IVAR

HYDRONIC COMPONENTS & SYSTEMS

MULTI•PRESS®

USER MANUAL

MULTI•PRESS®

User manual

INDEX

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INTRODUCTION

Figure 1. *Tee fitting.*

MULTI•PRESS® is a system of multi-crimping profile press fittings available in a complete range of figures for multilayer pipes from 16x2 to 63x4.5 mm diameter. The MULTI•PRESS® range of multi-crimping profile press fittings offers versatility and flexibility during installation. The fittings are designed, tested and guaranteed for use with seven crimping profiles: BE, B, TH, R, H, F and U. They can be used with multilayer pipes in climate control and sanitary DHW/DCW systems.

FITTING SPECIFICATIONS

- Tested and guaranteed for use with seven crimping profiles: BE, B, TH, R, H, F, U;
- Control of correct pipe positioning via the inspection holes in the bushing flange (orange plastic up to 32 mm diameter; white plastic from 40 to 63 mm diameter)
- Two o-rings for a more secure seal
- Wide range of diameters from 16 mm to 63 mm
- Maximum continuous operating temperature 120 °C (check the pipe specifications for the effective limit of the system)
- Maximum operating pressure 10 (bar check the pipe specifications for the effective limit of the system)
- High pull-out resistance thanks to the sawtooth insert profile
- Optimised bush/fitting coupling system to prevent detachment of the steel bush.

COMPATIBILITY

Diameter (mm)	16	18	20	25	26	32	40	50	63
BE	✓		✓		✓	✓			
B	✓	✓	✓		✓	✓			
F	✓	✓	✓		✓	✓	✓	✓	✓
R	✓	✓	✓	✓	✓	✓			
H	✓	✓	✓	✓	✓	✓	✓		
TH	✓	✓	✓	✓	✓	✓	✓	✓	✓
U	✓	✓	✓		✓	✓	✓	✓	✓

■ MATERIALS AND COMPONENTS

The materials used in the fittings are:

- Body: brass, CW617N or Cuphin® CW724R (Pb ≤ 0.1%)
- Bushes: AISI 304 solution heat treated stainless steel
- Bush holders: nylon
- O-ring: peroxide-cured EPDM, certified safe for food contact and use in potable water systems

Body

The MULTI·PRESS range is available in two versions, with fitting body in CW617N brass or Cuphin® CW724R (alloy with ≤ 0.1% lead content).

Both brass alloys are contained in the 4MS "Positive List" and can therefore be used in domestic potable water distribution networks.

The sawtooth profile of the fitting terminals helps grip the pipe inside the fitting itself, increasing the pull-out resistance in the event that the pipe-fitting system is subjected to tensile stress.

Bush

The bushes used in MULTI·PRESS fittings are made of AISI 304 solution heat treated stainless steel. This material, in addition to guaranteeing long-term performance, also offers increased ductility, which facilitates the crimping operation and ensures greater longevity of the crimping tools. The bush always carries the name of the manufacturer, the diameter and thickness of the multilayer pipe with which the fitting can be used, as well as the traceability symbol which identifies the month and year of production of the fitting.

Bush holder

Made of plastic, this prevents direct contact between the brass body of the fitting and the aluminium layer of the pipe, thus acting as a dielectric coupling; this prevents any damage due to electrolytic corrosion due to contact between dissimilar metals. The bush holder also features inspection holes which allow the installer to check correct positioning of the pipe once inserted.

O-ring

Each fitting has two peroxide-cured EPDM o-rings on each connection which, after crimping, ensure a perfect seal between the pipe and fitting. The o-rings meet all applicable European standards, allowing Multi·Press to be used in sanitary DHW/DCW systems.

RANGE

MULTI·PRESS press fittings are available in a broad range of configurations and sizes from 16x2 to 63x4.5. All figures with corresponding dimensional tables are provided in the appendix.

	**MP 5700 R** Straight reduced fitting		**MP 5717** Elbow fitting with flat-seal lock nut
	**MP 5700** Straight fitting		**MP 5760** Wall fitting
	**MP 5704** 45° fitting		**MP 5761** Wall fittings (kit with AS 1929)
	**MP 5710** Elbow fitting		**MP 5762** Wall fittings (kit with AS 1927)
	**MP 5720** Tee fitting		**MP 5780** Double wall fitting
	**MP 5720 RLL** Tee fitting with reduced side connections		**MP 5765** Double wall fittings (kit with AS 1929)
	**MP 5720 RCL** Tee fitting with reduced central and side branches		**MP 5766** Double wall fittings (kit with AS 1927)
	**MP 5720 RC** Tee fitting with reduced central connection		**MP 5781** Double 90° wall fitting
	**MP 5720 RL** Tee fitting with reduced side connection		**MP 5769** Double 90° wall fittings (kit with AS 1929)
	**MP 5720 RR** Tee fitting with double reduced connections		**MP 5723** Wall fitting for horizontal chases

	**MP 5608** Male straight fitting		**MP 5724** RH wall terminal for horizontal chases
	**MP 5711** Male elbow fitting		**MP 5725** LH wall terminal for horizontal chases
	**MP 5721** Male tee fitting		**MP 5764** Wall terminals for horizontal chases (kit with AS 1928)
	**MP 5609** Soft-seal male straight fitting		**MP 5701** Plug
	**MP 5607** Straight fitting with FASTEC fitting		**MP 5702** Straight fitting with chrome-plated copper pipe
	**MP 5613** Female straight fitting		**MP 5715** Elbow fitting with chrome-plated copper pipe
	**MP 5712** Female elbow fitting		**MP 5716** Tee fitting with chrome-plated copper pipe
	**MP 5712 L** Long female elbow fitting		**MP 5729** Built-in valve with DN 15 press-fit fitting, knob and rose
	**MP 5722** Female tee fitting		**MP 5730** Built-in valve with DN 15 press-fit fitting, cap and rose
	**MP 5703** Straight fitting with flat-seal lock nut		**MP 5610 B** Under-floor distribution box with 90° press fitting
	**MP 5705** Straight fitting with lock nut		**MP 5610 R** Under-floor distribution box with 90° press fitting

SPECIAL FIGURES

U-Fittings

As well as properly distributing water to all connected components, any sanitary DHW/DCW plumbing system must guarantee the best hygienic conditions possible by preserving the quality of the mains water supply.

A sanitary DHW/DCW distribution system is composed of different sections of piping:

- Main distribution ring
- Ascending or descending risers
- Horizontal distribution sections to the floors
- Connections to the terminal units (i.e. basins, baths, showers etc.)

There are several possible options for these. The two best known are shown in the following images, with branch connection (left) or via manifold (right), which are not ideal from a sanitary perspective.

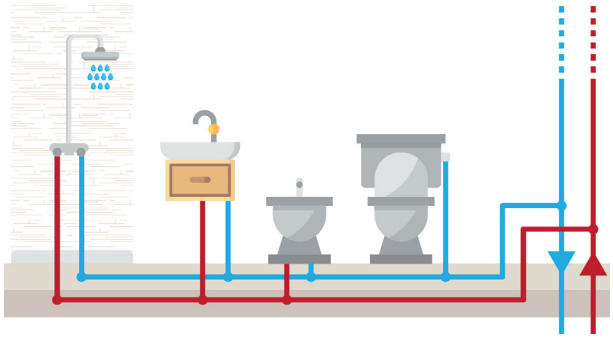

Figure 2 *Branch system.*

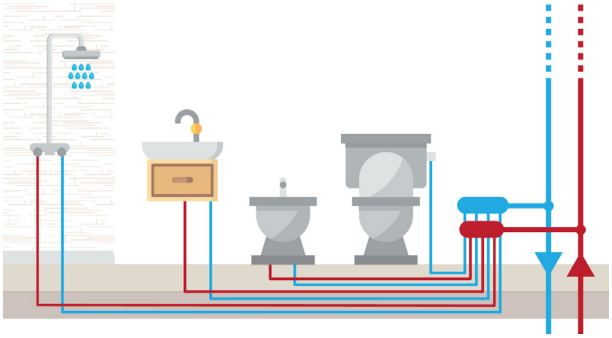

Figure 3 *Manifold system.*

Indeed, those pipe segments serving rarely used components suffer from a lack of water circulation, meaning the water in these becomes stagnant. The same water sitting inside pipes over a long period of time encourages the proliferation of bacteria (including legionella), and should therefore be avoided as much as possible.

IVAR's MP range of fittings includes the **5780 series**, which is essential for installations such as those shown in the following figures and which implement a series- (left) and a ring- (right) type distribution system.

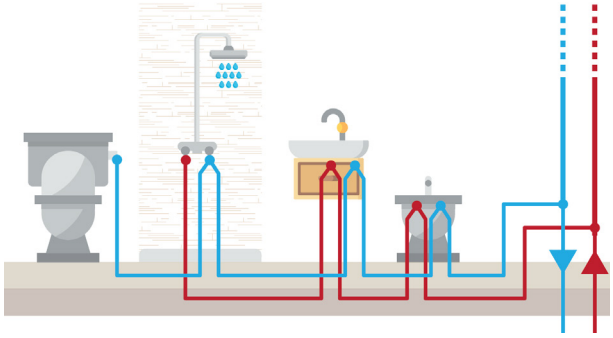

Figure 4 *Series distribution system.*

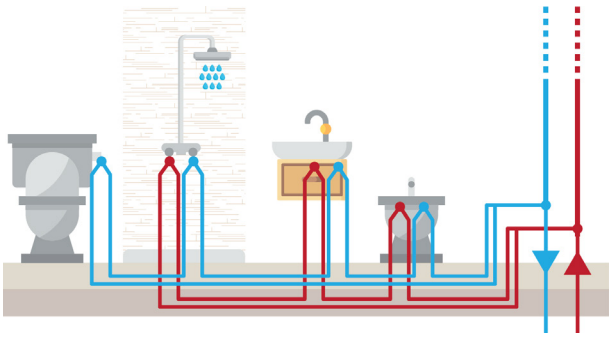

Figure 5 *Ring distribution system.*

In both cases, the goal of these configurations is to facilitate water circulation in the pipes, thus avoiding stagnation and reducing health risks. In the case of series distribution (left), the component used most frequently should be in the furthest position from the column so that every time this is used, the water is replaced completely through circulation in all the branches. In the case of ring distribution (right), the use of any plumbing fixture achieves the same result, making this distribution system the most effective for reducing hygienic risk. Depending on given regulations, there may be a requirement to build facilities for hospitals and community structures using a ring distribution system, including an automatic withdrawal point activated by timer. This ensures periodic water circulation in the system up to the terminal units during the thermal disinfection cycles.

Under-floor distribution box fitting

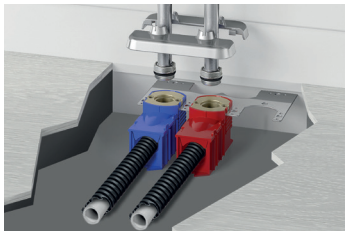

Figure 6 *Hidden distribution.*

Multilayer pipes are installed in corrugated conduit in some systems, for example, when additional protection is required or in countries where installation regulations require the pipes to be removable. For connection to the terminal units in these cases, the MP 5610 series under-floor distribution box fittings are required. Made with a 1/2" F connection, these accommodate the corrugated protective conduit inside, keeping the pipe insulated up to the point of exit from the masonry wall. The CW617N brass fitting is fixed to the plastic box by a pair of screws, so that it can be easily disassembled for crimping and then reinserted in the box.

■ ASSEMBLY AND INSTALLATION ACCESSORIES

	**AR 01** Calibration device for multilayer pipes		**AR 02** Calibration set for multilayer pipes including carry case
	**AR 09** Grip for multilayer pipe calibration device		**AR 04** Calibration devices for multilayer pipes
	**AR 37** Battery crimping machine with carry case, battery and charger		**AR 10 R** Jaws for press fittings
	**AR 37 B** Battery		**AR 37 C** Battery charger
	**AR 110** Pressing collars		**AR 120** Intermediate jaw for pressing collars

■ INSTALLATION INSTRUCTIONS

Cutting the Pipe

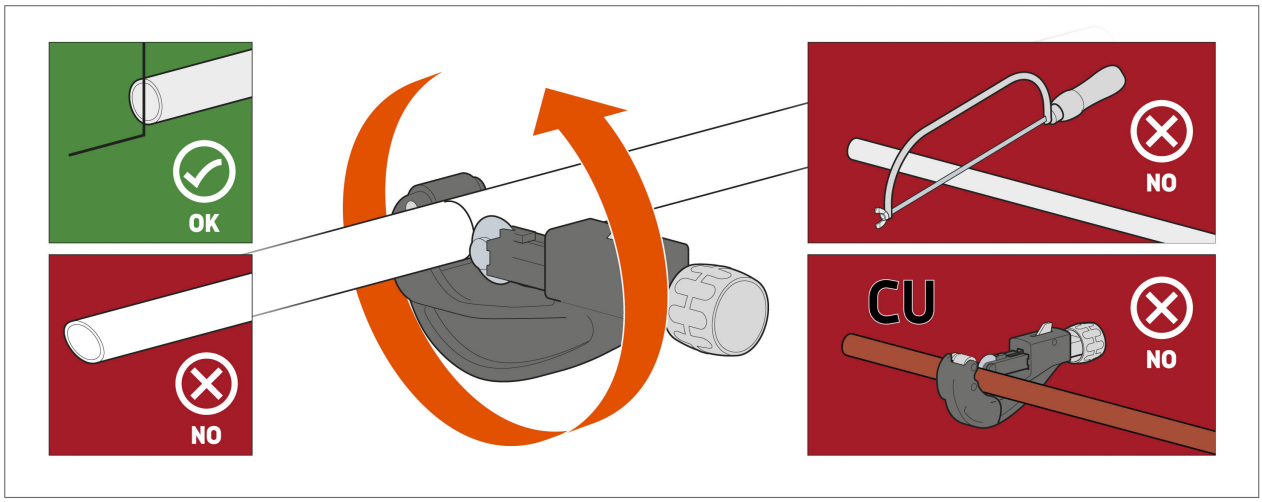

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Figure 7 *Pipe Cutting Procedure.*

Cuts in multilayer pipe must be performed to specifications using suitable pipe shears which prevent ovalisation of the pipe, ensuring that the cut is perpendicular to the pipe profile.

