VSH connects.

Technical Manual

VSH Super

Disclaimer:

This technical data is non binding and does not reflect the guaranteed 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 that are suitable for the intended application and that satisfy pressure ratings and performance characteristics. The installation instructions should always be read and followed. It is never permitted to remove, modify or correct any system component or defective part without first depressurising the system and allowing it to drain.

Contents

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 correct solution for systems in residential buildings, utilities, shipbuilding and industry.

VSH is a 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 essential. 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 enjoy playing this role now, and we aim to continue in this role in the future. Our promise is more than just a slogan: VSH connects.

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

VSH connects.

1 VSH Super compression fittings

VSH Super is a complete package of fittings suitable for a very wide variety of applications, ranging from drinking water, gas, heating and solar to compressed air systems. The VSH Super range includes compression fittings for connection to copper and steel tubes. VSH Super also has compression fittings that are suitable for connecting plastic pipes. Convenient installation and high quality are the top priorities.

The benefits of VSH Super

+ A broad selection of fittings for every application (for metal and plastic tubes)
+ Normal brass and DZR fittings from 6 to 54 mm
+ Available in raw finish, nickel-plated and chromium-plated variants
+ A wide range of accessories provided with press connections
+ Designed for optimum installation convenience thanks to the wide spanner flats on the union nuts and housings
+ Simple installation with standard tools
+ Quick connection technology allowing reassembly
+ Smooth assembly (no juddering or creaking) with additional pipe guide
+ Peace of mind: maximum quality and security
+ A wide range of approvals available, including KIWA and Gastec QA

VSH Super has been associated with compression fittings in the Dutch market since 1975. The fittings are available in different types of brass in dimensions from 6 to 54 mm. The fittings are suitable not only for heating installations, but also for gas, solar and drinking water systems.
In addition to the standard compression which is suitable for copper or thin-walled steel tubes, VSH Super also offers special solutions, including:

- **Multi Super** and **MPI sets**: for plastic and multi-layer tubes
- **Super Blue**: specifically for connecting thick-walled steel tubes
- **VSH Super gas** for Belgium: this range of fittings complies with the guidelines for gas installations in Belgium

A wide variety of accessories with compression connections completes the VSH Super range. These include solutions such as water ball valves, gas ball valves and balancing valves.

Designed for optimum installation convenience

VSH Super compression fittings are designed on the basis of fitters' requirements and thus offer optimum installation convenience. The results of this include, for example, the dimensionally stable heads, ensuring that the spanner always remains in place during tightening. The special compression ring ensures an optimum seal at all times. This delivers a huge saving in terms of manpower costs as there is no need to make a return visit for retightening. What's more, the high-quality finish of the fittings ensures a smooth assembly at all times, with no juddering or creaking.

Quality and availability

All VSH Super compression fittings are produced in our modern, automated factory in Hilversum (Netherlands). Delivering absolute top quality is our main focus, so we maintain strict quality control in the production process. The complete VSH Super product range is available from our reliable network of expert, service-oriented wholesalers in the Netherlands.

Safety

The years of experience in installation of VSH Super compression fittings in combination with a wide range of national and international approvals (such as KIWA, Gastec QA and DVGW) and the product guarantee ensure a reliable and safe product.

2 Applications

2.1 Applications for fittings

Potable water installation

VSH Super compression fittings with a copper tube, soft (R220) semi-hard (R250) and hard (R290) with dimensions in accordance with EN 1057, wall thickness in accordance with KIWA BRL-K639/03, the steel of which is certified under NEN-EN 1254-2. Stainless steel tube according to EN 10312, DVGW Worksheet W 541.

Operating temperature:	Max. 90°C
Maximum temperature:	120°C
Operating pressure:	Max. 10 bar

VSH Multi Super Compression with a plastic or multi-layer tube approved by VSH for this application.

Operating temperature:	Max. 70°C
Maximum temperature:	95°C
Operating pressure:	Max. 10 bar

VSH MPI sets with a plastic or multi-layer tube approved by VSH in accordance with the potable water certification (SITAC/ETA/STF).

Heating systems

VSH Super compression fittings with a copper tube R220/R250/R290 with dimensions according to EN 1057. Thin-walled galvanised steel tube according to EN 10305-3, stainless steel tube in accordance with EN 10312, thick-walled steel tube in accordance with EN 10255 (in combination with a Super Blue compression *ring). Stainless steel tube according to EN 10312, DVGW Worksheet W 541.*

Operating temperature:	Max. 90°C
Maximum temperature:	120°C
Operating pressure:	Max. 10 bar

VSH Multi Super compression with a plastic and multi-layer tube approved for this application by VSH in accordance with the applicable class (operating conditions in accordance with ISO 10508), see Table 2.1.

Temperature range in accordance with EN ISO 10508 Classes 4 or 5. Maximum operating pressure VSH Multi Universal, Multicon and Henco: 10 bar continuous, 12 bar peak (see Table 2.1).

For floor heating the temperature range is in accordance with ISO 10508 Class 4. Maximum operating pressure VSH Multi Universal, Multicon and Henco: 10 bar continuous/12 bar peak (see Table 2.1).

Note: For an application with other approved multi-layer and PEX pipes, check the pipe specifications

Application Class (EN ISO 10508)							
	T_d		T_{max}		T_{mal}		
Application Class	°C	time/ years	°C	time/ years	°C	time/ hours	Characteristics Intended Use
1[a]	60	49	80	1	95	100	Hot water supply (60°C)
2[a]	70	49	80	1	95	100	Hot water supply (70°C)
4[b]	20 40 60	2.5 20 25	70	2.5	100	100	Floor heating and low temperature radiators
5[b]	20 60 80	14 25 10	90	1	100	100	High temperature radiators

NOTE: Where the values for Td, Tmax and Tmal are higher than in the table above, this international standard does not apply.

[a] One country can select from the class or classes in accordance with their national legislation.

[b] Whenever a temperature higher than the design temperature occurs for any class, then the times must be aggregated. "Cumulatively" in the table implies a temperature profile for the temperature mentioned over a specific period. (For example a design temperature for 50 years for Class 5 is 20°C for 14 years, followed by 60°C for 25 years, 80°C for 10 years, 90°C for 1 year and 100°C for 100 hours.)

TABLE 2.1

Gas installations

VSH Super compression fittings with an R250 copper tube in accordance with EN 1057 depending on the gas approval type. For Belgium there are special VSH Super compression fittings with a different compression ring (with a stop end) and a raised nut that, in addition to Gastec QA, KE 35 also satisfies the Belgian gas approval KVBG/ARGB (maximum pressure 0.1 bar). Suitable for gas installations in accordance with the DVGW-Worksheet G260/I in the second and third gas family (for example methane, butane, propane) in accordance with DIN 3387 and DVGW-TRGI G 600.

Operating pressure:	Maximum 1 bar
Operating temperature:	- 20°C to 70°C

Compressed air systems

VSH Super compression fittings in combination with a galvanised steel tube in accordance with EN 10305-5 or a stainless steel tube in accordance with EN 10312 or a copper tube in accordance with EN 1057. A galvanised steel precision tube can be used with a maximum water volume of 880 mg/m^3, Class 3 ISO 8573 part 1. If the maximum water content is exceeded, copper or stainless steel must be used. The maximum operating pressure is 10 bar.

Steam systems

VSH Super compression fittings in combination with a stainless steel tube in accordance with EN 10312 or a copper tube (R250/R290) in accordance with EN 1057.

Temperature:	Max. 200°C
Pressure:	Max. 9 bar

Vacuum applications

VSH Super compression rings can be fitted with a vacuum pressure up to -0.8 bar (relative) in combination with a copper tube in accordance with EN 1057, a galvanised steel precision tube in accordance with EN 10305-3 or a stainless steel tube conforming to EN10312.

Solar installations

VSH Super compression fittings in combination with a stainless steel tube in accordance with EN 10312 or a copper tube (R250/R290) in accordance with EN 1057.

The formation of condensation on the fittings must be prevented.

Temperature:	Max. 200°C
Pressure:	Max. 9 bar

Oil installations

VSH Super compression in combination with a stainless steel tube in accordance with EN 10312, a galvanised steel tube according to EN 10305-3, provided that is a closed system and a copper tube in accordance with EN 1057. This applies for mineral and synthetic oils. Maximum pressure is 10 bar.

2.2 Suitable tubes

The VSH Super compression fittings, VSH Multi Super fittings, inserts and the MPI inserts can be combined with a range of different tube materials. The permitted tubes are set out below. If you wish to use the fittings with different tube materials than those described below, the written permission of VSH is required.

2.2.1 Copper tubes

The VSH Super compression fittings are designed to be fitted to a copper tube, soft (R220), semi-hard (R250) and hard (R290). With a soft copper tube (R220), use a copper support sleeve (type S1283).

Technical characteristics of approved copper tubes	
Material	DHP copper article No. CW024A in accordance with DIN EN 1412
External tolerance Ø	EN 1057
Tensile strength	R220 - soft - 220 N/mm^2 (not for GAS) R250 - medium-hard - 250 N/mm^2 R290 - hard - 290 N/mm^2
Smallest bend radius	3.5 x the external diameter of the tube (to -10°C)

TABLE 2.2

Copper tubes in accordance with EN 1057						
Outside Ø (mm)	Wall thickness (mm)					
	1.0	1.1	1.2	1.5	2.0	2.5
12	R220					
15	R220 R250 R290					
18	R250 R290					
22	R250 R290	R220				
28	R290		R250	R290		
35	R290		R250 R290	R290		
42	R290		R250 R290	R290		
54	R290		R250 R290		R290	
64			R250 R290		R290	
67			R250 R290		R290	
76.1				R250 R290	R290	
88.9					R290	
108				R250 R290		R290

TABLE 2.3

Applications:

- Potable water in accordance with a range of national (KIWA) and international (DVGW, ETA,SITAC, SINTEF) approvals and guidelines (including EU Directive 98/83/EC).
- Heating systems
- District heating
- Solar installations
- Compressed air systems
- Gas installations (if so, the necessary approvals must be taken into account, such as Gastec QA, KVBG*, DVGW-G)
- Fuel oil systems
- Shipbuilding

*VSH has special fittings for this purpose with a different nut and compression ring

2.2.2 Thin-walled steel precision tube

Thin-walled steel precision tube, seamless or welded in accordance with EN 10305-3 (previously DIN 2394). When using a connection made in accordance with the assembly specifications, the compression fittings and the zinc coating have no adverse effect on each other. The XPress galvanised tube by VSH, with article No. 1.0034, RSt 34-2 conforming to EN 10305-3, is also ideal in combination with VSH Super compression fittings.

Applications:

- Heating installations (closed systems)
- Compressed air
- Solar installations (closed-loop systems)
- Shipbuilding

2.2.3 Thin-walled stainless steel tube

Thin-walled stainless steel precision tube conforming to EN 10312 or DVGW worksheet GW541, for example the XPress RVS 1.4401 (AISI316) tube.

Applications:

- Potable water installation
- Heating systems
- Transport of treated water (such as softened or distilled water)
- Compressed air (dry or oil containing)
- Solar installations
- Shipbuilding

2.2.4 Plastic and multi-layer tube

It is possible to connect a PEX tube with an external diameter the same as for copper (10 to 28 mm), in which case a brass support sleeve (S1285) must be used. In addition there are VSH Multi Super inserts and fittings which are approved for a wide range of multi-layer tubes and PEX tubes (see section 4.2), which increase flexibility during installation. VSH can provide the following multi-layer tubes, which are suitable for use in combination with the VSH Multi Super inserts and fittings.

Tube Characteristics for MultiSkin, Multicon and Henco				
Outside Ø (mm)	14	16	20	26
Wall thickness (mm)	2.0	2.0	2.0	3
Internal Ø (mm)	10	12	16	20
Aluminium thickness (mm)	0.4	0.4	0.4	0.5
Minimum bend radius, manual (5xd) (mm)	70	80	100	125
Minimum bend radius, mechanical (2xd) (mm)	28	32	40	50
Weight (g/m)	111	129	175	274
Water Capacity (l/m)	0.079	0.113	0.201	0.314
Tensile Strength (N/mm²)	≥80	≥80	≥80	≥80
Linear expansion coefficient (mm/(mK))	0.025	0.025	0.025	0.025
Heat Conductivity Coefficient (W/mK)	0.50	0.50	0.50	0.50
Maximum Operating Pressure, long term (bar)	10	10	10	10

Maximum Operating Pressure, short term (bar)	12	12	12	12
Maximum Operating Temperature, continuous (°C)	70	70	70	70
Maximum Operating Temperature, medium term (°C)*	95	95	95	95
Maximum Operating Temperature, peak (°C)**	110	110	110	110
Oxygen Diffusion (mg/l)	0	0	0	0
Wall Roughness (mm)	0.007	0.007	0.007	0.007

TABLE 2.4

Tube Characteristics VSH Multi Universal				
Outside Ø (mm)	14	16	20	25
Wall thickness (mm)	2.0	2.0	2.0	2.5
Internal Ø (mm)	10	12	16	20
Aluminium thickness (mm)	0.2	0.2	0.4	0.5
Minimum bend radius, manual (5xd) (mm)	70	80	100	125
Minimum bend radius, mechanical (2xd) (mm)	28	32	40	50
Weight (g/m)	88	102	175	274
Water Capacity (l/m)	0.079	0.113	0.201	0.314
Tensile Strength (N/mm^2)	≥80	≥80	≥80	≥80
Linear expansion coefficient (mm/(mK))	0.025	0.025	0.025	0.025
Heat Conductivity Coefficient (W/mK)	0.43	0.43	0.50	0.50
Maximum Operating Pressure, long term (bar)	10	10	10	10
Maximum Operating Pressure, short term (bar)	12	12	12	12
Maximum Operating Temperature, continuous (°C)	70	70	70	70
Maximum Operating Temperature, medium term (°C)*	95	95	95	95
Maximum Operating Temperature, peak (°C)**	110	110	110	110
Oxygen Diffusion (mg/l)	0	0	0	0
Wall Roughness (mm)	0.007	0.007	0.007	0.007

TABLE 2.5

Applications:

- Potable water installation
- Heating systems
- Floor heating

** Depending on the system pressure, a few months up to 3 years*
*** Pressurized max. 5 minutes, depressurized up to 60 minutes*

2.2.5 Thick-walled steel tube

It is possible to connect a thick-walled steel tube that conforms to the EN 10255 standard with a VSH Super compression. The brass compression ring must then be replaced with a blue plastic compression ring (S1282), called VSH Super Blue.

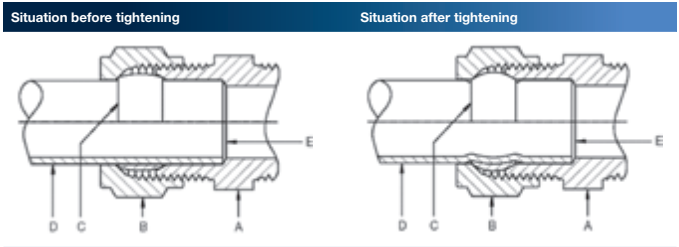
Application:

- Heating systems

3 Technical Data

3.1 Operation of VSH Super compression fittings

The compression ring lies closed up between two tapered bores; one in the housing and one in the union nut (see Figure 3.1). The point in the tapered bore of the housing is smaller than that of the union nut. The effect of this construction is that when the fitting is tightened, the compression ring first begins to deform in the housing and only afterwards in the union nut. In this way twisting of the tube at the same time during installation is prevented. A compression connection in the installed position is shown in Figure 3.2. After proper tightening of the union nuts, a tight connection is made.



A = housing | B = union nut | C = compression ring | D = tube | E = stop end

FIGURE 3.1

FIGURE 3.2

3.2 Material and screw threads for VSH Super compression fittings

3.2.1 Standard brass

The VSH Super compression fittings are manufactured as standard from first-class, low-lead brass: EN-CW617N (CuZn40Pb2). The threads of the compression fittings are manufactured in accordance with ISO 228-1. The long internal thread and tapered external thread conform to ISO 7-1. All type G fittings are manufactured in accordance with the Belgian gas standard (KBVG/ARGB) NBN-D51.003. These fittings are fitted with a compression ring with a ring with a stop end and a raised union nut.

3.2.2 Dezincification Resistant Brass

The VSH DZR (dezincification resistant) compression fittings, compression rings and reducing adaptors conform to the European standard EN 1254-2 (1998) for compression fittings. A thickened edge is fitted to the female thread, which lends extra strength to the fitting. Dezincification resistant brass CW602N (CuZn36Pb2As) is used as the raw material for these fittings in accordance with EN 12164 and EN 12165 (1998). The symbol CR is placed on these fittings, which indicates that the fittings are dezincification resistant.

3.2.3 Thread

The fittings with female thread have a long thread (Rp) according to ISO 7-1 or short cylindrical screw threads (G) in accordance with ISO 228-1.

The fittings are provided with an external thread of tapered screw threads (R) conforming to ISO 7-1 or short cylindrical threads (G) conforming to ISO 228. The male threads are provided with a serration so that the rotation of tape or hemp is prevented when installing.

3.3 Operation of VSH Multi Super compression fittings

Taking into account the difference in the machinability with different tube sizes, two different designs are available.

3.3.1 VSH Multi Super for 14 and 16 mm synthetic tubes

a. The insert has a cylindrical shape; this cylindrical part must be positioned against the stop in the housing to guarantee a perfect seal. The seal is made by the O-ring. The insert is also fitted with a white plastic ring. This ensures that contact between the brass and the aluminium is prevented and corrosion is avoided. The O-ring on the front end acts as shielding in the tube to meet the tolerances in the inner diameter.

b. The compression ring has a saw cut, allowing the outer diameter tolerances between different synthetic tubes to be met. The compression ring is also fitted with grooves on the inside, ensuring the compression ring grips the tube perfectly.

c. The union nut is similar to those present in the VSH Super Compression, with the only difference being the internal diameter on the front side. This is made to suit a synthetic tube of 14 and 16 mm. The size is printed on the nut.

3.3.2 VSH Multi Super for a synthetic tube Sizes 20, 25 and 26 mm

a. Here the insert has a tapered shape; this tapered part must be positioned against the oblique stop in the housing, in such a way that the O-ring is pressed against the housing to guarantee a perfect seal. The seal is made by the O-ring. The insert is also fitted with a white plastic ring. This ensures that contact between the brass and the aluminium is prevented and corrosion is avoided. The O-ring on the front end acts as shielding in the tube to meet the tolerances in the inner diameter.

b. The compression ring has a saw cut, allowing the outer diameter tolerances between different plastic tubes to be met. The compression ring is also fitted with grooves on the inside, ensuring the compression ring grips the tube perfectly.

c. The union nut is extended. The internal diameter at the front side is made to suit a plastic tube in sizes 20, 25 and 26 mm.

3.4 Materials and threads VSH Multi Super compression fittings

3.4.1 Fittings

The VSH Multi Super compression fittings are manufactured as standard from first-class, low-lead brass EN-CW617N (CuZn40Pb2). The screw threads of the VSH Multi Super compression fittings are manufactured in accordance with ISO 228. The long internal thread and tapered external thread conform to ISO 7. The O-rings are manufactured from EPDM material and have a maximum servicetemperature up to 135°C.

3.4.2 Technical aspects of multi-layer tubes

Construction of the tube

VSH multi-layer tubes (Multicon, MultiSkin and Henco) are plastic tubes with an aluminium core (Figure 3.3). The tube consists of an inner layer of PE-Xc (3) and an outer layer of PE-Xc (1) with an aluminium layer in between (2), which is fastened to the inner and outer layer with glue. This aluminium layer is fully closed with butt welding. Multicon and Henco multi-layer tubes have a diffusion barrier thanks to the fully sealed aluminium layer.

