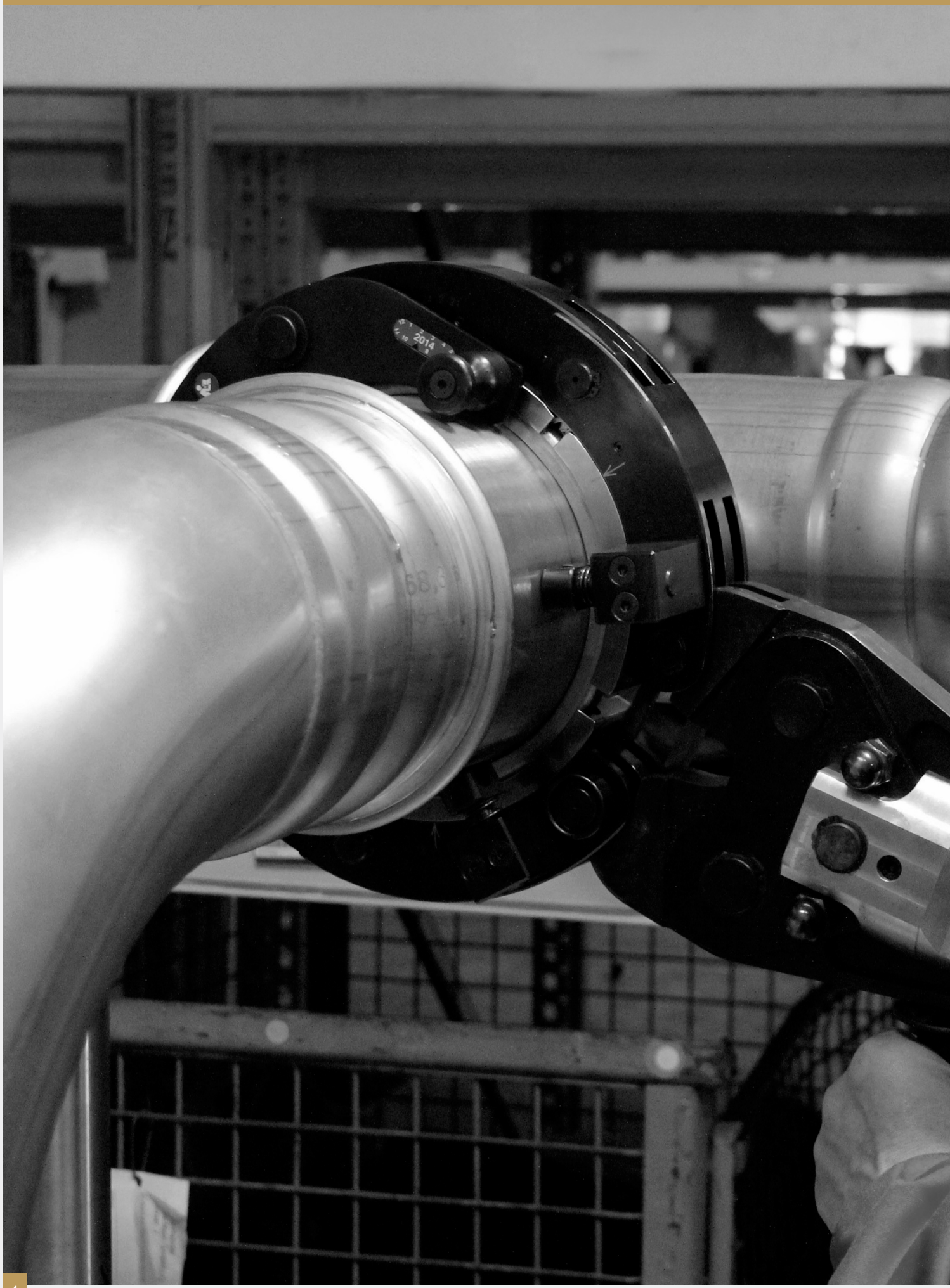
Instantor®

Instantor Stainless Steel Pipe & Press Fittings

Technical Guide

AISI 316 Stainless Steel Pressfitted Accessories

Contents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Introduction

There are a number of possible ways to join tubes and accessories in plumbing installations, including threaded joints, welding and inseparable joints using pressfitting of accessories (such as elbows, tees, couplings, etc.).

The Instantor Stainless Steel Press System consists of a range of accessories, tubes and a pressfitting tool.

This system makes it easy to quickly and safely install a wide range of domestic, commercial and industrial systems, with diameters ranging from 15mm to 108mm.

This means that the Instantor Stainless Steel Press System can be used in a wide range of installations.

PRODUCT FEATURES:

- Installation is quick and safe using this system
- The installation is reliable, even under severe use conditions
- Less labour is needed
- Resistant to corrosion
- Easy to handle
- No hot works permits are needed

System Description

The basis of the Instantor Stainless Steel Press System is the crimping of the fitting using an O-ring and tube. The O-ring is placed at the mouth of the fitting to make the joint watertight. The pipe is then inserted into the fitting up to its limit and the joint is created by mechanical deformation using an electric-hydraulic tool.

The strength of the joint results from the fitting and the tube being fitted to each other creating a durable, inseparable joint.

System Technical Specifications

Joint type: O-ring resistant to hot water, ageing and the additives commonly used in drinking water. There are two types: EPDM and FKM.

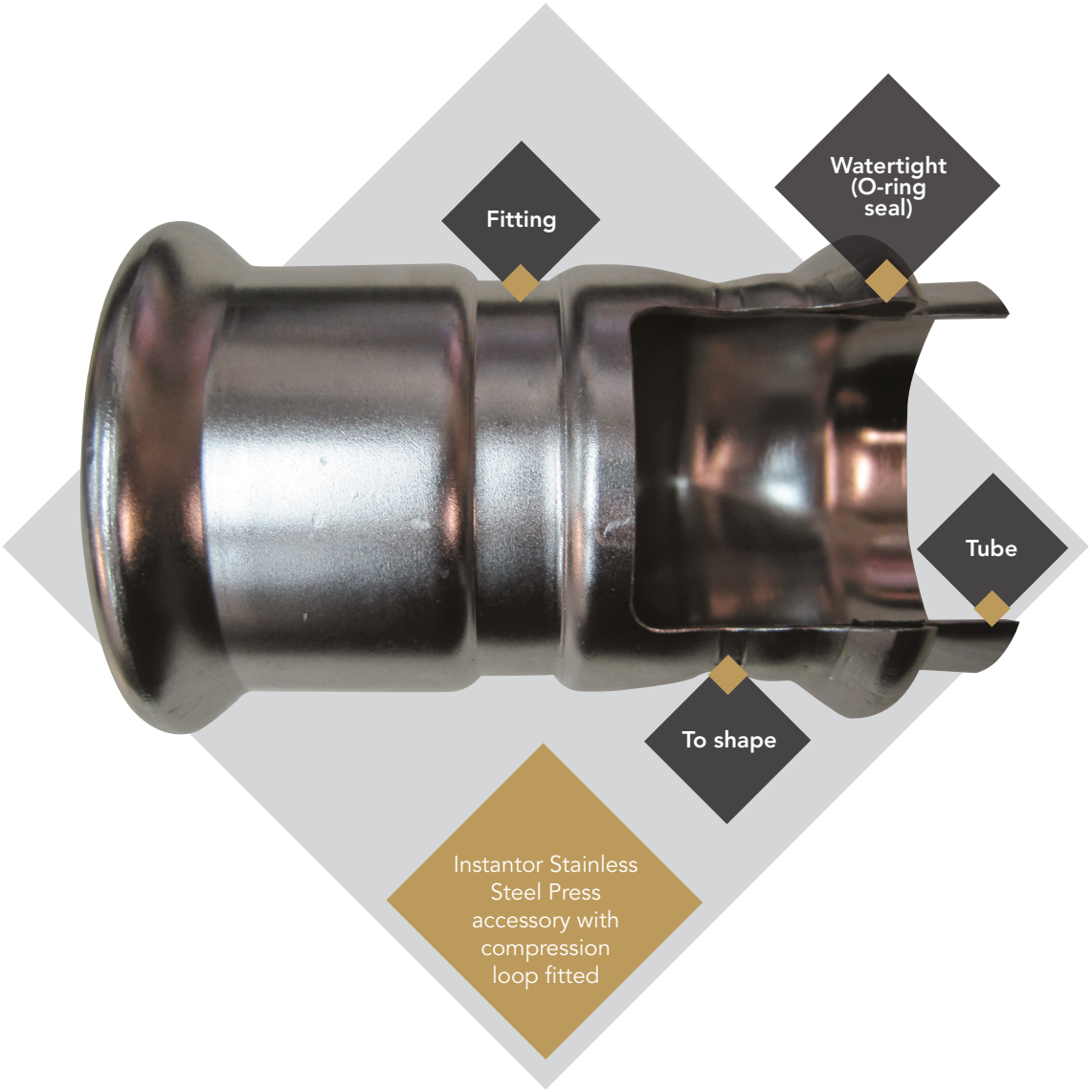
Fitting material: Stainless steel n° 1.4404 (AISI 316L).
Characteristics:
- Hygienic, as demonstrated in many food and pharmaceutical industry applications.
- Minimum load loss, resulting in faster fluid flows.
- Excellent decorative finish avoiding need for additional painting or external protection costs.
- Less heat conduction than other materials.
- The use of molybdenum results in good performance in chlorinated environments.
- Good resistance to oxidation at high temperatures.
- Good mechanical and deformation resistance at high temperatures.

Joint type: Permanent type pressfitting for joining stainless steel pipes.

Working pressure: Max 16 bar

Working temperature:
- With EPDM O-ring (black) –20°C to +110°C
- With FKM O-ring (green) From –20°C to +200°C dry app (hot air) or wet app (oils or primary solar energy circuits)
- With FKM O-ring (red) From –10°C to +160°C (constant); short exposure (peak value) max. +170/180°C; max. 7 bar (for saturated steam)
- With HNBR O-ring (yellow) From –20°C to +70°C (for gas and LPG)

Thickness of the fitting:
- 1.5 mm for diameters 15, 18, 22, 28, 35, 42, 54
- 2 mm for diameters 76.1, 88.9, 108



Certificates

ISO 9001 WRAS TÜV Lloyd's Register DVGW

As the manufacturer of the Instantor Stainless Steel Press System of stainless steel tubes and accessories, Instantor has been awarded certificates from the most prestigious bodies in Europe.

