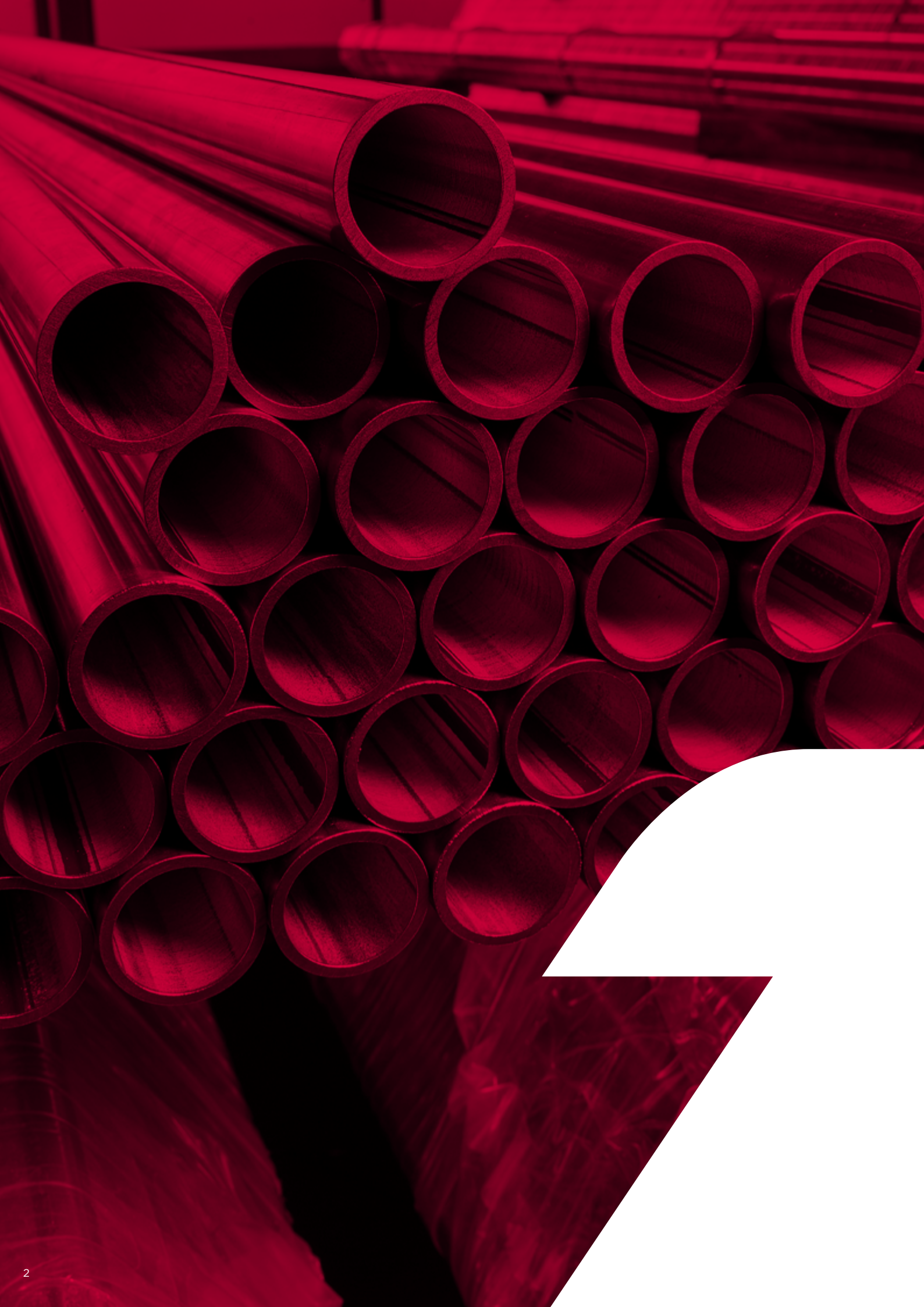
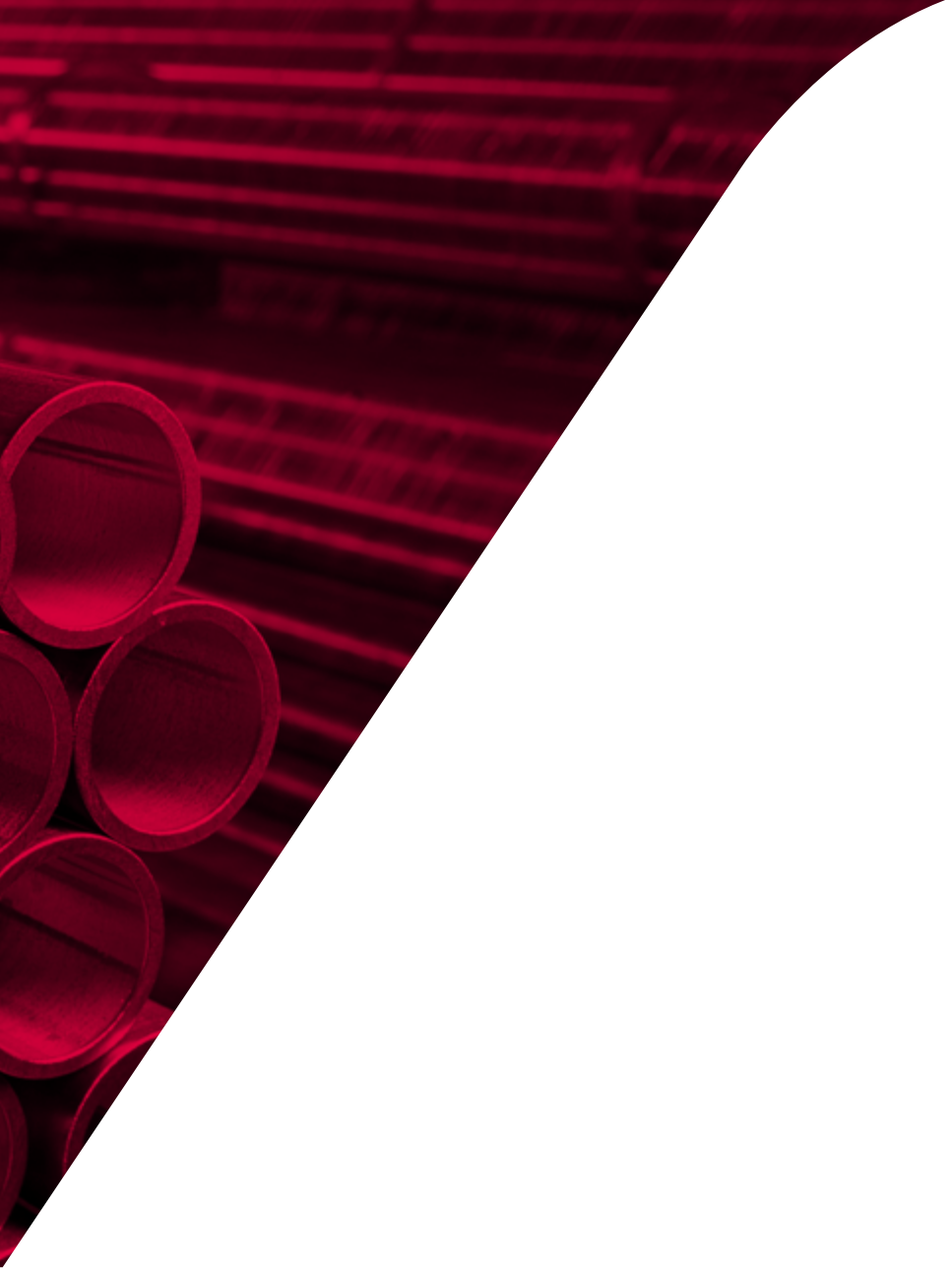
PEGLER
Valve technology

VSH MultiPress

aalberts integrated piping systems

EN technical manual

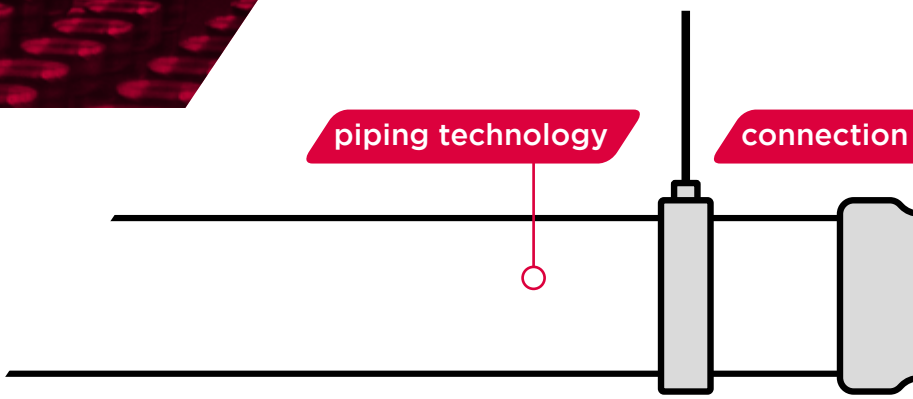




contents

don’t just buy products, buy solutions.

Aalberts Integrated Piping Systems



Aalberts Integrated Piping Systems develops and produces connectors, metal and plastic pipes, valves, and fastening technology for the distribution and control of liquids and gases. Our technologies enable customers to work quickly and reliably in a simple and efficient way.

integrated piping systems

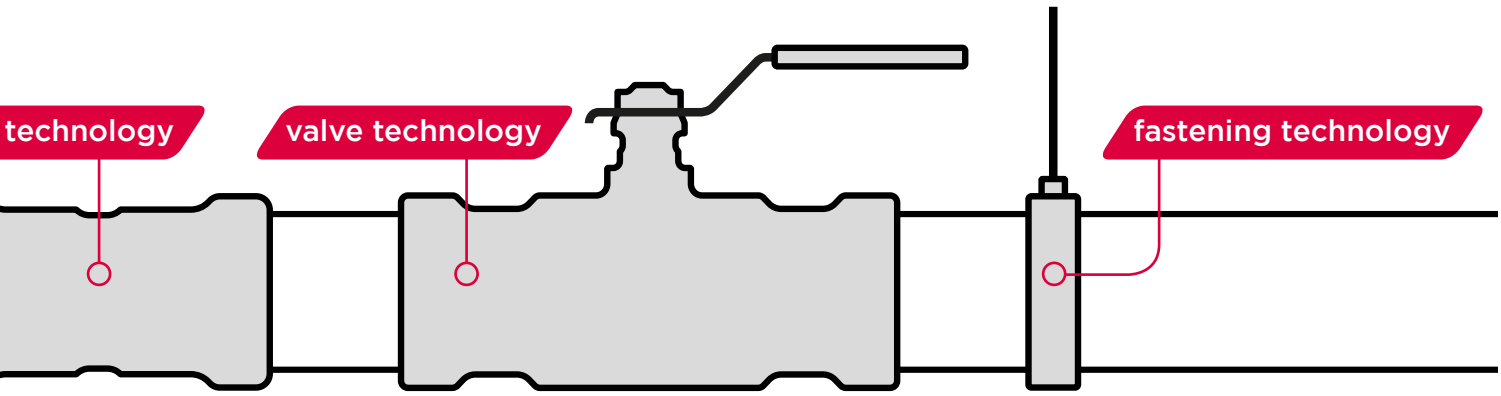
These bespoke systems are applicable for key vertical markets such as residential, commercial, industrial and utility. Our complete range of integrated piping systems and fittings is always available through a wide range of various distribution channels. Furthermore, our own engineers are always developing our existing systems and services to the next level, as well as the design of completely new and innovative solutions.
This is how Aalberts Integrated Piping Systems enables its customers to make every project a success.

global footprint with a local presence

We are part of Aalberts, a globally operating technology group and currently active at 30 locations in 14 countries, offering the broadest and most advanced portfolio. At Aalberts Integrated Piping Systems, we combine an overall technical expertise, global knowledge exchange, and the continuous drive to innovate within our group, with our knowledge of local markets and involvement in our customers' business. We offer them advice, Design Service and complete customised solutions from the design phase right through to delivery and aftercare, via our Aalberts Integrated Piping Systems Design Service®.
We take away all our customers worries and concerns and offer them a complete integrated piping solution, each and every time.

exceeding expectations

At Aalberts Integrated Piping Systems we not only invest in our customers, but also in our own employees. Because we realise that they are the heart of our company. With passion, teamwork, ownership and diversity, we have the ability to think 'out-of-the-box'. This means that we define answers on challenging market demands and invent a range of appropriate solutions. Our people are also constantly focused on achieving optimum performances and continuous innovation.
It is this dedication that enables us to exceed both ourselves and our customers' expectations.



our internationally strong brands and technologies

Aalberts Integrated Piping Systems does not simply focus on only one technology within the system, but applies different technologies for different applications. All these technologies employ strong brands and together they constitute what we call our integrated piping systems. Our systems are easy to specify, install and maintain.