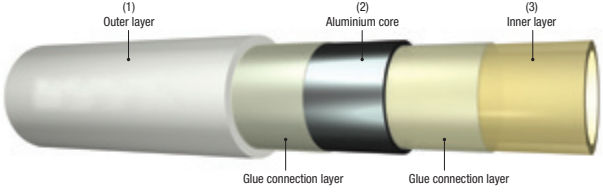


FIGURE 3.3

VSH Multi Universal tubes are plastic tubes with an aluminium core. The tubes consists of an inner layer of PE-RT, Type 2 (3), and have an increased temperature resistance (conforming to DIN 16833). A butt-welded aluminium layer (2) is fastened to the inner and outer layers with a special glue layer. The outer layer is made of PE-HD (1). VSH Multi Universal tubes have a diffusion barrier thanks to the fully sealed aluminium layer.

3.5 VSH Super Blue plastic compression rings

VSH Super compression fittings can also be fitted to a thick-walled steel tube in accordance with EN 10255. However the brass compression ring must then be replaced with a plastic Super Blue compression ring. Super Blue compression rings must only be used in heating systems, and not for gas or potable water connections.

The VSH Super compression with a Super Blue compression ring enables new radiators to be installed onto existing thick-walled connections with the following advantages:

- No need to thread the tubes
- Nothing needs to be welded
- Can be placed in recesses, saving space
- Nickel-plated fittings are available

It is possible to use it in combination with other tube materials, but only with the written approval of VSH. The pressure and temperature range appear in the table provided below.

Article No.	Dimension	Compression size	°C	Pressure	Peak	°C	Pressure
0858495	3/8	18	20	15 bar	120°C	95	8 bar
6320534	3/8	22	20	15 bar	120°C	95	8 bar
0858539	1/2	22	20	15 bar	120°C	95	8 bar
0858541	3/4	28	20	15 bar	120°C	95	6 bar
0858550	1	35	20	10 bar	120°C	95	4 bar

TABLE 3.1

4 Approvals

4.1 Approvals for VSH Super Compression

The VSH Super compression fittings are certified by a large number of European authorities. The relevant approvals are available on the website under the product range overview. The certificates are available on request.

Country	Installation	Medium	Tube Material
The Netherlands	KIWA	Water	Cu 10-54 mm
The Netherlands	Gastec	Gas	Cu 10-54 mm
Germany	DVGW	Water	Cu/Stainless Steel 12-42 mm
Germany	DVGW	Gas	Cu 12-22 mm
Belgium	KVBG/ARGB	Gas	Cu 12-28 mm
Sweden	SITAC	Water	Cu 10-54 mm PEX 10-28 mm
Norway	SINTEF	Water	Cu 8-54 mm
Norway	SINTEF	Water	PEX 10-28 mm
Finland	STF	Water	Cu 6-54 mm PEX 10-28 mm
Denmark	ETA	Water	Cu 10-54 mm Stainless steel 12-42 mm PEX 8-28 mm

TABLE 4.1

4.2 Approvals for VSH Multi Super Compression

If VSH Multi Super compression fittings are fitted in combination with tubes from other brands, KIWA approval may not be granted, as a system approval applies. VSH has tested all of the approved combinations with other tube brands under very heavy conditions (on the basis of KIWA requirements, including a thermal cycling test of 5,000 cycles) and therefore guarantees a perfect seal in water and heating applications.

Brand	Tube type	Size 14-16	Size 20-25-26
VSH Multi Universal	PE-RT/Al/PE-HD	X	X
VSH Multicon	PE-Xc/Al/PE-HD	X	X
VSH Multicon	PE-Xc	X	
MultiSkin	PE-Xc/Al/PE-X	X	X
Comap Techtub	PE-Xc/EVOH	X	X
Henco	PE-Xc/Al/PE-Xc	X	X
Alpex Therm	Multi-Layer	X	
Alphacan	PEX	X	
Becker Plastics	PEX	X	
Begetube	Multi-Layer	X	
Espace	PEX	X	
Fränkische Alpex Duo XS	Multi-Layer	X	X
Gabotherm	PB	X	
Georg Fischer – iFit	Multi-Layer	X	X
Giacomini	Multi-Layer	X	
HAKA	PE-Xc/Al/PE-Xc	X	X
Henco Unipex	PE-Xc (15x2.5)	X	
Hewing-Proaqua	PE-Xc/AlPE-X	X	
Pexep Alupex	Multi-Layer	X	
Pexep Pex	PEX	X	
Polytherm	Multi-Layer	X	
Polytherm MT	Multi-Layer	X	
Superpipe	Multi-Layer	X	
Uponor/Unipipe	PE-RT/Al/PE-RT	X	X
Velta	PEX	X	
Velta Rapex	Multi-Layer	X	
KAN-therm	PE-Xc/EVOH	X	X
KAN-therm	PE-RT/EVOH	X	
Wavin Tigris	PE-Xc/Al/PE-HD	X	X

TABLE 4.2

4.3 Approvals for MPI sets

The MPI sets that VSH has introduced especially for Scandinavian markets are provided with a range of potable water approvals in combination with specific PEX and multi-layer tubes that are stated in the approvals. The certificates for these product ranges are also available on request.

Country	Installation	Medium	Tube Material
Denmark	ETA	Water	Multi-Layer 15-20 mm PEX 15-22 mm
Finland	STF	Water	Multi-Layer 16-20 mm PEX 15-22 mm
Sweden	SITAC	Water	Multi-Layer 16-20 mm PEX 15-22 mm

TABLE 4.3

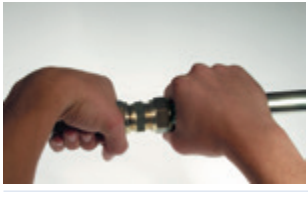
5 Installation Guidelines

5.1 Installation instructions for VSH Super compression fittings

Only use a tube with the same nominal diameter as the dimension given on the union nuts. The installation of the compression fittings must take place as follows (see Figures 1 to 4).

1. Cut the tube to the right length with a tube cutter, fine tooth hand saw or machine saw that is suitable for tube.

2. Remove any burrs and check the end of the tube for scratches, dirt and deformations.



3. Check that the fitting is in the correct position on the compression ring. Place the pipe in the fitting **as far as the tube stop in the housing.** The ring must now lie on the tube as shown in Figure 3.1 (situation before tightening).

4. Tighten the union nut by hand and the further tighten for the number of turns set out in the table.

Prescribed number of tightening turns						
Dimension	6 up to 12 mm	15 up to 22 mm	28 mm	35 mm	42 mm	54 mm
Tube type						
Copper	1	¾	¾	¾	¾	¾
Thin-walled steel	1	¾	¾	¾	-	-
Chromed copper	¾	1¼	-	-	-	-
Stainless steel	1	¾	¾	¾	½	½
Synthetic (PEX with supporting collar)	1¼	1¼	1¾	-	-	-
Thick-walled steel tube (with Super Blue synthetic compression ring)	Tube Ø	Compression	Number of tightening turns			
	3/8”	18 mm	1*			
	3/8”	22 mm	1*			
	1/2”	22 mm	1*			
	3/4 “	28 mm	1*			
	1 “	35 mm	1*			

TABLE 5.1

* When using a compression ring for a thick-walled tube, tighten the union nut after the first heating cycle by at least half a turn.

Note: Fitting of compression fittings must exclusively be carried out with an open spanner of the correct size or a well-set adjustable wrench (English wrench). An assembly tool that visibly damages the fitting increases the chance of stress corrosion. The use of pliers with serrated jaws (for example water pump pliers) or an incorrectly adjusted tool must, therefore, be avoided.

5. After installation, check the connection for water tightness with due regard to the guidelines for the substances applied.

   NB: Excessive tightening of the union nut can lead to leakage and rupture of the union nut. A sealant must be applied to the screw threads on the transition coupling that is permitted for that substance.

6. A connection that has already been made can be removed and installed again; this is, however, not permitted for compression fittings in gas installations (see NPR 3378-11). The compression ring that has been set in its place is put under tension by the union nut and must be tightened by hand and further tightened with a spanner by 1/8 to 1/4 of a turn. The compression fitting can be re-installed several times; as a rule of thumb, we advise to a maximum of three times.

   The compression ring can be removed by cutting across it (Figure 5.1) without damaging the tube. Break open the ring by putting a screwdriver in the slot and making a twisting motion. The second technique is to carefully squeeze the ring with water pump pliers, the jaws of which are placed over the ring, while the pliers are twisted. The stretched ring can now be slid off the tube. Before fitting a new compression, we refer you to the assembly instructions such as those described above.

In Table 5.2 and Figure 5.2 the insertion depth for prefabricated and built-in sites is given.

FIGURE 5.1

FIGURE 5.2

Compression Coupling Ø mm	Insertion Depth A (mm)
6	14
8	15
10	16
12	19
15	21
16	22
18	23
20	23
22	23
28	23
35	30
42	35
54	39

TABLE 5.2

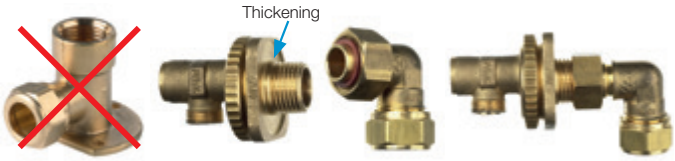
5.2 Installation of a one-piece assembly

It can happen that the desired size of fitting is not immediately available in store and the work cannot be deferred. The reducer sets from VSH offer the solution in this case.

- Cut off/saw the tube and deburr it.
- Remove the standard compression ring from the VSH Super compression.
- Set the reducer in the housing of the fitting, so that the angled surface meets the angled surface in the housing.
  - As soon as the union nut is turned on the housing, the reducer drops perfectly into the nut. The reducer should not protrude from the fitting!
- Slide the fitting over the tube and tighten the nut about 1/4 of a turn.
  - While the union nut is being tightened great pressure is exerted on the ingenious “breakband”, whereby the reducer – deliberately – breaks into two pieces. This is clearly noticeable when tightening.
- After the break the union nut must be tightened a further 3/4 of a turn. By doing so both parts slide into each other and the tube (as with a normal compression ring) is held fast and sealed.

Note: A wide selection can be used in both water and gas installations. On the VSH website and under the selection overview you can see under type S1268 which reducer sets are approved for water and/or gas installation and are provided with a KIWA and/or Gastec QA approval. **The approvals and guarantee are only valid when installed in combination with VSH Super compression fittings.**

5.3 Installation of fittings on a toilet with a built-in cistern



For many years several brands of pre-wall systems have been equipped with a tap connector with a square section which fits in place to the outside of the cistern. The tap connector is also fitted with a ½" tapered outside thread for connection to water lines.

The solution: Type S1241 Art. No. 0874500 and Type S1242 Art. No. 0874533
The solution for attaching water lines tensionstressfree, in combination with the tap connectors that are provided with the built-in cistern, is our VSH Super tap coupling with washer in both a straight and an angled configuration. The dimension of the tap connector is a 15 mm x ½" union nut connection. Our one-piece reducer 15/12 of type S1268 can be used to connect to 12 mm copper tubes.

With a union nut connection you can set the angled coupling into the correct position. Tightening the union nut and washer onto the tap coupling creates a satisfactory seal.

Note: Do not forget to check that there is a washer present.

5.4 Installation instructions for VSH Multi Super compression fittings

Only use a tube with the same nominal diameter as the dimension given on the union nut. (Tubes from the TECE, Geberit Mepla, Rehau and Viega Pexfit brands have an unusual diameter and for that reason can not be used.) The installation of Multi Super compression fittings must be carried out as follows (see Figures 1 to 7).

1. Cut the tube to the correct length.

2. Slide the union nut and compression ring over the pipe.

3. Calibrate the tube end.
- calibration triangle size 14 mm
- calibration triangle size 16 to 26 mm
- Article No. 3850000

4. Place the insert (fitted with an O-ring on the end inserted onto the pipe and a plastic ring) into the tube.

5. Press the tube with the insert as far as the stop in the fitting.

6. Tighten the connection by hand.

7a. Tighten the union nut by hand then further tighten one complete turn.
7b. Sets 25 x 22 and 26 x 22
Tighten by 1¼ turns.

Note: Installation of compression fittings must only be carried out with an open spanner of the correct size or a well-set adjustable flat wrench (Bahco). A fitting tool that visibly damages the fitting increases the chance of stress corrosion. The use of pliers with serrated jaws (such as pipe wrenches and water pump pliers) or a wrongly adjusted tool must therefore be avoided.

Calibration is necessary.
The tube is “rounded” and chamfered on the front end. As a result damage to the O-ring on the insert is prevented, a good seal is therefore guaranteed. The O-ring is necessary to compensate for the tolerances in the dimensions of the different types of tubes.

Afterwards, check the connection for water tightness with due regard to the guide-lines for the substances used.

NB: Excessive tightening of the union nut can lead to leakage and rupture of the union nut. A sealant must be applied to the screw threads on the transition coupling that is permitted for that medium. See the installation guidelines in this regard.

Reassembly of connections already made.
A connection that has already been made can be removed and installed again in the same position. To put the compression ring that has been fixed in place under tension again with the union nut, tighten it by hand and then turn it a further 1/4 of a turn with a spanner.

One possibility for removing the compression ring is to break the ring further open by putting a screwdriver in the slot and making a twisting motion. The stretched ring can now be slid off the tube and must be replaced. Before fitting a new compres-sion ring, we refer you to the installation guidelines such as described earlier in this chapter.

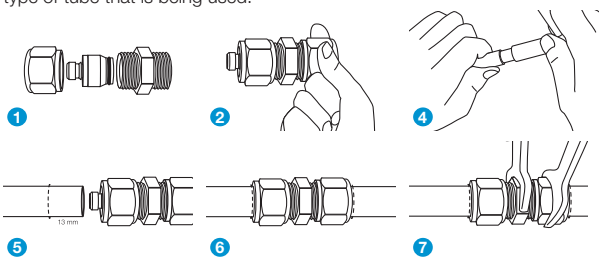
The insertion depth for prefabricated and built-in sites is set out in Table 5.3.

Compression Coupling Ø mm	Insertion Depth A (mm)
6	14
8	15
10	16
12	19
14	17
15	21
16	13
20	16
22	23
25	19
26	19
28	23

TABLE 5.3

5.5 Fitting instructions for MPI sets

Be aware that the operational parameters (pressure, temperature) depend on the type of tube that is being used.



1. Put the compression set in the fitting in the correct manner.
2. Tighten the union nut by hand.

3. Cut the tube off to the right length (no illustration).
4. Calibrate and deburr the tube with the appropriate tool.
5. Mark the insertion depth on the tube (13 mm).
6. Place the tube in the fitting. The marking must be visible.
7. Tighten the union nut with 1 1/2 turns
   (2 turns for M22x 16 and M22x20).

To connect the VSH Super compression fittings and the VSH Super MPI sets, VSH also has manifolds made from DZR (dezincification resistant) brass to which these components can be connected.

The connections are suitable for compression nuts and rings 15 and VSH Super MPI sets 15 and 16 mm. The female and male thread on both sides of the manifold has a dimension of G¾" (ISO 228-1). Our article Nos. 6340501 and 6340510, MPI sets M22x16 and M22x20 are suitable for heating under blocks from TA, MMA and L&K.

5.6 Sinking/Sealing

Sinking of connections should be avoided as much as possible.
Pipes for water must be sunk in accordance with the Water worksheet (dutch regulations) provided that the lines and fittings are not affected by the material of the wall or floor. Warm water pipes must be fitted with sheathing. It is sensible to fit all sunken pipes (cold water as well) with sheathing. In inaccessible areas, a jacket pipe is required so that any leakage can be identified. For gas, there is a difference between being accessibly and inaccessibly concealed. There are many specific exceptions, see NPR 3378 (dutch guidelines for gas) for a complete overview. Compression fittings with a copper tube (half hard) can be accessibly concealed, that means accessible without channelling, for example in cable shafts.

6 General Installation Information for Metal Tubes

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; for example installation of special expansion compensation devices, fixed anchoring points and brackets.

Expansion can be offset by the use of a pipe segment (Figure 6.1), U-bend (Figure 6.3) 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:

$$\Delta l = l \times \alpha \times \Delta T$$

Δl = total linear expansion [mm]
l = length of the segment in question [m]
ΔT = temperature difference [°C], difference between installation temperature with regard to minimum/maximum temperature
α = linear expansion coefficient, actual:
- for stainless steel tube 1.4401 α = 0.0160 mm/m
- for stainless steel tube 1.4521/1.4520 α = 0.0104 mm/m
- for galvanised steel tube α = 0.0108 mm/m
- for copper tube α = 0.0170 mm/m

Calculation of the expansion compensator length

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

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

B_d = compensation expansion length

k = material constant

= 45 for stainless steel and galvanised steel

= 35 for a copper tube

d_e = external diameter of the tube [mm]

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

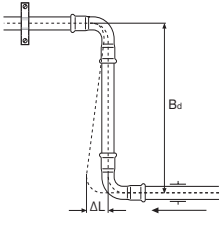


FIGURE 6.1

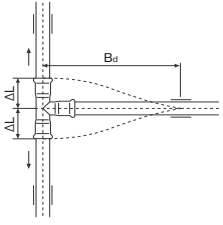


FIGURE 6.2

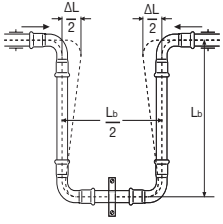


FIGURE 6.3

The following is an example of an analytical calculation:

A tube network with a length of 16 m consisting of copper tubes with a diameter of 22 mm are subject to a temperature difference of 60° C.

If we use the equation for calculating the linear expansion, the result is:

$$\Delta l = 16 \times 0.0170 \times 60 = 16.32 \text{ mm}$$

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 6.1 and 6.2).

The analytical calculation gives the following result:

$$B_d = 35 \times \sqrt{(22 \times 16.32)} = 663.2 \text{ mm}$$

In case of an Ω-shaped expansion connection, the calculated value of an expansion equaliser as in Figure 6.3 has to be halved as it is actually two expansion sections. The value [Bd] does not have to be divided exactly by two, but by a factor of 1.8:

$$L_b = (35/1.8) \times \sqrt{(22 \times 16.32)} = 368.44$$

Or otherwise:

$$L_b = B_d/1.8 = 663.2/1.8 = 368.44$$

As can be seen clearly in Figures 6.1, 6.2 and 6.3, the correct compensation of the expansion also depends on the placement of fixing devices, such as brackets and anchoring points. Never 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. Place this saddle clip as close as possible to the middle of the straight segment. In this way, any expansion will be distributed in both directions and the length of the expansion equaliser 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.

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.

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

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 XPress and SudoPress Galvanised Steel and Stainless Steel

If you wish to perform these calculations, please consult the relevant specialised literature. For the normal installation calculations, the appropriate diagrams such as those given in Figure 6.4 can be used to solve this problem. The pressure drop [R] and the flow velocity [m/s] for a given water flow rate, can be determined simply and quickly on the basis of this method.

