6201690	105	111	70	76	65
66.7 x Ø66.7	6340290	145	157	95	107	80
76.1 x Ø76.1	6208061	155	168	100	113	92
88.9 x Ø88.9	6208070	179	193	116	130	107
108 x Ø108	6208081	216	233	139	156	130

C1413 Bend 45°

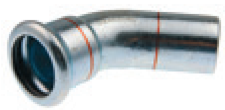
(2 x press)

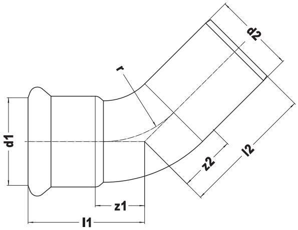


Dimension	Article No.	l1/l2	z1/z2	r
15	6201701	31	11	18
18	6201712	32	12	22
22	6201723	35	14	27
28	6201734	40	17	34
35	6201745	46	20	42
42	6201756	56	26	51
54	6201767	67	32	65
66.7	6340312	98	48	80
76.1	6208125	101	46	92
88.9	6208136	116	53	107
108	6208147	139	62	130

C1412 Bend 45°

(press x male)

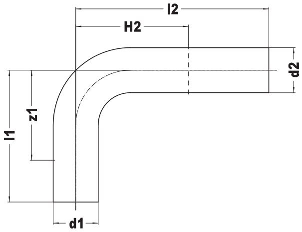




Dimension	Article No.	l1	l2	z1	z2	r
15 x Ø15	6201778	31	38	11	18	18
18 x Ø18	6201789	32	39	12	19	22
22 x Ø22	6201791	35	42	14	21	27
28 x Ø28	6201800	40	46	17	23	34
35 x Ø35	6201811	46	51	20	25	42
42 x Ø42	6201822	56	63	26	33	51
54 x Ø54	6201833	67	73	32	38	65
66.7 x Ø66.7	6340301	98	110	48	60	80
76.1 x Ø76.1	6208092	101	114	46	59	92
88.9 x Ø88.9	6208103	116	130	53	67	107
108 x Ø108	6208114	139	157	62	80	130

C1425 Bend 90°

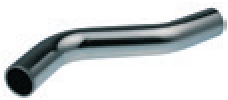
(2 x male)

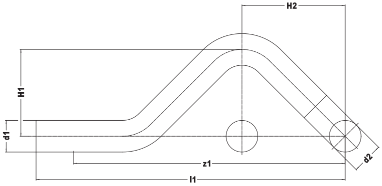


Dimension	Article No.	l1	l2	z1	H2
Ø12	6201844	72	122	55	58
Ø15	6201855	72	122	52	58
Ø18	6201866	72	122	52	63
Ø22	6201877	74	122	53	70
Ø28	6201888	84	122	61	80
Ø35	6201899	122	202	96	100
Ø42	6201901	152	252	122	120
Ø54	6201910	202	302	167	145

C1417 Crossover

(2 x male)

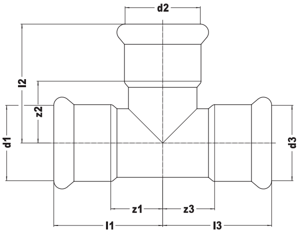




Dimension	Article No.	l1	z1	H1	H2
Ø12	6201921	154	137	35	55
Ø15	6201932	158	138	37	57
Ø18	6201943	165	145	40	60
Ø22	6201954	178	157	44	65
Ø28	6201965	210	187	50	74

C1414 Tee

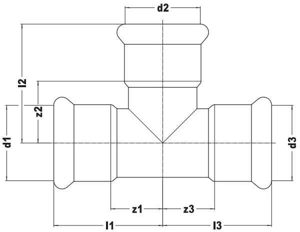
(3 x press)



Dimension	Article No.	l1/l3	l2	z1/z3	z2
12	6202482	31	40	14	23
15	6202493	35	44	15	24
18	6202504	37	46	17	26
22	6202515	40	49	19	28
28	6202526	45	54	22	31
35	6202537	52	60	26	34
42	6202548	61	67	31	37
54	6202559	71	78	36	43
66.7	6340334	99	99	49	49
76.1	6206442	115	110	60	55
88.9	6206453	130	128	67	65
108	6206464	155	153	78	76

C1415 T-reduced

(3 x press)



Dimension	Article No.	l1/l3	l2	z1/z3	z2
12 x 15 x 12	6202768	31	43	14	23
15 x 12 x 15	6202561	35	41	15	21
15 x 18 x 15	6202779	35	44	15	24
15 x 22 x 15	6202781	35	48	15	27
18 x 12 x 18	6202570	37	43	17	26
18 x 15 x 18	6202581	37	46	17	29
18 x 22 x 18	6202790	37	47	17	26
22 x 12 x 22	6202592	40	45	19	24
22 x 15 x 22	6202603	40	48	19	27
22 x 18 x 22	6202614	40	48	19	27
22 x 28 x 22	6202801	40	52	19	29
28 x 15 x 28	6202625	45	51	22	31
28 x 18 x 28	6202636	45	51	22	31
28 x 22 x 28	6202647	45	52	22	31
35 x 15 x 35	6202658	52	54	26	34
35 x 18 x 35	6202669	52	54	26	34
35 x 22 x 35	6202671	52	55	26	34
35 x 28 x 35	6202680	52	57	26	34
42 x 22 x 42	6202691	60	58	30	37
42 x 28 x 42	6202702	60	60	30	37

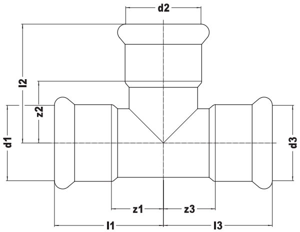
C 1415 T-reduced

(3 x press)

Dimension	Article No.	l1/l3	l2	z1/z3	z2
42 x 35 x 42	6202713	60	63	30	37
54 x 22 x 54	6202724	71	64	36	43
54 x 28 x 54	6202735	71	66	36	43
54 x 35 x 54	6202746	71	69	36	43
54 x 42 x 54	6202757	71	73	36	43
66.7 x 28 x 66.7	6340345	99	73	49	50
66.7 x 35 x 66.7	6340356	99	76	49	50
66.7 x 42 x 66.7	6340367	99	80	49	50
66.7 x 54 x 66.7	6340378	99	85	49	50
76.1 x 22 x 76.1	6207047	115	68	60	47
76.1 x 28 x 76.1	6207058	115	85	60	62
76.1 x 35 x 76.1	6207069	115	87	60	61
76.1 x 42 x 76.1	6207071	115	97	60	67
76.1 x 54 x 76.1	6206475	115	110	60	75
76.1 x 66.7 x 76.1	6340389	126	105	71	55
88.9 x 22 x 88.9	6209654	130	76	67	55
88.9 x 28 x 88.9	6209665	130	92	67	69
88.9 x 35 x 88.9	6209676	130	97	67	71
88.9 x 42 x 88.9	6209687	130	105	67	75
88.9 x 54 x 88.9	6209698	130	117	67	82
88.9 x 66.7 x 88.9	6340391	128	112	65	62
88.9 x 76.1 x 88.9	6206486	130	117	67	62
108 x 22 x 108	6209711	155	85	78	64
108 x 28 x 108	6209720	155	102	78	79
108 x 35 x 108	6209731	155	107	78	81
108 x 42 x 108	6209742	155	115	78	85
108 x 54 x 108	6209753	155	128	78	93
108 x 76.1 x 108	6209764	155	128	78	73
108 x 88.9 x 108	6206497	155	137	78	82

C 1416 T-reduced

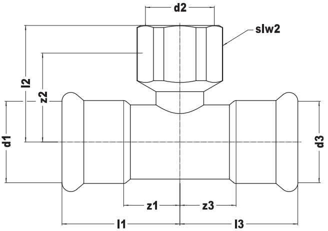
(3 x press)



Dimension	Article No.	l1	l2	l3	z1	z2	z3
22 x 15 x 15	6206739	40	48	47	19	28	27
22 x 22 x 15	6206741	40	49	49	19	28	29

C1418 Tee branch female

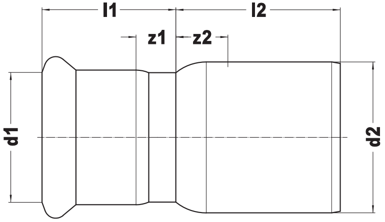
(press x female thread x press)



Dimension	Article No.	l1/l3	l2	z1/z3	z2	slw2
15 x Rp1/2 x 15	6202812	35	37	15	22	24
18 x Rp1/2 x 18	6202823	37	37	17	22	24
18 x Rp3/4 x 18	6209841	37	40	17	24	30
22 x Rp1/2 x 22	6202834	40	39	19	24	24
22 x Rp3/4 x 22	6206706	40	41	19	25	30
22 x Rp1 x 22	6341995	40	19	46	23	41
28 x Rp1/2 x 28	6202845	45	42	22	27	24
28 x Rp3/4 x 28	6207181	45	44	22	28	30
28 x Rp1 x 28	6209601	45	48	22	25	41
35 x Rp1/2 x 35	6202856	52	46	26	31	24
35 x Rp3/4 x 35	6207102	52	48	26	31	30
35 x Rp1 x 35	6209610	52	52	26	29	41
42 x Rp1/2 x 42	6202867	61	48	31	33	24
42 x Rp3/4 x 42	6207113	61	50	31	34	30
42 x Rp1 x 42	6209621	61	54	31	31	41
54 x Rp1/2 x 54	6202878	71	54	36	39	24
54 x Rp3/4 x 54	6207124	71	56	36	40	30
54 x Rp1 x 54	6207795	71	60	36	37	41
66.7 x Rp3/4 x 66.7	6340400	99	67	49	51	30
76.1 x Rp3/4 x 76.1	6206508	115	82	60	66	30
88.9 x Rp3/4 x 88.9	6206519	130	84	67	68	30
108 x Rp3/4 x 108	6206521	155	94	78	78	30

C1407 Reducer

(male x press)



Dimension	Article No.	l1	l2	z1	z2
Ø15 x 12	6202119	29	27	12	7
Ø18 x 12	6202121	27	29	10	9
Ø18 x 15	6202130	31	27	11	7
Ø22 x 12	6202141	27	33	10	12
Ø22 x 15	6202152	29	32	9	11
Ø22 x 18	6202163	32	29	12	8
Ø28 x 15	6202174	30	38	10	15
Ø28 x 18	6202185	30	36	10	13
Ø28 x 22	6202196	33	33	12	10
Ø35 x 22	6202207	30	41	9	15
Ø35 x 28	6202218	36	34	13	8
Ø42 x 22	6206651	32	51	11	21
Ø42 x 28	6206662	32	51	9	21
Ø42 x 35	6202229	39	41	13	11
Ø54 x 18	6206673	34	64	14	29
Ø54 x 22	6202231	34	63	13	28
Ø54 x 28	6202240	33	58	10	23
Ø54 x 35	6206684	38	57	12	22
Ø54 x 42	6202251	44	52	14	17
Ø66.7 x 28	6340213	41	96	18	46
Ø66.7 x 35	6340224	38	84	12	34

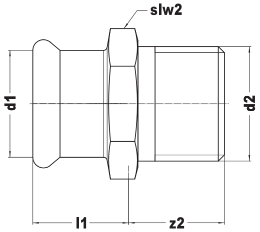
C1407 Reducer

(male x press)

Dimension	Article No.	l1	l2	z1	z2
Ø66.7 x 42	6340235	44	81	14	31
Ø66.7 x 54	6340246	48	72	13	22
Ø76.1 x 42	6206387	50	97	20	42
Ø76.1 x 54	6206398	55	86	20	31
Ø76.1 x 66.7	6340257	64	75	14	20
Ø88.9 x 54	6206409	54	101	19	38
Ø88.9 x 66.7	6340268	65	92	15	29
Ø88.9 x 76.1	6206411	68	90	13	27
Ø108 x 66.7	6340279	65	122	15	45
Ø108 x 76.1	6206420	68	120	13	43
Ø108 x 88.9	6206431	77	110	14	33

