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System description

1. General

PREMANT is the registered name for a pre-insulated plastic casing pipe system used to transport district heat, and PREMANT DUO is a special version of this system. It is a pipe system for direct installation in the ground, without channels.

PREMANT DUO district heating pipe is available with a medium pipe made of welded or seamless steel, as specified by the customer. It is suitable to transport heating water, domestic hot water, water/glycol mixtures and other fluids. Due to the connected pipes and the limited maximum temperature, the use of this system for steam or condensate is restricted.

Heat insulation for PREMANT DUO district heating pipe is provided by a rigid polyurethane foam that can withstand temperatures of up to 144 °C. A PE-HD casing pipe provides external protection. All three components form one fixed unit, so this pipe system is a member of the composite pipe family.

PREMANT DUO district heating pipe is available in two categories of insulation thickness. Depending on the dimensions, it can be supplied in lengths of 6 m, 12 m and (16 m). The construction units and all the relevant preformed parts such as bends, T-pieces and fixed points, etc., are prefabricated in the factory. The result is a modular system that is correspondingly simple to plan and install.

All the components are connected together on site with circumferential seams. Supplementary insulation of the weld seam and the weld-on ends is provided by means of joint sleeves. The supplementary insulation work is usually carried out by BRUGG / GERMAN PIPE itself or by qualified specialist companies on our behalf. During the planning phase, we offer support based on our system experience to system users who request this.

PREMANT DUO district heating pipe, and the preformed parts and fittings, are manufactured according to the latest standards (EN 15698, EN 448 and EN 488).

Important note on statics and stability:

PREMANT DUO district heating pipe is designed for a temperature difference of 100 Kelvin between the flow and the return. When planning double pipe systems, it must be ensured that this value is not exceeded. In particular, the stated value must not be exceeded when starting up plants that have been cooled down.

In order to compensate for the difference in expansion between the flow and return pipes, both pipes must be permanently connected to each other. This is especially important:

- on free pipe ends in buildings, shafts and other structures
- on free pipe ends in end sleeves
- in/ahead of bends, branches, reductions, drainers, vents and
- in/ahead of shut-offs.

With PREMANT DUO district heating pipes, these **fixing plates** are installed in the factory **on all DUO preformed parts and fittings**. No further joints to absorb forces are required in straight sections of pipe between two bends. For reasons related to production, welded spacers are used in pipe rods, but these spacers do not perform any static functions.

When installing PREMANT DUO pipes, **fixing plates must be installed on site** in the following situations:

- at the end of house lead-ins
- on all ends of fitting bends and branches
- on the larger side of reduction pieces (except for pre-insulated reduction pieces)

Please contact your BRUGG partner for information on design and execution.

All the illustrations are schematic representations, and they do not correspond to the original components in every detail.

2. Range of applications

Max. continuous operating temperature

T_{Bmax} : 130 °C

Max. temperature difference between flow and return

t_{Bmax} : 100 K

Max. permitted operating pressure

p: 25 bar

System description

1. Medium pipe

Bars: steel pipes with longitudinal or helical seam welds
Quality: P235TR1 or P235GH as per (EN 10220/ EN 10217-1) or EN 10217-2
Standard: EN 15698-1
Test certificate: EN 10204-3.1
Welding bevel: From wall thickness > 3.2 mm, as per DIN 2559-1 codes 21 and 22

Preformed parts: **T-pieces** are flared, or are produced with a welded T-piece as per EN 10253 (formerly DIN 2615); material as appropriate to the straight welded pipes.
Quality: P235TR1 or P235GH as per EN 10220/ EN 10217
Standard: EN 448
Factory certificate: EN 10204-2.2
Test certificate: EN 10204-3.1
Welding bevel: From wall thickness > 3.2 mm, as per DIN 2559-1, codes 21 and 22

Bends are made from cold-bent (seamless or welded) steel pipes, or with welded bends as per EN 10253 (formerly DIN 2605).

Quality: P235TR1 or P235GH as per EN 10220/ EN 10217
Standard: EN 448
Factory certificate: EN 10204-2.2
Acceptance test certificate: EN 10204-3.1
Welding bevel: From wall thickness > 3.2 mm, as per DIN 2559-1, codes 21 and 22

Note:

To ensure a long service life for the PREMANT plastic jacket pipe system, it is important to observe the correct heating water quality. The requirements of VDI 2035 (standard of the Association of German Engineers), AGFW FW 510 (worksheet of the German District Heating Association) and European standard EN 12953-10 must be complied with, in particular with respect to preventing magnetite (iron(II,III) oxide) and scale formation. Before commissioning, a newly installed heat distribution network should be run without a heat exchanger, if possible, and the particulate matter should be removed using a suitable filter system. If possible, this procedure should also be repeated each time the network is extended or repairs are made.