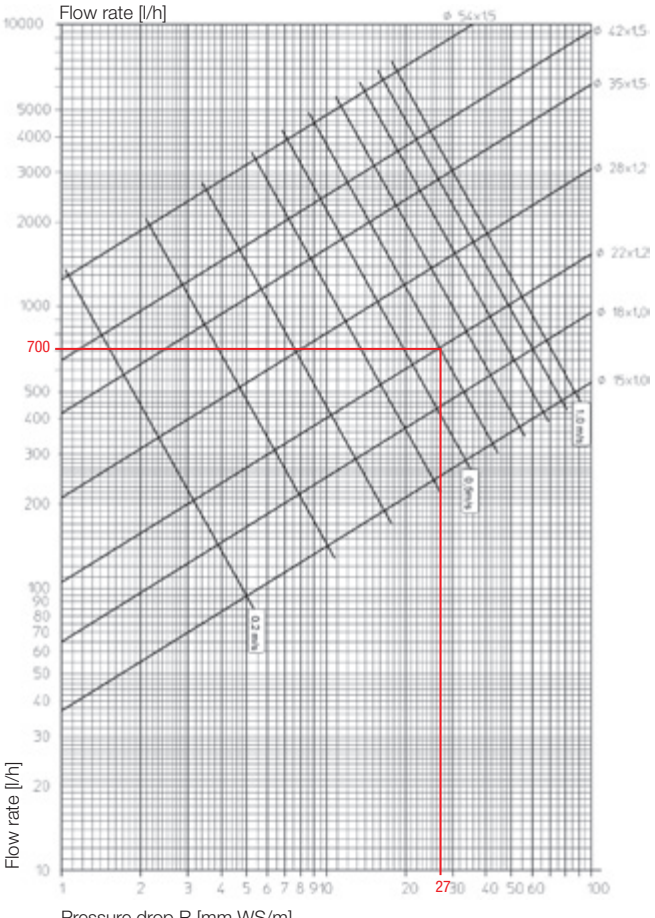

Flow rate [l/h]
10000
5000
4000
3000
2000
1000
700
500
400
300
200
100
90
80
70
60
50
40
30
20
10
Flow rate [l/h]
1
2
3
4
5
6
7
8
9
10
20
27
30
40
50
60
100
Pressure drop R [mm WS/m]
ø 54x1.5
ø 42x1.5
ø 35x1.5
ø 28x1.2
ø 22x1.2
ø 18x1.0
ø 15x1.0
1.0 m/s
0.5 m/s
0.2 m/s

FIGURE 6.4

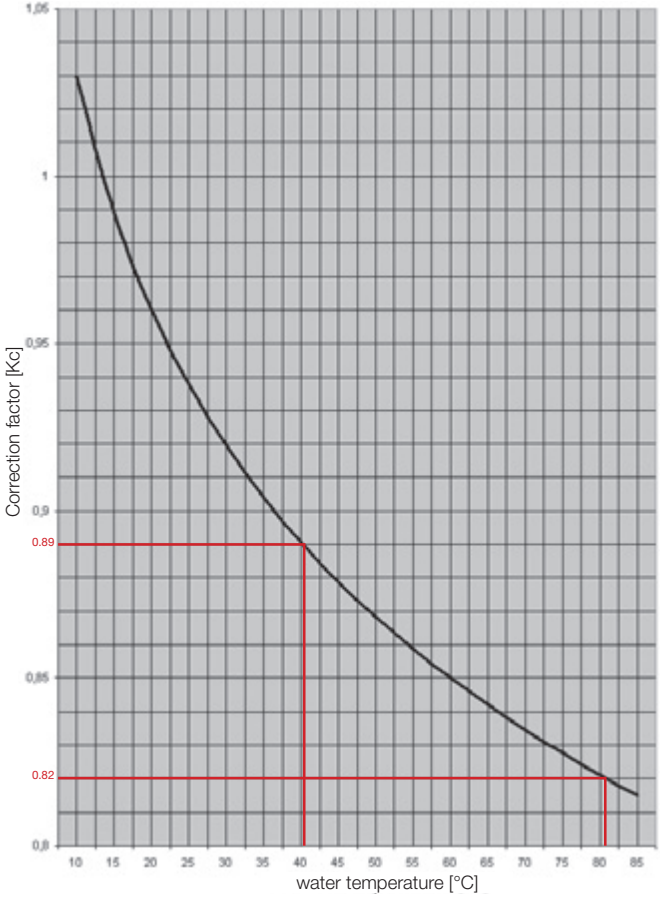

1,05
1
0,95
0,9
0.89
0,85
0.82
0,8
Correction factor [Kc]
10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85
water temperature [°C]

FIGURE 6.5

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 6.5 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 6.5 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, then we see a value of R of 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. Or:

R = (27/0.82) x 0.89 = 29.3 mm WS/m [29.3 mbar/m]

6.3 Flow restriction/local pressure drops

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 Tables 6.3 and 6.4). The effective 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.

The flow restrictions for a flow rate of 0.75 m/s are shown in Tables 6.3 and 6.4, in equivalent metres of tube length.

	12	15	22	28	35	42	54
	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	-	0.5	0.6	0.7	1.2	-	-
	0.5	0.5	0.8	0.8	1.2	1.4	1.8
	0.1	0.1	0.2	0.2	0.2	0.2	0.2
	0.5	0.5	0.8	0.8	1.2	1.4	1.8
	-	0.5	0.8	0.8	1.2	-	-
	-	0.1	0.1	0.2	0.2	-	-

TABLE 6.3

	12	15	22	28
10	0.2	-	-	-
22	0.3	0.2	-	-
28	-	0.3	0.1	-
35	-	0.4	0.2	0.1

TABLE 6.4

For reducer fittings the value from Table 6.4 must be added to the value in Table 6.3.

6.4 Heat losses

The necessary measures must be taken to limit heat loss from the tubes. Please consult the relevant regulations on minimum insulation thicknesses and the heat insulation standards.

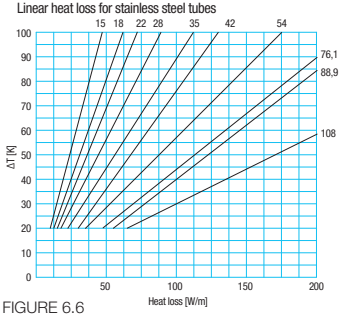


FIGURE 6.6

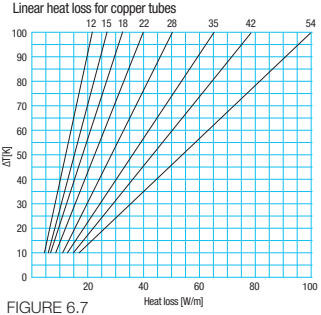


FIGURE 6.7

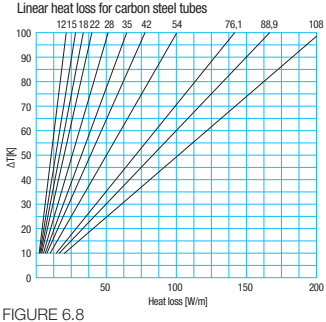


FIGURE 6.8

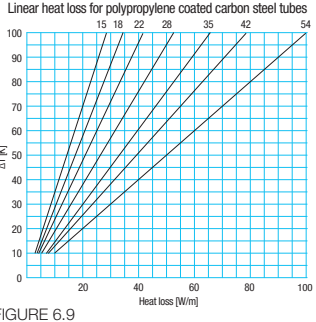


FIGURE 6.9

Figures 6.6 to 6.9 show the linear heat losses of the tubes as a function of their diameter and the 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.

6.5 Mounting the tubes

When securing the tubes, you must take account of the following:
The load-bearing capacity of the mounting brackets must correspond to the weight of the tubes and the material must 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.

Guidelines for distances of mounting brackets		
Ø tube diameter [mm]	Maximum interval [m] horizontal	Maximum interval [m] vertical
15 x 1.0	1.25	1.88
18 x 1.0	1.50	2.55
22 x 1.2	2.00	3.00
28 x 1.2	2.25	3.38
35 x 1.5	2.75	4.13
42 x 1.5	3.00	4.50
54 x 1.5	3.50	5.25

TABLE 6.5

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.

6.6 Bending the tubes

It may be necessary to bend a tube in order to carry out the installation. Manual, 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. Stainless steel, galvanised steel and copper tubes can 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 calculated as follows:
Stainless steel tube (15-28 mm)

$$r_{min} = 3.5 \times d$$

Copper tubes (12-54 mm) conforming to EN 1057 and DVGW-GW 392

$$r_{min} = 3.5 \times d$$

Galvanised steel tubes (12-28 mm)

$$r_{min} = 3.5 \times d$$

A smaller bend radius is not permitted.

6.7 Pressure testing

As soon as a tubing system has been installed, it must be checked for leaks before being built in and concealed. With potable water and heating installations, the pressure test can be carried out with water, air or inert gases. A pressure test must be performed in accordance with local regulations. As a rule of thumb, a pressure of 1.5 times the operating pressure is used for a pressure test with water.

6.8 (Main) Equipotential bonding in residential premises

All metal tubing systems using equipotential bonding must comply with equipotential bonding requirements. Continuity checks must always be conducted by a qualified electrician in accordance with the regulations, once the installation work has been finished. Stainless steel and blank copper pipes that satisfy EN 1057 (R250/

R290) used in combination with the respective fittings are electrical conductive tube systems and, therefore, must be included in the equipotential bonding. Galvanised steel tubes with polypropylene coating are not an electrical conductive and so do not need to be included in the equipotential bonding.

6.9 Stray currents

Corrosion from cross currents begins on the outer side of the tube and appears as a cone-shaped crater with the point inwards. There must be a direct current to prevent the corrosion from cross currents (usually no direct current is applied in dwellings). This cross current gives the metal anodised properties. The anode is the part that is dissolved by an electrolytic liquid.

The cross current is actually a current that, despite the presence of insulation, penetrates the ground and flows into other adjacent metal parts. A portion of the tubing is used as a conductor and then the current flows back into the ground again. To penetrate the tubing system the earth current must find a point where the insulation is damaged or missing.

To prevent possible cross currents from entering the interior installation, there are insulation couplings that completely isolate the interior installation from the supply tubing.

7 General Installation Information for Synthetic Pipe Systems

The length of the system depends on the thermal difference that occurs in the system. Small changes in length can be accommodated by the “elasticity” of the pipe network. Appropriate measures must be taken when making larger changes to the length. This can be done by using sliding and fixed anchoring points and integrating expansion lengths and bends into the pipe system.

7.1 Thermal expansion (in the tubing system)

In an installation, the expansion (ΔI) of a pipe (I) provides the change in shape of the pipe that forms the expansion loop (A). The length of the expansion loop (A) must be chosen in such a way that extensive tension cannot occur in the pipe (I). The ultimate length of the expansion leg is dependant on the length of the pipe (I), the temperature difference (ΔT) and the diameter of the tube.
The compensation length of a pipe system must be calculated by calculating the changes in the length in the pipe network before installation.
The equation for calculating the changes in length is as follows:

$$\Delta I = I \times \alpha \times \Delta T$$

ΔI = total change in length (mm)
I = length of the tube (m)
α = linear expansion coefficient
ΔT = temperature difference [K]

for multi-layer pipes (Multicon, Henco, Multi Universal, MultiSkin)
α = 0.025 mm/mK

To facilitate the calculation, the total changes in length in mm are provided in Table 7.1 for a range of pipe lengths and a range of temperature differences.

l (m)	ΔT (K)								
	10	20	30	40	50	60	70	80	90
0.5	0.13	0.25	0.38	0.50	0.63	0.75	0.88	1.00	1.13
1	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25
2	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
3	0.75	1.50	2.25	3.00	3.75	4.50	5.25	6.00	6.75
4	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00
5	1.25	2.50	3.75	5.00	6.25	7.50	8.75	10.00	11.25
6	1.50	3.00	4.50	6.00	7.50	9.00	10.50	12.00	13.50
7	1.75	3.50	5.25	7.00	8.75	10.50	12.25	14.00	15.75
8	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00
9	2.25	4.50	6.75	9.00	11.25	13.50	15.75	18.00	20.25
10	2.50	5.00	7.50	10.00	12.50	15.00	17.50	20.00	22.50
15	3.75	7.50	11.25	15.00	18.75	22.50	26.25	30.00	33.75
20	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00
25	6.25	12.50	18.75	25.00	31.25	37.50	43.75	50.00	56.25
30	7.50	15.00	22.50	30.00	37.50	45.00	52.50	60.00	67.50
35	8.75	17.50	26.25	35.00	43.75	52.50	61.25	70.00	78.75
40	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00

TABLE 7.1

In Table 7.2, the length for which the expansion loop (A) must be able to compensate for expansion in the system is provided.

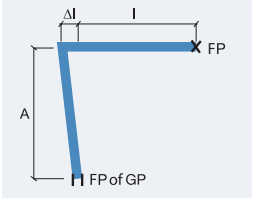
Δl (mm)	Dz - Diameter of the pipe (mm)				
	14	16	20	25	26
5	300	320	360	410	410
10	430	460	510	580	580
15	530	560	620	710	710
20	600	640	720	820	820
30	740	790	880	1,010	1,010
40	850	910	1,020	1,160	1,160
50	950	1,050	1,140	1,300	1,300
60	1,050	1,120	1,250	1,420	1,420
70	1,130	1,210	1,350	1,540	1,540
80	1,210	1,290	1,440	1,640	1,640
90	1,280	1,370	1,530	1,740	1,740

TABLE 7.2

7.1.1 Calculation of an expansion loop/expansion bend, type L

The length of the expansion loop (A) is determined as follows:

1. Determine using Table 7.1 or by calculation the length of the expansion (Δl), using the length of the pipe (l) and the temperature difference (ΔT).
2. Based on the expansion length (Δl) determined for the pipe (l) and the tube diameter for the pipe, the length of the expansion loop (A) is set out in Table 7.2.

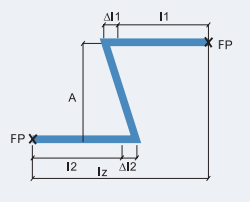


A - the length of the expansion loop
GP - the pivot point (so that the pipe can only move axially)
FP - the fixed point (prevents the pipe from moving)
l - the starting length of the pipe
Δl - the expansion of the pipe

7.1.2 Calculating an expansion loop/ expansion bend, type Z

The length of the expansion loop (A) is determined as follows:

1. Determine the replacement size lz = l1 + l2
2. Using Table 7.1 or a calculation, determine the length of the expansion (Δlz), based on the length of the pipe (lz) and the temperature difference (ΔT).
3. Based on the calculated length of the expansion (Δl) for the pipe (l) and the outer diameter of the pipe, the length of the expansion loop (A) can be determined from Table 7.2.

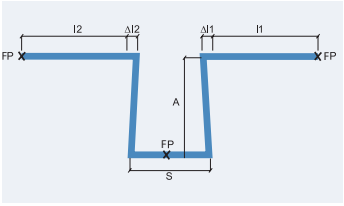


A - the length of the supported loop
FP - the fixed point (prevents the pipe from moving)
lz - the starting length of the pipe
Δlz - the expansion of the pipe

7.1.3 Calculating an expansion loop/ expansion bend, type U

The length of the expansion loop (A) is determined as follows:

1. Determine the replacement size lu = (l1 + l2)/1.8
2. Use Table 7.1 or a calculation to determine the length of the expansion (Δlu), based on the length of the pipe (lu) and the temperature difference (ΔT).
3. Based on the expansion length (Δl) determined for the pipe (l) and the tube diameter for the pipe, the length of the expansion loop (A) is set out in Table 7.2.



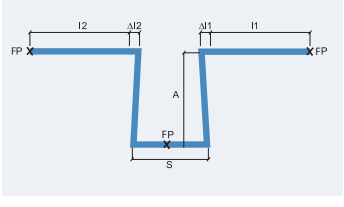
A - the length of the supported loop
FP - the fixed point (prevents the pipe from moving)
I - the starting length of the pipe
FP - the expansion of the pipe
S - the length of the U-shaped compensation loop

The length of the compensation loop (S) must guarantee the free operation of the pipe sections l1 and l2, taking into account the thickness of the pipe insulation and the installation circumstances.

$$S \geq 2\times d_{isol} + \Delta l1 + \Delta l2 + S_{min}$$

d_{isol} = Thickness of the insulation
$\Delta l1$, $\Delta l2$ = Expansion in pipe sections l1 and l2
S_{min} = Minimum length of the fitting or the radius of curvature of the tube

The length of the pipe (S) must be as short as possible. Where the length of the pipe (S), however, is more than 10% of the values l1 or l2, a fixed anchoring point must be set in the middle of the pipe (S). In this case the length of the compensator (A) can be calculated as Type Z. This must be done on both sides of the anchoring point.



A - the length of the supported loop
FP - the fixed point (prevents the pipe from moving)
I - the starting length of the pipe
Δl - the expansion of the pipe
S - the length of the U-shaped compensation loop

7.2 Pressure and heat loss

In section 3 (Technical Data) you will find the tube characteristics of the three types of Multi Super system tubes, from which the heat loss can be determined.

7.2.1 Load rating and flow speed

The values set out in Table 7.3 apply to a temperature difference of 20°C across the radiator. The flow rate is at most 0.6 m/s, as the noise from the flow can become irritating at higher rates. To determine the total resistance per section, the necessary pipe lengths must be multiplied by the pressure loss per metre. The capacity of the heating circuit pump must be great enough to overcome this resistance. The table below is determined by the formula:

$$P = q \times S.W. \times \Delta T$$

P = radiator capacity in Watts
q = rate in l/s
S.W. = specific heat of water = 4180 J/s.
ΔT = temperature difference across the radiator 20°C

Tube	Flow Rate m/s					
	0.1		0.2		0.3	
	P	q	P	q	P	q
14x2	657	0.00785	1313	0.01571	1970	0.02356
16x2	945	0.01131	1891	0.02262	2836	0.03393
20x2	1681	0.02011	3362	0.04021	5043	0.06032
25x2.5	2626	0.03142	5253	0.06283	7879	0.09425
26x3	2626	0.03142	5253	0.06283	7879	0.09425
	0.4		0.5		0.6	
14x2	2626	0.03142	3283	0.03927	3940	0.04712
16x2	3782	0.04524	4727	0.05655	5673	0.06786
20x2	6724	0.08042	8404	0.10053	10085	0.12064
25x2.5	10505	0.12566	13132	0.15708	15758	0.18850
26x3	10505	0.12566	13132	0.15708	15758	0.18850

TABLE 7.3

7.2.2 Pressure drop in Sanitair and CV tubes

Any liquid loses energy when it flows through a tube as a result of the friction of the liquid against the walls of the tube. Diagram 7.1 shows, for a given flow rate, the pressure loss as a function of the diameter of the tube and the flow rate. The medium here is assumed to be water with a temperature of 10°C,
P = Q x ΔT x 1.163 = power in Watts

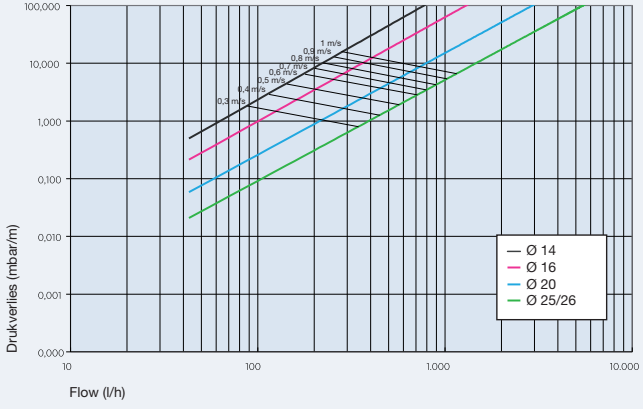


DIAGRAM 7.1

7.2.3 Localised pressure loss/flow resistance fittings/inserts

The flow resistances for a water flow rate of 0.75 m/s are given in Table 7.4, in equivalent metres of tube length.

		14	16	20	25	26
	Straight Fitting	1.4	1.8	1.8	2.0	2.0
	Knee Fitting	3.1	5.0	3.2	4.0	4.0
	T-coupling (connection access with flow distribution)	2.0	2.6	2.2	2.5	2.5
	T-coupling (connection with flow distribution)	3.4	4.8	3.2	4.0	4.0
	T-coupling (connection against the flow with flow distribution)	2.1	2.6	1.7	1.8	1.8

TABLE 7.4

7.3 Pipe fitting

Pipe brackets can be fitted as pivot points (GP) or fixed anchor points (FP). The pipe brackets are installed with regard to the intervals necessary to support the weight of the pipes. If the fixing of a pivot point is an obstacle to the necessary length of the expansion loop, then a pipe support should be fitted on the underside of the pipe. The maximum permitted installation intervals between two mounting brackets are given in Table 7.5.