C1405 Straight connector

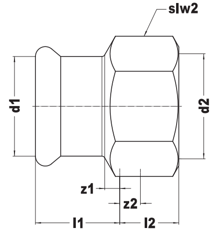
(press x male thread)



Dimension	Article No.	l1	z2	slw2
12 x R3/8	6202262	17	14	22
15 x R3/8	6202273	20	15	24
15 x R1/2	6202284	20	19	24
18 x R1/2	6202295	20	19	27
18 x R3/4	6202306	20	20	27
22 x R1/2	6206717	21	22	32
22 x R3/4	6202317	21	23	32
22 x R1	6206728	21	29	34
28 x R3/4	6209852	23	23	38
28 x R1	6202328	23	25	41
35 x R1	6341247	26	27	46
35 x R1 1/4	6202339	26	29	46
42 x R1 1/2	6202341	30	29	55
54 x R2	6202350	35	34	70
66.7 x R2 1/2	6340422	50	40	85
76.1 x R2 1/2	6204781	55	42	80
88.9 x R3	6204792	63	46	95

C1402 Straight connector

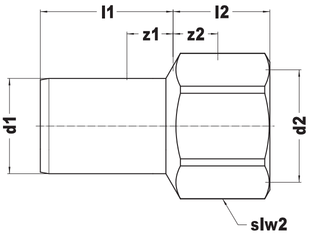
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
12 x Rp1/2	6202361	20	19	3	4	24
15 x Rp1/2	6202372	22	19	2	4	24
18 x Rp1/2	6202383	21	19	1	4	27
18 x Rp3/4	6202394	23	20	3	4	30
22 x Rp1/2	6340202	22	14	1	0	32
22 x Rp3/4	6202405	23	20	2	4	32
22 x Rp1	6341984	24	20	3	5	38
28 x Rp1/2	6207806	24	14	1	1	41
28 x Rp3/4	6209830	24	17	1	0	38
28 x Rp1	6202416	26	23	3	4	41
35 x Rp1/2	6340917	30	12	4	1	46
35 x Rp3/4	6340928	28	15	2	3	46
35 x Rp1	6340939	33	13	7	0	46
35 x Rp1 1/4	6206695	28	22	2	7	46
42 x Rp1 1/2	6341192	32	22	2	6	54
54 x Rp2	6341203	37	26	2	8	67

C1433 Straight connector

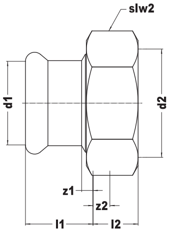
(male x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
Ø12 x Rp3/8	6209874	25	17	8	6	19
Ø12 x Rp1/2	6202427	25	24	8	9	24
Ø15 x Rp1/2	6202438	28	23	8	8	24
Ø18 x Rp1/2	6202449	28	22	8	7	24
Ø18 x Rp3/4	6202451	28	25	8	9	30
Ø22 x Rp1/2	6202460	29	21	8	6	24
Ø22 x Rp3/4	6202471	29	24	8	8	30

Take care, when pressing, that the jaws do not interfere with the wrench flats!

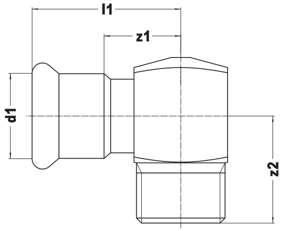
C1404 Straight connector
(press x euroconus)



Dimension	Article No.	l1	l2	z1	z2	slw2
15 x 3/4	6208169	21	16	1	7	30
18 x 3/4	6208171	22	16	2	7	30

C1428 Angle adapter 90°

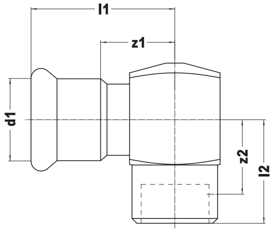
(press x male thread)



Dimension	Article No.	l1	z1	z2
12 x R3/8	6202064	37	20	22
15 x R3/8	6202075	40	20	22
15 x R1/2	6202086	41	21	28
18 x R1/2	6202097	42	22	28
22 x R3/4	6202108	45	24	32

C1409 Angle adapter 90°

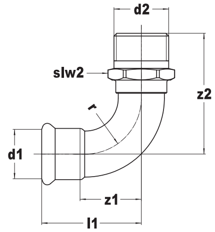
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2
22 x Rp1/2	6341038	45	31	24	16
28 x Rp1/2	6341049	51	35	28	20
35 x Rp1/2	6341051	57	35	31	20

C1430 Bend 90°

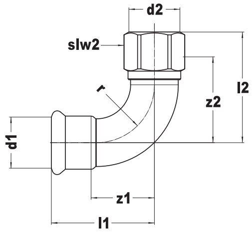
(press x male thread)



Dimension	Article No.	l1	z1	z2	slw2	r
12 x R3/8	6201976	35	18	42	17	15
15 x R3/8	6201987	41	21	45	19	18
15 x R1/2	6201998	41	21	50	22	18
18 x R1/2	6202009	45	25	54	22	22
22 x R3/4	6202011	51	30	62	30	27
28 x R1	6202020	61	38	74	36	34
35 x R1 1/4	6202031	72	46	86	46	42
42 x R1 1/2	6202042	87	57	96	50	51
54 x R2	6202053	105	70	116	60	65

C1438 Bend 90°

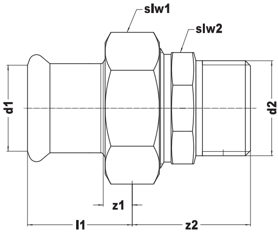
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2	r
15 x Rp3/8	6200931	41	42	21	31	19	18
15 x Rp1/2	6200942	41	48	21	33	24	18
18 x Rp1/2	6200953	45	52	25	37	24	22
22 x Rp1/2	6209577	51	59	30	44	27	27
22 x Rp3/4	6200964	51	59	30	43	30	27
28 x Rp1/2	6207025	61	65	38	50	32	34
28 x Rp3/4	6200986	61	65	38	49	32	34
28 x Rp1	6209588	61	70	38	51	41	34
35 x Rp1/2	6201063	72	75	46	55	41	42
35 x Rp3/4	6201074	72	75	46	54	41	42
35 x Rp1	6209599	72	75	46	56	41	42

C1435 Straight union

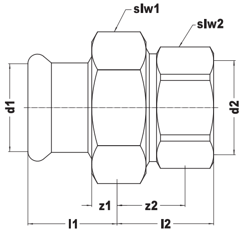
(press x male thread)



Dimension	Article No.	l1	z1	z2	slw1	slw2
15 x R1/2	6207190	29	9	35	30	25
18 x R1/2	6207036	29	9	35	30	25
22 x R3/4	6207201	30	9	40	36	32
28 x R1	6207212	31	8	44	46	39
35 x R1 1/4	6207223	34	8	48	52	49
42 x R1 1/2	6207234	41	11	47	58	51
54 x R2	6207245	47	12	53	75	65

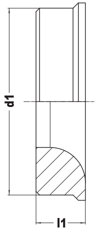
C1444 Straight union

(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw1	slw2
15 x Rp1/2	6208906	29	30	9	15	30	27
18 x Rp1/2	6208917	29	30	9	15	30	27
22 x Rp3/4	6208928	30	33	9	17	36	34
28 x Rp1	6208939	31	34	8	15	46	42
35 x Rp1 1/4	6208941	34	42	8	20	52	50
42 x Rp1 1/2	6208950	41	42	11	20	58	55
54 x Rp2	6208961	47	46	12	20	75	70

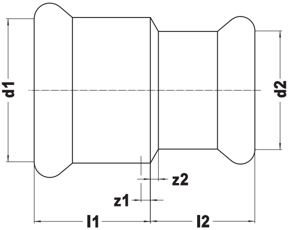
C1431 Venturi-insert



Dimension	Article No.	l1
Ø18	6202922	6
Ø22	6202933	7
Ø28	6202944	7

C1439 Reducer

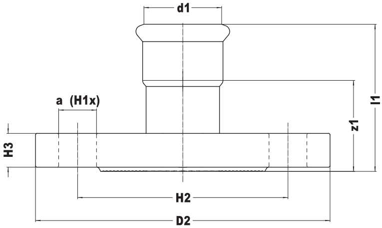
(2 x press)



Dimension	Article No.	l1	l2	z1/z2
22 x 15	6201129	23	22	2
28 x 22	6201131	25	23	2

C1426 Flanged connector PN 10/16

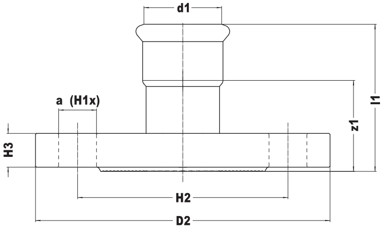
(1 x press)



Dimension	Article No.	l1	z1	H1	H2	H3	D2	a	holes
35	6341500	70	44	4	100	16	140	18	4
42	6341511	77	47	4	110	16	150	18	4
54	6341522	87	52	4	125	16	165	18	4
66.7	6340323	89	39	4	145	16	185	18	4
76.1	6206596	112	57	4	145	16	185	18	4
88.9	6206607	118	55	8	160	18	200	18	8
108	6206618	114	37	8	180	18	220	18	8

C1427 Flanged connector PN6

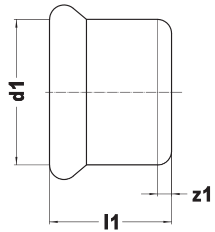
(1 x press)



Dimension	Article No.	l1	z1	H1	H2	H3	D2	a	holes
66.7	6207080	85	37	4	130	12	160	14	4
76.1	6206629	108	53	4	130	12	160	14	4
88.9	6206631	114	51	4	150	14	190	18	4
108	6206640	110	33	4	170	14	210	18	4

C1429 Stop end

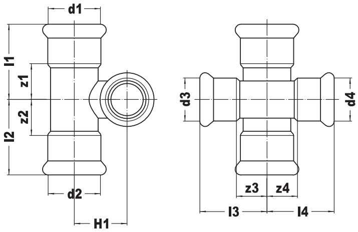
(1 x press)



Dimension	Article No.	l1	z1
15	6202955	23	3
18	6202966	23	3
22	6202977	24	3
28	6202988	26	3
35	6202999	29	3
42	6203001	37	7
54	6203010	42	7
66.7	6340171	60	10
76.1	6206915	64	9
88.9	6206926	72	9
108	6206937	97	20

C1434 Crossing 90°

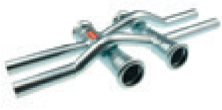
(4 x press)

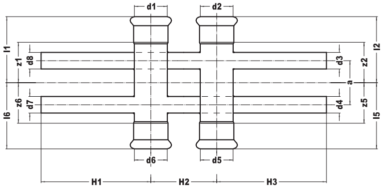


Dimension	Article No.	l1/l3	l2/l4	z1/z3	z2/z4	H1
15 x 15 x 15 x 15	6202889	35	35	15	15	21
18 x 15 x 18 x 15	6202891	37	35	17	15	23
22 x 15 x 22 x 15	6202900	40	35	19	15	25
22 x 18 x 22 x 18	6202911	40	37	19	17	26
28 x 15 x 28 x 15	6207135	45	35	22	15	28
28 x 18 x 28 x 18	6207146	45	37	22	17	29
28 x 22 x 28 x 22	6207157	45	40	22	19	31

C1436 Crossingpair double

(press x male)