O-Ring Seals

One of the most important elements in the system is the O-ring seal. A number of different O-ring seal versions have been developed which are resistant to ageing so that the Instantor Stainless Steel Press System can be used in as wide a range of installations as possible.

O-ring type

EPDM (Black) Ethylene rubber, resistant to ageing and hot water.

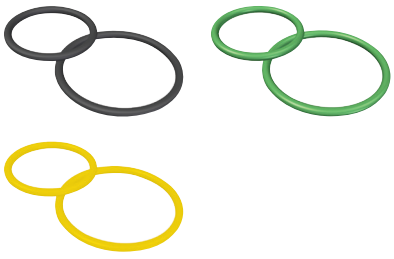
- **Applications**: Hot water, heating, fire protection and compressed air (oil-free)
- **Temperature**: From –20°C to +110°C

FKM (Green) Fluoroelastomer rubber

- **Applications**: Oils, hydrocarbons, solar installations, compressed air
- **Temperature**: From –20°C to +200°C dry app (hot air) or wet app (oils or primary solar energy circuits)

FKM (Red) Fluoroelastomer rubber

- **Applications**: Saturated steam
- **Temperature**: From –10°C to +160°C (constant); short exposure (peak value) max. +170/180°C; max. 7 bar



HNBR (Yellow) Nitrile rubber

- **Applications**: Gas & LPG
- **Temperature**: From –20°C to +70 °C

Please consult our Technical Department if you have doubts on which O-ring is suitable for the project application, or if the project design characteristics are near the extremities of the O-ring working ranges.

All Instantor Stainless Steel Press Fitting accessories are manufactured using AISI 316L N°1.4404 UNE EN 10088 stainless steel tubing, meeting the requirements of the DVGW W534 standard. Threads in mixed format accessories are manufactured to the DIN 2999 standard.

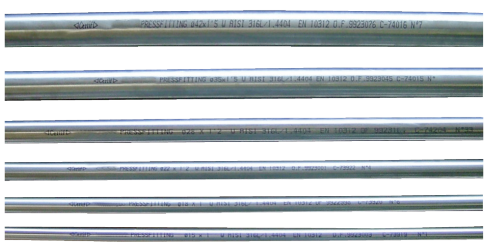
Instantor
Stainless Steel Press Pipe

Welded stainless steel pipes are manufactured in accordance with the EN 10312 standard. Instantor Stainless Steel tube meets the 1.4404/1.4301 AISI 316L standard under UNE EN 10088 and EN 10.217-7.
(AISI 304 stainless steel tube is available upon request.)

Ext. diameter wall thickness x (mm)	Weight (Kg/m)	Water capacity (l/m)	Max pipe pressure (bar)
15 x 0.6	0.216	0.149	88
22 x 0.7	0.373	0.327	86
28 x 0.8	0.545	0.547	63
35 x 1	0.851	0.855	63
42 x 1.2	1.226	1.236	63
54 x 1.2	1.587	2.091	49
76.1 x 1.5			
88.9 x 2			
108 x 2			

Format supplied: 5 metre lengths

- **Curvature radius**: r = 3,5 x d
- **Surface supplied**: The exterior and interior surfaces are smooth.
- **Heat insulation**: The content of disolved chlorine ions in insulating materials for stainless steel tubes should not exceed 0.05%. Heat insulation should be in accordance with current regulations.



Instantor Press Tools

Revolutionary Press Tools offer a new way of plumbing in comparison to traditional methods. Instantor Press Tools are available with 19kN and 32kN. The Instantor Stainless Steel Press range is suitable for use with M profile jaws only.

Most of the press tools that exist in the market allow pressing Instantor Stainless Steel Press Fittings from a diameter of 15mm to a diameter of 108mm. Each diameter needs its own jaw or collar. The Instantor mini press gun will press 15mm to 28mm stainless steel, and our large press gun will press 15mm to 54mm stainless steel. For larger dimension pressing tools please contact our office.

M profile jaws or collars should always be used. In case of doubt, please ask our technical department.

Instantor® Tools

INSTANTOR PRESS TOOL KITS SUPPLIED WITH:

- Instantor Press Tool
- Heavy duty plastic protective case
- 2 x 18V 4Ah batteries
- Charger
- Adapter (Large Press Tool only)
- Jaws of choice

IT2020
IT2040

Technical data	IT2020	IT2040
Power supply	18 V / 4 Ah	18 V / 4 Ah
Output	19kN	32kN
Dimensions (L x W x H)	363 x 119 x 75 mm	490 x 89 x 123 mm
Weight	2.4 kg (with battery)	4.1 kg (with battery)
Suitable for	12 - 28mm pipe	12 - 54mm pipe

Introduction

Drinking water

All design, calculation, installation and bringing into service of drinking water facilities is subject to the provisions of regulations applicable at the time.

Instantor's AISI 316L stainless steel pipes and accessories have no effect on the perfect quality of drinking water.

The O-ring seal complies with recommendations for drinking water installations (EPDM O-ring seals are used for sanitation water installations).

Stainless steel is not recommended for installations which contain or transport sea water.

Solar power facilities

Solar power installations obtain heat energy from the Sun. This energy is captured by a solar collector and, once absorbed, it is conducted by a solar fluid (a mixture of steam and anti-freeze) to the heat accumulator.

We recommend that FKM (green) O-ring seals are used in such installations as they can withstand temperatures of up to 200°C.

The anti-freezes used are basically chemical preparations based on glycol which lower the freezing point. These anti-freezes always contain other additives, and it is advisable to consult the manufacturer when such additives are used.

The main reasons for using stainless steel in such installations are: low maintenance, better performance and less labour needed.

Sprinkler

Sprinkler systems consist of fixed tubing with fittings for connecting hoses and other outlet systems. These tubes can be divided into:

- **Wet tubes**: these are always full of water.
- **Dry tubes**: the tubes are filled by fire-fighters or by automatic devices which are activated in an emergency.

These installations are subject to the accreditation and approval conditions of insurance companies.

Compressed air

Compressed air is used in a wide range of applications.

Service pressures in compressed air installations goes up to a maximum of 10 bar. However, tools frequently only require a maximum connection pressure of 6 bar.

Instantor Stainless Steel Press System can work with pressures up to 16 bar.

FKM (green) O-ring seals are used in such installations. These O-ring seals are used because there are often traces of oil in most compressed air installations. Where the Standard O-ring is used (EPDM-Black) the oil content must be below <1mg/m³.

INSTANTOR STAINLESS STEEL GAS CERTIFIED PRODUCTS

gas installations

Instantor Stainless Steel Press Gas

Gas

Gas has many varied applications within domestic and industrial environments. Instantor Stainless Steel Gas System is suitable for installations of natural gas (gas family 2 - groups H, L, E, Ref. EN437 Table1) and LPG (gas family 3 - groups B/P, P, B, Ref. EN437 Table1).

Instantor Stainless Steel fittings for gas have been tested and certified by most respectful certifying Institutions worldwide, ensuring that Instantor Press System meets the requirements of EN 10.352 for gas installation.

Testing completed on Instantor Stainless Steel gas fittings, known as GT1, consists of testing the system at 1 bar working pressure and an exposure to +650°C temperature for the period of 30 minutes. This test ascertains the resistance of the system at high temperature to prevent the occurrence of an explosive mixture in the event of a fire, when leak takes place.

Instantor Stainless Steel gas fittings (made of stainless steel AISI 316L / 1.4404) are certified for diameters ranging from 15mm to 108mm, at working pressure 5 bar (external above ground) and 1 bar (within buildings that are subject to fire regulations), accordingly, and within the temperature range -20°C to +70°C.

Instantor Stainless Steel Pipe is certified for gas applications in stainless steel dual grade AISI 316/316L (1.4401/1.4404), for diameters from 15mm to 108mm, where the tube has been manufactured according to EN 10.312. Gas fitting bearing yellow markings and are fitted with an yellow H-NBR O-ring whose chemical compound has been developed particularly for gas applications and to meet EN 549 requirements.

Ensuring the correct crimping is of a vital importance. For this purpose, it is of an utmost importance working with an appropriate press-tools and jaws/slings in perfect condition. If any questions arise related to press-tools and their accessories, Instantor´s sales department would be pleased to assist you and advice upon the performance of the press-equipment.

Instantor Stainless Steel Gas System could be exposed to the risk of an external corrosion when the system gets in contact with gasses, vapours, or materials of certain chloride content, especially in humid environment.

The project designer and/or an installer is responsible for choosing an effective anti-corrosion protection.

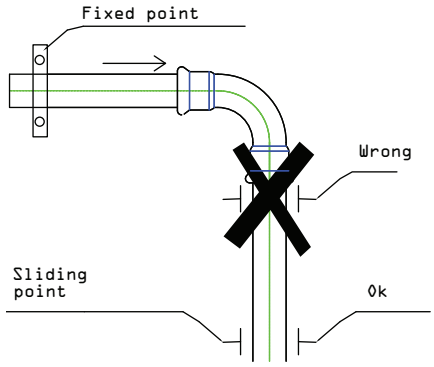
Fixing of Pipes

Correct fixing of fixed and sliding fasteners

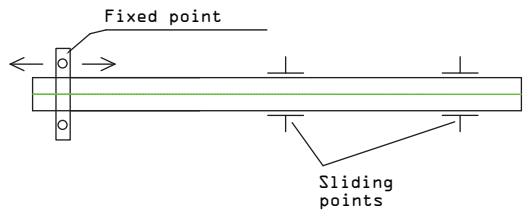
There are two purposes for fixing pipes. Firstly the fasteners support the pipe system; and secondly, they direct changes in the length of pipes resulting from temperature changes in the desired direction.

In pipe fixings we can distinguish between fixed (static) fasteners and sliding fasteners (enabling axial movement of the tube).