Tube diameter	14x2	16x2	20x2	25/26x2.5
Maximum pipe clamp interval (m)	1.2	1.2	1.3	1.5

TABLE 7.5

7.3.1 Design of fixed brackets (FP) and pivot brackets (GP)

- Fixed brackets make any axial movement of the pipes impossible, and for that reason must be fitted to both sides of a fitting.
- The pipe clamps that make up a fixed mounting bracket may not be installed directly on the fittings and fitting sleeves, as this can prevent the thermal movement of the pipe.
- If fixed mounting points for T-joints are installed, care should be taken that the brackets that support the pipe are not placed on branches that have a smaller diameter than the size of the tube from which the branch emanates. In this situation, pipes with a large diameter can cause forces that could then cause damage to a smaller diameter pipe.
- Pivot points or guide brackets allow the pipe only axial movement and can be viewed as radial fixed mounting points. Do not forget that the pipe brackets prevent side-to-side movement of the tube. For that reason it is important to install them on the length of the expansion loop.

7.3.2 Installation advice concerning the fastening and expansion of the pipe system

- The water and heat meters (and their attachments) connected to the pipes must be fixed to the wall with a fixed mounting bracket on installation (the weight and operation of these should not exert any force on the pipe).
- Accessories attachment may not be fitted in a section of the installation that serves as an expansion pipe and also may not obstruct the movement of the pipe, such as at pivot points, in any way. Ideally, fit the accessories as fixed mounting points, whereby the pipes are also protected against excessive load from their weight and from the force resulting from the opening and closing of the valves.
- In no case may there be sections of pipe that have no ability to move in the case of expansion.
- When connecting pipes made of multi-layer tubes to steel tubes, it is recommended to make a fixed mounting point on the steel pipe at the connection point on both sides of the fitting (this must be included in the planning for expansion compensation in the steel pipe).

- If the pipe is connected at right angles to the steel tube, the connection should be treated as a point that prevents movement along the axis of the pipe made of multi-layer tubing. It is not permitted to make a fixed mounting point for the steel pipe by mounting the brackets on the multi-layer tubing pipe. Where the steel pipe at the connection with the multi-layer tube can be subject to considerable expansion, then the connection of the multi-layer tube must be fitted as an expansion loop with the suitable placement of a pivot point. The mounting of a fixed mounting point is not permitted in this case. The length of this loop should be determined on the basis of the expansion coefficient Δl of the steel pipe.
- In the case of an axial connection of the pipes of multi-layer tubing to steel tubes, the expansion loop that compensates for the expansion of this pipe section is determined on the basis of the total of the expansion of both pipes.
- In shafts, risers must have the ability to move freely under thermal influences.

8 Corrosion

General

All VSH Super Brass compression fittings fully satisfy the requirements set out in the ISO 6957 standard. Nevertheless stress corrosion can occur under particular conditions in brass and lead to failure of the material. In the following paragraphs instructions are given to prevent the occurrence of corrosion problems in the normal areas of application. A distinction must be made on the basis of inner and outer corrosion and the area of application. We shall further examine the application possibilities of different materials combined in one installation (combi-installations).

8.1. Internal corrosion

8.1.1 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

Stainless steel tubes and fittings 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.

Galvanised steel

Internal corrosion is normally impossible in **closed-loop** heating installations with galvanised steel tubes and fittings as oxygen from outside cannot penetrate the installation. **Combi-installations:** Unalloyed galvanised 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
Galvanised 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.

8.1.2 (Potable) water installations

Stainless steel
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 is 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. Stainless steel system components are suitable for all water treatment methods (water softening) for potable water. They are also corrosion-resistant as regards demineralised and distilled water, and water containing glycol. Stainless steel fittings and tubes are, however, not suitable for operation in dosing systems, for example, for disinfectants, which are added to the potable water. Stainless steel fittings and tubes are also suitable for all other open and closed-loop water systems (such as 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.

Galvanised steel
Galvanised steel tubes and fittings are not permitted in potable water installations. Contact corrosion will occur with galvanised steel if it comes into direct contact with stainless steel.

The possibility of contact corrosion is negligibly small if bronze, copper or brass fittings are used between a galvanised steel tube and a stainless steel tube. Contact corrosion on a galvanised 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 galvanised 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	Galvanised steel
↓	Copper
Noble	Stainless steel

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

8.2 External corrosion

8.2.1 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.).

8.2.2 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;
- If stainless steel pipes (including cold water pipes) 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. Stainless

steel tubes in cement floors will not be subject to electrolytic outer corrosion in connection with potential equalisation.

8.2.3 Galvanised 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 galvanised steel also be resistant against corrosion for a longer period. Galvanised steel tube 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 galvanised steel tubes effective corrosion protection.

8.2.4 Copper and copper gas

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.

8.3 Impact of application and processing

8.3.1 General information

Corrosion may occur due to incorrectly designed installations and faulty commercial applications. The points below must be kept in mind.

Tube cutting

A tube may not be cut by grinding due to the creation of heat.

Tube bending

A tube may not be bent when warm. The heating of the tube alters the structure of the material (sensitisation) and inter-crystalline corrosion can take place.

Heat conduction (such as, for example, a heated ribbon)
The conduction of heat from the outside to the inside through the tube wall must be prevented, as the creation of a film on the inner wall of the tube is a possible result. This film can lead to an increase in the concentration of chloride ions. Chloride ions cause pitting in critical concentrations (particulary for stainless steel).

Connections
When soldering stainless steel tubes when applying liquid media, crevice corrosion may occur. 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, above all on the inner side of the tube, can only be rectified with varnish, which is not practical with installed tubes. When using VSH Super compression fittings, this will not occur.

8.3.2 Stainless steel – Copper – Galvanised steel

With all materials (copper, stainless steel, galvanised steel), water line corrosion can occur in the presence of a three-phase boundary (water, metal, gas (air)). This corrosion will be avoided when, after the pipes have been filled for the first time, the pipes always remain completely filled and do not remain partly empty. Partial filling occurs whenever, for example, the tubes are emptied after the water pressure has been tested. in which case a pressure test using gas/air is to be recommended.

8.4 Impact of insulation

8.4.1 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.

8.4.2 Insulation of 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).

8.4.3 Insulation of galvanised 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.

8.4.4 Insulation of copper

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

8.5 Stress corrosion

8.5.1 General

Stress corrosion is a form of corrosion that leads to crack formation in certain metals as a result of interaction between the metal, the environment and mechanical loading (tensional stress when installing). Stress corrosion can only occur where a combination of the following factors occurs:

- Use of a material that is prone to stress corrosion (for example, brass).
- The presence of ammonia in the insulation material or other corrosive substances in the vicinity of the installation.
- The formation of condensation on the installation (moisture).
- Tensional stress (or residual stress) on the material.

8.5.2 Tensional or installation stress

Brass fittings can be manufactured in a number of ways: hot pressing, turning of raw material or casting. A high concentration of stress can occur during manufacture, through, for example, shrinkage stresses during hot pressing or tension when extracting from raw material. With the last process, cold deformation occurs which leads to residual stress in the material. These residual stresses can cause tensional stress (on the upper surface) of the material. Much more important, however, is installation stress. When tightening the union nut on the compression fittings critical stress can occur where the internal taper of the union nut presses onto the compression ring. This tightening torque causes deformations, whereby stress is created, above all, in the union nut. The chance of stress corrosion can be reduced by completely loosening and retightening the union nut after it has been tightened for the first time. In this way the deformation tension built up in the nut is virtually removed. It is important to apply the required number of turns. An installation tool that visibly damages the fitting significantly increases the chance of stress corrosion. The use of pliers with serrated jaws (such as pipe wrenches and water pump pliers) or a wrongly adjusted tool must, therefore, be avoided.

8.5.3 Moisture

As noted previously, tension on its own does not cause stress corrosion. An important condition for the occurrence of corrosion is the presence of moisture. In a poorly ventilated room that is damp, condensation can form on cold pipes and fittings. This condensation is, in principle, quite pure and does not cause corrosion problems. However, the condensation can absorb gases from the surroundings and thereby become corrosive.

8.5.4 Ammonia

Ammonia must be mentioned in this context in particular. Ammonia can originate from a range of other substances, such as cleaning materials, human and animal excretions, foam rubber (insulation material), building materials (cements) and similar substances.

8.5.5 Cooling pipes/Heat pumps

As a consequence of the introduction of heat pumps, more cooling pipes are being installed. Whenever brass compression fittings are fitted to these pipes and the pipe is completely insulated from damp with foam rubber, then stress corrosion can also occur in the brass fittings through a combination of factors. During the production of foam rubber insulation, a low quantity of ammonia forms in the material. The emission of very low amounts of ammonia from the damp-proof insulation can, in combination with moisture and a particular tension in the brass, lead to stress corrosion in the brass.

In high humidity conditions, where there is insulation on the cooling pipe and a temperature difference between the metal surface and closed-in moist air, condensation forms on the metal. A very thin film of moisture at the atomic level and a very low quantity of ammonia are sufficient for the formation of an aggressively corrosive chemical environment on the brass surface. In combination with a particular stress, stress corrosion can occur on the brass material as a result. The stress corrosion can have a range of causes as described above. In the circumstance outlined here the insulation material is the source of the ammonia. **The combination of brass and ammonia must be avoided at all times.**

Protecting the brass by applying a chrome, nickel or paint coating to the fitting offers inadequate protection against stress corrosion.

9 Product Liability

Damage caused by stress corrosion does not fall under the product warranty since all VSH Super and VSH Multi Super compression fittings satisfy the requirements set down in the ISO 6957 standard, which does not change the fact that stress corrosion can occur if a combination of the above-mentioned factors is present.

10 Warranty

The warranty and liability apply in accordance with our warranty conditions.
The terms and conditions of our warranty for VSH Super and Multi Super compression fittings are set at 10 (ten) years or five years where:

- 10 years applies for approved metal, plastic and multi-layer tubes in sizes 14, 16, 20, 25 and 26 mm:
  a. MultiSkin (PE-Xc/Al/PE-Xc)
  b. VSH Multi Universal (PE-RT/Al/PE-HD)
  c. VSH Multicon (PE-Xc/Al/PE-HD-PE-Xc)
  d. Henco (PE-Xc/Al/PE-Xc)
- 5 years applies with tubes of other materials or types approved by VSH.
- When using parts other than the original components of a VSH Super or VSH Multi Super compression, the warranty right lapses.
- Damage caused by stress corrosion does not fall under the scope of the product liability and warranty.

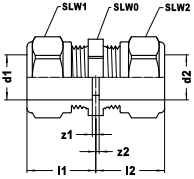
Furthermore, our General Terms and Conditions of Delivery apply.

VSH
connects.

11.1 VSH Super Compression

VSH Super

S1200 Straight Coupling (2 x compression)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	SLW0	l1/l2	z1/z2	SLW1/ SLW2
8 x 8	0860081		13	17	2	14
10 x 10	0860090	K/G	15	19	3	17
12 x 12	0860200	K/G	17	21	2	19
15 x 15	0860301	K/G	22	23	2	24
16 x 16	0868879		24	24	2	26
18 x 18	0860409		27	25	2	27
22 x 22	0860508	K/G	30	26	3	32
28 x 28	0860607	K/G	36	27	4	39
35 x 35	0860706	K/G	46	31	1	46
42 x 42	0878306	K/G	55	37	2	55
54 x 54	0878317	K/G	65	41	2	70

S1200 Straight Coupling (2 x compression)

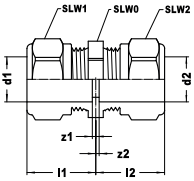
Material: DZR

Dimension	Article No.	KIWA/ Gastec	SLW0	l1/l2	z1/z2	SLW1/ SLW2
6 x 6	0880101*		13	16	2	13
8 x 8	0880110*		13	17	2	14
10 x 10	0880121	G	15	19	3	17
12 x 12	0880132	G	17	21	2	19
15 x 15	0880143	G	22	23	2	24
18 x 18	0880154		27	25	2	27
20 x 20	0882387		27	25	3	30
22 x 22	0880165	G	30	26	3	32
28 x 28	0880176	G	36	27	4	39
35 x 35	0880187	G	46	31	1	46
42 x 42	0866239	G	55	37	2	55
54 x 54	0866272	G	65	41	2	70

** Terminating*

S1200 Straight coupling nickel/chrome plated

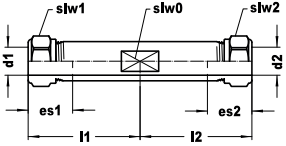
(2 x compression)



Material: DZR

Dimension	Article No.	Surface treatment	KIWA/ Gastec	SLW0	l1/l2	z1/z2	SLW1/ SLW2
10 x 10	0860411	Ni	G	15	19	3	17
12 x 12	0876315	Ni	G	17	21	2	19
15 x 15	0862851	Ni	G	22	23	2	24
22 x 22	0862862	Ni	G	30	26	3	32
28 x 28	0862873	Ni	G	36	27	4	39
10 x 10	0896027	Cr		15	19	3	17
12 x 12	0896038	Cr		17	21	2	19
15 x 15	0896049	Cr		22	23	2	24
18 x 18	0896051	Cr		27	25	2	27
22 x 22	0896060	Cr		30	26	3	32

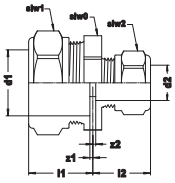
S1208 Repair coupling (2 x compression)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1/l2	es1/es2	slw1/slw2
15 x 15	0876854	K/G	18	60	27	24
22 x 22	0876876	K/G	26	61	29	32

S1201 Reducer coupling (2 x compression)



Material: Brass

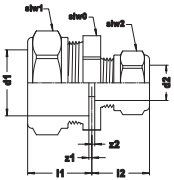
Dimension	Article No.	KIWA/ Gastec	slw0	l1	l2	z1	z2	slw1	slw2
12 x 10	0873103	K/G	17	19	22	0	5	19	17
15 x 10	0873136	K/G	22	24	22	2	5	24	17
15 x 12	0860211	K/G	22	24	21	2	2	24	19
22 x 15	0860310	K/G	30	25	24	2	2	32	24
22 x 18	0860741		30	26	25	3	3	32	27
22 x 20	0860783		30	26	26	3	3	32	30
28 x 15	0860387		36	27	25	3	3	39	24
28 x 22	0860519	K/G	36	27	26	3	3	39	32

Material: DZR

Dimension	Article No.	KIWA/ Gastec	slw0	l1	l2	z1	z2	slw1	slw2
10 x 8	0880321		15	19	17	3	3	17	14
12 x 8	0880319		17	21	17	2	2	19	14
12 x 10	0880231	G	17	21	19	2	2	19	17
15 x 8	0880242*		15	24	17	2	2	24	14
15 x 10	0880253	G	22	24	22	2	5	24	17
15 x 12	0880264	G	22	24	21	2	2	24	19
16 x 15	0880330		24	24	23	2	2	26	24
18 x 12	0880275		24	25	21	3	3	27	19
18 x 15	0880286		24	25	24	2	2	27	24
22 x 15	0880297	G	30	25	24	2	2	32	24

** Terminating*

S1201 Reducer coupling nickel/chromium-plated (2 x compression)



Material: Brass

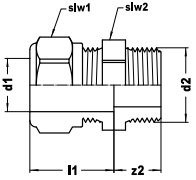
Dimension	Article No.	Surface treatment	KIWA/ Gastec	slw0	l1	l2	z1	z2	slw1	slw2
28 x 22	0871442	Ni	G	36	27	26	3	3	39	32

Material: DZR

Dimension	Article No.	Surface treatment	KIWA/ Gastec	slw0	l1	l2	z1	z2	slw1	slw2
12 x 10	0873631	Ni	G	17	21	19	2	2	19	17
15 x 10	0873642	Ni	G	22	24	22	2	5	24	17
18 x 15	0877008	Ni		24	25	24	2	2	27	24
22 x 15	0875611	Ni	G	30	25	24	2	2	32	24
10 x 8	0896236	Cr		15	19	17	3	3	17	14
12 x 8	0896225	Cr		17	21	17	2	2	19	14
12 x 10	0896071	Cr		17	21	19	2	2	19	17
15 x 10	0896082	Cr		22	24	22	2	5	24	17
15 x 12	0896093	Cr		22	24	21	2	2	24	19
16 x 15	0886371	Cr		24	24	23	2	2	26	24
18 x 15	0896258*	Cr		24	25	24	2	2	27	24

** Terminating*

S1202 Straight connector (compression x male thread)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	l1	z2	slw1	slw2
12 x R3/8	0877580	K/G	19	18	19	17
12 x R1/2	0857505	K/G	19	20	19	21
15 x R3/8	0861498	K/G	22	18	24	21
15 x R1/2	0861401	K/G	22	23	24	21
15 x R3/4	0861850	K/G	22	22	24	27
16 x R1/2	0877602		23	22	26	24
18 x R1/2	0861630		23	23	27	24
18 x R3/4	0861586		23	23	27	27
20 x R1/2	0878262		23	23	30	27
20 x R3/4	0862070		23	23	30	27
22 x R1/2	0877646	K/G	23	20	32	30
22 x R3/4	0861905	K/G	23	23	32	30
22 x R1	0861927	K/G	23	28	32	36
28 x R3/4	0861003	K/G	24	24	39	24
28 x R1	0861949	K/G	24	29	39	36
6 x G1/4	0862114		14	13	13	15
8 x G1/4	0861971		15	13	14	15
8 x G3/8	0861993		15	15	14	19
10 x G1/4	0861212	K	17	12	17	15
10 x G3/8	0861201	K	17	15	17	19
10 x G1/2	0861267	K	17	12	17	24
12 x G3/8	0861300	K	19	15	19	19
12 x G3/4	0861520		19	15	19	30
15 x G3/8	0861311	K	22	14	24	21

S1202 Straight connector (compression x male thread)

15 x G1/2	0861377	K	22	15	24	24
15 x G3/4	0861597	K	22	17	24	30
22 x G1/2	0861454	K	23	16	32	30
22 x G3/4	0861509	K	23	17	32	30
22 x G1	0861619		23	20	32	39
28 x G1	0861608	K	24	22	39	36
28 x G5/4	0861696		24	23	39	42
35 x G1	0861621		30	19	46	42
35 x G5/4	0861707		30	20	46	46

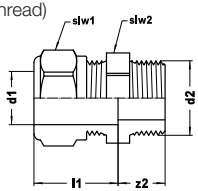
Material: DZR

Dimension	Article No.	KIWA/ Gastec	l1	z2	slw1	slw2
8 x G3/8*	0880431*		15	15	14	19
8 x G1/2	0880473		15	12	14	24
10 x G1/4*	0880429		17	12	17	15
10 x G3/8	0880440		17	15	17	19
10 x G1/2	0880484		17	12	17	25
12 x G3/8	0880451		19	15	19	19
12 x G1/2	0880495		19	13	19	24
15 x G3/8	0880462		22	14	24	21
15 x G1/2	0880506		22	15	24	24
15 x G3/4	0880781		22	17	24	30
16 x G1/2	0885951		23	15	26	24
18 x G3/8	0886633		23	15	27	21
18 x G1/2	0880517		23	15	27	24
18 x G3/4	0880528		23	17	27	30
22 x G1/2	0880594		23	16	32	30
22 x G3/4	0880539		23	17	32	30
22 x G1	0880792		23	20	32	36
28 x G3/4	0880385		24	18	39	36
28 x G1	0880541		24	22	39	36
35 x G1	0880605		30	19	46	42
35 x G5/4	0880550		30	20	46	46
42 x G3/2	0866393		36	19	55	55
54 x G2	0866415		39	20	70	65

** Terminating*

S1202 Straight connector nickel/chrome plated

(compression x male thread)



