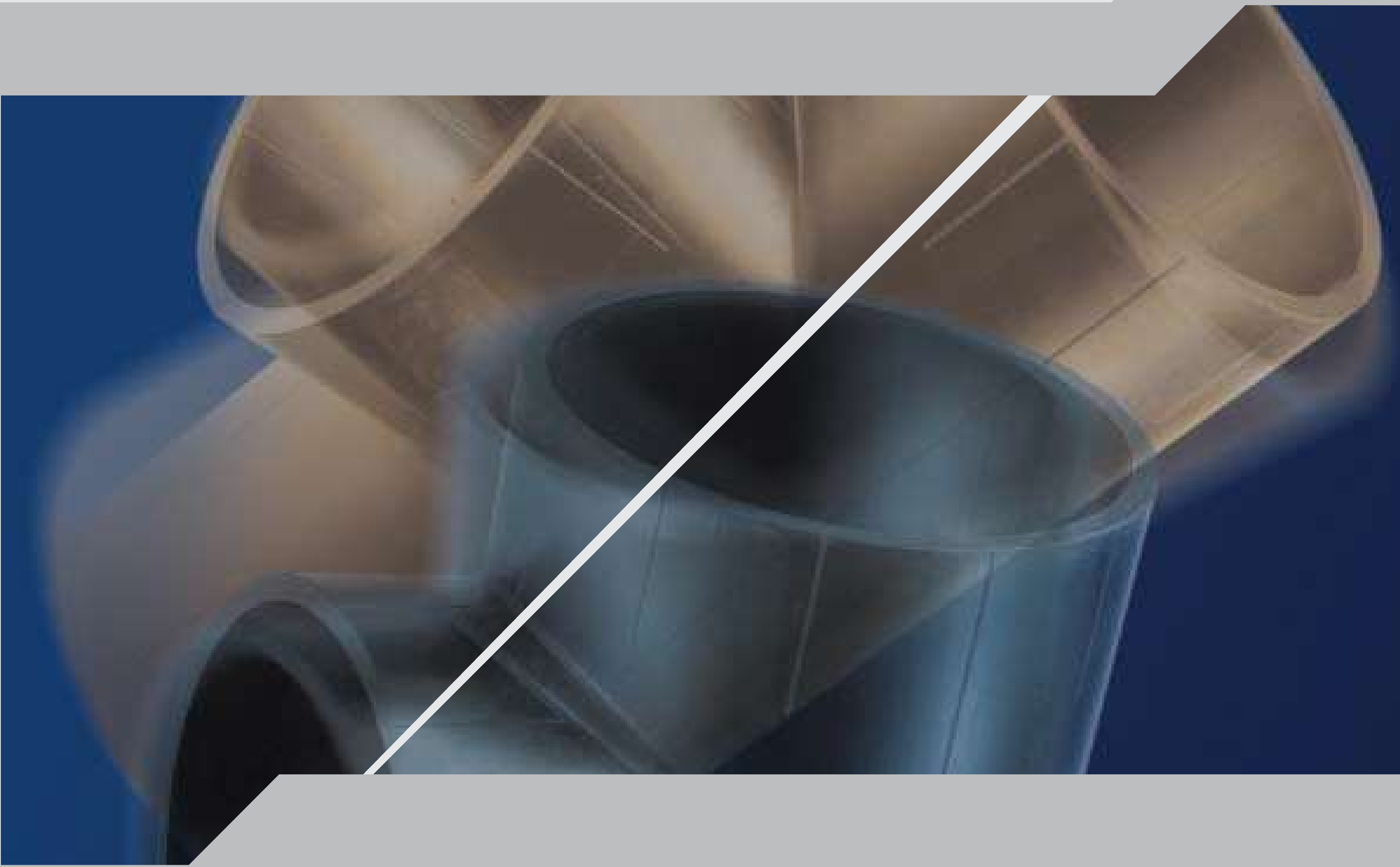
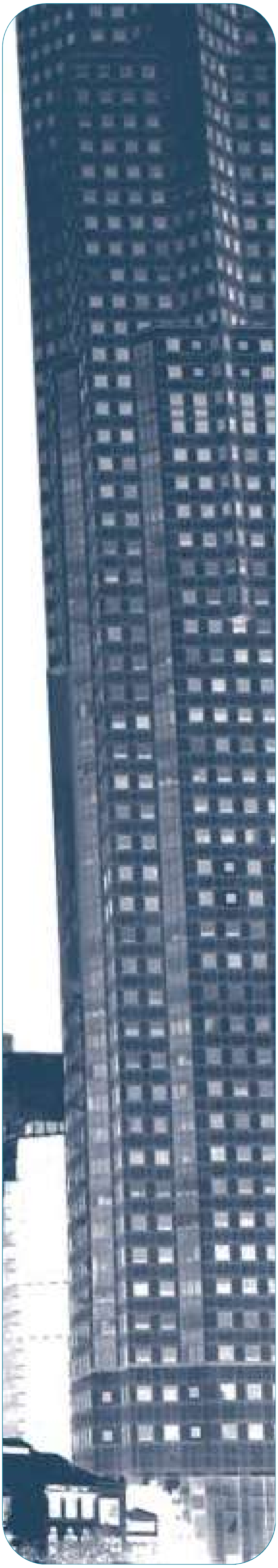
Coestilen®