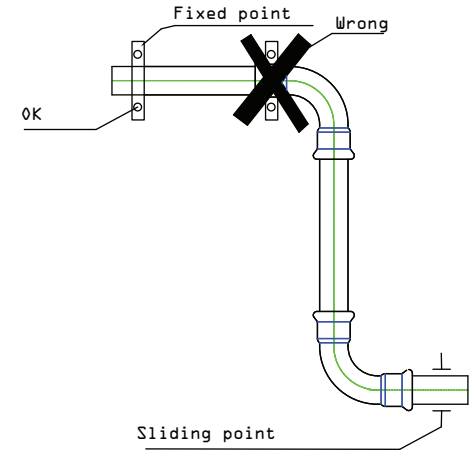
Fixed fastenings should not be used with accessories. Sliding fastenings should be fitted in such a way that they do not involuntarily become fixed fasteners in use. With pipe elongation, we should take into account the minimum distance to the first sliding fastening. A stretch of piping with no changes of direction and no elongation compensator should not have more than one fixed fastening.



Incorrect fixing: the horizontal pipe cannot extend freely.



Fixing in a continuous length with a fixed fastening.



Fixing of fixed fastenings on the pipe and not the fitting.

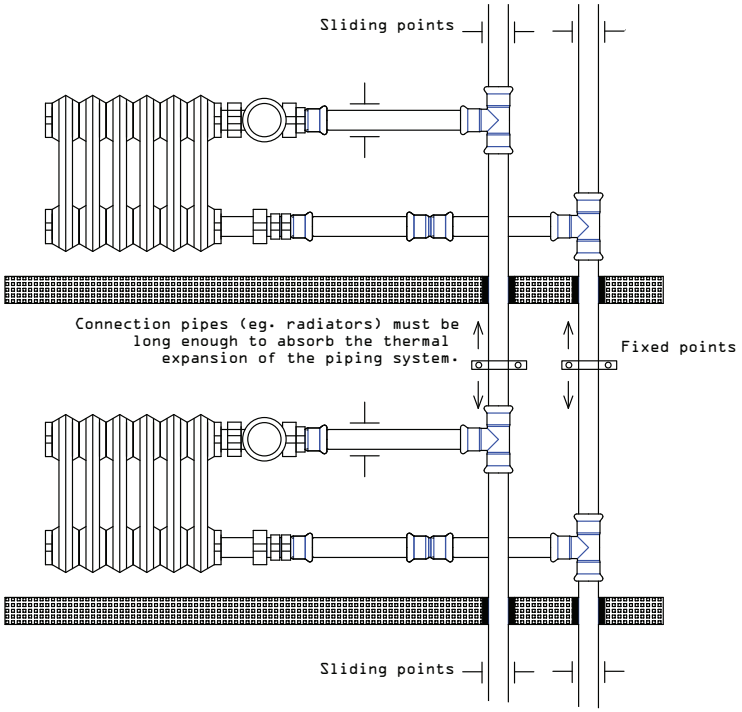
With long stretches, we recommend that the fixed fastening should be in the centre of the stretch in order to distribute the elongation in both directions. This occurs for example in vertical pipes between floors in a building when there is no elongation compensator.

As the ascending pipe is fixed in the centre (and not unilaterally to the building) the heat elongation is distributed in two directions, and this reduces the force of the deviation. Commercial fastenings are used. Insulating brackets should be used for noise insulation.

Piping does not usually produce noise, but it does transmit noise (from other equipment, etc.) and it should therefore be fitted in a way which provides insulation from noise pollution.

Table of maximum bracket distances for stainless steel pipes

Diameter x Thickness	Support Distances (m)
15 x 0.6	1.25
22 x 0.7	2.0
28 x 0.8	2.25
35 x 1.0	2.75
42 x 1.2	3.0
54 x 1.2	3.5
76.1 x 1.5	4.25
88.9 x 2	4.75
108 x 2	5.0



Fixing extremely long pipes.

Installation Instructions

Storage

Damage and lack of cleanliness should be avoided during transport and storage. Accessories are packed effectively in plastic bags to ensure that they are received by the warehouse or installer in perfect condition.

Bending

316L stainless steel tube is not suitable to be bent using bending tools.

Threaded joints

Instantor Stainless Steel Press Fittings for domestic drinking water installations can be connected to standard threaded accessories (thread in accordance with DIN 2999) or non-ferrous metal accessories using connection.

Limits for application

Maximum pressure

16 bar

Maximum depression in relative terms

–0.8 bar

Mechanical properties

Minimum elasticity limit	240 N/mm^2
Minimum elongation	40%
Minimum breakage load	530 N/mm^2

Cutting

Once the pipes have been measured, they can be cut to the correct length using:

- A fine tooth saw
- A pipe-cutting knife (stainless steel)
- A fine-tooth electric saw

The tools must be suitable for stainless steel.

Cutting using abrasive discs makes the stainless steel more fragile as a result of the high temperature caused by the friction.

After cutting the pipe, the inside and outside of the ends should be thoroughly deburred to avoid damaging the O-ring seal when the cut pipe is inserted into the accessory.

When pipes are cut using electro-mechanical saws which are cooled with oil or other refrigerants, all traces of oil should be removed so as not to affect the O-ring seals on the accessories.

Preparation of the joint for pressfitting

After cutting, the ends of the pipe should be deburred inside and outside prior to fitting of accessories. The availability of an O-ring seal for the accessory should be checked prior to assembly.

The zone of contact of the O-ring of the pressfitting with the pipe has to be clean, smooth, free of dirt, free of rills and grooves.

In order to create a sound joint using pressfitting, the length to be inserted into the accessory should be marked on the pipe by the installer.

In the event of any difficulties in inserting the pipe into the accessory as a result of the tolerance of the pipe, soapy water can be used as effective lubricants.

Prior to pressfitting, the pipe and the accessory are fitted together by gently rotating and pressing in the direction of the limit or mark. In accessories which do not have a limit, insert the pipe based on its nominal diameter.

The fittings are pressfitted using a press tool. An interchangable M Profile jaw should be used for each pipe diameter. Pressfitting can only be carried out using the correct pressfitting jaw.

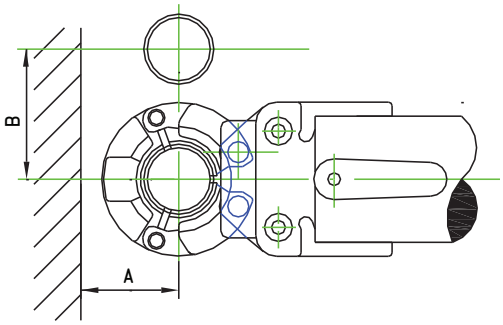
In the event where pipework needs to be altered after press fittings have been used, the same section of the pipework cannot be reused where there was a press joint previously used. Movement in the pipes, which often occurs when they are raised to be installed or removed, is acceptable.

Taping of pipes should be carried out prior to pressfitting, and should use commercial substances which do not contain chlorides. It is strongly recommended that pipework is suitably pressure tested before the application of insulation or the closing of service ducts.

Space required and minimum distances

Due to the design of the jaws and the compression collars, minimum distances need to be respected during assembly of the pressfitting joint system.

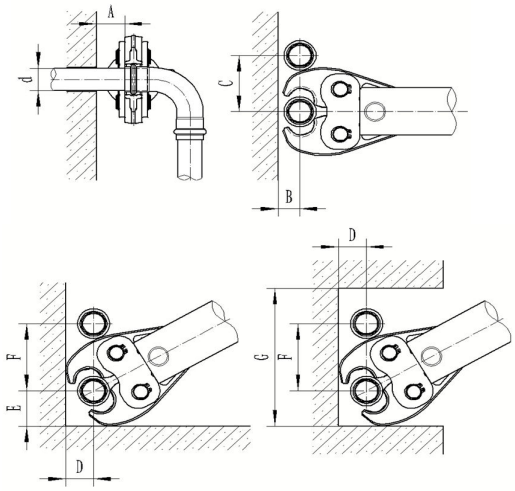
The tables show this information based on the external diameter of the pipe, jaws and collars required.



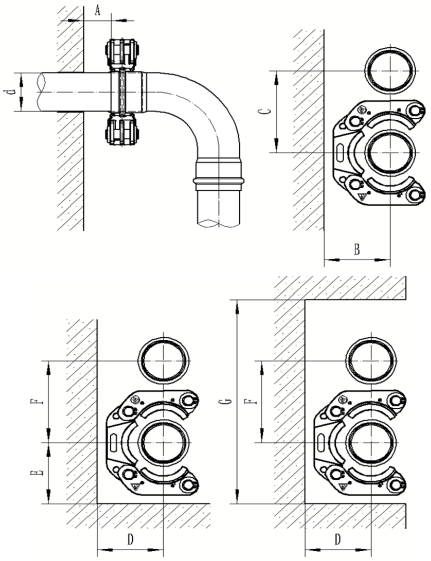
External diameter of the pipe (mm)	A (mm)	B (mm)
15 x 0.6	20	56
22 x 0.7	20	60
28 x 0.8	25	65
35 x 1.0	25	75
42 x 1.2	30	75
54 x 1.2	60	140
76.1 x 1.5		
88.9 x 2		
108 x 2		

Installation Instructions

Space Required and Minimum Distances for IT2020							
d (mm)	A (cm)	B (cm)	C (cm)	D (cm)	E (cm)	F (cm)	G (cm)
15	3.5	1.8	5.5	2.3	3.5	7.5	14.5
18	3.5	2.0	6.0	2.5	3.6	7.6	14.8
22	3.5	2.5	6.5	3.1	4.2	8.2	16.6
28	3.5	2.5	7.0	3.2	4.4	8.4	17.2
35	3.5	3.0	8.0	3.7	5.0	9.0	19.0



Space Required and Minimum Distances for IT2040 (IT2040 supports 42 & 54)							
d (mm)	A (cm)	B (cm)	C (cm)	D (cm)	E (cm)	F (cm)	G (cm)
42	3.5	7.5	10.0	7.5	7.5	10.0	25.0
54	3.5	8.5	11.5	8.5	8.5	11.5	28.5
76.1	5.5	11.0	16.0	11.0	11.0	16.0	38.0
88.9	5.5	12.0	17.5	12.0	12.0	17.5	41.5
108	5.5	14.0	20.5	14.0	14.0	20.5	48.5



Minimum distance and length of fit

Pipe size OD x WT	316L	Standard Length	Min Distance Between Fittings	Depth of Insertion	Pipe Metres per Bundle	Bundle Weight
d (mm)	(Eur/mt)	(metres)	(millimeters)	(millimeters)	(metres)	(kg)
15 x 0.6	2.058	5	10	20	845	178
22 x 0.7	3.266	5	10	21	635	254
28 x 0.8	4.494	5	10	23	455	246
35 x 1.0	6.972	5	10	26	455	387
42 x 1.2	10.028	5	20	30	455	560
54 x 1.2	12.968	5	20	35	305	483
76.1 x 1.5	22.271	6	20	53	114	320
88.9 x 2	33.926	6	20	60	114	496
108 x 2	41.507	6	20	71	114	605

Pressfitting

Instantor Press Tools are for diameters from 12mm to 54mm.