Material: Brass

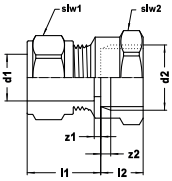
Dimension	Article No.	Surface treatment	KIWA/ Gastec	l1	z2	slw1	slw2
15 x R1/2	0862917	Ni	G	22	23	24	21
18 x R1/2	0874863	Ni		23	23	27	24
18 x R3/4	0876953	Ni		23	23	27	27
20 x R3/4	0878405	Ni		23	23	30	27
22 x R3/4	0868549	Ni	G	23	23	32	30
22 x R1	0875996	Ni	G	23	28	32	36
28 x R1	0868571	Ni	G	24	29	39	36
35 x G5/4	0871673*	Ni		30	20	46	46

Material: DZR

Dimension	Article No.	Surface treatment	KIWA/ Gastec	l1	z2	slw1	slw2
10 x G3/8	0874104	Ni		17	15	17	19
10 x G1/2	0861344	Ni		17	12	17	24
12 x G3/8	0873730	Ni		19	15	19	19
15 x G1/2	0873939	Ni		22	15	24	24
15 x G3/4	0875974	Ni		22	17	24	30
18 x G3/4	0882156*	Ni		23	17	27	30
22 x G1/2	0868538	Ni		23	16	32	30
28 x G1	0873994*	Ni		24	22	39	36
10 x G1/2	0896302	Cr		17	12	17	24
12 x G3/8	0896313	Cr		19	15	19	19
12 x G1/2	0896324	Cr		19	13	19	24
15 x G1/2	0896335	Cr		22	15	24	24
22 x G3/4	0896346	Cr		23	17	32	30

** Terminating*

S1204 Straight connector (compression x female thread)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	l1	z1	l2	z2	slw1	slw2
6 x Rp1/4	0862103*		17	3	14	3	13	17
8 x Rp3/8	0862268		19	4	14	3	14	21
10 x Rp1/4	0862246		19	2	14	3	17	17
10 x Rp3/8	0862281	K	20	3	14	3	17	21
10 x Rp1/2	0862389	K	21	4	19	4	17	27
15 x Rp1/2	0862367	K/G	24	2	19	4	24	27
15 x Rp3/4	0862598	K/G	26	4	20	4	24	32
20 x Rp1/2	0873565		23	0	16	1	30	30
22 x Rp1/2	0862807	K/G	23	0	16	1	32	30
22 x Rp3/4	0862488	K/G	25	2	20	4	32	32
22 x Rp1	0862611	K/G	27	4	23	4	32	41
28 x Rp3/4	0877668	K	26	2	22	4	39	36
28 x Rp1	0862686	K/G	26	2	23	4	39	41
35 x Rp5/4	0862708		32	2	25	4	46	50
42 x Rp3/2	0878097		39	3	25	4	55	55
12 x G3/8	0862301	K	21	2	10	3	19	21
12 x G1/2	0862499	K	21	2	12	3	19	27
15 x G3/8	0862312	K	24	2	10	3	24	21
15 x G1/2	0862400	K	25	3	12	3	24	27
15 x G3/4	0864996	K	24	2	13	4	24	30
16 x G1/2	0868846		27	4	11	2	26	27
16 x G3/4	0868835*		25	2	13	4	26	30
18 x G1/2	0862411		25	2	13	4	27	27
18 x G3/4	0862587		25	2	13	4	27	30

** Terminating*

S1204 Straight connector (compression x female thread)

22 x G3/4	0862501	K	25	2	13	4	32	30
28 x G1	0862609	K	26	2	16	4	39	39
28 x G5/4	0877681		29	5	25	4	39	50

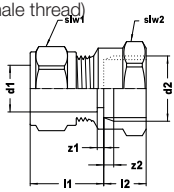
Material: DZR

Dimension	Article No.	KIWA/ Gastec	l1	z1	l2	z2	slw1	slw2
8 x Rp1/2	0880651*		19	4	19	4	14	27
10 x Rp3/8	0880627		20	3	14	3	17	21
10 x Rp1/2	0880660		21	4	19	4	17	27
12 x Rp3/8	0880638	G	21	2	14	3	19	21
12 x Rp1/2	0880671	G	22	3	19	4	19	27
15 x Rp3/8	0880649	G	23	1	14	3	24	21
15 x Rp1/2	0880682	G	24	2	19	4	24	27
15 x Rp3/4	0880704	G	26	4	20	4	24	32
16 x Rp1/2	0885995		26	3	18	3	26	27
18 x Rp1/2	0880693		25	2	19	4	27	27
18 x Rp3/4	0880715*		26	3	20	4	27	32
20 x Rp3/4	0882409*		25	3	20	4	30	32
22 x Rp1/2	0880770	G	23	0	17	1	32	30
22 x Rp3/4	0880726	G	25	2	20	4	32	32
22 x Rp1	0880759	G	27	4	23	4	32	41
28 x Rp1	0880737	G	26	2	23	4	39	41
35 x Rp5/4	0880748		32	2	25	4	46	50
42 x Rp3/2	0866461		39	3	25	4	55	55
54 x Rp2	0866481		42	3	30	4	70	70

** Terminating*

S1204 Straight connector

(compression x female thread)



Material: Brass

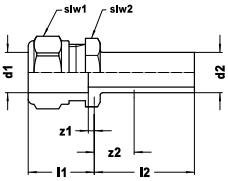
Article No.	Dimension	Surface treatment	Gas-tec	l1	z1	l2	z2	slw1	slw2
22 x Rp1	0876051	Ni	G	27	4	23	4	32	41
15 x G1/2	0872401	Ni		24	3	12	3	24	27
18 x G3/4	0876964	Ni		25	2	13	4	27	30
22 x G3/4	0872410	Ni		25	2	13	4	32	30

Material: DZR

Article No.	Dimension	Surface treatment	Gas-tec	l1	z1	l2	z2	slw1	slw2
10 x Rp1/2	0896401	Cr		21	4	19	4	17	27
12 x Rp3/8	0896412	Cr		21	2	14	3	19	21
12 x Rp1/2	0896423	Cr		21	2	12	3	19	27
15 x Rp3/8	0886591	Cr		23	1	14	3	24	21
15 x Rp1/2	0896434	Cr		24	2	19	4	24	27
22 x Rp1/2	0896445	Cr		23	0	17	1	32	30

** Terminating*

S1275 Straight coupling (compression x male)

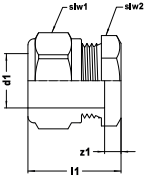


Material: Brass

Article No.	Dimension	l1	z1	l2	z2	slw1	slw2
12 x Ø12	0875006*	19	0	39	21	19	17
15 x Ø15	0875017*	22	0	40	19	24	21
22 x Ø22	0875028*	23	0	41	18	32	30
28 x Ø28	0875039*	24	0	42	19	39	36

** Terminating*

S1206 Stop end (1 x compression)



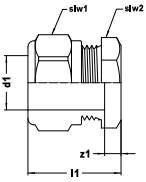
Material: Brass

Dimension	Article No.	KIWA/ Gastec	l1	z1	slw1	slw2
12	0861124	K/G	23	4	19	17
15	0861135	K/G	27	5	24	21
22	0861157	K/G	29	6	32	30
28	0861168	K/G	31	7	39	36
35	0886908	K/G	35	5	46	42

Material: DZR

Dimension	Article No.	KIWA/ Gastec	l1	z1	slw1	slw2
10	0880871		22	5	17	17
12	0880814	G	23	4	19	17
15	0880825	G	27	5	24	21
18	0880880		29	6	27	27
22	0880836	G	29	6	32	30
28	0880869	G	31	7	39	36

S1206 Stop end nickel/chrome plated (1 x compression)



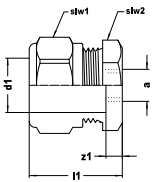
Material: Brass

Dimension	Article No.	Surface treatment	KIWA/ Gastec	l1	z1	slw1	slw2
28	0872278*	Ni	G	31	7	39	36

Material: DZR

Dimension	Article No.	Surface treatment	KIWA/ Gastec	l1	z1	slw1	slw2
15	0872256	Ni	G	27	5	24	21
22	0872267	Ni	G	29	6	32	30

S1207 Stop end with air vent (1 x compression)

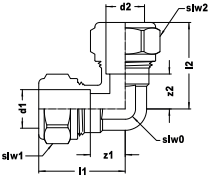


Material: Brass

Dimension	Article No.	l1	z1	slw1	slw2
22 x G1/8	0861181*	29	6	32	30

** Terminating*

S1210 Elbow 90° (2 x compression)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1/l2	z1/z2	slw1/slw2
8 x 8	0863181		10	23	8	14
10 x 10	0863192	K/G	12	26	9	17
12 x 12	0863203	K/G	14	29	10	19
15 x 15	0863302	K/G	17	33	11	24
16 x 16	0868824*		18	34	11	26
18 x 18	0863401		22	37	13	27
22 x 22	0863500	K/G	24	38	15	32
28 x 28	0863601	K/G	30	42	18	39
35 x 35	0863709	K/G	36	50	19	46
42 x 42	0878273	K/G	46	59	23	55
54 x 54	0878284	K/G	60	68	28	70

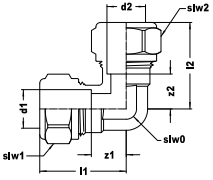
Material: DZR

Dimension	Article No.	KIWA/ Gastec	slw0	l1/l2	z1/z2	slw1/slw2
8 x 8	0880913*		10	23	8	14
10 x 10	0880924	G	12	26	9	17
12 x 12	0880935	G	14	29	10	19
15 x 15	0880946	G	17	33	11	24
18 x 18	0880957		22	37	13	27
22 x 22	0880968	G	24	38	15	32
28 x 28	0880979	G	30	42	18	39
35 x 35	0880981	G	36	50	19	46
42 x 42	0863731	G	46	59	23	55
54 x 54	0863753	G	60	68	28	70

** Terminating*

S1210 Elbow 90° nickel/chrome plated

(2 x compression)



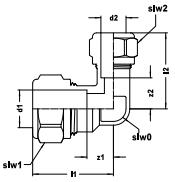
Material: Brass

Dimension	Article No.	Surface treatment	KIWA/ Gastec	slw0	l1/l2	z1/z2	slw1/ slw2
12 x 12	0863610	Cr		14	29	10	19
15 x 15	0863489	Cr		17	33	11	24

Material: DZR

Dimension	Article No.	Surface treatment	KIWA/ Gastec	slw0	l1/l2	z1/z2	slw1/2
10 x 10	0863115	Ni	G	12	26	9	17
12 x 12	0876359	Ni	G	14	29	10	19
15 x 15	0872553	Ni	G	17	33	11	24
22 x 22	0872564	Ni	G	24	38	15	32
28 x 28	0872575	Ni	G	30	42	18	39
10 x 10	0896500	Cr		12	26	9	17
12 x 12	0896511	Cr		14	29	10	19
15 x 15	0896522	Cr		17	33	11	24
18 x 18	0896533	Cr		22	37	13	27
22 x 22	0896544	Cr		24	38	15	32

S1211 Reduced elbow 90° (2 x compression)



Material: Brass

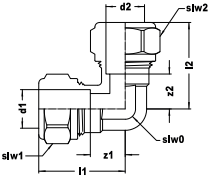
Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	l2	z2	slw1	slw2
12 x 10	0863456	K/G	12	28	9	27	10	19	17
15 x 10	0863379	K/G	14	30	8	30	12	24	17
15 x 12	0863214	K/G	14	30	9	30	11	24	19
22 x 15	0863313	K/G	17	39	11	39	15	32	24
28 x 22	0863599	K/G	24	39	15	43	18	39	32

Material: DZR

Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	l2	z2	slw1	slw2
15 x 12	0882816	G	14	30	9	30	11	24	19
16 x 15	0882827		17	35	11	35	13	26	24
22 x 15	0882838	G	17	39	11	39	15	32	24

S1211 Reduced elbow 90° nickel/chrome plated

(2 x compression)



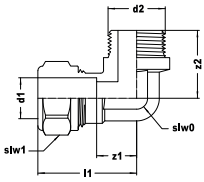
Material: Brass

Dimension	Article No.	Surface treatment	KIWA/ Gastec	slw0	l1	z1	l2	z2	slw1	slw2
12 x 10	0874049	Ni	G	12	28	9	27	10	19	17
15 x 10	0863381	Ni	G	14	30	8	30	12	24	17
28 x 22	0864127	Ni	G	24	39	15	43	18	39	32

Material: DZR

Dimension	Article No.	Surface treatment	KIWA/ Gastec	slw0	l1	z1	l2	z2	slw1	slw2
22 x 15	0864105	Ni	G	17	39	11	39	15	32	24
15 x 12	0886479	Cr		14	30	9	30	11	24	19

S1212 Angle adaptor 90° (compression x male thread)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	z2	slw1
12 x R3/8	0862169	K/G	14	29	11	27	19
15 x R1/2	0862004	K/G	18	33	11	35	24
16 x R1/2	0877745		19	35	14	35	26
18 x R1/2	0864457		18	34	11	36	27
18 x R3/4	0864523		24	37	14	37	27
22 x R3/4	0862026	K/G	24	38	14	42	32
28 x R1	0877767	K/G	30	45	21	48	39
12 x G1/2	0864490	K	14	34	15	22	19
15 x G3/8	0877701	K	17	36	14	25	24
15 x G1/2	0864402	K	17	36	14	25	24
15 x G3/4	0864512	K	17	39	17	26	24
22 x G1/2	0862840		18	38	14	30	32
22 x G3/4	0864501	K	24	41	17	31	32
22 x G1	0864611	K	24	44	20	34	32
28 x G3/4	0864534	K	30	43	21	37	39
28 x G1	0864600	K	30	45	21	38	39

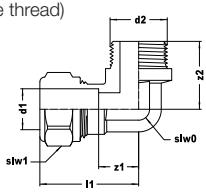
S1212 Angle adaptor 90° (compression x male thread)

Material: DZR

Dimension	Article No.	slw0	l1	z1	z2	slw1
10 x G1/2	0881056	12	32	16	21	17
10 x G3/8	0881023	12	29	14	21	17
12 x G3/8	0881034	14	31	13	22	19
12 x G1/2	0881067	14	34	15	22	19
15 x G3/8	0886259	17	36	14	25	24
15 x G1/2	0881078	17	36	14	25	24
15 x G3/4	0881201	17	39	17	26	24
18 x G1/2	0881089	19	38	14	27	27
18 x G3/4	0886270	24	37	17	37	27
22 x G1/2	0882508	18	38	14	30	32
22 x G3/4	0881091	24	41	17	31	32
28 x G1	0881100	30	45	21	38	39
35 x G5/4	0863984	36	52	21	42	46
42 x G3/2	0864193	46	59	23	49	55

S1212 Angle adaptor 90° nickel/chrome plated

(compression x male thread)



Material: Brass

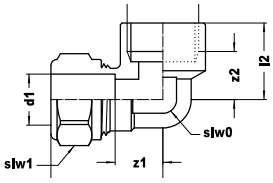
Dimension	Article No.	Surface treatment	KIWA/ Gastec	slw0	l1	z1	z2	slw1
15 x R1/2	0862939	Ni	G	18	33	11	35	24
22 x R3/4	0875952	Ni	G	24	38	14	42	32

Material: DZR

Dimension	Article No.	Surface treatment	slw0	l1	z1	z2	slw1
28 x G1	0871079	Ni	30	45	21	38	39
10 x G3/8	0886611*	Cr	12	29	14	21	17
10 x G1/2	0896601	Cr	12	32	16	21	17
12 x G3/8	0896610	Cr	14	31	13	22	19
12 x G1/2	0896621	Cr	14	34	15	22	19
15 x G1/2	0896632	Cr	17	36	14	25	24

** Terminating*

S1214 Angle adaptor 90° (compression x female thread)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	l2	z2	slw1
10 x Rp3/8	0865293		12	30	13	22	10	17
12 x Rp3/8	0865304	K/G	14	32	13	22	10	19
12 x Rp1/2	0865491	K/G	14	35	16	28	13	19
15 x Rp3/8	0865315	K/G	17	35	13	22	10	24
15 x Rp1/2	0865471	K/G	17	37	15	28	13	24
15 x Rp3/4	0865513	K/G	17	40	18	31	14	24
18 x Rp1/2	0865414		22	38	15	29	14	27
18 x Rp3/4	0865524		22	41	18	32	15	27
22 x Rp1/2	0862829	K/G	24	38	15	27	12	32
22 x Rp3/4	0865581	K/G	24	41	18	33	16	32
22 x Rp1	0865689	K	24	44	21	38	19	32
28 x Rp1	0865601	K/G	30	46	21	34	15	39
15 x G1/2	0865403	K	17	33	11	23	14	24
22 x G3/4	0865502	K	24	44	16	26	17	32
22 x G1	0865590		24	42	18	27	15	32

S1214 Angle adaptor 90° (compression x female thread)

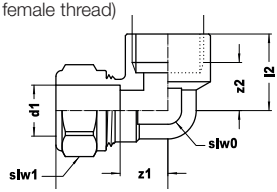
Material: DZR

Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	l2	z2	slw1
10 x Rp3/8	0881311*		12	30	13	22	10	17
10 x Rp1/2	0881232		12	33	17	28	13	17
12 x Rp3/8	0881210	G	14	32	13	22	10	19
12 x Rp1/2	0881243	G	14	35	16	28	13	19
15 x Rp1/2	0881254	G	17	33	15	23	14	24
18 x Rp1/2	0881265		22	38	15	29	14	27
18 x Rp3/4	0881298*		22	41	18	32	15	27
22 x Rp1/2	0881342	G	24	38	15	27	12	32
22 x Rp3/4	0881276	G	24	41	18	33	16	32
28 x Rp1	0881287	G	30	46	21	34	15	39
35 x Rp5/4	0863962		36	50	22	46	25	46
42 x Rp3/2	0864006		46	59	23	49	27	55
54 x Rp2	0864215		60	68	28	60	35	70

** Terminating*

S1214 Angle adaptor 90° nickel/chrome plated

(compression x female thread)



Material: Brass

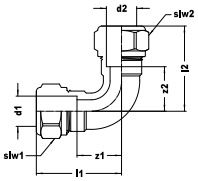
Dimension	Article No.	Surface treatment	KIWA/ Gastec	slw0	l1	z1	l2	z2	slw1
15 x Rp3/4	0872641	Ni	G	17	40	18	31	14	24
15 x G1/2	0872883	Ni		17	33	11	23	14	24
22 x G3/4	0872872	Ni		24	44	16	26	17	32

Material: DZR

Dimension	Article No.	Surface treatment	KIWA/ Gastec	slw0	l1	z1	l2	z2	slw1
22 x Rp1/2	0872685	Ni	G	24	38	15	27	12	32
28 x Rp1	0872707	Ni	G	30	46	21	34	15	39
10 x Rp3/8*	0886556	Cr		12	30	13	22	10	17
10 x Rp1/2	0896709	Cr		12	33	17	28	13	17
12 x Rp3/8	0896711	Cr		14	32	13	22	10	19
12 x Rp1/2	0896720	Cr		14	35	16	28	13	19
15 x Rp1/2	0896731	Cr		17	33	15	23	14	24

** Terminating*

S1216 Bend 90° (2 x compression)

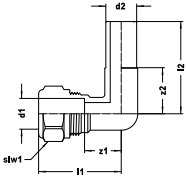


Material: Brass

Dimension	Article No.	l1/l2	z1/z2	slw1/slw2
15 x 15	0863016	42	18	24
22 x 22	0863027	51	23	32
28 x 28	0863038	52	28	39
35 x 35	0863049	64	33	46

** Terminating*

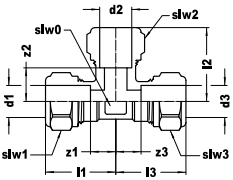
S1218 Angle adaptor 90° (compression x male)