Coestilen®

Coestilen® is the drainage system for welding made of polyethylene which is exceptionally elastic and resistant to mechanical stress and vibrations.

The programme consists of pipes and fittings in diam. of 32 to 315 mm and includes a wide range of joint fittings and connections to sanitary and sewage systems.

The high molecular weight of PE is a guarantee against fracture due to prolonged use. It is also particularly suited to absorb mechanical stresses of significant intensity; specifically for installation in seismic areas. Moreover it offers excellent resistance to operating temperatures between –40° and +70°C, with the capacity to handle peaks of up to 95°C.

Coestilen® pipes and fittings are compliant with UNI EN 1519.

- OUTSTANDING ELASTICITY AND RESISTANCE TO MECHANICAL STRESS AND VIBRATIONS. IDEAL FOR SEISMIC AREAS
- OUTSTANDING RESISTANCE TO WORKING TEMPERATURES BETWEEN –40° AND + 70°C, TO CHEMICALS AND THE EFFECTS OF THE WEATHER
- EXCELLENT RESISTANCE TO PRESSURE AND ACCIDENT PRESSURE SURGES

RAW MATERIAL NON-POLLUTANT AND 100% RECYCLABLE

TECHNICAL FEATURES

physical properties	value	unit of measure	testing methods
density	954	Kg/m3	ISO 1183 D
melt index 190 °C/5Kg	0,5	g/10 Min.	ISO 1133 Cond. 18
gas black content	2,0±2,5	%	ASTM D 1603
traction resistance	>20	MPa	ISO/DIS 6259
ultimate elongation	>600	%	IISO/DIS 6259
expansion coefficient between 20° and 90°C	0,18 mm/m°C		ASTM D 696

Resistance to temperatures, its characteristics remain unchanged. It does not break and does not buckle permanently if water freezes in the pipes, within a temperature range of –40°C and +70°C, allowing the handling of peaks of up to 95°C.

Low thermal conductivity, it does not tend to form condensate.

Resistance to mechanical stresses. Coestilen®
is elastic enough so as to bear external stresses, impacts and deformations, similar to steel.
As long as several specific technical rules are followed, Coestilen® can be buried in concrete.

Smoothness and abrasion resistance, thanks to the surface structure that prevents deposits and incrustations from forming.

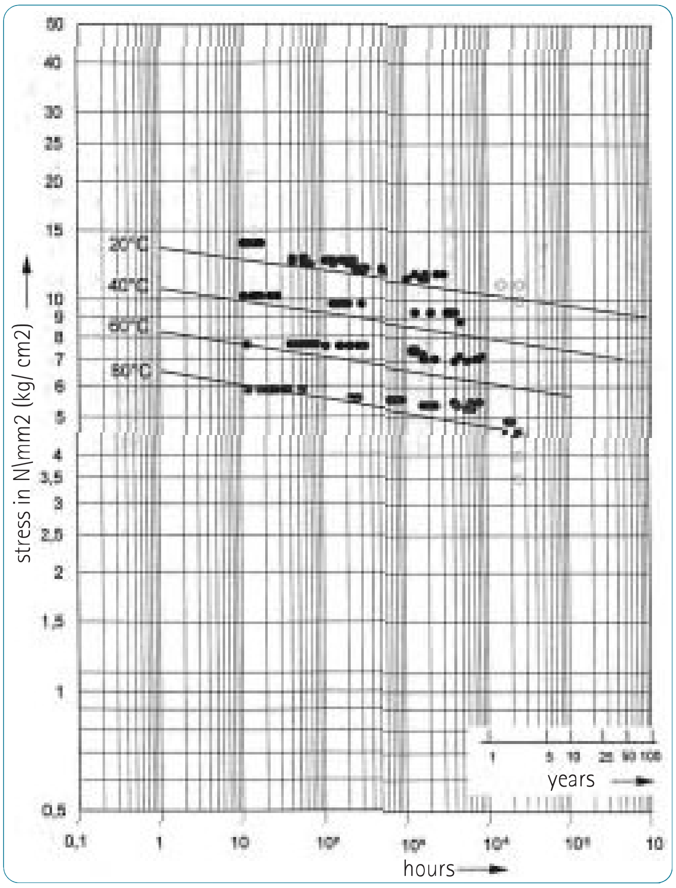
Resistance to chemical agents and to organic and inorganic solvents. It is resistant to detergents and acids used for unclogging sinks and WC.