- **valve technology.** Thanks to the internationally renowned brands Apollo and Pegler, Aalberts Integrated Piping Systems can offer the best valves for a wide range of market segments. Naturally these valves are high quality and distributed worldwide.
- **connection technology.** With the high-quality solutions from VSH, Aalberts Integrated Piping Systems is a market leader in connection technology. The wide range of solutions is suitable for numerous applications in residential, commercial and industrial buildings, general industrial usage, fire protection and shipbuilding.
- **piping technology.** Piping technology includes a complete range of carbon steel, stainless steel and plastic tubes in sizes ranging from 12 mm to 108 mm.
- **fastening technology.** Smart hangers for the optimal arrangement of the integrated piping system

Pegler

Pegler provides the best solutions for integrated piping systems. This term encompasses a range of product lines for connection technology and valve technology which, together with our design service, offer the ultimate solution for top-quality integrated piping systems.

VSH PowerPress®

material	carbon steel
suitable for	thick walled steel
connection	press / DW-profile
dimensions	1/2" - 2" (DN15 – DN50)

VSH Shurjoint

material	ductile iron / stainless steel
suitable for	thick walled steel / stainless steel / HDPE
connection	groove
dimensions	1/2" - 104" (DN15 – DN2600)

the strength of Pegler

- the perfect solution for every project
- smart, fast and efficient installation
- Aalberts Integrated Piping Systems Design Service
- valuable advice from the drawing board to delivery
- a very wide product range
- warranty Plus
- all products are BIM now

The integrated piping systems stand out due to their high and consistent quality, and quick and simple installation and maintenance. Pegler offers the widest, most comprehensive range of reliable press, compression, groove and push systems – including fittings for thick-walled and thin-walled metal and plastic tubes.

Aalberts Integrated Piping Systems Design Service®

Pegler is a fully customer-focused sales and service organisation with experts who are committed to product development, service and customer support every single day. This means that from day one at the digital drawing board, you will receive professional advice on customised total solutions while being able to rely on optimum availability and reliable support both during and after delivery. Our engineers have access to all Aalberts Integrated Piping Systems products and can therefore always find the best solution which is fully customised to your needs.

VSH XPress

material	carbon steel / stainless steel / copper
suitable for	thin walled / carbon steel / stainless steel / copper
connection	press / M-profile
dimensions	12 – 108 mm (DN10 – DN100)

VSH MultiPress

material	PPSU / brass
suitable for	Multilayer tube
connection	press / U & TH profile
dimensions	14 – 63 mm (DN10 – DN50)

VSH Tectite

material	brass / stainless steel / copper
suitable for	thin walled stainless steel / copper / carbon steel / PEX, PB and Multilayer tube
connection	push
dimensions	10 – 54 mm (DN8 – DN50)

Pegler Valve Technology

Pegler is well known and respected as one of the leading manufacturers of advanced plumbing, heating and engineering products in the world. It's a reputation earned through a total dedication to quality, innovation and customer service that's been the hallmark of the company since it was established in the 1890's (originally trading as Pegler Ltd and Yorkshire Fittings Ltd).

Our success has been derived from a commitment to a philosophy based on quality, service, investment, competitiveness and innovation. Energy and water conservation is very much at the forefront of our product development.

Pegler's unique Integrated Piping System brings together valves, fitting and pipes in one complete pipe-work system, with an emphasis on delivering heat free jointing.

Integrated Piping System combines the best elements of modern connection and valve technology, with international quality approvals and cost effective solutions for every project.

As a business partner to some of the world's best known plumbing and heating suppliers, our unrivalled list of market leading product brands include Yorkshire integral solder ring fittings, Pegler Terrier radiator valves, VSH Tectite push fit fittings, VSH PowerPress® products, VSH Shurjoint solutions, the VSH XPress press fit system, Pegler valves, Prestex general brassware, Endex end feed and Kuterlite compression fittings.

don't just buy products,
buy solutions.

VSH MultiPress system

VSH MultiPress is an extensive plastic tubing system with multi-profile press fittings for use in sanitary, heating and underfloor heating systems (among other areas). The fittings are suitable for connection to VSH MultiPress multilayer tubes. The system may be used in recessed and surface installation.

the strength of VSH MultiPress:

- diameter 16 up to 63 mm
- can be pressed with both U and TH profiles
- Leak Before Pressed function up to and including 32 mm
- calibration up to and including 32 mm not mandatory
- suitable for embedding in concrete and reinforced concrete screed (please follow local installation guidelines).
- check the insertion depth of the tube using the control windows
- optimal positioning of the press jaws for fast and secure pressing
- size colour coding

all VSH MultiPress fittings are produced in a fully automated factory in Europe. Precise test procedures and extensive quality control of all products ensure optimal quality.

VSH MultiPress

technical data

applications

The VSH Multipress system has been specifically developed for the housing, commercial and industrial building markets. For example, the thin floor screeds and folding walls have been taken into account.

for sanitary and central heating applications, the following temperature profiles apply:

application class (EN ISO 10508)	T_d		T_{max}		T_{mal}		typical application
	°C	time/ years	°C	time/ years	°C	time/ hours	
1a	60	49	80	1	95	100	hot water supply (60°C)
2a	70	49	80	1	95	100	hot water supply (70°C)
4b	20 40 60	2.5 20 25	70	2.5	100	100	underfloor heating and low temperature radiators
5b	20 60 80	14 25 10	90	1	100	100	high temperature radiators

NOTE: where the values for T_d, T_{max} and T_{mal} are higher than in the table above, this international standard does not apply.

a. a country may select class 1 or 2 in accordance with its national regulations.
b. where there is a combined temperature profile, as in classes 4 and 5, the times may be added together for a calculated total lifespan of 50 years. For example, for class 5: 20°C during 14 years + 60°C during 25 years + 80°C during 10 years + 90°C during 1 year + 100°C during 100 hours = 50 years.

temperature profiles

potable water installation

VSH MultiPress fittings in combination with VSH MultiPress tube

temperature range in accordance with EN ISO 10508:	classes 1a or 2a
maximum working pressure:	10 bar

central heating installations

VSH MultiPress brass fittings in combination with VSH MultiPress tube

temperature range in accordance with EN ISO 10508:	class 4b or 5b
maximum working pressure:	10 bar

underfloor heating installations

VSH MultiPress fittings in combination with VSH MultiPress tube

temperature profile in accordance with EN ISO 10508:	class 4b
maximum working pressure:	10 bar

compressed air installations

VSH MultiPress fittings in combination with VSH MultiPress tube

max. working temperature:	70°C
maximum working pressure:	10 bar
oil content:	max. 25 mg/m3, class 5, ISO 8573 Part 1

compressed air table ISO 8573

class	water content (mg/m³)	oil content (mg/m³)*
1	3	0.01
2	120	0.1
3	880	1
4	6000	5
5	7800	25
6	9400	>25

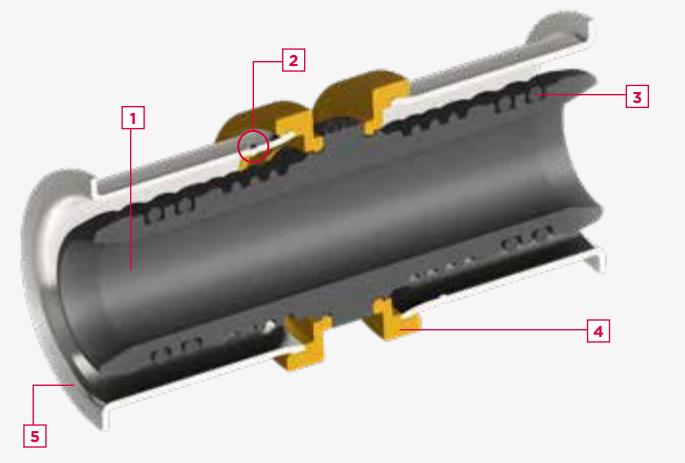
*only synthetic oil allowed

compressed air classes

Installations should be carried out in compliance with Building Regulations Part L (England & Wales). It is the responsibility of the architect and/or the builder to ensure that the insulation is adequate for the requirements of the system and in accordance Building Regulations.

fittings

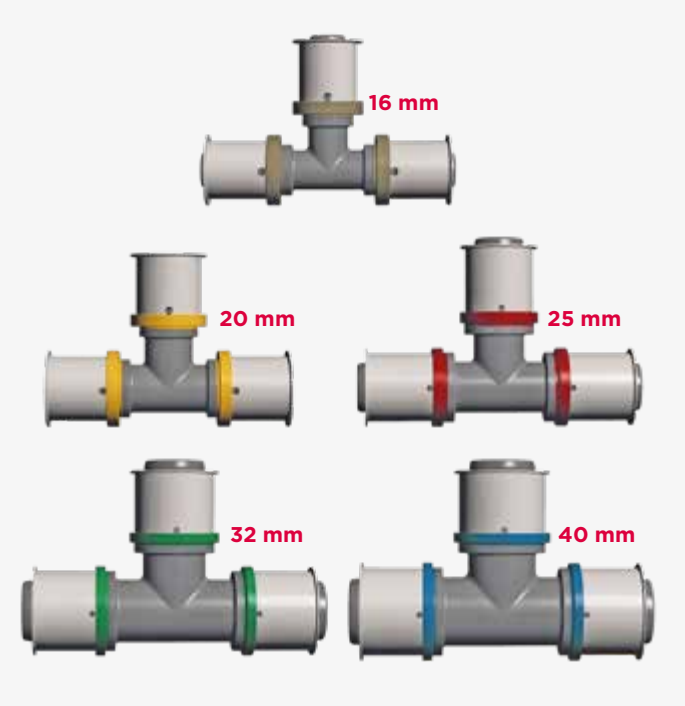
VSH MultiPress brass and PPSU fittings are constructed as follows:



1. brass or PPSU housing
2. control window for tube insertion depth
3. EPDM* O-rings
4. coloured plastic ring
5. stainless steel sleeve

coloured plastic ring

VSH MultiPress fittings up to and including 40 mm have a coloured ring that indicates the size of the connection. The coloured ring also prevents electrolytic corrosion of the aluminium core of the VSH MultiPress tube when the tube is inserted in the fitting, and ensures that the press jaws are correctly positioned for pressing tight. The 50 mm and 63 mm fittings do not have a coloured ring.



brass housing fittings

the material for these fittings is CW617N brass in accordance with EN 12164. The VSH MultiPress brass house fittings have been tested and approved in accordance with ISO 21003 and have WRAS, Kiwa and KOMO approval.

PPSU housing fittings

PPSU is a high-quality plastic that is very often used for sanitary and central heating applications. PPSU has the advantage of high mechanical strength and good chemical resistance. PPSU is neutral in relation to potable water, which means the material does not give any taste, smell or colour to the water. The VSH MultiPress PPSU fittings have been tested and approved in accordance with ISO 21003 and have WRAS, Kiwa and KOMO approval.

press sleeve

VSH Multipress press sleeve

the press sleeves of the VSH MultiPress fittings are made of 1.4301 (AISI 304) stainless steel. Control windows are placed on the press sleeves. These enable you to see whether the tube has been inserted far enough. In addition, the press sleeves are smooth so that there is an extra check whether the fitting has been pressed or not.

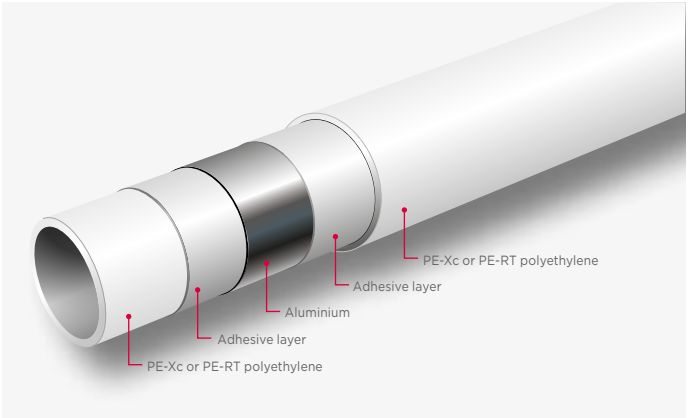
O-ring (standard)

the O-rings used for the standard VSH MultiPress fittings are made of EPDM rubber. This is a high quality rubber with high temperature resistance that, among other things, is an ideal choice for drinking water and central heating applications.

** Ethylene - Propylene - Diene - Monomer*

multilayer tube

VSH MultiPress multilayer tube is made up of an inner and outer layer of PE-RT polyethylene or cross-linked PE-Xc polyethylene and a butt-welded aluminium core. These three basic layers are bonded by two adhesive layers to form a stable tube wall. Thanks to this wall construction, the advantages of the plastic (light weight and corrosion resistant) and the metal (high mechanical strength, 100% oxygen diffusion tight, low expansion coefficient and dimensionally stable) are ideally combined in one tube and the mechanical properties, temperature resistance and life span are improved considerably. The thick butt-welded aluminium layer does not have any overlap. This gives a uniform wall structure without any unwanted discontinuities and allows a thicker aluminium core to be used. Of course, the VSH MultiPress tube system is WRAS, Kiwa and KOMO approved and can be used in heating and sanitary installations. In case of use for any media or application areas other than those mentioned above, please contact Pegler for potential approval.