You should take into account the minimum space you need to be able to use the pliers around the pipe and the accessory.

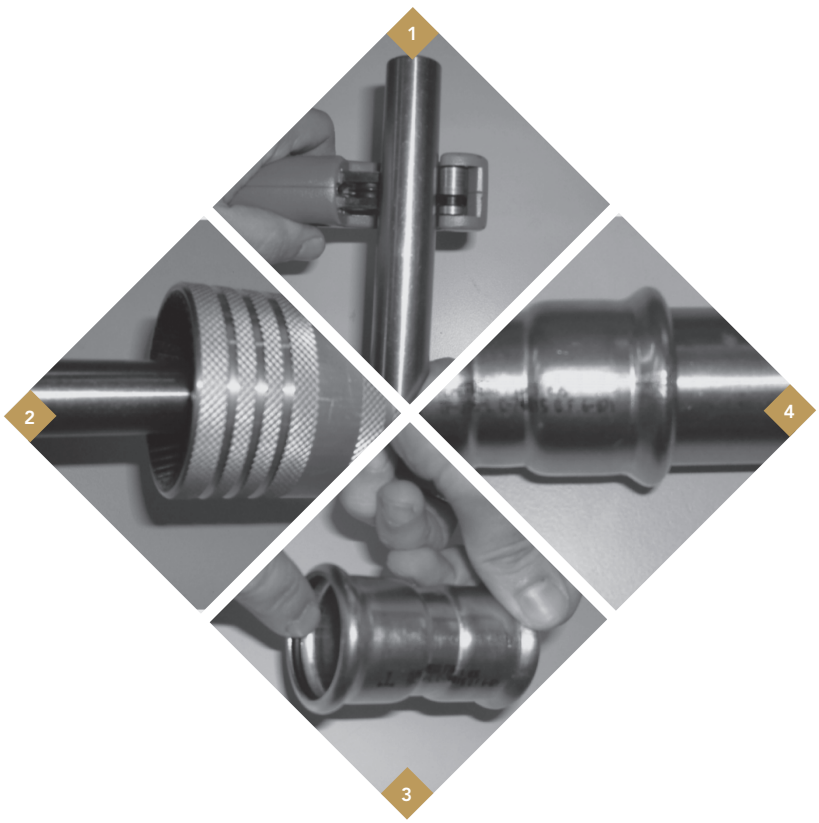
There are a range of jaws and collars with adaptors which can be changed quickly and easily depending on the external diameter of the pipes.

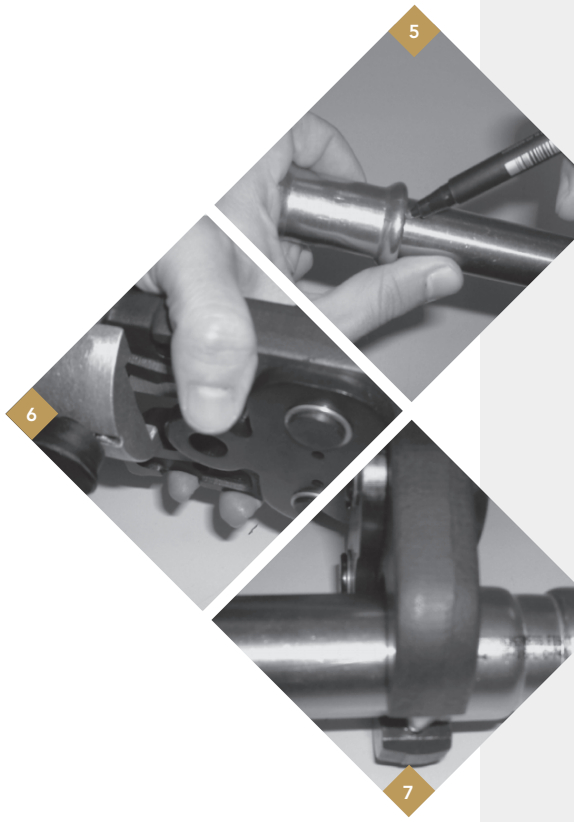
Only the appropriate jaws, collars and adaptors should be used with the press tool.

The internal slot in the jaws or collars should enclose the edge of the accessory in order to produce an adequate join. Our system uses an M jaw profile.

Assembly sequence

1. *Cut pipe at right angle.*
2. *Debur the pipe internally and externally to avoid damaging the seal.*
3. *Check the seal is properly placed. Do not use oil or grease.*
4. *Rotate the pipe slowly as you insert it in the joint until the limit.*
5. *Mark the pipe with a marker when inserted to the stop of the fitting.*
6. *Place the pressfitting jaw in the machine and insert the fastening bolt until it fits.*
7. *Open the jaw, place at a right angle and carry out the pressfitting.*





Additional Work

Testing for leaktightness

The finished pipes are tested for leaktightness before being covered or painted. Water is used in such testing for drinking water and heating installations. The results of the leaktightness testing should be documented appropriately. If it is foreseen that the pipe installation would not be operational for a long period of time after accomplishing of the leaktightness test, and for the sake of protecting the installation against possible corrosive process (there is a high probability of appearance of a puncture corrosion), we recommend that the leaktightness test should be carried out using air instead of water (please double check if you may need to have corresponding authorization for running the air test).

Drinking water installation

The leaktightness test for the pipes installed is carried out in accordance with current regulations. The pipes should be filled with filtered water so that they contain no air. The leaktightness test is used for both the preliminary and also the main test; the preliminary test may be sufficient for small parts of the installation such as, for example, connection and distribution piping in wet areas.

- **Preliminary test**: The preliminary test involves applying a test pressure corresponding to the acceptable overpressure plus 5 bar. This test pressure should be applied twice for ten minutes, within a total interval of 30 minutes. After a further 30 minutes, the test pressure should not have fallen by more than 0.6 bar (0.1 bar per 5 minutes).
- **Main test**: Immediately after the preliminary test. The test lasts 120 minutes. After this 120 minute period, the pressure reading from the end of the preliminary test should not have fallen by more than 0.2 bar. There should be no visible signs of leakage in any part of the installation checked.
- **Air tightness test**: If appropriate, carried out with the corresponding authorisation.

Heating installation

The leaktightness test for the pipes is carried out using water. Water-based heating is tested at a pressure 1.3 times higher than the overall pressure at each point in the installation, increasing the pressure by a minum of 1 bar. If possible, immediately following the leaktightness test using cold water, the installation should be checked to verify its leaktightness up to its maximum temperature.

This is carried out by heating the water to the maximum temperature on which the calculation is based. The pipes are washed out with drinking water before being put into operation.

Insulation

Insulation of piping serves to reduce:

– heat transfer
– fluids transported being heated by ambient temperatures
– noise
– condensation

Closed cells insulation material also provides protection against corrosion.

Requirements for pipe insulation are specified in local regulations.

When choosing insulating materials, we should ensure that they do not contain in excess of 0.05% of chloride ions.

Drinking water installation

Drinking water pipes should be protected against the formation of condensation and heating. Cold drinking water pipes should be installed at a sufficient distance from heat sources, and should be insulated so that the water quality is not affected by heating. In order to save energy, and for reasons of hygiene, hot drinking water pipes and water circulation pipes should be insulated to avoid excessive heat loss.

Heating installations

The insulation of water-based heating installations is a way of saving energy. This measure reduces CO_2 emissions. Heating is the largest single domestic source of energy consumption, accounting for 53% of energy use.

Water-based refrigeration systems

The main reasons for insulation against cold are to prevent the formation of condensation and to reduce energy losses when the water-based refrigeration pipes are in use. Increasing energy costs can only be avoided safely and lastingly by establishing the correct system.

Insulating materials and hoses can result in corrosion of pipes. For this reason, materials should be assessed for suitability when they are being chosen.

It is recommended that you consult with the pipe insulation supplier with regard to the suitability of the insulation for use on 316L pipework.

Thermal Elongation

Elongation (Expansion) Compensation

Whilst in use, pipes are subject to thermal loads which elongate them to differing degrees depending on temperature differences. Pipe installations should take into account such thermal elongation by:

– Allowing space for longitudinal elongation
– Elongation (Expansion) Compensators
– Correct fixing of the fixed and sliding fastenings

The flexion and torsion effects on a pipe during use can easily be absorbed if these factors are taken into account during assembly (to offset the elongation).

Small longitudinal changes in pipes can be offset by expansion space or absorbed by the elasticity of the pipe network.

Elongation compensators (such as flexible arms, expansion bends) should be used in large pipe networks. The choice of the compensator to be used depends on the material and characteristics of the construction and its service temperature.