Vibration-absorbent, thanks to its flexibility and elasticity, it is able to withstand small deformations without breaking (for example, in the case of buildings settling).

Weldability, through a butt-butt welding process or by arc melting.

Resistance to atmospheric agents, thanks to the gas black it contains, which prevents photo-oxygenation processes due to the UV rays.

Regression curves



- ● duration time
- ❍ test under progress
- ▬ actual testing period

Pipes' dimensions

Ø external	Ø internal	thickness	cm² passerby section
32	26	3	5,3
40	34	3	9
50	44	3	15,2
56	50	3	19,2
63	57	3	25,4
75	69	3	37,3
90	83	3,5	54,1
110	101,4	4,3	80,7
125	115,2	4,9	104,2
160	147,6	6,2	171,1
200	187,6	6,2	276,4
250	234,4	7,8	431,5
315	295,4	9,8	685,3

CONNECTION

Coestilen® connection can be classified in 3 groups:

1) Fixed traction-resistant connections
2) Connections not resistant to traction that can be disassembled
3) Traction-resistant connections that can be disassembled

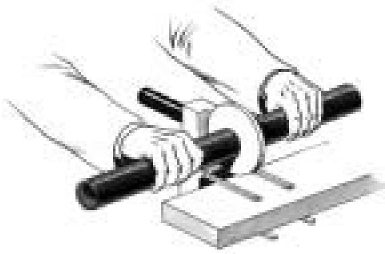
1) FIXED TRACTION-RESISTANT CONNECTIONS

They are obtained by welding two components to each other only with heat so as to get one single, structurally continuous piece after solidification.
This type of connection can be obtained with **butt-welding or welding with electric coupling.**

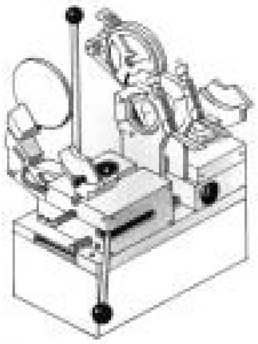

a)

a) Butt-welding

The operations to carry out follow:
- Clean the surfaces to be welded.
- Cut and trim the ends to be welded.



Up to Ø 63 mm:
- Set the two pieces to be welded on a thermal welding plate taken to the temperature of 210 °C ± 5°C.
- Apply slight pressure until an even bead forms along the circumference.
- After detaching them from the thermal welding plate, join the two pieces by applying a mounting axial force (and avoid rotations).
- Let the piece cool down.



For diameters greater than Ø 63 mm:
- Lodge the two pieces to be welded in the jaws of the welding machine.
- Cut and degrease the surfaces.
- Using suitable leverage, draw the two pieces close to the thermal welding plate after having taken its temperature to 210 °C ± 5.
- After the softening temperature of the polyethylene is reached, remove the thermal welding plate and press the two ends to be welded together.
  Time and precision of the operation depend on the diameter of the pieces.

Note: The welding must naturally be left to cool down, and the pieces cannot be subjected to mechanical stress before they are completely cool.


b)

b) Welding with electric coupling

It is obtained with the use of a special coupling provided with a heating element that, with the passage of current, heats up so as to soften and weld the two pieces of pipe placed end to end.

Welding with electric coupling is made in the following steps:

1 Cut the two pieces of pipe at a right angle.

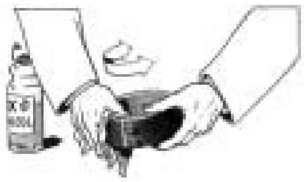
2 Scrape and trim the two pieces of pipe *(Fig. 1)*, degrease the electric coupling with alcohol *(Fig. 2)*.

3 Put the two pieces of pipe into the electric coupling as far as they will go *(Fig. 3)*.

4 Fasten the coupling contacts to the welding machine plug pins. Activate the welding machine start device *(Fig. 4)*.

Note: Once welding is completed, the electric coupling must not be subjected to mechanical stress before it has completely cooled.