Calibration

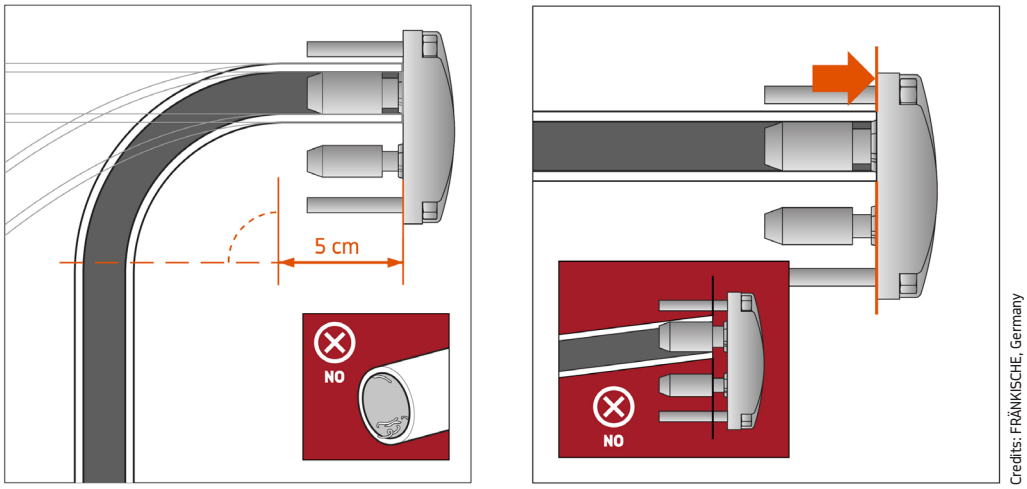


Figure 8 *Calibration Procedure.*

The calibration operation determines the correct internal diameter of the pipe while the chamfering operation bevels the end of the pipe so as to avoid the displacement of the o-rings from their seat during insertion. Correct calibration and chamfering requires use of the AR 01 tool.

- For 16x2, 18x2, 20x2, 26x3 and 32x3 pipes, use code 500406
- For 40x3.5 pipes, use code 500407
- For 50x4 pipes, use code 500408
- For 63x4.5 pipes, use code 500409.

Alternatively, it is possible to use the complete set of calibration tools item no. AR 02 (code 501797).

Chamfering

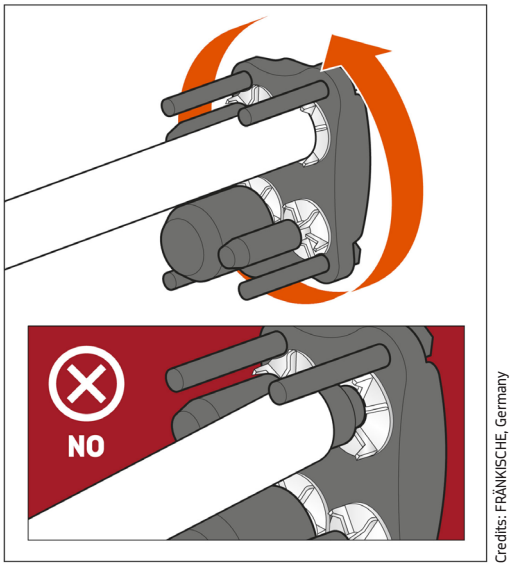


Figure 9 *Chamfering Procedure.*

1. Insert the tool inside the pipe, making sure it enters the cutting blades.
2. Rotate the tool to create a bevel inside the pipe.
3. Lubricate the o-rings on the fittings with water and insert the pipe onto the fitting.

WARNING! Use only water to lubricate the fittings. Use of mineral-based oil or grease is prohibited. It is also prohibited to change the original o-rings.

Inserting the pipe onto the press fitting

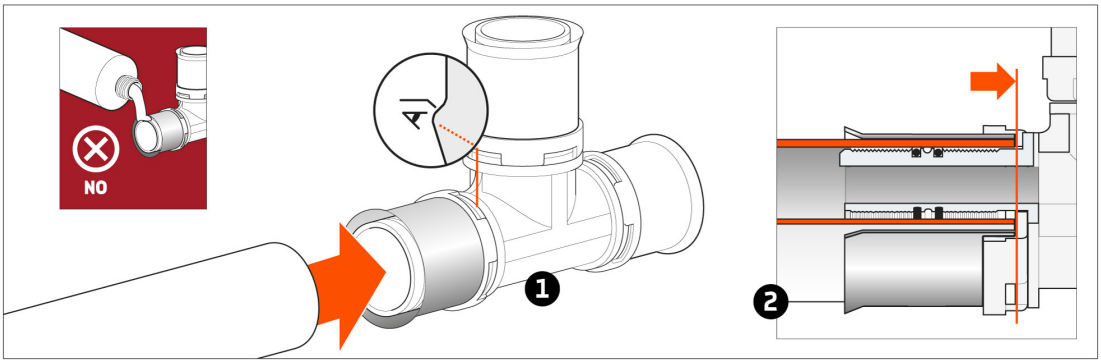


Figure 10 *Inserting the Pipe.*

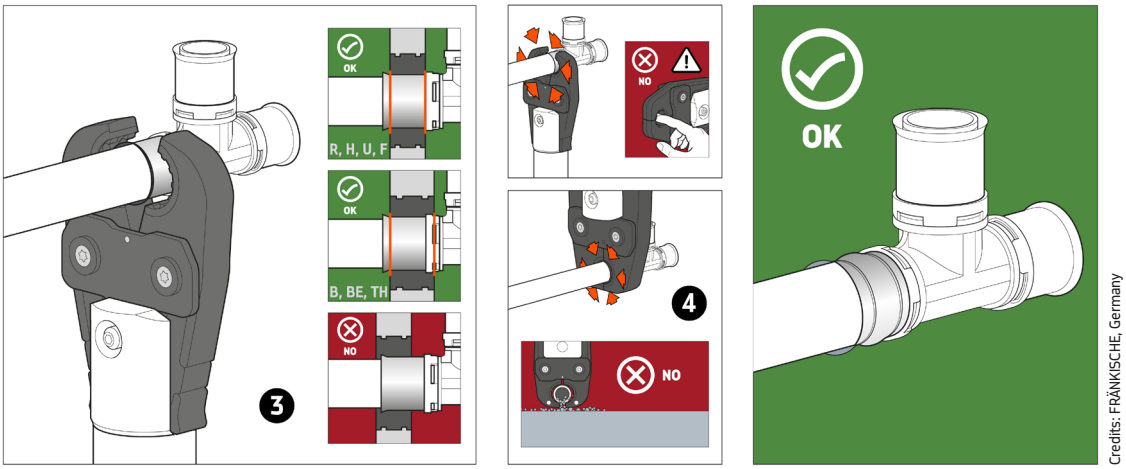


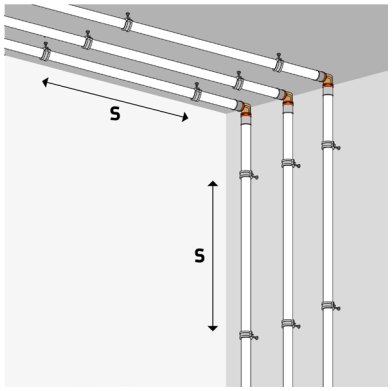
Figure 11 *Crimping Procedure.*

1. Insert the fitting up to the stop.
2. Ensure that you have reached the correct installation depth thanks to the opening on the plastic ring. If excessive resistance is encountered during insertion of the fitting, repeat the calibration/chamfering operations and lubricate the o-rings again with water.
3. Open the jaws of the crimp tool and insert the fitting to be crimped, ensuring that the plastic ring is inserted in the reference groove (with B and TH profile jaws), or that the jaws are in contact with the plastic ring (with F, H and U profile jaws).
4. Operate the crimping tool following the instructions given in the user manual.

Crimping is performed with the AR 37 electric crimping tool. Consult the manufacturer's instructions to ensure correct use of these tools.

■ PIPE BRACKET

Fixing points and surface mounting



For surface mount installations, it is recommended that straight lengths of pipe be used for convenience (ALPEX-DUO and IVAR-APEX B).

The maximum unsupported distance "S", for surface-mount pipework in walls or ceilings installation, is given in the following table.

Figure 12 *Surface-mount installation on walls.*

Pipe size (mm)	Weight of pipe with water (kg/m)	S (cm)	
		Horizontal	Vertical
16x2	0.225	120	150
18x2	0.267	130	150
20x2	0.355	135	150
25x2.5	0.608	150	175
26x3	0.608	150	175
32x3	0.935	165	200
40x3.5	1.438	200	200
50x4	2.264	250	250
63x4.5	3.611	250	250

For ALPEX-DUO and IVAR-APEX B installed in the floor, the fastening points must be at minimum intervals of one metre. Appropriate fastening collars must also be used immediately before and after all elbows.

Use of expansion legs in risers

It is essential to use expansion legs (indicated in the following figures with "*a*") also for pipes passing through a hole which connect to risers between floors. The expansion leg will be able to absorb movements due to changes in length. It is essential to make use of a section of corrugated conduit or insulation to protect the pipe in the area where it passes through the hole. Do not place pipe bends near sharp edges, as there is a risk of damage in this case.

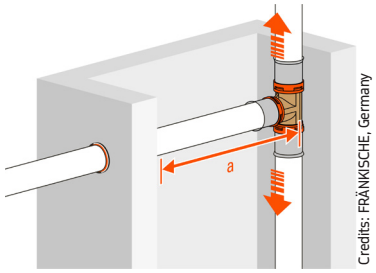


Figure 13 *Example of expansion leg.*

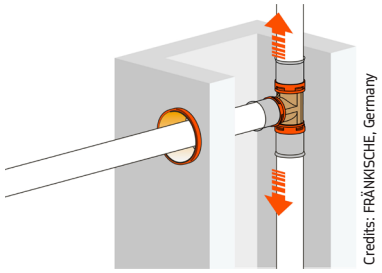


Figure 14 *Example of expansion leg.*

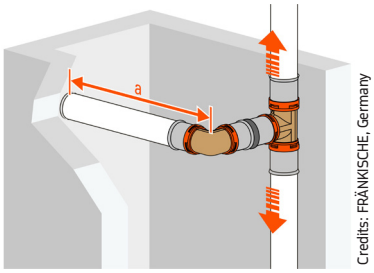


Figure 15 *Example of expansion leg.*

Linear expansion in pipes

The pipe brackets have a dual purpose, both to support the pipework and to handle changes in length caused by temperature variations occurring during operation. The brackets can be rigid or of sliding type, that is able to allow axial movement of the pipe. The pipework must always be laid out so that changes in length are not restricted. In general, fixed brackets can be installed at the centre of long lengths of pipe, in order to allow any change in length to occur in two directions.

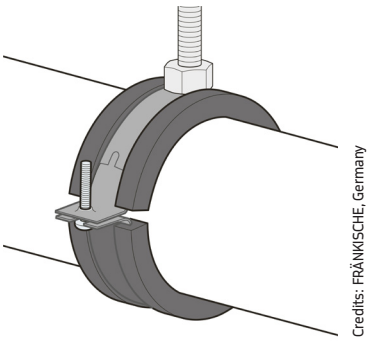


Figure 16 *Fixed pipe bracket.*

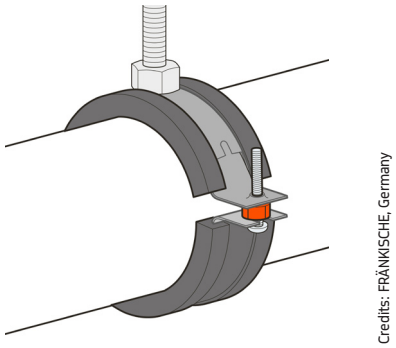


Figure 17 *Sliding pipe bracket.*

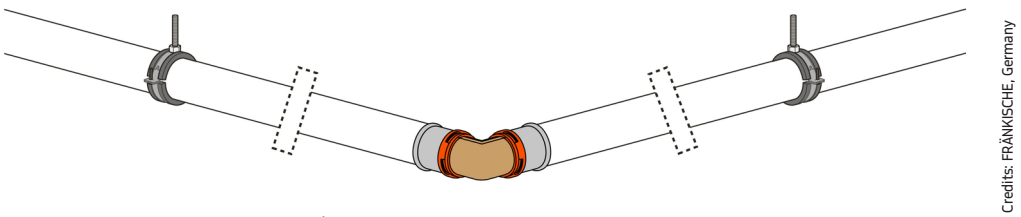


Figure 18 *Use of pipe brackets.*

Example

Assuming a temperature variation of 50° C and a pipe length of 5 metres (with IVAR ALPEX DUO pipe), the following increase in length will occur:

$$\Delta L = 0.026 \text{ mm/m°C} \cdot 50 \text{ °C} \cdot 5\text{m} = 6.5 \text{ mm}$$

The linear expansion values for pipe are given below in millimetres, depending on ΔT and pipe length.