Material: Brass

Dimension	Article No.	l1	z1	l2	z2	slw1
15 x Ø15	0312070	40	18	45	22	24
22 x Ø22	0862091	37	13	41	16	32

S1220 Tee (3 x compression)



Material: Brass

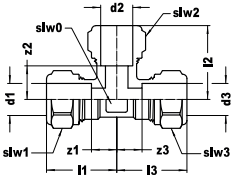
Dimension	Article No.	KIWA/ Gastec	slw0	l1/l3	z1/z3	l2	z2	slw1/slw2/ slw3
8 x 8 x 8	0866701		10	23	8	23	8	14
10 x 10 x 10	0866987		12	26	9	26	9	17
12 x 12 x 12	0867009	K/G	14	30	9	32	9	19
15 x 15 x 15	0867053	K/G	17	32	10	35	12	24
18 x 18 x 18	0866998		22	36	12	36	12	27
22 x 22 x 22	0867174	K/G	24	37	13	40	16	32
28 x 28 x 28	0867284	K/G	30	41	16	44	20	39
35 x 35 x 35	0867394		36	50	19	51	19	46

Material: DZR

Dimension	Article No.	KIWA/ Gastec	slw0	l1/l3	z1/z3	l2	z2	slw1/slw2/ slw3
6 x 6 x 6	0882585*		8	21	7	20	7	13
8 x 8 x 8	0881419*		12	23	8	23	8	14
10 x 10 x 10	0881421*		12	26	9	26	9	17
12 x 12 x 12	0881430	G	14	30	9	32	9	19
15 x 15 x 15	0881441	G	17	32	10	35	12	24
18 x 18 x 18	0881452		22	36	12	36	12	27
20 x 20 x 20	0880990*		24	37	14	40	16	27
22 x 22 x 22	0881463	G	24	37	13	40	16	32
28 x 28 x 28	0881474	G	30	41	16	44	20	39
35 x 35 x 35	0881485		36	50	19	51	19	46
42 x 42 x 42	0866613		46	59	23	59	23	55
54 x 54 x 54	0866635		60	68	28	68	28	70

** Terminating*

S1220 Tee nickel/chrome plated (3 x compression)

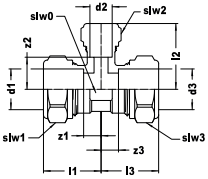


Material: DZR

Dimension	Article No.	Surface treatment	KIWA/ Gastec	slw0	l1/ l3	z1/ z3	l2	z2	slw1/slw2/ slw3
10 x 10 x 10	0868175*	Ni		12	26	9	26	9	17
15 x 15 x 15	0872731	Ni	G	17	32	10	35	12	24
22 x 22 x 22	0872740	Ni	G	24	37	13	40	16	32
28 x 28 x 28	0872751	Ni	G	30	41	16	44	20	39
10 x 10 x 10	0896808	Cr		12	26	9	26	9	17
12 x 12 x 12	0896819	Cr		14	30	9	32	9	19
15 x 15 x 15	0896821	Cr		17	32	10	35	12	24
18 x 18 x 18	0896830	Cr		22	36	12	36	12	27
22 x 22 x 22	0896841	Cr		24	37	13	40	16	32

** Terminating*

S1221 T-reduced (3 x compression)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1/l3	z1/z3	slw1/ slw3	l2	z2	slw2
12 x 15 x 12	0867011	K/G	17	30	11	19	31	9	24
15 x 12 x 15	0867031	K/G	17	31	9	24	34	13	19
15 x 22 x 15	0867064	K/G	24	36	13	24	37	12	32
18 x 15 x 18	0867372		22	35	10	27	35	13	24
22 x 12 x 22	0867130	K/G	24	32	8	32	36	17	19
22 x 15 x 22	0867141	K/G	24	34	9	32	38	16	24
22 x 18 x 22	0867449		30	40	13	32	41	18	27
22 x 28 x 22	0867185	K/G	30	40	16	32	41	16	39
28 x 15 x 28	0867229	K/G	30	34	10	39	42	20	24
28 x 18 x 28	0867451*		30	38	13	39	42	19	27
28 x 22 x 28	0867251	K/G	30	38	14	39	43	17	32

** Terminating*

S1221 T-reduced (3 x compression)

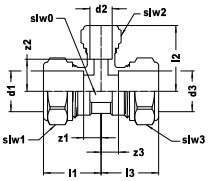
Material: DZR

Dimension	Article No.	KIWA/ Gastec	slw0	l1/l3	z1/z3	slw1/ slw3	l2	z2	slw2
12 x 10 x 12	0881551		14	30	9	19	31	10	17
12 x 15 x 12	0881562	G	17	30	11	19	31	9	24
15 x 10 x 15	0881584		17	30	8	24	30	12	17
15 x 12 x 15	0881606	G	17	31	9	24	34	13	19
15 x 18 x 15	0881947*		24	36	15	24	37	12	27
15 x 22 x 15	0885973	G	24	36	13	24	37	12	32
16 x 15 x 16	0881507		17	34	11	26	35	13	24
18 x 12 x 18	0881639		22	32	10	27	33	15	19
18 x 15 x 18	0881650		22	35	10	27	35	13	24
22 x 12 x 22	0886314	G	24	32	8	32	36	17	19
22 x 15 x 22	0881661	G	24	34	9	32	38	16	24
22 x 18 x 22	0881751*		24	37	13	32	39	18	27
28 x 15 x 28	0881683	G	30	34	10	39	42	20	24
28 x 22 x 28	0881694	G	30	38	14	39	43	17	32

** Terminating*

S1221 T-reduced nickel/chrome plated

(3 x compression)

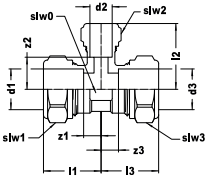


Material: DZR

Dimension	Article No.	Surface treatment	KIWA/ Gastec	slw0	l1/l3	z1/ z3	slw1/ slw3	l2	z2	slw2
15 x 22 x 15	0875633	Ni	G	24	36	13	24	37	12	32
22 x 15 x 22	0872071	Ni	G	24	34	9	32	38	16	24
28 x 15 x 28	0864050	Ni	G	30	34	10	39	42	20	24
28 x 22 x 28	0872080*	Ni	G	30	38	14	39	43	17	32
12 x 10 x 12	0896918	Cr		14	30	9	19	31	10	17
12 x 15 x 12	0896929	Cr		17	30	11	19	31	9	24
15 x 10 x 15	0896931	Cr		17	30	8	24	30	12	17
15 x 12 x 15	0896951	Cr		17	31	9	24	34	13	19
18 x 12 x 18	0896973	Cr		22	32	10	27	33	15	19
18 x 15 x 18	0896984	Cr		22	35	10	27	35	13	24
22 x 15 x 22	0897072	Cr		24	34	9	32	38	16	24

** Terminating*

S1247 T-reduced (3 x compression)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	slw1	l2	z2	slw2	l3	z3	slw3
15 x 15 x 12	0867042	K/G	17	33	10	24	35	12	24	33	11	19
22 x 22 x 15	0867163	K/G	24	37	15	32	40	15	32	39	16	24
28 x 28 x 15	0867262	K/G	30	42	18	39	44	18	39	41	18	24
28 x 28 x 22	0867273	K/G	30	41	18	39	44	18	39	42	18	32

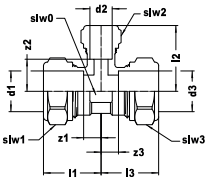
Material: DZR

Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	slw1	l2	z2	slw2	l3	z3	slw3
12 x 12 x 10	0881980*		14	31	9	19	26	9	19	31	12	17
15 x 15 x 12	0881617	G	17	33	10	24	35	12	24	33	11	19
22 x 22 x 12	0867152*		24	37	13	32	40	16	32	35	18	19
22 x 22 x 15	0881672	G	24	37	15	32	40	15	32	39	16	24
28 x 28 x 15	0881408	G	30	42	18	39	44	18	39	41	18	24

** Terminating*

S1247 T-reduced nickel/chrome plated

(3 x compression)

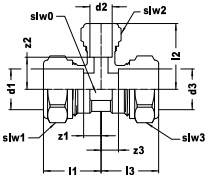


Material: DZR

Dimension	Article No.	Surface treatm.	KIWA/ Gastec	slw0	l1	z1	slw1	l2	z2	slw2	l3	z3	slw3
22 x 22 x 15	0875677	Ni	G	24	37	15	32	40	15	32	39	16	24
28 x 28 x 22	0871871*	Ni	G	30	41	18	39	44	18	39	42	18	32
12 x 12 x 10	0897028	Cr		14	31	9	19	26	9	19	31	12	17
15 x 15 x 12	0896962	Cr		17	33	10	24	35	12	24	33	11	19
22 x 22 x 15	0896874	Cr		24	37	15	32	40	15	32	39	16	24

** Terminating*

S1248 T-reduced (3 x compression)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	slw1	l2	z2	slw2	l3	z3	slw3
15 x 12 x 12	0867020	K/G	17	32	9	24	35	11	19	31	9	19
18 x 15 x 15	0867361		22	35	11	27	35	12	24	33	10	24
22 x 12 x 15	0867108*		24	32	10	32	37	16	19	31	11	24
22 x 15 x 12	0867119*	K/G	24	34	10	32	38	14	24	30	13	19
22 x 15 x 15	0867121	K/G	24	34	10	32	38	14	24	34	11	24
28 x 15 x 22	0867218	K/G	30	35	10	39	42	20	24	33	9	32
28 x 22 x 15	0867231	K/G	30	38	14	39	43	19	32	36	14	24
28 x 22 x 22	0867240	K/G	30	38	14	39	43	17	32	39	14	32

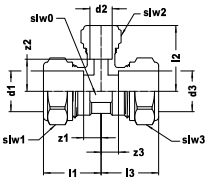
Material: DZR

Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	slw1	l2	z2	slw2	l3	z3	slw3
12 x 10 x 10	0881540*		24	27	10	17	27	10	17	28	9	17
15 x 12 x 12	0881595	G	17	32	9	24	35	11	19	31	9	19
18 x 15 x 15	0881641		22	35	11	27	35	12	24	33	10	24
22 x 15 x 15	0886292	G	24	34	10	32	38	14	24	34	11	24

** Terminating*

S1248 T-reduced nickel/chrome plated

(3 x compression)



Material: Brass

Dimension	Article No.	Surface treatm.	KIWA/ Gastec	slw0	l1	z1	slw1	l2	z2	slw2	l3	z3	slw3
28 x 15 x 22	0864545*	Ni	G	30	35	10	39	42	20	24	33	9	32
28 x 22 x 15	0871090*	Ni	G	30	38	14	39	43	19	32	36	14	24

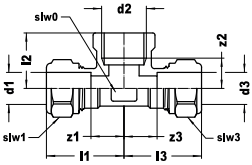
Material: DZR

Dimension	Article No.	Surface treatm.	KIWA/ Gastec	slw0	l1	z1	slw1	l2	z2	slw2	l3	z3	slw3
22 x 15 x 15	0875655	Ni	G	24	34	10	32	38	14	24	34	11	24
15 x 12 x 12	0896940	Cr		17	32	9	24	35	11	19	31	9	19
22 x 15 x 15	0886688	Cr		24	34	10	32	38	14	24	34	11	24

** Terminating*

S1223 Tee with female branch

(compression x female thread x compression)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1/l3	z1/z3	slw1/ slw3	l2	z2	slw2
12 x Rp1/2 x 12	0869253	K	14	31	15	19	21	12	12
15 x Rp1/4 x 15	0869321	K/G	17	32	10	24	19	8	8
15 x Rp3/8 x 15	0869330	K	17	33	11	24	20	8	8
15 x Rp1/2 x 15	0869341	K/G	24	36	15	24	26	9	9
18 x Rp1/2 x 18	0869440		22	37	14	27	26	11	11
22 x Rp3/8 x 22	0869539	K/G	24	34	11	32	24	12	12
22 x Rp1/2 x 22	0869541	K/G	24	37	13	32	27	12	12
22 x Rp3/4 x 22	0869550	K/G	24	39	15	32	28	15	15
28 x Rp1 x 28	0869660		30	53	19	39	36	17	17
28 x G1/2 x 28	0869649	K	30	38	13	39	32	17	17
28 x G3/4 x 28	0869651	K	30	41	16	39	32	16	16

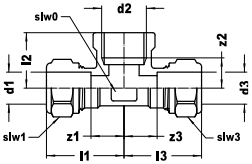
Material: DZR

Dimension	Article No.	KIWA/ Gastec	slw0	l1/l3	z1/z3	slw1/ slw3	l2	z2	slw2
12 x Rp1/2 x 12	0881815		22	31	15	19	21	12	12
15 x Rp3/8 x 15	0882090		17	33	11	24	20	8	8
15 x Rp1/2 x 15	0881826		24	36	15	24	26	9	9
18 x Rp1/2 x 18	0882101		22	37	14	27	26	11	11
18 x Rp3/4 x 18	0882376		22	42	18	27	32	16	16
22 x Rp1/2 x 22	0882079		24	37	13	32	27	12	12
22 x Rp3/4 x 22	0882081	G	24	39	15	32	28	15	15

** Terminating*

S1223 Tee with female branch nickel/chrome plated

(compression x female thread x compression)



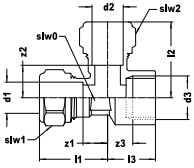
Material: Brass

Dimension	Article No.	Surface treatm.	KIWA/ Gastec	slw0	l1	z1/ z3	slw1/ slw3	l2	z2	slw2
15 x Rp1/4 x 15	0875699	Ni	G	17	32	10	24	19	8	8
15 x Rp1/2 x 15	0875710	Ni	G	24	36	15	24	26	9	9
18 x Rp1/2 x 18	0877461*	Ni		22	37	14	27	26	11	11
22 x Rp1/2 x 22	0875732	Ni	G	24	37	13	32	27	12	12
22 x Rp3/4 x 22	0875754*	Ni	G	24	39	15	32	28	15	15
28 x G1/2 x 28	0869605	Ni		30	38	13	39	32	17	17
28 x G3/4 x 28	0869715*	Ni		30	41	16	39	32	16	16

** Terminating*

S1224 Tee with female branch

(compression x compression x female thread)



Material: Brass

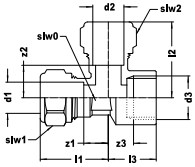
Dimensions	Article No.	KIWA/ Gastec	slw0	l1	z1	slw1	l2	z2	slw2	l3	z3
15 x 15 x Rp1/2	0869803	K/G	17	33	10	24	37	14	24	23	8
22 x 22 x Rp1/2	0869836	K/G	24	37	13	32	39	16	32	27	11
22 x 22 x Rp3/4	0869847	K/G	24	37	13	32	39	16	32	33	16
15 x 15 x G3/8	0869814		22	33	11	24	35	14	24	20	13
28 x 28 x G1/2	0869880	K	30	41	17	39	44	20	39	26	14

Material: DZR

Dimensions	Article No.	KIWA/ Gastec	slw0	l1	z1	slw1	l2	z2	slw2	l3	z3
15 x 15 x Rp1/2	0881837	G	17	33	10	24	37	14	24	28	8

S1224 Tee with female end nickel plated

(compression x compression x female thread)



Material: Brass

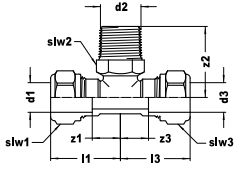
Dimensions	Article No.	Surface treatm.	KIWA/ Gastec	slw0	l1	z1	slw1/ slw2	l2	z2	l3	z3
22 x 22 x Rp1/2	0875811	Ni	G	24	37	13	32	39	16	27	11

Material: DZR

Dimensions	Article No.	Surface treatm.	KIWA/ Gastec	slw0	l1	z1	slw1/ slw2	l2	z2	l3	z3
15 x 15 x Rp1/2	0875798	Ni	G	17	33	10	24	37	14	28	8

S1225 Tee with male branch

(compression x male thread x compression)



Material: Brass

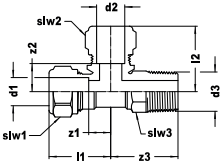
Dimension	Article No.	KIWA/ Gastec	l1/l3	z1/z3	slw1/ slw3	z2	slw2
15 x R1/2 x 15	0867988	K/G	35	10	24	36	21
22 x R1/2 x 22	0871706	K/G	36	12	32	41	19

Material: DZR

Dimension	Article No.	KIWA/ Gastec	l1/l3	z1/z3	slw1/ slw3	z2	slw2
15 x G1/2 x 15	0883003		35	10	24	36	21

S1226 Tee with male end

(compression x compression x male thread)

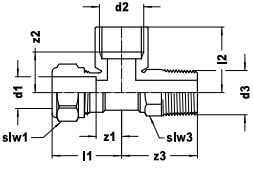


Material: Brass

Dimension	Article No.	KIWA/ Gastec	l1	z1	slw1/ slw2	l2	z2	z3	slw3
15 x 15 x R1/2	0867977	K/G	31	10	24	35	10	36	19

S1227 Tee with male end

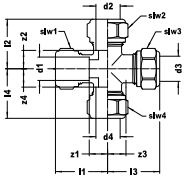
(compression x female thread x male thread)



Material: Brass

Dimension	Article No.	l1	z1	l2	z2	z3	slw1	slw3
15 x G1/2 x R1/2	0871805	33	12	31	16	36	24	19

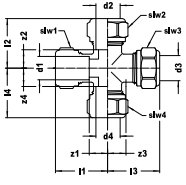
S1230 Cross (4 x compression)



Material: Brass

Dimensions	Article No.	KIWA/ Gastec	l1/l2/l3/l4	z1/z2/z3/z4	slw1/slw2/ slw3/slw4
15 x 15 x 15 x 15	0866008	K	32	10	24
22 x 22 x 22 x 22	0866030	K	37	14	32

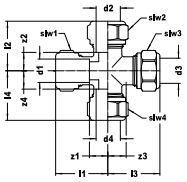
S1231 Cross reduced (4 x compression)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	l1/ l4	z1	l2	z2/ z4	l3	z3	slw1	slw2/ slw4	slw3
22 x 15 x 15 x 15	0866019	K	35	11	35	13	32	10	32	24	24
22 x 15 x 22 x 15	0866021	K	34	10	36	13	34	10	32	24	32

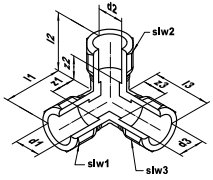
S1231 Cross reduced nickel coated (4 x compression)



Material: Brass

Dimension	Article No.	Surface treatm.	l1/ l4	z1	l2	z2/ z4	l3	z3	slw1	slw2/slw3/ slw4
22 x 15 x 15 x 15	0875930	Ni	35	11	35	13	32	10	32	24

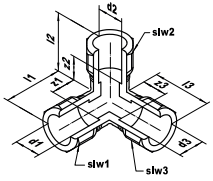
S1235 Corner tee (3 x compression)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	l1/l2/l3	z1/z3	z2	slw1/slw2/ slw3
15 x 15 x 15	0871332	K	33	11	10	24
22 x 22 x 22	0871354	K	37	14	14	32

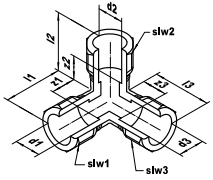
S1235 Corner tee nickel plated (3 x compression)



Material: Brass

Dimension	Article No.	Surface treatment	l1/l2/l3	z1/z3	z2	slw1/slw2/ slw3
15 x 15 x 15	0875831	Ni	33	11	10	24
22 x 22 x 22	0875853	Ni	37	14	14	32