1



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3

4

2) CONNECTIONS NOT RESISTANT TO TRACTION THAT CAN BE DISASSEMBLED

This type of connection, the feature of which is to make system quick and easy to disassemble, if necessary, is obtained by using **coupling and expansion sleeves or nipples or stuffing box fittings.**

a) Coupling and expansion sleeves

The coupling sleeves are equipped with an elastomeric seal that guarantees they are watertight. The connection is made following these steps:

- Chamfer the part to be coupled at about 15°.
- Lubricate.
- Engage all the way.

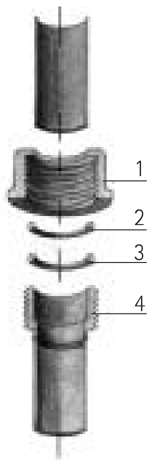
For the expansion sleeves, follow the instructions given on them.

b) Nipple or stuffing box fitting

The fitting is made up of:

1 Threaded ring nut
2 Packing gland
3 Seal
4 Threaded union

The union is welded onto the end of one of the two pipes to be joined. The ring nut, packing gland and seal are slid onto the end of the other pipe. The pipe is put into the union and the ring nut is tightened.



3) TRACTION-RESISTANT CONNECTIONS THAT CAN BE DISASSEMBLED

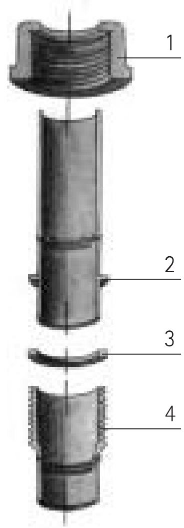
In the event there is the possibility that axial thrusts can cause the pipe to come out of the housings of the fittings described above, connection systems with the following are used for assembling the systems **nipple with fixing neck or flanges.**

a) Nipple with fixing neck

This type of fitting is similar to the nipple in which the packing gland is replaced by the fixing neck (2) on which the end of the pipe bearing the ring nut is welded.

The fitting is made up of:

1 Threaded ring nut
2 Connection neck
3 Seal
4 Threaded union

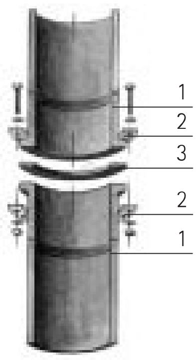


b) Flanges

The connection system with flanges is particularly recommended in industrial systems and for connecting pipes having a large diameter.
It makes connecting polyethylene pipes with other pipes made of a different material and with pumps, tanks and manifolds easy.

The fitting is made up of:

1 Neck for flange
2 Flange
3 Seal



SIZING

The design and sizing of drain and meteoric water systems must take the UNI 12056-1-2-3-4-5 specifications into account.

CHANGE OF COESTILEN® LENGTH
(due to temperature changes)

Like all materials, if Coestilen® is subjected to temperature changes, it suffers size modifications. The phenomena affecting the systems are only those regarding changes of pipe length.
Material expansion phenomena accompany an increase of temperature, which correspond to lengthening of the pipes.
A decrease of contraction phenomena results in a relative shortening of the pipes. These changes of length are proportional to the thermal head the material sustains in the range of temperatures taken into consideration, and are expressed by the relation:

$$\Delta L = \alpha L \Delta T$$

with: ΔL = change of length in mm
α = linear expansion coefficient 0,2 mm/m/°C
ΔT = thermal head °C
L = initial pipe length in m

The thermal head **ΔT** is given by the difference of the pipe temperature during the assembly stage (Ti) and the maximum or minimum temperature it reaches during operation.

This temperature can depend on:
- changes of the external temperature **Te.**
- the temperature **Tf** of the fluid flowing in the pipes.

However, in this second case the value to be taken is not always the fluid's **Tf** but a **Tc** value reduced by about 10-20°C if the briefness of the periods when these extreme working conditions is such that the pipes do not take on the temperature of the fluid due to the poor thermal conductivity of the polyethylene.