Pipe length	Temperature differential ΔT (°C)						
m	10	20	30	40	**50**	60	70
1.0	0.3	0.5	0.8	1.0	**1.3**	1.6	1.8
2.0	0.5	1.0	1.6	2.1	**2.6**	3.1	3.6
3.0	0.8	1.6	2.3	3.1	**3.9**	4.7	5.5
4.0	1.0	2.1	3.1	4.1	**5.2**	6.2	7.3
5.0	**1.3**	**2.6**	**3.9**	**5.2**	**6.5**	7.8	9.1
6.0	1.6	3.1	4.7	6.2	7.8	9.4	10.9
7.0	1.8	3.6	5.5	7.2	9.1	10.9	12.7
8.0	2.1	4.2	6.2	8.8	10.4	12.5	14.6
9.0	2.3	4.7	7.0	9.4	11.7	14.0	16.4
10.0	2.6	5.2	7.8	10.4	13.0	15.6	18.2

Positioning

The positioning of expansion legs is essential in the case of changes in length or direction. The example on the left is a situation where it is essential to use an expansion leg on a change of direction.

The example on the right shows a situation where it is useful to apply a U-shaped bend: on very long pipes without changes in direction, it is recommended to use a U-shaped bend with two expansion legs installed vertically to absorb the linear expansion, and a fixed collar on the horizontal section.

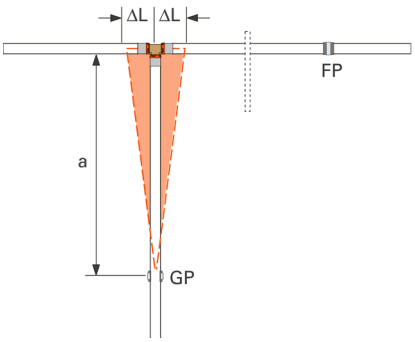


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Figure 19 *Fixed pipe bracket.*

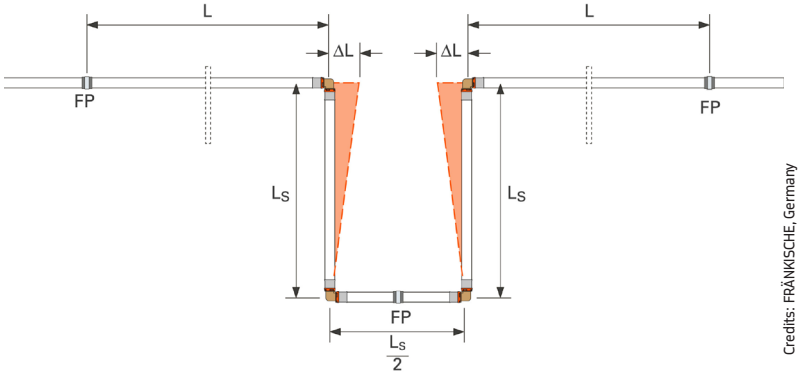

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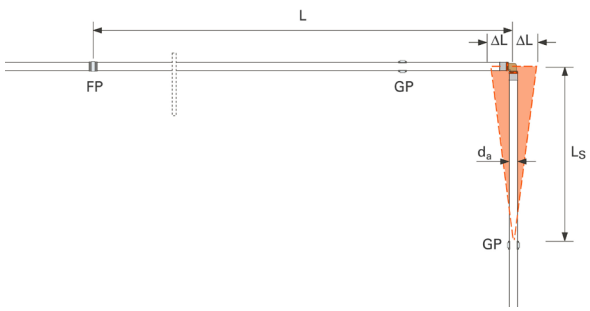
Figure 20 *Change of direction.*

Another example where an expansion leg is required on the change of direction is shown below.



Credits: FRÄNKISCHE, Germany

Figure 21 *Change of direction.*

a: expansion leg
d_a: pipe outer diameter

FP: fixed pipe bracket

GP: sliding pipe bracket

L: pipe length

ΔL: linear expansion
L_s: expansion leg length

Formulas for calculating the length of an expansion leg and graphs allowing for immediate sizing are given below.

$\Delta L\ (m) = \alpha \cdot L \cdot \Delta T$

$L_s = C \cdot \sqrt{(d_a \cdot \Delta L)}$

where:

α: coefficient of expansion (1/°C)

C: constant depending on the type of material (33 for ALPEX DUO and IVAR-APEX B pipe)

d_a: pipe outer diameter (mm)

L: pipe length (m)
ΔL: linear expansion (mm)

L_s: expansion leg length (mm)

ΔT: temperature differential (°C)

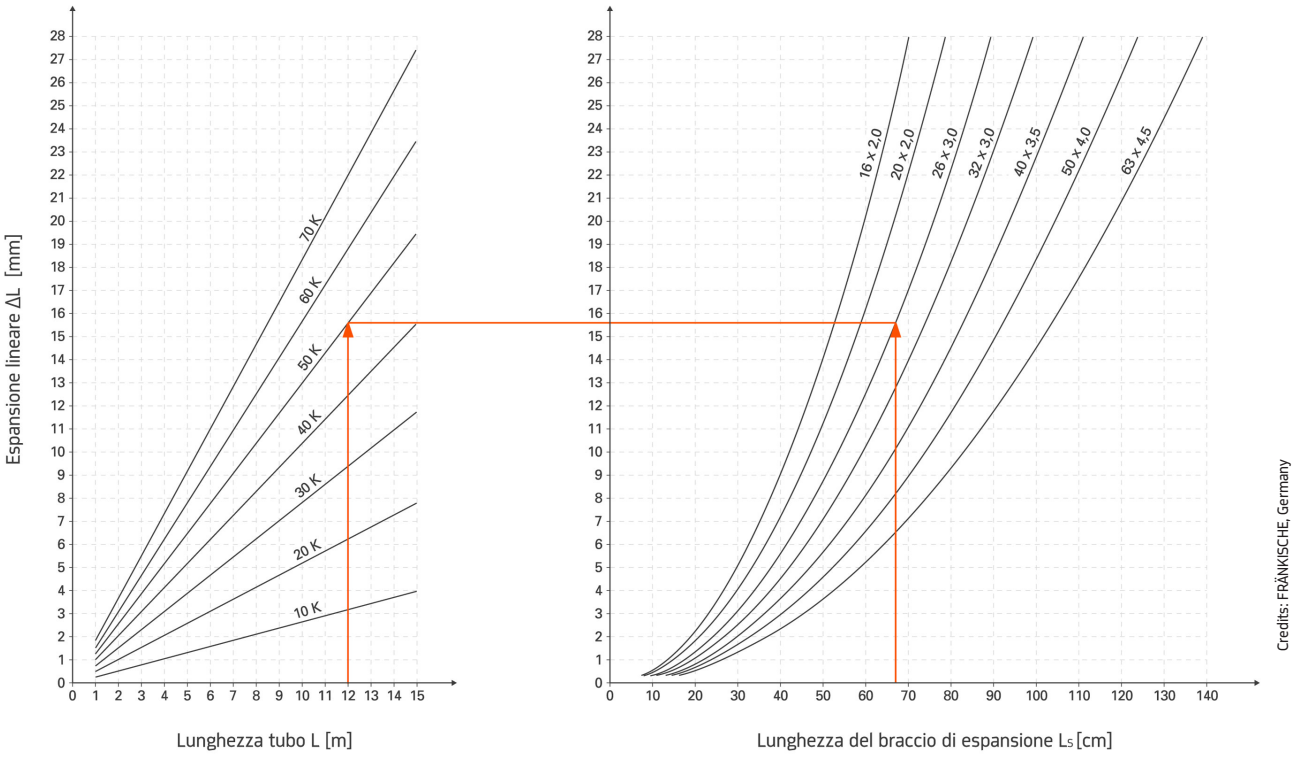


Figure 22 *Sizing graph examples.*

QUALITY CONTROL AND PRODUCTION PROCESS

The production process for IVAR press fittings is monitored throughout. The characteristics of the end product depend on the care taken in its production. Some of the most important aspects of this are described below.

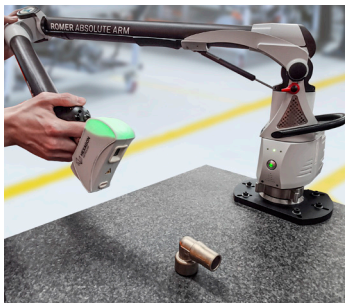


Figure 23 *Three-dimensional scanning.*

Receipt of materials

The **body of the fitting** blank comes from **VALMON STAMPATI s.p.a.**, a Brescia-based industrial company part of the I.V.A.R. group, which deals with the printing of semi-finished products starting from brass bars, obtaining the shape of the final piece, which will then be deburred and sandblasted.

IVAR's Quality Control department receives the samples of the **raw** brass components forming the body of the MULTI•PRESS® fittings and checks their dimensions using a 3D scanning process. An operative uses a mobile scanner to do this.

The physical component is compared with the technical drawing, and if it falls within the tolerances, the lot is accepted for processing. Otherwise, the nonconformity is reported to the stamping company.

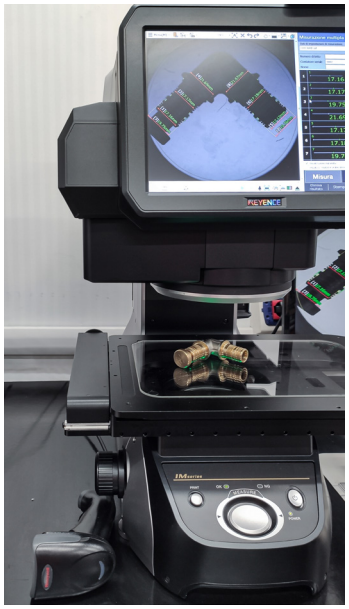


Figure 24 *Comparison with technical drawing.*

Analysis during machining

The **machining process** for entire production batches is begun only after analysis of the initial samples of the machining itself. If they conform with the technical department's drawings, production of the batch begins.

Throughout the entire machining process, the QC operatives take samples of the com-ponents from the machines. Samples are checked with an optical dimensional verification tool through a comparison with the mathematical 3D reference model. For press fittings, for example, the critical dimensions are the threads, the bases where the bush holders will rest, and the seats for the seal-ing o-rings. In the event of non-conformities, batch production is halted and all items produced up to that point are checked again with the optical scanner.

The bodies of the MULTI•PRESS® press fittings are now ready to move on to the as-sem-bly phase with the other components.

ASSEMBLY

IVAR has dedicated machinery for preparing just the bush including the polymer bush holder. During this process, the bush is also laser engraved with information on the size of the fitting, the certifications and the crimping profiles which can be used. The purpose of this preliminary process is to **speed up the supply of** components to the machines which handle assembly of the press fitting.

MULTI•PRESS® fitting assembly

The assembly station for the fittings is supplied with the necessary components via automated systems. The fitting bodies enter the machine via a loading choke system which ensures constant supply of one piece a time. Each piece is analysed by a vision system with video camera which recognises the profile and associates it with the correct assembly program, defining its pick-up co-ordinates for the robotic arm.

On board the machine, the fitting body is placed on the rotating table and reaches in turn the workstations required to obtain the end result.

For example, in order to make up a **single-bush fitting** with a single outlet for multilayer pipe, the fitting passes through two stations.

The **first** is responsible for inserting the two peroxide-cured EPDM sealing o-rings on the connection. Correct insertion of the o-rings is monitored by a dedicated video camera which films and analyses all the MULTI•PRESS® fittings manufactured by IVAR.