VSH MultiPress tube

external diameter d [mm]	16	20	25
internal diameter [mm]	12	16	20
wall thickness [mm]	2.0	2.0	3.0
application class [EN ISO 21003-1]	2-4-5	2-4-5	2-4-5
max. working pressure [bar]	10	10	10
thermal conductivity [W/mK]	0.43	0.43	0.43
linear expansion coefficient [mm/[mK]]	0.025	0.025	0.025
tube inner surface roughness [µm]	7	7	7
oxygen diffusion [mg/l]	0	0	0
minimum radius of curvature [manual]	≥5 x d	≥5 x d	≥5 x d
weight [kg/m]	0.129	0.152	0.239
capacity [l/m]	0.113	0.201	0.314

external diameter d [mm]	32	40	50	63
internal diameter [mm]	26	33	42	54
wall thickness [mm]	3.0	3.5	4.0	4.5
application class [EN ISO 21003-1]	2-4-5	2-4-5	2-4-5	2-4-5
max. working pressure [bar]	10	10	10	10
thermal conductivity [W/mK]	0.43	0.43	0.43	0.43
linear expansion coefficient [mm/[mK]]	0.025	0.025	0.025	0.025
tube inner surface roughness [µm]	7	7	7	7
oxygen diffusion [mg/l]	0	0	0	0
minimum radius of curvature [manual]	-	-	-	-
weight [kg/m]	0.365	0.510	0.885	1.265
capacity [l/m]	0.531	0.855	1.385	2.290

VSH MultiPress tube characteristics

Approvals marks

Pegler has the following system approval marks for VSH MultiPress in combination with VSH MultiPress tubes:

WRAS for potable water

- certificate number 1904345

Kiwa for potable water

- certificate number K42676 (14-40 mm) & K56649 (50 and 63 mm)
- the products meet Kiwa's assessment guideline BRL K536 part G

KOMO for heating systems

- certificate numbers K43008 & K56689
- the products meet Kiwa's assessment guideline BRL 5607

DVGW for potable water

- certificate number DW-8501B50302

these approval marks are system approval marks. This means that they apply only to combinations of VSH MultiPress fittings and tubes.

general installation guidelines

introduction

changes in temperature give rise to changes in the lengths of tubes in the tubing network, which in turn result in stresses. If it concerns small changes in length that can be absorbed by the tube network's own flexibility, no additional measures have to be taken. However, if the changes in length are greater, then expansion loops and/or bends must be placed in the tube network to give additional flexibility. Fixed points and sliding supports must be included in the tube network to ensure that length changes can be accommodated by the tube sections intended for this purpose.

securing of tubes

the tube brackets that are placed at fixed distances (see table below) to support the tubing and its weight can also serve as glide points (GP) or fixed points (FP).

Tube diameter d [mm]	16	20	25	32	40	50	63
distance between brackets [m]	1.2	1.3	1.5	1.6	1.7	2.0	2.2

distance between brackets

glide points

glide points should never be positioned in such a way as to block the tubes in the expected direction of movement. Therefore, never place an axial sliding support in the tube section that is intended for absorbing the changes in the radial length (the expansion loop).

fixed points

fixed points must be able to absorb all the forces that operate and transmit them to the building structure. Tube brackets that serve as fixed points should, however, never be placed directly on a fitting but always on both sides of the fitting (figure below, left). Place the brackets for fixed points on gradient T-pieces always on the tubes with the greatest external diameter (figure below, right).

changes in length (Δl)

the change in length (Δl) of tubes causes a change in shape of the perpendicular placed on the tube section (l_b) or the expansion loop. This must be long enough so that no excessive stresses occur in the fittings and tubes. The factors that are relevant for the changes in length are the linear expansion coefficient of the material (α), the temperature difference (ΔT) and the length of the tube (l). The change in length can be calculated for VSH MultiPress tube using an equation or read off directly in the table below.

the equation for calculating the changes in length is as follows:

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

l	= total change in length [mm]
Δl	= length of the tube [m]
α	= linear expansion coefficient for VSH MultiPress tubes α = 0.025 mm/mK
T	= temperature difference (K)

to simplify the calculation, the total changes in length in mm are shown for a range of tube lengths and a range of temperature differences.

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

total change in length (Δl) VSH Multipress tube

length of the expansion loop (lb)
if the change in length (Δl) is known, then the necessary length of the expansion loop (l_b), which depends on the tube diameter, can be calculated.

$$l_b = 36 \times V(D \times \Delta l)$$

l_b = necessary length of the expansion loop [mm]
Δl = total change in length [mm]
D = external diameter of the tube [mm]

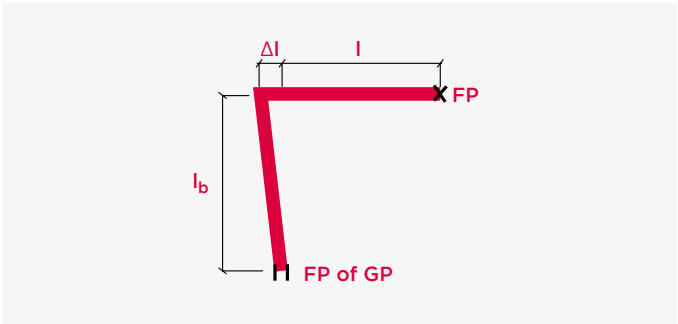
the length of the expansion loop (l_b) in mm needed to compensate the expansion in the tubes, is shown in the table.

Δl [mm]	tube diameter [mm]						
	16	20	25	32	40	50	63
5	322	360	402	455	509	569	639
10	455	509	569	644	720	805	904
15	558	624	697	789	882	986	1.107
20	644	720	805	911	1.018	1.138	1.278
30	789	882	986	1.115	1.247	1.394	1.565
40	911	1.018	1.138	1.288	1.440	1.610	1.807
50	1.018	1.138	1.273	1.440	1.610	1.800	2.020
60	1.115	1.247	1.394	1.577	1.764	1.972	2.213
70	1.205	1.347	1.506	1.704	1.905	2.130	2.391
80	1.288	1.440	1.610	1.821	2.036	2.277	2.556
90	1.366	1.527	1.708	1.932	2.160	2.415	2.711
100	1.440	1.610	1.800	2.036	2.277	2.546	2.857

length of the expansion loop (l_b)

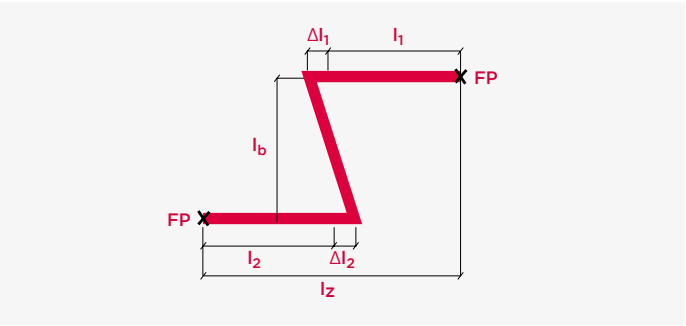
calculation of an expansion loop/expansion bend

type L
determine the length of the expansion loop (l_b) as follows:
1 determine using the table on page 13 or by a calculation the length of the expansion (Δl), using the length of the tube (l) and the temperature difference (ΔT).
2 based on the calculated length of the expansion (Δl) for the tube (l) and the outer diameter of the tube, the length of the expansion loop (l_b) can be determined from the table on page 14.



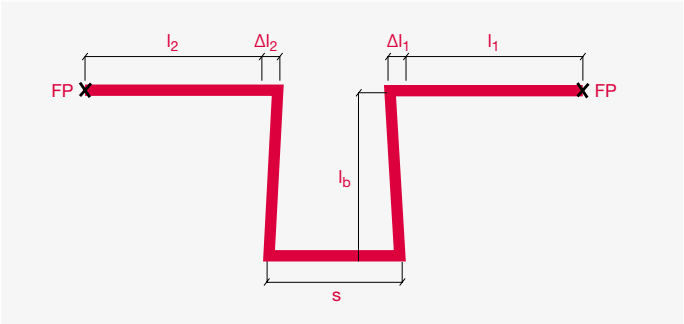
l_b = the length of the expansion loop
SS = the sliding support (so that the tube can only move axially)
FP = the fixed point (prevents the tube from moving)
l = the initial length of the tube
Δl = the expansion of the tube

type Z
determine the length of the expansion loop (l_b) as follows:
1 determine the equivalent size $l_z = l_1 + l_2$.
2 determine using the table on page 13 or by a calculation the length of the expansion (Δl_z), using the length of the tube (l_z) and the temperature difference (ΔT).
3 based on the calculated length of the expansion (Δl) for the tube and the outer diameter of the tube, the length of the expansion loop (l_b) can be determined from the table on page 14.



l_b = the length of the expansion loop
FP = the fixed point (prevents the tube from moving)
l_z = the initial length of the tube
Δl_z = the expansion of the tube

type U
determine the length of the expansion loop (l_b) as follows:
1 determine the equivalent size $l_u = (l_1 + l_2)/1.8$
2 determine using the table on page 13 or by a calculation the length of the expansion (Δl_u), using the length of the tube (l_u) and the temperature difference (ΔT).
3 based on the calculated length of the expansion (Δl) for the tube and the outer diameter of the tube, the length of the expansion loop (l_b) can be determined from the table on page 14.



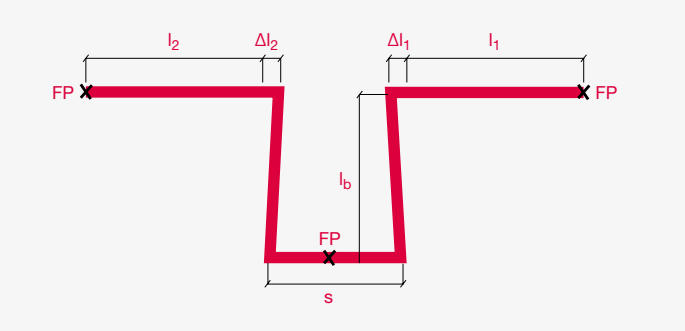
l_b = the length of the expansion loop
FP = the fixed point (prevents the tube from moving)
Δl = the expansion of the tube
S = the length of the U-shaped compensation loop

the length of the compensation loop (S) must ensure the free movement of the tube sections l_1 and l_2, taking into account the thickness of the tube insulation and the installation circumstances.

$s \geq 2x\ d_{ins} + \Delta l_1 + \Delta l_2 + s_{min}$

d_{ins} = thickness of the insulation
Δl_1, Δl_2 = expansion in tube sections l_1 and l_2
s_{min} = minimum length of the fitting diameter or the radius of curvature of the tube

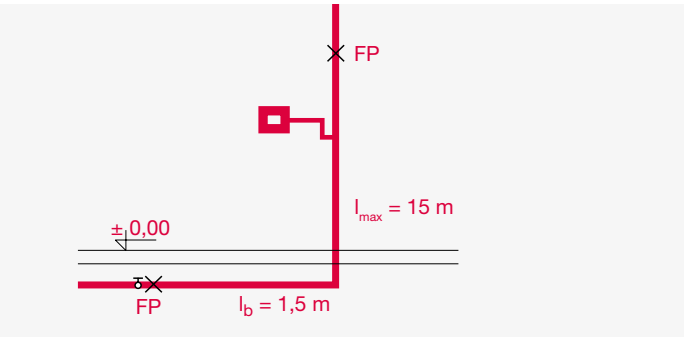
the length of the tube (S) must be as short as possible. If the length of the tube (S) is more than 10% of the values l_1 or l_2, a fixed point must be placed in the middle of the tube (S). In this case the length of the compensation loop (l_b) can be calculated as Type Z, and this should be done on both sides of the fixed point.



l_b = the length of the supported loop
FP = the fixed point (prevents the tube from moving)
l = the initial length of the tube
Δl = the expansion of the tube
S = the length of the U-shaped compensation loop

installation advice concerning the fastening and expansion of the tube system

- the water and heat meters (and their attachments) connected to the tubes must be secured to the wall as fixed points (the weight and operation of these should not exert any force on the tube)
- a valve or instrument is neither to be installed in a section of the installation that serves as an expansion tube; nor may it obstruct the movement of the tube, such as at gliding points in any way. Ideally, fit valves or instruments as fixed points, whereby the tubes are also protected against excessive load from their weight and from the force resulting from the opening and closing of the valves.
- in no event may there be sections of tube that cannot move in the event of expansion.
- when connecting multilayer tubes to steel tubes, it is recommended that a fixed point be placed at the connection point to the steel tube (this should be included in the planning of the compensation of the steel tube).
- if tubes are connected at right angles to steel tubes, the connection should be treated as a point that prevents movement along the axis of the multilayer tube. It is not permitted to make a fixed point for steel tubes by mounting the brackets on the multilayer tubes. If the steel tube at the connection with the multilayer tube is subject to considerable expansion, then the connecting section of the multilayer tube must be fitted as an expansion loop with a sliding support being suitably located. The length of this loop should be determined on the basis of the expansion coefficient Δl of the steel tube.
- in case of an axial connection of multilayer tubes to steel tubes, the expansion loop that compensates for the expansion of this tube section is determined on the basis of the total of the expansion of both tubes.
- in shafts, risers must be able to move freely under thermal influences.