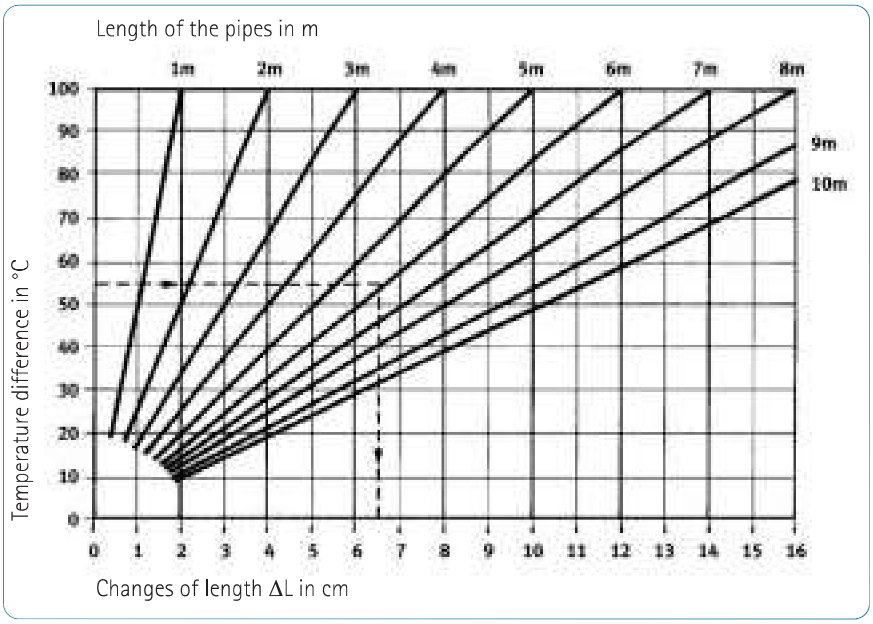
Calculation examples
a) Pipe subjected to an increased temperature
Tf = fluid temperature 95°C
Tc = reduced maximum working temperature 75°C
Ti = initial temperature of the pipes 20°C
ΔT = 75 – 20 = 55°C
L = length of the pipes 6 mt.

ΔL = 6•0,2•55 = 66 mm (expansion)

b) Pipe subjected to a decreased temperature
Tf = minimum working temperature –10°C
Ti = initial temperature of the pipes 20°C
ΔT = 20 – (–10) = 30°C
ΔL = length of the pipes 6 m.

ΔL = 6•0,2•30 = 36 mm (contraction)

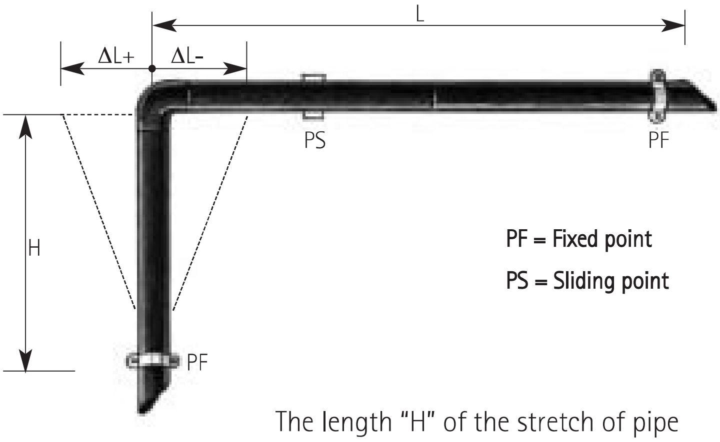
Note: It is advisable to indicate the decreases of length with the – sign.



COMPENSATION OF THE CHANGES OF PIPE LENGTH

Expansion compensators
In order to prevent the pipes from being subjected to mechanical stresses (axial thrusts), they have to be able to change their length freely.
This can be obtained by using:

a) Systems that use the elasticity and flexure of several stretches of system pipe
With this device, the change of length is compensated by the elastic deformation to which several stretches of pipes making up the system may be subjected.
It proves to be particularly advantageous when the geometric configuration of the system allows the elasticity of the material to be used to full advantage by suitably positioning the anchorages.

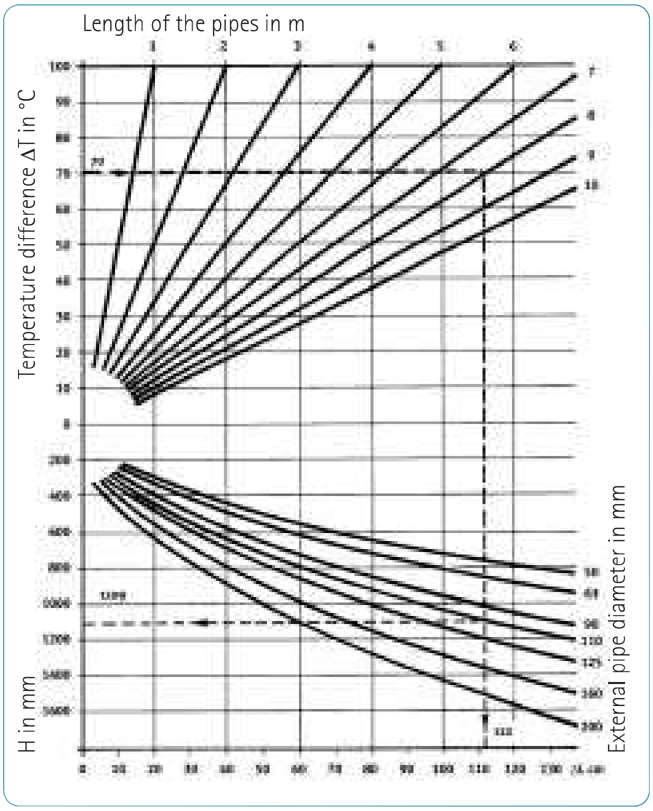


The length "H" of the stretch of pipe subjected to flexure depends on:

