FRABO

TECHNICAL CATALOGUE

# FRABOPRESS GAS

COPPER AND BRONZE PRESS FITTINGS

# FRABOPRESS GAS

Copper and Bronze press fittings


CONTENTS



**In the text of this manual are detailed references to Italian product standards and national installation. References to national rules of other countries (eg Germany) are presented for information purposes.**
**To get detailed information about consult the Technical Service FRABO**

## DESCRIPTION

### COPPER / BRONZE FRABOPRESS GAS FITTINGS

Highly pure copper and high quality bronze press fittings (**Cu-DHP**), with yellow **HNBR** gasket.

**FRABOPRESS GAS** fittings are suitable for the realization of pressed junctions on high quality copper pipes in gas systems according to current regulations.

The threaded fittings are manufactured in copper in compliance with European regulations. Suitable for pressing with "V" type jaws.

## ADVANTAGES

- Easy and quick installation
- High hydraulic and mechanical seal ("V" profile with pipe insertion guide)
- Noble (copper) and bacteriostatic material
- Safe installation
- High fitting body durability

## TECHNICAL FEATURES

### COMPLIANCE FEATURES

**FRABOPRESS GAS** fittings are suitable for the realization of pressed junctions on high-quality copper pipes in most gas installations (compliant with **EN 1057**).

**FRABOPRESS GAS** copper fittings comply with the **UNI 11065** standard, made with a careful choice of raw materials and maximum quality in the internal processing.

The threaded fittings are made of bronze in compliance with the **EN 1982** standard and have threads according to the **UNI EN 10226-1** standard.

### CONSTRUCTION FEATURES

| | |
|---|---|
| Available range: | 12, 15, 18, 22, 28, 35, 42, 54 mm |
| Fitting profile: | the type of profile adopted by **FRABO** (for "V" type jaws) for the **FRABOPRESS GAS**, series allows pressing at 3 points and is therefore optimal for guaranteeing seal and solidity at the pipe-fitting junction. The protruding collar of the fitting allows a more secure installation of the pipe without difficulty, preventing any deviations of the connection of the pipe in the fitting, which could damage the gasket. |
| Fitting structure: | the body of the **FRABOPRESS GAS** fitting features a particularly high wall thickness, hence guaranteeing maximum performance in every application. |

| FITTING TECHNICAL FEATURES | | |
|---|---|---|
| **APPLICATION** | Pmax (bar) | Tmax °C |
| Gas (domestic or LPG) | PN5/GT1 | -20°/+70°C |

## MATERIALS

**FRABOPRESS GAS Copper fittings**
They are made of high purity deoxidised copper (**Cu-DHP**) in compliance with the EN 1412 standard.

**FRABOPRESS GAS Bronze fittings**
They are made of high quality bronze alloy with low lead content in compliance with the EN 1982 standard.

## COPPER

Copper is widely used in the realization of many thermohydraulic installation thanks to its physical and technological properties and excellent thermal conductivity and corrosion resistance.

Copper is now a highly valuable material, used by designers and installation technicians for thermal systems due to its qualities and has always been one of the most noble metals.

## GASKET SEAL – O-RING

The O-ring for the **FRABOPRESS GAS** series is made of yellow **HNBR**. The high performance and excellent behaviour of this material against ageing, allow its safe and durable use in most domestic and industrial gas applications.

The **HNBR** O-ring comes with main European certifications for use with Methane and **LPG** gas.

**For other use, please contact the FRABO technical support office for direct inquiries.**

## USABLE PIPELINES

The **FRABOPRESS GAS** fittings are suitable for a safe connection to copper pipes (in rods or rolls) compliant with **EN 1057** regulations and **DVGW** certificates.

In gas system installations, pipes described in **EN 1057** standard and by **DVGW GW392** certificates can be pressed with the **FRABOPRESS GAS** system (hard and half hard copper pipes).

**FRABOPRESS GAS fittings are suitable for gas system installations as set by TRGI 600:2008.**
**Please refer to TRGI 600:2008 for details**

| MINIMUM THICKNESS FOR GAS SYSTEMS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| External Pipe Diameter [mm] | 12 | 15 | 18 | 22 | 28 | 35 | 42 | 54 |
| Minimum thickness [mm] | 1,0 | 1,0 | 1,0 | 1.0 | 1.5 | 1.5 | 1.5 | 2.0 |

## MARKINGS

**FRABOPRESS GAS** fittings are marked with the FB logo, size and corresponding product certification logos.

**There are three indications on the yellow markings:**


**Gas** – means that the product is suitable to be used in gas supply installations;

**PN** – followed by a bar pressure value: Indicates maximum working pressure;

**GT** – followed by a pressure value in bar: Indicates that the product was subject to a high temperature test.

The test consists in checking resistance at 650 °C for 30 minutes with an admissible loss, in these conditions, under 30 $dm^3/h$ as described by UNI regulation n° 11065 and DVGW G5614.

## PRESSING/JAW EQUIPMENT

The installation tools for the **FRABOPRESS GAS** products comprise a set of electronically controlled electro-mechanical equipment. You can refer to the paper catalogue or view the updated list of our available equipment and request detailed operating instructions on www.frabo.com.