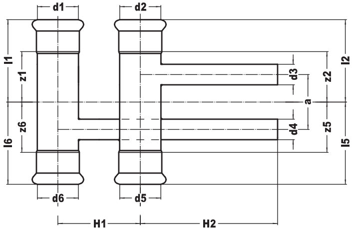




Dimension	Article No.	l1/l2/l5/l6	z1/z2/z5/z6	H1/H3	H2	a
12 x Ø12	6206750	50	33	100	60	40
15 x Ø12	6206761	60	40	100	60	40
15 x Ø15	6206772	60	40	100	60	40
18 x Ø12	6206783	60	40	100	60	40
18 x Ø15	6206794	60	40	100	60	40
22 x Ø12	6206948	60	39	100	60	40
22 x Ø15	6206805	60	39	100	60	40
28 x Ø12	6206816	60	37	100	60	40
28 x Ø15	6206827	60	37	100	60	40
35 x Ø15	6206838	60	34	100	60	40

C1437 Crossingpair single

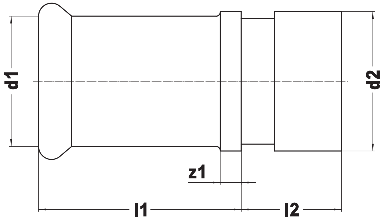
(press x male)



Dimension	Article No.	l1/l2/l5/l6	z1/z2/z5/z6	H1	H2	a
12 x Ø12	6206959	50	33	60	100	40
15 x Ø12	6206961	60	40	60	100	40
15 x Ø15	6206849	60	40	60	100	40
18 x Ø12	6206851	60	40	60	100	40
18 x Ø15	6206860	60	40	60	100	40
22 x Ø12	6206871	60	39	60	100	40
22 x Ø15	6206882	60	39	60	100	40
28 x Ø12	6206893	60	37	60	100	40
28 x Ø15	6206904	60	37	60	100	40

C1442 Transition for grooved couplings

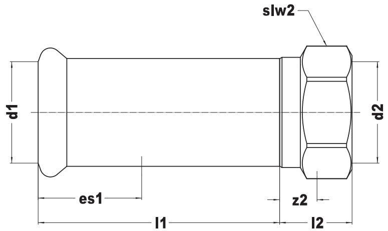
(press x groove)



Dimension	Article No.	l1	l2	z1
28 x 33.7	6241301	49	24	26
35 x 42.4	6241345	54	24	28
42 x 48.3	6241356	61	24	31
54 x 60.3	6241367	73	24	38
76.1 x 73	6341181	68	24	13
76.1 x 76.1	6340774	56	24	1
88.9 x 88.9	6340785	76	24	13
108 x 114	6340796	84	26	7

C1443 Slip coupling

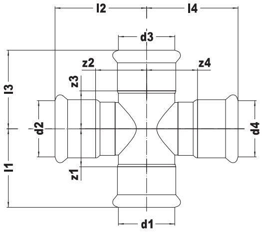
(press x female thread)



Dimension	Article No.	l1	l2	z2	es1	slw2
22 x Rp1/2	6241312	92	22	15	21	32
22 x Rp3/4	6241323	97	27	17	21	32
28 x Rp1/2	6241268	94	24	15	23	28
28 x Rp3/4	6241279	93	23	17	23	32

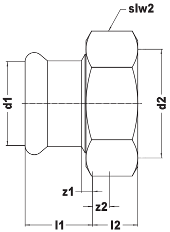
C1447 Crossing 90°

(4 x press)



Dimension	Article No.	l1/l3	l2/l4	z1/z3	z2/z4
35 x 35 x 35 x 35	6340972	52	60	26	34
42 x 42 x 42 x 42	6340983	61	67	31	37
54 x 54 x 54 x 54	6340994	71	78	36	43
35 x 28 x 35 x 28	6341005	52	57	26	34
42 x 28 x 42 x 28	6341016	61	60	31	37
54 x 28 x 54 x 28	6341027	71	66	36	43

C1446 Coupling with nut
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
15 x G3/4	6340521	29	8	9	2	30
18 x G3/4	6340532	29	8	9	2	30
22 x G1	6340554	30	10	9	2	36
28 x G1 1/4	6340565	31	10	8	2	46
35 x G1 1/2	6340576	34	11	8	2	52
42 x G1 3/4	6340587	41	11	11	2	52
54 x G2 3/8	6340598	47	11	12	3	75

C1451 O-ring Leak Before Pressed (LBP)

(black, EPDM) for Galvanized Steel and stainless steel

Dimension	Article No.
12	6222205
15	6222216
18	6222227
22	6222238
28	6222249
35	6222251
42	6222260
54	6222271

R2760 O-ring standard

(black, EPDM) for Galvanized Steel and stainless steel

Dimension	Article No.
66.7	6208180
76.1	6208015
88.9	6208026
108	6208037

C1452 Flat seal

(black, EPDM) for Galvanized Steel and stainless steel

Dimension	Article No.
15-18	6228013
22	6228024
28	6228035
35	6228046
42	6228057
54	6228068

R2764 O-ring (LBP) for special applications

(green, FPM) for Galvanized Steel and stainless steel

Dimension	Article No.
15	6119401
18	6119410
22	6119421
28	6119432
35	6119443
42	6119454
54	6119465

R2761 O-ring for special applications

(green, FPM) for Galvanized Steel and stainless steel

Dimension	Article No.
66.7	6119476
76.1	6119377
88.9	6119388
108	6119399

R2767 O-ring (LBP) for special applications

(green, FPM) for Galvanized steel and stainless steel

Dimension	Article No.
15-18	6118301
22	6118310
28	6118321
35	6118332
42	6118343
54	6118354

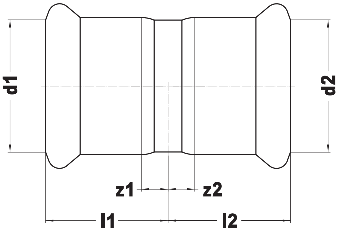
VSH connects.

5.4 Copper

XPress

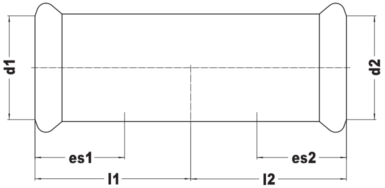
7270 Straight coupling

(2 x press)



Dimension	Article No.	l1/l2	z1/z2
12	4800004	21	4
15	4800015	22	2
18	4800026	22	2
22	4800037	23	2
28	4800048	25	2
35	4800059	28	2
42	4800061	36	4
54	4800070	42	5
64	4806001	74	24
66.7	4800081	55	5
76.1	4800092	55	5
88.9	4800103	66	8
108	4800114	72	5

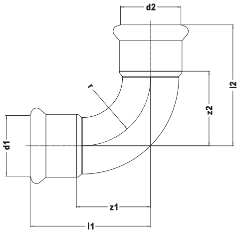
7270S Slip coupling
(2 x press)



Dimension	Article No.	l1/l2	es1/es2
15	4800125	40	20
18	4800136	40	20
22	4800147	42	21
28	4800158	46	23
35	4800169	50	25
42	4800171	60	30
54	4800180	71	36
66.7	4806604	55	50
76.1	4800202	55	50
88.9	4800213	66	50
108	4800224	72	68

7002A Bend 90°

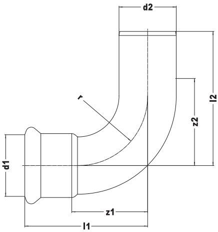
(2 x press)



Dimension	Article No.	l1/l2	z1/z2	r
12	4800301	31	14	14
15	4800312	38	17	17
18	4800323	42	22	22
22	4800334	47	26	26
28	4800345	56	34	34
35	4800356	68	42	42
42	4800367	80	50	50
54	4800378	100	65	65
64	4806021	172	122	90
66.7	4800389	132	87	80
76.1	4800391	142	92	90
88.9	4800400	170	106	105
108	4800411	201	135	161

7001A Bend 90°

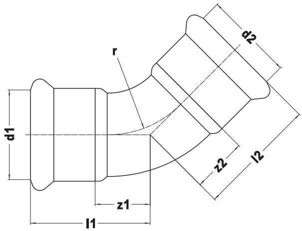
(press x male)



Dimension	Article No.	l1	l2	z1	z2	r
12 x Ø12	4800422	31	45	14	28	14
15 x Ø15	4800433	36	50	16	30	18
18 x Ø18	4800444	42	53	22	33	22
22 x Ø22	4800455	47	58	27	38	26
28 x Ø28	4800466	58	64	34	40	34
35 x Ø35	4800477	69	82	44	57	42
42 x Ø42	4800488	81	101	52	72	50
54 x Ø54	4800499	100	120	66	86	65
66.7 x Ø66.7	4800501	130	175	78	123	80
76.1 x Ø76.1	4800510	143	150	93	100	90
88.9 x Ø88.9	4800521	170	178	112	116	106
108 x Ø108	4800532	208	259	141	194	161

7041 Bend 45°

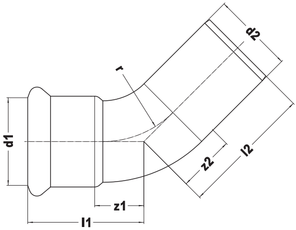
(2 x press)



Dimension	Article No.	l1/l2	z1/z2	r
12	4800543	23	6	14
15	4800554	28	8	18
18	4800565	29	9	22
22	4800576	31	12	26
28	4800587	37	16	34
35	4800598	44	18	42
42	4800609	51	21	50
54	4800611	62	27	65
66.7	4800620	85	35	80
76.1	4800631	91	45	91
88.9	4800642	109	46	107
108	4800653	125	59	130

7040 Bend 45°

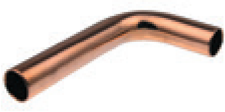
(press x male)

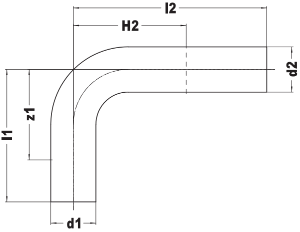


Dimension	Article No.	l1	l2	z1	z2	r
12 x Ø12	4800664	23	32	6	15	14
15 x Ø15	4800675	28	37	8	17	18
18 x Ø18	4800686	29	39	9	19	22
22 x Ø22	4800697	32	44	11	23	26
28 x Ø28	4800708	37	47	14	24	34
35 x Ø35	4800719	43	58	17	32	42
42 x Ø42	4800721	51	71	21	41	50
54 x Ø54	4800730	62	82	27	47	65
66.7 x Ø66.7	4800741	85	88	35	38	80
76.1 x Ø76.1	4800752	90	97	40	54	91
88.9 x Ø88.9	4800763	109	116	47	54	107
108 x Ø108	4800774	115	136	50	69	130

7005 Bend 90°

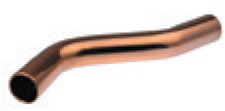
(2 x male)

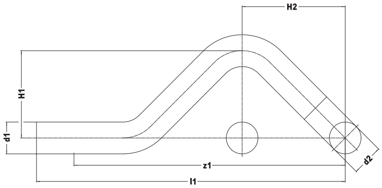




Dimension	Article No.	l1	l2	z1	H2
Ø15	4805504	70	120	50	100
Ø22	4805526	70	120	49	99
Ø28	4805537	80	120	57	97

7087 Crossover
(2 x male)

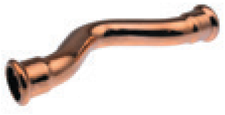


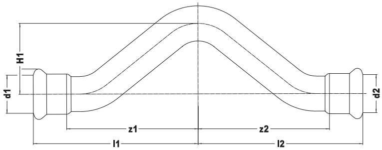


Dimension	Article No.	l1	z1	H1	H2
Ø15	4800785	118	98	33	41
Ø18	4800796	128	108	36	45
Ø22	4800807	142	121	40	50

7085 Crossover

(2 x press)

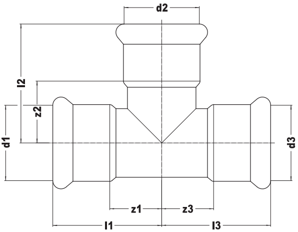




Dimension	Article No.	l1/l2	z1/z2	H1
15	4800818	70	50	26
18	4800829	76	56	27
22	4800831	85	64	28

