

DESCRIPTION

"PEGASUS" CSST pliable corrugated stainless steel tubing system conform to EN 15266 / DVGW G 5616 for combustible gases.

APPLICATION FIELDS

- Plants for the supply of gas of the I (town gas), II (natural gas - methane) and III (GPL) family in buildings with maximum operative pressure MOP = 0,5 bar;



The "PEGASUS" CSST tubing system must be installed in accordance with all the existing municipal, regional and national regulations and the instructions by PSP.

- Connection of fixed gas appliances with maximum operative pressure MOP = 0,5 bar.



The CSST pliable corrugated tubes are not suitable for the connection of moving appliances: for these purposes use only suitable flexible hoses.

COMPONENTS OF THE TUBING SYSTEM

- Tube:** CSST pliable corrugate tube type 3 annular in austenitic stainless steel conform to EN 10028-7 type 1.4404 - X2CrNiMo17-12-2 (AISI 316L) with solution annealing treatment and with yellow external protective coating in plastic material.
- Fittings:** fittings (nuts and various nipples) in nickel plated brass conform to EN 12164 / EN 12165 type CW614N or CW617N with relative plane gaskets in synthetic fibers conform to DIN 3535-6 and DVGW VP 401 or in NBR rubber conform to EN 549.



The use of fittings other than those specifically supplied by PSP for the "PEGASUS" tubing could not ensure a durable tightness: contact PSP to verify the suitability of the fittings from other manufacturers.

- Accessories:** supports clamps in galvanized steel with rubber protection, protective self-fusing silicone tape, centering spacers, pipe-cutter with smooth rollers, flanging toll and templates.

CERTIFICATIONS

- The quality management system of PSP S.r.l. is certified as conform to EN ISO 9001 : 2015 (Bureau Veritas certificate nr. IT308879).
- The "PEGASUS" CSST tubing system by PSP is certified as conform to EN 15266 : 2007 (Bureau Veritas certificate nr. 900/002).

INSTALLATION MODALITIES

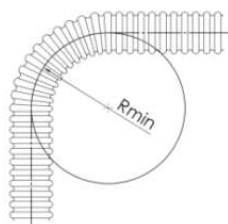


The "PEGASUS" CSST tubing system must be installed in accordance with all the existing municipal, regional and national regulations and the instructions by PSP.

Note: details of installation are given in the national standards / codes of practice. The European standard EN 1775 "Gas supply - Gas pipework for buildings - Maximum operating pressure less than or equal to 5 bar - Functional recommendations" specifies general recommendations for the design, construction, testing, commissioning, operation and maintenance of installation pipework between the delivery point of the gas and the inlet connection of the gas appliance.

BENDING OF THE CSST TUBES

It is possible to bend the tubes by hand, avoiding repeated bending, respecting the following minimum bending radii:



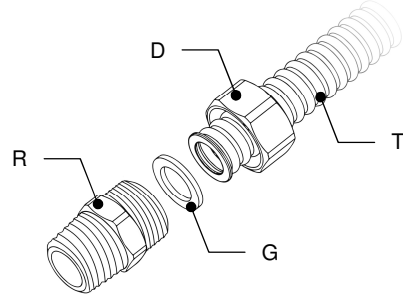
Nominal dimension	Minimum bending radius Rmin [mm]
DN 12	25
DN 15	25
DN 20	30
DN 25	45

JOINTING METHODS

Fittings of the flanging system:

- Cut to size the CSST pliable corrugated tube (T) adding the two corrugations that will be compressed to obtain the flange.
- Pay attention not to engrave the tube, remove any external coating from seven / eight corrugations.
- Insert the nut (D) on the tube (T).
- Flange the tube (T) following the instructions of the flanging tool.
- Put the plane gasket (G) in the nut (D).

Tight the nut (D) on the fitting (R) with plane surface (do not use fittings without plane surface: it is possible to tight the nut directly on the male threaded of the appliance only if this has a plane surface otherwise the tightness for long time is not secured due to damaging of the gasket).