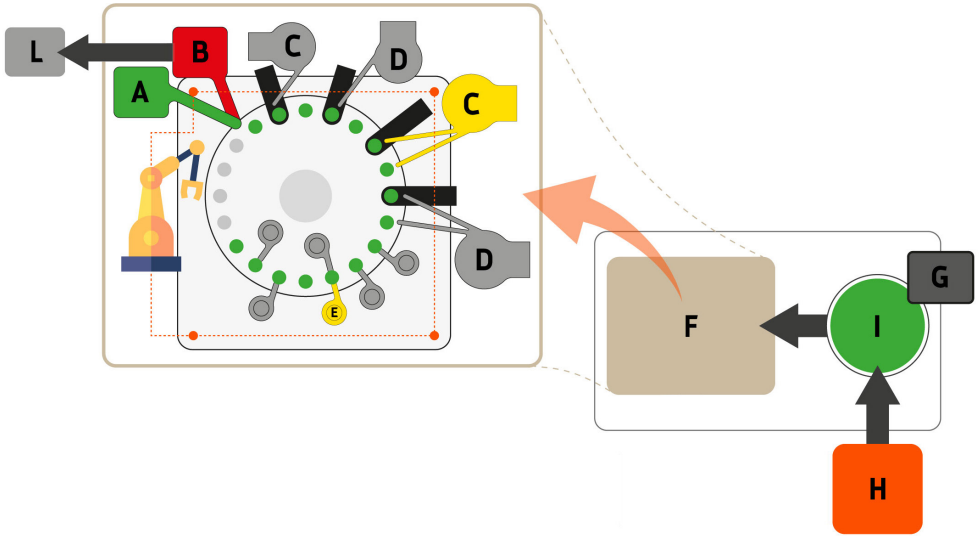


Figure 25 *Assembly station schematic diagram.*

A. Rejected components
B. 20 mm bushes
C. 16 mm bushes
D. 20 mm O-rings
E. Assembly machine
F. Division system and robot
G. Machine onboard PC
H. Case tipper
I. Body parts feeding
L. Packaging machine

The second station fits the bush including bush holder on the fitting body. From here, the fitting reaches the end of the rotating table and is placed inside the package, which contains the correct quantity of fittings destined for sale.

A scale checks the weight of the bagged fittings to ensure that there have not been any errors during the process, and the bag is placed inside the recycled cardboard box.

Throughout the assembly process, the QC operatives monitor the components by picking samples. Moreover, each machine is network-connected and monitored remotely. It is possible to monitor the cycle times and performance over time, as well as any anomalies.

Figure 26 *Process control.*

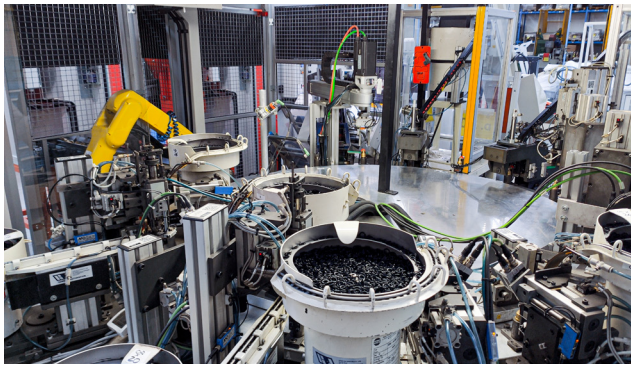


Figure 27 *Assembly station rotating table.*

LABORATORY TESTS

Reference standards

IVAR bases most of its laboratory tests on the **DVGW W-534** worksheet, a unambiguous basis for the assessment of fittings, joints and pipes for use in contact with potable water.

Traction

Figure 28 *Schematic diagram of the test*

The purpose of this test is to define the mechanical characteristics of the pipe-fitting system. During the test, it must not be possible to pull the pipe out of the fitting, the pipe must not crack, kink or bend, while the fittings must not sustain damage which could affect their operation.

The pipes are clamped in a device for stress testing, which allows the maximum axial traction force to be reached without bending and/or kinking. The maximum traction force is reached in 10-15 seconds and held for more than an hour, with deviations of 2.5% permitted. The test is carried out at 20 ± 5 °C and 93 ± 2 °C; different test pieces are used for the two different temperatures.

Thermal cycles

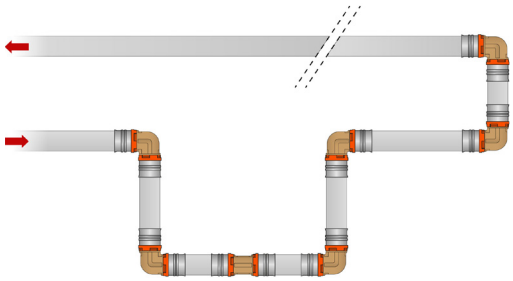


Figure 29 *Schematic diagram of the test*

The thermal cycles test is a fatigue test which guarantees the reliability of the IVAR pipe-fitting system over time. In the first part of the test, a circuit is assembled composed of pipes and fittings in accordance with schemes set out by the reference standard. Once ready, the circuit undergoes 5,000 thermal cycles of alternating hot and cold water. The duration and temperature of the individual cycles depend on the specific case. Generally, IVAR bases its tests on the specifications provided by the DWGV W-534 worksheet. For an even more complete assessment of the pipe-fitting system, IVAR may adopt further tests in addition to those mentioned.

All components of the circuit must hold their seal throughout and at the end of the test. This also applies for threaded fittings of the fittings being examined, where applicable.

Vibration

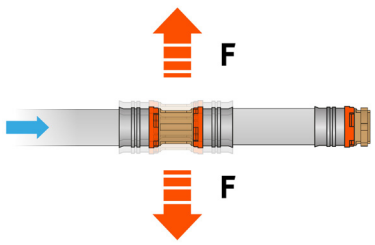


Figure 30 *Schematic diagram of the test*

This test is designed to check the compatibility of the pipe-fitting system and ensure the pipe does not detach from the fitting. Two sections of pipe connected by a fitting undergo the combined action of two factors:

- Internal water pressure greater than 15 bar
- Mechanical misalignment stress of ±10 mm at a frequency of 20 Hz.

The test is passed if no breakages or leaks occur after the number of vibration cycles provided for by the reference standard.

Water hammer

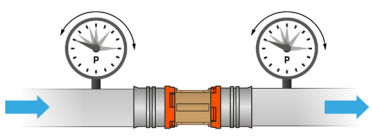


Figure 31 *Schematic diagram of the test*

This test is designed to check the mechanical robustness of the fitting and the absence of leaks. The test is performed with pipes and with at least three fittings for each of the dimensions under examination.

The test is performed at an ambient temperature of 20 ±5 °C with water as the pressure transmission fluid. Within the test circuit, the pressure is quickly and repeatedly varied from the minimum value (0.5 bar) to the maximum value (25 bar) at which it is to be tested.

CALCULATION OF PRESSURE DROPS

As it passes through the pipework and the terminal devices making up the system, the fluid is subject to a reduction in pressure known as **pressure drops**.

Distributed pressure drops

For every metre of pipework which the fluid flows through, a **distributed** pressure drop (or head loss) is assigned. The following equation can be used to calculate this:

$$\triangle P = \frac{8w\mu}{R^2}L$$

Where:

- *w*: velocity of the fluid [m/s]
- μ: kinematic viscosity of the fluid [Pa s]
- *R*: radius of the pipe in question [m]
- *L*: length of the pipe in question [m]

The pressure drop is therefore directly proportional to the viscosity and the velocity of the fluid, and the length of the pipe; it is inversely proportional to the square of the radius of the pipe.

Concentrated pressure drops

There are losses due to obstacles such as bends, elbows, valves and fittings that the fluid may meet as it flows through the pipes. These factors are defined as **concentrated** pressure drops and do not depend on the length of the pipework. They can be expressed using the following formula:

$$\triangle P = \frac{\rho w^2 \beta}{2}$$

Where:

- ρ: density of the fluid [kg/m3]
- w: velocity of the fluid [m/s]
- β: coefficient of friction This is a dimensionless quantity whose value, generated experimentally, depends in turn on the Reynolds number, the internal roughness of the piping and the distance covered by the fluid from the pipe inlet.

Equivalent length

In order to size the circulation pump for the climate control system (or to check compatibility with the available pressure in the sanitary DHW/DCW system), it is necessary to find the sum of pressure losses along the entire plumbing circuit. This can be done in two ways: analytically, by adding together the distributed and concentrated losses of each component, or else by using a **simplified method.**

This consists of calculating the pressure drops of the components of the system as if they were generated by a linear section of pipe $\mathbf{L_{EQ}}$ of a certain length.

The total pressure drops of the system are calculated with the following formula:

$$\triangle P = \frac{\rho w^2 \beta}{2D}(L + L_{EQ})$$

Where:

- ρ: density of the fluid [kg/m3]
- *w*: velocity of the fluid [m/s]
- *D* Diameter of the pipe in question [m]
- β coefficient of friction

Finally, L_{EQ} is the sum of the equivalent lengths for all roughness encountered by the fluid in its passage through the system. In order to convert the concentrated pressure drops into equivalent lengths of pipe, it is advisable to use conversion tables supplied by the manufacturers of the components in question.

PRESSURE TESTING TO EN 806 PART 4

Testing can be carried out either using water or, where permitted by national regulations, using low-pressure air (clean and unlubricated) or inert gases.

The DHW or DCW system must be filled only with potable water free of particles ≥ 150 µm (for example using mechanical filters to EN 13443-1).

For the hydraulic testing, the pressure gauges and the recording device must be accurate to 0.02 MPa (0.2 bar), and must be installed at the lowest point of the system. The pressure gauge should have a range from 0 MPa to 1.6 MPa (0 bar - 16 bar). When required, the system test pressure can also be increased in accordance with national standards.

All details of the test (complete test procedure diagram) must be recorded and retained.

The maximum permissible speed of pressure increase when pressurising the system is calculated using the following formula:

$$v = (4 \cdot PN) / 60 \text{ bar} \cdot s\text{-}1 \quad (1)$$

When using plastic or metal-plastic pipework, the properties of these materials mean they may expand for a certain period of time when placed under pressure, and this may affect the results of the test.

For plastic pipework, for example, a change in system temperature may cause a change in pressure.

If the equilibrium temperature of the plastic pipework system exceeds 25 °C, a reduction factor (f_T) must be applied on the basis of the material used. The manufacturer of the system can provide the graphical function correlated with the operating temperature.

The test pressure is then calculated using the following formulas:

$$TP = 1.1 \cdot MDP, \text{ if } T \leq 25 \text{ °C} \quad (2)$$

$$TP = 1.1 \cdot MDP \cdot f_T, \text{ if } > T\ 25\text{°C} \quad (3)$$

where:

- T is the temperature
- TP is the test pressure
- MDP is the maximum design pressure

If the equilibrium temperature of the system is greater than 25 °C, the reduction factor f_T of the material must be taken into consideration.

Test procedure

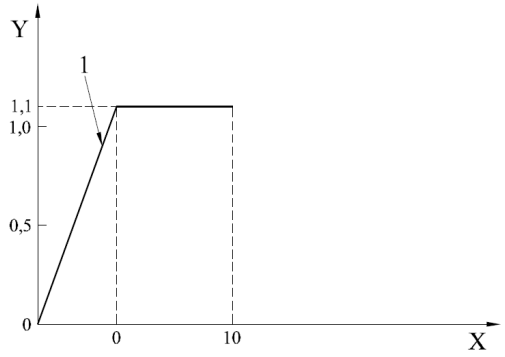
Material type	Hydraulic testing procedure
Linear elastic materials (i.e. metals)	
Elastic materials (PVC-U, PVC-C etc.) and multilayer materials	Test procedure A
Viscoelastic materials (i.e. PP, PE, PEX, PA, PB, etc.) with DN ≤ 63	
Viscoelastic materials with DN > 63 (i.e. PE, PP, PEX, PA, PB etc.)	Test procedure B or C
Combined systems with DN ≤ 63 (metals and plastic)	**Test procedure A**
Combined systems with DN > 63 (metals and plastic)	**Test procedure B or C**

Procedure A

Flush the system.

Fill the system with water and ensure that all air has been bled out; seal the purge and air vent valves.

Apply the selected test pressure TP equal to 1.1 times the maximum design pressure MDP using a pump for a period of ten minutes, in accordance with the following figure.



- 1: Pumping phase
- X: time in minutes
- Y: Test pressure/MDP

Figure 32 *Test profile.*

The test pressure must be kept constant for ten minutes. If a loss of pressure is determined, the system must be kept at the test pressure until any leaks in the system have been identified.

Procedure B

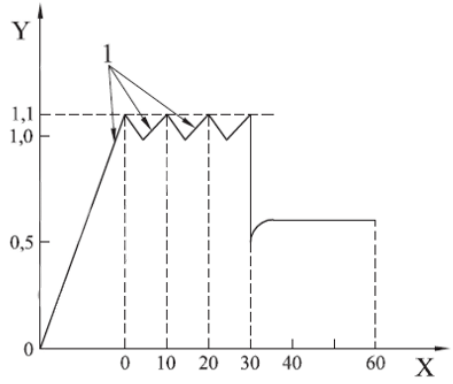
Flush the system.

Fill the system with water and ensure that all air has been bled out; seal the purge and air vent valves.

Apply the selected test pressure TP equal to 1.1 times the maximum design pressure MDP using a pump for a period of thirty minutes, in accordance with the following figure. An inspection must be made to identify any evident leaks in the system being tested.

Reduce the pressure to 0.5 times the test pressure by purging water from the system.

Close the flushing valve. The system is considered to have passed the leak test if the pressure maintains a value of at least 0.5 times the operating pressure for a period of thirty minutes following the reduction in pressure. Carry out a visual check for leaks. If, during this period, a pressure drop is determined, this means that there is a leak in the system. Maintain the pressure and identify the leak.



- 1: Pumping phase
- X: time in minutes
- Y: Test pressure/MDP

Figure 33 *Test profile.*

Procedure C

Flush the system.