Thanks to the deformation imposed on the fitting and the pipe, the pressing tools create a permanent junction, which is constantly sealed and not removable.

A clear visual example of the nature of the deformation is provided in the following figures.

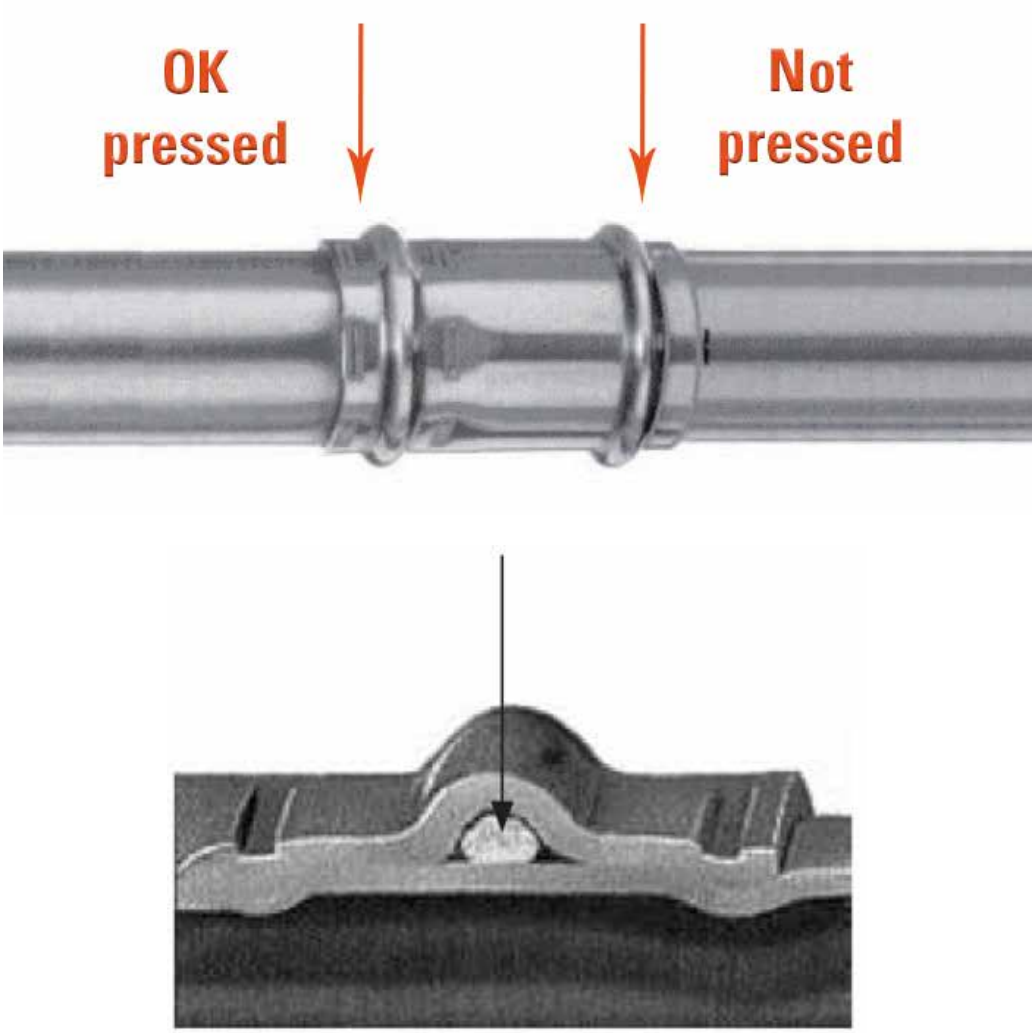



Figure 1 - Chain and its adapter

A notable characteristic of the electric pressing tools provided by **FRABO** is the ability to optimize the pressure force based on the nominal diameter to compress.

For larger diameters (42, 54) the **FRABOPRESS GAS** system proposes, instead of traditional pressing jaws, chains with the same function. (fig. 1)

## COMPATIBLE INSTALLATION EQUIPMENT

Original **FRABO** jaws or jaws with the same profile ("V") are used to install **FRABOPRESS GAS** fittings.
A good number of pressing tools are available on the market today, which are provided by different tool manufacturers and can be used for the installation of **FRABOPRESS GAS** fittings.

For the sake of simplicity, we list the minimal characteristics of the pressing tools here below:

- Minimum pressing force of the electric tool: 32kN
- Jaw profile suitable for **FRABOPRESS GAS** fittings
- Jaw fastening pin diameter: 14 mm
- Minimum jaw housing width: 33 mm
- Pressing without stop function – after pressing begins, the pliers cannot be separated (with no special operation, such as the pressing of the emergency stop button) from the piece, which may not yet be connected to pressure.

The chain offers the advantage of a smaller footprint during positioning and pressing and allows the achievement of an installation with excellent concentricity between the pipe and the fitting.

The electric tools provided by **FRABO** can also be used in other press fitting systems

### COMPACT PRESSES

Compact presses that provide easier installation thanks to greater manageability are now available on the market. The minimum electric tool pressing force is about 19 kN and they are suitable for fittings with diameters up to 28 mm (metal).


