filinox

PRESSFITTINGS TECHNICAL MANUAL

Instalpress inox

Instalpress steel

SUMMARY

PRESSFITTINGS TECHNICAL MANUAL

This technical manual offers important indications especially for the project manager and installer for analysing the application of pipe systems according to current technical requirements.

This technical document refers to current European technical requirements, and as applicable shows other Spanish dispositions and regulations as well as the general "technical status".

For other queries, please ask the **FILINOX** Technical Department.

1. SYSTEM TECHNOLOGY

1.1 Pressing technique

The Instalpress Inox and Instalpress Steel press-fit systems consist of pipes and fittings with an O-ring inside.

The system is based on a mechanical joint created when pressure is exerted by a press machine, making the pipe and the fitting form a single, completely sealed unit.

The installer does not need any tools other than the press machine, a marker and a pipe cutter – the basic instruments for completing an installation. There is no need to carry gas bottles, torches, catalysts, etc.

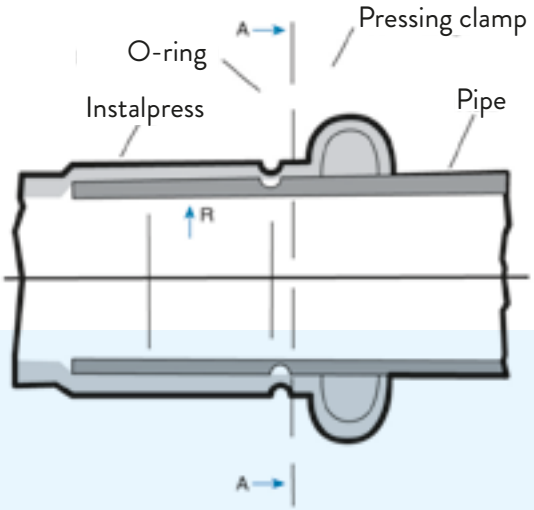
The speed of assembly considerably reduces installation costs, allowing users greater accessibility to stainless steel installations, the mechanical properties of which have led it to be considered the best and most efficient on the market. This fast, simple and safe joint is a technical and economical alternative to threaded or welded joints.

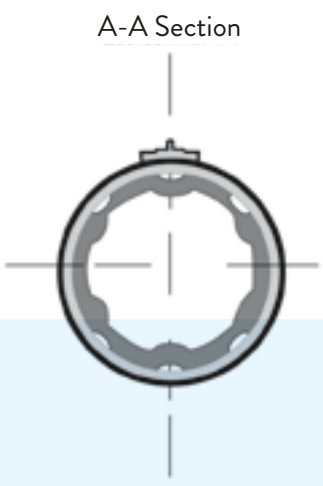
Critical factors to ensure the mechanical strength of the joint are the profile of the fitting and the insertion depth of the pipe within the press-fit fitting.

EPDM elastomer is used to seal the joint. The pressed joint, which is indissoluble according to DVGW W 534 and has a long-lasting seal, is inseparable due to its shape and longitudinal force, which are achieved by means of cold-shaping both the press-fit fittings and the pipe.

The joint is created using the press tool described in this technical manual.

The pressing process shapes the profile in two positions. In the first position, the seal is achieved by the compression of the elastomer. To give the joint the necessary mechanical resistance, the press-fit fittings and the pipe are cold-formed in the second position.





1.2 Instalpress INOX and Instalpress STEEL systems pipe technical data.

• UNE-EN 10312 STANDARD: "WELDED STAINLESS STEEL PIPES FOR AQUEOUS LIQUIDS INCLUDING WATER FOR HUMAN CONSUMPTION. TECHNICAL CONDITIONS OF SUPPLY".

This European standard establishes delivery conditions for thin-walled stainless steel pipes especially for piping water, heating, etc., including water for human consumption, supplied in straight pipes suitable for being installed with fittings with adhesive, capillary welding with inert gas, welding silver, compressive or pressfittings (pressure).

This standard applies to 6mm to 267mm external diameter pipes.

Taking into account that the standards are the same in all the entities and units related to the approval and legalisation of drinking water and heating, etc. facilities, it is approved and valid according to the former UNE 19049-1 as well as the current UNE EN 10312 standard.

Measures provided in the standard and marketed by FILINOX, S.A. are the following:

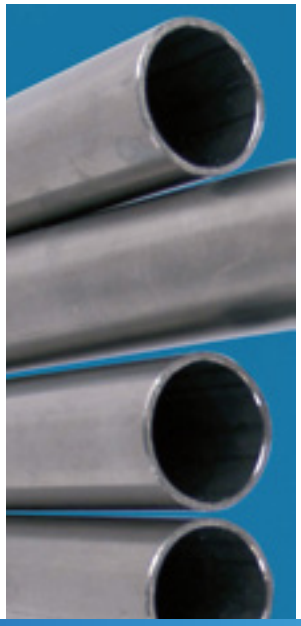
	ND	ext Ø (mm)		UNE-EN 10312 theoretic thickness, Series 1	Linear mass Kg / m	UNE-EN 10312 theoretic thickness, Series 2 (DVGW GW-541)	Linear mass Kg / m
		Max	Min				
UNE-EN 10312 Serie 1 Serie 2 (DVGW)	10	10,045	9,940	0,6	0,141	-	-
	12	12,045	11,940	0,6	0,171	-	-
	15	15,045	14,940	0,6	0,216	1	0,351
	18	18,045	17,940	0,7	0,303	1	0,426
	22	22,055	21,950	0,7	0,373	1,2	0,625
	28	28,055	27,950	0,8	0,545	1,2	0,805
	35	35,070	34,965	1,0	0,851	1,5	1,258
	42	42,070	41,965	1,2	1,230	1,5	1,521
	54	54,070	53,840	1,2	1,470	1,5	1,972
	76,1	76,300	75,540	2,0	3,711	2,0	3,711
	88,9	89,120	88,230	2,0	4,352	2,0	4,352
	108,0	108,250	107,17	2,0	5,328	2,0	5,328

The tube of the **Instalpress INOX** System is a fine wall tube welded lengthwise. The tube is made from fine alloy Cr-Ni-Mo steel, austenitic, stainless, with material No. 1.4404 (AISI-316 L) according to UNE-EN 10088.

These installation tubes comply with UNE-EN 10312, UNE-EN 10217-7 as well as DVGW GW-541 requirements. The internal and external surfaces of these tubes are pure metal, they are therefore free from tempering colours, are shiny and also free from corrosive and hygienically toxic substances.

All the system's tubes are tested and certified by DVGW.

The **Instalpress INOX** pipes are supplied in 6m bars.



Nominal diameter ND	d x s mm	di mm	Longitudinal mass Kg / m	Water content L / m
12	15 x 1,0	13	0,351	0,133
15	18 x 1,0	16	0,426	0,201
20	22 x 1,2	19,6	0,625	0,302
25	28 x 1,2	25,6	0,805	0,514
32	35 x 1,5	32	1,258	0,804
40	42 x 1,5	39	1,521	1,194
50	54 x 1,5	51	1,972	2,042
65	76,1 x 2,0	72,1	3,711	4,080
80	88,9 x 2,0	84,9	4,352	5,660
100	108,0 x 2,0	104	5,328	8,490

- **UNE-EN 10305-3 STANDARD: "STEEL TUBES FOR PRECISION APPLICATIONS. TECHNICAL CONDITIONS OF SUPPLY. PART 3: WELDED AND COLD-CALIBRATED TUBES"**

The **Instalpress STEEL** system's tube is an E-220 non-alloy steel precision tube with material No. 1.0038 according to DIN UNE-EN 10305, fine wall and welded lengthwise as stated in the DIN UNE-EN 10305-3 standard.

The non-alloy steel is characterised by its high grade of purity and low carbon content. It can be welded if necessary.

The tube is galvanised on the outside and inside (for PCI use) or on outside only (for heating use) and the welding is polished in order to guarantee a perfectly sealed surface.

The **Instalpress STEEL** pipes are supplied in 6m bars.

Nominal diameter ND	d x s mm	di mm	Longitudinal mass Kg / m	Water content L / m
10	12 x 1,2	9,6	0,416	0,079
12	15 x 1,2	12,6	0,408	0,125
15	18 x 1,2	15,6	0,497	0,191
20	22 x 1,2	19,6	0,616	0,302
25	28 x 1,5	25	0,980	0,491
32	35 x 1,5	32	1,239	0,804
40	42 x 1,5	39	1,498	1,194
50	54 x 1,5	51	1,942	2,042
65	76,1 x 2,0	72,1	3,655	4,080
80	88,9 x 2,0	84,9	4,286	5,660
100	108,0 x 2,0	104	5,228	8,490

1.3 Instalpress INOX and Instalpress STEEL system pipe fittings technical data.

• Instalpress INOX

The Instalpress INOX system pressfittings are made from fine alloy Cr-Ni-Mo steel, austenitic, stainless, with material No. 1.4404 (AISI-316 L) according to UNE-EN 10088. The diameters of these fittings are manufactured in compliance with the UNE-EN 10312 and DVGW GW-541 specifications, and are supplied with factory-fitted EPDM gaskets.

Diameter, mm	Wall thickness, mm
15 - 54	0.6 ÷ 1,5
76,1 – 108,0	2,0

• Instalpress STEEL

The Instalpress STEEL pressfittings are made from E-235 +N non-alloy steel, material No. 1.0308 according to DIN UNE-EN 10305-2 and supplied in 12mm to 108mm dimensions. The galvanised zinc layer protects the fitting from external corrosion. The fittings are permanently marked with the manufacturer's logo and the inscription "Zinc plated".

Diameter, mm	Wall thickness, mm
12 - 54	1,2 ÷ 1,5
76,1 – 108,0	2,0

The Instalpress STEEL pressfittings are supplied with factory-fitted EPDM black joint rings.

1.4 System elastomer technical data

The sealing material used by **FILINOX, S.A.** for the precedent joined is EPDM (ethylene propylene) and is factory-fitted in the system's pressfittings. The gasket has a contour, so that any unpressed spots are immediately recognisable. This elastomer is consistent with the German Health Authority's KTW recommendation requirements and is especially suitable for drinking water applications.

FILINOX, S.A. supplies the following gaskets for other applications:

Gasket types and specifications

EPDM, black	FPM (DIN ISO 1629) FKM (ASTM D1418), green	FPM (DIN ISO 1629) FKM (ASTM D1418), red
Temp: -10°C - +110°C (120°C) Diameter: Ø12 - Ø108mm	Temp: -30°C - +160°C (200°C) Diameter: Ø15 - Ø108mm	Temp: -30°C - +160°C (200°C) Diameter: Ø15 - Ø108 mm
		
Applications: • Drinking water • Delible water • Rainwater • Heating installations • Circulation pipes • Fire fighting protection systems	**Applications:** • Air pressure systems • Vapour and compressed air systems • Solar power installations • Cooling installations • Hydrocarbons, except diesel • Mineral, vegetable and synthetic oils	**Applications:** • Air pressure systems • Mineral, vegetable and synthetic oils • Grease and industrial applications • Hydrocarbons, (except heavy diesel)

2. PRESSFITTING MATERIALS

	Instalpress INOX	Instalpress STEEL
DRINKING WATER	Suitable	Not suitable
HEATING	Suitable	Suitable Outside galvanised pipe
SOLAR	Suitable with FKM (green)	Suitable with FKM (green)
GAS	GASRESS	Not suitable
FUEL (diesel)	Suitable with FKM (red)	Suitable with FKM (red)
PRESSURISED AIR	Suitable up to Class 4 Class 5, with FKM (green)	Suitable up to Class 4 Class 5, with FKM (green)
RAINWATER	Suitable	Not suitable
CONDENSED STEAM	Suitable with FKM (green)	Not suitable
INDUSTRY	On request	On request
PCI (BIES / SPRAYER)	Suitable	Suitable Inside / outside galvanised pipe
WELL WATER	Not suitable	Not suitable

3. FIELDS OF APPLICATION

3.1 Drinking water installation (Instalpress INOX)

As a basic principle, the respective valid and current provisions and standards for planning, evaluating, executing and operating drinking water installations must be observed. The requirements for drinking water are described in the 2001 drinking water ordinance. In order to avoid negative influence due to installation pipe materials on the hygienic requirements of the 2001 drinking water ordinance, they must be selected with the new UNE-EN 12502 and national residual standard DIN 50930-6.

The individual components are consistent with the requirements of the DVGW standard (GW-541 system pipes, W-534 press connection, KTW recommendation, EPDM gasket, etc.) and can therefore be introduced in drinking water installations without restrictions according to DIN 50930-6. Furthermore, the **Instalpress INOX** system is highly suited as well as authorised according to DIN 1988-6 and DIN 14462 for implementation in the following states:

- *wet*
- *dry-wet*
- *dry*

a) Disinfection of drinking water with Instalpress INOX

If it is necessary to permanently disinfect drinking water, all disinfectants on the German Federal Environment Agency's list of treatment agents and disinfection processes, Part 1C can be used in connection with **Instalpress INOX** systems. For example, a constant chlorine allowance of maximum 1.2 mg/l chlorine (free chloride in the disinfecting solution) can be added. The threshold of free chloride in purified drinking water may only amount to a maximum of 0.3 mg/l.

b) Disinfection of drinking water pipes Instalpress INOX

All disinfection processes for drinking water pipes according to DVGW W-291 and ZVS-HK-bulletin "Flushing, disinfecting and initiating drinking water installations" may be implemented. In order to avoid the emergence of corrosion, the system should be flushed after disinfection.

3.2 Purified water with Instalpress INOX

The **Instalpress INOX** system, with the factory-fitted EPDM gasket, can be used for all purified water applications. The water may be partially (softened, decarbonised) or completely desalinated (also deionised, demineralised and distilled). Even for ultrapure water with a conductivity under 0.1µS/cm, **Instalpress INOX** is suitable and absolutely non-corroding. All water purification procedures can thereby be used, such as ion exchangers or reverse osmosis, etc.

If ultrapure water, pharmaceutical water, etc. are required for this drinking water quality, such as:

- TOC < 500 ppb
- < 10 KBE
- smooth pipe wall surface finishes R < 0,8 µm
- seamless pipe connections

application of the Instalpress INOX system is not recommended.

3.3 Heating

Instalpress INOX

Instalpress INOX with a black EPDM gasket is not suitable for warm water systems up to a maximum of 120°C according to DIN 4751 and a maximum 16 bar pressure. The installations may be flush mount or embedded.

FILINOX technical department should be consulted before applying frost and/or corrosion protection materials.

The **Instalpress INOX** system can be used in open water heating systems.

Also in heat pump installations (air/water) (water/water), the **Instalpress INOX** system can be used with no problem as long as the systems have a maximum temperature of 120ºC.

Instalpress STEEL

Instalpress STEEL with a black EPDM gasket is suitable for closed warm water systems up to a maximum of 120°C according to DIN 4751 and a maximum 16 bar pressure. The installations may be flush mount or embedded.

Atmospheric oxygen must always be prevented from entering the heating water. It is recommended to use additives to eliminate the oxygen from the water (anti-corrosive products).

FILINOX technical department should be consulted before applying frost and/or corrosion protection materials.

Due to the fine walls of the pipes and the oxidation, **Instalpress STEEL** cannot be used in open water heating systems.

Also in heat pump installations (air/water) (water/water), the **Instalpress STEEL** System can be used with no problem as long as the systems are closed and have a maximum temperature of 120ºC.

3.4 Compressed air installation

Compressed air installations are divided into five classes, among other things based on their residual oil content according to DIN ISO 8573-1. This division can be consulted in the table that appears in the special applications heading.

These types of installations have very diverse applications and are used in almost all fields in the production and processing industry. Normally, service pressures in compressed air installations go to a maximum of 10 bar, and depending on the application there are different requirements in relation to the content of residual oil, moisture and purity.

If high purity is required, dehumidifiers or oil separators must be used. All these design specifications of the installation must be known before defining the typology of the materials to be used.

Instalpress INOX and **Instalpress STEEL** are not suitable for closed compressed air systems up to a maximum of 16 bar pressure. It must be taken into account that compression air classes 1-4 are possible for factory-installed black EPDM gaskets, consistent with ISO 8573-1 / 2001. A FKM gasket must be used for compressed air class 5 applications.

Instalpress INOX and **Instalpress STEEL** are also suitable for inert gases (non-explosive, non-toxic), such as nitrogen, argon, and carbon dioxide.

3.5 Cooling circuits

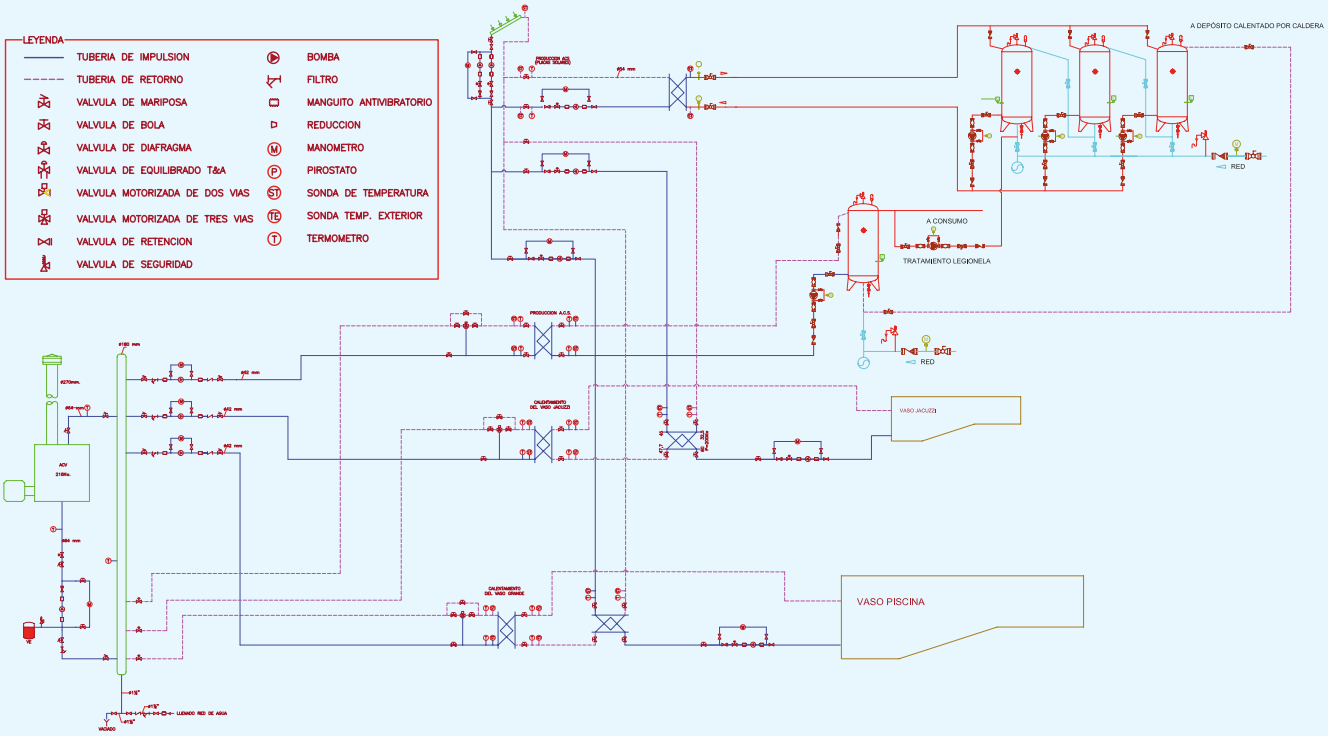
Instalpress INOX and **Instalpress STEEL** are suitable for closed cooling circuits with the black EPDM gasket at temperatures between - 10°C and + 120°C.