7130 Tee

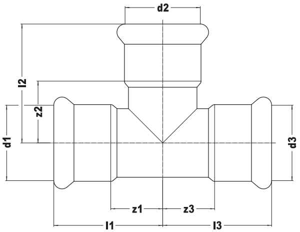
(3 x press)



Dimension	Article No.	l1/l3	l2	z1/z3	z2
12	4801599	28	28	11	11
15	4801601	32	32	12	12
18	4801610	34	34	14	14
22	4801621	37	37	16	16
28	4801632	42	42	19	19
35	4801643	50	50	24	24
42	4801654	58	58	28	28
54	4801665	69	69	34	34
64	4806087	133	134	83	84
66.7	4801676	95	111	45	62
76.1	4801687	101	119	51	69
88.9	4801698	162	162	100	100
108	4801709	159	159	92	92

7125 T-reduced

(3 x press)



Dimension	Article No.	l1/l3	l2	z1/z3	z2
15 x 12 x 15	4801720	32	32	12	15
18 x 12 x 18	4801764	34	35	14	15
18 x 15 x 18	4801786	34	35	14	15
22 x 12 x 22	4805671	37	34	16	17
22 x 15 x 22	4801821	37	38	16	18
22 x 18 x 22	4801852	37	38	16	18
28 x 12 x 28	4805713	42	37	19	20
28 x 15 x 28	4801885	42	41	19	21
28 x 18 x 28	4801907	42	41	19	21
28 x 22 x 28	4801929	42	41	19	20
35 x 15 x 35	4801940	45	44	19	24
35 x 22 x 35	4801951	45	45	19	24
35 x 28 x 35	4801962	50	44	24	21
42 x 15 x 42	4801973	50	48	20	28
42 x 22 x 42	4801984	50	48	20	27
42 x 28 x 42	4801995	56	49	26	26
42 x 35 x 42	4802006	56	50	26	24
54 x 22 x 54	4802017	60	54	25	33
54 x 28 x 54	4802028	60	55	25	32
54 x 35 x 54	4802039	61	55	24	29

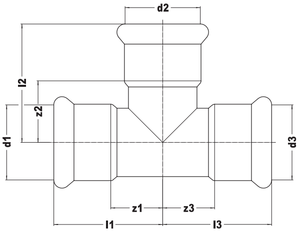
7125 T-reduced

(3 x press)

Dimension	Article No.	l1/l3	l2	z1/z3	z2
54 x 42 x 54	4802041	69	64	34	34
66.7 x 28 x 66.7	4806197	76	67	26	43
66.7 x 35 x 66.7	4805361	80	70	29	43
66.7 x 42 x 66.7	4805350	82	76	32	41
66.7 x 54 x 66.7	4805341	88	78	47	43
76.1 x 22 x 76.1	4805372	73	73	22	50
76.1 x 28 x 76.1	4805383	77	73	26	50
76.1 x 35 x 76.1	4802061	80	78	30	53
76.1 x 42 x 76.1	4802072	103	106	55	70
76.1 x 54 x 76.1	4802083	93	85	41	50
88.9 x 54 x 88.9	4802105	136	119	77	77
88.9 x 76.1 x 88.9	4802116	151	146	91	96
108 x 54 x 108	4802127	127	122	63	87
108 x 66.7 x 108	4805394	117	141	46	96
108 x 76.1 x 108	4802138	120	139	52	88
108 x 88.9 x 108	4802149	126	151	59	90

7126 T-reduced

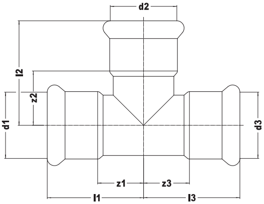
(3 x press)



Dimension	Article No.	l1/l2	l3	z1/z2	z3
15 x 15 x 12	4801731	32	36	12	19
18 x 18 x 15	4801797	34	42	14	22
22 x 22 x 15	4801863	37	46	16	26
22 x 22 x 18	4801874	37	43	16	23
28 x 28 x 15	4805405	42	55	19	35
28 x 28 x 22	4801931	42	52	19	31
35 x 35 x 22	4805416	51	72	25	51
35 x 35 x 28	4805427	51	67	25	41

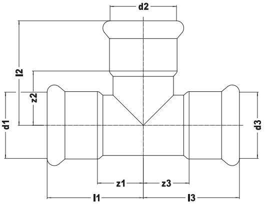
7127 T-reduced

(3 x press)



Dimension	Article No.	l1	l2	l3	z1	z2	z3
15 x 12 x 12	4801711	32	32	32	12	15	15
18 x 15 x 15	4801775	34	35	40	14	15	20
22 x 15 x 15	4801808	37	44	43	16	18	23
22 x 15 x 18	4801819	37	44	34	16	18	14
22 x 18 x 15	4801830	37	38	44	16	18	24
22 x 18 x 18	4801841	37	38	41	16	18	21
28 x 15 x 22	4805438	42	41	46	19	21	25
28 x 18 x 22	4801896	42	41	47	19	21	26
28 x 22 x 22	4801918	42	41	49	19	20	28
35 x 22 x 22	4805449	51	44	67	25	23	45
35 x 22 x 28	4805451	51	44	63	25	23	40
35 x 28 x 28	4805460	51	44	67	25	21	44
42 x 35 x 35	4805471	56	50	74	26	24	48
54 x 42 x 42	4805680	69	64	83	34	34	53

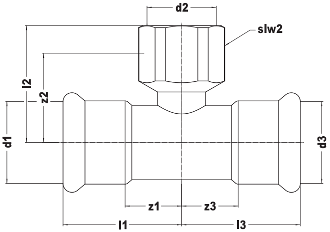
7128 T-reduced
(3 x press)



Dimension	Article No.	l1	l2	l3	z1	z2	z3
12 x 15 x 12	4805669	36	32	36	19	15	15
15 x 18 x 15	4801742	35	32	23	15	12	35
15 x 22 x 15	4801753	38	34	23	18	13	38
22 x 28 x 22	4802050	52	42	52	31	19	31
28 x 35 x 28	4800191	42	50	42	26	24	26

6130G Tee branch female

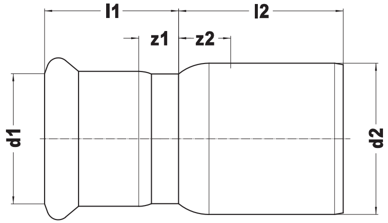
(press x female thread x press)



Dimension	Article No.	l1/l3	l2	z1/z3	z2	slw2
12 x Rp1/2 x 12	4802151	34	26	14	10	26
15 x Rp1/2 x 15	4802160	34	25	14	13	26
18 x Rp1/2 x 18	4802171	42	24	22	8	26
22 x Rp1/2 x 22	4802182	42	26	21	11	26
22 x Rp3/4 x 22	4802193	45	27	24	11	32
28 x Rp1/2 x 28	4802204	44	29	21	14	26
28 x Rp3/4 x 28	4802215	42	35	19	14	32
35 x Rp1/2 x 35	4802226	50	34	24	19	26
42 x Rp1/2 x 42	4802237	57	38	27	23	26
54 x Rp1/2 x 54	4802248	69	44	34	29	26
76.1 x Rp1/2 x 76.1	4805482	65	48	15	30	-
108 x Rp1/2 x 108	4805493	82	65	15	53	-

7243 Reducer

(male x press)



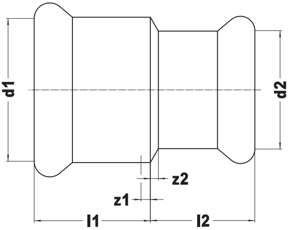
Dimension	Article No.	l1	l2	z1	z2
Ø15 x 12	4802259	21	23	4	3
Ø18 x 12	4802261	21	26	4	6
Ø18 x 15	4802270	24	23	4	3
Ø22 x 15	4802281	24	28	4	7
Ø22 x 18	4802292	24	26	4	5
Ø28 x 15	4802303	25	37	4	14
Ø28 x 18	4802314	26	35	4	12
Ø28 x 22	4802325	25	30	4	7
Ø35 x 22	4802336	29	39	9	13
Ø35 x 28	4802347	28	35	5	9
Ø42 x 22	4802358	25	49	4	19
Ø42 x 28	4802369	27	44	4	14
Ø42 x 35	4802371	35	38	8	8
Ø54 x 28	4802380	27	59	4	24
Ø54 x 35	4802391	35	53	9	18
Ø54 x 42	4802402	40	47	9	12
Ø64 x 54	4806142	54	61	20	11
Ø66.7 x 28	4806208	37	72	14	22
Ø66.7 x 35	4802424	40	69	14	19
Ø66.7 x 42	4802435	43	67	13	17

7243 Reducer

(male x press)

Dimension	Article No.	l1	l2	z1	z2
Ø66.7 x 54	4802446	49	63	14	13
Ø76.1 x 35	4802457	39	74	13	24
Ø76.1 x 42	4802468	43	70	13	20
Ø76.1 x 54	4802479	52	64	17	14
Ø76.1 x 64	4806153	70	64	20	14
Ø76.1 x 66.7	4802481	66	60	16	10
Ø88.9 x 42	4802490	46	89	16	27
Ø88.9 x 54	4802501	48	84	13	22
Ø88.9 x 76.1	4802512	65	75	15	13
Ø108 x 42	4802523	47	106	17	39
Ø108 x 54	4802534	54	102	20	35
Ø108 x 66.7	4806329	70	96	20	29
Ø108 x 76.1	4802556	70	92	20	25
Ø108 x 88.9	4802567	82	84	20	17

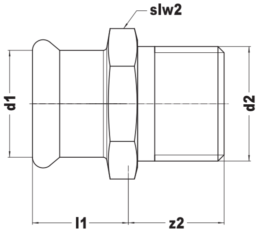
7240 Reducer
(2 x press)



Dimension	Article No.	l1	l2	z1	z2
15 x 12	4805581	23	22	3	5
22 x 15	4805592	28	25	7	5
28 x 15	4805647	35	23	12	3
28 x 22	4805603	29	26	6	5
35 x 28	4805614	33	28	7	5
42 x 35	4805625	37	31	7	5
54 x 42	4805636	46	34	11	4

6243G Straight connector

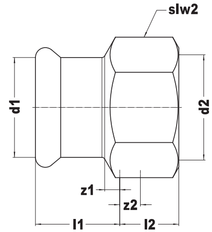
(press x male thread)



Dimension	Article No.	l1	l2	z2	slw2
12 x R3/8	4801038	17	15	9	19
12 x R1/2	4801049	17	19	11	19
15 x R3/8	4801051	20	13	7	21
15 x R1/2	4801060	20	17	8	21
15 x R3/4	4801071	20	19	10	25
18 x R1/2	4801082	20	17	9	25
18 x R3/4	4801093	20	19	10	25
22 x R1/2	4801104	21	17	9	30
22 x R3/4	4801115	21	19	10	30
22 x R1	4801126	21	21	11	32
28 x R3/4	4801137	23	20	10	36
28 x R1	4801148	23	21	11	36
28 x R1 1/4	4801159	23	25	12	36
35 x R1	4801161	26	22	12	41
35 x R1 1/4	4801170	26	28	15	41
42 x R1 1/4	4801181	30	28	16	51
42 x R1 1/2	4801192	30	28	16	51
54 x R2	4801203	35	28	12	57
64 x R2 1/2	4806065	50	51	34	66
66.7 x R2 1/2	4801214	50	43	25	74
76.1 x R2 1/2	4801225	50	48	31	76
76.1 x R3	4801236	50	60	39	77
88.9 x R3	4801247	62	51	30	100
108 x R4	4801258	68	64	38	107