**ATTENTION**

Except in cases where the manufacturer of the pressing equipment explicitly declares the compatibility of its electric tool with jaws produced by other manufacturers, the use of a brand of jaws different from that of the electric tool is not allowed.

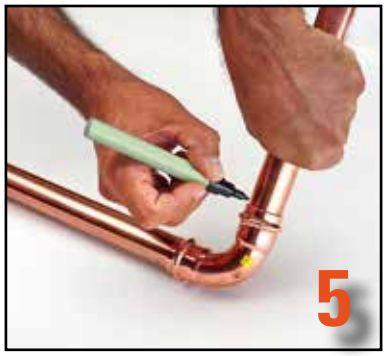
# INSTRUCTIONS FOR FRABOPRESS INSTALLATION AND ASSEMBLY


Cut the pipe perpendicularly across its section (by means of a pipe cutter or a fine tooth saw).


Internally and externally bar the pipe.


Make sure the O-Ring is well-inserted.


Fully insert the pipe in the fitting.




Mark the pipe at the stroke position.


Insert the jaw suited for the pressing tool and push the stop pin until it clicks


Open the jaw and position it perpendicularly on the fitting


Begin pressing. It will run completely automatically. The jaw must close completely


After pressing has occurred, the jaw can be opened.

# TECHNICAL SOLUTIONS FOR INSTALLATION AND ASSEMBLY

The **FRABOPRESS GAS** system is an excellent solution for the realization of many types of systems. A good installation depends on the degree of accuracy used for the assembly of the various components and respect for some simple technical rules in addition to the Regulations.

## CUTTING OF THE PIPE

The copper pipes used along with the **FRABOPRESS GAS** fittings, must be cut by using a pipe cutting tool, the efficacy of which has previously been verified. By using this tool, the cut will not have burrs and will be perpendicular to the pipe's axis.

Other cutting systems can of course be used, although Frabo generally discourages the installer from using them. In any case, it is absolutely necessary to deburr the pipe.

## DEBURRING THE PIPE

Once the pipe has been cut to the desired size, it is always necessary to carefully deburr its internal and external extremities. This operation is absolutely essential whenever the adopted cutting system can create burrs; for example, with manual and electric saws. The removal of any residual chips prevents the possible damage of the O-ring gasket once the pipe is introduced into the fitting.

## DEPTH OF THE CONNECTION

To be absolutely sure of the correct depth of the connection of the pipe inside the fitting, it is sufficient to mark the depth of the connection beforehand, or make sure that the pipe is introduced up to the end stop in the coupling block of the fitting itself.

In the case of passing fittings, i.e. without an arresting block, or for a better quality of work, it is advisable to trace the depth of the connection on the pipe, in order to verify, visually as well, the proper insertion of the pipe.

## CONTROL

Before proceeding, it is best to check correct O-ring position beforehand; then check its integrity and cleanliness.

## PRESSING

To perform a proper pressing, the appropriate equipment must be used, which can be battery powered or plugged into an electricity supply. For each diameter of pipe utilized, the appropriate deformation jaws must be used to permit the realization of a perfectly airtight junction.

To perform perfect pressing, put the fitting inside the jaw and keep the tool positioned at right angles to the pipe.

Ensure that the toroidal chamber of the fitting (which contains the O-Ring) is properly positioned inside the corresponding groove of the jaw. Then begin pressing the junction; the pliers will automatically perform the deformation until its completion.

## PIPE BENDING

The range of **FRABOPRESS GAS** fittings includes 45° and 90° bends and elbows that allow changes to be made in the route without the need to bend the pipe directly. However, sometimes, the cold shaping of the pipes is necessary. To carry out this type of operation, the use of a special pipe-bending tool is absolutely recommended.

The minimum bending radius (R) is inferred from the following relations:

**R = 3,5 x D for D <= 18mm**
**R = 5,5 x D for D >= 18 mm**

where D is the diameter of the pipe

Avoid making bends that have a minimum radius that is lower than that indicated.

**Hot pipe bending using an acetylene torch or other tool is absolutely unacceptable.**

**It is always necessary to respect a minimum distance from the bend made on the pipe to the installation of fittings (fig.4.1).**

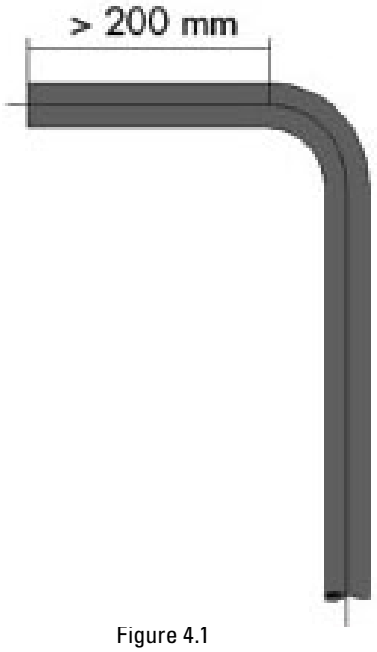



Figure 4.1

## FITTING DEPTHS

The installation depths and the coupling tolerances are designed and implemented with the utmost attention to ensure the highest degree of safety of the junction.