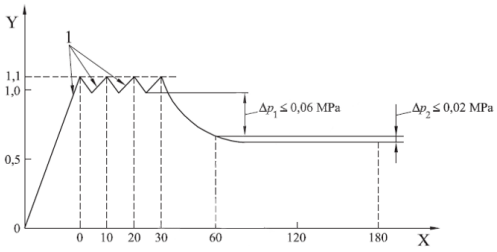
Fill the system with water and ensure that all air has been bled out; seal the purge and air vent valves.

Apply the selected test pressure TP equal to 1.1 times the maximum design pressure MDP using a pump for a period of thirty minutes, in accordance with the following figure.

Record the pressure after thirty minutes have passed. An inspection should be made to identify any evident leaks in the system.

Record the pressure after another thirty minutes have passed. If the pressure drop is less than 0.06 MPa, the system can be considered free of evident leaks. Continue the test without pumping.

Carry out a visual check for leaks over the course of the next two hours. If the pressure falls by more than 0.02 MPa in this time, this means there is a leak in the system. Maintain the pressure and identify the leak.



- 1: Pumping phase
- X: time in minutes
- Y: Test pressure/MDP
- ΔP1: Maximum drop in pressure between thirty and sixty minutes of the test procedure
- ΔP2: Maximum drop in pressure between sixty and one hundred and eighty minutes of the test procedure

Figure 34 *Test profile.*

■ CERTIFICATION

SPECIFICATION ITEMS

	**MP 5700 R** Straight multi-crimp tool press fitting reducer. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5700** Straight multi-crimping profile fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5704** 45° multi-crimp tool press fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5710** Elbow multi-crimp tool press fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5720** Tee multi-crimping profile press fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5720 RLL** Tee multi-crimping profile press fitting with reduced side branches. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bush: AISI 304 solution heat treated stainless steel.
	**MP 5720 RCL** Tee multi-crimp tool press fitting with reduced central and side branches. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5720 RC** Tee multi-crimp tool press fitting with reduced central branch. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5720 RL** Tee multi-crimp tool press fitting with reduced side branch. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5720 RR** Tee multi-crimping profile press fitting with double reduction. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5728** Multi-crimping profile press double crossed T fitting for skirting board systems. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5608** Male straight multi-crimping profile fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.

	**MP 5711** Male elbow multi-crimping profile press fitting. Maximum operating temperature: 120 °C.Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5721** Male tee multi-crimping profile press fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5609** Soft-seal male straight multi-crimping profile fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5607** Straight multi-crimp tool press fitting with FASTEC fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5613** Female straight multi-crimp tool press fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5712** Female elbow multi-crimping profile press fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5712L** Long female elbow multi-crimping profile press fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5722** Female tee multi-crimp tool press fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5703** Straight multi-crimping profile fitting with flat-seal lock nut. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5705** Straight multi-crimping profile fitting with lock nut. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5717** Elbow multi-crimping profile press fitting with flat-seal lock nut. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5760** Multi-crimping profile press fitting wall fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.

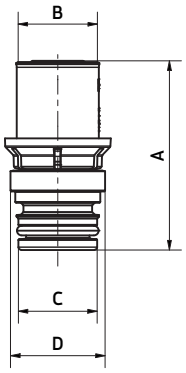
	**MP 5761** Multi-crimping profile press fitting wall fitting on bracket (AS 1929 kit). Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5762** Multi-crimping profile press fitting wall fitting on bracket (AS 1927 kit). Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5780** Multi-crimping profile double wall fitting. Maximum operating temperature:120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bush: AISI 304 solution heat treated stainless steel.
	**MP 5765** Multi-crimping profile press fitting double wall fitting on bracket (kit AS 1929). Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5766** Multi-crimping profile press fitting double wall fitting on bracket (AS 1927 kit). Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5781** Multi-crimping profile press double 90° wall fitting. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5769** Multi-crimping profile press fitting double 90° wall fitting on bracket (AS 1929 kit). Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5723** Multi-crimping profile press wall fitting for horizontal chases. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5763** Multi-crimping profile press fitting wall fitting for horizontal chases on bracket (AS 1928 kit). Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5724** Multi-crimping profile press fitting RH wall terminal for horizontal chases. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5725** Multi-crimping profile press fitting RH wall terminal for horizontal chases. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5764** Multi-crimping profile press fitting wall terminals for horizontal chases on bracket (kit with AS 1928). Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.

	**MP 5701** Multi-crimping profile press fitting with plug. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5702** straight multi-crimping profile fitting with chrome-plated copper pipe. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5715** Stem elbow multi-crimping profile press fitting with chrome-plated copper pipe. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5716** Tee multi-crimp tool press fitting with chrome-plated copper pipe. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5729** Multi-crimping profile press fitting with built-in valve with DN 15 press-fit fitting, knob and rose. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5730** Multi-crimping profile press fitting with built-in valve with DN 15 press-fit fitting, cap and rose. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5610 B** Multi-crimping profile press fitting in blue under-floor distribution box. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.
	**MP 5610 R** Multi-crimping profile press fitting in red under-floor distribution box. Maximum operating temperature: 120 °C. Maximum operating pressure: 10 bar. Body: CW617N brass. O-ring: Peroxide-cured EPDM. Bush holder: Nylon. Bushing: AISI 304 solution heat treated stainless steel.

FITTING DIMENSIONS

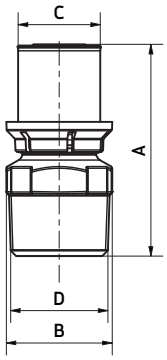
This section lists the main dimensions of all MULTI•PRESS® press fittings contained in the catalogue.

MP 5607



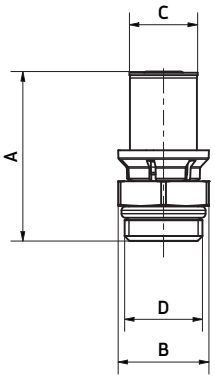
Art.	Cod.	A	B	C	D
MP 5607	511115 MP	50	16/2	FASTEC	24.3
MP 5607	511116 MP	50	16/2.25	FASTEC	24.3
MP 5607	511117 MP	50	18/2	FASTEC	23.4
MP 5607	511118 MP	50	20/2	FASTEC	23.5
MP 5607	511119 MP	50	20/2.25	FASTEC	24.3
MP 5607	511120 MP	50	20/2.5	FASTEC	24.3
MP 5607	511121 MP	53	25/2.5	FASTEC	24.3
MP 5607	511122 MP	53	26/3	FASTEC	24.3

MP 5608



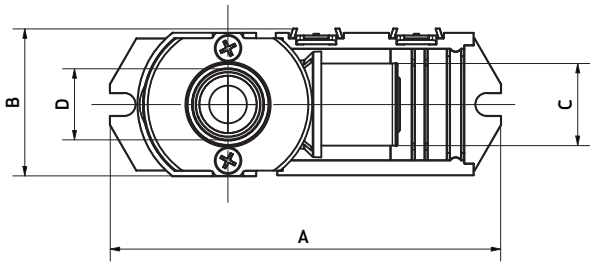
Art.	Codice	A	B	C	D
MP 5608	510084 MP	51.5	SW19	16/2	3/8"
MP 5608	510001 MP	53.5	SW22	16/2	1/2"
MP 5608	511045 MP	53.5	SW22	16/2.25	1/2"
MP 5608	510105 MP	56	SW28	16/2	3/4"
MP 5608	510042 MP	53.5	SW22	18/2	1/2"
MP 5608	510043 MP	56	SW28	18/2	3/4"
MP 5608	510002 MP	53.5	SW22	20/2	1/2"
MP 5608	511046 MP	53.5	SW22	20/2.25	1/2"
MP 5608	511047 MP	53.5	SW22	20/2.5	1/2"
MP 5608	510003 MP	56	SW28	20/2	3/4"

MP 5609



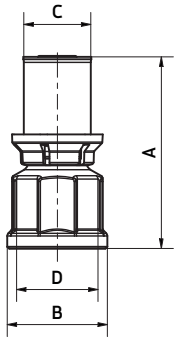
Art.	Cod.	A	B	C	D
MP 5609	510048 MP	44.8	SW 24	16/2	1/2"
MP 5609	511050 MP	44.8	SW 24	16/2.25	1/2"
MP 5609	510050	44.8	SW 24	20/2	1/2"
MP 5609	511051	44.8	SW 24	20/2.25	1/2"

MP 5610



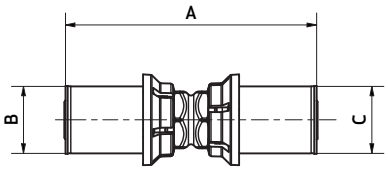
Art.	Cod.	A	B	C	D
MP 5610	500304 MP	104	38	16/2	1/2"
MP 5610	500306 MP	104	38	20/2	1/2"

MP 5613



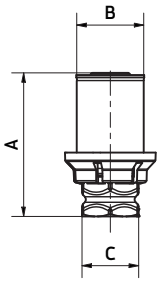
Art.	Cod.	A	B	C	D
MP 5613	510011 MP	51	SW 24	16/2	1/2"
MP 5613	511040 MP	51	SW 24	16/2.25	1/2"
MP 5613	510109 MP	52	SW 30	16/2	3/4"
MP 5613	510045 MP	50.5	SW 24	18/2	1/2"
MP 5613	510046 MP	51	SW 30	18/2	3/4"
MP 5613	510012 MP	50.5	SW 24	20/2	1/2"
MP 5613	511041 MP	50.5	SW 24	20/2.25	1/2"
MP 5613	511042 MP	50.5	SW 24	20/2.5	1/2"
MP 5613	510013 MP	52	SW 30	20/2	3/4"
MP 5613	511044 MP	52	SW 30	20/2.5	3/4"
MP 5613	510132 MP	54	SW 30	25/2.5	3/4"
MP 5613	510133 MP	62	SW 37	25/2.5	1"
MP 5613	510014 MP	54	SW 30	26/3	3/4"
MP 5613	510047 MP	62	SW37	26/3	1"
MP 5613	510022 MP	63.5	SW 37	32/3	1"
MP 5613	510183	58	SW 46	40/3.5	1"1/4
MP 5613	510184	67	SW 52	50/4	1"1/2
MP 5613	510185	74	SW 65	63/4.5	2"

MP 5700



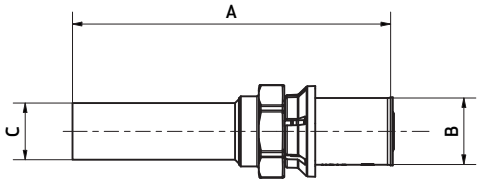
Art.	Cod.	A	B	C
MP 5700	510005 MP	67	16/2	16/2
MP 5700	511030 MP	67	16/2.25	16/2.25
MP 5700	510038 MP	67	18/2	18/2
MP 5700	510006 MP	67	20/2	20/2
MP 5700	511034 MP	67	20/2.25	20/2.25
MP 5700	511037 MP	67	20/2.5	20/2.5
MP 5700	510134 MP	74.5	25/2.5	25/2.5
MP 5700	510007 MP	74.5	26/3	26/3
MP 5700	510020 MP	80	32/3	32/3
MP 5700	510030	98	40/3.5	40/3.5
MP 5700	510028	109	50/4	50/4
MP 5700	510053	122	63/4.5	63/4.5

MP 5701



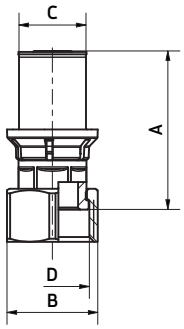
Art.	Cod.	A	B	C
MP 5701	510071 MP	38	SW 15	16/2
MP 5701	510073 MP	35.5	SW 24	20/2
MP 5701	510170 MP	42	SW 28	25/2.5
MP 5701	510074 MP	42	SW 28	26/3
MP 5701	510075 MP	46.3	SW 35	32/3

MP 5702



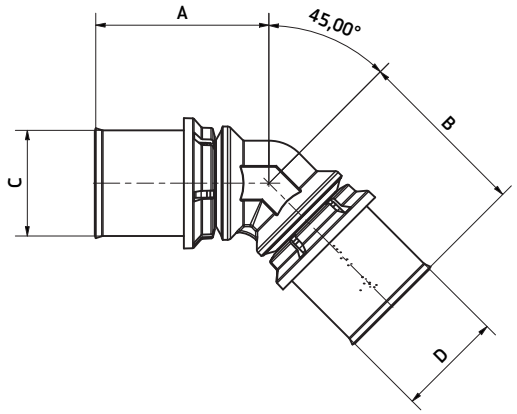
Art.	Cod.	A	B	C
MP 5702	510065 MP	85	16/2	15
MP 5702	510090 MP	85	20/2	15
MP 5702	510066 MP	85	20/2	18
MP 5702	510091 MP	93	20/2	22
MP 5702	510168 MP	91.5	25/2.5	22
MP 5702	510067 MP	91.5	26/3	22
MP 5702	510068 MP	103	32/3	28