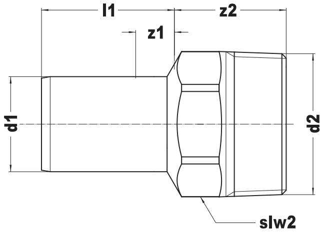
6270G Straight connector

(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
12 x Rp3/8	4801269	17	14	0	6	20
12 x Rp1/2	4801271	18	17	0	8	22
15 x Rp3/8	4801280	20	14	2	6	20
15 x Rp1/2	4801291	20	18	3	8	25
15 x Rp3/4	4801302	21	19	5	8	30
18 x Rp1/2	4801313	19	18	2	8	25
18 x Rp3/4	4801324	20	19	2	9	30
22 x Rp1/2	4801335	20	17	1	7	30
22 x Rp3/4	4801346	20	19	0	9	30
22 x Rp1	4801357	21	22	3	11	37
28 x Rp3/4	4801368	23	17	3	7	37
28 x Rp1	4801379	23	22	3	10	37
28 x Rp1 1/4	4801381	24	24	2	10	46
35 x Rp3/4	4805691	29	15	4	4	30
35 x Rp1	4801390	24	22	5	10	42
35 x Rp1 1/4	4801401	25	25	3	11	46
42 x Rp1 1/4	4801412	30	22	0	8	46
42 x Rp1 1/2	4801423	29	25	3	11	48
54 x Rp2	4801434	34	25	3	11	48
64 x Rp2 1/2	4806076	49	40	1	9	82

6280G Straight connector
(male x male thread)

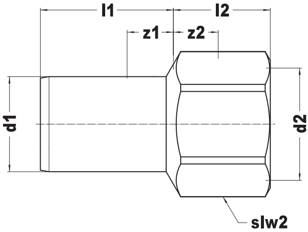


Dimension	Article No.	l1	l2	z1	z2	slw2
15 x R1/2	4803251	30	21	10	12	19
18 x R1/2	4803260	30	20	10	12	19
18 x R3/4	4803271	30	23	10	14	25
22 x R1/2	4803282	30	21	9	13	25
22 x R3/4	4803293	30	23	9	13	25
28 x R1	4803304	32	26	9	15	32
35 x R1 1/4	4803315	35	29	9	16	36
42 x R1 1/2	4803326	51	29	21	16	46

Take care, when pressing, that the jaws do not interfere with the wrench flats!

6246G Straight connector

(male x female thread)

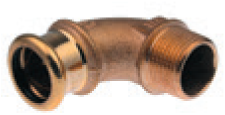


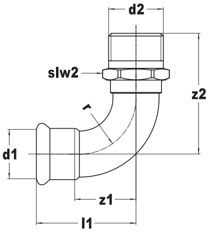
Dimension	Article No.	l1	l2	z1	z2	slw2
15 x Rp1/2	4803117	30	18	10	3	22
18 x Rp1/2	4803128	30	17	10	3	22
18 x Rp3/4	4803139	30	20	10	3	30
22 x Rp1/2	4803141	30	17	9	2	22
22 x Rp3/4	4803150	30	19	9	3	30
28 x Rp3/4	4803161	32	18	9	2	30
28 x Rp1	4803172	32	22	9	3	37
35 x Rp1	4803183	35	21	9	2	37
35 x Rp1 1/4	4803194	35	25	9	4	46
42 x Rp1 1/2	4803205	51	25	21	4	48
54 x Rp2	4803216	56	30	21	4	65

Take care, when pressing, that the jaws do not interfere with the wrench flats!

6092G Angle adapter 90°

(press x male thread)

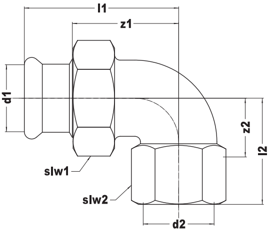




Dimension	Article No.	l1	z1	z2	slw2	r
12 x R3/8	4800928	36	19	25	15	14
12 x R1/2	4800939	40	23	26	26	14
15 x R3/8	4800941	43	12	24	18	18
15 x R1/2	4800950	38	19	34	18	18
18 x R1/2	4800961	42	15	37	18	22
18 x R3/4	4800972	47	18	31	25	22
22 x R3/4	4800983	47	28	43	25	26
28 x R1	4800994	58	36	53	33	34
35 x R1 1/4	4801005	55	30	47	40	42
42 x R1 1/2	4801016	62	32	51	50	50
54 x R2	4801027	70	35	63	60	65

6096G Angle adapter 90°

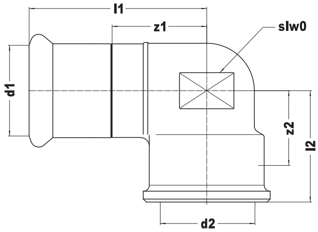
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw1	slw2
12 x Rp1/2	4802831	49	32	32	15	30	27
15 x Rp1/2	4802842	53	32	33	17	30	27
18 x Rp1/2	4802853	55	32	35	17	30	27
18 x Rp3/4	4802864	61	36	41	20	36	33
22 x Rp3/4	4802875	66	40	45	21	36	40
22 x Rp1	4802886	62	36	41	20	36	33
28 x Rp1	4802897	68	44	45	25	46	40

6090G Angle adapter 90°

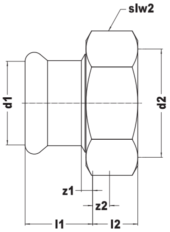
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw0
12 x Rp3/8	4801478	39	18	22	10	15
12 x Rp1/2	4801489	39	20	22	7	26
15 x Rp3/8	4801491	43	18	23	11	18
15 x Rp1/2	4801500	41	23	21	12	18
15 x Rp3/4	4805570	36	29	16	13	31
18 x Rp1/2	4801511	41	24	21	14	21
18 x Rp3/4	4801522	52	25	32	12	21
22 x Rp1/2	4801533	37	32	16	13	25
22 x Rp3/4	4801544	45	27	24	11	25
28 x Rp1	4801555	51	33	28	14	33
35 x Rp1 1/4	4801566	55	45	29	21	46
42 x Rp1 1/2	4801577	63	52	35	26	53
54 x Rp2	4801588	74	60	42	33	65

6359 Coupling with nut

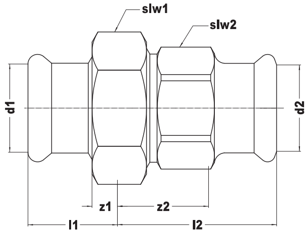
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
15 x G3/4	4800235	30	11	10	3	30
18 x G3/4	4800246	28	11	8	3	30
22 x G1	4800257	36	13	15	3	36
28 x G1 1/4	4800268	36	14	13	4	46
35 x G1 1/2	4800279	36	15	10	4	52
42 x G2 1/4	4800281	44	17	14	4	58

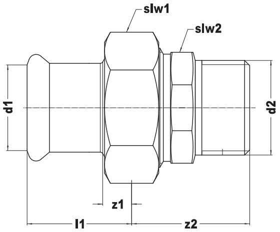
6330 Straight union

(2 x press)



Dimension	Article No.	l1	l2	z1	z2	slw1	slw2
15	4803348	27	33	7	13	30	25
18	4803359	29	33	9	13	30	25
22	4803361	31	37	10	16	36	32
28	4803370	33	41	10	17	46	40
35	4803381	33	38	7	14	52	46
42	4803392	41	50	11	20	58	51
54	4803403	48	51	13	16	75	65

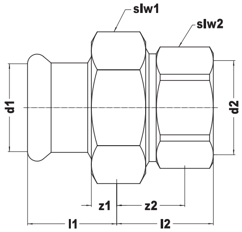
6331G Straight union
(press x male thread)



Dimension	Article No.	l1	l2	z1	z2	slw1	slw2
12 x R3/8	4802578	21	27	3	21	24	19
12 x R1/2	4802589	22	32	5	23	27	25
15 x R1/2	4802591	30	32	10	24	30	25
15 x R3/4	4802600	25	33	5	23	30	25
18 x R1/2	4802611	28	31	8	23	30	25
18 x R3/4	4802622	28	33	8	24	30	25
22 x R1/2	4802633	29	37	8	28	36	32
22 x R3/4	4802644	36	38	15	28	36	32
22 x R1	4802655	29	39	8	28	36	32
28 x R3/4	4805561	36	39	13	30	46	40
28 x R1	4802666	36	40	13	30	46	40
35 x R1 1/4	4802677	36	43	10	24	52	46
42 x R1 1/2	4802688	44	44	14	31	58	51
54 x R2	4802699	52	49	17	33	75	65

6330G Straight union

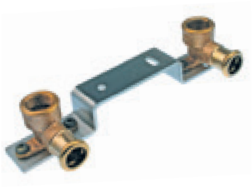
(press x female thread)

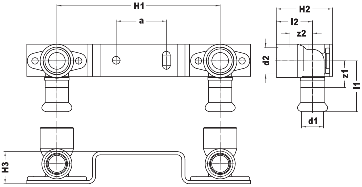


Dimension	Article No.	l1	l2	z1	z2	slw1	slw2
12 x Rp1/2	4802721	22	20	5	5	27	26
15 x Rp1/2	4802732	30	22	10	7	30	26
15 x Rp3/4	4802743	25	30	5	13	30	32
18 x Rp1/2	4802754	28	20	8	5	30	26
18 x Rp3/4	4802765	28	29	8	13	30	32
22 x Rp3/4	4802776	36	32	14	15	36	39
22 x Rp1	4802787	29	36	8	17	36	32
28 x Rp3/4	4805559	36	32	13	16	46	32
28 x Rp1	4802798	36	29	13	10	46	43
35 x Rp1 1/4	4802809	36	38	9	17	52	48
42 x Rp1 1/2	4802811	44	39	14	18	58	54
54 x Rp2	4802820	52	38	17	12	75	65

6490 Double wallplate

(press x female thread)

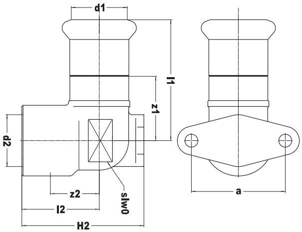




Dimension	Article No.	l1	l2	z1	H1	H2	H3	Distance holes
12 x Rp3/8	4807506	63	31	46	119	45	21	120
15 x Rp1/2	4807517	42	20	22	153	39	25	153

6472G Wallplate 90°

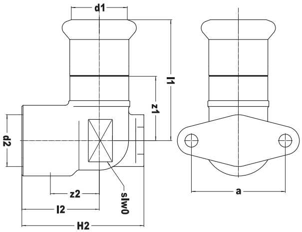
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	H2	slw0	a
12 x Rp1/2	4800873	63	25	46	10	35	15	35
15 x Rp1/2	4800884	42	20	22	9	35	18	40
18 x Rp1/2	4800895	43	24	23	9	39	25	40
22 x Rp3/4	4800906	45	27	24	11	45	18	40

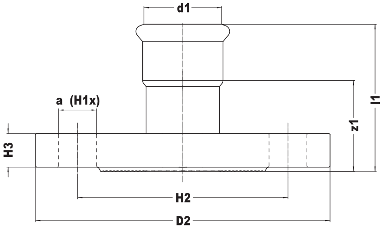
6472L Wallplate 90° long

(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	H2	slw0	a
15 x Rp1/2	4800917	47	48	27	8	58	18	40

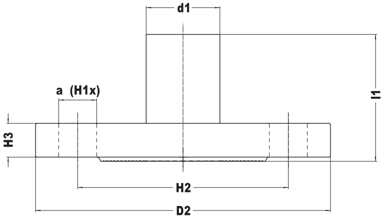
7510 Flanged connector PN 10/16
(1 x press)



Dimension	Article No.	l1	z1	H2	H3	D2	a	holes
Ø66,7 DN65	4806373	103	53	145	20	185	18	4
Ø76,1 DN65	4806441	103	53	145	20	200	18	8
Ø76,1 DN80	4806384	103	53	160	20	200	18	8
Ø88,9 DN80	4806395	113	51	160	20	200	18	8
Ø108 DN100	4806406	126	59	180	20	220	18	8

7520 Flanged connector PN 10/16

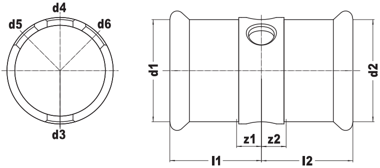
(1 x male)