every place where a fixture is fitted is a fixed point

securing and expansion of a riser

- a 15 m long tube section will expand by 30 mm if the temperature increases by 80°C. The 30-mm expansion requires an expansion loop l_b of 1.5 m long for a tube with a diameter of 63 mm.
- based on the principle that the expansion loop at the base of the riser l_b = 1.5 m, and with the fixed point is located halfway up the riser, a riser height of 30 m is possible with a tube diameter of 63 mm.
- a greater riser height can be possible if we allow a greater expansion of the tube section above the fixed point. The length of the expansion loop l_b can also be increased.
- the branch is best carried out in the Z-form. Respect the necessary length of the expansion loop.
- the floor clearance must allow for movement by the tube both lengthwise and crosswise, to cater for a change in the shape caused by the expansion of section l_b.

pressure loss of VSH MultiPress fittings

formula for calculating the pressure loss on the basis of the Kv values:

$$\Delta p = 100{,}000 \times (Q / Kv)^2$$

Δp = pressure loss [Pa]
Q = flow [m^3/h]

formula for calculating the pressure loss on the basis of the zeta values:

$$\Delta p = \frac{\zeta \times v^2}{0.001962}$$

Δp = pressure loss [Pa]
v = flow velocity [m/s]

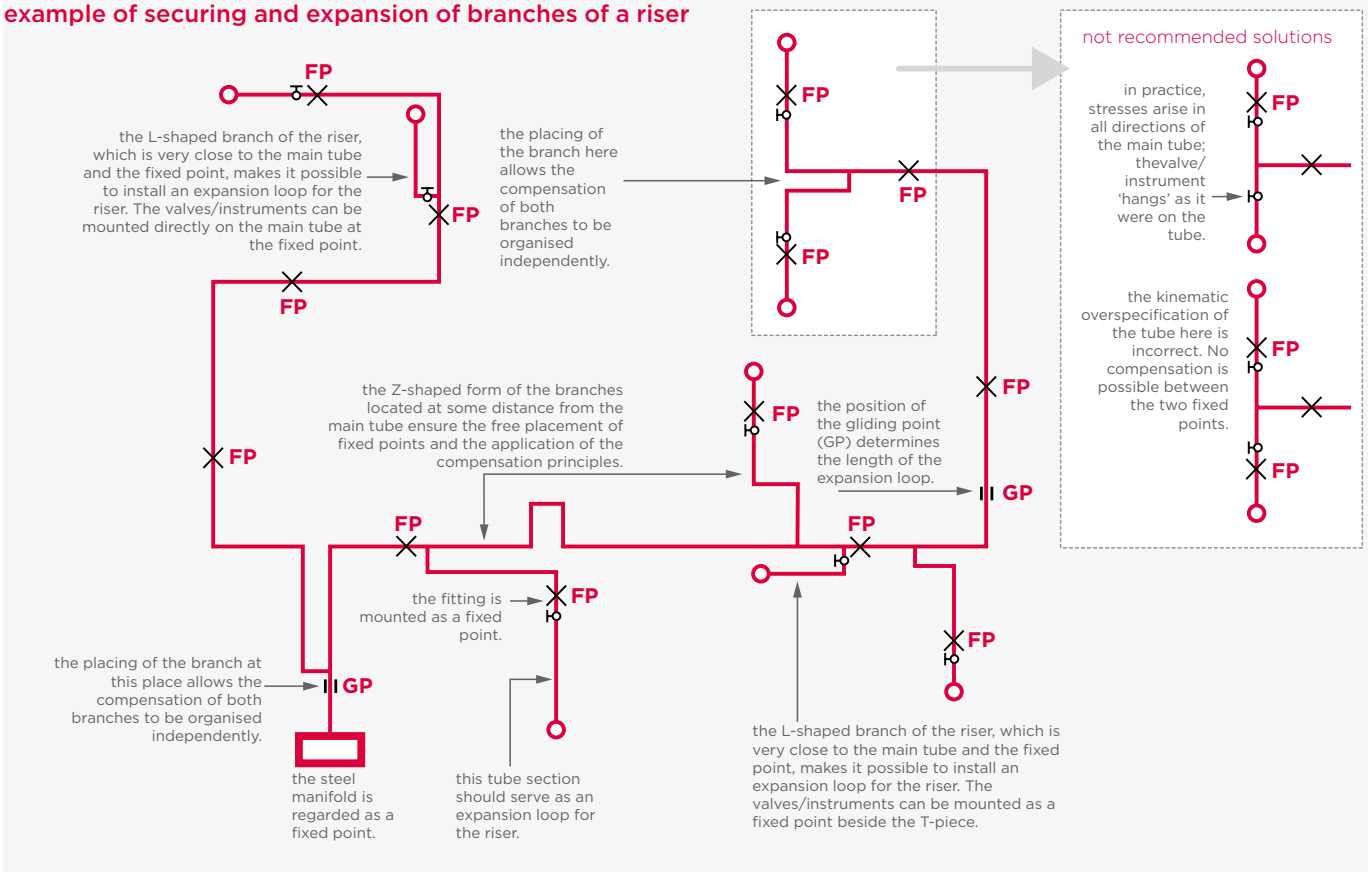
pressure loss with VSH MultiPress fittings Kv values [m^3/h]

fitting type	T (°C)	d16	d20	d25	d32	d40	d50	d63
	15	3.08	5.91	11.31	19.12	30.80	57.62	95.24
	65	3.11	5.97	11.42	19.30	31.10	58.16	96.15
	15	5.76	10.24	16.00	38.24	61.61	99.79	164.96
	65	5.82	10.34	16.15	38.61	62.19	100.74	166.53
	15	3.33	6.48	11.31	19.12	35.57	57.62	95.24
	65	3.36	6.54	11.42	19.30	35.91	58.16	96.15
	15	3.64	7.24	13.06	22.08	43.56	70.56	116.65
	65	3.68	7.31	13.19	22.29	43.98	71.23	117.76
	15	5.76	11.45	22.63	38.24	61.61	99.79	164.96
	65	5.82	11.56	22.84	38.61	62.19	100.74	166.53
	15	4.87	10.24	17.89	30.23	48.70	78.89	130.41
	65	4.91	10.34	18.06	30.52	49.17	79.64	131.65
	15	3.08	5.91	-	-	-	-	-
	65	3.11	5.97	-	-	-	-	-
	15	2.75	5.47	-	-	-	-	-
	65	2.77	5.53	-	-	-	-	-
	15	2.75	5.47	-	-	-	-	-
	65	2.77	5.53	-	-	-	-	-

pressure loss with VSH MultiPress fittings ζ - values.

fitting type	d16	d20	d25	d32	d40	d50	d63
	3.5	3.0	2.0	2.0	2.0	1.5	1.5
	1.0	1.0	1.0	0.5	0.5	0.5	0.5
	3.0	2.5	2.0	2.0	1.5	1.5	1.5
	2.5	2.0	1.5	1.5	1.0	1.0	1.0
	1.0	0.8	0.5	0.5	0.5	0.5	0.5
	1.4	1.0	0.8	0.8	0.8	0.8	0.8
	3.5	3.0	-	-	-	-	-
	4.4	3.5	-	-	-	-	-
	4.4	3.5	-	-	-	-	-

example of securing and expansion of branches of a riser



pressure losses in VSH MultiPress for water

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. The pressure loss depends on the diameter of the tube and the flow velocity. The tables show the pressure loss for sanitary and central heating applications at a given flow rate and temperature.

pressure loss for VSH MultiPress tube for drinking water applications (60°C)

q [l/s]	d 16 x 2.0		d 20 x 2.0		d 25 x 2.5		d 32 x 3.0		d 40 x 3.5		d 50 x 4.0		d 63 x 4.5	
	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m
0.01	0.09	9	0.05	3	0.03	1	-	-	-	-	-	-	-	-
0.02	0.18	51	0.10	13	0.06	5	0.04	1	-	-	-	-	-	-
0.03	0.27	102	0.15	26	0.10	9	0.06	3	0.04	1	-	-	-	-
0.04	0.36	168	0.20	43	0.13	15	0.08	4	0.05	1	-	-	-	-
0.05	0.45	249	0.25	63	0.16	22	0.10	6	0.06	2	0.04	1	-	-
0.06	0.54	342	0.30	87	0.19	30	0.11	9	0.07	3	0.04	1	-	-
0.07	0.63	449	0.35	113	0.23	39	0.13	11	0.08	4	0.05	1	-	-
0.10	0.90	846	0.51	212	0.32	73	0.19	21	0.12	7	0.07	2	0.04	1
0.13	1.17	1353	0.66	337	0.42	116	0.25	33	0.15	11	0.10	3	0.06	1
0.14	1.26	1546	0.71	385	0.45	132	0.27	38	0.17	12	0.10	4	0.06	1
0.15	1.35	1751	0.76	435	0.49	149	0.29	43	0.18	14	0.11	4	0.07	1
0.20	1.80	2951	1.01	728	0.65	248	0.38	71	0.24	23	0.15	7	0.09	2
0.21	1.89	3225	1.06	795	0.68	271	0.40	77	0.25	25	0.15	8	0.09	2
0.22	1.98	3511	1.11	865	0.71	294	0.42	83	0.26	27	0.16	8	0.10	3
0.25	2.25	4438	1.26	1089	0.81	370	0.48	105	0.30	33	0.18	11	0.11	3
0.27	-	-	1.37	1252	0.87	424	0.52	120	0.32	38	0.20	12	0.12	4
0.30	-	-	1.52	1516	0.97	513	0.57	145	0.36	46	0.22	15	0.13	4
0.35	-	-	1.77		1.13	677	0.67	191	0.42	61	0.26	19	0.16	6
0.40	-	-	2.02	2563	1.30	863	0.77	242	0.48	77	0.29	24	0.18	7
0.45	-	-	-	-	1.46	1069	0.86	299	0.54	95	0.33	30	0.20	9
0.50	-	-	-	-	1.62	1295	0.96	362	0.59	114	0.37	36	0.22	11
0.55	-	-	-	-	1.78	1541	1.05	430	0.65	136	0.40	43	0.24	13
0.60	-	-	-	-	1.94	1808	1.15	503	0.71	159	0.44	50	0.27	15
0.65	-	-	-	-	2.10		1.25	582	0.77	183	0.48	57	0.29	17
0.70	-	-	-	-	-	-	1.34	666	0.83	209	0.51	65	0.31	20
0.75	-	-	-	-	-	-	1.44	755	0.89	237	0.55	74	0.33	22
0.80	-	-	-	-	-	-	1.53	849	0.95	266	0.59	83	0.36	25
0.85	-	-	-	-	-	-	1.63	949	1.01	297	0.62	93	0.38	28
0.90	-	-	-	-	-	-	1.72	1053	1.07	330	0.66	103	0.40	31
0.95	-	-	-	-	-	-	1.82	1163	1.13	364	0.70	113	0.42	34
1.00	-	-	-	-	-	-	1.92	1278	1.19	399	0.73	124	0.44	37
1.10	-	-	-	-	-	-	-	-	1.31	475	0.81	147	0.49	44
1.20	-	-	-	-	-	-	-	-	1.43	557	0.88	173	0.53	51
1.30	-	-	-	-	-	-	-	-	1.55	645	0.95	200	0.58	59
1.40	-	-	-	-	-	-	-	-	1.66	739	1.03	228	0.62	68
1.50	-	-	-	-	-	-	-	-	1.78	838	1.10	259	0.67	77
1.60	-	-	-	-	-	-	-	-	1.90	944	1.17	291	0.71	86
1.70	-	-	-	-	-	-	-	-	2.02	1056	1.25	325	0.76	96
1.80	-	-	-	-	-	-	-	-	-	-	1.32	361	0.80	107
1.90	-	-	-	-	-	-	-	-	-	-	1.39	398	0.84	118
2.00	-	-	-	-	-	-	-	-	-	-	1.47	438	0.89	129
2.10	-	-	-	-	-	-	-	-	-	-	1.54	479	0.93	141
2.20	-	-	-	-	-	-	-	-	-	-	1.62	521	0.98	153
2.30	-	-	-	-	-	-	-	-	-	-	1.69	566	1.02	166
2.40	-	-	-	-	-	-	-	-	-	-	1.76	612	1.07	180
2.50	-	-	-	-	-	-	-	-	-	-	1.84	659	1.11	194
2.60	-	-	-	-	-	-	-	-	-	-	1.91	709	1.15	208
2.70	-	-	-	-	-	-	-	-	-	-	1.98	760	1.20	223
2.80	-	-	-	-	-	-	-	-	-	-	2.06	813	1.24	238
2.90	-	-	-	-	-	-	-	-	-	-	-	-	1.29	254

pressure loss for VSH MultiPress tube for drinking water applications (60°C)