Glycol-based anti-freeze products always contain other additives. The compatibility of gaskets with these additives must be checked before they are used. Please contact the **FILINOX** Technical Department for information.

3.6 Solar power installations

Instalpress INOX and **Instalpress STEEL** are suitable for carrying out solar power installations. A solar installation is a special way of obtaining thermal energy from solar energy. Collection and absorption surfaces absorb the solar energy (in a dispersed manner). The absorbed thermal energy is piped through a solar fluid (water and anti-freeze) to a heat accumulator.

A solar installation is used normally for combining the hot water preparation, with a heating installation, (combined accumulator), where the water heater always has preference. Once the needs of the hot water accumulator have been met, the excess thermal energy is available for heating, and if there is more surplus, it can be used to heat the water in a swimming pool. See diagram:



Legislative requirements:

1. Building Thermal Installation Regulation (in Spanish, RITE).
2. Technical Building Code (in Spanish, CTE) DB-HE Section HE 4.

For metallic pipes it is recommended to work with moderately hard water approximately 10°HF with ISL=+0.5 with the aim of obtaining a very fine CaCO3 skin on the inside of the pipes to protect them against corrosion.

Design the installation for a range of speeds between 0.6 and 2 m/s.

The primary circuit where the working fluid easily surpasses 60°C is correctly treated with corrosion inhibitors and anti-freeze products. It is recommended to install the tubes in conduits, false ceilings or facades rather than embed them or leave them in contact with other material. Avoid joining different metals and in this case inter-weave dielectric sleeves.

Hot water pipes must be insulated with an insulation layer so that they can expand. With a separation of more than 4 cm from the cold water pipes and always placed above to avoid condensation.

The galvanised steel pipes must not be welded or bent in the works.

3.7 Vacuum lines

Instalpress INOX and **Instalpress STEEL** are suitable for vacuum and solar installations, the Instalpress system pipe connections have passed the low pressure test at 200 mbar absolute. However, please contact the **FILINOX** technical department for information.

3.8 Industrial installations, oils and hydrocarbons

The **Instalpress INOX** and **Instalpress STEEL** systems are suitable, with the fluorescent rubber Red FPM gaskets, for building light diesel supply systems. Also, and always with the red FPM gaskets, which the installer must change in the works location, the system is suitable for diesel supply systems for heating, fuel transport engine oils and oils for gears with A III hazard category.

3.9 Special applications for installations with Instalpress INOX

With the aim of advising the customer in accordance with the rules of the profession in relation to the **Instalpress INOX** system's resistance for media not common in building services, the following data are required:

- Name of the media,
- product data sheet and safety of the media,
- effective pressure of the media,
- pipe dimensions, and,
- purpose of the installation.

Some media are described in the attached table. (The information provided is merely indicative).

Medium	STAINLESS STEEL		JOINTS	
	1.4307 (AISI-304L)	1.4404 (AISI-316L)	EPDM	VITON
Acetaldehyde	A	A	B	A
Acetic acid 10%-50°C	B	A	C/D	D
Acetic acid 25%-50°C	B	A	D	D
Acetic acid 3.5-5%	B	A	B	B
Acetic acid 75%-50°C	B	A	D	D
Acetic anhydride	B	B	B	D
Acetone	A	A	A	D
Acetylene	A	A	A	A
Aluminium chloride (dry)	C	B	A	A
Ammonia 100% (dry)	A	A	B	C
Ammonium carbonate	B	B	A	B
Ammonium chloride 1%	B	B	A	A
Ammonium nitrate	A	A	A	A
Ammonium phosphate	B	B	A	A
Ammonium sulphate	B	B	A	A
Amyl alcohol	A	A	B	B
Aniline	A	A	B/C	A
Animal oil	A	A	D	A
Aqua regia (turpentine)	A	A	D	B/C
Barium chloride	C	C	A	A
Beer	A	A	A	A
Benzaldehyde	A	A	B	D
Benzene	B	B	D	C

Medium	STAINLESS STEEL		JOINTS	
	1.4307 (AISI-304L)	1.4404 (AISI-316L)	EPDM	VITON
Benzene petrol 50/50	A	A	D	B
Benzene petrol 60/40	A	A	D	B
Benzene petrol 70/30	A	A	D	B
Benzene petrol 80/20	A	A	D	B
Bleaching liquor	A	A	A	A
Borax	B	B	A	A
Boric acid	B	B	A	A
Bromine	D	D	C	B
Butadiene	A	A	D	B
Butane	A	A	D	B
Butanol	B	B	A	B
Butylene	A	A	D	A
Butyric acid 5%	B	B	-	B
Calcium bisulphite	C	B	A	B
Calcium chloride	C	B	A	A
Calcium hydroxide	B	B	A	A
Camphor	A	A	D	B
Carbon anhydride	A	A	A	A
Carbon disulphide	A	A	D	A
Carbon tetrachloride	B	B	D	B
Carbonic acid	B	B	A	A
Chlorine (dry)	B	B	B	A
Chlorine (wet)	D	D	C	A

DEFINITIONS: A = Highly resistant; B = Resistant; C = Partially resistant; D = Not resistant; - = Not tested.
JOINTS: EPDM: Ethylene Propylene Rubber; VITON: Fluor Viton Rubber.

Medium	STAINLESS STEEL		JOINTS	
	1.4307 (AISI-304L)	1.4404 (AISI-316L)	EPDM	VITON
Chlorobenzene (dry)	A	A	D	B
Chloroethane (dry)	A	A	D	B
Chloroform (dry)	A	A	D	B
Chloromethane	B	A	D	C
Chlorosulphuric acid	B	B	D	C
Chromic acid 5%	B	B	B/C	A
Citric acid	A	A	A	A
Coca-Cola	B	B	B	A
Coconut oil	B	B	D	A
Cognac	B	B	A	A
Coke gas	A	A	-	A
Cold water	A	A	A	A
Copper chloride	C	C	A	A
Copper nitrate	B	B	A	A
Diacetone alcohol	A	A	A	D
Dibenzyl ether	B	B	B	C
Dibutyl ether	B	B	C	D
Dichlorobenzene	B	B	D	B
Dichlorobutene	B	B	D	D
Dichloroethane	B	B	D	B
Dichloroethane	B	B	D	B
Dichloroethylene	B	B	-	B
Dichlorohexylamine	B	B	-	-
Diethanolamine	B	B	C/D	D
Diethyl ether	B	B	D	D
Diethylene glycol	B	B	A	A
Diisobutyl ketone	B	B	B	D
Dimethyl ether	B	B	B/C	D
Dimethylformamide	B	B	B	D
Dioxane	B	B	B/C	D
Dioxolane	B	B	B/C	-
Dipentene	B	B	D	A
Diphenyl ether	B	B	D	D
Distilled water (up to 50°C)	A	A	A	B
Ethane	B	B	D	A
Ethanol	B	B	A	B
Ethanol benzene petrol 50/30/20	A	A	D	B
Ethyl acetate	B	B	B/C	D
Fatty acid	B	A	-	A
Ferric chloride	D	D	A	A
Fluorine	B	B	-	A
Fluorosilicic acid	B	B	A	A
Formic acid (cold)	C	B	B	D
Freon (dry)	A	A	B	D
Fuel oil	A	A	C	A
Gas Oil	A	A	D	A
Gelatin	A	A	A	A
Glucose	A	A	A	A

Medium	STAINLESS STEEL		JOINTS	
	1.4307 (AISI-304L)	1.4404 (AISI-316L)	EPDM	VITON
Glycerol	A	A	A	B
Glycerol chlorohydrin	B	B	B	B
Hydraulic acid	A	A	D	A
Hydrobromic acid	D	D	B	A
Hydrochloric acid	D	D	A	A
Hydrochloric acid 10%-80°C	D	D	A	B
Hydrochloric acid 30%	D	D	A	B
Hydrochloric acid 37%	D	D	A	B
Hydrofluoric acid	D	D	C	B/C
Hydrogen	A	A	A	A
Hydrogen cyanide	A	A	B	A
Hydrogen peroxide	A	A	A	A
Hydrogen sulphide 100% (wet)	C	B	A	C
Ink	A	A	A	A
Iodine / iodide	D	D	A	A
Iron sulphate	B	B	A	A
Jet fuel JP3	A	A	D	A
Jet fuel JP4	A	A	D	A
Jet fuel JP5	A	A	D	A
Jet fuel JP6	A	A	D	A
Kerosene	A	A	D	A
Lactic acid 5%	A	A	A	A
Limewater	A	A	D	A
Liquor	B	B	A	A
Lubricant	A	A	D	A
Magnesium chloride	B	B	A	A
Magnesium hydroxide	A	A	A	A
Magnesium sulphate	B	B	A	A
Malic acid 10-40%	A	A	A	A
Margarine	B	B	D	A
Mercuric chloride	D	C	A	A
Methane	B	B	C	A
Methanol	B	B	A	B
Milk	A	A	A	A
Mineral oil	A	A	D	A
Molasses	A	A	A	A
Motor oil	A	A	D	A
Naphtha	B	B	D	A
Naphthalene	B	B	D	A
Natural gas	A	A	D	A
Nickel chloride	B	B	A	A
Nickel sulphate	B	B	A	A
Nitric acid 10%-80°C	A	A	D	D
Nitrobenzene	B	B	D	B/C
Nitrogen gas	A	A	C	C
Nitrous oxide	B	B	B	D
Oleic acid 100%	A	A	C	A
Olive oil	A	A	D	A

DEFINITIONS: A = Highly resistant; B = Resistant; C = Partially resistant; D = Not resistant; - = Not tested.
JOINTS: EPDM: Ethylene Propylene Rubber; VITON: Fluor Viton Rubber.

Medium	STAINLESS STEEL		JOINTS	
	1.4307 (AISI-304L)	1.4404 (AISI-316L)	EPDM	VITON
Oxalic acid 5%	A	A	A	A
Oxygen	A	A	B	D
Ozone (dry)	A	A	C	D
Ozone (wet)	A	A	C	D
Palmitic acid	B	B	D	A
Paraffin	A	A	D	A
Pentane	A	A	D	A
Petrol	A	A	D	A
Petroleum	A	A	D	A
Petroleum	A	A	-	A
Phosphoric acid 5%	A	A	A	A
Picric acid	B	B	A	A
Potassium bromide	A	A	A	A
Potassium carbonate	B	B	A	A
Potassium chlorate	B	B	A	A
Potassium chloride	C	C	A	A
Potassium cyanide	B	B	A	A
Potassium nitrate	B	B	A	A
Potassium sulphate	B	B	A	A
Propane	B	B	D	A
Salicylic acid	A	A	A	A
Silver nitrate	B	B	A	A
Simple syrup	A	A	A	A
Soap	A	A	A	A
Sodium bicarbonate	B	B	A	A
Sodium carbonate	B	B	A	A
Sodium chlorate	B	B	B	A

Medium	STAINLESS STEEL		JOINTS	
	1.4307 (AISI-304L)	1.4404 (AISI-316L)	EPDM	VITON
Sodium chloride 5%	B	B	A	A
Sodium cyanide	B	B	A	A
Sodium nitrate	B	B	A	A
Sodium phosphate	B	B	A	A
Sodium silicate	B	B	A	A
Sodium sulphate	B	A	A	A
Sodium sulphite	B	B	A	A
Soy oil	A	A	D	A
Stannic chloride	D	D	A	A
Stearic acid	A	A	A	A
Styrene	A	A	D	B
Sulphur	B	B	B	A
Sulphuric acid 5% (boiling)	D	D	A	B
Sulphurous anhydride 90%	D	C	A	A
Tannic acid	B	B	B	B
Tartaric acid	B	B	A	A
Tetrachloroethylene	C	C	D	B
Toluene	A	A	D	B
Transformer oil	A	A	D	B
Urea	B	B	A	A
Vegetable oil	A	A	C	A
Water (up to 100°C)	A	A	A	A
Xylene	A	A	D	B
Yeast	A	A	A	A
Zinc chloride	D	D	A	A
Zinc sulphate	B	B	A	A

DEFINITIONS: A = Highly resistant; B = Resistant; C = Partially resistant; D = Not resistant; - = Not tested.
JOINTS: EPDM: Ethylene Propylene Rubber; VITON: Fluor Viton Rubber.

4. CORROSION

4.1 Internal Corrosion Resistance

Instalpress INOX

Stainless steel consistent with DVGW GW-541 and W-534 commensurate to DIN 50930 can be used for drinking water without restrictions. Stainless steel behaves neutrally in drinking water due to the passive layer forming in connection with oxygen. This denotes that reactions with substances found in drinking water do not occur. Washed-in corrosion products from other metallic pipe materials do not therefore elicit corrosion processes on properly designed passive layers in the **Instalpress INOX** system. A mixed installation of **Instalpress INOX** and all non-ferrous metals can be executed directly and independent of the sequence.

The direct joining of stainless steel with galvanised materials results in bi-metal corrosion of the galvanised steel.

A separation of these two pipe materials using a non-ferrous metal armature can occur according to DIN 1988-7 in order to avoid this. Empirically, the installation of a spacer at least 50 mm in length is sufficient for avoiding this type of corrosion.

Stainless steels can be joined directly to all nonferrous metals (RG bronze, copper or, if applicable, tin) in a mixed installation.

All this must be carefully taken into account in circuits in drinking water installations and open water circuits.

It must also be taken into account when installing galvanised and stainless steel together in open water installations or circuits the rule of flow must be observed due to the different behaviour of these materials:

Stainless steel, in the direction of the water flow, must always be installed before the galvanised steel components.

In closed water or heating circuits, mixed installations can be carried out in any order and with no restrictions, with no risk of corrosion.

In these cases, it is possible to join, for example:

Instalpress INOX with CARBON STEEL Instalpress

The **FILINOX** components are adapted between each other in their dimensions so that they can be joined together directly using pressure.

Pitting corrosion can occur due to certain factors such as incorrect use of disinfectants or high chlorine concentration in drinking water (over 250 mg/l). The sensitisation of the stainless steel can be caused by the formation of oxide layers and tarnish if the heat treatment is incorrect (for example, from welding, separation with fast running saws or circular saws) and should be avoided. Only slow running saws are therefore permissible. Likewise, the hot bending of steel pipes is not permissible.

Such a sensitisation of stainless steel can surely be avoided by plastically cold forming the pressing.

The risks of crevice or perforating corrosion may only occur in the following risk contexts:

a) Use of waste water (untreated water, well water, saline water, etc.),

b) Hydrostatic testing of piping and fittings without starting-up the installation until after a certain period. In these cases it is recommend to carry out air / nitrogen tests,

c) Temperature increase due to external convection of the pipe wall (pipe tracing, electrical wiring, heating, etc.),

d) Pipes sealed with materials containing chlorides (glues, adhesives, plastic tapes, etc.), and,

e) Carburization of the material due to an improper handling (fast cutting saws, welding, grinding machines, hot bending, blowers, etc.).

Instalpress STEEL

Closed heating and cooling circuits usually do not contain oxygen from the air and there-fore there is no risk of corrosion. When they are filled, there is no need to be concerned about the small amount of oxygen in the installation, since this reaction with the system's internal surface breaks down.

In the case of heating, the oxygen is released through the escape valves. As a preventive measure against the undesired absorption of oxygen, oxygen eliminating additives or anti-corrosive inhibitors can be added.

Adding oxygen eliminating additives to the circulating water stops corrosion. This achieves a pH of 8.5 - 9.5, which is necessary for the CARBON STEEL. This aims to avoid corrosion in the steel materials.

If using oxidising media, please contact the **FILINOX** Technical Department for information.

4.2 External Corrosion Resistance

Instalpress INOX

For stainless steel pipes that are embedded or laid underground, corrosion protection bands and heat-shrinkable sleeves consistent with DIN 30672 pressure class A (non-corrosive soil) and/or pressure class B (corrosive soil) can be used as external corrosion protection. Empirically, coatings consistent with DIN 55928 (protective coats) can applied if they are universal and free of defects.

Stainless steel pipes can be used with insulation materials according to DIN 1988 with a maximum weight of 0.05% water-soluble chloride ions. Insulating materials of AS quality, (AS = austenitic steels) consistent with AGI-Q 135 are therefore particularly recommended for stainless steels.

Stainless steel pipes that are installed in chlorine-containing environments (swimming pools for example) require a suitable coating (according to DIN 55928 for example) or surface finishing (according to DIN 30672 for example).

Instalpress STEEL

Instalpress STEEL pipes and fittings are protected against external corrosion by galvanisation. However, anti-corrosion protection should also be added in the **Instalpress STEEL** pipes and fittings in case of long-term moisture.

Non-alloy steel must not be permanently exposed to moisture.