Longitudinal change Δl (mm) of stainless steel

Tube length (m)	Δl (mm) Δυ: Temperature difference (K)									
	10	20	30	40	50	60	70	80	90	100
1	0.16	0.33	0.50	0.66	0.82	1.00	1.16	1.30	1.45	1.60
2	0.33	0.66	1.00	1.30	1.60	2.00	2.30	2.60	2.90	3.20
3	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
4	0.66	1.30	2.00	2.60	3.30	4.00	4.60	5.20	5.90	6.60
5	0.82	1.60	2.50	3.30	4.10	5.00	5.80	6.60	7.40	8.20
6	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.40	10.80
7	1.16	2.30	3.50	4.60	5.70	7.00	8.20	9.00	10.20	11.40
8	1.32	2.60	4.00	5.30	6.50	8.00	9.30	10.40	11.70	13.00
9	1.48	3.00	4.50	6.00	7.40	9.00	10.50	11.70	13.30	14.80
10	1.65	3.30	5.00	6.60	8.30	10.00	11.60	13.20	14.90	16.60

In stainless steel pipes, the longitudinal change resulting from thermal elongation (from 20 °C to 100 °C) is given by:

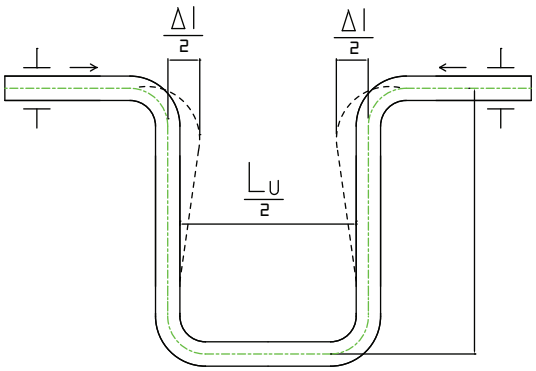
$$\Delta l = l_0 \times \alpha \times \Delta \upsilon$$

With a thermal elongation coefficient of:

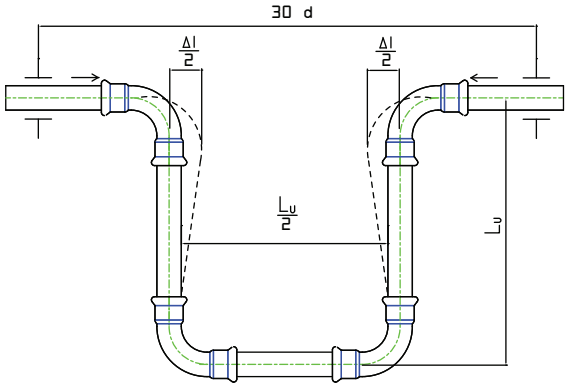
$$\alpha\ [10^{-6}\ K^{-1}] = 16.5$$

For pipe length 10 m:

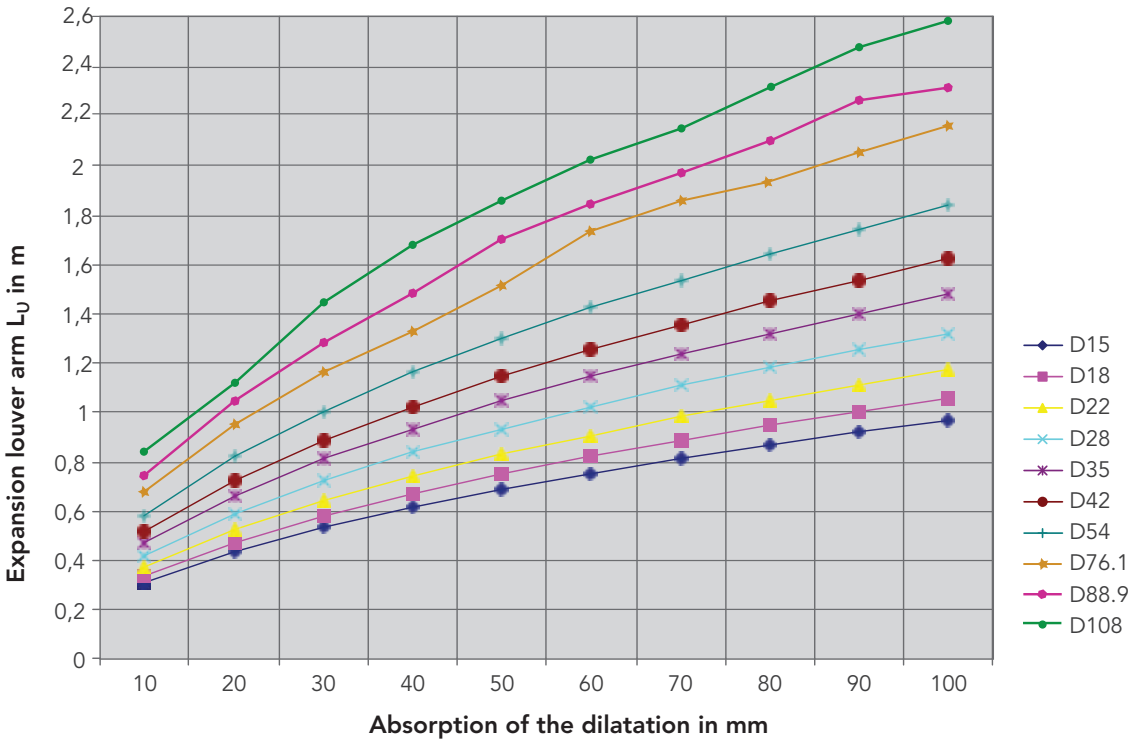
$$\Delta \upsilon = 50\ K.\ \ \Delta l\ (mm) = 8.3$$



Offsetting elongation using bend based on a curved pipe.



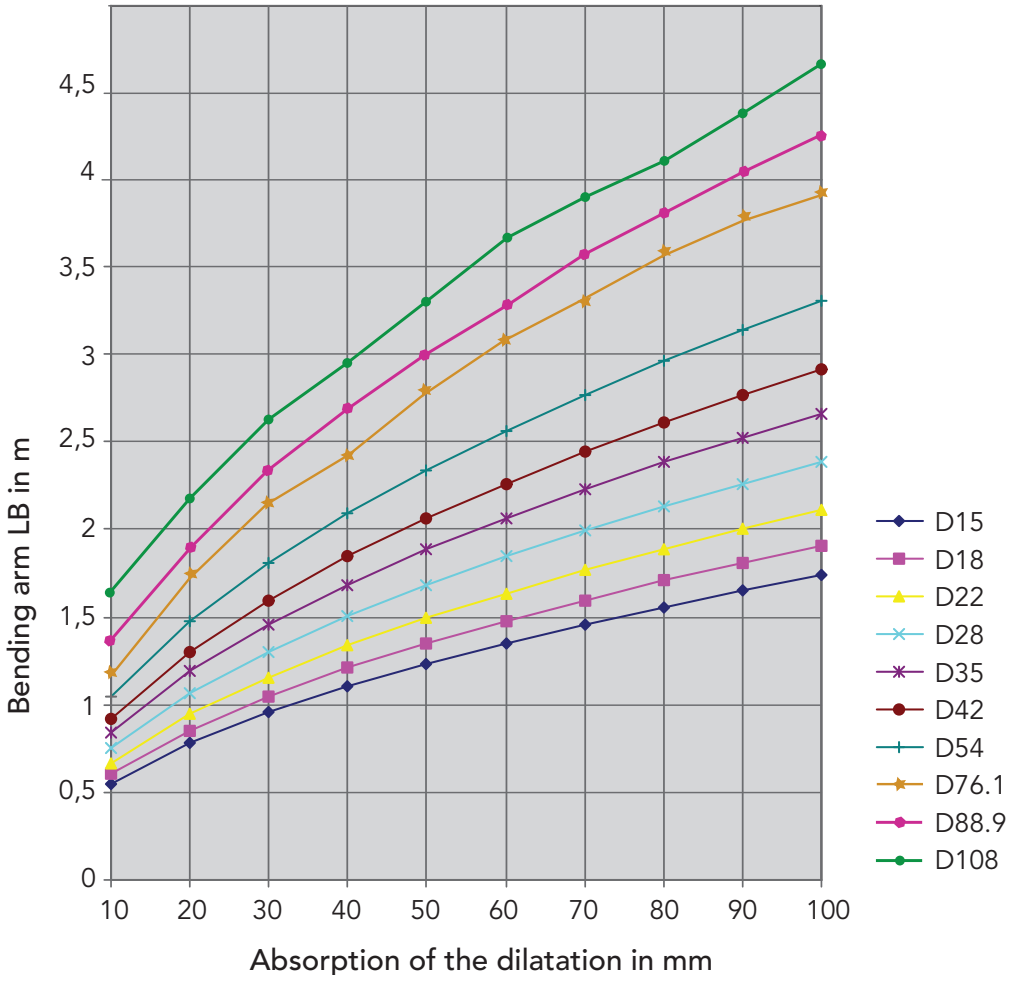
Offsetting elongation using bend made with accessories.



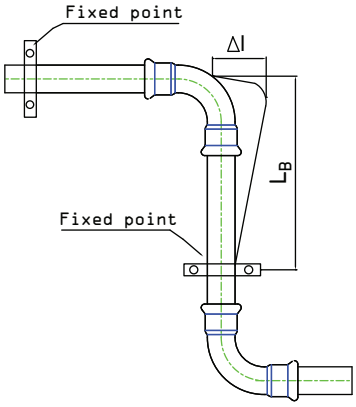
Determining the length of the flexible arm L_U. Formula: $L_U = 0.025\sqrt{(d \times \Delta l)}$ mm (d and Δl in mm).

Thermal Elongation

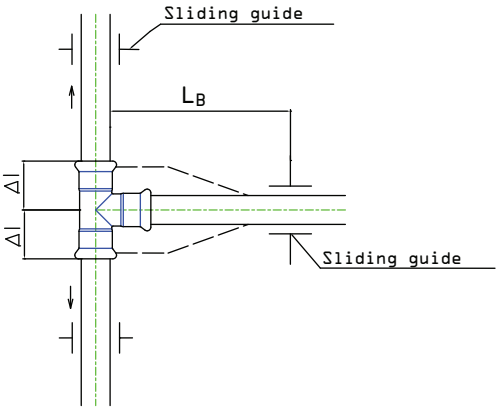
Elongation compensation



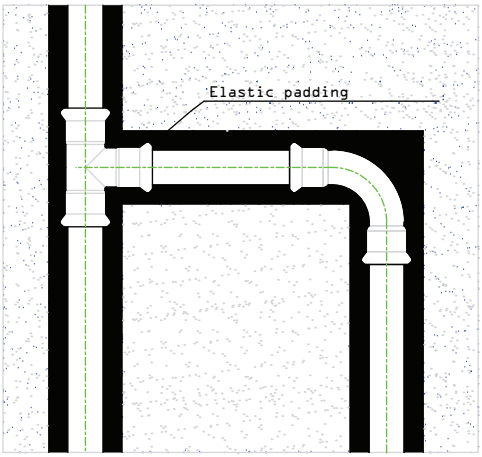
Determining the length of the flexible arm L_B. Formula: $L_B = 0.045\sqrt{(d \times \Delta l)}$ m (d and Δl in mm).