q [l/s]	d 16 x 2.0		d 20 x 2.0		d 25 x 2.5		d 32 x 3.0		d 40 x 3.5		d 50 x 4.0		d 63 x 4.5	
	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m
3.00	-	-	-	-	-	-	-	-	-	-	-	-	1.33	270
3.20	-	-	-	-	-	-	-	-	-	-	-	-	1.42	304
3.40	-	-	-	-	-	-	-	-	-	-	-	-	1.51	340
3.60	-	-	-	-	-	-	-	-	-	-	-	-	1.60	378
3.80	-	-	-	-	-	-	-	-	-	-	-	-	1.69	417
4.00	-	-	-	-	-	-	-	-	-	-	-	-	1.78	458
4.20	-	-	-	-	-	-	-	-	-	-	-	-	1.87	502
4.40	-	-	-	-	-	-	-	-	-	-	-	-	1.95	547
4.60	-	-	-	-	-	-	-	-	-	-	-	-	2.04	594

pressure loss for VSH MultiPress tube for water applications (10°C)

q [l/s]	d 16 x 2.0		d 20 x 2.0		d 25 x 2.5		d 32 x 3.0		d 40 x 3.5		d 50 x 4.0		d 63 x 4.5	
	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m
0.01	0.09	26	0.05	8	0.03	3	0.02	1	-	-	-	-	-	-
0.02	0.18	71	0.10	19	0.06	7	0.04	2	0.02	1	-	-	-	-
0.03	0.27	138	0.15	36	0.10	13	0.06	4	0.04	1	-	-	-	-
0.04	0.35	223	0.20	58	0.13	21	0.08	6	0.05	2	0.03	1	-	-
0.05	0.44	326	0.25	84	0.16	30	0.09	9	0.06	3	0.04	1	-	-
0.06	0.53	444	0.30	115	0.19	40	0.11	12	0.07	4	0.04	1	-	-
0.07	0.62	578	0.35	149	0.22	52	0.13	15	0.08	5	0.05	2	0.03	1
0.10	0.88	1067	0.50	273	0.32	95	0.19	28	0.12	9	0.07	3	0.04	1
0.13	1.15	1684	0.65	429	0.41	149	0.24	43	0.15	14	0.09	5	0.06	1
0.14	1.24	1916	0.70	487	0.45	169	0.26	49	0.16	16	0.10	5	0.06	2
0.15	1.33	2162	0.75	549	0.48	191	0.28	55	0.18	18	0.11	6	0.07	2
0.20	1.77	3587	0.99	906	0.64	313	0.38	90	0.23	29	0.14	9	0.09	3
0.21	1.86	3910	1.04	987	0.67	341	0.40	98	0.25	32	0.15	10	0.09	3
0.22	1.95	4245	1.09	1070	0.70	370	0.41	107	0.26	35	0.16	11	0.10	3
0.25	2.21	5327	1.24	1339	0.80	462	0.47	133	0.29	43	0.18	14	0.11	4
0.27	-	-	1.34	1534	0.86	528	0.51	152	0.32	49	0.19	16	0.12	5
0.30	-	-	1.49	1847	0.95	635	0.57	182	0.35	59	0.22	19	0.13	6
0.35	-	-	1.74	2426	1.11	833	0.66	238	0.41	77	0.25	25	0.15	7
0.40	-	-	1.99	3076	1.27	1054	0.75	301	0.47	97	0.29	31	0.17	9
0.45	-	-	2.24	3795	1.43	1298	0.85	370	0.53	119	0.32	38	0.20	12
0.50	-	-	-	-	1.59	1564	0.94	445	0.58	143	0.36	45	0.22	14
0.55	-	-	-	-	1.75	1853	1.04	527	0.64	169	0.40	54	0.24	16
0.60	-	-	-	-	1.91	2164	1.13	614	0.70	197	0.43	62	0.26	19
0.65	-	-	-	-	2.07	2496	1.22	707	0.76	226	0.47	72	0.28	22
0.70	-	-	-	-	-	-	1.32	807	0.82	258	0.51	82	0.31	25
0.75	-	-	-	-	-	-	1.41	912	0.88	291	0.54	92	0.33	28
0.80	-	-	-	-	-	-	1.51	1023	0.94	326	0.58	103	0.35	31
0.85	-	-	-	-	-	-	1.60	1139	0.99	363	0.61	115	0.37	35
0.90	-	-	-	-	-	-	1.70	1262	1.05	402	0.65	127	0.39	38
0.95	-	-	-	-	-	-	1.79	1389	1.11	442	0.69	139	0.41	42
1.00	-	-	-	-	-	-	1.88	1523	1.17	484	0.72	153	0.44	46
1.10	-	-	-	-	-	-	2.07	1807	1.29	574	0.79	181	0.48	54
1.20	-	-	-	-	-	-	-	-	1.40	670	0.87	211	0.52	63
1.30	-	-	-	-	-	-	-	-	1.52	772	0.94	243	0.57	73
1.40	-	-	-	-	-	-	-	-	1.64	882	1.01	277	0.61	83
1.50	-	-	-	-	-	-	-	-	1.75	998	1.08	313	0.65	94
1.60	-	-	-	-	-	-	-	-	1.87	1120	1.15	351	0.70	105
1.70	-	-	-	-	-	-	-	-	1.99	1249	1.23	391	0.74	117
1.80	-	-	-	-	-	-	-	-	-	-	1.30	433	0.79	130
1.90	-	-	-	-	-	-	-	-	-	-	1.37	477	0.83	143
2.00	-	-	-	-	-	-	-	-	-	-	1.44	523	0.87	156
2.10	-	-	-	-	-	-	-	-	-	-	1.52	571	0.92	171
2.20	-	-	-	-	-	-	-	-	-	-	1.59	620	0.96	185

pressure loss for VSH MultiPress tube for water applications (10°C)

q [l/s]	d 16 x 2.0		d 20 x 2.0		d 25 x 2.5		d 32 x 3.0		d 40 x 3.5		d 50 x 4.0		d 63 x 4.5	
	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m
2.30	-	-	-	-	-	-	-	-	-	-	1.66	672	1.00	201
2.40	-	-	-	-	-	-	-	-	-	-	1.73	725	1.05	216
2.50	-	-	-	-	-	-	-	-	-	-	1.80	780	1.09	233
2.60	-	-	-	-	-	-	-	-	-	-	1.88	838	1.14	250
2.70	-	-	-	-	-	-	-	-	-	-	1.95	896	1.18	267
2.80	-	-	-	-	-	-	-	-	-	-	2.02	957	1.22	285
2.90	-	-	-	-	-	-	-	-	-	-	-	-	1.27	304
3.00	-	-	-	-	-	-	-	-	-	-	-	-	1.31	323
3.20	-	-	-	-	-	-	-	-	-	-	-	-	1.40	362
3.40	-	-	-	-	-	-	-	-	-	-	-	-	1.48	404
3.60	-	-	-	-	-	-	-	-	-	-	-	-	1.57	447
3.80	-	-	-	-	-	-	-	-	-	-	-	-	1.66	493
4.00	-	-	-	-	-	-	-	-	-	-	-	-	1.75	541
4.20	-	-	-	-	-	-	-	-	-	-	-	-	1.83	591
4.40	-	-	-	-	-	-	-	-	-	-	-	-	1.92	642
4.60	-	-	-	-	-	-	-	-	-	-	-	-	2.01	696

pressure loss VSH MultiPress tube, central heating application at an average temperature of 70°C (80/60°C)

Q [Δt = 20°C] [W]	d 16 x 2.0		d 20 x 2.0		d 25 x 2.5		d 32 x 3.0		d 40 x 3.5		d 50 x 4.0		d 63 x 4.5	
	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m
100	0.01	1	-	-	-	-	-	-	-	-	-	-	-	-
200	0.02	2	0.01	1	-	-	-	-	-	-	-	-	-	-
400	0.04	4	0.02	1	0.02	1	-	-	-	-	-	-	-	-
600	0.06	6	0.04	2	0.02	1	-	-	-	-	-	-	-	-
800	0.09	14	0.05	2	0.03	1	-	-	-	-	-	-	-	-
1000	0.11	20	0.06	5	0.04	1	-	-	-	-	-	-	-	-
1200	0.13	28	0.07	7	0.05	2	0.03	1	-	-	-	-	-	-
1400	0.15	36	0.08	9	0.05	3	0.03	1	-	-	-	-	-	-
1600	0.17	45	0.10	12	0.06	4	0.04	1	-	-	-	-	-	-
1800	0.19	55	0.11	14	0.07	5	0.04	1	-	-	-	-	-	-
2000	0.22	66	0.12	17	0.08	6	0.05	2	-	-	-	-	-	-
2200	0.24	77	0.13	20	0.09	7	0.05	2	0.03	1	-	-	-	-
2400	0.26	90	0.15	23	0.09	8	0.06	2	0.03	1	-	-	-	-
2600	0.28	103	0.16	27	0.10	9	0.06	3	0.04	1	-	-	-	-
2800	0.30	117	0.17	30	0.11	11	0.06	3	0.04	1	-	-	-	-
3000	0.32	131	0.18	34	0.12	12	0.07	3	0.04	1	-	-	-	-
3200	0.35	147	0.19	38	0.12	13	0.07	4	0.05	1	-	-	-	-
3400	0.37	163	0.21	42	0.13	15	0.08	4	0.05	1	-	-	-	-
3600	0.39	180	0.22	46	0.14	16	0.08	5	0.05	2	-	-	-	-
3800	0.41	198	0.23	51	0.15	18	0.09	5	0.05	2	0.03	1	-	-
4000	-	-	0.24	55	0.16	19	0.09	6	0.06	2	0.04	1	-	-
4200	-	-	0.25	60	0.16	21	0.10	6	0.06	2	0.04	1	-	-
4400	-	-	0.27	65	0.17	23	0.10	7	0.06	2	0.04	1	-	-
4600	-	-	0.28	71	0.18	25	0.11	7	0.07	2	0.04	1	-	-
4800	-	-	0.29	76	0.19	26	0.11	8	0.07	3	0.04	1	-	-
5000	-	-	0.30	81	0.19	28	0.11	8	0.07	3	0.04	1	-	-
5200	-	-	0.32	87	0.20	30	0.12	9	0.07	3	0.05	1	-	-
5400	-	-	0.33	93	0.21	32	0.12	9	0.08	3	0.05	1	-	-
5600	-	-	0.34	99	0.22	35	0.13	10	0.08	3	0.05	1	-	-
5800	-	-	0.35	105	0.23	37	0.13	11	0.08	3	0.05	1	-	-
6000	-	-	0.36	112	0.23	39	0.14	11	0.09	4	0.05	1	-	-
6200	-	-	0.38	118	0.24	41	0.14	12	0.09	4	0.05	1	-	-
6400	-	-	0.39	125	0.25	43	0.15	13	0.09	4	0.06	1	-	-
6600	-	-	0.40	132	0.26	46	0.15	13	0.09	4	0.06	1	-	-

pressure loss VSH MultiPress tube, central heating application at an average temperature of 70°C (80/60°C)