Instalpress STEEL can be protected against external corrosion as follows:

- Anti-corrosive bands
- Closed-cell insulating material
- Applying a covering
- Layer
- Avoiding environments susceptible to corrosion.

For galvanised steel pipes that are embedded or laid underground, corrosion protection bands and heat-shrinkable sleeves consistent with DIN 30672 pressure class A (non-corrosive soil) and/or pressure class B (corrosive soil) can be used as external corrosion protection. Empirically, coatings consistent with DIN 55928 (protective coats) can applied if they are universal and free of defects.

Galvanised steel pipes can be used with insulation materials according to DIN 1988 with a maximum weight of 0.05% water-soluble chloride ions. Insulating materials of AS quality, (AS = austenitic steels) consistent with AGI-Q 135 are therefore particularly recommended for stainless steels.

Sealing materials that release chlorine ions into the water or that may cause local chlorine accumulation must never be used.

5. FIRE PROTECTION AND SOUNDPROOFING

5.1 Fire protection

Instalpress INOX

In the case of appliances, equipment or components in fire protection installations in member states of the European Union, it is considered that the required safety technical specifications in this regulation are satisfied if current national dispositions in the respective countries are fulfilled, as long as these imply a safety level for people and property that is recognised by the Ministry for Industry and Energy.

In Germany, the valid provisions of each respective federal state are applicable for fire protection. These provisions are described in the respective regional building laws (Landesbauordnung) "LBO" and their associated administrative regulations "VwV".

Furthermore, the foundation for piping systems building requirements are established in the prototyping building code "PBC" (PBC 2002) or (Muster-Bau-Ordnung) "MBO" (MBO 2002) in German, the prototyping piping systems guidelines "PPSG" (PPSG 03/2000) or (Muster-Leitungsanlagen-Richtlinie) "MLAR" (MLAR 03/2000) in German, as well as other technical regulations and standards. All these are recognised by the Spanish Ministry for Industry and Energy.

Instalpress INOX corresponds to DIN 4102-1 of building material, class A (non-flammable).

The UNE standards related to signage in fire protection installations (NBE-CPI), cited as obligatory compliance, do not establish a basic section for marking the pipes. It defines that all the components of the installed system must be visually identified from any other type of installation. It specifies that all the pipes and fittings that form the circuit must be protected against corrosion, and therefore many installers opt to paint it red, which is not necessary if it is a material that is highly resistant to corrosion and quickly visually recognised as is the stainless steel of the **Instalpress INOX** system or galvanised steel of the **Instalpress STEEL** System.

The **Instalpress INOX** pressfitting system is compliant with design requirements for water system applications for extinguishing fires according to standard:

- UNE-EN 12845:2016 + A1:2021 "Fixed fire control systems. Automatic sprinkler systems. Design, installation and maintenance".
- Technical building code in the basic fire control document. CTE DB SI4.
- Basic Building Standard NBE-CPI/96: "Fire protection conditions in buildings" approved by Royal Decree 2177/1996 of October 4.
- Fire Protection Installations Regulation, approved by Royal Decree 1942/1993, 5 November and complimentary dispositions.
- Approval Standard Class number 1920.

Application description and limitations:

The **Instalpress INOX** System is accredited in accordance with FM directives and certified for use in sprinkling systems, with use limited to the components of the system itself.

Material: UNE-EN 10312 stainless steel pipe, Series 2. Work PN: 16 bar.

Applications:

a) Installations with closed outlets (sprinklers) for wet, dry and prior action systems.

b) Installations with open outlets (sprayed water).

c) BIES networks.

The system can be connected with external components always on dismountable metallic threaded connections with joints.

The system is certified for slight and ordinary 1 to 4 risk fire control protection systems (cinemas, theatres, concert halls, parking, etc.).

Instalpress STEEL

The **Instalpress STEEL** pressfitting system is designed for water system applications for extinguishing fires according to standard:

- VdS CEA 4001 "Sprinkler systems. Design and installation".
- UNE-EN 12845:2016 + A1:2021 "Fixed fire control systems. Automatic sprinkler systems. Design, installation and maintenance".
- Technical building code in the basic fire control document. CTE DB SI4.
- Basic Building Standard NBE-CPI/96: "Fire protection conditions in buildings" approved by Royal Decree 2177/1996 of October 4.
- Fire Protection Installations Regulation, approved by Royal Decree 1942/1993, 5 November and complimentary dispositions.
- Approval Standard Class number 1920.

Usage restrictions of the system:

- **Material:** Galvanised pipe on the inside and outside. Pressure: 16 bar.
- **Aplication:** Damping system (sprinkler), distribution branches and pipes.

The **Instalpress STEEL** system is approved for use in fire extinguishing systems with static water loads. The system is accredited in accordance with VdS directives, FM Approval and certified for use in wet column sprinkling systems assembled with fire detection systems. The maximum working pressure of the system is 16 bar and the use is limited to the components of the system itself. The system can be connected with external components always on dismountable metallic threaded connections with joints.

The **Instalpress STEEL** system is certified for type LH, OH1 to OH3 and OH4 fire control systems (cinemas, theatres, concert halls, parking, etc.).

5.2 Soundproofing

Sources of noise may be, for example, structures, fixtures and sanitation objects. Noise does not originate from pipes, however, they can conduct noise. Avoiding noise in structu-res is achieved using suitable conduit mountings (for example, rubber strips) and insulation material. Noise insulation is described in DIN 4109.

6. INSTALLATION TECHNIQUE

6.1 Thermal elongation

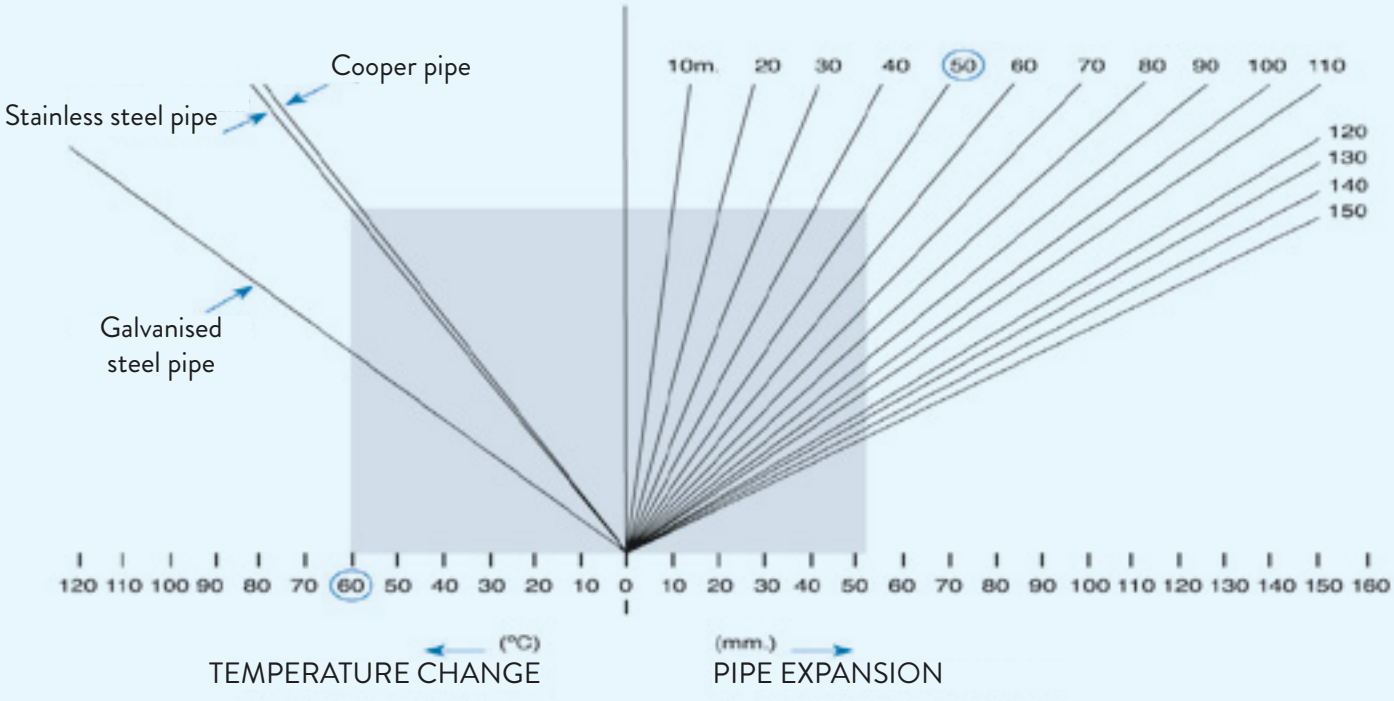
During operation, fluid pipeline installations contract and expand due to temperature fluctuations. Accordingly, the following considerations must be verified:

- Sufficient space for lengthwise expansion.
- Correct mounting of the corresponding mounting points.
- Expansion compensators if necessary.

The corresponding equation to achieve this is: $\Delta L = L * \alpha * \Delta T$

Where:

ΔL = Total extension in mm.
L = Length of the pipe in m.
ΔT = Temperature fluctuation in °K.
α = Linear expansion coefficient
(α = 0,0166 mm / m °K for stainless steel)
(α = 0,0110 mm / m °K for galvanised steel)



Application methods for the diagram

STAINLESS STEEL example: Determine the total extension of a 50 m long pipe with a fluid temperature change of 60°C. Go from the 60°C position "temperature change" vertically up to the sloping line of the "stainless steel pipe". Then go right up to the other sloping line, which indicates the meters (50m). Next go vertically below up to the 51.5mm point of the right side axis "pipe expansion".

Result: 51,5 mm.

ΔL= 50 * 0,0166 * 60 = 50 mm.

The following table and diagram can be used for calculating the extension.

	ΔT (°K) STAINLESS STEEL THERMAL JUMP									
L (m)	10	20	30	40	50	60	70	80	90	100
1	0,16	0,33	0,50	0,70	0,82	1,00	1,15	1,32	1,50	1,65
2	0,33	0,66	1,00	1,32	1,65	2,00	2,31	2,64	3,00	3,30
3	0,50	1,00	1,50	2,00	2,50	3,00	3,50	4,00	4,50	5,00
4	0,66	1,32	2,00	2,64	3,30	4,00	4,62	5,30	6,00	6,60
5	0,82	1,65	2,50	3,30	4,12	5,00	5,77	6,60	7,42	8,25
6	1,00	2,00	3,00	4,00	5,00	6,00	7,00	8,00	9,00	10,00
7	1,15	2,31	3,50	4,62	5,78	7,00	8,09	9,24	10,40	11,55
8	1,32	2,64	4,00	5,28	6,60	8,00	9,24	10,56	11,90	13,20
9	1,48	3,00	4,50	6,00	7,50	9,00	10,50	12,00	13,50	15,00
10	1,65	3,30	5,00	6,60	8,25	10,00	11,55	13,20	14,85	16,50
12	2,00	4,00	6,00	8,00	10,00	12,00	14,00	16,00	18,00	20,00
14	2,31	4,62	7,00	9,25	11,55	14,00	16,20	18,50	20,80	23,10
16	2,64	5,28	8,00	10,56	13,20	15,84	18,48	21,12	23,76	26,40
18	3,00	6,00	9,00	12,00	15,00	18,00	21,00	24,00	27,00	30,00
20	3,30	6,60	9,90	13,20	16,50	19,80	23,10	26,40	29,70	33,00

STEEL example: Determine the total extension of a 50m long pipe with a fluid temperature change of 60°C. Go from the 60°C position "temperature change" vertically up to the sloping line of the "Galvanised steel pipe". Then go right up to the other sloping line, which indicates the meters (50m). Next go vertically below up to the 34.3mm point of the right side axis "pipe expansion."

Result: 34,3 mm.

ΔL= 50 * 0,0110 * 60 = 33 mm.

The following table can be used for calculating the extension of the carbon steel:

	ΔT (°K) STEEL THERMAL JUMP									
L (m)	10	20	30	40	50	60	70	80	90	100
1	0,11	0,22	0,33	0,44	0,55	0,66	0,77	0,88	0,99	1,10
2	0,22	0,44	0,66	0,88	1,10	1,32	1,54	1,76	2,00	2,20
3	0,33	0,66	1,00	1,32	1,65	2,00	2,31	2,64	3,00	3,30
4	0,44	0,88	1,32	1,76	2,20	2,64	3,08	3,52	4,00	4,40
5	0,55	1,10	1,65	2,20	2,75	3,30	3,85	4,40	4,95	5,5
6	0,66	1,32	2,00	2,64	3,30	4,00	4,62	5,28	6,00	6,6
7	0,77	1,44	2,31	3,10	3,85	4,62	5,40	6,16	6,93	7,7
8	0,88	1,76	2,64	3,52	4,40	5,28	6,15	7,05	7,92	8,8
9	0,99	2,00	3,00	4,00	4,95	6,00	7,00	8,00	9,00	9,9
10	1,10	2,20	3,30	4,40	5,50	6,60	7,70	8,80	9,90	11,0
12	1,32	1,64	4,00	5,28	6,60	7,92	9,25	10,56	11,88	13,2
14	1,54	3,08	4,62	6,20	7,70	9,24	10,80	12,30	13,86	15,4
16	1,76	3,52	5,30	7,05	8,80	10,56	12,32	14,08	15,84	17,60
18	1,98	4,00	6,00	7,90	10,00	12,00	14,00	16,00	18,00	20,00
20	2,20	4,40	6,60	8,80	11,00	13,20	15,40	17,60	19,80	22,00

6.1.1 Room for expansion

Modern installations are, with the exception of industrial installations, seldom visibly installed and are usually installed as flush-mounted and floating along floor coverings. In the case of visibly installed installations or those that run under galleries, there is usually sufficient space. However, in the case of pipes that have to be cleaned, an elastic protective filling made of insulation material must be used, such as glass wool or plastic (closed-cell foam) (Fig. 1).

If an installation is carried out under floating floors, the pipes are installed within the insulating layer so they can expand unhindered. The vertical outlets and junctions must be equipped with elastic sockets made of insulating material or insulating plastic (Fig. 2).

In the same way, fillings must be used for wall and ceiling pipes so they can move in every direction (Fig. 3).

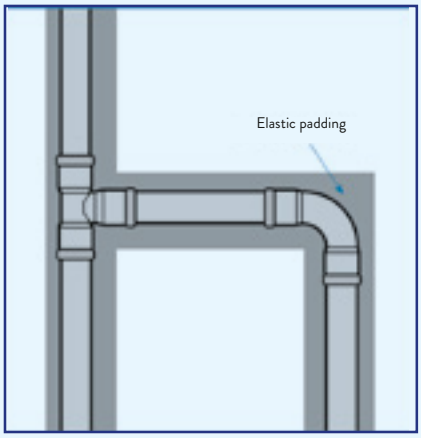


Fig. 1

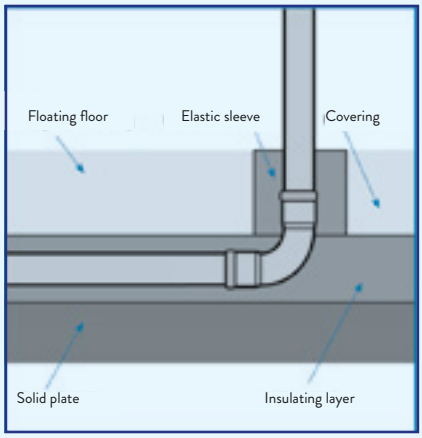


Fig. 2

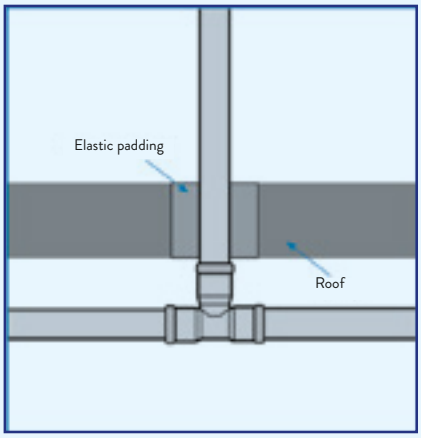


Fig. 3

6.1.2 Expansion compensators

If piping length fluctuations cannot be absorbed by their own elasticity or with sufficient space, expansion compensators must be applied.

There are three types of expansion compensators: U or Z shape or those with internal threading, enabling it to be screwed onto the structure (Fig. 4).

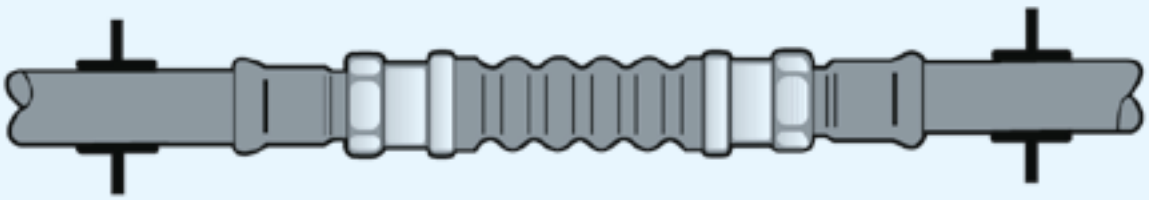


Fig. 4

The compensators can be bent in a U or Z shape or also originate from a straight pipe and angled attachment. The following calculation method can be used for calculating the len-gth of the angular offset:

- Calculation of the thermal expansion
  (use the Thermal Elongation formula)

- Calculation of the angular offset length
  (in the case of compensator of Fig. 10. Determining the band length for the Z bend expansion compensator)

where: $L = K \times \sqrt{(de \times \Delta l)}$

L = Flexor arm
K = Material constants = 45 (STAINLESS STEEL)
de = Outer diameter of the pipe
Δl = Thermal expansion to be compensated

If the U type is used, the length of the angular offset must be divided by 2 according to the above formula, because there are two expansion arms. To be more accurate, the divided value must be equal to L / 1.8.

a) Compensators with internal thread

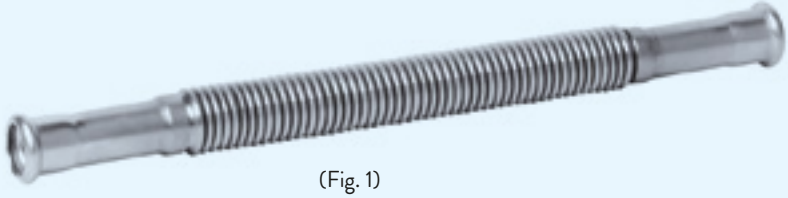
- Temperature range: - 20 °C up to 100 °C
- Pressure: PN (from empty) 16 bar
- Duration: 10,000 cycles
- Fluids: air, steam, water, mineral oil,
  fuel liquids and liquid gases derived from oil.

b) Instalpress expansion compensators

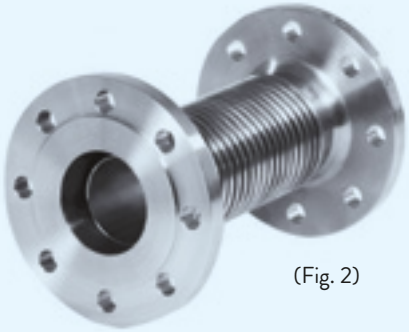
Instalpress expansion compensators are designed to absorb axial movements (along the lengthwise axis) of a pipe section.