The connection depths based on the diameter are reported in following table.

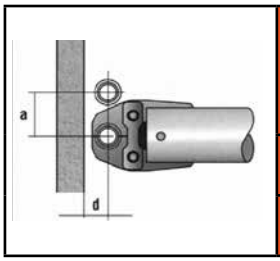

| Nominal Diam. [ mm ] | 12 | 15 | 18 | 22 | 28 | 35 | 42 | 54 |
|---|---|---|---|---|---|---|---|---|
| L mm | 18 | 22 | 23 | 24 | 25 | 26 | 35 | 42 |

Table 2.1

## INSTALLATION DEPTHS

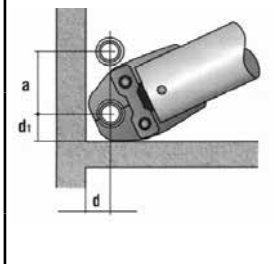
The use of the cold pressing technique gives a great advantage in terms of execution time of the connections. To facilitate correct installation, the cases that we report below may prove useful, as they very clearly exemplify the minimum installation depths that allow an installation that is easy and free of annoying complications.

The distances from walls, corners, and cracks in the wall necessary for the installation of pipelines can be deduced from the diagrams and the following tables:



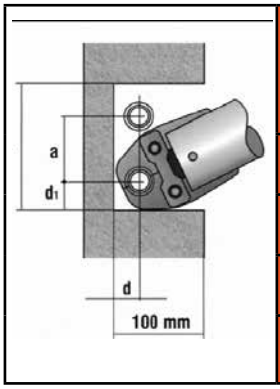

| Nom. diam. mm. | 12 | 15 | 18 | 22 | 28 | 35 | 42 chain | 54 chain |
|---|---|---|---|---|---|---|---|---|
| d mm | 20 | 20 | 22 | 25 | 25 | 30 | 75 | 85 |
| a mm | 56 | 56 | 60 | 65 | 75 | 83 | 115 | 120 |

Minimum depths of the pipelines installed in-wall



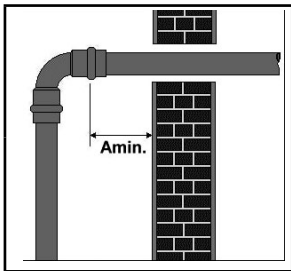

| Nom. diam. mm. | 12 | 15 | 18 | 22 | 28 | 35 | 42 chain | 54 chain |
|---|---|---|---|---|---|---|---|---|
| d mm | 31 | 31 | 31 | 31 | 31 | 31 | 75 | 85 |
| a mm | 80 | 80 | 80 | 80 | 80 | 84 | 75 | 85 |
| d1 mm | 28 | 28 | 28 | 35 | 35 | 44 | 115 | 120 |

Minimum depths of pipelines installed near corners



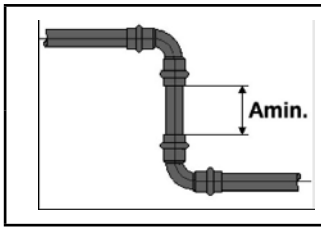

| Nom. diam. mm. | 12 | 15 | 18 | 22 | 28 | 35 | 42 chain | 54 chain |
|---|---|---|---|---|---|---|---|---|
| d mm | 31 | 31 | 31 | 31 | 31 | 31 | 75 | 85 |
| a mm | 80 | 80 | 80 | 80 | 80 | 84 | 75 | 85 |
| c mm | 155 | 155 | 161 | 173 | 181 | 206 | 265 | 290 |
| d1 mm | 28 | 28 | 28 | 35 | 35 | 44 | 115 | 120 |

Minimum depths of pipelines installed inside cracks and crevices




| | |
|---|---|
| d mm | 12-54 |
| A mm | 50 |

Minimum distance from the fitting to the wall for passing through walls




| Nom. diam. mm. | 12 | 15 | 18 | 22 | 28 | 35 | 42 | 54 |
|---|---|---|---|---|---|---|---|---|
| A mm | 10 | 10 | 15 | 20 | 20 | 25 | 30 | 35 |

Minimum distance between two pressed fittings

## NOTE COMPACT PRESSES

Smaller sized pressing tools or tools with specific joints/articulations which allow to easily carry out pressing operations are also available on the market.

## APPLICATIONS

**FRABOPRESS GAS** press fittings are suitable for the realisation of **GAS** systems compliant with current regulations.

### GAS SYSTEMS

**FRABOPRESS GAS** fittings are suitable in gas systems for civil and industrial use, whether Methane of LPG gas, downstream from the meter.

In the construction of a gas system, safety and regulatory compliance are essential requisites. Safety instructions concerning gas systems are mainly listed in worksheet **TRGI G 600: 2008**. Refer to current regulations for suitable system construction.