Q [Δt = 20°C] [W]	d 16 x 2.0		d 20 x 2.0		d 25 x 2.5		d 32 x 3.0		d 40 x 3.5		d 50 x 4.0		d 63 x 4.5	
	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m	v m/s	R Pa/m
6800	-	-	0.41	139	0.26	48	0.16	14	0.10	5	0.06	1	-	-
7000	-	-	0.42	146	0.27	51	0.16	15	0.10	5	0.06	2	-	-
7200	-	-	0.44	153	0.28	53	0.17	15	0.10	5	0.06	2	-	-
7400	-	-	0.45	161	0.29	56	0.17	16	0.11	5	0.07	2	0.04	1
7600	-	-	0.46	169	0.30	59	0.17	17	0.11	5	0.07	2	0.04	1
7800	-	-	0.47	176	0.30	61	0.18	18	0.11	6	0.07	2	0.04	1
8000	-	-	0.49	184	0.31	64	0.18	18	0.11	6	0.07	2	0.04	1
8200	-	-	0.50	193	0.32	67	0.19	19	0.12	6	0.07	2	0.04	1
8400	-	-	0.51	201	0.33	70	0.19	20	0.12	7	0.07	2	0.04	1
8600	-	-	-	-	0.33	73	0.20	21	0.12	7	0.08	2	0.05	1
8800	-	-	-	-	0.34	76	0.20	22	0.13	7	0.08	2	0.05	1
9000	-	-	-	-	0.35	79	0.21	23	0.13	7	0.08	2	0.05	1
9200	-	-	-	-	0.36	82	0.21	24	0.13	8	0.08	2	0.05	1
9400	-	-	-	-	0.37	85	0.22	24	0.13	8	0.08	3	0.05	1
9600	-	-	-	-	0.37	88	0.22	25	0.14	8	0.08	3	0.05	1
9800	-	-	-	-	0.38	91	0.23	26	0.14	9	0.09	3	0.05	1
10000	-	-	-	-	0.39	94	0.23	27	0.14	9	0.09	3	0.05	1
11000	-	-	-	-	0.43	112	0.25	32	0.16	10	0.10	3	0.06	1
12000	-	-	-	-	0.47	130	0.28	37	0.17	12	0.11	4	0.06	1
13000	-	-	-	-	0.51	149	0.30	43	0.19	14	0.11	4	0.07	1
14000	-	-	-	-	0.54	170	0.32	49	0.20	16	0.12	5	0.07	2
15000	-	-	-	-	0.58	192	0.34	55	0.21	18	0.13	6	0.08	2
16000	-	-	-	-	0.62	215	0.37	62	0.23	20	0.14	6	0.09	2
17000	-	-	-	-	-	-	0.39	69	0.24	22	0.15	7	0.09	2
18000	-	-	-	-	-	-	0.41	76	0.26	24	0.16	8	0.10	2
19000	-	-	-	-	-	-	0.44	84	0.27	27	0.17	9	0.10	3
20000	-	-	-	-	-	-	0.46	91	0.29	29	0.18	9	0.11	3
22000	-	-	-	-	-	-	0.51	108	0.31	35	0.19	11	0.12	3
24000	-	-	-	-	-	-	0.55	126	0.34	41	0.21	13	0.13	4
26000	-	-	-	-	-	-	0.60	145	0.37	47	0.23	15	0.14	4
28000	-	-	-	-	-	-	0.64	165	0.40	53	0.25	17	0.15	5
29000	-	-	-	-	-	-	0.67	176	0.41	57	0.26	18	0.15	5
30000	-	-	-	-	-	-	0.69	187	0.43	60	0.26	19	0.16	6
32000	-	-	-	-	-	-	0.74	210	0.46	67	0.28	21	0.17	6
34000	-	-	-	-	-	-	-	-	0.49	75	0.30	24	0.18	7
36000	-	-	-	-	-	-	-	-	0.51	83	0.32	26	0.19	8
38000	-	-	-	-	-	-	-	-	0.54	91	0.33	29	0.20	9
40000	-	-	-	-	-	-	-	-	0.57	100	0.35	32	0.21	10
42000	-	-	-	-	-	-	-	-	0.60	109	0.37	34	0.22	10
44000	-	-	-	-	-	-	-	-	0.63	118	0.39	37	0.23	11
46000	-	-	-	-	-	-	-	-	0.66	128	0.41	40	0.25	12
48000	-	-	-	-	-	-	-	-	0.69	138	0.42	44	0.26	13
50000	-	-	-	-	-	-	-	-	0.71	148	0.44	47	0.27	14
60000	-	-	-	-	-	-	-	-	0.86	205	0.53	65	0.32	20
70000	-	-	-	-	-	-	-	-	-	-	0.62	85	0.37	26
80000	-	-	-	-	-	-	-	-	-	-	0.70	108	0.43	33
90000	-	-	-	-	-	-	-	-	-	-	0.79	133	0.48	40
100000	-	-	-	-	-	-	-	-	-	-	0.88	161	0.53	48
120000	-	-	-	-	-	-	-	-	-	-	1.06	223	0.64	67
140000	-	-	-	-	-	-	-	-	-	-	-	-	0.75	88
160000	-	-	-	-	-	-	-	-	-	-	-	-	0.85	112
180000	-	-	-	-	-	-	-	-	-	-	-	-	0.96	138
200000	-	-	-	-	-	-	-	-	-	-	-	-	1.07	167
220000	-	-	-	-	-	-	-	-	-	-	-	-	1.17	198
240000	-	-	-	-	-	-	-	-	-	-	-	-	1.28	232

installation recommendations

tube bending

the VSH MultiPress tube holds its retention and up to 25 x 2.5 mm can be bent manually. For manual bending of curves with a radius smaller than 5 x the external tube diameter, a bending tool can be used. The minimum bending radii are shown in the table below.

tube diameter d [mm]	minimum bending radius r_{min} [mm]	
	manual bending ($r_{min} \geq 5$ x d)	mechanical bending ($r_{min} \geq 3.5$ x d)
d16	80	56
d20	100	70
d25	125	88
d32	-	112
d40	-	140
d50	-	175
d63	-	221

bending radius of VSH MultiPress tube

avoid chemical erosion

never expose components of the VSH MultiPress system to chemicals that might adversely affect the products' properties or cause corrosion. Avoid:

- the brass housing of the press fittings being exposed to ammonia, nitrite or ammonium compounds;
- the stainless steel press sleeves being exposed to chlorides;
- PPSU fittings coming into contact PUR (polyurethane construction foam), aggressive solvents or liquid gaskets based on cyanoacrylate, perspex and isocyanate, in order to prevent stress corrosion.

prevent energy loss and sound transmission by insulation

to avoid unwanted heat loss and sound transmission, sanitary tubing systems should be mechanically decoupled from the building structure by a corrugated protective tube or insulation.

tube systems for heating applications should be thermally insulated to prevent undesired heat losses and a too low flow temperature of the radiators/convectors. For the specific details in this regard, please consult BS5970.

avoid cracks in the screed

please consult BS8203 on the quality and performance of cement-based screeds to avoid among other things cracks in them.

avoid damage by freezing

work with the VSH MultiPress systems only at temperatures above 0°C and avoid filling the system with water when there is a risk of freezing.

avoid damage by UV light

do not expose VSH MultiPress tubes to direct sunlight or other sources of UV light.

avoid damage by too high temperatures

never expose the components of the VSH MultiPress systems to open fire or surroundings or contact temperatures that are higher than 110°C.

avoid any kinks in the tube

roll out the tube gradually and use a tube decoiler when using for underfloor heating.

avoid damage by mechanical overloading

make sure that tube connection fittings are always placed axially and not at an angle, and use a suitable form of tube guidance for that where necessary. In order to avoid excessive loads due to bending forces on fittings, it is recommended that tubes not be bent within a distance of less than 10 times the outer diameter from the fitting.

avoid damage to the main tube and the corrugated protective tube. Do not drag the tube over rough surfaces, and avoid contact with sharp objects.

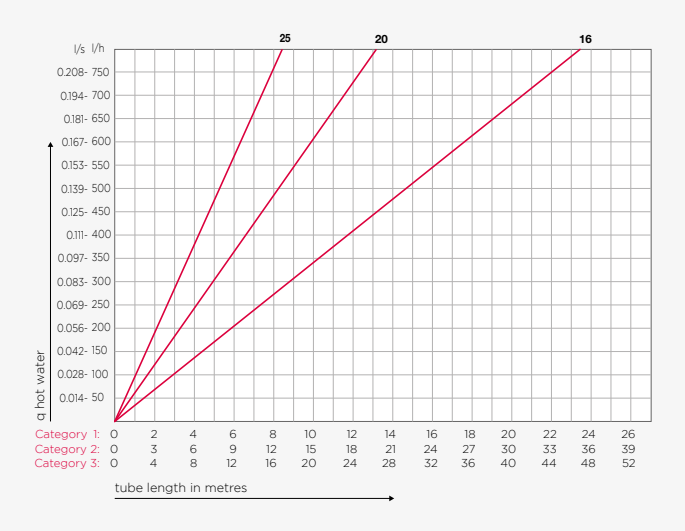
pressurisation of the installation

the complete tube system should be pressurised before being commissioned according to the local installation instructions and worksheets.

maximum tube length for hot tap water:

the maximum tube length (see graphic page 20) of a tap water installation depends on the category into which it falls. there are three categories:

- **category I**: for mains water for a kitchen sink tap, a maximum waiting time of 20 seconds.
- **category II:** for mains water for a washbasin tap or bidet, with a maximum waiting time of 30 seconds.
- **category III:** for mains water for a bath tap, shower head or dishwasher, with a maximum waiting time of 40 seconds.



maximum tube length [m]

placing tubes in screed

for practical and aesthetic reasons, tubing systems are often embedded in walls and floors in modern homes. It is recommended that the fittings be insulated before being placed in the walls or floor and that local guidelines and recommendations are followed.

general

place the tube with plastic brackets on the construction floor and respect the minimum bending radius according to the table on page 19.

- ensure that the fittings are mounted without any tension.
- always use a corrugated protective tube for dilatations and other transitions where building parts can move relative to each other.
- the distance between two tubes should be at least 2 cm so that the mortar of the screed is able to penetrate properly between them.
- cap open tube ends if the tube is not immediately connected, in order to prevent any dirt getting inside.

VSH MultiPress multilayer tube

when installed in screed, VSH MultiPress tubes compensate for the changes in length and therefore no measures need to be taken.

placing of tubes in the construction

for fixing rigid VSH MultiPress tube, use brackets with rubber inlays. See page 13 for the bracket distances and compensation for thermal length changes.

corrosion

general

all VSH MultiPress fittings fully meet the highest requirements in the market. Nevertheless stress corrosion can occur in brass and plastic under certain conditions and lead to failure of the material. Instructions are given below on how to prevent the occurrence of corrosion problems.

stress corrosion

stress corrosion is characterised by the sudden appearance of cracks in the material after some time. These cracks are the result of a simultaneous action of certain chemicals and/or mechanical stresses, combined with moisture from the environment. Stress corrosion can only occur if all these factors are present simultaneously and is not specific to metals or plastics; it can occur in both of them. It is well known that especially (but not exclusively) copper alloys, such as brass, are sensitive to ammonium compounds such as ammonia. Stresses arise from a combination of internal stresses from production and external stresses due to installation. Humidity often occurs as a result of condensation on the tube.

ammonia also occurs biologically from the decomposition of manure and urine. That is why brass fittings should not be used around livestock farms. With use of certain insulation materials there is also a chance that small concentrations can release ammonia, which can settle on the VSH MultiPress fittings.

with PPSU fittings, stress corrosion may occur when they come into contact with PUR (construction foam), aggressive solvents or liquid gaskets based on cyanoacrylate, perspex and isocyanate.

electrolytic corrosion

electrolytic corrosion is a reaction between two different metals in contact with each other in a damp environment. Due to the difference in potential between two different metals, there is a redox reaction in which the least precious metal is attacked at the expense of the nobler. Because aluminium (-1.662 V) is less noble than copper (+0.337 V), in the case of direct contact between the brass (about 60% copper) of the fitting and the aluminium of the multilayer tube in a humid environment, the aluminium can become corroded with characteristic 'blisters'. In time this can weaken the tube and cause the fitting to leak. To prevent this, the VSH MultiPress fittings have a coloured ring that also acts as a separating layer. This ring prevents the brass from coming into contact with the aluminium of the VSH MultiPress tubes.

installation instructions

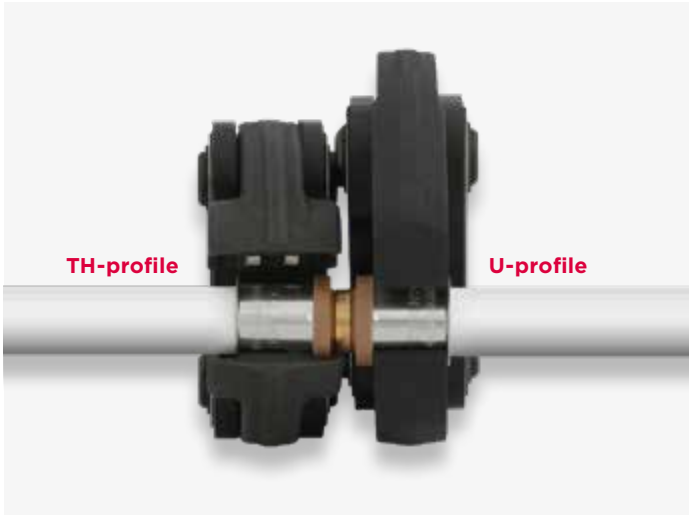
cut the tube to length
cut the tube to the desired length with a special tube cutter/cutting blade or cutter suitable for plastic multilayer tube. To prevent burrs and irregularities, never use a saw.

sizing and deburring
if the tube is cut with the right tool, sizing is not necessary for diameters up to and including 32 mm. Sizing is recommended if the tube if not round. When sizing each tube end with the VSH MultiPress tool, size it and check that the inside of the tube has a bevelled edge.

tube and fitting assembly
remove any irregularities and dirt from the fitting and tube. Insert the tube into the fitting until the tube end is visible in the control window.

making a press connection
select the press jaws of the right dimension and profile, and check them for damage. Remove any dirt and place the jaws in the press tool.

open the jaws and place them correctly over the fitting. The plastic ring ensures that the jaws are precisely and correctly positioned during the pressing process. Start the pressing tool and wait until it indicates that the pressing is fully completed. Never interrupt the process, as the fitting will not be completely pressed and the joint will not be correct.



TH profile: open the press jaws/sling and place them/it over the sleeve, including the coloured ring. Start the pressing.
U-profile: open the press jaws/sling and place them/it against the coloured ring.

the 50 and 63 mm (TH profile) sizes do not have coloured rings. In these cases, the press jaws must be placed on the stainless steel press sleeve against the housing.

never press a connection more than once!

press tools

in order to achieve correct VSH MultiPress press connections, a VSH-approved pressing tool with associated jaws should be used. These are available for the entire range of diameters from 16 mm to 63 mm.

approved press tools for VSH MultiPress
use only VSH-approved jaws and tools and check that they are in good condition. You will find a summary of the press tools approved by VSH for VSH MultiPress on www.vsh.nl/presstool.