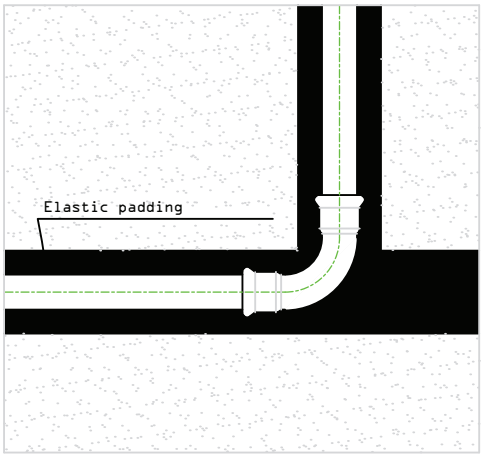
Offsetting elongation using flexible arm.



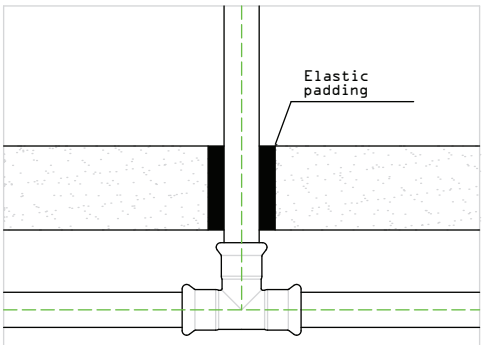
Offsetting elongation by derivation.



Under plaster



Under floating floor



Under gallery

Elongation compensation

In installations we have to distinguish the following types of pipes:

- those which are visible or installed under galleries
- those which are to be under plaster (built in)
- those which are under floating floors

In the case of visible installations or those under galleries, there is sufficient space. In the case of pipes which are built in, we should ensure the installation of an elastic protective filling of insulating fibre such as for example glass fibre, rock wool or sponge materials with closed pores.

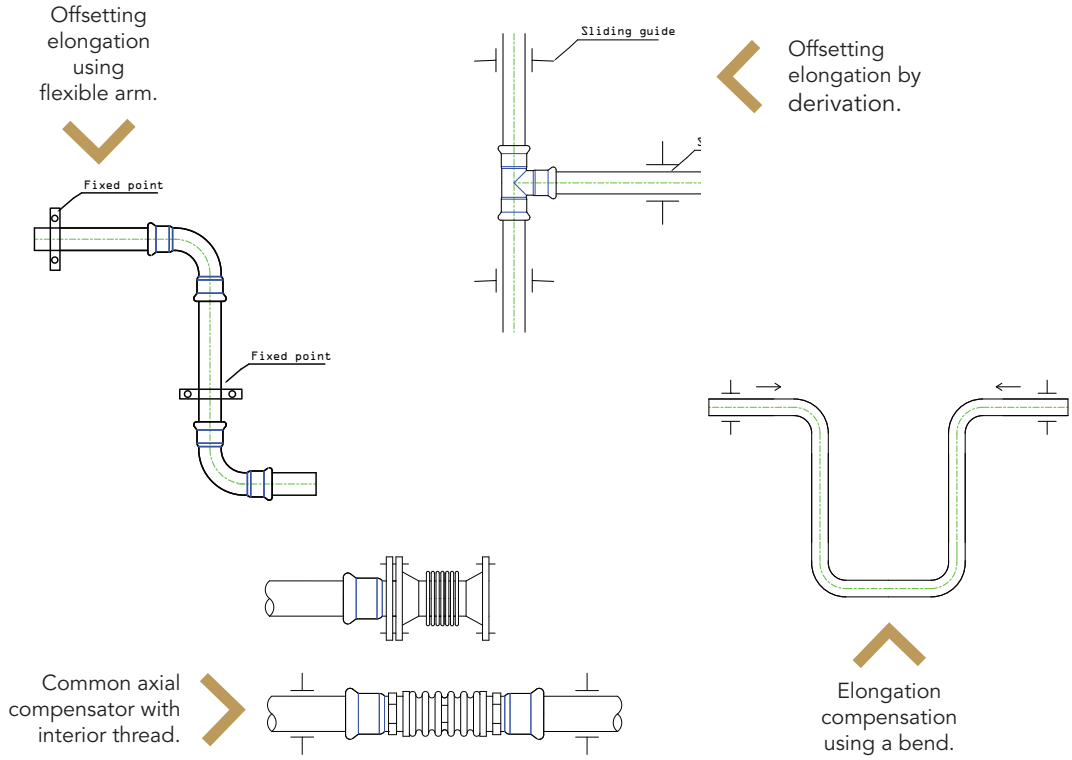
Elongation compensators

The longitudinal variation of pipes may be offset by an expansion space and/ or absorbed by elasticity in the pipe network.

If this is not possible, elongation compensators should be installed.

Thermal Elongation

Elongation (Expansion) Compensators



Heat Emission and Heat Insulation for Pipes

In this point, we need to differentiate between the heat emitted by hot water pipes – heating and hot water – and drinking water pipes. The former case deals with pipes installed in areas involving heating, whilst the other does not require specific heating, and might even need to be kept cold.

In the first case, the emission of heat by pipes has a favourable effect on the parts of buildings to be heated and, as a result, taking into account this heat emission in thermal calculations, does not result in economic losses.

Pipes which should be protected against heat emissions require additional insulation. Pipes can be insulated using fibres (such as glass fibre) or by prefabricated elements in the form of single-shell casings. We do not recommend the use of tubular casings or felt wrappings, as felt retains absorbed moisture for too long which can result in corrosion.

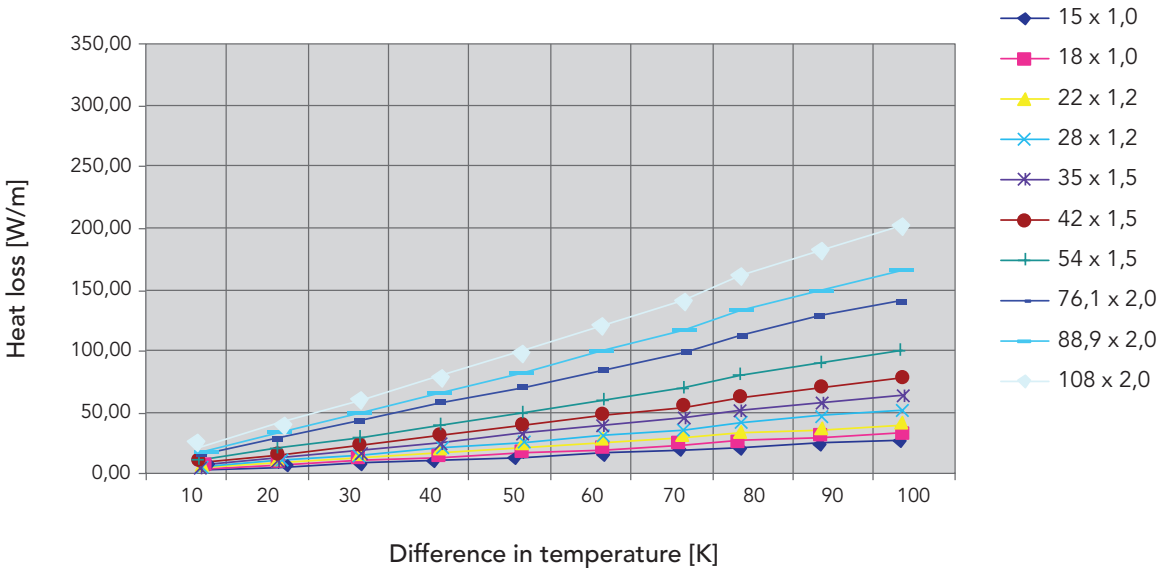
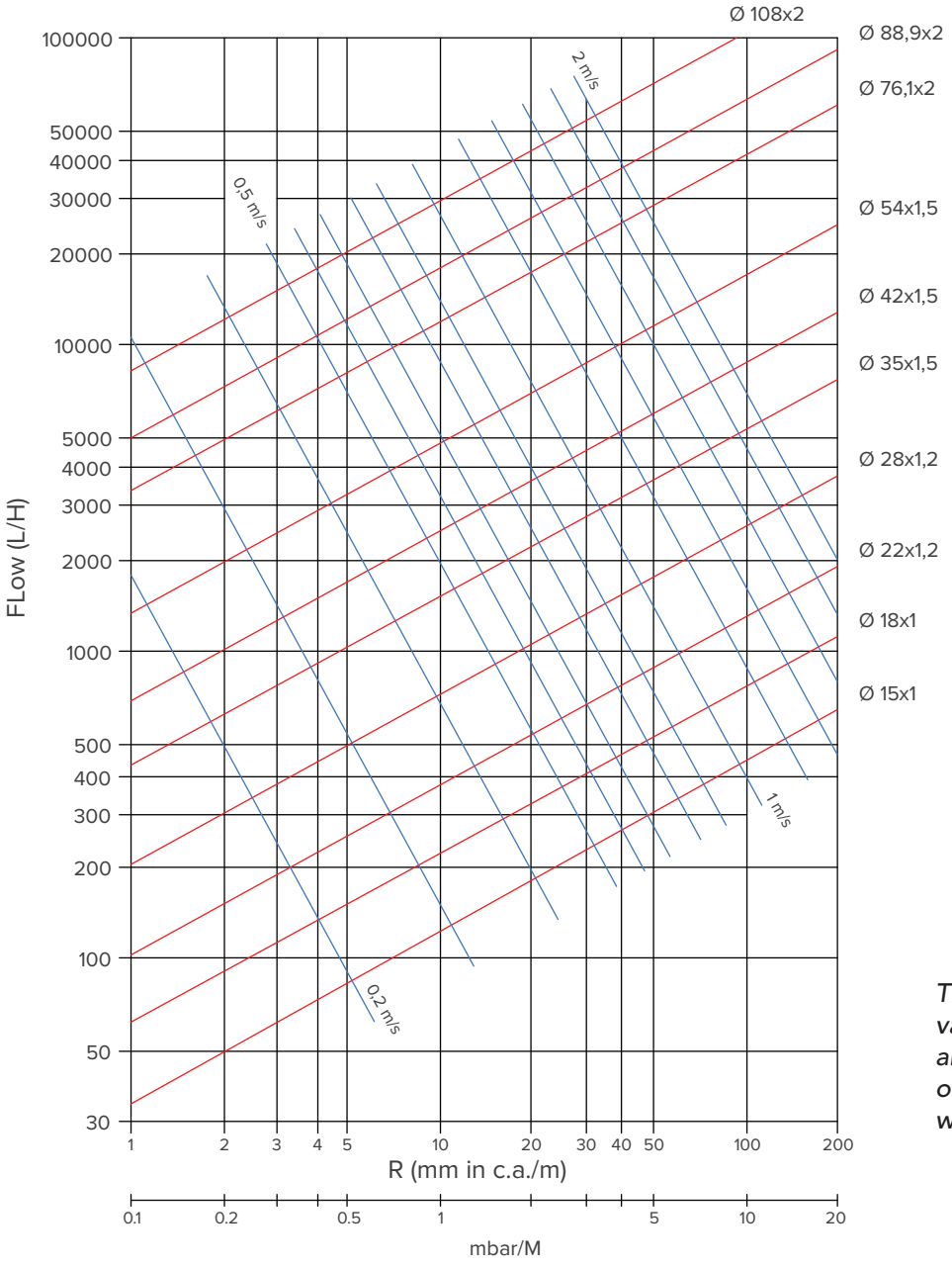