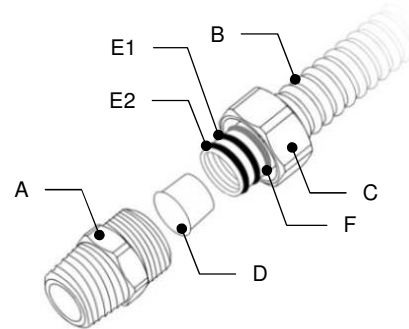


Fittings of the no flanging system:



Always use the protective cap in order to avoid to damage the O-rings during their insertion on the CSST corrugated tube.

- Screw the fitting (A) onto the terminal to be connected using a suitable sealant.
- Insert the nut (C) into the CSST tube (B).
- Insert the protective cap (D) into the CSST tube (B).
- Insert two O-rings (E1 and E2) in the first two grooves of the CSST tube (B).
- Remove the protective cap (D).
- Insert the open brass ring (F) into the third groove of the CSST tube (B) and tighten it with pliers without deforming the CSST tube (B).
- Insert the CSST tube (B) up to the stop in the fitting (A).
- Screw the nut (C) onto the fitting (A).



FASTENING OF THE CSST TUBES

To fasten the tubes use the collars with rubber coating supplied by PSP respecting the following minimum distances:

Nominal dimension	DN 12 / 15	DN 20 / 25
At sight tubes (horizontal or vertical)	1,2 m	1,8 m
Tubes in channel or hollow	3 m	3 m

PROTECTIVE TAPE

To avoid any corrosion or mechanical damage, the sections of the tube were junction fittings are present or that present damages to the coating must be covered with yellow protective supplied or declared suitable by PSP that must be applied by wrapping it under tension so to adhere to the tube and the fitting.

DIMENSIONING OF THE GAS PLANT



The gas plant must be dimensioned and tested in accordance with all the existing municipal, regional and national regulations.

In the case specific regulations for the dimensioning are not available, the following procedure shall be followed.

Gas plants with thermal power up to 35 kW

For the dimensioning of the gas plants with thermal power up to 35 kW the size of the tubing shall assure a gas flow rate adequate to cover the maximum request (static pressure measured in dynamic conditions that is when during the operation all the connected appliances work at their maximum nominal power) limiting the pressure drops between the gas meter and each gas appliances to values not exceeding:

- 0,5 mbar for gases of the I family (manufactured gas);
- 1,0 mbar for gases of the II family (natural gas);
- 2,0 mbar for the gases of the III family (LPG).

If there is a pressure regulator upstream the gas meter, the above pressure drops can be the double.

The dimensioning of the gas plant shall be made as follows:

- 1) determine the maximum flow rate for each stretch of the plant (the flow rate necessary to feed each appliance shall be deduced from the indications given by its manufacturer);
- 2) determine the virtual length of each stretch of tubing measuring the geometrical length of the tubes and adding the equivalent lengths of the special pieces (fittings and valves - table 1) that are in the examined stretch of plant;
- 3) on the basis of the density of the gas, procede to dimension the plant stretch by stretch using for the virtual lengths VL and the flow rates the closest values to excess of the data of the table 2 and from these obtain the diameter to use.

Gas plants with thermal power over 35 kW

The dimensioning of the gas plants with thermal power over 35 kW shall assure the correct operation of the gas appliances complying with the pressures defined for each appliance by its manufacturer. For this reasons the following pressure drops shall be properly determined:

- spread pressure drops: ΔP_d ;
- localized pressure drops (due to fittings, section reductions, bends, elbows, and so on): ΔP_l ;
- pressure change due to the possible difference in height between the starting point and the gas appliance:

$$\Delta P_h [\text{Pa}] = (\gamma_g - \gamma_a) \times h \times g$$

where:

- γ_g [kg/m³]: density of the gas (15°C, 1013,25 mbar),
- γ_a [kg/m³]: density of the air (15°C, 1013,25 mbar),
- h [m]: difference in height between the base and the final point of the vertical stretch,
- g = 9,81 m/s²: gravity acceleration.

Instead of individually calculate the spread pressure drops ΔP_d and the localized pressure drops ΔP_l , it is possible to calculate the virtual lengths (table 2) adding to the lengths of the tubing stretches the equivalent lengths of the special pieces that are in the examined stretch of plant (table 1).