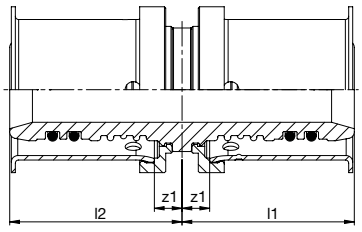
maintenance
for the required periodic maintenance of the press tools, please refer to the instructions of the respective manufacturer. It is the user's responsibility to ensure that the required periodic maintenance of the press tools is carried out.

threaded connections
fittings with an inner thread have internal threading in accordance with ISO 7-1 (Rp) or threading in accordance with ISO 228-1 (G). Clean the screw thread first before assembling. Then wrap with hemp (in the thread direction) and mastic or PTFE. Then screw the threads together.

VSH MultiPress

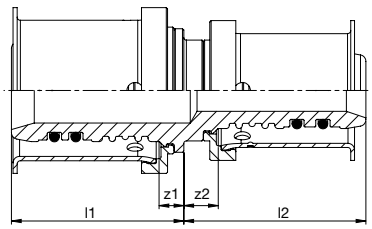
fittings

K7010 straight coupling
(2 x press)



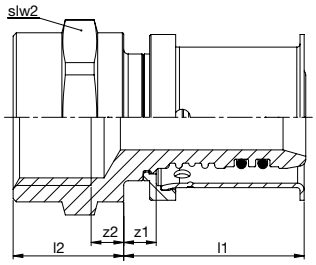
dimension	article no.	material	l1/l2	z1/z2
16	3820014	PPSU	27	5
20	3820036	PPSU	27	5
25	3820047	PPSU	38	5
32	3820058	brass	38	5
40	3820069	brass	47	5
50	3820071	brass	43	5
63	3820080	brass	66	6

K7012 reducer
(2 x press)



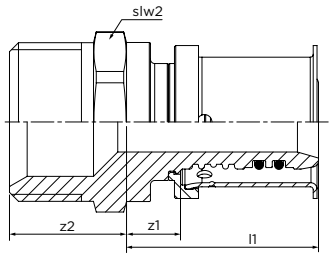
dimension	article no.	material	l1	z1	l2	z2
20 x 16	3820234	PPSU	27	4	29	6
25 x 16	3820256	PPSU	40	7	30	7
25 x 20	3820278	PPSU	40	7	30	7
32 x 16	3820289	brass	40	7	28	5
32 x 20	3820291	brass	40	7	28	5
32 x 25	3820300	brass	40	7	38	5
40 x 20	3820305	brass	49	7	28	5
40 x 25	3820311	brass	49	7	38	6
40 x 32	3820322	brass	49	7	39	6
50 x 32	3820333	brass	44	6	42	9
50 x 40	3820344	brass	43	5	50	8
63 x 40	3820355	brass	66	6	52	10
63 x 50	3820366	brass	66	6	44	6

K7022 straight connector
(press x female thread)



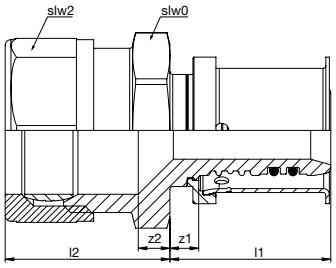
dimension	article no.	material	l1	z1	l2	z2	slw2
16 x G1/2	3820916	brass	28	5	18	6	27
20 x G1/2	3820951	brass	28	5	17	5	27
20 x G3/4	3820960	brass	28	5	23	7	34
25 x G3/4	3820982	brass	38	6	22	6	34
25 x G1	3820993	brass	38	6	28	8	41
32 x G1	3821004	brass	40	7	24	4	41
32 x G1 1/4	3821015	brass	40	7	34	9	50
40 x G1	3821026	brass	49	7	24	9	43
40 x G1 1/4	3821037	brass	49	7	30	5	50
40 x G1 1/2	3821048	brass	49	7	34	8	55

K7020 straight connector
(press x male thread)



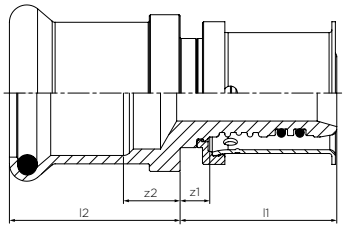
dimension	article no.	material	l1	z1	z2	slw2
16 x G1/2	3820619	brass	28	5	20	27
20 x G1/2	3820652	brass	28	5	20	27
20 x G3/4	3820663	brass	28	5	22	34
25 x G1/2	3820680	brass	38	6	21	27
25 x G3/4	3820685	brass	38	6	22	34
25 x G1	3820696	brass	38	6	25	41
32 x G1	3820707	brass	39	7	25	41
32 x G1 1/4	3820718	brass	40	7	28	50
40 x G1	3820729	brass	49	7	26	43
40 x G1 1/4	3820731	brass	49	7	30	50
40 x G1 1/2	3820740	brass	49	7	30	55
50 x G1 1/2	3820751	brass	46	8	32	60
63 x G2	3820762	brass	69	9	42	72

K7224 straight connector
(press x compression)



dimension	article no.	material	l1	l2	z1	z2	slw0	slw2
16 x 15	3823402	brass	28	28	5	3	22	24
20 x 22	3823424	brass	28	29	5	6	30	32
25 x 22	3823435	brass	38	29	6	6	32	32

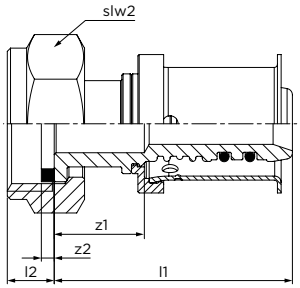
K7227 straight connector
(press x VSH XPress)



dimension	article no.	material	l1	l2	z1	z2
16 x 15	3824304*	brass	28	28	8	5
20 x 15	3824315*	brass	28	25	8	2
20 x 22	3824326*	brass	31	28	10	5
25 x 22	3824337*	brass	31	35	10	4

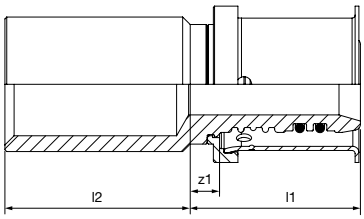
*available October 2019

K7261 coupling with nut
(press x female thread)



dimension	article no.	material	l1	l2	z1	z2	slw2
16 x G1/2"	3823900	brass	37	7	14	2	24
16 x G3/4"	3823911	brass	38	9	15	2	30
20 x G3/4"	3823922	brass	41	10	18	2	30
20 x G1"	3823933	brass	34	13	11	2	37
25 x G3/4"	3823944	brass	54	9	22	2	30
25 x G1"	3823955	brass	52	13	20	2	37
25 x G1 1/4"	3823966	brass	46	10	14	2	45
32 x G1"	3823977	brass	60	11	28	2	37
32 x G1 1/4"	3823988	brass	56	9	23	2	45
32 x G1 1/2"	3823999	brass	47	13	15	2	53
40 x G1 1/2"	3824000	brass	66	13	25	2	53
40 x G2"	3824001	brass	55	17	14	2	65

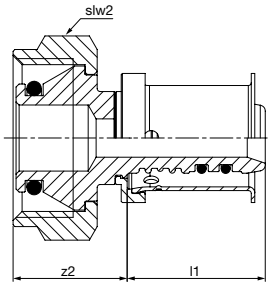
K7226 straight connector
(press x Ø)



dimension	article no.	material	l1	l2	z1
16 x Ø12	3823523	brass	29	24	6
16 x Ø15	3823534	brass	28	28	5
20 x Ø22	3823556	brass	28	30	5
25 x Ø22	3823567	brass	39	29	7
25 x Ø28	3823578	brass	38	31	6

K7262 coupling with nut, Eurocone

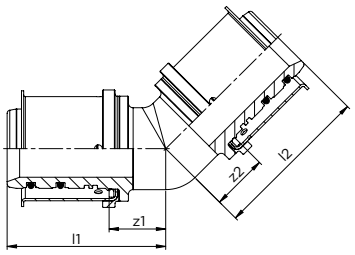
(press x female thread)



dimension	article no.	material	l1	z2	slw2
16 x 3/4" EC	3823701	brass	23	19	30
32 x 1" EC	3822082	brass	33	36	37

K7231 elbow 45°

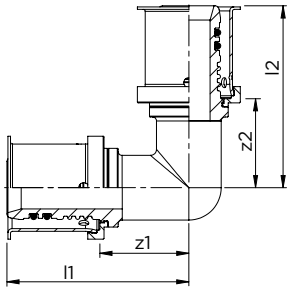
(2 x press)



dimension	article no.	material	l1/l2	z1/z2
32	3802007	PPSU	51	18
40	3802018	PPSU	64	22
50	3805890	PPSU	60	23
63	3805901	PPSU	95	34

K7230 elbow 90°

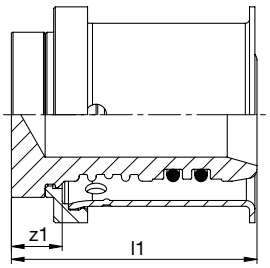
(2 x press)



dimension	article no.	material	l1l2	z1/z2
16	3801215	PPSU	41	18
20	3801237	PPSU	45	22
25	3801248	PPSU	59	27
32	3801259	PPSU	64	31
40	3801261	PPSU	78	36
50	3805879	PPSU	77	39
63	3805881	PPSU	108	48

K7229 stop end

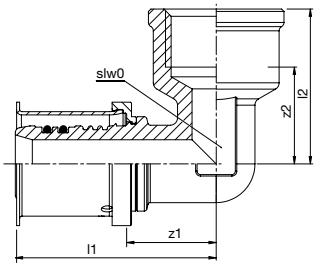
(1 x press)



dimension	article no.	material	l1	z1
16	3823710	brass	29	6
20	3823721	brass	29	6
25	3823732	brass	39	7
32	3823743	brass	40	7

K7029 elbow adapter 90°

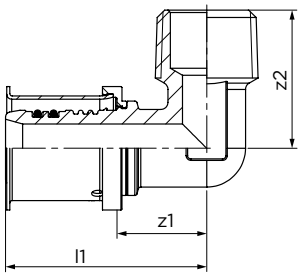
(press x female thread)



dimension	article no.	material	l1	z1	l2	z2	slw0
16 x G1/2"	3821510	brass	42	19	32	20	13
20 x G1/2"	3821554	brass	42	19	32	20	17
20 x G3/4"	3821565	brass	45	22	38	24	17
25 x G3/4"	3821587	brass	58	25	39	25	19
25 x G1"	3821598	brass	62	29	43	27	19
32 x G1"	3821599	brass	65	32	48	32	27
40 x G1 1/4"	3821631	brass	83	41	54	34	0

K7032 bend adapter 90°

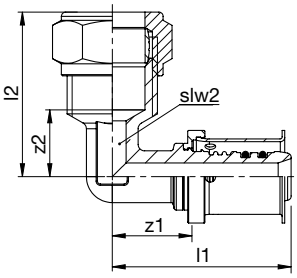
(press x male thread)



dimension	article no.	material	l1	z1	z2	slw0
16 x G1/2"	3821213	brass	42	19	28	13
20 x G1/2"	3821257	brass	42	19	29	17
20 x G3/4"	3821268	brass	42	19	29	17
25 x G3/4"	3821281	brass	58	25	36	19
25 x G1"	3821290	brass	62	29	38	19
32 x G1"	3821301	brass	65	32	42	27
40 x G1 1/4"	3821334	brass	83	41	53	0

K7234 elbow adapter 90°

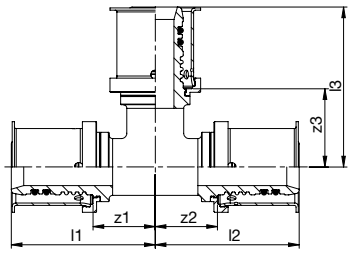
(press x compression)



dimension	article no.	material	l1	z1	l2	z2	slw2
16 x 15	3823622	brass	40	17	38	16	24
22 x 20	3823633	brass	45	22	44	23	17

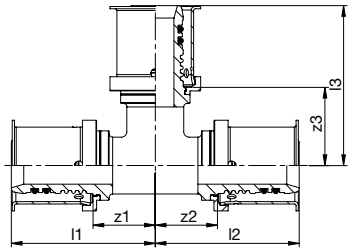
K7240 tee

(3 x press)



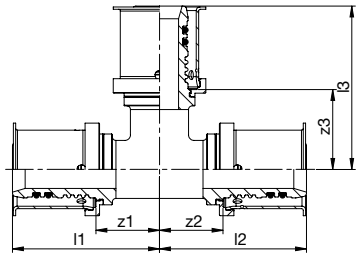
dimension	article no.	material	l1/l2	l3	z1/z2	z3
16	3802117	PPSU	39	41	16	18
20	3802139	PPSU	41	45	18	22
25	3802141	PPSU	56	59	24	27
32	3802150	PPSU	64	64	31	31
40	3802161	PPSU	78	78	36	36
50	3805912	PPSU	77	77	39	39
63	3805923	PPSU	108	108	48	48

K7241 tee reduced
(3 x press)