System description

2. Thermal insulation

Material: Polyurethane foam (pentane-blown), manufactured from 3 components: polyol, isocyanate and cyclopentane
High-pressure plants are used for mixing and metering.

| PUR insulation | Reference temperature °C | PREMANT value | Test standard |
|---------------------------------|--------------------------|---------------|---------------|
| Pressure resistance | - | ≥ 0.3 MPa | EN 253 |
| Thermal conductivity | 50 | ≤ 0.0260 W/mK | DIN 52612 |
| Percentage of closed cells | - | ≥ 96 % | |
| Water absorption after 24 hours | - | ≤ 10 % | |

2.1 Supplementary insulation

Standard: EN 489
Execution:

- Executed by trained installation staff
- Polyurethane foam is used to foam and seal the sleeve joints
- Sealing with shrink-on sleeve or electro-welding joint
- Connecting the monitoring wires
- Installing the expansion pads, consisting of an elastic foam material which is resistant to ageing

3. Casing pipe

Quality: PE-HD, GM 5010 T3 or equivalent
Standard: EN 15698-1
Factory certificate: EN 10204-2.2

| Dimensions of PE-HD casing pipes | | | Dimensions of PE-HD casing pipes | |
|----------------------------------|------------|-----------------------|----------------------------------|----------------------------|
| Outer Ø mm | Pipe mm | Preformed parts mm | Outer Ø mm | Pipe/Preformed parts mm |
| 125 | 3.0 | 4.0 | 355 | 5.1 |
| 140 | 3.0 | 4.0 | 400 | 5.3 |
| 160 | 3.0 | 4.0 | 450 | 5.6 |
| 180 | 3.0 | 4.0 | 500 | 6.3 |
| 200 | 3.2 | 4.0 | 560 | 7.0 |
| 225 | 3.5 | 4.0 | 630 | 7.6 |
| 250 | 3.6 | 5.0 | 670 | 8.0 |
| 280 | 4.4 | 5.0 | | |
| 315 | 4.5 | 6.3 | | |

4. Monitoring wires

Brandes system: 1 x CrNi, red, insulated and perforated, Ø 0.8 mm / 0.5 mm²
1 x Cu, green, insulated, Ø 1.0 mm / 0.8 mm²
Nordic system: 1 x Cu, bare: 1.5 mm²
1 x Cu, tinned: 1.5 mm²
Task: Identification and location of moisture by means of resistance or pulse measurements