Features:

- Axial compensation, 50mm
- Bellows manufactured in AISI-316L (1.4404)
- Interior sleeve manufactured in AISI-316L (1.4404)
- Diameters 15, 18, 22, 28, 35, 42 and 54 with HH ends for press manufactured in AISI-316L (1.4404) (Fig. 1)
- Diameters 76.1, 88.9 and 108.0 with flat flanges DIN-2576 in AISI-316L (1.4404) on the ends (Fig. 2)



(Fig. 1)



(Fig. 2)

Installation:

- **Fixed points and guides**

Given that these compensators cannot support the force caused by the internal pressure of the installation itself (effective area x maximum working or testing pressure) two **anchors or main fixed points** must always be installed. These fixed points must prevent the movement of the pipe in any direction.

As standard, the main fixed points are located at:

- Changes of direction on the pipe.
- Between two straight sections of a different section.
- Involves and other fittings on a straight section.
- On the blind ends of the pipe.

The purpose of the **guides** is to support the pipe and keep it correctly aligned so that the compensator works correctly. The location of the guides prevents the line from bending given the flexibility of the expansion compensator.

Recommended distances:

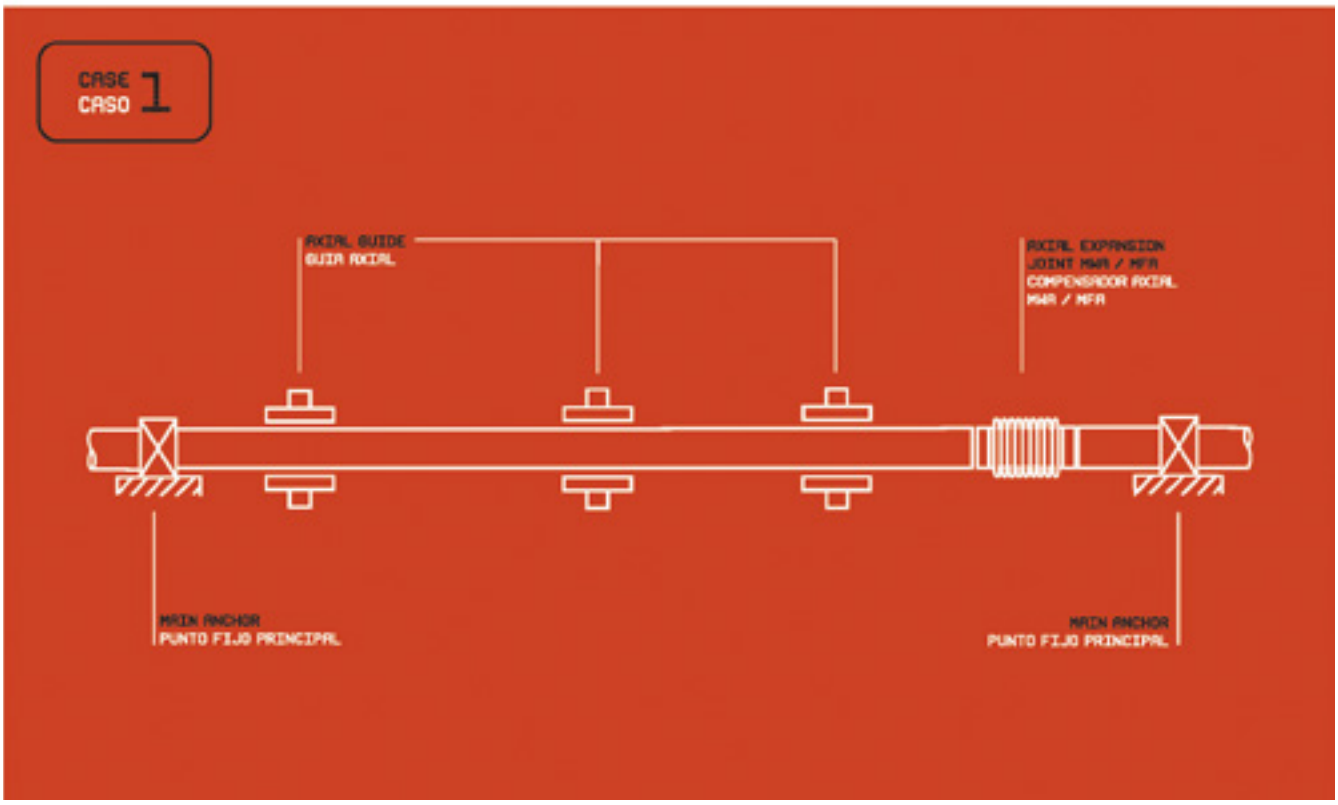
It is recommended to place the expansion compensator at the beginning or the end of the pipe section in accordance with the following diagram:

PF = Fixed point
CD = Expansion compensator
G = Guide

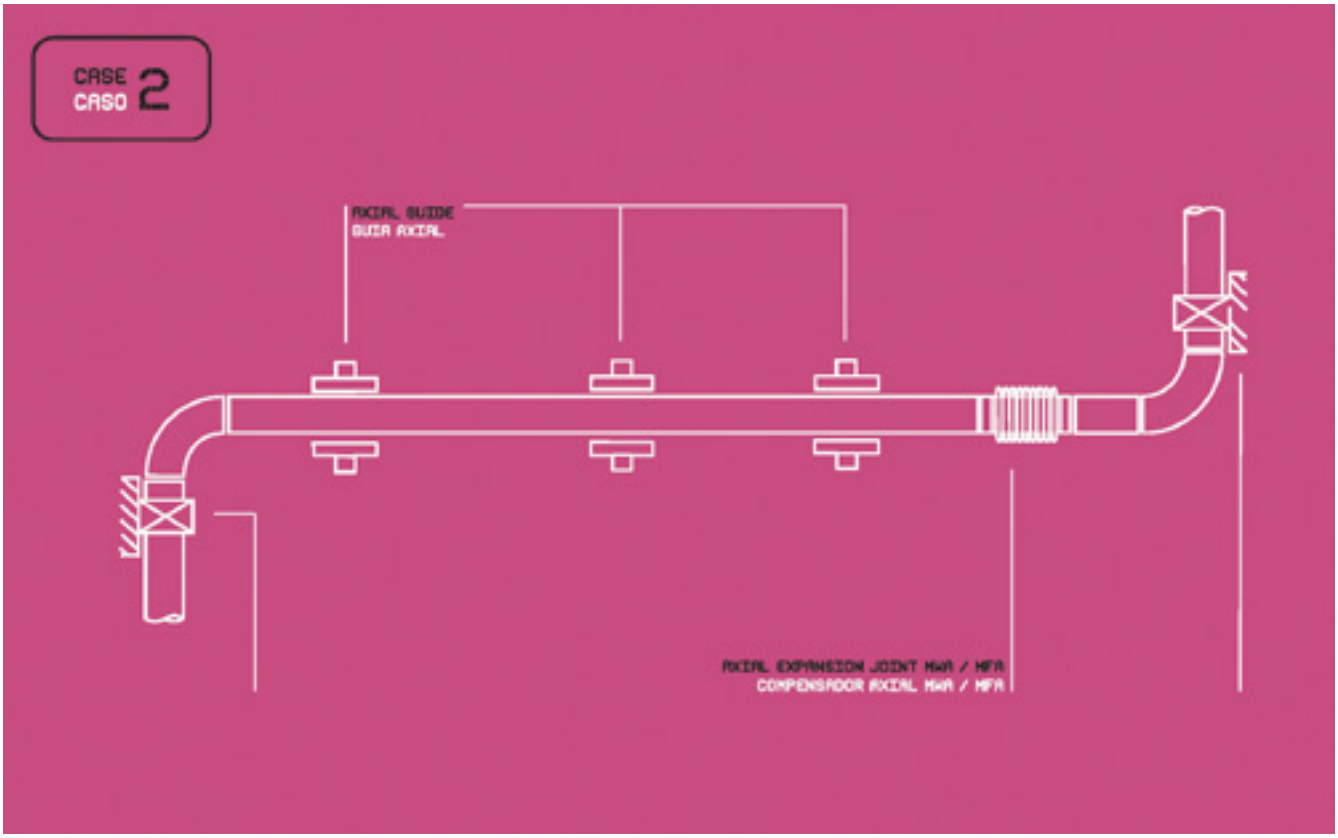
d_0 = 4 times the external diameter of the pipe up to a maximum distance of 300 mm
d_1 = 4 times the external diameter of the pipe
d_2 = 14 times the external diameter of the pipe
d_3 = Maximum length (1.0 – 1.5m depending on the diameter and the installation)

- Examples of applications

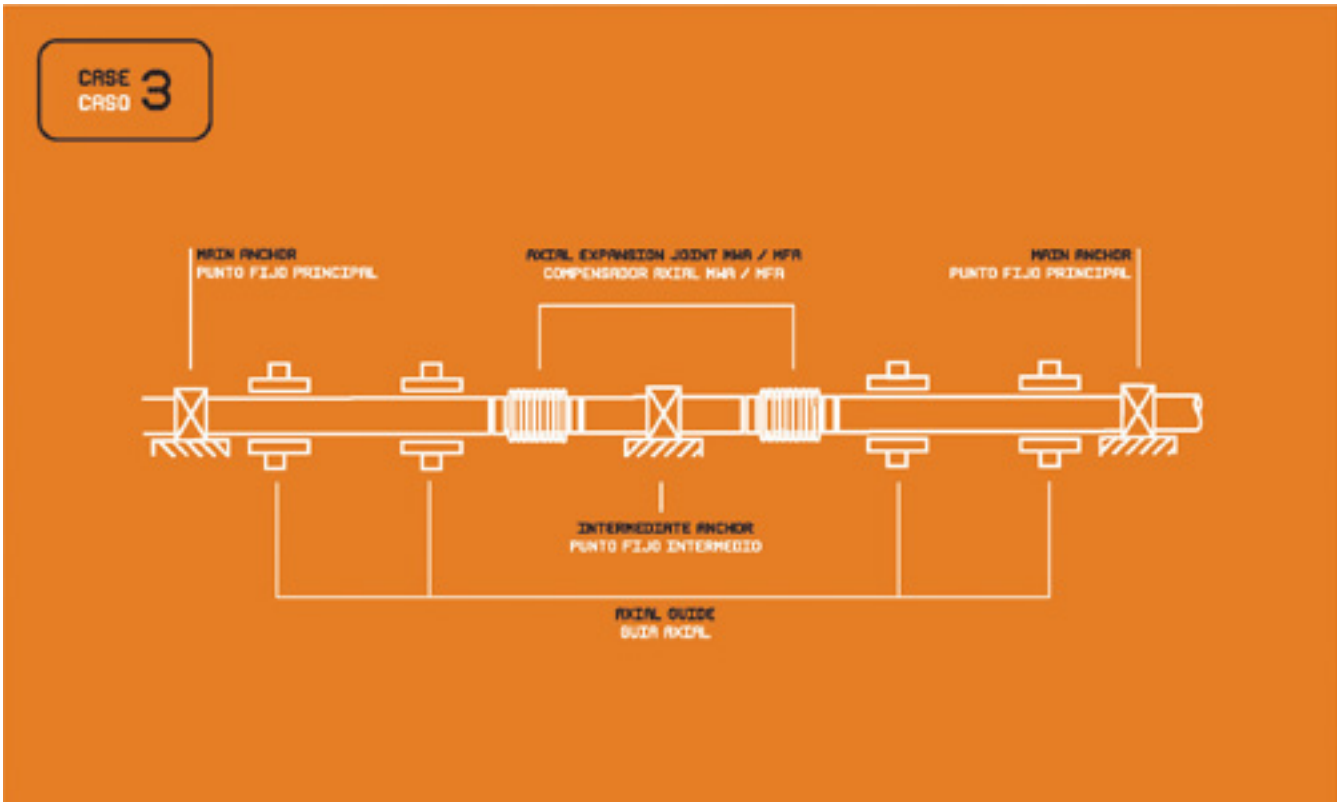
Case 1: Compensator located on a straight section of pipe between two main fixed points.



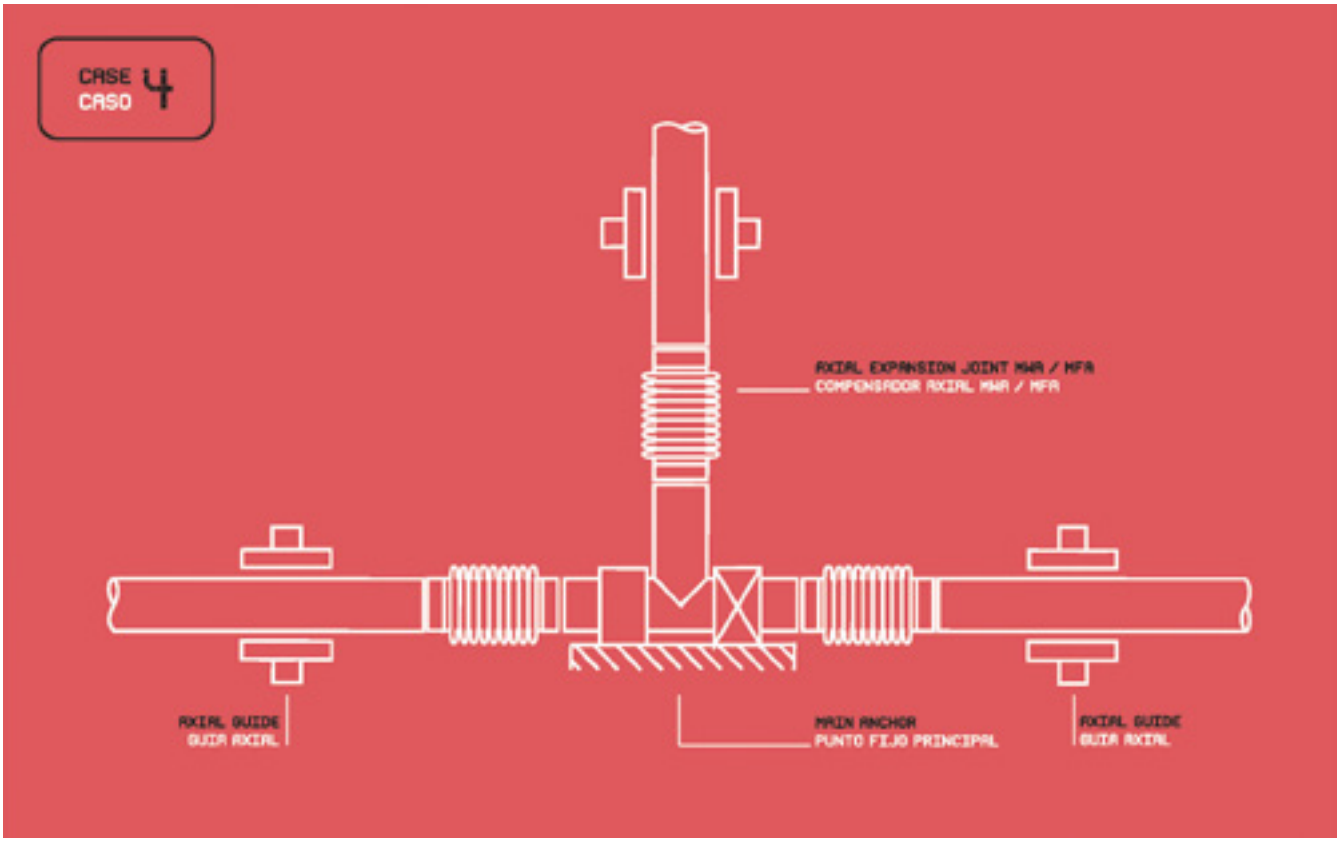
Case 2: The main fixed points are located on the changes of direction on the pipe.