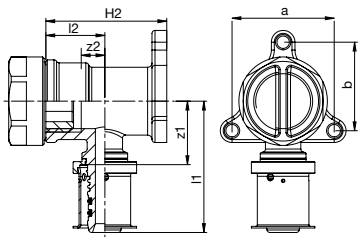
dimension	article no.	material	l1/l2	z1/z2	l3	z3
16 x 16 x 20	3803118	PPSU	40	18	43	18
20 x 20 x 16	3802337	PPSU	41	18	43	18
20 x 20 x 25	3803129	PPSU	46	23	57	23
25 x 25 x 16	3802359	PPSU	50	18	46	18
25 x 25 x 20	3802370	PPSU	52	20	46	20
25 x 25 x 32	3803131	PPSU	63	31	61	31
32 x 32 x 16	3802381	PPSU	56	23	53	23
32 x 32 x 20	3802403	PPSU	58	25	53	25
32 x 32 x 25	3802414	PPSU	61	28	63	28
40 x 40 x 20	3802436	PPSU	67	25	57	25
40 x 40 x 25	3802447	PPSU	71	29	67	29
40 x 40 x 32	3802458	PPSU	74	32	68	32
50 x 50 x 20	3821906	brass	61	23	61	39
50 x 50 x 25	3821939	brass	65	27	71	39
50 x 50 x 32	3821961	brass	68	31	72	39
50 x 50 x 40	3821983	brass	72	34	81	39
63 x 63 x 20	3821994	brass	84	24	67	44
63 x 63 x 25	3822005	brass	88	28	77	45
63 x 63 x 32	3822038	brass	91	31	78	45
63 x 63 x 40	3822060	brass	95	35	89	47
63 x 63 x 50	3822071	brass	101	41	84	46

K7242 tee reduced FFF
(3 x press)



dimension	article no.	material	l1	l2	l3	z1	z2	z3
20 x 16 x 16	3802722	PPSU	41	41	43	18	18	20
20 x 16 x 20	3802744	PPSU	41	41	45	18	18	22
25 x 20 x 16	3802755	PPSU	50	40	46	18	17	23
25 x 16 x 20	3802766	PPSU	52	42	46	20	19	20
25 x 20 x 20	3802777	PPSU	52	42	46	20	19	19
25 x 16 x 25	3803140	brass	56	46	59	24	23	27
25 x 20 x 25	3805945	PPSU	56	46	59	24	23	27
32 x 25 x 20	3802801	PPSU	58	57	53	25	25	30
32 x 25 x 25	3802810	PPSU	61	60	63	28	27	31
32 x 20 x 32	3802815	PPSU	64	53	64	31	30	31
32 x 25 x 32	3802816	PPSU	64	63	64	31	31	31
40 x 32 x 20	3802821	PPSU	67	58	57	25	25	34
40 x 32 x 25	3802832	PPSU	71	62	67	29	29	35
40 x 32 x 32	3802843	PPSU	74	35	68	32	32	35
40 x 32 x 40	3802865	PPSU	78	69	78	36	36	36
50 x 40 x 25	3821917	brass	65	69	71	27	27	39
50 x 40 x 32	3821941	brass	69	72	72	30	30	39
50 x 40 x 40	3821972	brass	72	76	81	34	34	39
63 x 50 x 32	3822027	brass	91	68	78	31	30	45
63 x 50 x 40	3822049	brass	95	72	89	35	34	47
63 x 50 x 50	3822051	brass	101	79	84	41	41	46

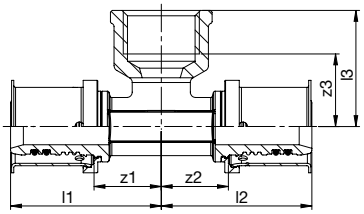
K7251 wallplate 90° with plug
(press x female thread)



dimension	article no.	material	l1	l2	z1	z2	H2	a	b
16 x G1/2"	3823765	brass	45	20	22	8	41	35	30
20 x G1/2"	3823776	brass	45	20	22	8	45	35	30
20 x G3/4"	3823787*	brass	49	20	26	16	41	35	30
25 x G3/4"	3823798	brass	59	30	26	16	54	35	30

* without plug

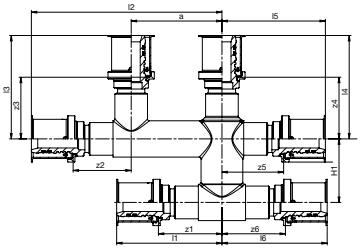
K7043 tee female branch
(press x female thread x press)



dimension	article no.	material	l1/l2	l3	z1/z2	z3
16 x 16 x G1/2"	3821807	brass	42	32	19	20
20 x 20 x G1/2"	3821831	brass	42	32	19	20
20 x 20 x G3/4"	3821840	brass	45	38	22	24
25 x 25 x G1/2"	3821862	brass	55	34	22	22
25 x 25 x G3/4"	3821873	brass	58	39	25	25
32 x 32 x G1/2	3821884	brass	54	37	21	22
32 x 32 x G3/4	3821895	brass	57	40	24	24

K7201 crossing nickle plated

(6 x press)

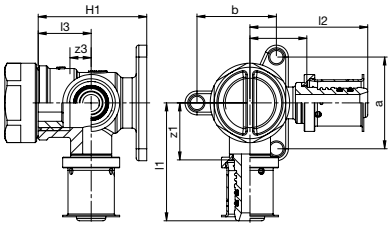


dimension	article no.	material
16	3823204	brass
20 x 16 x 16	3823226	brass
20 x 16 x 20	3823237	brass
20	3823248	brass

dimension	l1	l2	l3/l4	l5	l6	z1	z2	z3/z4	z5	z6	a	H1
16	55	102	54	54	32	32	29	31	31	54	50	35
20 x 16 x 16	58	105	54	54	55	35	32	31	31	54	50	35
20 x 16 x 20	58	105	54	57	58	35	32	31	34	35	50	35
20	58	105	57	57	58	35	32	34	34	35	50	35

K7054 double wallplate 90° with plug

(press x female thread)



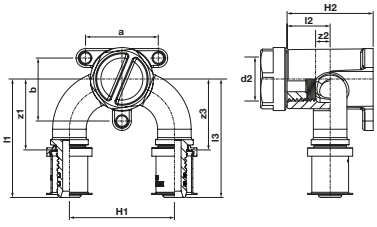
dimension	article no.	material	l1/l3	l2	z1/z3	z2	H1	a	b
20 x G1/2" x 20	3822841	brass	45	20	22	8	41	35	30
16 x G1/2" x 16	3822929	brass	45	20	22	8	41	35	30

K7265 isolation loop through wallplate

dimension	article no.
16 - 20	3824293

K7264 loop through wallplate with plug

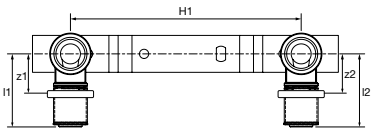
(press x female thread x press)



dimension	article no.	material	l1/l3	l2	z1/z3	z2	H1	H2	a	b
16 x G1/2 x 16	3824271	brass	57	21	34	7	50	41	35	30
20 x G1/2 x 20	3824282	brass	57	21	34	7	50	41	35	30

K7257 double wall plate bracket with plugs

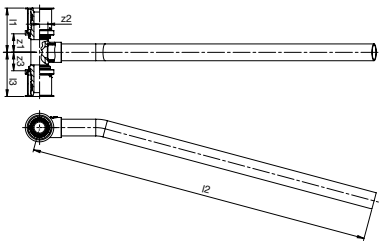
(2x press x female thread)



dimension	article no.	material	l1/l2	z1/z2	H1
16 x G1/2	3805060	brass, steel	45	22	153

K7267 radiator connection

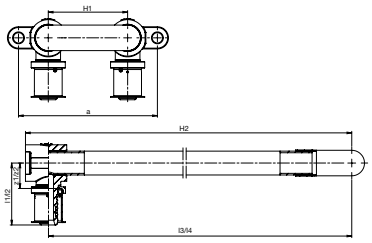
(press x male x press)



dimension	article no.	material	l1/l3	z1/z3	l2	z2
16 x Ø15 x 16	3805208	brass	40	17	300	6
20 x Ø15 x 20	3805230	brass	40	17	300	8

K7269 double floor plate

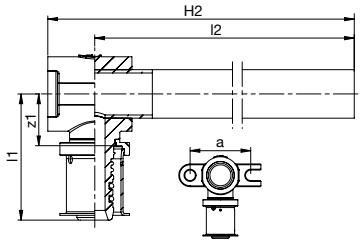
(press x Ø)



dimension	article no.	length	l1/l2	z1/z2	l3/l4	H1	H2
16 x Ø15	3805714	300 mm	39	16	300	50	363

K7268 floor plate

(press x male)



dimension	article no.	material	l1	l2	z1	H2	a
16 x Ø15	3805615	brass	39	300	16	315	38

VSH MultiPress

multilayer tube

K7140 multilayer tube

dimension	article no.	length (coil)
16 x 2,0	3840012	200 m
16 x 2,0	3840021	100 m
20 x 2,0	3840034	100 m
25 x 2,5	3840045	50 m
32 x 3,0	3840056	50 m
40 x 3,5	3840067	25 m
32 x 3,0	3840254	5 m (straight length)
40 x 3,5	3840265	5 m (straight length)
50 x 4,0	3840278	5 m (straight length)
63 x 4,5	3840298	5 m (straight length)

K7145 multilayer tube with corrugated tube

dimension	article no.	colour	length (coil)
16 x 2,0	3842025	red	75 m
16 x 2,0	3842036	blue	75 m
20 x 2,0	3842069	red	75 m
20 x 2,0	3842071	blue	75 m
25 x 2,5	3842080	red	50 m
25 x 2,5	3842091	blue	50 m

K7150 isolated multilayer tube 6 mm

dimension	article no.	colour	length (coil)
16 x 2,0	3841222	red	50 m
16 x 2,0	3841233	blue	50 m
20 x 2,0	3841266	red	50 m
20 x 2,0	3841277	blue	50 m
25 x 2,5	3841288	red	25 m
25 x 2,5	3841299	blue	25 m
32 x 3,0	3841321	red	50 m
32 x 3,0	3841332	blue	50 m

VSH MultiPress

tools and accessories

P5991 press tools Novopress ACO103

version	article no.
ACO103 includes 2 batteries (12V-1,5Ah Li-Ion), battery charger and carry case	39283

K5725 press jaws U-profile

for Novopress ACO102/103

dimension	article no.
16	3850319
20	3850330
25	3850341
32	3850352
40	3850363

K5765 press jaws TH-profile

for Novopress ACO102/103

dimension	article no.
16	3850901
20	3850902
32	3852112
40	3850906

P6013/6014 press tools Novopress ECO203

version	article no.
ECO203 includes carry case	39051

P6002/6013 press tools Novopress ACO203BT

version	article no.
ACO203BT includes battery (18V-1,5Ah Li-Ion), battery charger and carry case	39075

K5730 press jaws U-profile

for Novopress ACO/ECO203 (PB2)

dimension	article no.
16	3850418
20	3850431
25	3850440
32	3850451
40	3850462

K5780/P5990 press jaws and slings TH-profile

for Novopress ACO/ECO203 (PB2)

version	dimension	article no.
PB2 jaw	16	3852013
PB2 jaw	20	3852035
PB2 jaw	32	3852123
ZB203 adapter for snap-on sling		39190
snap-on sling	40	3852079
snap-on sling	50	3852081
snap-on sling	63	3852090
case for 3 Snap-on slings sizes 40-63 mm and 1 press adapter		6342303

K3050 tube scissors

dimension	article no.
16-25	0715517

K5700 calibration set

dimension	article no.
16, 20, 25	3850000
25, 32, 40	3850011
50, 63	3850022

R290 tube cutter for plastic multilayer tube

dimension	article no.
16-63	3851232

disclaimer:

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

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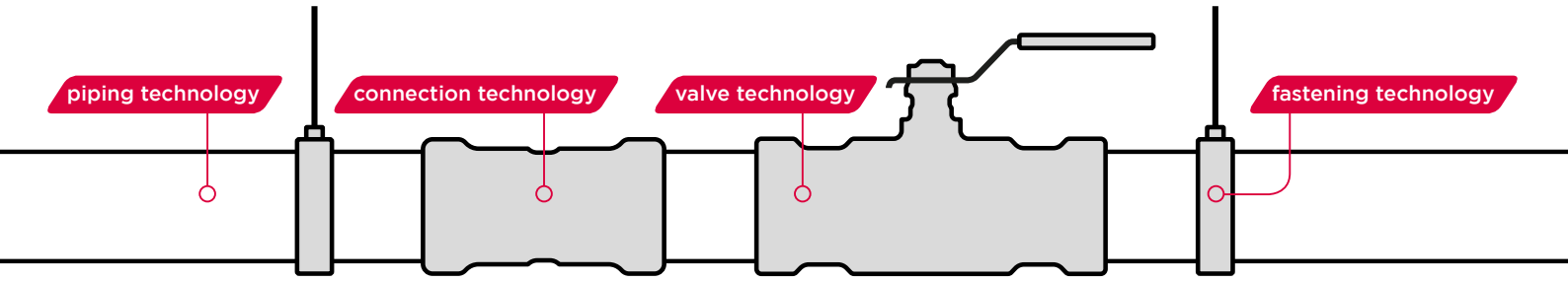

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