**FRABOPRESS GAS** fittings are suitable for gas system installations as described by TRGI G 600: 2008.

## INSTALLATION WARNINGS AND RECOMMENDATIONS

This manual provides a quick overview of the most common installation problems. The topics covered are principally intended to increase the attention of the designer to the most common plant design problems that they can meet to guarantee the realization of plants that are safe and reliable over time. Therefore the installer has to refer to the current and mandatory full texts of the regulations.

## CONDENSATION

The changing of state from a vapour to a liquid is called condensation: when there is a sudden temperature difference between the substance in the form of a vapour (e.g. water in the air) and a colder wall, it is likely that condensation will form.

Condensation on metal pipes may create rust and corrosive currents that become hazardous to system seals and reliability in time.

For in-wall or underground pipe segments, refer to current regulations for adequate protections

## MECHANICAL VIBRATIONS

The mechanical stresses and vibrations that affect a system may make it less reliable in the long run. In these cases, the use of mounting brackets that can cushion and compensate for vibrations as much as possible is recommended. When possible, use mechanical breakers to separate the source of vibrations from the rest of the system.

## CORROSION

Copper fitting and pipe corrosion mainly depends on internal surface quality. **FRABOPRESS GAS** system components are made of high resistance phosphor deoxidised copper.

**FRABOPRESS GAS** press fittings guarantee effective protection against deep corrosion thanks to the natural surface passivation phenomenon.

## THERMAL EXPANSIONS

As for all the types of pipes constituting a distribution network, even with the **FRABOPRESS GAS** system the elongations or contractions due to thermal expansions as a result of the increase or decrease of temperature of the conveyed fluid must be evaluated.

To compensate for these effects, the necessary space for the expansions, the proper placement of fixed sliding support points, and the realization of any line compensators must therefore be provided for.

First of all, it is necessary to determine the extension of a given part of pipe [ΔL] based on a certain thermal jump [ΔT]. The equation used to calculate this variable is: $\Delta L = L \bullet \alpha \bullet \Delta T$

with ΔL: global extension [m]
L: length of the stretch considered [m]
α: linear expansion coefficient of copper (0.0000168 $K^{-1}$ between 25°and 100°C)
ΔT: thermal change [°C] or the difference between the maximum and minimum operating tempera tures

For example: in a rectilinear copper tubing, which is 40 m long and installed at a room temperature of 5 °C and which can reach an operating temperature of 65 °C, the elongation is:

$\Delta L = 40 \bullet 0.0000168 \bullet (65 - 5) = 0.04$ m which corresponds to 40 mm

If the conduit is found between two fixed pieces of equipment (e.g. meter and boiler) and has a limited diameter (for ex. 18x1.0), only a flexion of the tube would most likely be found as a result of expansion, with harmful consequences for any intermediate bodies (valves or others).

If the pipe has a larger diameter (e.g. 35x1.5) and therefore less elasticity, elevated axial effects could express themselves. The result of the expansion, in fact, is a strain that is expressed by the following formula $\delta = \varepsilon \bullet E$

with ε: $\Delta L / L = \alpha \bullet \Delta T$
E = 132.000 $N/mm^2$ for raw copper

Therefore:

$\delta = 0.0000168 \bullet (65 - 5) \bullet 132.000 = 133.05$ N / $mm^2$

Note that this value is not negligible since it is more than 40% of the minimum traction break load (290N/ $mm^2$).

Finally it is possible to determine the stress exerted by the tube against the equipment placed at the ends using the following formula: $F = \delta \bullet S$

where S is the section of the pipe calculated with the relationship:

$S = \pi \bullet (D^2 - d^2) / 4 = \pi \bullet (35^2 - 32^2) / 4 = 157.78$ $mm^2$

Substituting we have:
F = 133.05 • 157.78 = 20.992 N a significant value.

The above shows that thermal expansions cause deformations and stresses to the pipelines and strains at the ends.

Thus, in the case in which the tract considered is not straight, the deformations of the conduit, depending on the geometry of the course, can dangerously stress characteristic points such as bends, derivations, extremities, etc.

It should be noted that the same stresses calculated for positive ΔT can also be calculated for negative ΔT (e.g. GAS pipes set up for 10 - 15°C but subject to weather conditions such as cold and frost).

In this case the calculated formulas change sign and compressive stresses turn into traction stresses with a possible danger of disengagement of the pipe from the fitted connection.

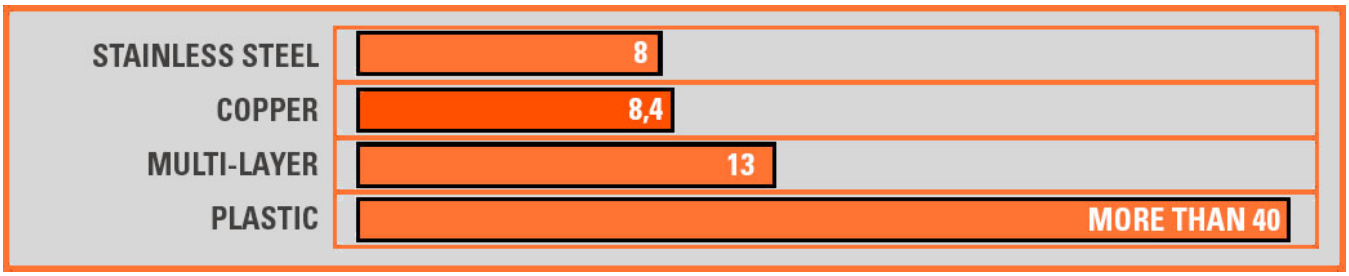



Table 6.1 – Expansion in mm for a 10 metre pipe upon material variation with ΔT 50°