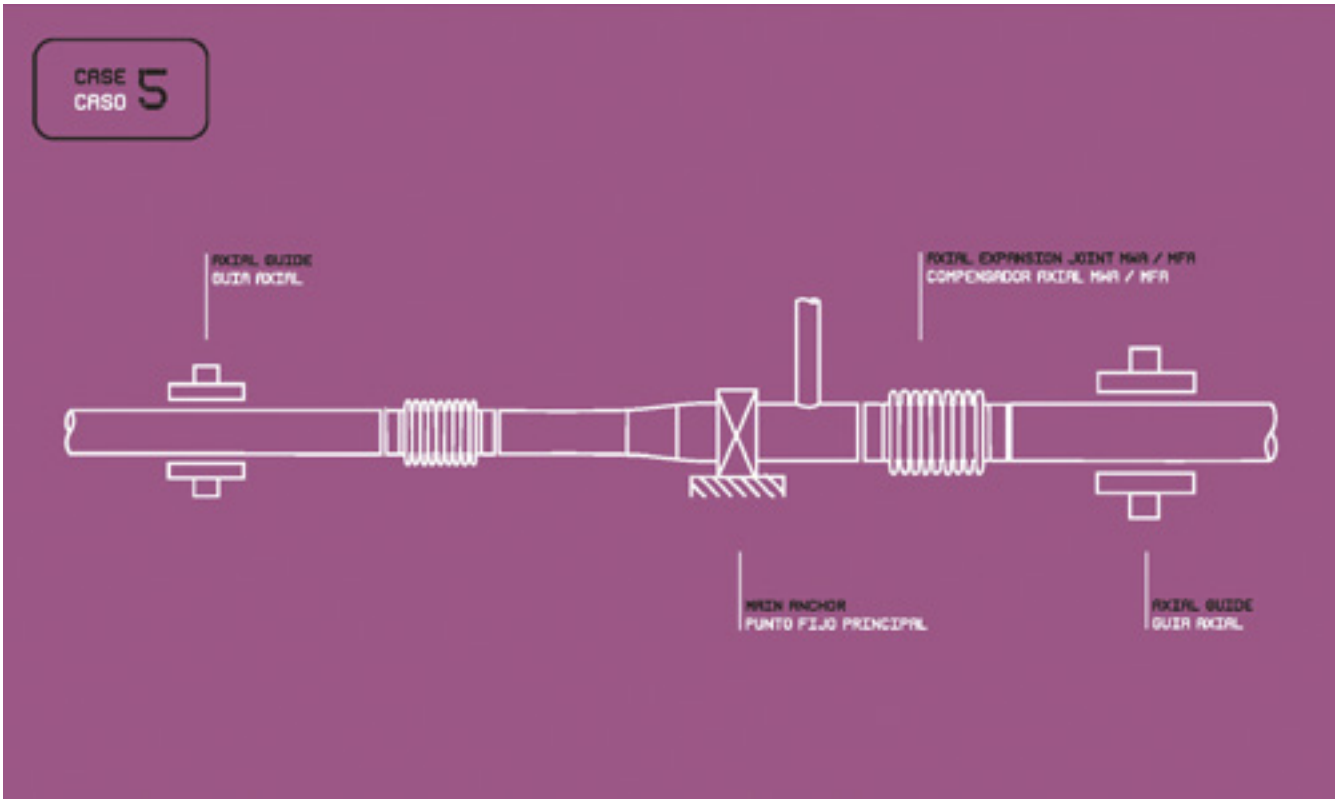
Case 3: Due to the magnitude of the straight section it is necessary to fit to expansion compensators joined by an intermediate fixed point.



Case 4: The main fixed point is on the intersection of the two pipe sections.



Case 5: he main fixed point is on the joining point of the two different diameter pipes given the difference of the forced due to the internal pressure of the two sections of pipe.



- Basic rules

- Avoid damaging the bellows with strike that may cause dents on the waves, welding projections, etc.
- The expansion compensators must not be stretched or compressed in order to absorb deficiencies in the length of the pipe or misalignments.
- The expansion compensator is installed in accordance with the direction of the inside sleeve.

- Verifications before start-up or pressure testing

- Check that the expansion compensator is correctly fitted with respect to the fluid direction.
- Check that the supports and guides are installed as planned.
- Check that there are no misalignments in the expansion compensator.

- Inspections during and immediately after the pressure test.

- Check that there are no leaks or pressure losses.
- Check for any possible instability of the bellows.
- Check the solidity and resistance of the fixed points, the guides, the compensator and other components of the system.

EXPANSION COMPENSATOR TECHNICAL SPECIFICATIONS

Ref. no.	Profile	DN	Nominal diameter	Stroke	Spring rate	Nominal Surface
			mm	mm	N/m	cm^2
27CD15	Instalpress	DN-15	15	50	17	5
27CD18	Instalpress	DN-18	15	50	17	5
27CD22	Instalpress	DN-20	22	50	14	8
27CD28	Instalpress	DN-25	28	50	18	11
27CD35	Instalpress	DN-32	35	50	15	18
26CD42	Instalpress	DN-40	42	50	19	22
26CD54	Instalpress	DN-50	54	50	38	37
26CD76	Instalpress	DN-65	76,1	40	31	53
26CD88	Instalpress	DN-80	88,9	40	29	77
26CD108	Instalpress	DN-100	108,0	40	73	123

6.1.3 Arrangement of the fixed and displacement points

As shown in figures Abb.5, Abb.6, Abb.7 and Abb.8, correct compensation depends on the adjustment of the fixation and displacement points. A fixation point may not be applied near the fitting. It must also be observed that the floating points may not be applied in such a way that they act as a fixation point. For a straight pipe or expansion compensator, only one fixation point may be applied in order to avoid deformation, namely in the centre of the straight section if possible in order to distribute the expansion.

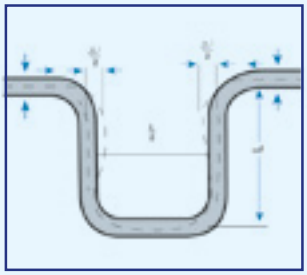


Abb. 5

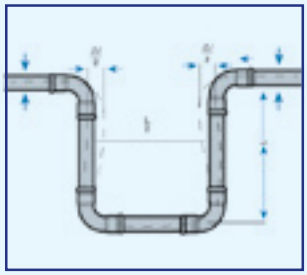


Abb. 6

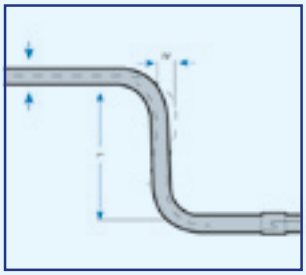


Abb. 7

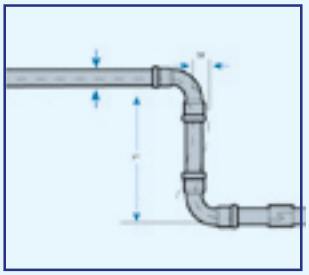


Abb. 8

On the basis of the thermal expansion of the pipe, the **Instalpress INOX** connection attach-ments can disrupt pressures by twisting. It must be observed that the permissible torsion angles should not be larger than 50ºC and the length of the lever is dependent on the free length of the pipe. The attached diagram of Fig. 12 can be used to calculate the lengths of the lever on the compression equipment.

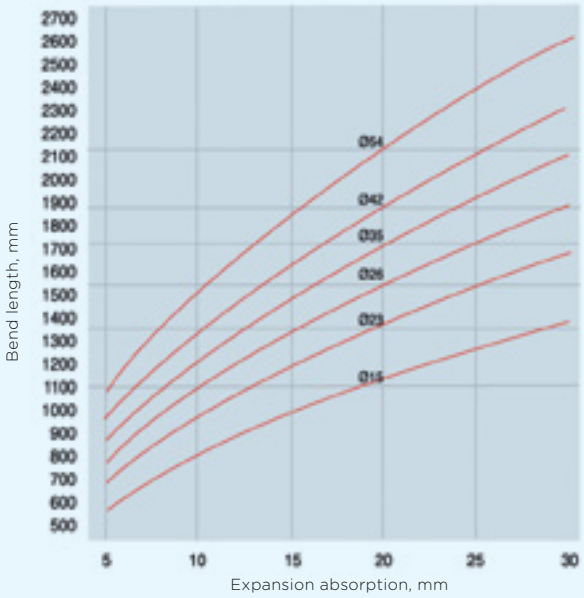


Fig. 10: Determining the band length for the Z bend expansion compensator.

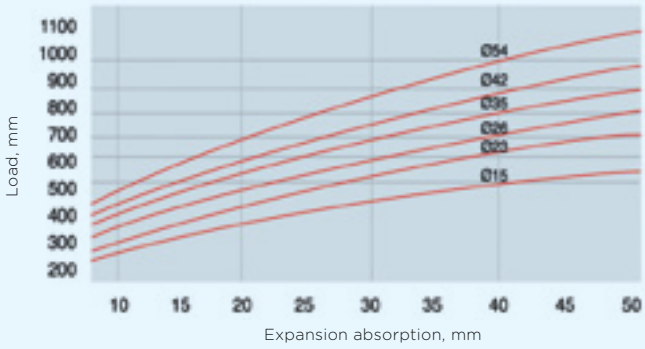


Fig. 11: Determining the pressure drop for the U bend expansion compensator.

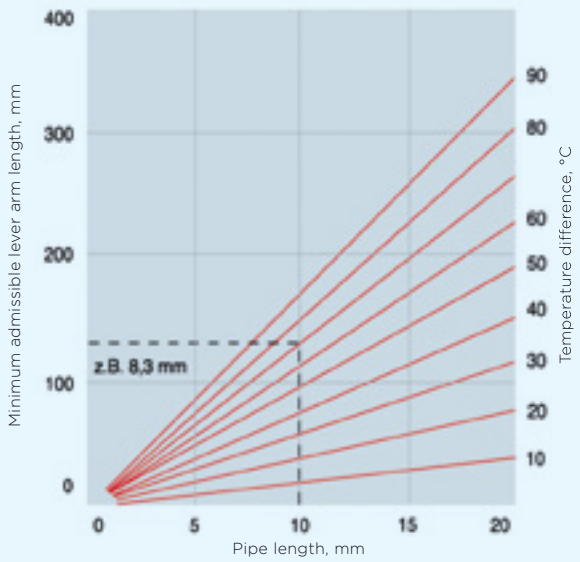


Fig. 12: Determining the lever arm length.

6.2 Conduit mounting

Conduit mountings serve to mount pipes to ceilings, walls or floors. By setting fixation and floating points, the elongation of the pipe resulting from temperature fluctuations is guided in the desired direction.

Pipe clamps may not be applied as fittings. Fixing floating points must occur so that the elongation of the pipe is not hindered.

A pipe section that is uninterrupted by a change in direction or that does not contain expansion compensators must only have one fixed point. On long sections of pipe it is recommended to install a fixed point half way along the section with the aim of distributing the expansion in both directions (Vertical sections through several floors).

Unless otherwise established in the standards, clamp intervals can be used as guides for **Instalpress INOX** and **Instalpress STEEL.**

DN	d x s	Fixing distances, DIN 1988
	mm	m
12	15 x 1,2	1,25
15	18 x 1,2	1,50
20	22 x 1,5	2,00
25	28 x 1,5	2,25
32	35 x 1,5	2,75
40	42 x 1,5	3,00
50	54 x 1,5	3,50
65	76,1 x 2,0	4,25
80	88,9 x 2,0	4,75
100	108,0 x 2,0	5,00

6.3 Piping heat output

In addition to transporting thermal fluid (water, steam), the pipes transmit the thermal energy to the outside due to the laws of physics. This effect can be reversed, so that the pipes could be used for heat emission, as well as the absorption, (water cooling systems, geothermal heat, etc.).

d x s		Temperature difference, K									
mm		10	20	30	40	50	60	70	80	90	100
		Heat emission, W / m									
STAINLESS STEEL	STEEL										
	12 x 1,2	3,5	7,2	10,8	14,5	18,0	22,0	25,0	30,0	33,5	37,3
15 x 1,0	15 x 1,2	4,5	9,2	13,5	18,0	23,0	27,5	31,0	35,0	40,0	45,0
18 x 1,0	18 x 1,2	5,5	10,5	15,8	22,2	27,5	32,5	38,5	44,5	49,5	55,5
22 x 1,2	22 x 1,5	6,5	13,2	20,5	27,5	34,0	40,5	47,5	54,5	61,5	67,5
28 x 1,2	28 x 1,5	8,5	17,5	25,5	34,5	43,5	52,2	60,5	69,5	78,2	87,0
35 x 1,5		10,8	21,5	32,5	43,5	54,5	65,2	75,8	87,0	97,5	108,5
42 x 1,5		13,0	26,0	39,0	52,3	65,2	78,0	91,5	104,3	117,5	130,5
54 x 1,5		16,8	33,6	50,2	67,2	84,0	100,5	117,5	134,2	151,0	168,0
76,1 x 2,0		23,7	44,3	71,0	94,7	118,5	142,0	165,7	189,5	213,0	236,5
88,9 x 2,0		27,5	55,2	83,0	110,5	138,0	165,5	193,5	221,0	249,0	276,5
108,0 x 2,0		33,5	67,0	100,5	134,5	168,0	201,5	235,5	269,0	302,5	336,0

6.4 Electrical heating

When using heating cables in connection with Instalpress INOX, the temperature of the inner pipe wall may not exceed 60°C. A temporary temperature increase to 70°C (one hour per day) is permitted for necessary thermal disinfection measures. For systems equipped with an accumulation safety device or backflow preventer, an impermissible increase in pressure as a result of heating is to be avoided.

6.5 Potential equalisation

A potential equalisation must be implemented for all electricity conducting pipes.

Instalpress INOX must be included in the main potential equalisation. **Instalpress STEEL** does not conduct electricity and therefore does not need to be part of the main equipotential connection. Therefore neither is it suitable for the additional equipotential connection.

The electrical system installer is responsible for the potential equalisation.

6.6 Compression tests

Drinking water systems pressure testing are carried out in line with stainless applications for drinking water, pursuant to DIN 1988–2 and VDI 6023 with filtered drinking water right before the start-up of operations.

If drinking water systems are not be launched right away, the pressure test is to be conducted according to the ZVSHK bulletin “Impermeability Testing for Drinking Water Installations with Compressed Air, Inert Gas or Water”.

6.7 Flushing

The system must be flushed immediately following the pressure test and start-up according to DIN 1988-2 and VDI 6023. This flushing is carried out with a water-air mixture using filtered drinking water.

An additional flushing procedure is described in the ZVSHK bulletin “Flushing, Disinfecting and Launching Drinking Water Installations”.

The flushing procedure to be used is agreed upon in advance with the customer.

7. PIPELINE DIMENSIONS

Every liquid that flows through a network of pipes experiences a drop in pressure due to constantly rubbing against the inner wall of the pipe, changes in direction and turbulence caused by resistance, all of which make calculation complex.

It is essential to distinguish between continuous and localised pressure drops.

- **Continuous load losses** are surface losses on the contact of the fluid with the pipe (limit layer), the rubbing of some fluid layers with others (laminar regime) or particles of the fluid between each other (turbulence regime). They occur in uniform flow, therefore mainly on the constant pipe sections.

- **Localised load losses** are the losses of shape that manifest at certain points on an installation, occur in the transitions (current expansions or contractions), elbows, valves and all types of pipe fittings.

a) CONTINUOUS LOAD LOSSES

To calculate the load losses experienced during the movement of the fluid along a straight pipe of a certain length, the pipe's unit resistance must first be known and this value multiplied by the total length.

This value can be determined analytically using the opportune mathematical equations.

DARCY-WEISBACH EQUATION $$H_{rp} = \& \frac{L\ V^2}{D\ 2g}$$

Where:

H_{rp} = Primary load loss
& = Primary load loss coefficient
L = Pipe length
D = Pipe diameter
V = Average flow speed
g = Gravity acceleration (m/s^2)

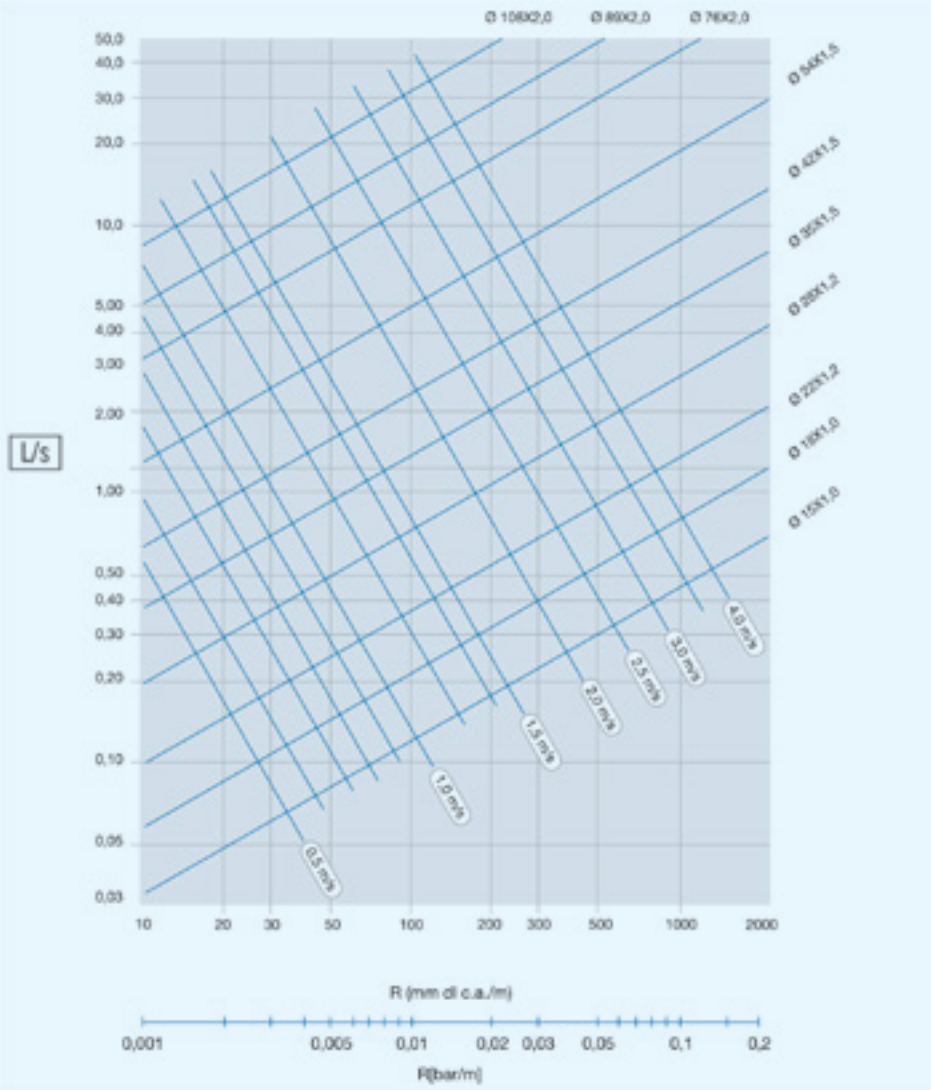
However, for the requirements of the most usual installation technique, nomograms such as the one shown in this chapter can often be used.

The nomogram can be used to determine the value of the unit load loss (R) and the value of the speed (m/s) for a certain water flow. Therefore, once the (R) is determined in the length of the network (ineffective metres or equivalent metres), the value of the total loss of the section is obtained.