Table for heat loss [W/m] from n° 1.4401 (316) stainless steel tube (visible installation)

Diameter x thickness	Δv: Temperature difference [K]									
mm	10	20	30	40	50	60	70	80	90	100
15 x 1.0	2.72	5.44	8.16	10.88	13.60	16.32	19.04	21.76	24.48	27.20
18 x 1.0	3.29	6.57	9.86	13.15	16.44	19.72	23.01	26.30	29.59	32.87
22 x 1.2	4.02	8.04	12.06	16.08	20.10	24.12	28.14	32.16	36.18	40.20
28 x 1.2	5.15	10.31	15.46	20.61	25.77	30.92	36.08	41.23	46.38	51.54
35 x 1.5	6.44	12.88	19.32	25.76	32.21	38.65	45.09	51.53	57.97	64.41
42 x 1.5	7.76	15.53	23.29	31.05	38.81	46.58	54.34	62.10	69.86	77.63
54 x 1.5	10.03	20.05	30.08	40.11	50.13	60.16	70.19	80.21	90.24	100.26
76.1 x 2.0	14.14	28.28	42.42	56.56	70.70	84.83	98.97	113.11	128.43	141.39
88.9 x 2.0	16.55	33.11	49.66	66.21	82.76	99.32	115.87	132.42	148.97	165.53
108 x 2.0	20.15	40.31	60.46	80.61	100.77	120.92	141.70	161.23	181.38	201.53

Load Loss

The pipe network places a continuous restriction on the flow of fluid resulting from friction which is known as **load loss**. This reduces pressure in the system as it flows through the pipes and accessories. This chart will help to calculate this factor.



The chart shows the value of the load loss R and the flow as a function of fluid velocity m/s for water at 10°C.

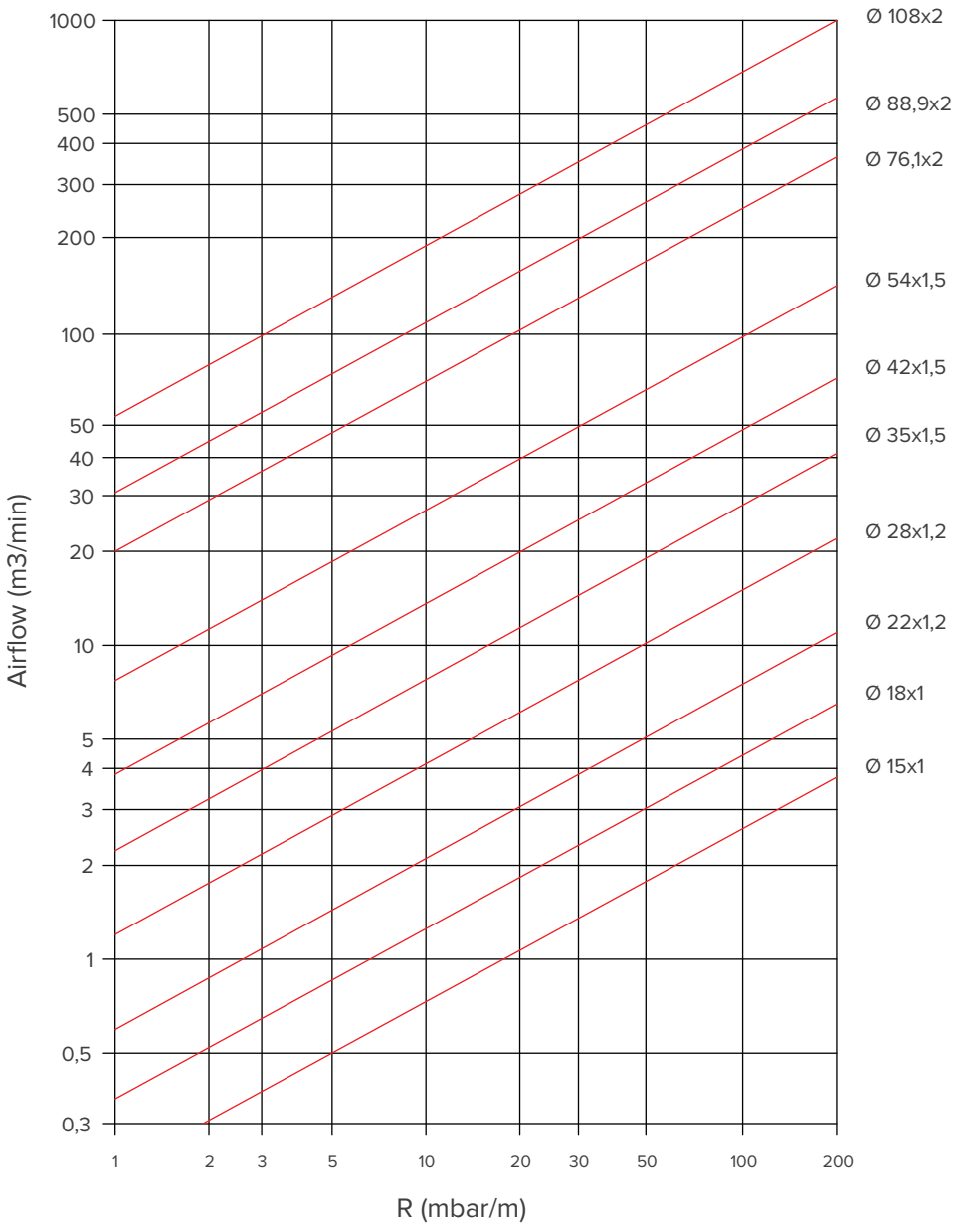
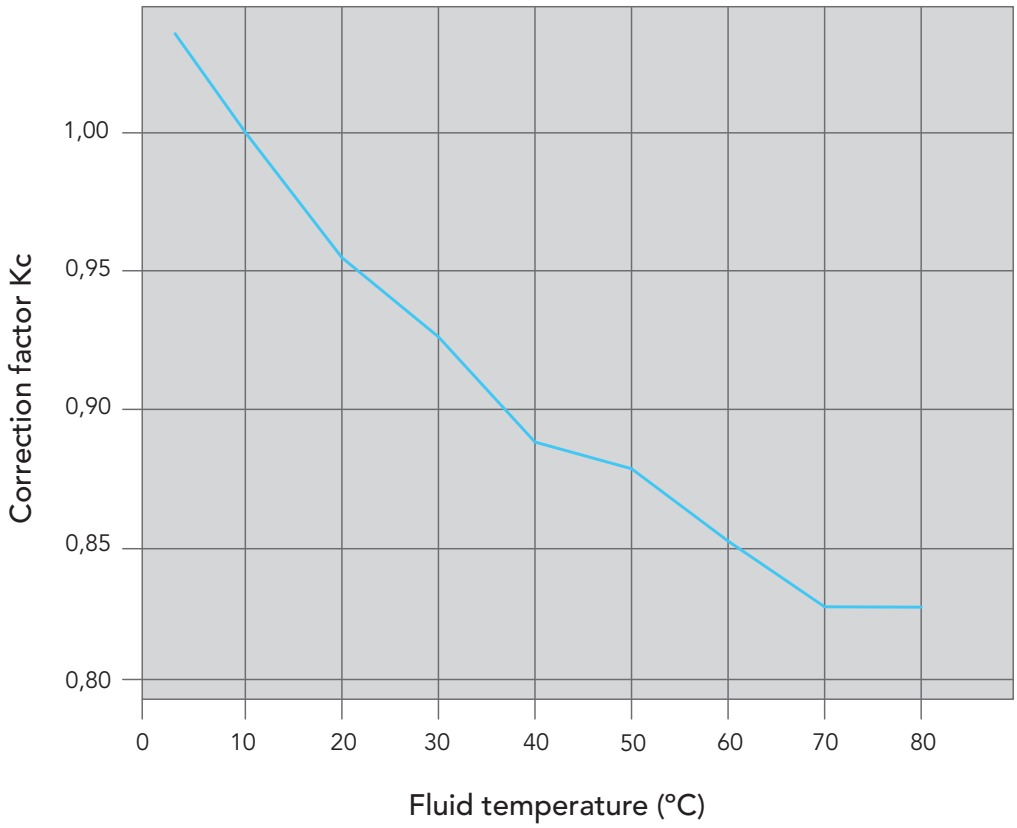


Chart of load loss for compressed air at 7 bar and 15°C.

Load loss

Table of load loss in the main press fittings (in equivalent metres of pipe)

INSTANTOR STAINLESS STEEL PRESS	Resistance coefficient in equivalent metres, calculated for a water velocity of 0.7m/s									
										
	1.5	0.7	0.5	0.5	0.4	0.9	1.3	1.5	3	1.5
15 x 1.0	0.90	0.40	0.30	0.30	0.25	0.50	0.70	0.90	1.80	0.90
18 x 1.0	1.10	0.50	0.40	0.40	0.30	0.65	0.90	1.10	2.30	1.10
22 x 1.2	1.40	0.60	0.50	0.50	0.40	0.80	1.20	1.40	2.80	1.40
28 x 1.2	1.90	0.90	0.60	0.60	0.50	1.10	1.50	1.90	3.80	
35 x 1.5	2.50	1.20	0.80		0.70	1.50	2.10	2.50	5.00	
42 x 1.5	3.10	1.40	1.00		0.90	1.80	2.60	3.10	6.20	
54 x 1.5	4.00	1.80	1.30		1.10	2.30	3.30	4.00	8.00	
76.1 x 2		2.50	1.90		1.60	3.10	5.00	5.60	11.50	
88.9 x 2		3.00	2.20		1.90	3.70	5.80	6.50	13.00	
108 x 2		3.50	2.60		2.20	4.40	7.00	7.80	16.00	



We also have the correction Kc based on the water temperature.