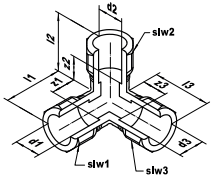
S1236 Corner T-reduced (3 x compression)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	l1/l2	z1/z2	l3	z3	slw1	slw2	slw3
22 x 15 x 15	0871365	K	38	16	34	10	32	24	24
22 x 15 x 22	0871343	K	38	14	38	16	32	24	32

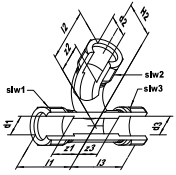
S1236 Corner T-reduced nickel plated (3 x compression)



Material: Brass

Dimension	Article No.	Surface treatm.	l1/l2	z1/z2	l3	z3	slw1	slw2	slw3
22 x 15 x 15	0875897	Ni	38	16	34	10	32	24	24
22 x 15 x 22	0875875	Ni	38	14	38	16	32	24	32

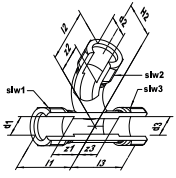
S1237 Offset tee (3 x compression)



Material: Brass

Dimension	Article No.	l1/l3	z1/z3	l2	z2	H2	slw1/ slw2/slw3
15 x 15 x 15	0867955	32	11	36	14	34	24
22 x 22 x 22	0867999	38	15	41	17	37	32

S1237 Offset tee nickel plated (3 x compression)

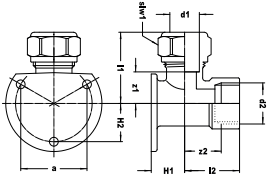


Material: Brass

Dimension	Article No.	Surface treatment	l1/l3	z1/z3	l2	z2	H2	slw1/ slw2/slw3
15 x 15 x 15	0871521*	Ni	32	11	36	14	34	24
22 x 22 x 22	0871508*	Ni	38	15	41	17	37	32

** Terminating*

S1240 Wall plate 90° (compression x female thread)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	l1	z1	slw1	l2	z2	H1	H2	a
12 x G1/2	0865238	K	35	16	19	28	14	17	20	34
15 x G1/2	0865007	K	36	14	24	28	14	17	20	34
22 x G3/4	0865018	K	41	17	32	29	12	21	23	39

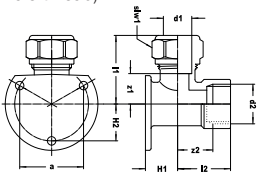
Material: DZR

Dimension	Article No.	KIWA/ Gastec	l1	z1	slw1	l2	z2	H1	H2	a
12 x Rp1/2	0881914*		35	16	19	28	14	17	20	34
15 x Rp1/2	0881925	G	36	14	24	28	14	17	20	34

** Terminating*

S1240 Wall plate 90° nickel/chrome plated

(compression x female thread)



Material: Brass

Dimension	Article No.	Surface treatment	l1	z1	slw1	l2	z2	H1	H2	a
15 x G1/2	0873061	Ni	36	14	24	28	14	17	20	34
22 x G3/4	0873070*	Ni	41	17	32	29	12	21	23	39

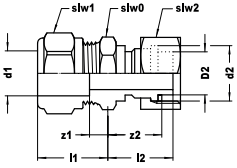
Material: DZR

Dimension	Article No.	Surface treatment	l1	z1	slw1	l2	z2	H1	H2	a
12 x Rp1/2	0897006	Cr	35	16	19	28	14	17	20	34
15 x Rp1/2	0897017	Cr	36	14	24	28	14	17	20	34

** Terminating*

S1241 Straight tap connector with fibre ring

(compression x union nut)

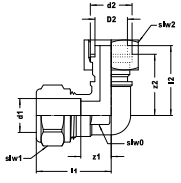


Material: Brass

Dimension	Article No.	slw0	l1	l2	z2	slw1	slw2
15 x G1/2	0874500	21	22	24	20	24	24
15 x G3/4	0874511*	17	22	24	19	24	30
22 x G3/4	0874522	27	23	26	21	32	30

S1242 Tap connector 90° with fibre ring

(compression x union nut)

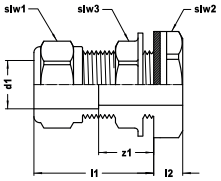


Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	l2	z2	D2	slw1	slw2
15 x G1/2	0874533	K	17	33	11	31	26	14	24	24
22 x G3/4	0874544		24	36	12	35	30	20	32	30

** Terminating*

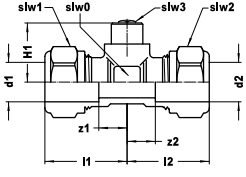
S1245 Tap connector with counter nut (1 x compression)



Material: Brass

Dimension	Article No.	l1	z1	l2	slw1	slw2	slw3
15	0874566	37	15	10	24	30	24
22	0874577	38	15	10	32	30	32
28	0869418*	39	15	2	39	39	36

S1250 Straight coupling with air vent (2 x compression)

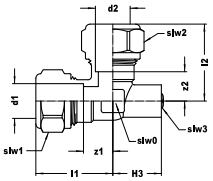


Material: Brass

Dimension	Article No.	slw0	l1/l2	z1/z2	H1	slw1/ slw2	slw3
15 x 15	0860112	17	31	9	23	24	5
22 x 22	0860123	24	32	8	23	32	5

** Terminating*

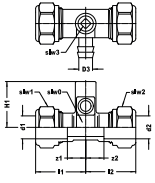
S1251 Angle adaptor 90° with venting (2 x compression)



Material: Brass

Dimension	Article No.	Surface treatment	slw0	l1	z1/z2	l2	H3	slw1/ slw2	slw3
15 x 15	0863907		17	33	11	33	27	24	5
22 x 22	0863951		24	37	15	40	28	32	5
15 x 15	0876172	Ni	17	33	11	33	27	24	5
22 x 22	0876194	Ni	24	37	15	40	28	32	5

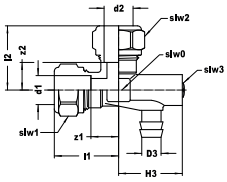
S1255 Straight coupling with drain (2 x compression)



Material: Brass

Dimension	Article No.	slw0	l1/l2	z1/z2	D3	slw1/ slw2	slw3
15 x 15	0860816	17	32	11	10	24	5
22 x 22	0860827	24	33	10	10	32	5

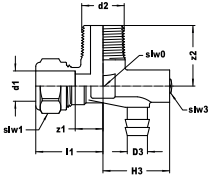
S1256 Angle adaptor 90° with drain (2 x compression)



Material: Brass

Dimension	Article No.	slw0	l1/l2	z1/z2	D3	H3	slw1/ slw2	slw3
15 x 15	0863126	19	33	11	10	33	24	5
22 x 22	0863137	24	39	16	10	36	32	5

S1257 Angle adaptor 90° with drain (compression x male thread)

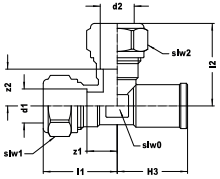


Material: Brass

Dimension	Article No.	slw0	l1	z1	z2	D3	H3	slw1	slw3
15 x R1/2	0864820	19	33	11	30	10	33	24	5
22 x G3/4	0864842*	27	39	16	42	10	36	32	5

** Terminating*

S1290 Angle adaptor 90° with control valve (2 x compression)

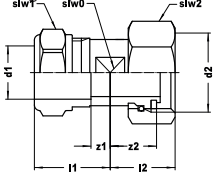


Material: Brass

Dimension	Article No.	slw0	l1	l2	z1	z2	H3	slw1	slw2
15 x 15	2614953	17	32	36	10	14	31	24	24

K1043 Straight connector 2-part with neoprene ring

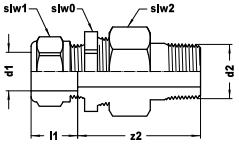
(compression x retaining nut)



Material: Brass

Dimension	Article No.	slw0	l1	l2	z1	z2	slw1	slw2
15 x G3/4	0604340	17	22	26	0	18	24	30
22 x G1	0604362	24	23	35	0	27	32	37

S1260 Radiator coupling straight (compression x male thread)

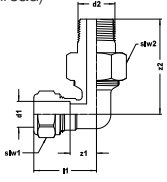


Material: Brass

Dimension	Article No.	Surface treatment	slw0	l1	z2	slw1	slw2
15 x R1/2	0861817		27	22	42	24	30
15 x R1/2	0876293*	Ni	27	22	42	24	30

S1259 Radiator coupling 90°

(compression x male thread)

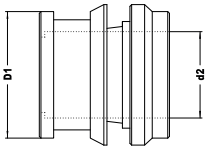


Material: Brass

Dimension	Article No.	Surface treatment	l1	z1	z2	slw1	slw2
15 x R1/2	0864952		36	14	53	24	30
15 x R1/2	0876271*	Ni	36	14	53	24	30

** Terminating*

S1268 One piece reducer



Material: Brass

Dimension	Article No.	Surface treatment	KIWA/ Gastec	D1	d2
12 x 10	0878108		K/G	12	10
15 x 10	0878119		K/G	15	10
15 x 12	0878121		K/G	15	12
22 x 12	0878130		K/G	22	12
22 x 15	0878141		K/G	22	15
28 x 15	0878152		K/G	28	15
28 x 22	0878163		K/G	28	22
35 x 22	0878174		K/G	35	22
35 x 28	0878185		K/G	35	28
42 x 22	0878196		K/G	42	22
42 x 28	0878207		K/G	42	28
42 x 35	0878218		K/G	42	35
54 x 35	0878229		K/G	54	35
54 x 42	0878231		K/G	54	42

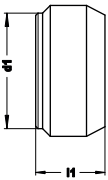
S1268 One piece reducer

Material: DZR

Dimension	Article No.	Surface treatment	KIWA/ Gastec	D1	d2
10 x 8	0885071			10	8
12 x 8	0885082			12	8
12 x 10	0885093		G	12	10
15 x 8	0885104*			15	8
15 x 10	0885115		G	15	10
15 x 12	0885126		G	15	12
15 x 13	0886787			15	13
18 x 10	0885247			18	10
18 x 12	0885137			18	12
18 x 15	0885148			18	15
18 x 16	0885159			18	16
22 x 12	0885161		G	22	12
22 x 15	0885170		G	22	15
22 x 18	0885181			22	18
22 x 20	0885931			22	20
28 x 15	0886017		G	28	15
28 x 22	0885192		G	28	22
35 x 22	0887139		G	35	22
35 x 28	0886028		G	35	28
42 x 22	0886039		G	42	22
42 x 28	0886041		G	42	28
42 x 35	0886050		G	42	35
42 x 36	0886061			42	36
54 x 35	0886094		G	54	35
54 x 42	0886105		G	54	42
15 x 10	0888910*	Ni		15	10

** Terminating*

S1271 Blanking plug



Material: Brass

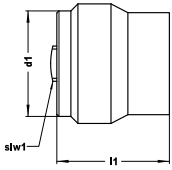
Dimension	Article No.	l1
12	0866921	8
15	0866932	9
22	0866954	10

Material: DZR

Dimension	Article No.	l1
10	0882123	8
12	0882013	8
15	0882024	9
18	0882035	10
22	0882046	10
28	0882057	11
35	0882068	11
42	0882191	13
54	0882200*	13

** Terminating*

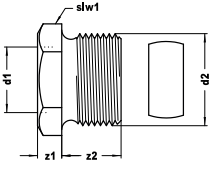
S1295 Cover plate with ventilation



Material: Brass

Dimension	Article No.	l1	slw1
15	0879989	16	5
18	2572207*	16	5

S1272 Straight connector

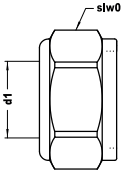


Material: Brass

Dimension	Article No.	Surface treat-ment	z1	z2	slw1
15 x G1/2	0879991	Ni	6	16	20

** Terminating*

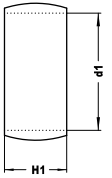
S1280 Union nut



Material: Brass

Dimension	Article No.	Surface treatment	slw0
6	0869891		13
8	0870001		14
10	0870166		17
12	0870485		19
15	0870034		24
16	0870144		26
18	0870045		27
20	0870155		30
22	0870056		32
28	0870067		39
35	0870078		46
42	0870089		55
54	0870133		70
15	0874236	Ni	24
22	0878636	Ni	32
28	0878647	Ni	39
10	0878680	Cr	17
12	0878691	Cr	19
18	0878724	Cr	27

S1281 Compression ring



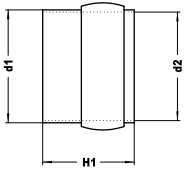
Material: Brass

Dimension	Article No.	H1
10	0878009	5.5
12	0878011	6.5
15	0878020	8
18	0878031	8.5
22	0878042	8.5
28	0878053	9.5
35	0878064	10
42	0878075	11
54	0878086	11

Material: DZR

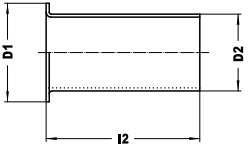
Dimension	Article No.	H1
6	0877305	5
8	0881111	5
10	0881122	5.5
12	0881133	6.5
15	0881144	8
16	0881001	8.5
18	0881155	8.5
20	0877371	8.5
22	0881166	8.5
28	0881177	9.5
35	0881188	10
42	0877415	11
54	0877426	11

S1282 Super Blue compression ring



Dimension	Article No.	H1
3/8 (Ø18)	0858495	17
3/8 (Ø22)	6320534	17
1/2 (Ø22)	0858539	12
3/4 (Ø28)	0858541	20
1 (Ø35)	0858550	24

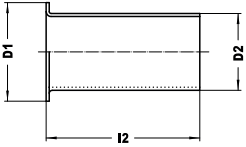
S1283 Insert for soft copper tube



Material: Copper

Dimension	Article No.	D1	D2	l2
8 x 0.8	0882411	8	6	19
10 x 0.8	0887117	10	8	19
10 x 1.0	0883223	10	8	19
12 x 1.0	0883234	12	10	23
15 x 1.0	0883245	15	13	23
18 x 1.0	0883278	18	16	25
22 x 1.0	0883291	22	20	27
28 x 1.2	0883300	28	25	32

S1285 Insert for plastic tubes



Material: Brass

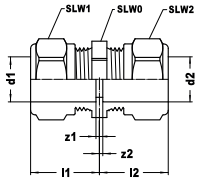
Dimension	Article No.	D1	D2	l2
10 x 1.8	0882519	10	6	19
12 x 2.0	0882521	12	8	21
15 x 2.5	0882530	15	10	22
18 x 2.5	0882541	18	13	24
20 x 2.0	0882552	20	16	25
22 x 3.0	0882563	22	16	26
28 x 4.0	0882574	28	20	27

S5700 Open ring spanner

Material: Brass

Size	Article No.	Material	Opmerking
24 x 32 mm	0890001	Chromed steel	for union nuts 15 and 22 mm

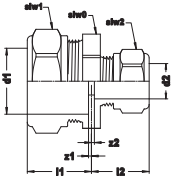
SD1200 Value box of straight couplings (2 x compression)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1/l2	z1/z2	slw1/slw2
12 x 12	0889482	K/G	17	21	2	19
15 x 15	0889207	K/G	22	23	2	24
22 x 22	0889218	K/G	30	26	3	32

SD1201 Value box of reducer couplings (2 x compression)

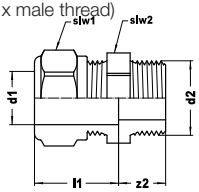


Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1	l2	z1	z2	slw1	slw2
15 x 12	0889504	K/G	22	24	21	2	2	24	19
22 x 15	0889229	K/G	30	25	24	2	2	32	24

SD1202 Value box of straight connectors

(compression x male thread)

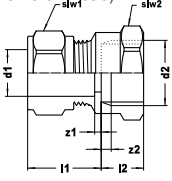


Material: Brass

Dimension	Article No.	KIWA/ Gastec	l1	z2	slw1	slw2
12 x G3/8	0889493	K	19	18	19	17
15 x R3/8	0889231	K/G	22	18	24	21
15 x R1/2	0889240	K/G	22	23	24	21
22 x R3/4	0889251	K/G	23	23	32	30

SD1204 Value box of straight connectors

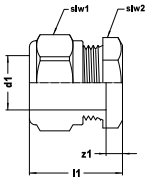
(compression x female thread)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	l1	z1	l2	z2	slw1	slw2
15 x Rp1/2	0889262	K/G	24	2	19	4	24	27
22 x Rp3/4	0889273	K/G	25	2	20	4	32	32

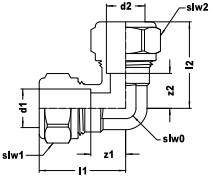
SD1206 Value box of stop ends (1 x compression)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	l1	z1	slw1	slw2
15	0889284	K/G	27	5	24	21
22	0889295	K/G	29	6	32	30

SD1210 Value box of elbows 90° (2 x compression)

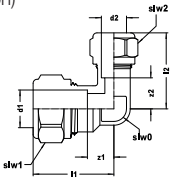


Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1/l2	z1/z2	slw1/slw2
12 x 12	0889471	K/G	14	29	10	19
15 x 15	0889306	K/G	17	33	11	24
22 x 22	0889317	K/G	24	38	15	32

SD1211 Value box of reduced elbows 90°

(2 x compression)

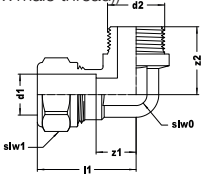


Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	l2	z2	slw1	slw2
15 x 12	0889515	K/G	14	30	9	30	11	24	19
22 x 15	0889328	K/G	17	39	11	39	15	32	24

SD1212 Value box of angle adaptors 90°

(compression x male thread))

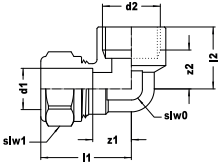


Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	z2	slw1
12 x R3/8	0889460	K/G	14	29	11	27	19
15 x G3/8	0889339	K	17	36	14	25	24
15 x R1/2	0889341	K/G	18	33	11	35	24
22 x R3/4	0889350	K/G	30	45	21	48	39

SD1214 Value box of angle adaptors 90°

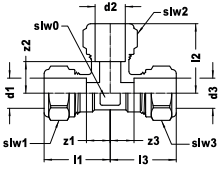
(compression x female thread)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	l2	z2	slw1
15 x Rp1/2	0889361	K/G	17	37	15	28	13	24

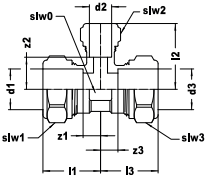
SD1220 Value box of tees (3 x compression)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1/l3	z1/z3	l2	z2	slw1/ slw2/ slw3
12 x 12 x 12	0889526	K/G	14	30	9	32	9	19
15 x 15 x 15	0889372	K/G	17	32	10	35	12	24
22 x 22 x 22	0889383	K/G	24	37	13	40	16	32

SD1221 Value box of T-reduced (3 x compression)

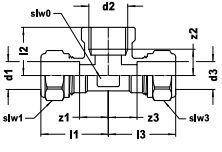


Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1	z1	slw1	l2	z2	slw2	l3	z3	slw3
22 x 15 x 22	0889394	K/G	24	34	9	32	38	16	24	34	9	32
22 x 22 x 15	0889405	K/G	24	37	15	32	40	15	32	39	16	16
22 x 15 x 15	0889416	K/G	24	34	10	32	38	14	24	34	11	24

SD1223 Value box of tees with female branch

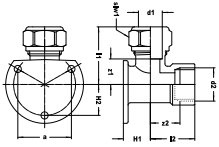
(2 x compression x female thread)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	slw0	l1/l3	z1/z3	slw1/ slw3	l2	z2	slw2
15 x Rp1/2 x 15	0889427	K/G	24	36	15	24	26	9	9
22 x Rp1/2 x 22	0889438	K/G	24	37	13	32	27	12	12

SD1240 Value box of wall plates 90° (compression x female thread)



Material: Brass

Dimension	Article No.	KIWA/ Gastec	l1	z1/z2	slw1	l2	H1	H2	a
15 x G1/2	0889449	K	36	14	24	28	17	20	34

SD1299 Value box mix

Material: Brass

Dimension	Article No.	Opmerking
12-22	0897996	5x straight coupling FF 12 x 12 5x straight coupling FF 15 x 15 5x straight coupling FF 22 x 22 5x straight connector FM 12 x G3/8 5x stop end F 12 5x stop end F 15 5x elbow 90° FF 15 x 15 5x elbow 90° FF 22 x 22 5x angle adaptor 90° FM 12 x R3/8 2x tank connector 90° FF 15 x G1/2 5x Tee FFF 15 x 15 x 15

VSH
connects.