On the date offered in the nomogram, the following table of load losses has been created for pipes with water at 10ºC, for ideal speed intervals in houses:

House interiors	flow speed 0,5 m/s. to 2,0 m/s.
Individual assemblies	flow speed 0,5 m/s. to 2,5 m/s.
General assemblies	flow speed 1,0 m/s. to 1,5 m/s.
Connections (basements, boilers)	flow speed 2,0 m/s.

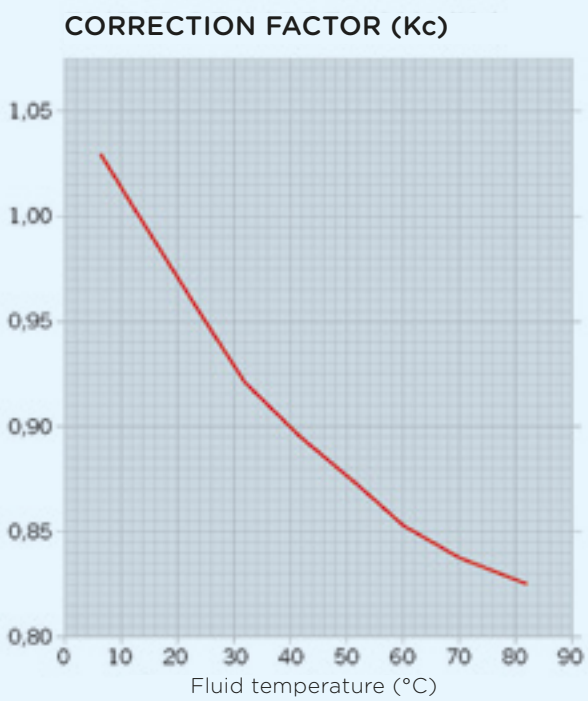
If the speeds are below the minimum impurities begin to decant on the pipes, and if on the other hand the upper margin is surpassed noises will occur along the installation.



Load loss (bar / m), Instalpress INOX and Instalpress STEEL pipes,
Water at 10°C depending on the flow rate (L / s)

Q = (L/s)	0,1	0,2	0,4	0,5	1,0	2,0	3,0	4,0	5,0	10,0	20,0	30,0	40,0
15 x 1,0	0,0075	0,0225	0,0800	0,1200	---	---	---	---	---	---	---	---	---
18 x 1,0	0,0027	0,0085	0,0300	0,0430	0,1430	---	---	---	---	---	---	---	---
22 x 1,2	0,0012	0,0037	0,0130	0,0170	0,0600	0,2000	---	---	---	---	---	---	---
28 x 1,2	---	0,0012	0,0037	0,0050	0,0175	0,0600	0,1150	0,1950	---	---	---	---	---
35 x 1,5	---	---	0,0012	0,0017	0,0056	0,0190	0,0400	0,0650	0,0930	---	---	---	---
42 x 1,5	---	---	---	---	0,0026	0,0078	0,0168	0,0240	0,0380	0,1300	---	---	---
54 x 1,5	---	---	---	---	0,0010	0,0022	0,0046	0,0079	0,0117	0,0330	0,1100	0,2000	---
76,1 x 2,0	---	---	---	---	---	---	0,0010	0,0016	0,0023	0,0078	0,0240	0,0500	0,0880
88,9 x 2,0	---	---	---	---	---	---	---	---	0,0010	0,0034	0,0115	0,0220	0,0385
108,0 x 2,0	---	---	---	---	---	---	---	---	---	0,0014	0,0045	0,0092	0,0165
Pipeline							bar / m						

So that there are not numerous diagrams corresponding to each temperature, the following graph is referred to, which, based on the actual temperature of the circulating flow, provides the correction factor (Kc) to apply to the (R) value.



Practical example:
Supposing that a flow is 0.40 l/s, with a pipe with dimensions Ø18 x 1.0 mm (for water at 10°C), the intersection of both lines determines the R value = 0.03 bar/m.

Imagine now that you want to know if the (R) value for water at 40°C.

Given that the correction factor (Kc) in the above graph is 1.0 for water at 10°C, the (R) value must first be recovered for this temperature and the value obtained multiplied by the correction coefficient (Kc) relative to the temperature of 40°C.

R = (0,03 / 1,0) • 0,89 = 0.0267 bar/m

b) LOCALISED LOAD LOSSES

SLocalised load losses are the losses of shape that manifest at certain points on an installation, occur in the transitions (current expansions or contractions), elbows, valves and all types of pipe fittings.
There are two calculation systems: the direct analytical method and the equivalent length method.

o Direct analytical method

A localised Load loss is defined by the following mathematical expression:

BASIC EQUATION FOR SECONDARY LOSSES

$$H_{rs} = \zeta \frac{V^2}{2g}$$

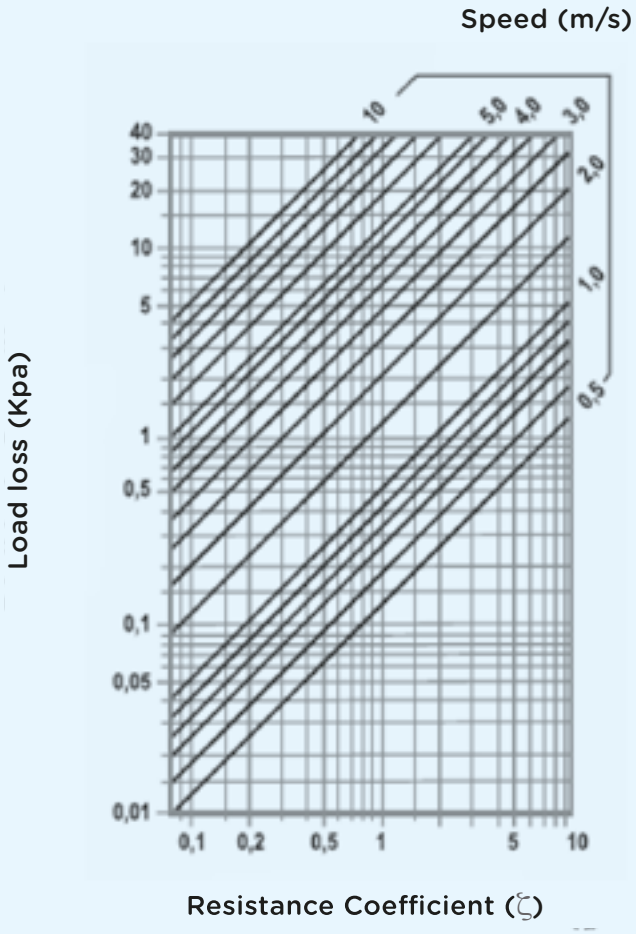
where:

V = fluid circulation speed (m/s)
g = gravity acceleration (m/s2)
ζ = localised resistance coefficient

The following table provides all the ζ values for all types of fittings. The speed value is normally used in domestic type installations have been taken into account, according to the speed ratios previously provided.

Table of localised load losses, Resistance coefficient values (ζ) and (m) equivalents

Fitting								
ζ	**0,75**	**0,42**	**0,50**	**0,40**	**0,90**	**1,30**	**1,50**	**3,00**
15 x 1,0	0,40	0,30	0,30	0,25	0,50	0,70	0,90	1,80
18 x 1,0	0,50	0,40	0,40	0,30	0,65	0,90	1,10	2,30
22 x 1,2	0,60	0,50	0,50	0,40	0,80	1,20	1,40	2,80
28 x 1,2	0,90	0,60	0,60	0,50	1,10	1,50	1,90	3,80
35 x 1,5	1,20	0,80	0,80	0,70	1,50	2,10	2,50	5,00
42 x 1,5	1,40	1,00	1,00	0,90	1,80	2,60	3,10	6,20
54 x 1,5	1,80	1,30	1,30	1,10	2,30	3,30	4,00	8,00
76,1 x 2,0	2,10	1,70	1,70	1,40	2,90	4,30	4,90	9,80
88,9 x 2,0	2,30	1,90	1,90	1,70	3,50	5,00	5,50	11,00
108,0 x 2,0	2,60	2,00	2,00	1,90	4,00	5,60	6,10	12,20



With the aim of calculating localised load losses more quickly, load losses based on ζ and water circulation speed inside the pipes is provided in the following graph. This way, knowing the ζ value, the direct reading of the localised load loss corresponding to it can be obtained.

o Equivalent length method

The method involves, given a certain localised resistance, (elbow, valve, etc.) resolving the problem of the calculation by attributing the fictitious value of the length of a straight pipe of equal diameter that results in the same loss load value.

Basically, all the equivalent length values obtained are added to the actual length of the installation, for each type of fitting, according to the following table.

Total length (Actual length + Equivalent length) is multiplied by the unit load loss value (R), thus obtaining the total resistance of the circuit.

8. Instalpress INOX and Instalpress STEEL
PREPARATION AND ASSEMBLY

8.1 Transport and storage

In transport and storage **Instalpress INOX** and **Instalpress STEEL** systems pipes and fittings are to be protected against damage, moisture, UV-radiation and dirtiness.

8.2 Separation and de-burring

Instalpress system pipes can be cut to length using commercial cutting tools suitable for metallic materials. It should be ensured that tarnishing does not result from performing cutting procedures on **Instalpress INOX** and **Instalpress STEEL.**

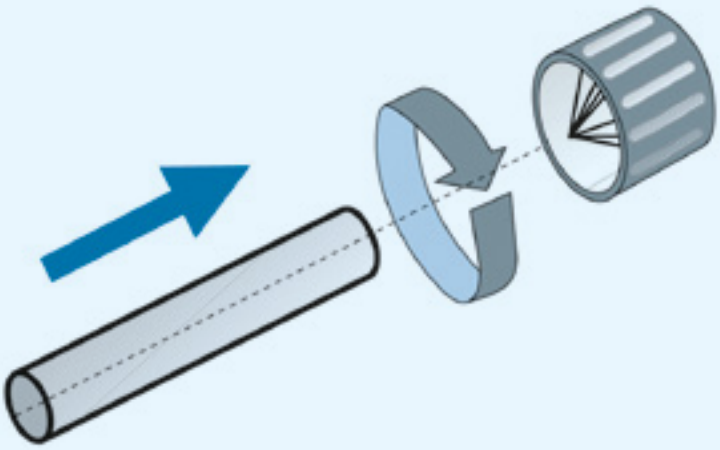
The use of the following tools is recommended:

- Pipe cutters
- Fine-toothed hand saws
- Slow running electronic machine saws.

The following tools are not permitted:

- Tools that cause tarnishing
- Oil-cooled saws
- Angle grinders.

After cutting procedures, the pipe ends must be finished internally and externally with a commercial device for processing stainless steel or a suitable file. This guarantees safety on inserting the pipe section into the pressure fittings, otherwise the joint may be damaged.



8.3 Marking the depth of the insertion

To get a correct and secure pressfitting connection:

a) Before assembly, the required insertion depth "A" must be marked on the pipes. The insertion depth is marked with the respective gauge and an indelible marker (Fig. 1).

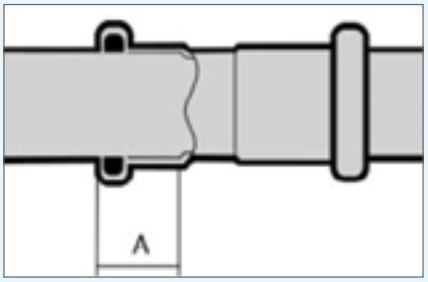
b) The joint's mechanical resistance can only be ensured by respecting the insertion depth "A" specified. When the pipe is inserted into the fitting, the mark should be just on the edge of the fitting ring (Fig. 2).

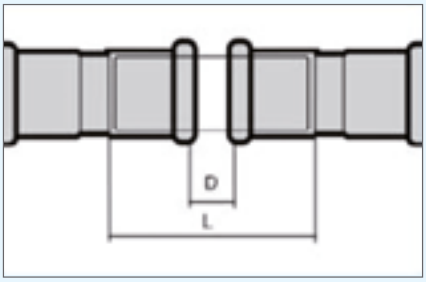
c) Pressfittings with insertable ends such as reductions, bent pipes, male-female elbows, deflection elbows or plugs must be marked prior to assembly with the insertion depths "A" specified (Fig. 3).

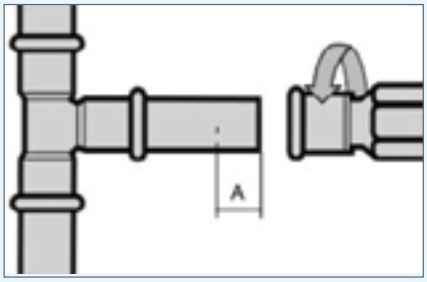
Fig. 1

Fig. 2

Fig. 3



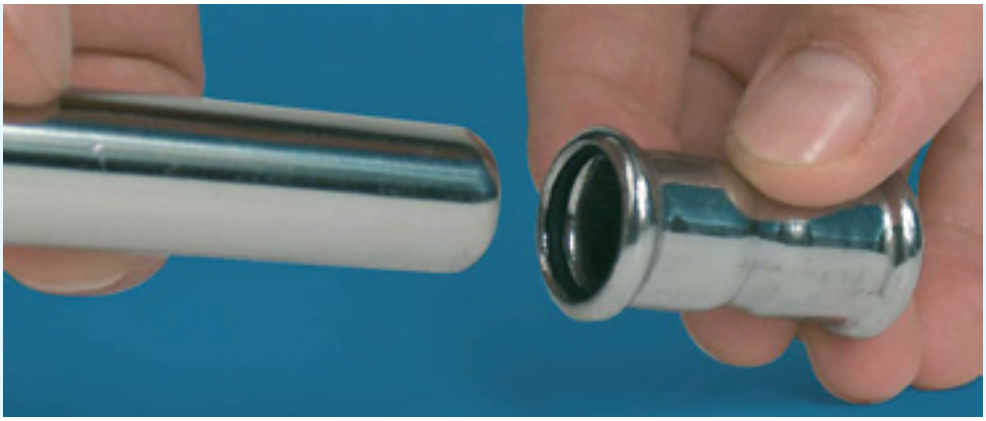




d mm	Insertion depth "A"mm	"D" - Min. distance between presses mm	Insertion depth "L"mm
15	20	10	50
18	20,5	10	51
22	21,5	10	53
28	23	10	56
35	25	10	60
42	30	20	80
54	35	20	90
76,1	53	30	130
88,9	60	30	150
108,0	75	30	180

8.4 Insertion into the press fitting

A permanent marking on the system pipe or moulding with spigots, I-A arcs and pass arcs, serve to achieve the required mechanical solidness of the press connection. This marking is to be applied before attaching to the end of the pipe.



8.5 Manufacturing the press connection

Upon merging the **Instalpress INOX** system pipe section with the **Instalpress STEEL** system fitting, the pressfitting can be conducted with the aid of the permitted pressing tools. The press connections of the pipe dimensions mentioned in previous chapters in this manual can only be manufactured with pressing devices, with the corresponding clamps and loops with an **M profile** for Instalpress INOX and Instalpress STEEL fittings.

Depending on the dimension of the pressfitting, the associated press jaws are to be inserted into the press device / proper press snare / chain on the moulding. In doing so, the press jaw / press snare notch must rest on the pressfitting bead of the moulding.

After pressing operations, the correctness and proper execution as well as compliance with the designated insertion depth are to be inspected. The user must be sure that all connec-tions have been pressed. After the pressing locations have undergone pressing operations, the pipes may no longer be adjusted. Threaded connections must be executed in advance.

FILINOX includes press-fit press indicators in order to facilitate the detection of non-pressed joints during the completion of any installation.

The press indicator is a coloured plastic seal visible in the profile of the mouth of the fitting which tears during pressing for easy removal by the installer. It is specifically designed to leave no traces in slings and jaws.

During assembly work, especially on large or complex installations, some fittings may inadvert-ently remain unpressed, which could pose a significant hazard.

Sometimes even during pressure tests, the leakage from an unpressed fitting can be so slight that it is barely detectable.

These new built-in indicators allow you to quickly visually check that all the fittings have been correctly pressed.

9. MINIMUM INSTALLATION MEASUREMENTS

Once the pipe is inserted into its housing, it is essential to mark its definitive position (INSER-TION). During the rest of the assembly this prevents the other fittings from causing any move-ment on any joint and the defect can be corrected before pressing.

With the aim of optimising assembly times, it is recommended to make a series of pipe and fitting insertions, so that the joints can be pressed, one after the other.

First check that there has been no movement in the joints and then before proceeding to the definitive deformation check the minimum measurements (A) of access of the pressing machine with its clamp.

Joints of between 12 and 108mm can be made with INSTALPRESS system. Each pipe length requires its respective pressing clamp and/or loop.

9.1 Clamp pressing (Ø15 – 35mm)

Take into account the minimum space required to surround the pipe and the fitting with the clamp. The pressing machine for 15 to 35mm diameters has a sliding pass on its head with the corresponding clamp is attached to the press measure. Open the clamp manually and place it on the end of the fitting where the gasket is located, keeping the machine positioned at a straight angle with respect to the pipe and then press the start-up switch and automatically press the joint.

It is recommended to follow the usage instructions in the machine's manufacturer's manual.

The **INSTALPRESS** system can be used with any clamp with a universal "M" profile.

9.2 Pressing with loop (Ø42 – 54mm)

Despite the availability on the market of pressing clamps for 42 and 54mm measures, **FILINOX, S.A.,** as a systemist manufacturer, recommends to press these measures with chain-type clamps (loops), in order to ensure proper deformation and anchoring between pipe and fitting.

Installation will be performed in the same mode as described in cases for pressing 76.1 to 108.0mm pipes.

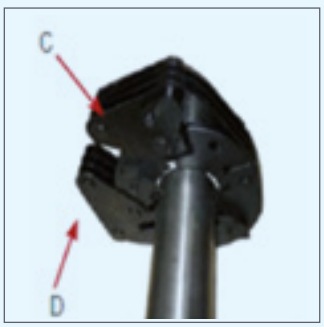
9.3 Pressing with loop (Ø76.1 - 88.9 – 108.0mm)

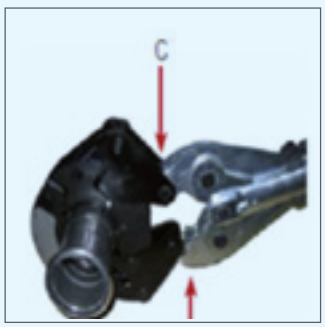
For pressing diameters 42, 54, 76.1, 88.9 and 108.0, the first pick up the clamp in a circular shape and open the pass (A) to be able to surround the pipe and the fitting to join. The same as with the pressing clamps for 42 and 54mm diameters, the position of the clamp does not matter, given that it is symmetric. On the larger measures, the clamp only has one correct position.