- the change of length ΔL to be compensated
- the diameter D of the pipe, and is given by:

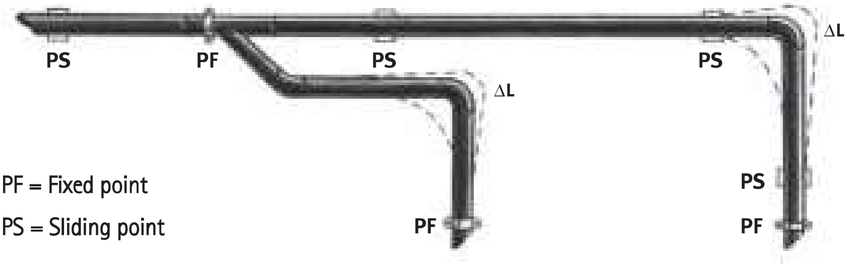
$$H=10\cdot\sqrt{\Delta L\cdot D}$$

Calculation of the thermal expansion and of the lenght of the expansion casting for Coestilen® pipes



Example:
Pipe 8 m long, Ø 110 mm,
drain liquid 80°C.
Ambient temperature 10°C.
Thermal head 70°C.
ΔL = Change of length 112 mm
H = Flexible arm 1109 mm

Pipe with expansion sleeve



PF = Fixed point

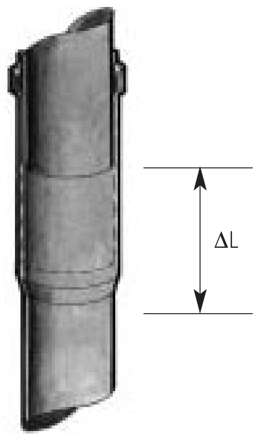
PS = Sliding point

L = length

ΔL = change of length ■

b) Expansion sleeves or joints
Devices in the housings of which the free end of a pipe can slide in order to compensate its change of length.
The expansion sleeve is used:
- vertical columns *(see Fig. A)*
- horizontal backbones/manifolds
  (see Fig. B in the following page)

You have to bear in mind the following parameters in order to properly install the expansion sleeve:
- length of the pipe
- maximum thermal range the pipe is subjected to (ΔT)
- installation temperature