Afmeting	Artikel nr.	l1	H2	H3	D2	a	holes
Ø66,7 DN65	4806428	112	145	20	185	18	4
Ø76,1 DN80	4806439	113	160	20	200	18	8
Ø108 DN100	4806516	141	180	20	220	18	8

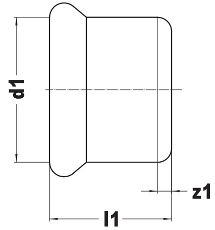
6131G Multi-port coupling

(2 x press)



Dimension	Article No.	l1/l2	z1/z2	d1	d2	d3	d4	d5	d6
66.7 x Rp1/2	4803051	65	15	67	67	1/2"	1/2"		
76.1 x Rp1/2	4803062	65	14	76	76	1/2"	1/2"		
88.9 x Rp3/4	4803073	80	18	89	89	3/4"	3/4"	3/4"	
108 x Rp3/4	4803084	85	18	108	108	3/4"	3/4"	3/4"	3/4"

7301 Stop end
(1 x press)



Dimension	Article No.	l1	z1
12	4805702	17	2
15	4802941	20	2
18	4802952	20	2
22	4802963	21	2
28	4802974	23	2
35	4802985	26	2
42	4802996	30	2
54	4803007	35	2
66.7	4806340	50	2
76.1	4803029	50	2
88.9	4806351	64	2
108	4803040	67	2

7999 O-ring standard

(black, EPDM) for copper

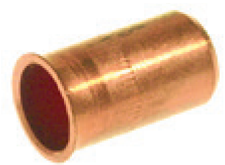
Dimension	Article No.
12	6115901
15	6115912
18	6115923
22	6115934
28	6115945
35	6115956
42	6115967
54	6115978
64	4805064
66.7	4806527
76.1	4805075
88.9	4805086
108	4805097

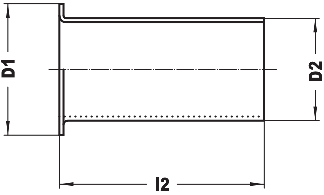
C1700 O-ring for special applications

(green, FPM) for copper

Dimension	Article No.
12	4805207
15	4805218
18	4805229
22	4805231
28	4805240
35	4805251
42	4805262
54	4805273
66.7	6119476
76.1	6119377
88.9	6119388
108	6119399

S1283 Insert for Wicu tube
(male)





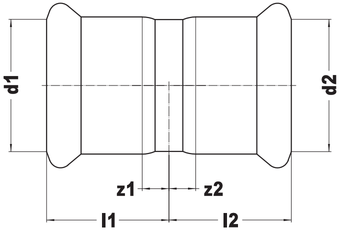
Dimension	Article No.	l2	D1	D2
12 x 1.0	0883234	23	12	9.8
15 x 1.0	0883245	23	15	12.5
18 x 1.0	0883278	25	18	15.8
22 x 1.0	0883291	27	22	19.8
28 x 1.2	0883300	32	22	25.4

VSH connects.

5.5 Copper GAS

XPress

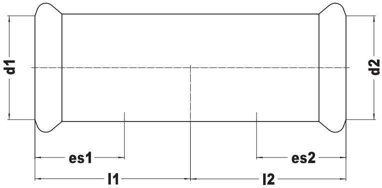
G7270 Straight coupling
(2 x press)



Dimension	Article No.	l1/l2	z1/z2
15	4804437	22	2
18	4804448	22	2
22	4804459	23	2
28	4804461	25	2
35	4804470	28	2
42	4804481	36	4
54	4804492	42	5

G7270S Slip coupling

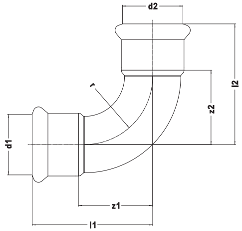
(2 x press)



Dimension	Article No.	l1/l2	es1/es2
15	4804503	40	20
18	4804514	40	20
22	4804525	42	21
28	4804536	46	23
35	4804547	50	25
42	4804558	60	30
54	4804569	71	36

G7002A Bend 90°

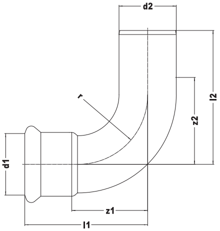
(2 x press)



Dimension	Article No.	l1/l2	z1/z2	r
15	4803832	38	17	14
18	4803843	42	22	22
22	4803854	47	26	26
28	4803865	56	34	34
35	4803876	68	42	42
42	4803887	80	50	50
54	4803898	100	65	65

G7001A Bend 90°

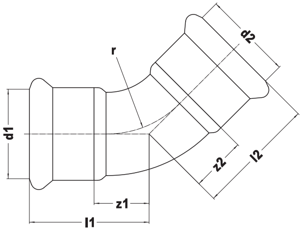
(press x male)



Dimension	Article No.	l1	l2	z1	z2	r
15 x Ø15	4803766	36	50	16	30	18
18 x Ø18	4803777	42	53	22	33	22
22 x Ø22	4803788	47	58	27	38	26
28 x Ø28	4803799	58	64	34	40	34
35 x Ø35	4803801	69	82	44	57	42
42 x Ø42	4803810	81	101	52	72	50
54 x Ø54	4803821	100	120	66	86	65

G7041 Bend 45°

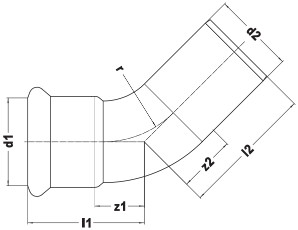
(2 x press)



Dimension	Article No.	l1/l2	z1/z2	r
15	4803975	28	8	18
18	4803986	29	9	22
22	4803997	31	12	26
28	4804008	37	16	34
35	4804019	44	18	42
42	4804021	51	21	50
54	4804030	62	27	65

G7040 Bend 45°

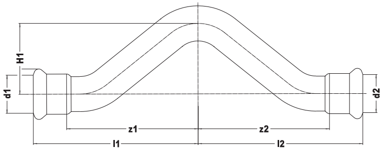
(press x male)



Dimension	Article No.	l1	l2	z1	z2	r
15 x Ø15	4803909	28	37	8	17	18
18 x Ø18	4803911	29	39	9	19	22
22 x Ø22	4803920	32	44	11	23	26
28 x Ø28	4803931	37	47	14	24	34
35 x Ø35	4803942	43	58	17	32	42
42 x Ø42	4803953	51	71	21	41	50
54 x Ø54	4803964	62	82	27	47	65

G7085 Crossover

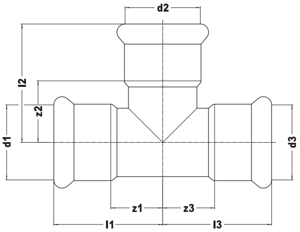
(2 x press)



Dimension	Article No.	l1/l2	z1/z2	H1
15	4804041	70	50	34
18	4804052	76	56	36
22	4804063	85	64	50

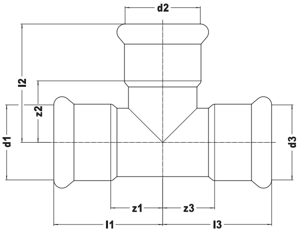
G7130 Tee

(3 x press)



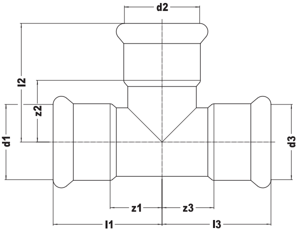
Dimension	Article No.	l1/l2/l3	z1/z2/z3
15	4804107	32	12
18	4804118	34	14
22	4804129	37	16
28	4804131	42	19
35	4804140	50	24
42	4804151	58	28
54	4804162	69	34

G7125 T-reduced
(3 x press)



Dimension	Article No.	l1/l3	l2	z1/z3	z2
18 x 15 x 18	4804173	34	35	14	15
22 x 15 x 22	4804195	37	38	16	18
22 x 18 x 22	4804206	37	38	16	18
28 x 15 x 28	4804228	42	41	19	21
28 x 22 x 28	4804241	42	41	19	20
35 x 22 x 35	4804250	45	45	19	24
35 x 28 x 35	4804261	50	44	24	21
42 x 22 x 42	4807638	50	48	20	27
42 x 28 x 42	4804272	56	49	26	26
42 x 35 x 42	4804283	56	50	26	24
54 x 22 x 54	4807649	60	54	25	33
54 x 42 x 54	4804294	69	64	34	34

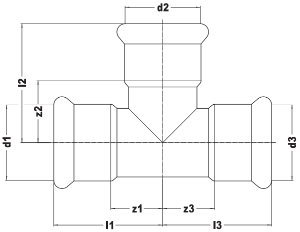
G7126 T-reduced
(3 x press)



Dimension	Article No.	l1/l2	l3	z1/z2	z3
22 x 22 x 15	4804217	37	46	16	26

G7127 T-reduced

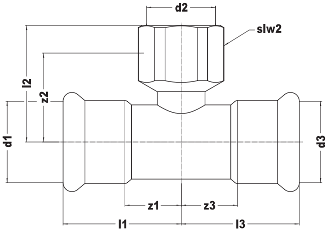
(3 x press)



Dimension	Article No.	l1	l2	l3	z1	z2	z3
22 x 15 x 15	4804184	37	44	43	16	18	23

G6130G Tee branch female

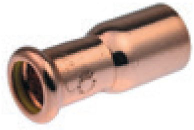
(press x female thread x press)

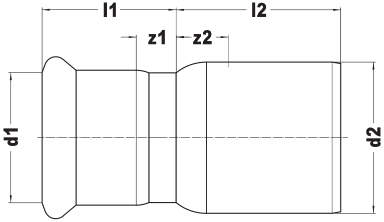


Dimension	Article No.	l1/l3	l2	z1/z3	z2	slw2
15 x Rp1/2 x 15	4804833	32	59	48	12	22
18 x Rp1/2 x 18	4804844	42	24	8	22	22
22 x Rp1/2 x 22	4804855	34	65	50	13	22
22 x Rp3/4 x 22	4804866	37	67	51	16	30
28 x Rp1/2 x 28	4804877	44	29	14	21	22
28 x Rp3/4 x 28	4804888	41	34	14	18	30
35 x Rp1/2 x 35	4804899	50	34	19	24	22
35 x Rp1 x 35	4804901	50	34	14	24	46
42 x Rp1/2 x 42	4804910	57	38	23	27	48
54 x Rp1/2 x 54	4804932	69	44	29	34	65

G7243 Reducer

(male x press)

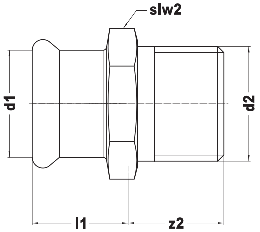




Dimension	Article No.	l1	l2	z1	z2
Ø18 x 15	4804305	24	23	4	3
Ø22 x 15	4804316	24	28	4	7
Ø22 x 18	4804327	24	26	4	5
Ø28 x 15	4804338	25	37	4	14
Ø28 x 18	4804349	24	26	4	5
Ø28 x 22	4804351	25	30	4	7
Ø35 x 22	4804360	29	39	9	13
Ø35 x 28	4804371	28	35	5	9
Ø42 x 22	4804382	25	49	4	19
Ø42 x 28	4804393	27	44	4	14
Ø42 x 35	4804404	35	38	8	8
Ø54 x 28	4807286	27	59	4	24
Ø54 x 35	4804415	35	53	9	18
Ø54 x 42	4804426	40	47	9	12

G6243G Straight connector

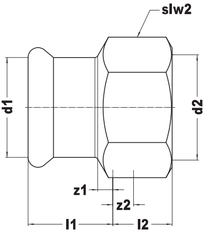
(press x male thread)