As can be seen in the graph, **FRABOPRESS GAS** fitting quality combined with reduced copper pipe heat expansions provide for safe and stable system, even with temperature changes.

| L [mm] | Δt [°K] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 1 | 0,17 | 0,34 | 0,50 | 0,67 | 0,84 | 1,01 | 1,18 | 1,34 | 1,51 | 1,68 |
| 2 | 0,34 | 0,67 | 1,01 | 1,34 | 1,68 | 2,02 | 2,35 | 2,69 | 3,02 | 3,36 |
| 3 | 0,50 | 1,01 | 1,51 | 2,02 | 2,52 | 3,02 | 3,53 | 4,03 | 4,54 | 5,04 |
| 4 | 0,67 | 1,34 | 2,02 | 2,69 | 3,36 | 4,03 | 4,70 | 5,38 | 6,05 | 6,72 |
| 5 | 0,84 | 1,68 | 2,52 | 3,36 | 4,20 | 5,04 | 5,88 | 6,72 | 7,56 | 8,40 |
| 6 | 1,01 | 2,02 | 3,02 | 4,03 | 5,04 | 6,05 | 7,06 | 8,06 | 9,07 | 10,08 |
| 7 | 1,18 | 2,35 | 3,53 | 4,70 | 5,88 | 7,06 | 8,23 | 9,41 | 10,58 | 11,76 |
| 8 | 1,34 | 2,69 | 4,03 | 5,38 | 6,72 | 8,06 | 9,41 | 10,75 | 12,10 | 13,44 |
| 9 | 1,51 | 3,02 | 4,54 | 6,05 | 7,56 | 9,07 | 10,58 | 12,10 | 13,61 | 15,12 |
| 10 | 1,68 | 3,36 | 5,04 | 6,72 | 8,40 | 10,08 | 11,76 | 13,44 | 15,12 | 16,80 |
| 11 | 1,85 | 3,70 | 5,54 | 7,39 | 9,24 | 11,09 | 12,94 | 14,78 | 16,63 | 18,48 |
| 12 | 2,02 | 4,03 | 6,05 | 8,06 | 10,08 | 12,10 | 14,11 | 16,13 | 18,14 | 20,06 |
| 13 | 2,18 | 4,37 | 6,55 | 8,74 | 10,92 | 13,10 | 15,29 | 17,47 | 19,66 | 21,84 |
| 14 | 2,35 | 4,70 | 7,06 | 9,41 | 11,76 | 14,11 | 16,46 | 18,82 | 21,17 | 23,52 |
| 15 | 2,52 | 5,04 | 7,56 | 10,08 | 12,60 | 15,12 | 17,64 | 20,16 | 22,68 | 25,20 |
| 16 | 2,69 | 5,38 | 8,06 | 10,75 | 13,44 | 16,13 | 18,82 | 21,50 | 24,19 | 26,88 |
| 17 | 2,86 | 5,71 | 8,57 | 11,42 | 14,28 | 17,14 | 19,99 | 22,85 | 25,70 | 28,56 |
| 18 | 3,02 | 6,05 | 9,07 | 12,10 | 15,12 | 18,14 | 21,17 | 24,19 | 27,22 | 30,24 |
| 19 | 3,19 | 6,38 | 9,58 | 12,77 | 15,96 | 19,15 | 22,34 | 25,54 | 28,73 | 31,92 |
| 20 | 3,36 | 6,72 | 10,08 | 13,44 | 16,80 | 20,16 | 23,52 | 26,88 | 30,24 | 33,60 |
| 21 | 3,53 | 7,06 | 10,58 | 14,11 | 17,64 | 21,17 | 24,70 | 28,22 | 31,75 | 35,20 |
| 22 | 3,70 | 7,39 | 11,09 | 14,78 | 18,48 | 22,18 | 25,87 | 29,57 | 33,26 | 36,96 |
| 23 | 3,86 | 7,73 | 11,59 | 15,46 | 19,32 | 23,18 | 27,05 | 30,91 | 34,78 | 38,64 |
| 24 | 4,03 | 8,06 | 12,10 | 16,13 | 20,16 | 24,19 | 28,22 | 32,26 | 36,29 | 40,32 |
| 25 | 4,20 | 8,40 | 12,60 | 16,80 | 21,00 | 25,20 | 29,40 | 33,60 | 37,80 | 42,00 |
| 26 | 4,37 | 8,74 | 13,10 | 17,47 | 21,84 | 26,21 | 30,58 | 34,94 | 39,31 | 43,68 |
| 27 | 4,54 | 9,07 | 13,61 | 18,14 | 22,68 | 27,22 | 31,75 | 36,29 | 40,82 | 45,36 |
| 28 | 4,70 | 9,41 | 14,11 | 18,82 | 23,52 | 28,22 | 32,94 | 37,63 | 42,34 | 47,04 |
| 29 | 4,87 | 9,74 | 14,62 | 19,49 | 24,36 | 29,23 | 34,10 | 38,98 | 43,85 | 48,72 |
| 30 | 5,04 | 10,08 | 15,12 | 20,16 | 25,20 | 30,24 | 35,28 | 40,92 | 45,36 | 50,40 |

Table 6.2 – Overall elongations ΔL – [mm] for COPPER (linear expansion coefficient equal to 16,8 10-6)

## CALCULATION OF AN EXPANSION ARM

Elongation as an effect of thermal expansion cannot always be compensated for by counting on the normal configuration of the distribution network, where the various path changes can actually act as compensators.