Reaction to Corrosion

REACTION TO CORROSION OF STAINLESS STEEL PIPES IN DRINKING WATER SYSTEMS

General

Perforation corrosion only occurs in stainless steel under certain conditions. Corrosion in fissures occurs in cracks or areas of sedimentation.

Resistance to interior corrosion

Austentic stainless steel is passive in drinking water systems. In this state it is completely resistant to uniform corrosion of its surface, avoiding any hygiene problems, such as, for example, contamination by heavy metals (non-ferrous metals).

Stainless steel is resistant to corrosion from the chemical products used in the treatment of drinking water. This is also true for decalcinated, decarbonated and distilled water.

The various forms of corrosion are defined below by their causes:

– **Perforation corrosion**: Perforation corrosion can only take place in water with high levels of chlorides. In the use of AISI 316 stainless steel material, the concentration of chloride ions in the water cannot exceed 500 mg · l^{-1} = 30 mol · m^{-3}. Most other substances in water inhibit perforation corrosion. The probability of perforation corrosion in AISI 316 stainless steel material does not increase as a result of common chloride indices of 1 to 2 mg/l of water.

– **Fissure corrosion**: The contents of the "Perforation corrosion" section also apply here. Experience has shown that, under current application conditions, AISI 316 stainless steels fittings which contain molybdenum have sufficient resistance to fissure corrosion from water with authorised chloride levels in domestic sanitary water installations.

– **Intercrystalline corrosion**: In tests, pipes and fittings are shown to be resistant to intercrystalline corrosion. If water installations contains desinfectants, please always ask our technical department before use.

– **Transcrystalline corrosion resulting from tension-fissuring**: Transcrystalline corrosion does not take place in drinking water at temperatures below 45°C. This type of corrosion only occurs at higher temperatures combined with perforation and fissure corrosion. As a result, there will be no tension-fissuring corrosion if the stipulations of the "Perforation corrosion section" are followed.

Resistance to external corrosion

There is a risk of external corrosion when:

– Hot water pipe system with accessories that come into contact with construction material containing chlorides (antifreeze, accelerators with chloride content) and insulating materials which contain chlorides; and when they are subject to humidity over prolonged periods which exceed those which normally occur during construction.

– It is not possible to avoid the appearance of humidity in hot water pipes and accessories which could result in higher chloride concentrations.

In such situations it is generally necessary to apply an anti-corrosive in layers. This layer needs to be thick, non-porous and defects, and to be resistant to heat and ageing. Plastic tape can be used as adequate protection against corrosion. Heat insulation measures are not sufficient to meet the requirements to ensure protection against exterior corrosion. The manufacturer's instructions should be followed.

If the stainless steel installation is in contact with construction materials which may be wet with water containing chlorides during a prolonged period, they should be dried before being installed.

In the case of installation on top of plaster or in installations under galleries, no anti-corrosive is required.

Materials

Physical properties	
Density	8.000 kg/m^3
Specific heat (20°C)	500 J/kg · K
Thermal conductivity (20°C)	15 W/m · K
Linear elongation coefficient (20-200°C)	16.5 10^{-6}/K
Elasticity module (20°C)	200 KN/mm^2
Electrical resistance (20°C)	0.75 Ω mm^2/m

Mechanical properties	
Minimum elasticity limit	240 N/mm^3
Minimum elongation	40%
Minimum breakage load	530 N/mm^2

Chemical composition		
%	AISI 316L	AISI 304
Cr	16.5-18.5	17-19.5
Ni	10-13	8-10.5
Mo	2-2.5	
Mn max.	2	2
Si max.	1	1
P max.	0.045	0.045
S max.	0.015	0.015
C max.	0.03	0.07

Stainless steel is resistant to corrossion through its ability to remain passive in a large number of atmospheres. In its passive state, stainless steel has a very fine, invisible, stable protective layer.

Resistance to corrossion is not the same in all stainless steel, as some forms are more resistant than others. European regulation EN-10088 details the various types of stainless steel.

AISI 304 (1.4301) stainless steel is the most common form used in drinking water installations.

AISI 316L (1.4404) stainless steel is recommended when the level of dissolved chlorides in water exceeds 200 ppm (200 mg/litre), particularly for hot water installations, as the corrosive effect increases with temperature.

The difference between AISI 304 and AISI 316L is the presence of molybdenum (Mo) which is added to the alloy in a proportion of 2-2.5% to protect the stainless steel from the action of chloride. The Instantor Stainless Steel Press range uses high quality 316L material in the pipework and fittings.

Stainless steel is a poor conductor of heat, which means it can be used for transporting fluid with lower heat losses. The linear expansion of stainless steel pipework highlights the importance that elongation should be taken into consideration in installations which are subject to hot-cold cycles.

Comparison of main characteristics with other materials

	Physical properties		Mechanical properties		
	Specific weight (kg/dm^3)	Linear elongation (k 10/°C)	Resistance to traction (N/mm^2)	Elastic limit (N/mm^2)	Lengthening
Stainless steel	8.0	16	600	220	45
Galvanised steel	8.0	12	350	220	25
Copper	8.9	16.5	250	130	50
Aluminium	2.7	24	90	70	15
Heat-resistant PVC		70	55		30

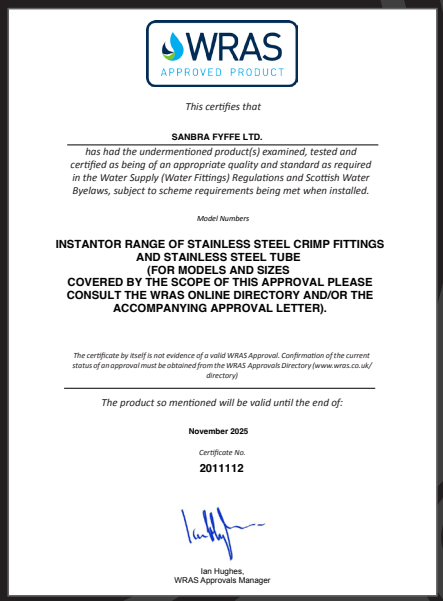
Warranty

Instantor Stainless Steel Press Fittings and Pipe carry a warranty of 10 years. The warranty covers defects in manufacture which are attributable to our areas of responsibility. The guarantee is only valid when the joint has been created using Instantor Stainless Steel Press fittings and pipe, and the joint has been pressfitted under pressure of not less than 19kN for pipe diameters of 15-28mm and 32kN for pipe diameters of 28-54mm using an Instantor Press M-profile jaw. For diameters greater than 54mm ask our technical department.

This warranty is not valid if the installation was carried out by non-professionals or if the assembly instructions in our manual were not followed. Civil responsibility is limited to a period of ten years after the installation.

In the event of damage, this must be communicated to Sanbra Fyffe Ltd. in writing within a period of five days from the accident. Defective Instantor Stainless Steel Press Fittings and Pipes must be kept and made available to our technicians for the checks required in each case.

Instantor®



WRAS APPROVED PRODUCT

This certifies that

SANBRA FYFFE LTD.

has had the undermentioned product(s) examined, tested and certified as being of an appropriate quality and standard as required in the Water Supply (Water Fittings) Regulations and Scottish Water Byelaws, subject to scheme requirements being met when installed.

Model Numbers

INSTANTOR RANGE OF STAINLESS STEEL CRIMP FITTINGS AND STAINLESS STEEL TUBE (FOR MODELS AND SIZES COVERED BY THE SCOPE OF THIS APPROVAL PLEASE CONSULT THE WRAS ONLINE DIRECTORY AND/OR THE ACCOMPANYING APPROVAL LETTER).

The certificate by itself is not evidence of a valid WRAS Approval. Confirmation of the current status of an approval must be obtained from the WRAS Approvals Directory (www.wras.co.uk/directory)

The product so mentioned will be valid until the end of:

November 2025

Certificate No.

2011112

Ian Hughes,
WRAS Approvals Manager

NSAI

Certificate of Registration
of Environmental Management
System to I.S. EN ISO 14001:2015

Sanbra Fyffe Ltd (Instantor)
Instantor Works
Santry Avenue
Santry
Dublin 9
Ireland
D09K160

NSAI certifies that the aforementioned company has been assessed and deemed to comply with the provisions of the standard referred to above in respect of:-

The supply of brassware compression fittings & the distribution of plumbing & heating equipment

Registration Number: 14.5368
Original Registration: 14 June 2021
Last amended on: 19 July 2021
Valid from: 19 June 2021
Remains valid to 18 July 2024

All valid certifications are listed on NSAI's website – www.nsai.ie. *The continued validity of this certificate may be verified under "Certified Company Search"*

NSAI (National Standards Authority of Ireland) 1 Swift Square, Northwood, Santry, Dublin 9, Ireland T +353 1 807 3800 F

CERT-161 WM: 14001 2015 INAB (3)

NSAI

Certificate of Registration
of Quality Management System
to I.S. EN ISO 9001:2015

Sanbra Fyffe Ltd (Instantor)
Instantor Works
Santry Avenue
Santry
Dublin 9
Ireland

NSAI certifies that the aforementioned company has been assessed and deemed to comply with the provisions of the standard referred to above in respect of:-

The supply of brassware compression fittings and the distribution of plumbing and heating equipment.

Registration Number: 183787
Original Registration: 19 February 1992
Last amended on: 16 August 2020
Valid from: 7 October 2020
Remains valid to: 7 October 2023

All valid certifications are listed on NSAI's website – www.nsai.ie. The continued validity of this certificate may be verified under "Certified Company Search"

NSAI (National Standards Authority of Ireland) 1 Swift Square, Northwood, Santry, Dublin 9, Ireland T +353 1 807 3800 E

CERT-155 WM: 9001 2015 INAB (3)

T 01 842 6255 E sales@instantor.ie **www.instantor.ie**

Sanbra Fyffe Ltd.
Instantor Works, Santry Avenue, Santry, Dublin D09 K160

Make the connection with us socially

Superior Plumbing Products
Manufactured by **Sanbra Fyffe**