Dimension	Article No.	l1	z1	z2	slw2
15 x R1/2	4803414	20	4	17	21
15 x R3/4	4803425	20	4	19	25
18 x R1/2	4803436	20	4	17	25
18 x R3/4	4803447	20	4	19	25
22 x R1/2	4803458	21	5	17	30
22 x R3/4	4803469	21	5	19	30
22 x R1	4803471	21	5	21	32
28 x R3/4	4803480	23	5	20	36
28 x R1	4803491	23	5	10	36
28 x R1 1/4	4803502	23	4	13	40
35 x R1	4803513	26	5	22	41
35 x R1 1/4	4803524	26	5	27	41
42 x R1 1/4	4803535	30	2	28	51
42 x R1 1/2	4803546	30	2	28	51
54 x R2	4803557	35	7	28	57

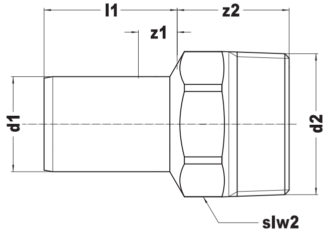
G6270G Straight connector

(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
15 x Rp1/2	4803568	19	18	2	8	25
15 x Rp3/4	4803579	17	19	1	8	30
18 x Rp1/2	4803581	19	18	1	8	25
18 x Rp3/4	4803590	20	19	2	9	30
22 x Rp1/2	4803601	19	17	1	7	30
22 x Rp3/4	4803612	20	19	1	9	30
28 x Rp1	4803623	23	22	1	10	37
35 x Rp1 1/4	4803634	25	25	1	11	46
42 x Rp1 1/2	4803645	27	25	1	11	48
54 x Rp2	4803656	32	25	1	11	48

6280G Straight connector
(male x male thread)

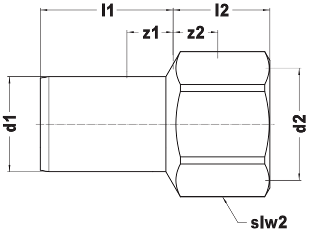


Dimension	Article No.	l1	z1	z2	slw2
15 x R1/2	4803251	30	10	21	19
18 x R1/2	4803260	30	10	20	19
18 x R3/4	4803271	30	10	23	25
22 x R1/2	4803282	30	9	21	19
22 x R3/4	4803293	30	9	23	25
28 x R1	4803304	32	9	26	32
35 x R1 1/4	4803315	35	9	29	36
42 x R1 1/2	4803326	51	21	29	46

Take care, when pressing, that the jaws do not interfere with the wrench flats!

6246G Straight connector

(male x female thread)

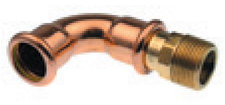


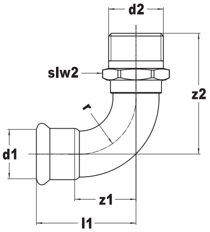
Dimension	Article No.	l1	l2	z1	z2	slw2
15 x Rp1/2	4803117	30	18	10	3	22
18 x Rp1/2	4803128	30	17	10	3	22
18 x Rp3/4	4803139	30	20	10	3	30
22 x Rp1/2	4803141	30	17	9	2	22
22 x Rp3/4	4803150	30	19	9	3	30
28 x Rp3/4	4803161	32	18	9	2	30
28 x Rp1	4803172	32	22	9	3	37
35 x Rp1	4803183	35	21	9	2	37
35 x Rp1 1/4	4803194	35	25	9	4	46
42 x Rp1 1/2	4803205	51	25	21	4	48
54 x Rp2	4803216	56	30	21	4	65

Take care, when pressing, that the jaws do not interfere with the wrench flats!

G6092G Angle adapter 90°

(press x male thread)

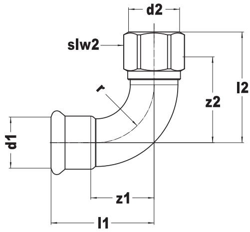




Dimension	Article No.	l1	z1	z2	slw2	r
15 x R1/2	4804756	37	18	67	19	18
18 x R1/2	4804767	64	44	34	19	22
18 x R3/4	4804778	60	40	37	25	22
22 x R3/4	4804789	48	27	79	30	26
28 x R1	4804791	57	35	88	36	34
35 x R1 1/4	4804800	80	55	59	41	42
42 x R1 1/2	4804811	104	74	57	51	50
54 x R2	4804822	104	69	80	57	65

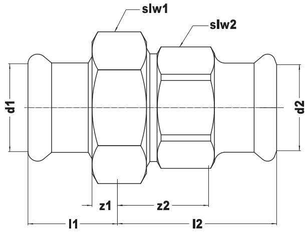
G6090G Angle adapter 90°

(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2	r
15 x Rp1/2	4804646	55	26	35	12	22	18
15 x Rp3/4	4804657	63	29	43	12	30	18
18 x Rp1/2	4804668	55	25	35	9	22	22
18 x Rp3/4	4804679	61	29	41	11	30	22
22 x Rp1/2	4804681	56	25	35	14	22	26
22 x Rp3/4	4804690	62	29	41	13	30	26
22 x Rp1	4804701	66	38	45	21	37	26
28 x Rp1	4804712	73	37	50	18	37	34
35 x Rp1 1/4	4804723	83	43	57	19	46	42
42 x Rp1 1/2	4804734	88	46	60	27	48	50
54 x Rp2	4804745	104	55	72	33	65	65

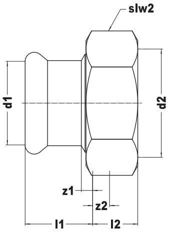
G6340 Straight union
(2 x press)



Dimension	Article No.	l1	l2	z1	z2	slw1	slw2
15	4803667	25	36	5	16	34	28
22	4803689	29	38	8	17	41	36
28	4803691	34	41	11	18	48	41
35	4803700	36	46	10	20	58	50
42	4803711	46	51	16	21	65	55
54	4803722	46	58	11	23	80	70

G6360 Coupling with nut

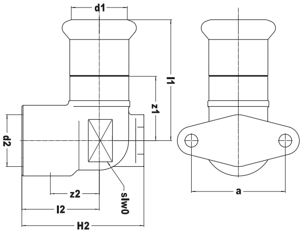
(press x female thread)



Dimension	Article No.	l1	l2	z1	z2	slw2
15 x G7/8	4803733	20	14	4	9	34
28 x G1 3/8	4803755	23	22	4	18	48

G6471G Wallplate 90°

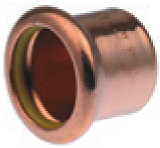
(press x female thread)

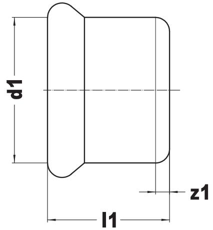


Dimension	Article No.	l1	l2	z1	z2	H2	slw0	a
15 x Rp1/2	4804954	51	22	31	11	38	-	40
18 x Rp1/2	4804965	51	22	31	10	38	-	40
22 x Rp3/4	4804976	61	31	40	15	48	-	40

G7301 Stop end

(1 x press)





Dimension	Article No.	l1	z1
15	4804571	20	2
18	4804580	20	2
22	4804591	21	2
28	4804602	23	2
35	4804613	26	2
42	4804624	30	2
54	4804635	35	2

G7999 O-ring standard
(yellow, NBR) for copper GAS

Dimension	Article No.
15	4805108
18	4805119
22	4805121
28	4805130
35	4805141
42	4805152
54	4805163

VSH sluit aan.

5.6 CuNi

XPress

CUN7550 CuNi Tube

(6 m length)

Dimension	Article No.	DN
15 x 1,0	7509007	10
18 x 1,0	7509018	12
22 x 1,0	7509029	15
28 x 1,5	7509031	25
35 x 1,5	7509040	32
42 x 1,5	7509051	40
54 x 1,5	7509062	50
76,1 x 2,0	7509073	65
88,9 x 2,0	7509084	80
108 x 2,0	7509095	100

CUN7501 Straight coupling
(2 x press)

Dimension	Article No.
15	7500009
18	7500011
22	7500020
28	7500031
35	7500042
42	7500053
54	7500064
76,1	7500075
88,9	7500086
108	7500097

CUN7503 Slip coupling

(2 x press)

Dimension	Article No.
15	7500108
18	7500119
22	7500121
28	7500130
35	7500141
42	7500152
54	7500163
76,1	7500174
88,9	7500185
108	7500196

CUN7508 Bend 90°

(2 x press)

Dimension	Article No.
15	7500405
18	7500416
22	7500427
28	7500438
35	7500449
42	7500451
54	7500460
76,1	7500471
88,9	7500482
108	7500493

CUN7511 Bend 90°

(press x male)

Dimension	Article No.
15	7500504
18	7500515
22	7500526
28	7500537
35	7500548
42	7500559
54	7500561
76,1	7500570
88,9	7500581
108	7500592

CUN7512 Bend 45°

(press x male)

Dimension	Article No.
15	7500889
18	7500891
22	7500900
28	7500911
35	7500922
42	7500933
54	7500944
76,1	7500955
88,9	7500966
108	7500977

CUN7513 Bend 45°

(2 x press)

Dimension	Article No.
15	7500781
18	7500790
22	7500801
28	7500812
35	7500823
42	7500834
54	7500845
76,1	7500856
88,9	7500867
108	7500878

CUN7520 Bend 15°

(2 x press)

Dimension	Article No.
15	7501164
22	7501175
28	7501186
35	7501197
42	7501208
54	7501219
76,1	7501221
88,9	7501230
108	7501241

CUN7519 Bend 15°

(press x male)

Dimension	Article No.
15	7501252
22	7501263
28	7501274
35	7501285
42	7501296
54	7501307
76,1	7501318
88,9	7501329
108	7501331

CUN7522 Bend 30°

(2 x press)

Dimension	Article No.
15	7500988
22	7500999
28	7501001
35	7501010
42	7501021
54	7501032
76,1	7501043
88,9	7501054
108	7501065

CUN7519 Bend 15°
(press x male)

Dimension	Article No.
15	7501252
22	7501263
28	7501274
35	7501285
42	7501296
54	7501307
76,1	7501318
88,9	7501329
108	7501331

CUN7522 Bend 30°

(2 x press)

Dimension	Article No.
15	7500988
22	7500999
28	7501001
35	7501010
42	7501021
54	7501032
76,1	7501043
88,9	7501054
108	7501065

CUN7521 Bend 30°

(press x male)

Dimension	Article No.
15	7501076
22	7501087
28	7501098
35	7501109
42	7501111
54	7501120
76,1	7501131
88,9	7501142
108	7501153

CUN7524 Bend 60°

(2 x press)

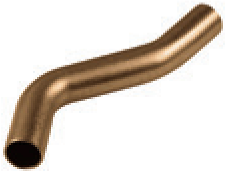
Dimension	Article No.
15	7500603
22	7500614
28	7500625
35	7500636
42	7500647
54	7500658
76,1	7500669
88,9	7500671
108	7500680

CUN7523 Bend 60°

(press x male)

Dimension	Article No.
15	7500691
22	7500702
28	7500713
35	7500724
42	7500735
54	7500746
76,1	7500757
88,9	7500768
108	7500779

CUN7517 Crossover
(2 x male)



Dimension	Article No.
Ø15	7501340
Ø18	7501351
Ø22	7501362
Ø28	7501373

CUN7514 Tee

(3 x press)

Dimension	Article No.
15	7501384
18	7501395
22	7501406
28	7501417
35	7501428
42	7501439
54	7501441
76,1	7501450
88,9	7501461
108	7501472

CUN7515 T-reduced
(3 x press)

Dimension	Article No.
18 x 15 x 18	7501483
22 x 15 x 22	7501494
22 x 18 x 22	7501505
28 x 15 x 28	7501516
28 x 18 x 28	7501527
28 x 22 x 28	7501538
35 x 15 x 35	7501549
35 x 18 x 35	7501551
35 x 22 x 35	7501560
35 x 28 x 35	7501571
42 x 22 x 42	7501582
42 x 28 x 42	7501593
42 x 35 x 42	7501604
54 x 22 x 54	7501615
54 x 28 x 54	7501626
54 x 35 x 54	7501637
54 x 42 x 54	7501648
76,1 x 22 x 76,1	7501659
76,1 x 28 x 76,1	7501661