Drain column assembly

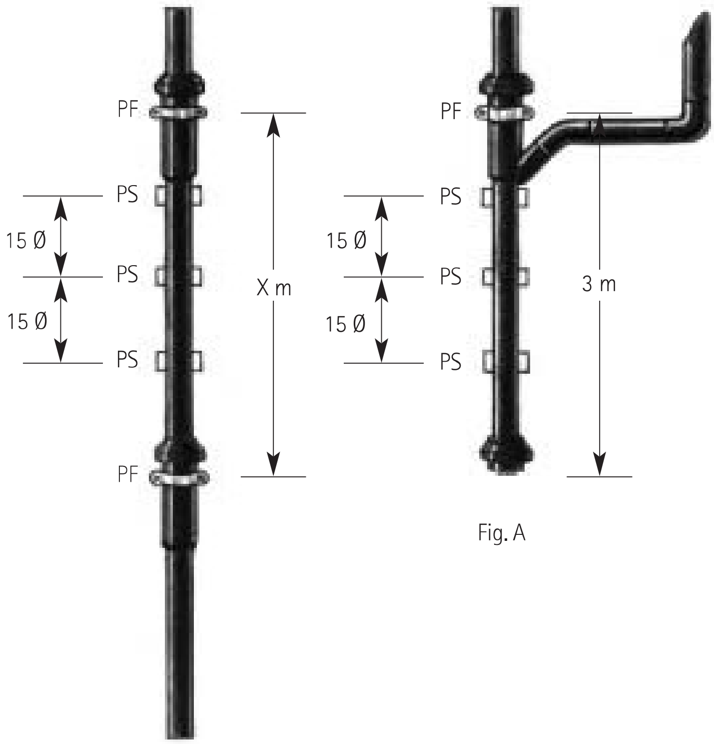


Fig. A

PF = Fixed point PS = Sliding point

Pipe with expansion sleeve

PF = Fixed point

PS = Sliding point

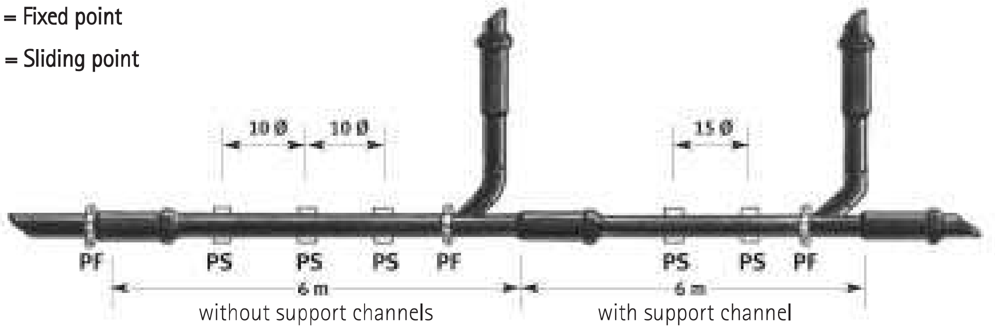


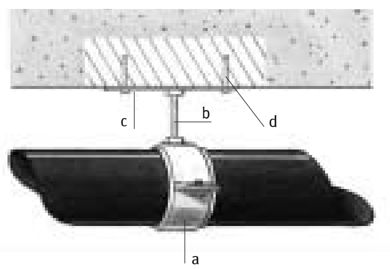
Fig. B

Fixed points and their execution

Use of the devices described presupposes that the changes of pipe length occur in a way compliant with what is envisaged during the design stage.
So it is necessary that you rigidly restrain the ends of the stretches of pipes where you want to compensate the change of length so as to foster movements in the direction of the foreseen compensation devices.
These restraints are the fixed points of the system.
Their selection and arrangement must take into account some construction features of the system and the probable existence of structural conditions, such as branches, crossing through structures, etc., which may themselves constitute a fixed point.

Metal supports consisting of the following are normally used for making fixed points:

a) collar for bracing and fastening the pipes or expansion sleeve
b) rod
c) anchor plate
d) screws or tie bars



Note: The plate and screws may be omitted in the case the rod is fixed directly in the wall structure.

Making fixed points

Thrusts

The stresses the fixed points are subjected to are:
P = thrust exercised by the pipe
p = weight of the pipe and the liquid it contains

In the case of expansion sleeves, the thrust value is the resistance offered by the sleeve to the flow of the pipe in its housing.
In the case of expansion joints, it is the resistance offered by the stretch of pipe subjected to elastic deformation and can be found form relations of this type:

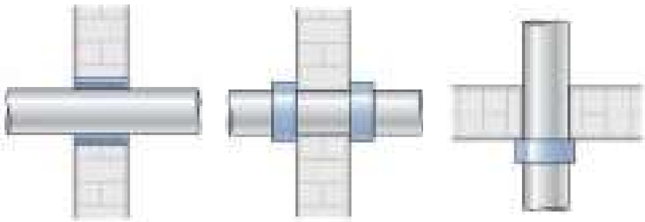
$$P = n \bullet \Delta L \bullet EJ/H^3$$

Coestilen® coupling flow resistance values

Ø Ext. mm	Thrust N.	Kg f
50/63	200	20
75	300	30
90	400	40
110	500	50
125	600	60
160	800	80
200	1100	110
250	1500	150
315	2000	200

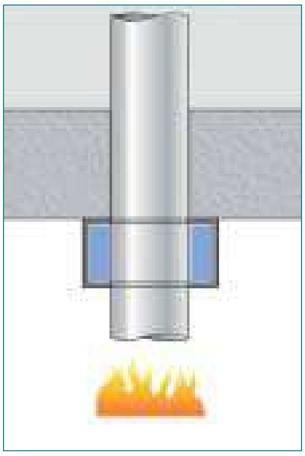
FLAME-RESISTANT ACCESSORIES

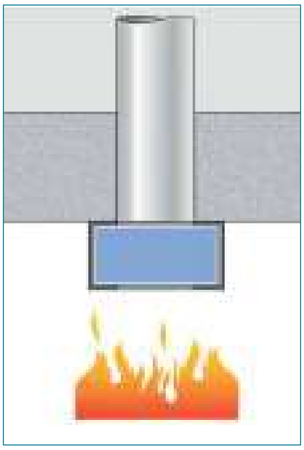
The **fire-barrier sleeve** is an essential accessory in preventing the spread of fire and smoke.
Due to its characteristics and based on the type of drain system, it guarantees protection classified as REI 120 or REI 180.
This means that even under the action of fire, the material from which the collar is made preserves its mechanica properties, preventing flames and gases from propagating for a period of 120 or 180 minutes.