MP 5703



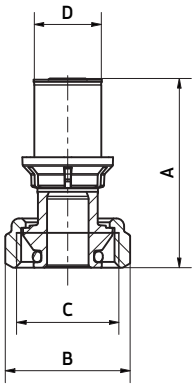
Art.	Cod.	A	B	C	D
MP 5703	510110 MP	42	SW 20	16/2	3/8"
MP 5703	510085 MP	42	SW 24	16/2	1/2"
MP 5703	510087 MP	42.5	SW 24	20/2	1/2"
MP 5703	510076 MP	42	SW 30	16/2	3/4"
MP 5703	510077 MP	42	SW 30	18/2	3/4"
MP 5703	510078 MP	42	SW 30	20/2	3/4"
MP 5703	510195 MP	42	SW 30	20/2.5	3/4"
MP 5703	510171 MP	45	SW 30	25/2.5	3/4"
MP 5703	510088 MP	45	SW 30	26/3	3/4"
MP 5703	510172 MP	47	SW 36	25/2.5	1"
MP 5703	510079 MP	47	SW 36	26/3	1"
MP 5703	510089 MP	50	SW 36	32/3	1"
MP 5703	510080 MP	49.5	SW 46	32/3	1"1/4
MP 5703	510081	66.75	SW 52	40/3.5	1"1/2
MP 5703	510098	89	SW 52	50/4	1"1/2
MP 5703	510082	87	SW 61	50/4	1"3/4
MP 5703	510083	96.5	SW 61	63/4.5	2"

MP 5704



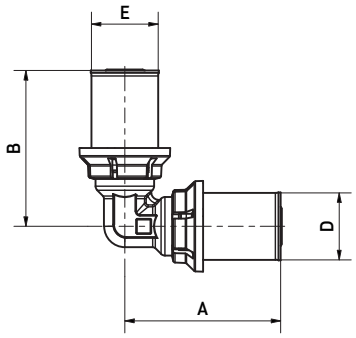
Art.	Cod.	A	B	C	D
MP 5704	510169 MP	46	46	25/2.5	25/5
MP 5704	510099 MP	46	46	26/3	26/3
MP 5704	510100 MP	48	48	32/3	32/3
MP 5704	510101	71	71	40/3.5	40/3.5
MP 5704	510102	76.5	76.5	50/4	50/4
MP 5704	511093	83	83	63/4.5	63/4.5

MP 5705



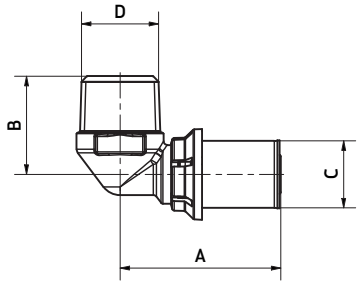
Art.	Cod.	A	B	C	D
MP 5705	510017 MP	50	SW 30	16/2	3/4''
MP 5705	513020 MP	50	SW 30	18/2	3/4''
MP 5705	510018 MP	50	SW 30	20/2	3/4''

MP 5710



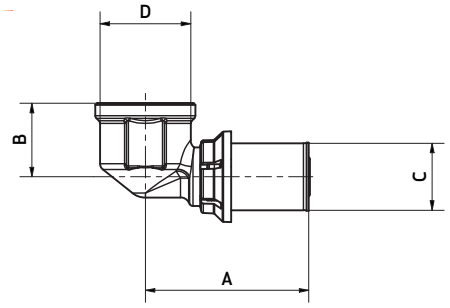
Art.	Cod.	A	B	C	D
MP 5710	511009 MP	41.5	41.5	16/2	16/2
MP 5710	511053 MP	41.5	41.5	16/2.25	16/2.25
MP 5710	511018 MP	43.5	43.5	18/2	18/2
MP 5710	511010 MP	43.5	43.5	20/2	20/2
MP 5710	511054 MP	43.5	43.5	20/2.25	20/2.25
MP 5710	511055 MP	43.5	43.5	20/2.5	20/2.5
MP 5710	510140 MP	51	51	25/2.5	25/2.5
MP 5710	511011 MP	51	51	26/3	26/3
MP 5710	511012 MP	56	56	32/3	32/3
MP 5710	510035	69.5	69.5	40/3.5	40/3.5
MP 5710	510036	81	81	50/4	50/4
MP 5710	510056	94	94	63/4.5	63/4.5

MP 5711



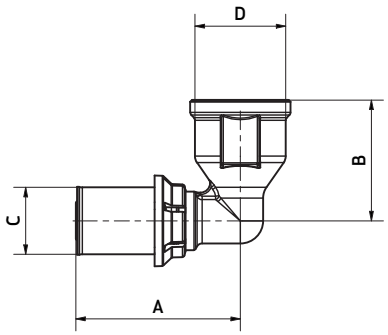
Art.	Cod.	A	B	C	D
MP 5711	511123 MP	46.5	25.5	16/2	3/8"
MP 5711	511001 MP	42.5	26	16/2	1/2"
MP 5711	511062 MP	42.5	26	16/2.25	1/2"
MP 5711	511021 MP	42.5	26	18/2	1/2"
MP 5711	511002 MP	42.5	26	20/2	1/2"
MP 5711	511063 MP	42.5	26	20/2.25	1/2"
MP 5711	511064 MP	42.5	26	20/2.5	1/2"
MP 5711	511003 MP	45	29.5	20/2	3/4"
MP 5711	511065 MP	45	29.5	20/2.25	3/4"
MP 5711	511066 MP	45	29.5	20/2.5	3/4"
MP 5711	510141 MP	48	29.5	25/2.5	3/4"
MP 5711	511004MP	48	29.5	26/3	3/4"
MP 5711	510229 MP	54	36	25/2.5	1"
MP 5711	511113 MP	54	36	26/3	1"
MP 5711	511013 MP	56	36	32/3	1"
MP 5711	510033	69.5	45	40/3.5	1"1/4
MP 5711	510034	81	49.5	50/4	1"1/2
MP 5711	510057	94	59	63/4.5	2"

MP 5712



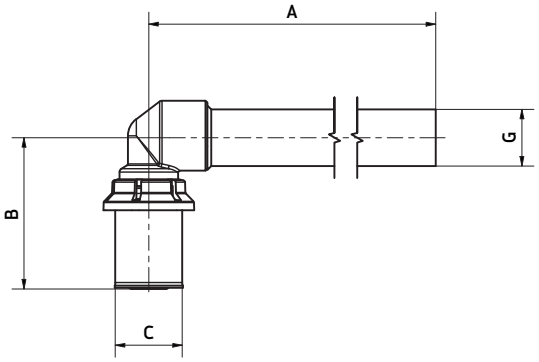
Art.	Cod.	A	B	C	D
MP 5712	511005 MP	43.5	19.5	16/2	1/2"
MP 5712	511056 MP	43.5	19.5	16/2.25	1/2"
MP 5712	511019 MP	44.5	22.5	18/2	1/2"
MP 5712	511006 MP	44.5	22.5	20/2	1/2"
MP 5712	511057 MP	44.5	22.5	20/2.25	1/2"
MP 5712	511058 MP	44.5	22.5	20/2.5	1/2"
MP 5712	511020 MP	47	22.5	18/2	3/4"
MP 5712	511007 MP	47	22.5	20/2	3/4"
MP 5712	511059 MP	47	22.5	20/2.25	3/4"
MP 5712	511060 MP	47	22.5	20/2.5	3/4"
MP 5712	510142 MP	51	26	25/2.5	3/4"
MP 5712	511008 MP	51	26	26/3	3/4"
MP 5712	511114 MP	54	33	26/3	1"
MP 5712	511014 MP	56	33	32/3	1"
MP 5712	510186	73.5	36	40/3.5	1"1/4
MP 5712	510187	82	41	50/4	1"1/2
MP 5712	510188	97	49	63/4.5	2"

MP 5712 L



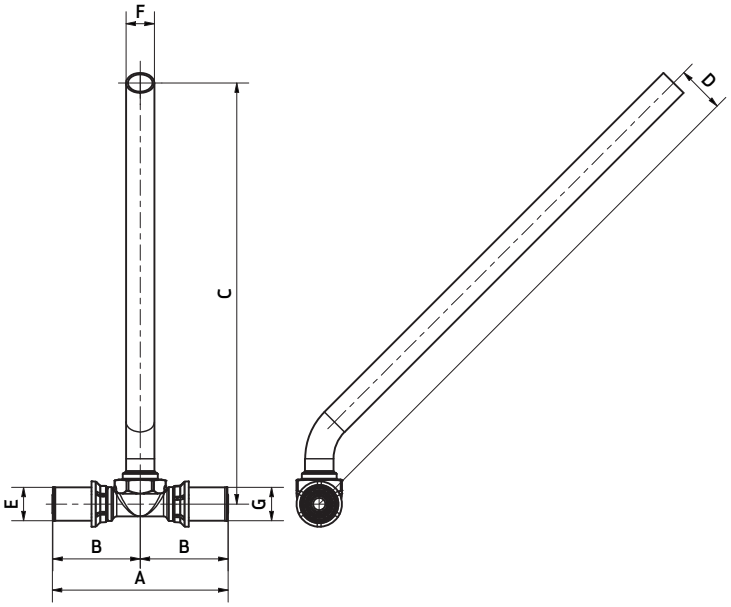
Art.	Cod.	A	B	C	D
MP 5712L	511029 MP	43.5	32	16/2	1/2"
MP 5712L	511069 MP	43.5	32	16/2.25	1/2"
MP 5712L	511102 MP	43.5	32	18/2	1/2"
MP 5712L	511103 MP	43.5	32	20/2	1/2"
MP 5712L	511104 MP	43.5	32	20/2.25	1/2"
MP 5712L	511105 MP	4.35	32	20/2.5	1/2"

MP 5715



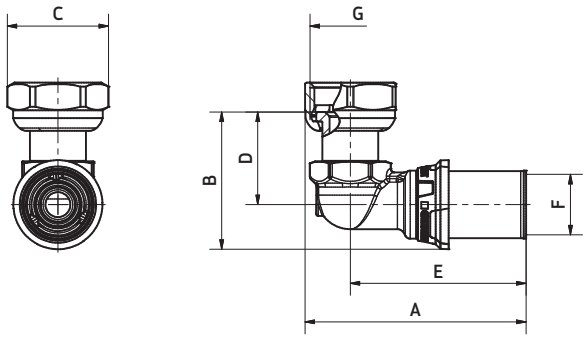
Art.	Cod.	A	B	C	D
MP 5715	511015 MP	165.5	40.5	16/2	15
MP 5715	511016 MP	345.5	40.5	16/2	15
MP 5715	511017 MP	1095.5	46.5	16/2	15
MP 5715	511025 MP	165.5	46.5	20/2	15
MP 5715	511026 MP	345.5	46.5	20/2	15
MP 5715	511027 MP	1095.5	46.5	20/2	15

MP 5716



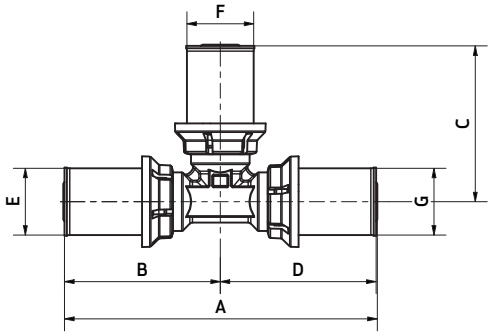
Art.	Cod.	A	B	C	D	E	F	G
MP 5716	512077 MP	93	46.5	290	25	16/2	15	16/2
MP 5716	512079 MP	93	46.5	290	25	20/2	15	20/2

MP 5717



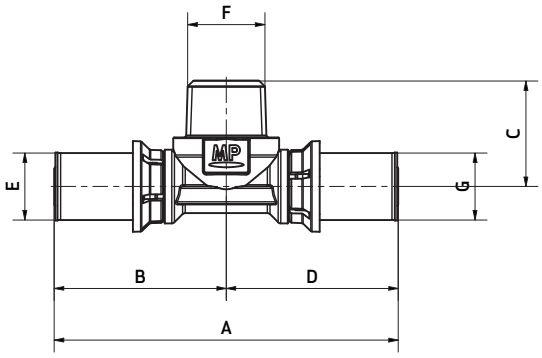
Art.	Cod.	A	B	C	D	E	F	G
MP 5717	512033 MP	60	36.5	27	24.5	46.5	16/2	1/2"
MP 5717	512034 MP	59	38	33	26	42.5	16/2	3/4"
MP 5717	512109MP	58	38	23	26	46.5	16/2	3/8"
MP 5717	512110MP	60	40	27	26	46.5	20/2	1/2"
MP 5717	512111MP	59	40	33	26	42.5	20/2	3/4"
MP 5717	512112MP	64.5	45.5	33.5	28.5	48	26/3	3/4"
MP 5717	512113MP	70	48	38	31	51	26/3	1"