The bolts (B) or on some clamps are plated plates, serves as a reference for placing it on the joint site between the pipe and the fitting. Once the clamp is in place, close the pass and connect the machine to the clamp, first on the upper part (C), and action the machine little by little ensuring a good link between the upper and lower parts (D).

Once the machine is well-connected with the clamp, continuously advanced it to the back regression which indicates the end of the pressing.

In case of doubt please consult the **FILINOX, S.A.** Technical department.

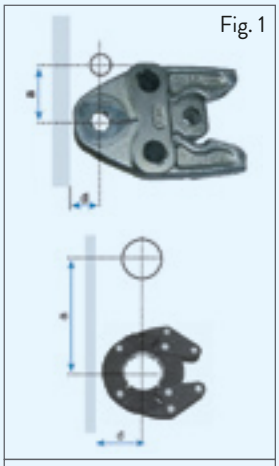


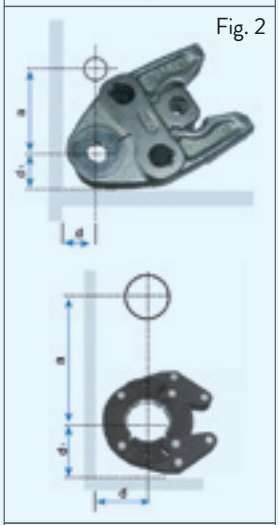


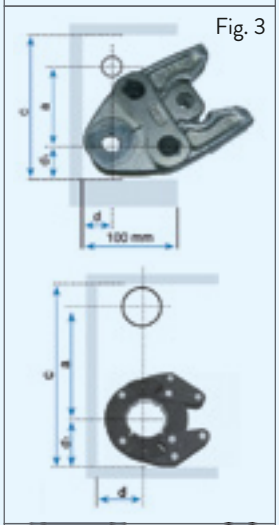
9.4 Minimum installation measurements with Clamp and Loop

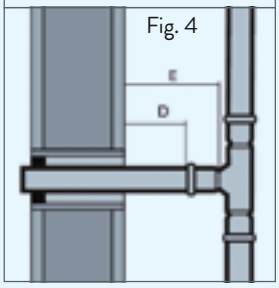
	Fig. 1		Fig. 2			Fig. 3				Fig. 4	
INSTALLATION WITH CLAMP											
Ø	a	d	a	d	d1	a	c	d1	d	D	a
15	56	20	75	25	28	75	140	25	28	35	55
18	60	20	75	25	28	75	140	25	28	35	55
22	65	25	80	31	35	80	150	31	35	35	56
28	75	25	80	31	35	80	150	31	35	35	58
35	75	30	80	31	44	80	170	31	44	35	61
INSTALLATION WITH LOOP											
42	150	110	150	110	150	150	321	150	110	35	150
54	150	110	150	110	150	150	327	150	110	35	150
76,1	210	170	210	170	170	210	418	170	170	100	210
88,9	260	190	260	190	190	260	495	190	190	100	260
108,0	320	200	320	200	200	320	574	200	200	100	320

* The measurements are for the Klauke UAP100 device loop. For other devices please contact the Filinox technical department.





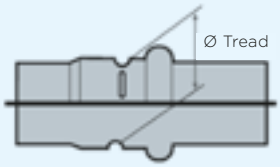




10. USEFUL WORKING PERIOD OF THE CLAMPS

To check that the clamps within the useful working period, the base pressing measurement must be between the values referred to in the following table:

		Tread (maximum)	
Nominal pipe	Tread (nominal)	Tread (nominal)	Instalpress INOX / Instalpress STEEL profile
15	15	15,6	16,8
18	18	18,6	19,8
22	22	22,6	23,6
28	28	28,8	29,4
35	35	35,8	35,9
42	42	41,5	41,5
54	54	53,0	53,0
76,1	76,1	76,1	76,1
88,9	88,9	86,3	86,3
108,0	108,0	106,5	106,5



- Only use pressing clamps and/or rings with the specific pressing profile for the correspon ding pressure assembly system.
- Do not carry out any pressing operation with incorrect pressing clamps and/or rings (press- ing profile, size, etc). The pressed joint may be unusable and therefore the machine and the clamp and or rings may be damaged.
- Use the pressing clamp only for pressing joints, do not strike or press other objects.
- Before each use, the pressing clamp must be checked for possible damage and wear.
- Do not continue to use damaged or worn pressing clamps. Otherwise the pressing may be incorrect.
- Perfect pressings can be guaranteed if the pressing clamp closes completely.
- Once the pressing operation is completed it must be checked that the pressing clamps close completely, on one point as well as on the opposite side.
- If on closing the pressing and there is a notable bear on the press pushing, this may indi cate a defective or non-sealed pressing operation.

IPG
GASPRESS
DVGW
MOP5/GT5

11. GASPRESS. STAINLESS STEEL PRESSING GAS SYSTEM

11.1 Description

GASPRESS system pipes and fittings are approved for use in gas distribution systems in several European countries, and can be used for indoor and outdoor installations. The application is approved for all types of combustible gas, both natural and liquid, in accordance with the DVGW G260 reference standard.

GASPRESS fittings come factory-equipped with yellow sealed O-rings made from hydrogenated acrylonitrile butadiene rubber (HNBR), a special variation of NBR rubber. It is perfect for gas applications, ensures greater resistance to high temperatures, is compatible with any variety of gas used, and is resistant to aging. It is compliant with the UNE-EN 549:2020 standard.

To indicate the gas application, **GASPRESS** fittings are stamped with both the Filinox brand and yellow identification panels showing our IPG **GASPRESS** brand, the DVGW certification, and their MOP5 /GT5 pressure features. All diameters of fittings come with **GASPRESS** Yellow press indicators.

Note. With this application it is absolutely forbidden to use black EPDM O-rings and ferritic stainless steel pipes, except for those approved under DVGW GW 541.

GASPRESS system pipes and fittings have been certified and approved under the German DVGW G 5614 standard for gas applications. The only piping permitted to be used for this application is EN 10312 Series 2, in 1.4404 (A-316L) grade.

Usage Conditions of the **GASPRESS** system:
- The pressed connection is created by mechanically deforming the fitting and the piping using a electrohydraulic pressing tool, with power of no less than 32 kN.
- The resulting pressed connection will be irreversible and permanent.
- Maximum pressure: 5 bar
- Minimum temperature: -20°C
- Maximum temperature: +70°C
- The system can be used for indoor and outdoor installations, in accordance with UNE EN 60670.

Each country is governed by specific regulations for gas installations, which the installer must know and comply with. In Spain the applicable law is Royal Decree 919/2006, of July 28, which approves the Technical regulation for the distribution and use of gaseous fuels and their supplementary technical instructions ICG 01 to 11. (BOE 09/04/06) and the national regulations in force in this area.

The reference standard for gas installations for domestic, commercial and industrial use and/or similar is the UNE 60670:2014 “Gas installations pipework supplied at maximum operating pressure (MOP) up to and including 5 bar.” In other countries, the relevant law for this type of installation should be applied.

GASPRESS system pipes and fittings are certified by the laboratories of the DVGW, a prestigious certification body, guaranteeing the system meets all the safety requirements for gas installations. It has passed several tests, including the GT5 high-temperature resistance test. GT 5 Test: Test at 650 ºC for 30 minutes at 5 bar of pressure.

The high-temperature resistance test aims to prevent an explosive mixture from forming due to possible leaks in a gas installation, in the event of fire. Since the ignition temperature of natural gas in the air is T= 640 ºC, the test is done at a higher temperature to verify that a significant or dangerous amount of gas would not escape at that temperature.

11.2 Fields of Application. GASPRESS

Field of Application	Piping	O-Ring	Approval	MOP (bar)	T (ºC)
Natural Gas	E.N. 10312 Series 2 (DVGW GW 541) A-316L	HNBR	DVGW G 5614	5	-20/+70
Methane Gas	E.N. 10312 Series 2 (DVGW GW 541) A-316L	HNBR	DVGW G 5614	5	-20/+70
Propane Gas	E.N. 10312 Series 2 (DVGW GW 541) A-316L	HNBR	DVGW G 5614	5	-20/+70
Liquefied Gases (LPG)	E.N. 10312 Series 2 (DVGW GW 541) A-316L	HNBR	DVGW G 5614	5	-20/+70

11.3 Technical Data for GASPRESS System Piping and Fittings

GASPRESS system pipes and fittings are made with austenitic stainless steel, with material no. 1.4404 (A- 316L), in accordance with UNE-EN 10088.

GASPRESS system pipes meet the requirements of the EN 10312 Series 2 standard and the German DVGW GW 541 standard. They are austenitic stainless steel pipes made from high-alloy Cr-Ni-Mo, welded lengthwise. The internal and external surfaces of these pipes are pure metal, so they are shiny, free from tarnishing, and free from corrosive and hygienically toxic substances.

All the system's pipes are tested and certified by DVGW. **GASPRESS** pipes are supplied in 6 meter bars, with the diameters and thicknesses noted in the following table:

Serie 1 Nominal Diameter ND DVGW GW-541	d x s mm	di mm	Longitudinal mass Kg / m	Water content Kg / m
12	15 x 1,0	13	0,351	0,133
15	18 x 1,0	16	0,426	0,201
20	22 x 1,2	19,6	0,625	0,302
25	28 x 1,2	25,6	0,805	0,514
32	35 x 1,5	32	1,258	0,804
40	42 x 1,5	39	1,521	1,194
50	54 x 1,5	51	1,972	2,042
65	76,1 x 2,0	72,1	3,711	4,080
80	88,9 x 2,0	84,9	4,352	5,660
100	108 x 2,0	104	5,328	8,490

GASPRESS fittings come factory-equipped with yellow sealed O-rings made from hydrogenated acrylonitrile butadiene rubber (HNBR), a special variation of NBR rubber. It is perfect for gas applications, ensures greater resistance to high temperatures, is compatible with any variety of gas used, and is resistant to aging. It is compliant with the UNE-EN 549:2020 standard.

GASPRESS fittings are made with austenitic stainless steel, with material no. 1.4404 (A-316L), in accordance with UNE-EN 10088. They are stainless steel pipes made from high-alloy Cr-Ni-Mo, for diameters of between 15 and 108 mm. They have a complete traceability system which includes the manufacturer, the diameter, the production lot, as well as the DVGW certification, all indelibly marked with a laser.

Additionally, as mentioned in the previous chapter, to indicate the gas application, **GASPRESS** fittings have two yellow identification panels (at 180°), showing our IPG GASPRESS brand, the DVGW certification and their MOP5 /GT5 pressure features. They also have Yellow press indicators.

Diameter, mm	Wall thickness, mm
15 - 54	1,5
76,1 – 108,0	2,0

The pressed connection for all **GASPRESS** fittings is created by mechanically deforming the fitting and the piping using a electrohydraulic pressing tool, with power of no less than 32 kN.

Because **GASPRESS** fittings with threaded terminals are made from stainless steel, they are compatible with brass, bronze, copper and carbon steel pieces.

GASPRESS installations must be installed, used and maintained by qualified personnel who understand the technical installation instructions described in this technical manual.

11.4 Technical Data for GASPRESS System Elastomers

GASPRESS fittings come factory-equipped with yellow sealed O-rings made from hydrogenated acrylonitrile butadiene rubber (HNBR), a special variation of NBR rubber. It is perfect for gas applications, ensures greater resistance to high temperatures, is compatible with any variety of gas used, and is resistant to aging. It is compliant with the UNE-EN 549:2020 standard.

The yellow gas rings made with HNBR material are not suitable for drinking water and heating installations.

HNBR, Yellow	Applications:	
Temp: -20°C - +70°C Diameter: Ø 15 -108 mm	• Natural Gas Installations. • Liquefied Gases (LPG) Installations.	• Methane Gas Installations. • Propane Gas Installations. • Butane Gas Installations.

11.5 GASPRESS System Corrosion Behavior

The **GASPRESS** system corrosion behavior is determined by the intrinsic characteristics of austenitic stainless steel Cr-Ni-Mo, no. 1.4404 (A-316L).

GASPRESS does not normally need specific and/or supplementary corrosion protection. In any case, corrosion protection bands and heat-shrinkable sleeves may be used for piping that is embedded or laid underground, in accordance with DIN 30672, stress class A (non-corrosive soil) and stress class B (corrosive soil). Empirically, coatings in accordance with DIN 55928 (protective coats) can also be used, provided they are continuous and free from defects.

GASPRESS piping can be used with insulation materials in accordance with DIN 1988, with a maximum weight of 0.05% water-soluble chloride ions. Insulating materials of AS quality (austenitic steels) in accordance with AGI-Q 135 are particularly recommended.

The following contexts should be avoided to reduce the risk of external corrosion of the **GASPRESS** system:

- Do not allow **GASPRESS** system piping and fittings to come into contact with wet mortars, drip areas, or coatings that contain or produce chlorides.
- Do not allow **GASPRESS** system piping and fittings to experience condensation.
- Do not allow **GASPRESS** system piping and fittings to come into contact with chlorinated gases and/or vapors.
- Do not allow **GASPRESS** system piping and fittings to be exposed to the evaporation of water with high salt content (maritime zones, chlorinated pools, etc.).

11.6 GASPRESS System Preparation and Assembly

11.6.1 Transport and Storage

The **GASPRESS** system stainless fittings and piping must be protected against damage, moisture, dirtiness and UV radiation during transport and storage.

11.6.2 Separation and Deburring

GASPRESS system pipes can be cut using common cutting tools intended for metallic materials. Tarnishing does not result during the cutting process with **GASPRESS**.
We recommend using:

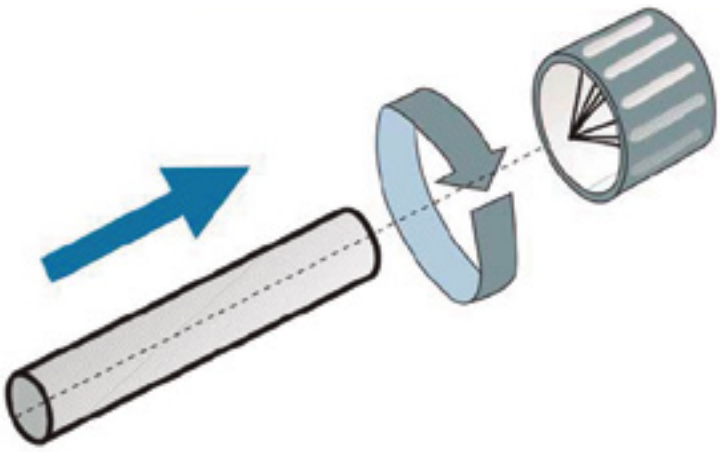
- Pipe cutters
- Fine-toothed hand saws
- Sierras electromecánicas de funcionamiento lento

The following tools are not permitted:

- Tools that cause tarnishing
- Oil-cooled saws
- Angle grinders

IMPORTANT NOTE: It is not permitted to fold or cut pipes by applying heat with an acetylene torch.

After the cutting process, the pipe ends must be treated internally and externally with a common pipe deburring tool for stainless steel. This guarantees the pipe section can be inserted into the pressure fittings safely, as otherwise the O-ring could be damaged.



11.6.3 Marking the depth of the insertion

To get a correct and secure pressfitting connection with the GASPRESS system:

a) Before assembly, mark the necessary insertion depth "A" on the pipes. Mark the insertion depth using the insertion gauge and an indelible marker (Fig. 1).

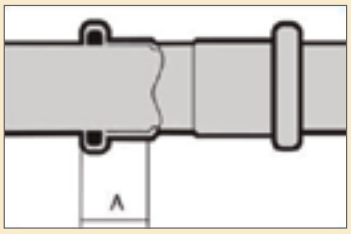
b) The mechanical resistance of the connection can only be ensured if the specified insertion depth "A" is followed. When the pipe is inserted into the fitting, the mark should be just at the edge of the fitting ring (Fig. 2).

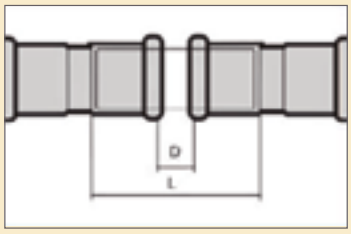
c) Pressfittings with insertable ends, such as reductions, curved pipes, male-female elbows, deflection elbows or plugs, must be marked prior to assembly with the specified insertion depths "A" (Fig. 3).

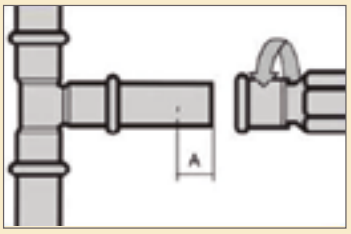
Fig. 1

Fig. 2

Fig. 3





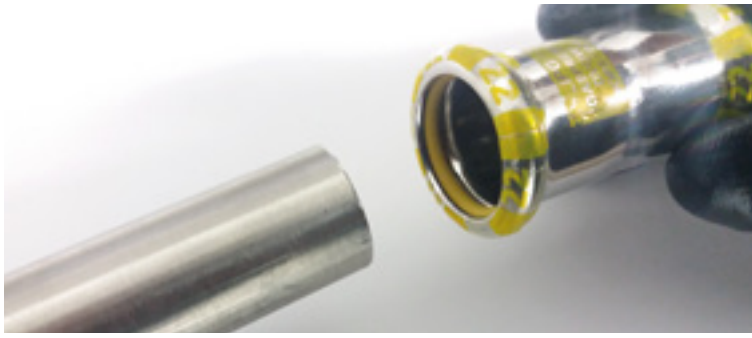


d mm	Insertion depth "A" mm	"D" - Min. distance between presses mm	Insertion depth "L" mm
15	20	10	50
18	20,5	10	51
22	21,5	10	53
28	23	10	56
35	25	10	60
42	30	20	80
54	35	20	90
76,1	53	30	130
88,9	60	30	150
108,0	75	30	180

Another detail to take into consideration is the minimum distance between contiguous fittings: distance "D". It is essential to respect this minimum distance to ensure successful pressfitting, preventing the notch of a fitting from interfering when placing the clamp or loop on contiguous fittings.