The sleeve consists of a metal bracket that acts as a "container" for a ring made of heat-expansive intumescent material which is sensitive to high temperatures. As the fire develops, the sleeve ring expands, closing the pipe passage and insulating the connection between rooms.

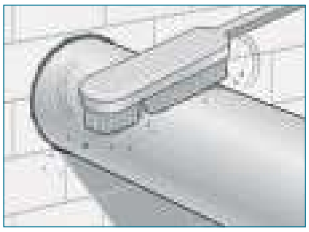
Operation of the fire-barrier sleeve



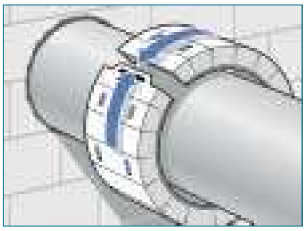


Installation of the fire-barrier sleeve

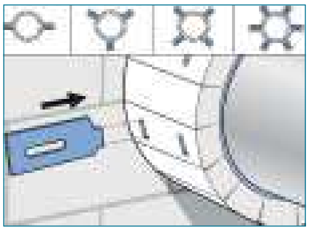
1 - Seal the fissures around the pipe with mortar.



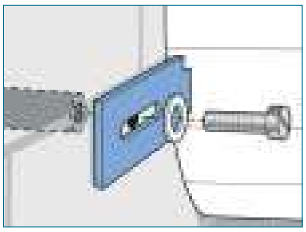
2 - Clean the pipe before applying the fire resistant sleeve.



3 - Fasten the sleeve onto the pipe.



4 - Fasten the hooks in the relevant holes around the fire barrier sleeve.



5 - Use metal anchor plugs to fasten the sleeve.

FIELDS OF USE

Coestilen® was designed for drainage inside domestic and industrial buildings for the following fields of application:

- **Drainage of sanitary fixtures.**
- **Drainage of washing machines and dishwashers.**
- **Extended drainage of waste water** (large kitchens, laundries, industrial systems).
- **Drainage of aggressive fluids** in schools, laboratories and industrial buildings, according to ISO/TR10358.
- **Medium and large-sized drain manifolds.**

Application conditions
Maximum temperature of the fluids piped not under vacuum: 95°C.

Note: It cannot be used for piping drain water containing benzene or benzole (DIN 1986/3, 2.3).

TRANSPORT

Avoid disorderly transport, if pipes have been removed from their original factory packaging *(Fig. 1)*.

Fig. 1

Avoid dragging along the ground or against the walls of the vehicle *(Fig. 2)*.

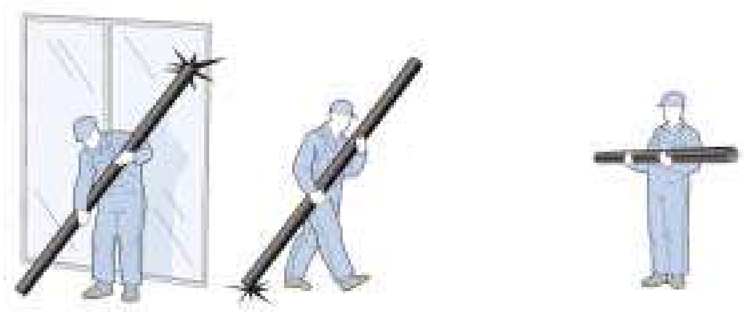


Fig. 2

STORAGE

Pipes stacking

- The pipes are to be laid on flat surfaces without any roughness.
- In order to prevent deformations over time, the maximum stacking height must be no more than 2 m, whatever their diameter may be.
- Outdoor storage must be restricted to 2 years at the most.

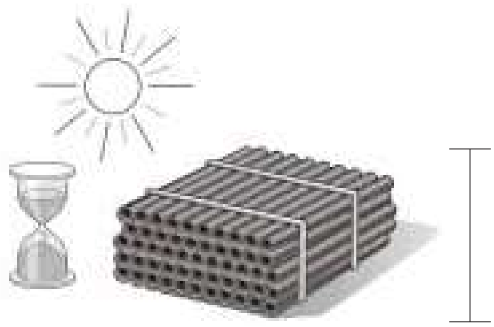


Fig. 3

Fittings storage

- The same precautions taken for the pipes must be taken for the fittings when storing. They are to be stored with care and protected from direct sunlight.