MP 5720



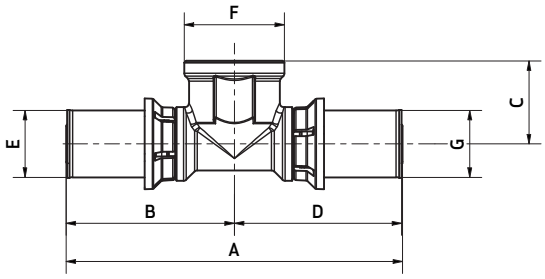
Art.	Cod.	A	B	C	D	E	F	G
MP 5720	512010 MP	83	41.5	41.5	41.5	16/2	16/2	16/2
MP 5720	511067 MP	83	41.5	41.5	41.5	16/2.25	16/2.25	16/2.25
MP 5720	512054 MP	85	42.5	42.5	42.5	18/2	18/2	18/2
MP 5720	512002 MP	87	43.5	43.5	43.5	20/2	20/2	20/2
MP 5720	511070 MP	87	43.5	43.5	43.5	20/2.25	20/2.25	20/2.25
MP 5720	510143 MP	102	51	51	51	25/2.5	25/2.5	25/2.5
MP 5720	512003 MP	102	51	51	51	26/3	26/3	26/3
MP 5720	512020 MP	112	56	56	56	32/3	32/3	32/3
MP 5720	512035	139	69.5	69.5	69.5	40/3.5	40/3.5	40/3.5
MP 5720	512036	162	81	81	81	50/4	50/4	50/4
MP 5720	510058	188	94	94	94	63/4.5	63/4.5	63/4.5

MP 5721



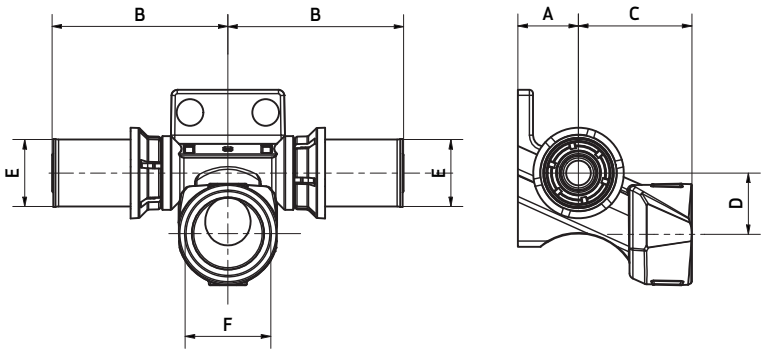
Art.	Cod.	A	B	C	D	E	F	G
MP 5721	512029 MP	91	45.5	28	45.5	16/2	1/2"	16/2
MP 5721	512066 MP	91	45.5	28	45.5	18/2	1/2"	18/2
MP 5721	512030 MP	91	45.5	28	45.5	20/2	1/2"	20/2
MP 5721	511091 MP	91	45.5	28	45.5	20/2.25	1/2"	20/2.25
MP 5721	511092 MP	91	45.5	28	45.5	20/2.5	1/2"	20/2.5
MP 5721	512031 MP	91	45.5	29.5	45.5	16/2	3/4"	16/2
MP 5721	511101 MP	91	45.5	29.5	45.5	18/2	3/4"	18/2
MP 5721	512032 MP	91	45.5	29.5	45.5	20/2	3/4"	20/2
MP 5721	511094 MP	91	45.5	29.5	45.5	20/2.25	3/4"	20/2.25
MP 5721	511095 MP	91	45.5	29.5	45.5	20/2.5	3/4"	20/2.5
MP 5721	510161 MP	96	48	29.5	48	25.5/2.5	3/4"	25.5/2.5
MP 5721	512067 MP	96	48	29.5	48	26/3	3/4"	26/3

MP 5722



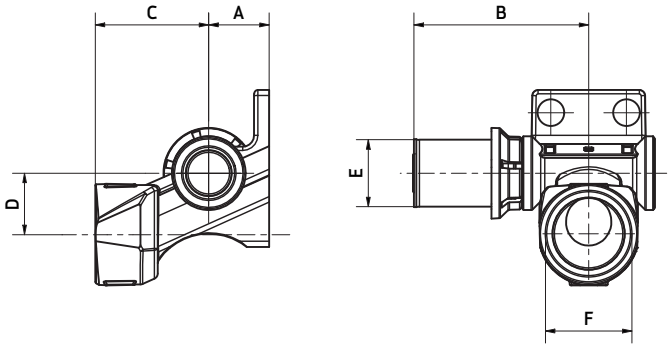
Art.	Cod.	A	B	C	D	E	F	G
MP 5722	512022 MP	89	44.5	22	44.5	16/2	1/2"	16/2
MP 5722	511083 MP	89	44.5	22	44.5	16/2.25	1/2"	16/2.25
MP 5722	512028 MP	94	47	23	47	16/2	3/4"	16/2
MP 5722	512065 MP	89	44.5	21	44.5	18/2	1/2"	18/2
MP 5722	512045 MP	94	47	22.5	47	18/2	3/4"	18/2
MP 5722	512027 MP	89	44.5	22	44.5	20/2	1/2"	20/2
MP 5722	511084 MP	89	44.5	21	44.5	20/2.25	1/2"	20/2.25
MP 5722	511085 MP	89	44.5	22	44.5	20/2.5	1/2"	20/2.5
MP 5722	512023 MP	94	47	23	47	20/2	3/4"	20/2
MP 5722	511089 MP	94	47	23	47	20/2.5	3/4"	20/2.5
MP 5722	510162 MP	93	48	21.5	45	25/2.5	1/2"	20/2
MP 5722	511087 MP	93	48	21.5	45	25/2.5	1/2"	20/2.5
MP 5722	510163 MP	96	48	21.5	48	25/2.5	1/2"	25/2.5
MP 5722	510164 MP	102	51	26	51	25/2.5	3/4"	25/2.5
MP 5722	512047 MP	93	48	21.5	45	26/3	1/2"	20/2
MP 5722	512046 MP	96	48	21.5	48	26/3	1/2"	26/3
MP 5722	512042 MP	102	51	26	51	26/3	3/4"	26/3

MP 5723



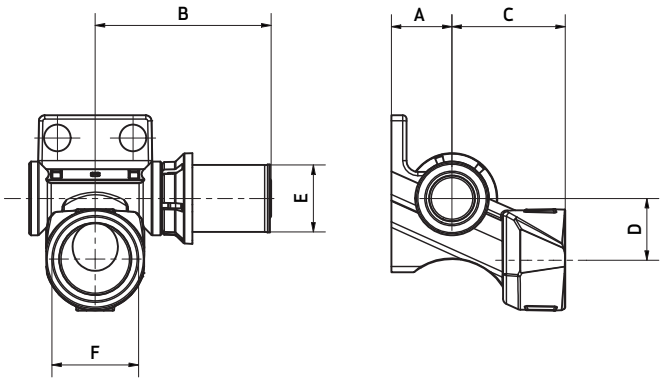
Art.	Cod.	A	B	C	D	E	F
MP 5723	513005 MP	16	46.5	30	16	16/2	1/2"
MP 5723	513006 MP	16	46.5	30	16	18/2	1/2"
MP 5723	513007 MP	16	46.5	30	16	20/2	1/2"

MP 5724



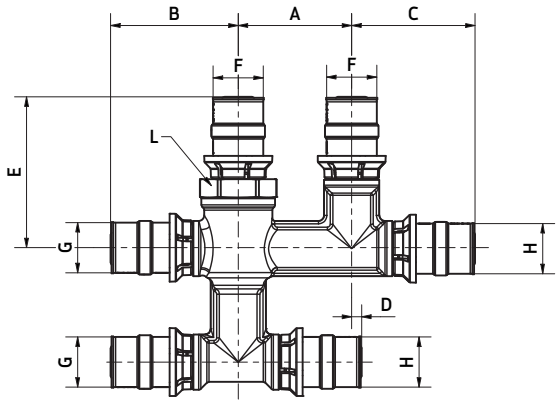
Art.	Cod.	A	B	C	D	E	F
MP 5724	513009 MP	16	46.5	30	16	16/2	1/2"
MP 5724	513011 MP	16	46.5	30	16	18/2	1/2"
MP 5724	513013 MP	16	46.5	30	16	20/2	1/2"

MP 5725



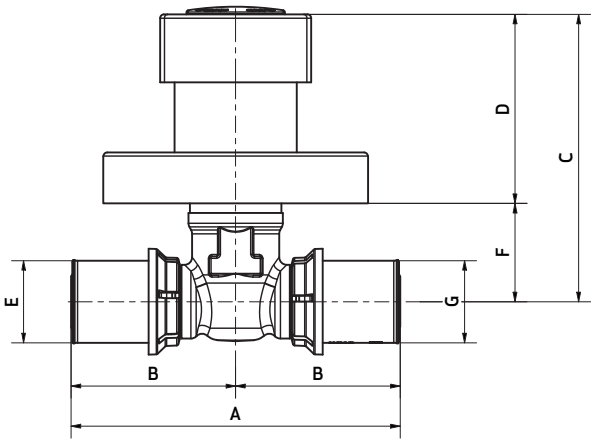
Art.	Cod.	A	B	C	D	E	F
MP 5725	513008 MP	16	46.5	30	16	16/2	1/2"
MP 5725	513010 MP	16	46.5	30	16	18/2	1/2"
MP 5725	513012 MP	16	46.5	30	16	20/2	1/2"

MP 5728



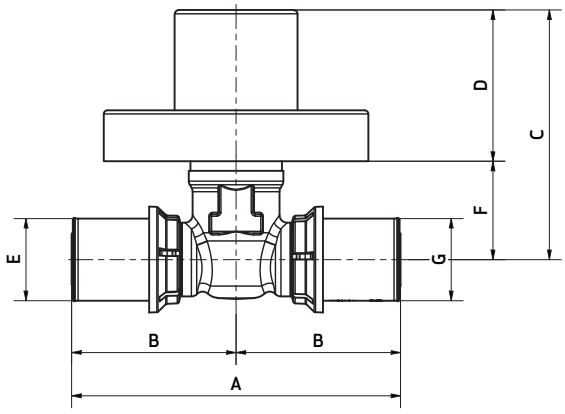
Art.	Cod.	A	B	C	D	E	F	G	H	L
MP 5728	512080 MP	40	45	43.5	3.5	53.5	16/2	16/2	16/2	SW 24
MP 5728	512082 MP	40	45	43.5	3.5	53.5	20/2	16/2	20/2	SW 24
MP 5728	512083 MP	40	45	43.5	3.5	53.5	20/2	16/2	16/2	SW 24
MP 5728	512084 MP	40	45	43.5	3.5	53.5	16/2	20/2	16/2	SW 24
MP 5728	512085 MP	40	45	43.5	3.5	53.5	20/2	20/2	20/2	SW 24
MP 5728	512086 MP	40	45	43.5	3.5	53.5	20/2	20/2	16/2	SW 24
MP 5728	512096 MP	40	45	43.5	3.5	53.5	16/2	16/2	20/2	SW 24
MP 5728	512097 MP	40	45	43.5	3.5	53.5	16/2	20/2	20/2	SW 24

MP 5729



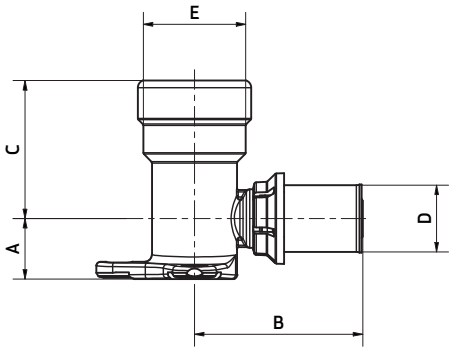
Art.	Cod.	A	B	C	D	E	F	G
MP 5729	510189 MMP	87	43.5	79	54	16/2	25	16/2
MP 5729	510192 MMP	87	43.5	79	54	16/2.25	25	16/2.25
MP 5729	510190 MMP	87	43.5	79	54	18/2	25	18/2
MP 5729	510191 MMP	87	43.5	79	54	20/2	25	20/2
MP 5729	510193 MMP	87	43.5	79	54	20/2.25	25	20/2.25
MP 5729	510194 MMP	87	43.5	79	54	20/2.5	25	20/2.5

MP 5730



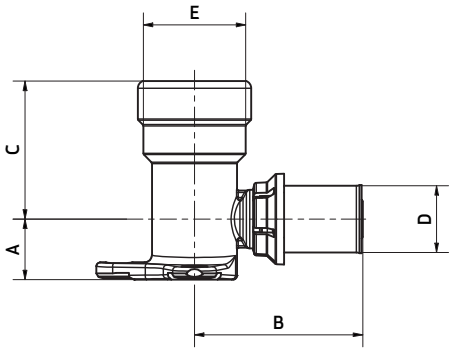
Art.	Cod.	A	B	C	D	E	F	G
MP 5730	510189 CMP	87	43.5	70	45	16/2	25	16/2
MP 5730	510192 CMP	87	43.5	70	45	16/2.25	25	16/2.25
MP 5730	510190 CMP	87	43.5	70	45	18/2	25	18/2
MP 5730	510191 CMP	87	43.5	70	45	20/2	25	20/2
MP 5730	510193 CMP	87	43.5	70	45	20/2.25	25	20/2.25
MP 5730	510194 CMP	87	43.5	70	45	20/2.5	25	20/2.5