11.6.4 Insertion into the press fitting

Before inserting the end of the pipe into the press sleeve of the molding, check that the sealed O-ring is in the correct position and that there is no damage or dirtiness. Then insert the pipe section into the pressure fitting using gentle pressure and rotating it to the insertion mark.



11.6.5 Pressfitting GASPRESS Fittings

After the insertion of the pipe section with the **GASPRESS** system fittings, the pressfitting can be done using approved tools. The pressed connections for the pipe dimensions mentioned in previous chapters of this manual can only be done using pressing machines with at least 32 kN of power, with "M" profile clamps and loops. These must be in perfect conditions without any wear due to usage. It is very important for the interior profile of the clamp or loop, as well as their articulation points, to be clean and free from rust, dirt and debris.

Depending on the dimension of the press fittings, the corresponding press clamps are placed in the machine (Diameters 15, 18, 22, 28 and 35 mm) or the corresponding press Loop/-Chain are placed in the fitting (Diameters 42, 54, 76.1, 88.9 and 108 mm). The groove in the press clamp or loop must fit into the notch of the fitting.

After pressing, analyze the connection to ensure it is correctly and properly executed, and that the insertion depth is respected. The user must ensure that all connections have been correctly pressed. After the pressure points have been pressed, the pipes may no longer be adjusted. Threaded connections must be done in advance.

All **GASPRESS** fittings have a press indicator to facilitate detection of non-pressed connections during the execution of any installation. Sometimes even during pressure tests, the leakage from a non-pressed fitting can be so slight that it is barely detectable.

With the press Indicator, it is very easy for the installer to identify non-pressed fittings, even during assembly and without having to get to the pressure test. The press indicator is a factory-installed Yellow (**GASPRESS**) plastic seal on the molding end (profile of the mouth) of fittings to allow the insertion of the tube, but which tears while pressing the pressfitting connection for easy removal by the installer. It is specifically designed to not leave debris on clamps.

It comes in several colors, identifying the family to which the fittings belong; in our case it is yellow for the **GASPRESS** family. In addition to the colored bands to identify the family, it shows the diameter of the fitting mouth, at 2 levels, so that it is always easy to read.

The sequence to ensure correct pressing of GASPRESS fittings is:

- Cut the pipe.
- Deburr the pipe cut, removing interior and exterior debris that could damage the O-ring.
- Mark the insertion depth on the end of the pipe using an insertion gauge and a marker.
- Examine the interior of the fitting, checking for the presence and correct positioning of the O-ring.
- Insert the fitting into the tube, rotating it and pushing it in with gentle pressure.
- Ensure that the insertion process between the pipe and the fitting has been completed.
- Mount the "M" profile clamp and/or loop adapter on the press machine, depending on the diameter.
- Open the clamp/loop and place it on the notch of the fitting being pressed.
- Press and visually check the resulting pressed connection.
- Remove any debris from the press indicator.

11.7 GASPRESS System Minimum Installation Measurements

Once the pipe is inserted into its housing, it is essential to mark its definitive position (INSERTION). During the rest of the assembly this prevents the other fittings from causing any movement at any connection, and enables any defects to be corrected before pressing, always ensuring the minimum insertion depth "A".

In order to optimize assembly times, we recommended doing a series of pipe and fitting insertions, so that the connections can then be pressed one after the other.

The **GASPRESS** system can be used to make connections with diameters of between 15 and 108 mm. Every pipe size will need its respective press clamp and/or loop. The pressed connection is created by using an electrohydraulic tool to mechanically deform the fitting and the pipe. The resulting pressed connection is irreversible and permanent.

11.7.1 Clamp Pressing for GASPRESS fittings (Ø 15 - Ø 35)

Take into account the minimum space required to surround the pipe and the fitting with the clamp. The press machine for 15 to 35 mm diameters has a sliding pin on its head where you attach the clamp for the size being pressed. Open the clamp manually and place it on the end of the fitting where the notch that houses the O-ring is located, keeping the machine positioned at a right angle to the pipe. Then press the start-up switch to automatically press the connection.

We recommend always following the usage instructions from the Machine Manufacturer's Manual. The **GASPRESS** system must always use clamps with a universal "M" profile.

11.7.2 Loop Pressing for GASPRESS fittings (Ø 42 - Ø 54)

GASPRESS fittings with diameters of 42 and 54 mm must always been pressed with chain-type loops in order to ensure correct deformation and anchoring between piping and fitting. Clamps may not be used for **GASPRESS** fittings with these diameters. Their installation follows the same procedure described below for pressing pipes with diameters of 76.1 to 108 mm.

11.7.3 Loop Pressing for GASPRESS fittings (Ø 76.1, Ø 88.9 and Ø 108)

To press pipes with diameters of 42, 54, 76.1, 88.9 and 108 mm, first pick up the loop in a circular shape and open the pin (A) to be able to surround the pipe and the fitting being connected. Loops are normally symmetrical up to a diameter of 54 mm, so the position does not matter as long as it is mounted on the notch of the fitting that houses the O-ring. On pipes with larger diameters of 76.1, 88.9 and 108, the clamp only has one correct position.

The bolt (B), or on some clamps a side plate (horseshoe), serve as a reference for placing the loop oriented with the side plate toward the pipe connection side. It is a Poka-Yoke system, so if the loop has an incorrect orientation it will not fit.

Once the clamp is in place, close the pin and then connect the adapter to the press machine. After completing this operation, proceed with the press machine + adapter assembly, connecting it to the Loop, first on the upper part (C) and then operating the machine little by little to ensure a good connection between the upper (C) and lower (D) parts. Once the press machine + adapter assembly is well-connected to the loop, advance it continuously to its rear stop which indicates the end of the pressing.

In case of doubt please contact the **FILINOX, S.A.** technical department.

11.7.4 Minimum Installation Measurements for GASPRESS Fittings with Clamp and Loop

For technically correct pressfitting on site, make sure there is enough space between the walls, ceiling or any other obstacle to be able to correctly locate the press clamp or loop on the notch of the fitting.

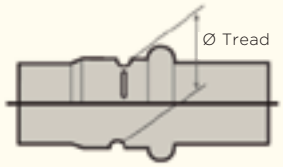
	Fig. 1		Fig. 2			Fig. 3				Fig. 4	
INSTALLATION WITH CLAMP											
Ø	a	d	a	d	d1	a	c	d1	d	D	a
15	56	20	75	25	28	75	140	25	28	35	55
18	60	20	75	25	28	75	140	25	28	35	55
22	65	25	80	31	35	80	150	31	35	35	56
28	75	25	80	31	35	80	150	31	35	35	58
35	75	30	80	31	44	80	170	31	44	35	61
INSTALLATION WITH LOOP											
42	150	110	150	110	150	150	321	150	110	35	150
54	150	110	150	110	150	150	327	150	110	35	150
76,1	210	170	210	170	170	210	418	170	170	100	210
88,9	260	190	260	190	190	260	495	190	190	100	260
108,0	320	200	320	200	200	320	574	200	200	100	320

*The measurements are for the Klauke UAP100 machine loop. For other machines please contact the Filtube Technical Department.

11.8 GASPRESS system Press Tools.

To check that the clamps are within their useful working period, the tread measurement must fall between the values in the following table:

Nominal Pipe	Tread (Nominal)	Instalpress / GASPRESS Profile
15	15	16,8
18	18	19,8
22	22	23,6
28	28	29,4
35	35	35,9
42	42	41,5
54	54	53,0
76,1	76,1	76,1
88,9	88,9	86,3
108,0	108,0	106,5



• Only use press clamps and/or rings with the specific press profile for the corresponding pressure assembly system.
• Do not do any press operation with incorrect press clamps and/or rings (press profile, size, etc). The pressed joint could become unusable and both the machine and the clamp and/or rings could be damaged.
• Use the press clamp only for making pressed connections, and do not strike or press other objects.
• Before each use, check the press clamp for possible damage and wear.
• Do not continue to use press clamps if they are damaged or worn. Otherwise the pressing may be incorrect.
• Perfect pressings can only be guaranteed if the press clamp closes completely.
• Once the press operation is completed, check that the press clamps close completely, both at the tip and on the opposite site.
• If a notable excess is produced on the press casing when closing the clamp, this may indicate a defective or non-sealed press operation.

Fig. 1

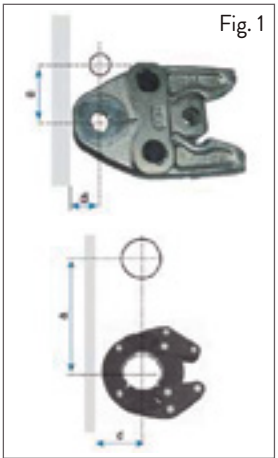


Fig. 2

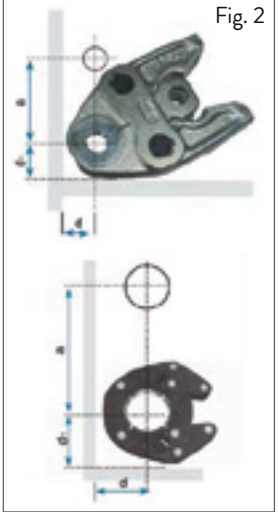


Fig. 3

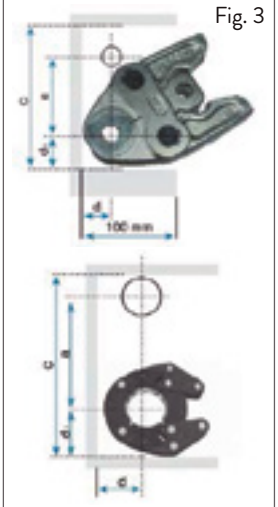
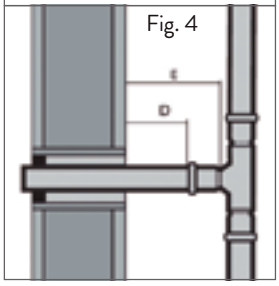


Fig. 4



11.8.1 Maintenance Instructions for the GASPRESS fittings clamps and/or loops:

- Periodically check that the press clamps and/or loops move smoothly.
- Keep press clamps free from dust, plaster, cement, etc.
- If necessary, clean press clamps and lightly lubricate pins with machine oil.
- Remove material debris from the press profile.
- Keep edges free from construction debris and build-up.
- Keep the stepping area (tread) clean.
- Prevent oxidation of press clamps/loops by cleaning and lubricating them.
- Press clamps and/or loops must be reviewed by the manufacturer's technical service at least once a year or every 1000 work hours.

11.9 Characteristics of the GASPRESS System Press Machines

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Model	Pressing force	Diameters	Weight (kg)	Power supply mode
UNP2 (fig. 1)	32 kN	12 - 54	3,5	230 V Mains
UAP3L (fig. 2)	32 kN	12 - 54	3,5	3.0 Ah Li-Ion Battery
UAP4L (fig. 3)	32 kN	12 - 108,0	4,3	3.0 Ah Li-Ion Battery
AH700LS (fig. 4	700 bar	12 - 108,0	6,4	3.0 Ah Li-Ion Battery

11.10 Final Leakage Testing of the GASPRESS system Installation

The test is done with air or inert gas (e.g.: nitrogen, etc.) and must be carried out in accordance with worksheet DVGW - G600. For safety reasons, the test must be done by two testers and the maximum pressure admissible is 3 bar.

System with operating pressure of up to 100 mbar

The test includes two phases: the load test and the subsequent seal test.

Load test

Test pressure: 1 bar.
Read sensitivity of the test manometer: 0.1 bar.
Duration of the test: see Tab. 13.

The test begins after a necessary pressure stabilization time in accordance with Tab. 13. The result is successful if the pressure remains constant during the testing time (Δp = 0).

Main test

Test pressure: 150 mbar.
Read sensitivity of the test meter: 0.1 mbar (1 mm H2O).
Duration of the test: see Tab. 13.
The test begins after a necessary pressure stabilization time in accordance with Tab. 13.

The result is successful if the pressure remains constant during the testing time (Δp = 0).
Note. The worksheet DVGW - G 600 determines that the test ends with a utilization capacity test, by connecting the gas system to the supply network to verify its suitability.

Volume of the Installation	Stabilization Time	Duration of the Test
< 100 Litros	10 Min.	10 Min.
≥ 100 Litros < 200 Litros	30 Min.	20 Min.
≥ 200 Litros	60 Min.	30 Min.

Systems with operating pressure > 100 mbar and <1 bar

The test includes a combined load and sealing test.
- Prueba combinada de carga y estanqueidad
- Presión de prueba: 3 bar.
- Sensibilidad de lectura del manómetro de prueba: 0,1 bar.
- Duración de la prueba: 120 minutos.

La prueba debe comenzar después de aproximadamente 3 horas desde la inserción del elemento aeriforme para llevarlo a temperatura ambiente.
El resultado es exitoso si durante el tiempo de prueba la presión permaneció constante (Δp = 0).

12. PRESSING MACHINE SPECIFICATIONS

PRESS MACHINE MAP2L 19

JAWS
19 kN

MINI Range	
Ref.	26MAP2L19NG
Bluetooth	YES
OLED Display	YES
Realtime Clock (RTC)	YES
Hydraulic Pressure Control (HPC)	YES
Linear Force:	19KN
Battery:	18V 1,5 Ah Li-Ion Makita
Nº of pressings / charging time	150 (NS20) * / 15 Min
Weight with battery / without jaw head rotation:	1,8 kg
Suitable pressing jaw:	350°
Referencia de Mordazas:	SBMX / UWMX

i-press®

PRESS MACHINES UNP2

JAWS
32 kN

STANDARD Range	
Ref.	26MPHFK
Bluetooth	NO
OLED Display	NO
Realtime Clock (RTC)	NO
Hydraulic Pressure Control (HPC)	NO
Linear Force:	32KN
Battery:	230V
Nº of pressings / charging time	-
Weight with battery / without jaw head rotation:	3,5 kg
Suitable pressing jaw:	350°
Referencia de Mordazas:	SB / UW / QC / SSK

PRESS MACHINE UAP3L

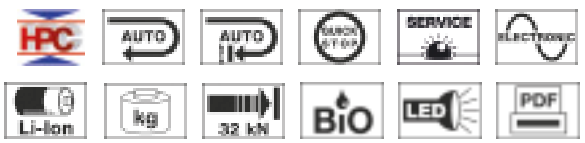
JAWS
32 kN

STANDARD Range	
Ref.	26UAP3LNG
Bluetooth	YES
OLED Display	YES
Realtime Clock (RTC)	YES
Hydraulic Pressure Control (HPC)	YES
Linear Force:	32KN
Battery:	18V 4,0 Ah Li-Ion Makita
N° of pressings / charging time	400 (NS20) * / 22 Min
Weight with battery / without jaw head rotation:	3,6 kg
Suitable pressing jaw:	350°
Referencia de Mordazas:	SB / UW / QC / SSK

PRESS MACHINE UAP4L

JAWS
32 kN

STANDARD Range	
Ref.	26UAP4LNG
Bluetooth	YES
OLED Display	YES
Realtime Clock (RTC)	YES
Hydraulic Pressure Control (HPC)	YES
Linear Force:	32KN
Battery:	18V 4,0 Ah Li-Ion Makita
N° of pressings / charging time	400 (NS20) * / 22 Min
Weight with battery / without jaw head rotation:	4,4 kg
Suitable pressing jaw:	350°
Referencia de Mordazas:	SB / UW / QC / SSK / SBK /BP..LP



PRESS MACHINE UAP100120CFM

STANDARD Range	
Ref.	26MPEGNG
Bluetooth	YES
OLED Display	YES
Realtime Clock (RTC)	YES
Hydraulic Pressure Control (HPC)	YES
Linear Force:	120KN
Battery:	18V 4,0 Ah Li-Ion Makita
Nº of pressings / charging time	20 (NS1080) * / 22 Min
Weight with battery / without jaw head rotation:	12,9 kg
Suitable pressing jaw:	350°
Referencia de Mordazas:	BP..M

FIXED PROFILE JAWS

MINI 19KN / INOX/CARBON

Ø	M Profile (KSP3)
15	27TZ12L1915
18	27TZ12L1918
22	27TZ12L1922
28	27TZ12L1928
35	27TZ12L1935

STANDARD 32KN INOX/CARBON

Ø	M Profile (KSP3)
15	27TZ15
18	27TZ18
22	27TZ22
28	27TZ28
35	27TZ35
42	26TZK42
54	26TZK54

DAPPER JAWS AND CHAINS

3 SEGMENT CHAINS

Ø	M Profile
Adapter SBKQC	✓
40	-
42	26QC42MKL
50	-
54	26QC54MKL
63	-

Adapt with:
UAP3L · UAP4L p.3
UNP2 p.3 ·UAP332CFM p.3
UAP432CFM p.3 · HPU2 p.13
PKUAP3, PKUAP4 p.4

4 SEGMENT CHAINS

Ø	M Profile
Adapter	26AUAP3
42	26TZ42L
54	26TZ54L
PACK 42-54	26CMM42M54Z3

FILPRESS / INSTALPRESS PLIERS




Ø	Instalpress	Filpress	Instalpress	Filpress
15	27TZ2L1915	26TZK15	27TZ15	26TZK15
18	27TZ2L1918	26TZK18	27TZ18	26TZK18
22	27TZ2L1922	26TZK22	27TZ22	26TZK22
28	27TZ2L1928	26TZK28	27TZ28	26TZK28
35	27TZ2L1935	26TZK35	27TZ35	26TZK35
42	X	26TZ42L		
54	X	26TZ54L		
76,1	X	X		26TZ76L
88,9	X	X		26TZ88L
108,0	X	X		26TZ108L

ADAPTER AND PRESSING HEAD

Ø	Press Machine	Adapter
15 - 54	26UAP3LNG	26AUAP3
15 - 108,0	26UAP4LNG	26AUAP3 / 26AUAP4
76,1 - 108,0	26MPEGNG / UAP100120CFM	Ø



Instalpress
inox


Instalpress
steel

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