CUN7515 T-reduced
(3 x press)

Dimension	Article No.
76,1 x 35 x 76,1	7501670
76,1 x 42 x 76,1	7501681
76,1 x 54 x 76,1	7501692
88,9 x 22 x 88,9	7501703
88,9 x 28 x 88,9	7501714
88,9 x 35 x 88,9	7501725
88,9 x 42 x 88,9	7501736
88,9 x 54 x 88,9	7501747
88,9 x 76,1 x 88,9	7501758
108 x 22 x 108	7501769
108 x 28 x 108	7501771
108 x 35 x 108	7501780
108 x 42 x 108	7501791
108 x 54 x 108	7501802
108 x 76,1 x 108	7501813
108 x 88,9 x 108	7501824

CUN7518 Tee branch female

(press x female thread x press)

Dimension	Article No.
15 x Rp1/2 x 15	7502286
18 x Rp1/2 x 18	7502297
18 x Rp3/4 x 18	7502308
22 x Rp1/2 x 22	7502319
22 x Rp3/4 x 22	7502321
28 x Rp1/2 x 28	7502330
28 x Rp3/4 x 28	7502341
35 x Rp1/2 x 35	7502352
35 x Rp3/4 x 35	7502363
42 x Rp1/2 x 42	7502374
42 x Rp3/4 x 42	7502385
54 x Rp1/2 x 54	7502396
54 x Rp3/4 x 54	7502407
54 x Rp2 x 54	7502418
76,1 x Rp3/4 x 76,1	7502429
76,1 x Rp2 x 76,1	7502451
88,9 x Rp3/4 x 88,9	7502431
88,9 x Rp2 x 88,9	7502462
108 x Rp3/4 x 108	7502440
108 x Rp2 x 108	7502473

CUN7507 Reducer

(male x press)

Dimension	Article No.
Ø18 x 15	7500207
Ø22 x 15	7500218
Ø22 x 18	7500229
Ø28 x 15	7500231
Ø28 x 18	7500240
Ø28 x 22	7500251
Ø35 x 22	7500262
Ø35 x 28	7500273
Ø42 x 28	7500284
Ø42 x 35	7500295
Ø54 x 28	7500306
Ø54 x 35	7500317
Ø54 x 42	7500328
Ø76,1 x 42	7500341
Ø76,1 x 54	7500339
Ø88,9 x 54	7500350
Ø88,9 x 76,1	7500361
Ø108 x 54	7500372
Ø108 x 76,1	7500383
Ø108 x 88,9	7500394

CUN7505 Straight connector
(press x male thread)

Dimension	Article No.
15 x R1/2	7501923
18 x R1/2	7501934
18 x R3/4	7501945
22 x R3/4	7501956
28 x R1	7501967
35 x R1 1/4	7501978
42 x R1 1/2	7501989
54 x R2	7501991

CUN7502 Straight connector

(press x female thread)

Dimension	Article No.
15 x Rp1/2	7501835
18 x Rp1/2	7501846
18 x Rp3/4	7501857
22 x Rp1/2	7501868
22 x Rp3/4	7501879
28 x Rp1	7501881
35 x Rp1 1/4	7501890
42 x Rp1 1/2	7501901
54 x Rp2	7501912

CUN7528 Angle adapter 90°

(press x male thread)

Dimension	Article No.
15 x R1/2	7502209
18 x R1/2	7502211
22 x R3/4	7502231
28 x R1	7502242
35 x R1 1/4	7502253
42 x R1 1/2	7502264
54 x R2	7502275

CUN7509 Angle adapter 90°

(press x female thread)

Dimension	Article No.
15 x Rp1/2	7502143
18 x Rp1/2	7502154
22 x Rp1/2	7502176
22 x Rp3/4	7502165
28 x Rp1/2	7502187
35 x Rp1 1/4	7502198

CUN7535 3-piece straight union

(press x male thread)

Dimension	Article No.
15 x R1/2	7502077
18 x R1/2	7502088
22 x R3/4	7502099
28 x R1	7502101
35 x R1 1/4	7502110
42 x R1 1/2	7502121
54 x R2	7502132

CUN7538 3-piece straight union
(press x female thread)

Dimension	Article No.
15 x Rp1/2	7502000
18 x Rp1/2	7502011
22 x Rp3/4	7502022
28 x Rp1	7502033
35 x Rp5/4	7502044
42 x Rp3/2	7502055
54 x Rp2	7502066

CUN7526 Flanged connector PN16

(1 x press)

Dimension	Article No.
15	7502484
18	7502495
22	7502506
28	7502517
35	7502528
42	7502539
54	7502541
76,1	7502550
88,9	7502561
108	7502572

CUN7540 Pipe penetration

(2 x male)

Dimension	Article No.
Ø15	7502583
Ø18	7502594
Ø22	7502605
Ø28	7502616
Ø35	7502627
Ø42	7502638
Ø54	7502649
Ø76,1	7502651
Ø88,9	7502660
Ø108	7502671

5.7 Tools and accessories

XPress

P5991/5999 Press tools Novopress

	Dimension	Article No.
ACO102 + 2 batteries 1.5Ah + charger + case	12-35	6341302
ACO102 + 1 battery 3.0Ah + charger + case	12-35	6341324
ACO102 + 2 batteries 3.0Ah + charger + jaws 12-35 + case	12-35	6341720
PB1 jaw	12	6209203
PB1 jaw	15	6209214
PB1 jaw	18	6209225
PB1 jaw	22	6209236
PB1 jaw	28	6209247
PB1 jaw	35	6341544

P5992/6002/6003/6004/6005/6006 Press tools Novopress

	Dimension	Article No.
ECO203 + case	12-54	6342094
ACO203 + battery + charger + case	12-54	6342017
ACO203 + jaws + 2 batteries 3.0Ah + charger + case	12-15-18-22-28-35	6342072
ACO203 + jaws + slings + ZB203 + 2 batteries Li-Ion 3.0Ah + charger + case	22-28-35-42-54	6342083
ACO203XL + 2 batteries 3.0Ah + charger + case	12-108	6342226
ACO203XL + slings + ZB221 and ZB222 adapters + 2 batteries 3.0Ah + charger + cases	66.7-76.1-88.9-108	6342248

P5990/P6011 Press jaws/-slings Novopress

	Dimension	Article No.
PB2 ECOTEC jaw	12	6205331
PB2 ECOTEC jaw	15	6205342
PB2 ECOTEC jaw	18	6205353
PB2 ECOTEC jaw	22	6205364
PB2 ECOTEC jaw	28	6205375
PB2 ECOTEC jaw	35	6205386
ZB203 adapter	35-42-54	6340829
Snap-on sling	42	6341093
Snap-on sling	54	6341104
Snap-on HP sling	35	6341060
Snap-on HP sling	42	6341071
Snap-on HP sling	54	6341082
ZB221 adapter	66.7 + 76.1 + 88.9 + 108/1	6341896
ZB222 adapter	108/2	6341907
Snap-on slings	64	6341381
Snap-on slings	66.7	6341390
Snap-on slings	76.1	6341401
Snap-on slings	88.9	6341412
Snap-on slings	108	6341423
Set: case + Snap-on slings	42-54+ZB203	6205672
Set: case + Snap-on HP slings	42-54HP+ZB203	6341225
Set: case + Snap-on HP slings	35-42-54HP+ZB203	6341775
Set: case + Snap-on slings	66.7	6341940
Set: case + Snap-on slings	76.1 + 88.9	6341951
Set: case + Snap-on slings	108	6341962

P5997 Press tools Novopress

	Dimension	Article No.
ECO301 + case	12-108	6205507
ECO301 + cases + jaws + ZB203 adapter + slings 42-54	12-15-18-22-28-35-42-54	6341753
ECO301 + cases + ZB323 and ZB324 adapter + slings 76.1-108	76.1-88.9-108	6341764

P5989 Press jaws/-slings Novopress

	Dimension	Article No.
ECO301 jaw	12	6205727
ECO301 jaw	15	6205738
ECO301 jaw	18	6205749
ECO301 jaw	22	6205751
ECO301 jaw	28	6205760
ECO301 jaw	35	6205771
ZB303 adapter	35-42-54	6341115
Snap-on sling	42	6341093
Snap-on sling	54	6341104
Snap-on HP sling	35	6341060
Snap-on HP sling	42	6341071
Snap-on HP sling	54	6341082
ZB323 adapter	64-89-108/1	6341434
ZB334 adapter	108/2	6341445
ECO301 Snap-on sling	64	6341381
ECO301 Snap-on sling	66.7	6341390
ECO301 Snap-on sling	76.1	6341401
ECO301 Snap-on sling	88.9	6341412
ECO301 Snap-on sling	108	6341423
ECO301 copper sling	108 x 1.5	6205243
Set: Snap-on sling + ZB323	76.1-88.9	6341456
Set: Snap-on sling + ZB323 + ZB324	108	6341467
Set: Snap-on sling + ZB324	108	6341478

P6000/6001 Press tools Novopress and slings

	Dimension	Article No.
ACO401 + 2 batteries + charger + case	76.1-108	6340081
ACO401 + 2 batteries + charger + case + slings 76.1-108	76.1-108	6341236
HP401 sling + case	76.1	6340092
HP401 sling + case	88.9	6340103
HP401 sling + case	108	6340114

P5997/6002/6004 Case

	Dimension	Article No.
Case ACO102		6342039
Case AFP/EFP202		6340631
Case ECO/ACO203 (XL)		6342028
Case ACO202XL		6342041
Case ECO301		6341533
Case ACO401		6341214
Case for adapter ZB221 + ZB222		6341918
Case Snap-on slings + adapter	35-42-54 + ZB2/303	6341148
Case for Snap-on slings 76,1-88,9 + adapter ZB323		6341489
Case for Snap-on sling 108 + adapters ZB323 + ZB324		6341491

P5991/6002/6004 Battery + charger

	Article No.
AFP101 (9.6V) battery 3.0Ah	6209291
ACO102 (12V) battery 3.0Ah	6341271
ACO102 (12V) battery 1.5Ah	6341269
ACO102 (12V) charger	6341280
Battery AFP202 14.4V 2.0Ah NiCd	6340611
Battery AFP202 18V 3.0Ah Li-Ion	6340620
Charger AFP202	6340653
Battery ACO202/203 1.5Ah 18V	6340136
Battery ACO202/203/401 3.0Ah 18V	6340147
Charger ACO202/203/401	6340125

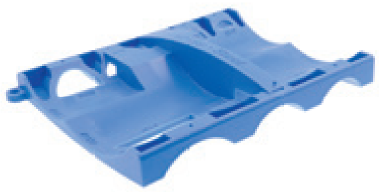
P1440 Stripping tool for PP-coating

Dimension	Article No.
15	6211843
18	6211854
22	6211865
28	6211876
35-54	6211887

P1441 Blades for stripping tool P1440

Dimension	Article No.
15-18	6212019
22-28	6212021
35-54	6212030

P2742 Insertion depth marker



Dimension	Article No.
12-108 (for VSH XPress Copper)	6212657
12-108 (for VSH XPress Galvanized Steel and Stainless)	6212646

P2743 Deburring tool

Dimension	Article No.
12-54	6211898

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VSH XPress	Piping systems with M-profile press fittings in three types of material: galvanized steel, copper and stainless steel. VSH XPress is suitable for heating, cooling, water, gas, solar, compressed air and fire protection systems in residential, commercial and industrial buildings, shipbuilding and industry.
VSH XPress HP	VSH XPress HP supplies an metal to metal sealing system that is perfect for pipe systems in industry, shipbuilding and fire safety systems operating under high pressure and/or high temperatures.
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