MP 5760



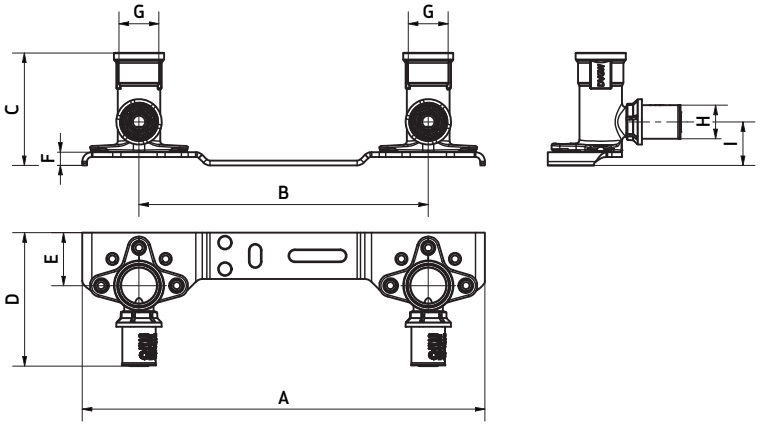
Art.	Cod.	A	B	C	D	E
MP 5760	513001 CMP	16	42.5	24	16/2	1/2"
MP 5760	513014 CMP	16	43	24	18/2	1/2"
MP 5760	513002 CMP	16	43	24	20/2	1/2"
MP 5760	513001 MP	16	42.5	36.5	16/2	1/2"
MP 5760	513001 MPHD	16	44.5	36.5	16/2	1/2"
MP 5760	51109 6 MP	16	42.5	36.5	16/2.25	1/2"
MP 5760	513014 MP	16	43	36.5	18/2	1/2"
MP 5760	513002 MP	16	45	36.5	20/2	1/2"
MP 5760	511097 MP	16	45	36.5	20/2.25	1/2"
MP 5760	511098 MP	16	45	36.5	20/2.5	1/2"
MP 5760	513003 MP	19	49	37.5	20/2	3/4"
MP 5760	511099 MP	19	49	37.5	20/2.25	3/4"
MP 5760	511100 MP	19	49	37.5	20/2.5	3/4"
MP 5760	510167 MP	19	49.5	37.5	25/2.5	3/4"
MP 5760	513004 MP	19	49.5	37.5	26/3	3/4"
MP 5760	513001 LMP	16	42.5	61	16/2	1/2"
MP 5760	513014 LMP	16	43	61	18/2	1/2"
MP 5760	513002 LMP	16	43	61	20/2	1/2"

MP 5760



Art.	Cod.	A	B	C	D	E
MP 5760	513001 CMP	16	42.5	24	16/2	1/2"
MP 5760	513014 CMP	16	43	24	18/2	1/2"
MP 5760	513002 CMP	16	43	24	20/2	1/2"
MP 5760	513001 MP	16	42.5	36.5	16/2	1/2"
MP 5760	513001 MPHD	16	44.5	36.5	16/2	1/2"
MP 5760	51109 6 MP	16	42.5	36.5	16/2.25	1/2"
MP 5760	513014 MP	16	45	36.5	18/2	1/2"
MP 5760	513002 MP	16	45	36.5	20/2	1/2"
MP 5760	511097 MP	16	45	36.5	20/2.25	1/2"
MP 5760	511098 MP	16	45	36.5	20/2.5	1/2"
MP 5760	513003 MP	19	49	37.5	20/2	3/4"
MP 5760	511099 MP	19	49	37.5	20/2.25	3/4"
MP 5760	511100 MP	19	49	37.5	20/2.5	3/4"
MP 5760	510167 MP	19	51.5	37.5	25/2.5	3/4"
MP 5760	513004 MP	19	51.5	37.5	26/3	3/4"
MP 5760	513001 LMP	16	44.5	61	16/2	1/2"
MP 5760	513014 LMP	16	45	61	18/2	1/2"
MP 5760	513002 LMP	16	45	61	20/2	1/2"

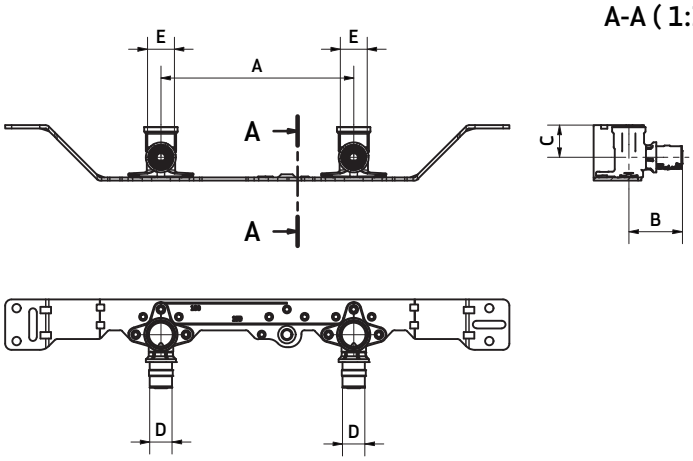
MP 5761



Art.	Cod.	A	B	C	D	E	F	G	H	I
MP 5761	513024 CMP	213	153	47	70.5	28	7	1/2"	16/2	23
MP 5761	513026 CMP	123	153	47	71	28	7	1/2"	18/2	23
MP 5761	513025 CMP	213	153	47	71	28	7	1/2"	20/2	23
MP 5761	513024 MP	213	153	59.5	72.5	28	7	1/2"	16/2	23
MP 5761	513026 MP	213	153	59.5	73	28	7	1/2"	18/2	23
MP 5761	513025 MP	213	153	59.5	73	28	7	1/2"	20/2	23
MP 5761	513024 LMP	213	153	84	72.5	28	7	1/2"	16/2	23
MP 5761	513026 LMP	213	153	84	73	28	7	1/2"	18/2	23
MP 5761	513025 LMP	213	153	84	73	28	7	1/2"	20/2	23

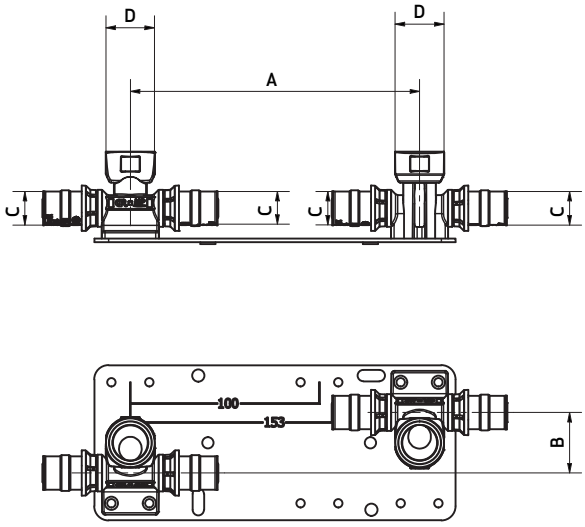
MP 5762

A-A (1:3)



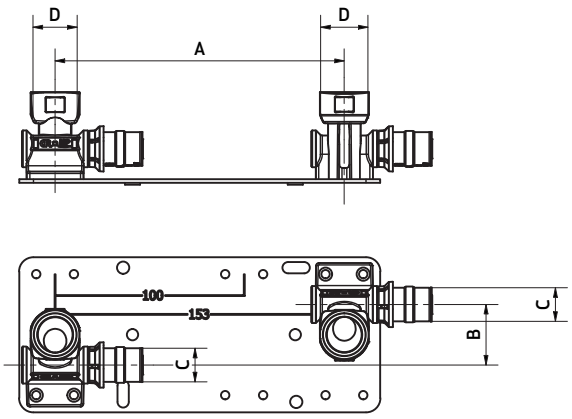
Art.	Cod.	A	B	C	D	E
MP 5762	513027 CMP	153/100	42.5	24	16/2	1/2"
MP 5762	513028 CMP	153/100	43	24	18/2	1/2"
MP 5762	513029 CMP	153/100	43	24	20/2	1/2"
MP 5762	513027 MP	153/100	42.5	36.5	16/2	1/2"
MP 5762	513028 MP	153/100	45	36.5	18/2	1/2"
MP 5762	513029 MP	153/100	45	36.5	20/2	1/2"
MP 5762	513027 LMP	153/100	44.5	61	16/2	1/2"
MP 5762	513028 LMP	153/100	45	61	18/2	1/2"
MP 5762	513029 LMP	153/100	45	61	20/2	1/2"

MP 5763



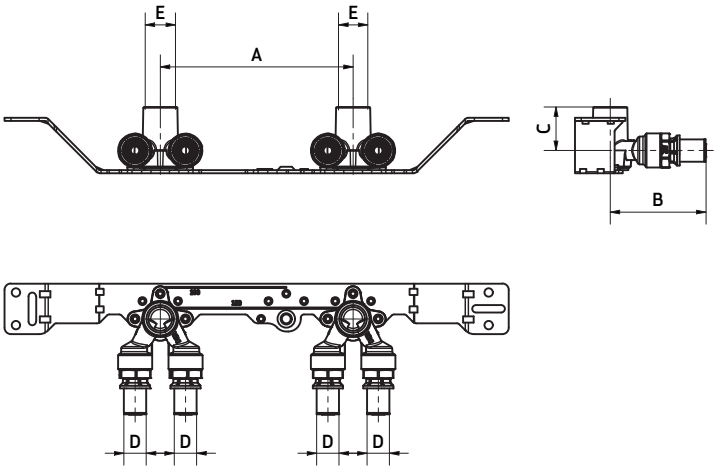
Art.	Cod.	A	B	C	D
MP 5763	513030 MP	153	32	16/2	1/2"
MP 5763	513031 MP	153	32	182/	1/2"
MP 5763	513032 MP	153	32	20/2	1/2"

MP 5764



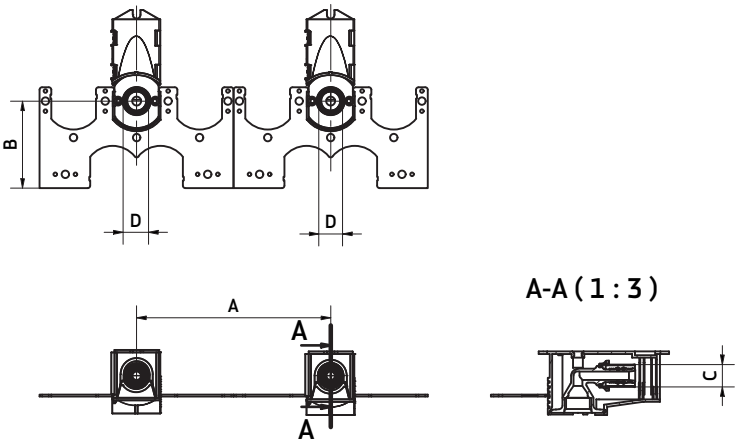
Art.	Cod.	A	B	C	D
MP 5764	513033 MP	153/100	32	16/2	1/2"
MP 5764	513034 MP	153/100	32	18/2	1/2"
MP 5764	513035 MP	153/100	32	20/2	1/2"

MP 5766



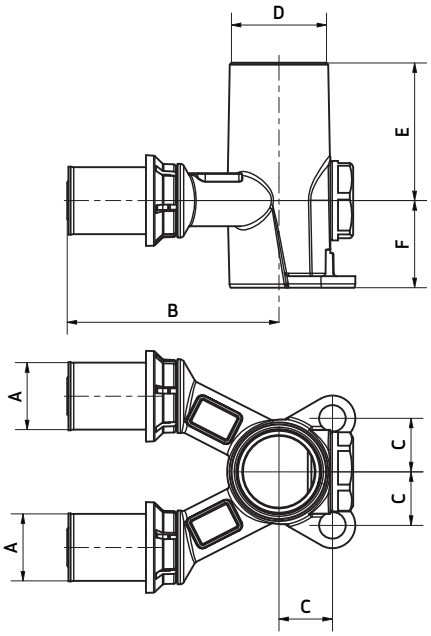
Art.	Cod.	A	B	C	D	E
MP 5766	513039 MP	153/100	56	36.5	16/2	1/2"
MP 5766	513041 MP	153/100	56	36.5	20/2	1/2"

MP 5767



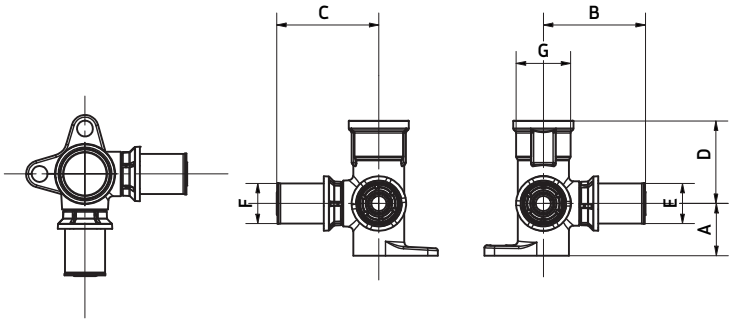
Art.	Cod.	A	B	C	D
MP 5767	513042 MP	153	69	16/2	1/2"
MP 5767	513044 MP	153	69	20/2	1/2"

MP 5780



Art.	Cod.	A	B	C	D	E	F
MP5780	510062 MP	16/2	56	14.14	1/2"	36.5	23
MP5780	510064 MP	20/2	56	14.14	1/2"	36.5	23

MP 5781



Art.	Cod.	A	B	C	D	E	F	G
MP 5781	511106 MP	23	45	45	36.5	16/2	16/2	1/2"
MP 5781	511108 MP	23	45	45	36.5	20/2	16/2	1/2"

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