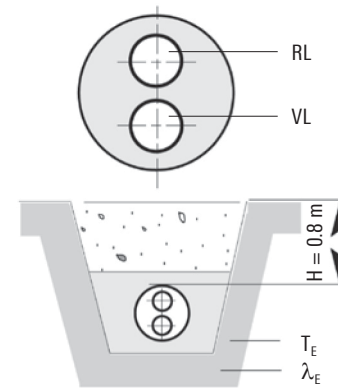
Heat loss

Insulation thickness 1

| Heat loss q [W/m] for VL and RL together | | | | | | | | | | |
|--|-----------------|---------------------------------------|-------|-------|-------|-------|--------|--------|--------|--------|
| PREMANT DUO | U-value W/mK | Average operating temperature TB [°C] | | | | | | | | |
| | | 50 °C | 60 °C | 70 °C | 80 °C | 90 °C | 100 °C | 110 °C | 120 °C | 130 °C |
| 26.9/ 26.9 - 125 | 0.174 | 7.0 | 8.7 | 10.5 | 12.2 | 13.9 | 15.7 | 17.4 | 19.2 | 20.9 |
| 33.7/ 33.7 - 140 | 0.195 | 7.8 | 9.7 | 11.7 | 13.6 | 15.6 | 17.5 | 19.5 | 21.4 | 23.3 |
| 42.4/ 42.4 - 160 | 0.216 | 8.6 | 10.8 | 12.9 | 15.1 | 17.2 | 19.4 | 21.6 | 23.7 | 25.9 |
| 48.3/ 48.3 - 160 | 0.263 | 10.5 | 13.2 | 15.8 | 18.4 | 21.1 | 23.7 | 26.3 | 29.0 | 31.6 |
| 60.3/ 60.3 - 200 | 0.254 | 10.2 | 12.7 | 15.2 | 17.8 | 20.3 | 22.8 | 25.4 | 27.9 | 30.5 |
| 76.1/ 76.1 - 225 | 0.312 | 12.5 | 15.6 | 18.7 | 21.8 | 24.9 | 28.1 | 31.2 | 34.3 | 37.4 |
| 88.9/ 88.9 - 250 | 0.363 | 14.5 | 18.1 | 21.8 | 25.4 | 29.0 | 32.6 | 36.3 | 39.9 | 43.5 |
| 114.3/114.3 - 315 | 0.362 | 14.6 | 18.3 | 21.9 | 25.6 | 29.2 | 32.9 | 36.5 | 40.2 | 43.8 |
| 139.7/139.7 - 400 | 0.331 | 13.4 | 16.7 | 20.1 | 23.4 | 26.8 | 30.1 | 33.5 | 36.8 | 40.2 |
| 168.3/168.3 - 450 | 0.413 | 16.6 | 20.8 | 25.0 | 29.1 | 33.3 | 37.4 | 41.6 | 45.7 | 49.9 |
| 219.3/219.3 - 560 | 0.473 | 18.9 | 23.6 | 28.3 | 33.0 | 37.7 | 42.4 | 47.1 | 51.8 | 56.6 |

Caution: In contrast to the single pipes heat losses the losses for both pipes listed together here.

- Type of installation: 1-pipe, laid in the ground
- Ground temperature: $T_E = 10\text{ °C}$
- Coverage height: $H = 0.8\text{ m}$
- Soil conductivity: $\lambda_E = 1.2\text{ W/mK}$
- Conductivity of PE jacket: $\lambda_{PE} = 0.4\text{ W/mK}$
- Conductivity of PUR foam: $\lambda_{PUR} = 0.0260\text{ W/mK}$



Heat loss

Insulation thickness 2

| Heat loss q [W/m] for VL and RL together | | | | | | | | | | |
|--|-----------------|---------------------------------------|-------|-------|-------|-------|--------|--------|--------|--------|
| PREMANT DUO | U-value W/mK | Average operating temperature TB [°C] | | | | | | | | |
| | | 50 °C | 60 °C | 70 °C | 80 °C | 90 °C | 100 °C | 110 °C | 120 °C | 130 °C |
| 26.9/ 26.9 - 140 | 0.154 | 6.1 | 7.7 | 9.2 | 10.8 | 12.3 | 13.8 | 15.4 | 16.9 | 18.4 |
| 33.7/ 33.7 - 160 | 0.165 | 6.6 | 8.3 | 9.9 | 11.6 | 13.2 | 14.9 | 16.5 | 18.2 | 19.8 |
| 42.4/ 42.4 - 180 | 0.184 | 7.3 | 9.2 | 11.0 | 12.9 | 14.7 | 16.5 | 18.4 | 20.2 | 22.0 |
| 48.3/ 48.3 - 180 | 0.216 | 8.6 | 10.8 | 12.9 | 15.1 | 17.3 | 19.4 | 21.6 | 23.7 | 25.9 |
| 60.3/ 60.3 - 225 | 0.211 | 8.4 | 10.5 | 12.6 | 14.8 | 16.9 | 19.0 | 21.1 | 23.2 | 25.3 |
| 76.1/ 76.1 - 250 | 0.253 | 10.1 | 12.6 | 15.2 | 17.7 | 20.2 | 22.8 | 25.3 | 27.8 | 30.3 |
| 88.9/ 88.9 - 280 | 0.278 | 11.1 | 13.9 | 16.7 | 19.5 | 22.2 | 25.0 | 27.8 | 30.6 | 33.4 |
| 114.3/114.3 - 355 | 0.275 | 11.1 | 13.8 | 16.6 | 19.4 | 22.1 | 24.9 | 27.7 | 30.4 | 33.2 |
| 139.7/139.7 - 450 | 0.258 | 10.4 | 13.0 | 15.5 | 18.1 | 20.7 | 23.3 | 25.9 | 28.5 | 31.1 |
| 168.3/168.3 - 500 | 0.310 | 12.4 | 15.5 | 18.7 | 21.8 | 24.9 | 28.0 | 31.1 | 34.2 | 37.3 |
| 219.3/219.3 - 630 | 0.328 | 13.0 | 16.3 | 19.6 | 22.8 | 26.1 | 29.3 | 32.6 | 35.8 | 39.1 |

Caution: In contrast to the single pipes heat losses the losses for both pipes listed together here.