The overall pressure drops ΔP_t are the sum of the spread pressure drops ΔP_d , the localized pressure drops ΔP_l and the difference in height ΔP_h :

$$\Delta P_t = \Sigma(\Delta P_d + \Delta P_l + \Delta P_h)$$

The designer shall also take into consideration any other factor that can influence the correct dimensioning, as for example: delivery pressure of the gas just before the starting point of the plant, contemporaneity of operation of the appliances at their maximum nominal power, effects of the pressure changes on the control devices at the moment of the ignition of the burners.

Table 1: equivalent lengths of the special pieces

Special piece	Equivalent length [m]
90° bends	0,3 m
Elbows	1,0 m
Tee fittings	0,5 m
Ball valves	0,3 m
Section reductions	0,2 m

Table 2: flow rate in volume in m³/h for the CSST tubes

VL [m]	Gas of the II family (natural gas) Pressure drops: 1 mbar				Gas of the III family (LPG) Pressure drops: 2 mbar			
	DN 12	DN 15	DN 20	DN 25	DN 12	DN 15	DN 20	DN 25
	1	2,8	6,4	11,6	27,7	2,4	5,4	9,9
2	2,0	4,5	8,2	19,1	1,7	3,8	6,9	16,5
3	1,6	3,7	6,6	15,3	1,4	3,1	5,6	13,3
4	1,4	3,2	5,7	13,1	1,2	2,7	4,9	11,4
5	1,3	2,8	5,1	11,6	1,1	2,4	4,3	10,1
6	1,2	2,6	4,7	10,5	1,0	2,2	4,0	9,1
7	1,1	2,4	4,3	9,7	0,9	2,0	3,7	8,4
8	1,0	2,2	4,0	9,0	0,8	1,9	3,4	7,8
9	0,9	2,1	3,8	8,5	0,8	1,8	3,2	7,3
10	0,9	2,0	3,6	8,0	0,8	1,7	3,0	6,9
11	0,9	1,9	3,4	7,6	0,7	1,6	2,9	6,6
12	0,8	1,8	3,3	7,3	0,7	1,5	2,8	6,3
13	0,8	1,7	3,1	6,9	0,7	1,5	2,7	6,0
14	0,8	1,7	3,0	6,7	0,6	1,4	2,6	5,8
15	0,7	1,6	2,9	6,4	0,6	1,4	2,5	5,6
20	0,6	1,4	2,5	5,5	0,5	1,2	2,1	4,8
21	0,6	1,4	2,5	5,4	0,5	1,2	2,1	4,6
22	0,6	1,3	2,4	5,2	0,5	1,1	2,0	4,5
23	0,6	1,3	2,3	5,1	0,5	1,1	2,0	4,4
24	0,6	1,3	2,3	5,0	0,5	1,1	1,9	4,3
25	0,6	1,3	2,2	4,9	0,5	1,1	1,9	4,2
30	0,5	1,1	2,0	4,4	0,4	1,0	1,7	3,8
35	0,5	1,1	1,9	4,1	0,4	0,9	1,6	3,5
40	0,5	1,0	1,8	3,8	0,4	0,8	1,5	3,3
45	0,4	0,9	1,7	3,6	0,4	0,8	1,4	3,1
50	0,4	0,9	1,6	3,4	0,3	0,8	1,3	2,9
75	0,3	0,7	1,3	2,7	0,3	0,6	1,1	2,3
100	0,3	0,6	1,1	2,3	0,2	0,5	0,9	2,0

TESTING OF THE TIGHTNES OF THE PLANT

The tightness of the gas plant must be verified before its commissioning, connection to the gas meter and before the connection of the gas appliances in accordance with all the existing municipal, regional and national regulations.

In the case specific municipal, regional and national regulations for the dimensioning are not available, use the following procedure (for the "PEGASUS" CSST tubing system, a high pressure test is not necessary):

- 1) isolate the plant;
- 2) introduce in the plant air or other inert gas up to a pressure between 100 mbar and 150 mbar;
- 3) let the pressure stabilize for at least 15 minutes and then measure the pressure using a monometer with an accuracy of at least 0,1 mbar;
- 4) after 15 minutes measure again the pressure: no difference between the two measures is necessary to assume the gas plant as tight;
- 5) if there is a difference between the two measures, the leakage shall be found and repaired and then the tightness test must be repeated.

INSTALLATION AND TESTING DOCUMENTATION

After the installation, the installer shall release the documentation required by the applicable municipal, regional and national regulations.