11.2 VSH Multi Super Compression

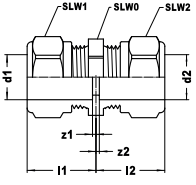
VSH Super

K3055 Insert + ring + nut

Material: DZR/brass

Dimension	Article No.	slw
14 x 15	0892001	24
16 x 15	0892100	24
20 x 22	0891000	32
25 x 22	0891011	39
26 x 22	0891022	39
25 x 28	0891033	39
26 x 28	0891044	39

K3056 Straight coupling (2 x multi super compression)

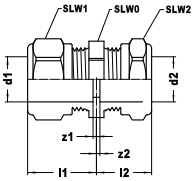


Material: DZR/brass

Dimension	Article No.	slw0	l1/l2	z1/z2	slw1/slw2
14 x 14	0892012	22	25	8	24
16 x 16	0892111	22	25	12	24
20 x 20	0891055	30	33	17	32
25 x 25	0891066*	36	43	24	39
26 x 26	0891077*	36	43	24	39

** Terminating*

K3057 Reducer coupling (multi super compression x compression)

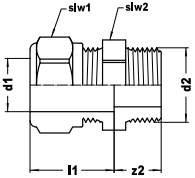


Material: DZR/brass

Dimension	Article No.	slw0	l1	z1	slw1	l2	z2	slw2
14 x 12	0891088*	22	26	8	24	21	2	19
14 x 15	0892023	22	25	8	24	23	1	24
16 x 15	0892122	22	25	12	24	23	1	24
20 x 22	0891099	30	33	17	32	26	2	32
25 x 22	0891101	36	35	16	39	26	3	32
25 x 28	0891121*	36	43	24	39	35	1	39
26 x 22	0891110	36	35	16	39	26	3	32
26 X 28	0891132*	36	43	24	39	35	1	39

** Terminating*

K3058 Straight connector (1 x multi super compression x male thread)

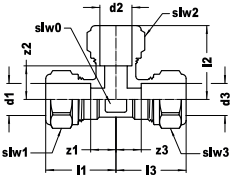


Material: DZR/brass

Dimension	Article No.	l1	slw1	z2	slw2
14 x R3/8	0891198*	24	24	18	22
14 x R1/2	0892034	24	24	23	22
16 x R1/2	0892133	24	24	23	22
20 x R1/2	0891209	31	32	20	30
20 x R3/4	0891211	31	32	23	30
25 x R3/4	0891220*	32	39	24	36
25 x R1	0891242*	32	39	29	36
26 x R3/4	0891231	32	39	24	36
26 x R1	0891253*	32	39	29	36

** Terminating*

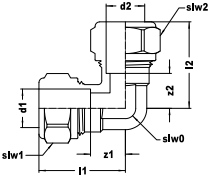
K3059 Tee (3 x multi super compression)



Material: DZR/brass

Dimension	Article No.	l1/l3	z1/z3	l2	z2	slw1/slw2/slw3
16 x 16 x 16	0892144	34	21	36	23	24
20 x 20 x 20	0891431	44	28	47	30	32
25 x 25 x 25	0891440	48	29	52	33	39
26 x 26 x 26	0891451	48	29	51	33	39

K3062 Elbow 90° (2 x multi super compression)

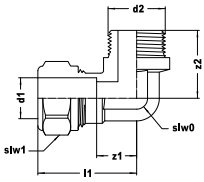


Material: DZR/brass

Dimension	Article No.	l1/l2	z1/z2	slw1/slw2
16 x 16	0892155	35	22	24
20 x 20	0891321	46	29	32
25 x 25	0891330	50	31	39
26 x 26	0891341*	50	31	39

** Terminating*

K3063 Angle adaptor 90° (1 x multi super compression x male thread)

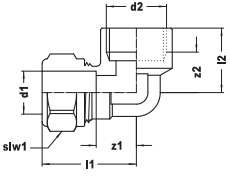


Material: DZR/brass

Dimension	Article No.	slw0	l1	z1	slw1	z2
14 x R1/2	0892067*	18	35	17	24	35
16 x R1/2	0892166*	18	35	22	24	35
20 x R3/4	0891352*	24	45	29	32	41
25 x R1	0891363*	30	53	34	39	48
26 x R1	0891374*	30	53	34	39	48

K3064 Angle adaptor 90°

(1 x multi super compression x female thread)

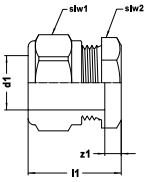


Material: DZR/brass

Dimension	Article No.	l1	l2	z1	z2	slw1
14 x Rp1/2	0892078*	39	28	21	13	24
16 x Rp1/2	0892177*	39	28	26	13	24
20 x Rp3/4	0891385*	49	32	32	16	32
25 x Rp1	0891396*	53	37	34	18	39
26 x Rp1	0891407*	53	37	34	18	39

** Terminating*

K3065 Stop end (1 x multi super compression)

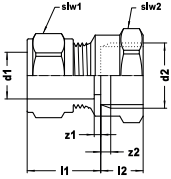


Material: DZR/brass

Dimension	Article No.	l1	z1	slw1	slw2
14	0892089	28	11	24	22
16	0892188	28	15	24	22
20	0891627	37	20	32	30
25	0891638*	39	20	39	36
26	0891649*	39	20	39	36

** Terminating*

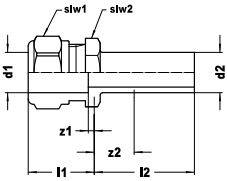
K3066 Straight connector (multi super compression x female thread)



Material: DZR/brass

Dimension	Article No.	l1	z1	slw1	l2	z2	slw2
14 x Rp1/2	0892091	26	9	24	19	4	27
16 x Rp1/2	0892199	26	13	24	19	4	27
20 x Rp1/2	0891264	31	15	32	16	0	30
20 x Rp3/4	0891275	33	17	32	20	4	32
25 x Rp3/4	0891286	32	13	39	22	6	36
25 x Rp1	0891308	34	15	39	23	4	41
26 x Rp3/4	0891297	32	13	39	22	6	36
26 x Rp1	0891319	34	15	39	23	4	41

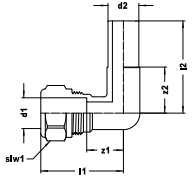
K3069 Straight coupling (1 x multi super compression x male)



Material: DZR/brass

Dimension	Article No.	l1	z1	slw1	l2	z2	slw2
14 x 15	0891143*	26	8	24	38	15	22
16 x 15	0891154*	26	12	24	38	15	22
20 x 22	0891165*	33	17	32	38	15	30
26 x 28	0891187*	35	16	39	39	15	36

K3072 Angle adaptor 90° (1 x multi super compression x male)

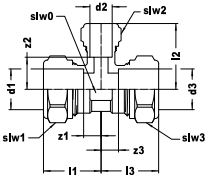


Material: DZR/brass

Dimension	Article No.	l1	z1	slw1	l2	z2
16 x 15	0891418	42	29	24	45	22
20 x 22	0891429	44	27	32	41	25

** Terminating*

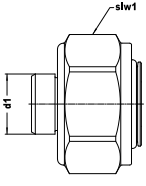
K3073 T-reduced (3 x multi super compression)



Material: DZR/brass

Dimension	Article No.	l1	z1/z3	slw1	l2	z2	l3	slw2/ slw3
25 x 20 x 20	0891539	47	28	39	48	33	45	32
26 x 20 x 20	0891541	46	28	39	48	32	45	32

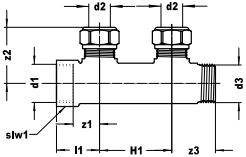
K3067 MPI set (insert + nut)



Material: DZR/brass

Dimension	Article No.	Surface treatment	slw1
15	6340433		24
15	6340444	Cr	24
16	6340455		24
16	6340466	Cr	24
18	6340477		27
20	6340488		32
22	6340499		32
M22 x 16	6340501	Cr	25
M22 x 20	6340510	Cr	32

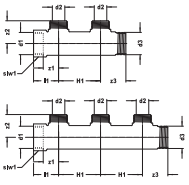
K3076 Manifold (multi super compression)



Material: DZR/brass

Dimension	Article No.	l1	z1	slw1	z2	z3	H1
2x16 x G¾ x G¾	0891671	30	18	32	39	28	50
3x16 x G¾ x G¾	0891682	30	18	32	39	28	50

K3068 Manifold (compression/MPI)



Material: DZR

Dimension	Article No.	l1	z1	slw1	z2	z3	H1
2x15 x G¾ x G¾	0883850	30	18	32	39	28	50
3x15 x G¾ x G¾	0883861	30	18	32	39	28	50

S1288 VSH Multi Super Compression Action Box

Dimension	Article No.	Contents
16	0892265	10x insert set 16 mm 5x straight coupling FF 16 x 16 5x reducer FF 16 x 15 5x straight connector FM 16 x R1/2 5x straight connector FF 16 x Rp1/2 5x Tee FFF 16 x 16 x 16 5x angle adaptor 90° FF 16 x 16 5x stop end F 16 1x calibration set 16 mm

K5700 Calibration Set

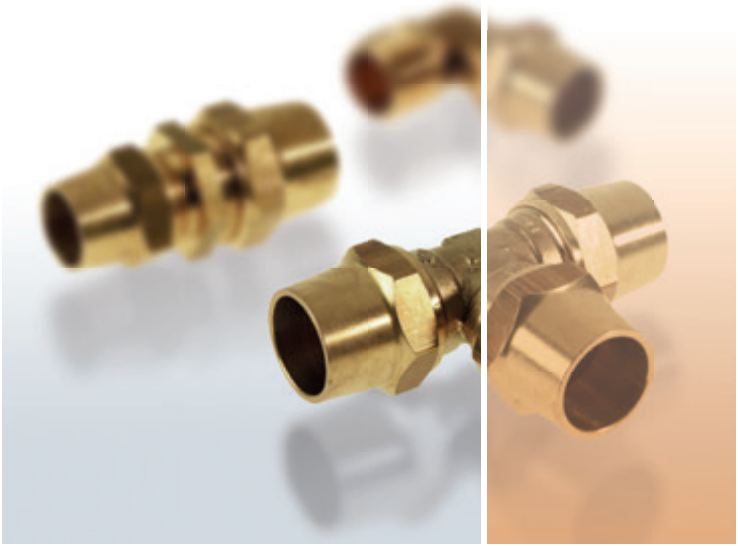
Dimension	Article No.
16-26 mm	3850000

K5701 Calibration tool

Dimension	Article No.
14 mm	3850704*

** Terminating*

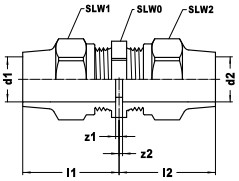
VSH
connects.



11.3 VSH Super Compression Gas Fittings Belgium

VSH Super

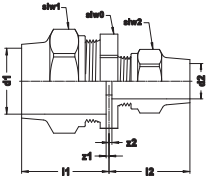
G1200 Straight coupling (2 x compression)



Material: Brass

Dimension	Article No.	KVBG	slw0	l1/l2	z1/z2	slw1/slw2
12 x 12	0879208	B	17	29	2	21
15 x 15	0879219	B	22	33	2	24
18 x 18	0865997	B	27	37	2	27
22 x 22	0879221	B	30	41	3	32
28 x 28	0879230	B	36	46	4	39

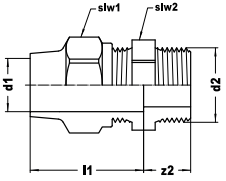
G1201 Reducer coupling (2 x compression)



Material: Brass

Dimension	Article No.	KVBG	slw0	l1	z1	l2	z2	slw1	slw2
22 x 15	0879263	B	30	40	2	34	2	32	24
28 x 22	0879274	B	36	45	3	40	3	39	32

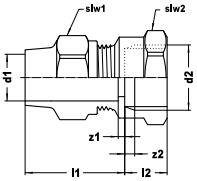
G1202 Straight connector (compression x male thread)



Material: Brass

Dimension	Article No.	KVBG	l1	z2	slw1	slw2
12 x R3/8	0879538	B	27	18	21	17
12 x R1/2	0879351	B	27	20	21	21
15 x R3/8	0879252	B	31	18	24	21
15 x R1/2	0879362	B	31	23	24	21
15 x R3/4	0879065	B	31	22	24	27
18 x R1/2	0876810	B	35	23	27	24
18 x R3/4	0879098	B	34	23	27	27
22 x R3/4	0879373	B	38	23	32	30
22 x R1	0879384	B	38	28	32	36
28 x R1	0879395	B	42	29	39	36

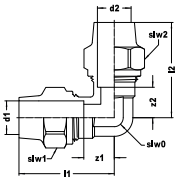
G1204 Straight connector (compression x female thread)



Material: Brass

Dimension	Article No.	KVBG	l1	z1	l2	z2	slw1	slw2
12 x Rp1/2	0879307	B	30	3	19	4	21	27
15 x Rp1/2	0879318	B	33	2	19	4	24	27
15 x Rp3/4	0879109	B	35	4	20	4	24	32
18 x Rp1/2	0876821	B	37	2	19	4	27	27
18 x Rp3/4	0879549	B	37	2	20	4	27	32
22 x Rp3/4	0879329	B	40	2	20	4	32	32
22 x Rp1	0879331	B	43	4	23	4	32	41
28 x Rp1	0879340	B	44	2	23	4	39	41

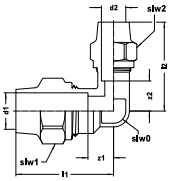
G1210 Elbow 90° (2 x compression)



Material: Brass

Dimension	Article No.	KVBG	slw0	l1/l2	z1/z2	slw1/slw2
12 x 12	0879406	B	14	37	10	21
15 x 15	0879417	B	17	42	11	24
18 x 18	0876667	B	22	38	13	27
22 x 22	0879428	B	24	53	15	32
28 x 28	0879439	B	30	60	18	39

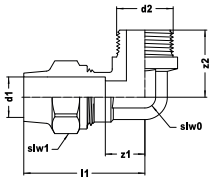
G1211 Reduced elbow 90° (2 x compression)



Material: Brass

Dimension	Article No.	KVBG	slw0	l1	z1	l2	z2	slw1	slw2
22 x 15	0879615	B	17	49	11	46	15	32	24
28 x 22	0879626	B	24	57	15	56	18	39	32

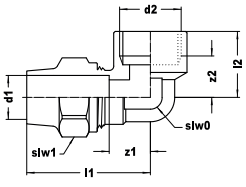
G1212 Angle adaptor 90° (compression x male thread)



Material: Brass

Dimension	Article No.	KVBG	slw0	l1	z1	z2	slw1
12 x R3/8	0879001	B	14	38	11	27	21
15 x R1/2	0879516	B	18	42	11	35	24
18 x R1/2	0876678	B	18	45	11	36	27
18 x R3/4	0879111	B	24	49	14	37	27
22 x R3/4	0879527	B	24	52	14	42	32
28 x R1	0879285	B	30	63	21	48	39

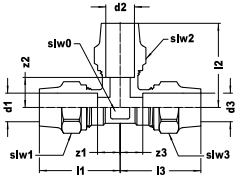
G1214 Angle adaptor 90° (compression x female thread)



Material: Brass

Dimension	Article No.	KVBG	slw0	l1	z1	l2	z2	slw1
12 x Rp1/2	0879142	B	14	43	16	28	13	21
15 x Rp1/2	0879560	B	17	46	15	23	14	24
18 x Rp1/2	0876656	B	22	50	15	29	14	27
22 x Rp3/4	0879571	B	24	56	18	33	16	32
22 x Rp1	0879582	B	24	59	21	38	19	32
28 x Rp1	0879043	B	30	63	21	34	15	39

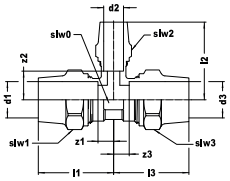
G1220 Tee (3 x compression)



Material: Brass

Dimension	Article No.	KVBG	slw0	l1/l3	z1/z3	l2	z2	slw2	slw1/ slw3
12 x 12 x 12	0879648	B	14	36	9	36	9	21	21
15 x 15 x 15	0879659	B	17	41	10	43	12	24	24
18 x 18 x 18	0876689	B	22	47	12	47	12	27	27
22 x 22 x 22	0879661	B	24	51	13	54	16	32	32
28 x 28 x 28	0879670	B	30	58	16	62	20	39	39

G1221 T-reduced (3 x compression)



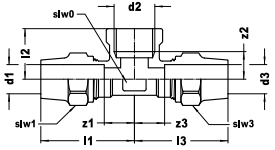
Material: Brass

Dimension	Article No.	KVBG	slw0	l1	z1	l2	z2	l3	z3	slw1	slw2	slw3
22 x 15 x 15	0879714*	B	24	48	10	45	14	49	11	32	24	32
22 x 15 x 22	0879681	B	24	47	9	47	16	47	9	32	24	32
22 x 22 x 15	0879703*	B	24	53	15	53	15	47	16	32	32	24
28 x 15 x 28	0879725*	B	30	52	10	51	20	52	10	39	24	39
28 x 22 x 22	0879736*	B	30	56	14	55	17	52	14	39	32	32
28 x 22 x 28	0879747*	B	30	56	14	38	17	56	14	39	32	39

** Terminating*

G1223 Tee with female branch

(compression x female thread x compression)



Material: Brass

Dimension	Article No.	KVBG	slw0	l1/l3	z1/z3	slw1/ slw3	l2	z2
15 x Rp1/2 x 15	0879813	B	24	46	15	24	26	9
22 x Rp1/2 x 22	0879824	B	24	51	13	32	27	12

G1280 Union nut

Material: Brass

Dimension	Article No.	slw1
12	0879835	21
15	0879846	24
18	0879857	27
22	0879868	32
28	0879879	39

G1281 Compression ring

Material: Brass

Dimension	Article No.
12	0879450
15	0879461
18	0879472
22	0879483
28	0879494

VSH
connects.

You can rely on VSH products and systems for top quality and the best solution for every situation. VSH systems stand for quality, innovation, ease of installation and reliability.

VSH Super	Compression fittings for drinking water, gas, heating and solar systems. VSH Super is suitable for steel, copper and plastic tubes.
XPress	Piping system with M-profile compression fittings in three types of material: galvanised steel, copper and stainless steel. XPress is suitable for heating, cooling, water, gas, solar, compressed air and fire protection systems in residential, commercial and industrial buildings, shipbuilding and industry.
SudoPress	Piping systems with V-profile compression fittings in copper, galvanised steel and stainless steel. SudoPress is suitable for heating, water, gas and solar systems.
Tectite	Push fittings in copper, galvanised steel and stainless steel, suitable for plumbing, heating and compressed air systems.
SkinPress	Plastic piping system with TH-profile compression fittings for use in sanitary, gas, heating and floor heating systems.
Ballorex	Balancing valves for adjusting heating and cooling systems to achieve uniform water flow for optimum comfort and minimal energy consumption.
Comap	Thermostatic heads, thermostatic valves and manually operated radiator valves for a comfortable indoor climate.
Biofloor	Floor heating systems consisting of a package of coordinated distributors, floor panels and pipes. This package is also suitable for wall heating and activated concrete core systems.

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