It is sometimes necessary to prepare and calculate expansion arms in a precise way or, in more challenging cases, [Ω] expanders constructed using appropriately shaped pipe or normal fittings.

The expression that permits the determination of the expansion arm of Fig. 6.1 in mm is as follows:

$$Bd = k * \sqrt{(de - \Delta L)}$$

where: k: material constant
de = external diameter of the pipe used
ΔL = extension to be compensated

The extrapolation of the result offered by the aforementioned formula can also be made through the use of charts that relate the pipe diameter, elongation to compensate for, and the value of the expansion arm length [Bd].

The easiest solution is to refer to the expansion arm length values listed in table 6.4.

Here too, the listed length value is a function of the different expansion values to be compensated by the external diameter of the pipe used. In table 6.4, the expansion arm length values of a square omega compensator are represented in fig. 6.2.

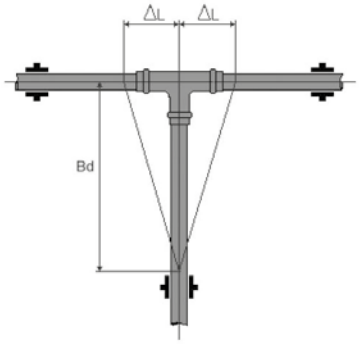



Figure 6.1

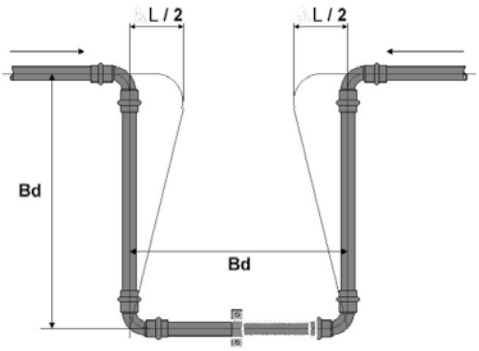



Figure 6.2

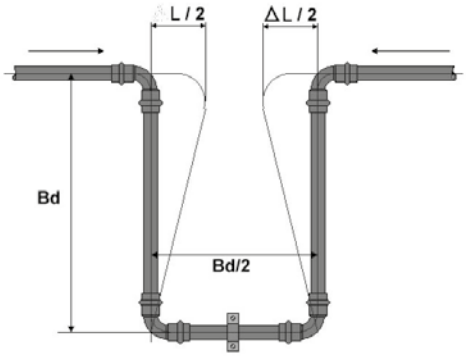



Figure 6.3

| EXPANSION ARM LENGTH BD [MM] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| External Copper Pipe Diameter [mm] | Extension to be compensated ΔL [mm] | | | | | | | | | |
| | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| 12 | 637 | 901 | 1103 | 1274 | 1424 | 1560 | 1685 | 1801 | 1911 | 2014 |
| 15 | 712 | 1007 | 1233 | 1424 | 1592 | 1744 | 1884 | 2014 | 2136 | 2252 |
| 18 | 780 | 1103 | 1351 | 1560 | 1744 | 1911 | 2064 | 2206 | 2340 | 2467 |
| 22 | 862 | 1220 | 1494 | 1725 | 1928 | 2112 | 2281 | 2439 | 2587 | 2727 |
| 28 | 973 | 1376 | 1685 | 1946 | 2175 | 2383 | 2574 | 2752 | 2918 | 3076 |
| 35 | 1088 | 1538 | 1884 | 2175 | 2432 | 2664 | 2878 | 3076 | 3263 | 3439 |
| 42 | 1191 | 1685 | 2064 | 2383 | 2664 | 2918 | 3152 | 3370 | 3574 | 3768 |
| 54 | 1351 | 1911 | 2340 | 2702 | 3021 | 3309 | 3574 | 3821 | 4053 | 4272 |

Table 6.4 – Square omega

In table 6.5, the expansion arm values of a rectangular omega compensator are represented in fig. 6.3.

| EXPANSION ARM LENGTH BD [MM] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| External Copper Pipe Diameter [mm] | Extension to be compensated ΔL [mm] | | | | | | | | | |
| | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| 12 | 735 | 1039 | 1273 | 1470 | 1643 | 1800 | 1944 | 2078 | 2205 | 2324 |
| 15 | 822 | 1162 | 1423 | 1643 | 1837 | 2012 | 2174 | 2324 | 2465 | 2598 |
| 18 | 900 | 1273 | 1559 | 1800 | 2012 | 2205 | 2381 | 2546 | 2700 | 2846 |
| 22 | 995 | 1407 | 1723 | 1990 | 2225 | 2437 | 2632 | 2814 | 2985 | 3146 |
| 28 | 1122 | 1587 | 1944 | 2245 | 2510 | 2750 | 2970 | 3175 | 3367 | 3550 |
| 35 | 1255 | 1775 | 2174 | 2510 | 2806 | 3074 | 3320 | 3550 | 3765 | 3969 |
| 42 | 1375 | 1944 | 2381 | 2750 | 3074 | 3367 | 3637 | 3888 | 4124 | 4347 |
| 54 | 1559 | 2205 | 2700 | 3118 | 3486 | 3818 | 4124 | 4409 | 4677 | 4930 |

Table 6.5 – Rectangular omega

The expansion compensators mentioned are generally realizable on-site on the basis of the expansion to compensate for, but they are often bulky and sometimes undesirable for aesthetic reasons. Alternatively, there are axial bellows compensators.

To size the bellows compensator, reference should be made to the following data:

- diameter of the pipe
- maximum operating pressure
- system test pressure
- operating pressures (minimum and maximum)
- expansion to absorb
- life desired for the compensator (number of cycles)

For these details, great emphasis should be placed on the installation of the pipe guides and clamps near the expansion joint so that the piece can be freely compensated.

The normal bellows expansion joint in commercial use can be connected to **FRABOPRESS GAS** fittings through the use of standard threaded connections.

The case-by-case consultation of the publications and manufacturer's technical specifications for these devices is therefore advisable.

## ARRANGEMENT OF COLLARS

1. Never place collars that constitute a fixed point near a fitting. (fig. 7.4)
2. It is also important to note that the sliding supports are not positioned to ensure that they behave as if they were fixed points. (fig. 7.5)
3. When there are sections of straight pipe without expansion compensators, only one fixed point can be installed in order to prevent possible deformations. All of the remaining points must be sliding points. It is a good practice to position this point in the intermediate position with respect to the length of the straight section (fig. 7.6) as much as possible; by doing this, the elongation due to expansion in the two directions is shared, thus halving the length of the necessary expansion arm.

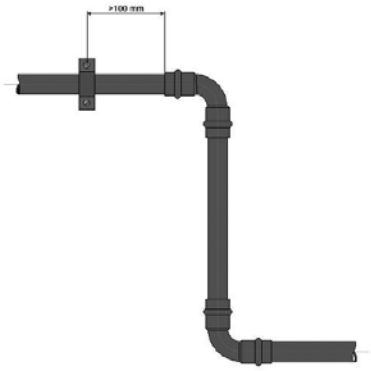



Figure 7.4

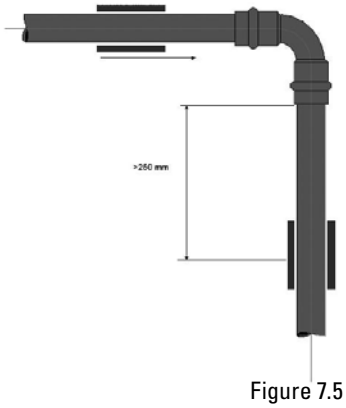



Figure 7.5

Figure 7.6

As a general rule, use copper collars or, if steel, use those with rubber seals; this type of support allows the isolation and dampening of any rustling and vibrations and better behaviour of the combination of stresses.

## TIGHTNESS TEST FOR GAS INSTALLATION

Copper press fittings and pipes are among the most frequently used products for gas installations for both domestic and industrial use.

As a general rule a gas installation must be tested for mechanical resistance and gas tightness before commissioning (Ref. i.e. EN 1775).
Good practices for tightness tests and mechanical resistance tests are fully described in the relevant national technical standards and installation worksheets (refer for instance to UNI 7129-1 for Italy, TRGI G 600 for Germany, NBN D51-003 and NBN D51-004 for Belgium).

At the end of the test a Report must be filled out as required by the above listed documents.

System testing may highlight any product or installation faults on the short-term and when the system is still accessible, avoiding higher recovery costs after commissioning.

**NB : Always follow all the indications set by current national regulations and standards.**

## GUARANTEES

The **FRABO** production line is known for the high level of quality reached through years of experience in thermohydraulic systems.

The **ISO 9001** certification and the numerous quality marks associated with its products are a direct testimony. With relation to its products **FRABO S.p.A.** declares that, in terms of third party liability insurance, it has taken out an insurance policy to cover any hidden product faults for a duration of 10 years.

The proper and professional use of the product according to **FRABO**'s specifications as well as respect for applicable technical regulations are essential conditions for the validity of the guarantee. The guarantee is not valid for those installations that are performed in an incorrect or non-professional way.

**This manual provides a quick overview of the most common installation plant design problems. Therefore the installer has to refer to the full texts of the current and mandatory regulations.**

**FRABO declares that it has a corporate liability insurance policy through a major insurance company, including responsibility for the extended product.**

**For the latest list of certifications, technical documentation and statements, please refer to the website www.frabo.com**

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