Type of installation:

Ground temperature:

Coverage height:

Soil conductivity:

Conductivity of PE jacket:

Conductivity of PUR foam:

1-pipe, laid in the ground

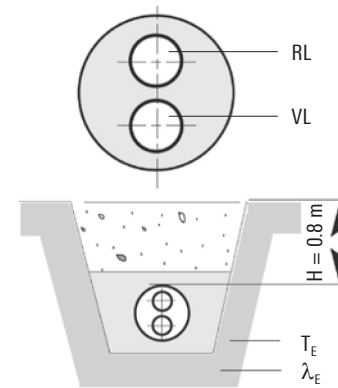
$T_E = 10\text{ °C}$

$H = 0.8\text{ m}$

$\lambda_E = 1.2\text{ W/mK}$

$\lambda_{PE} = 0.4\text{ W/mK}$

$\lambda_{PUR} = 0.0260\text{ W/mK}$



Heat loss

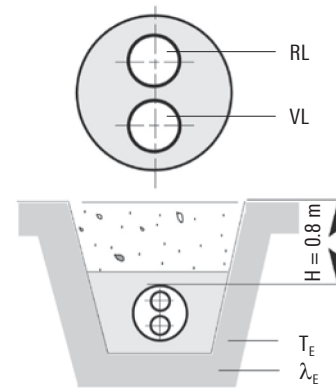
Insulation thickness 3

| Heat loss q [W/m] for VL and RL together | | | | | | | | | | |
|--|-----------------|---------------------------------------|-------|-------|-------|-------|--------|--------|--------|--------|
| PREMANT DUO | U-value W/mK | Average operating temperature TB [°C] | | | | | | | | |
| | | 50 °C | 60 °C | 70 °C | 80 °C | 90 °C | 100 °C | 110 °C | 120 °C | 130 °C |
| 26.9/ 26.9 - 140 | 0.135 | 5.4 | 6.8 | 8.1 | 9.5 | 10.8 | 12.2 | 13.5 | 14.9 | 16.2 |
| 33.7/ 33.7 - 160 | 0.147 | 5.9 | 7.4 | 8.8 | 10.3 | 11.8 | 13.2 | 14.7 | 16.2 | 17.6 |
| 42.4/ 42.4 - 180 | 0.163 | 6.5 | 8.2 | 9.8 | 11.4 | 13.0 | 14.7 | 16.3 | 17.9 | 19.6 |
| 48.3/ 48.3 - 180 | 0.187 | 7.5 | 9.4 | 11.2 | 13.1 | 15.0 | 16.8 | 18.7 | 20.6 | 22.4 |
| 60.3/ 60.3 - 225 | 0.184 | 7.4 | 9.2 | 11.0 | 12.9 | 14.7 | 16.6 | 18.4 | 20.2 | 22.1 |
| 76.1/ 76.1 - 250 | 0.212 | 8.5 | 10.6 | 12.7 | 14.8 | 17.0 | 19.1 | 21.2 | 23.3 | 25.4 |
| 88.9/ 88.9 - 280 | 0.226 | 9.0 | 11.3 | 13.6 | 15.8 | 18.1 | 20.3 | 22.6 | 24.9 | 27.1 |
| 114.3/114.3 - 355 | 0.224 | 9.0 | 11.2 | 13.4 | 15.7 | 17.9 | 20.2 | 22.4 | 24.6 | 26.9 |
| 139.7/139.7 - 450 | 0.218 | 8.7 | 10.9 | 13.1 | 15.3 | 17.4 | 19.6 | 21.8 | 24.0 | 26.2 |
| 168.3/168.3 - 500 | 0.248 | 9.9 | 12.4 | 14.9 | 17.4 | 19.8 | 22.3 | 24.8 | 27.3 | 29.8 |
| 219.3/219.3 - 630 | 0.257 | 10.3 | 12.9 | 15.4 | 18.0 | 20.6 | 23.1 | 25.7 | 28.3 | 30.8 |

Caution: In contrast to the single pipes heat losses the losses for both pipes listed together here.

Type of installation:
 Ground temperature:
 Coverage height:
 Soil conductivity:
 Conductivity of PE jacket:
 Conductivity of PUR foam:

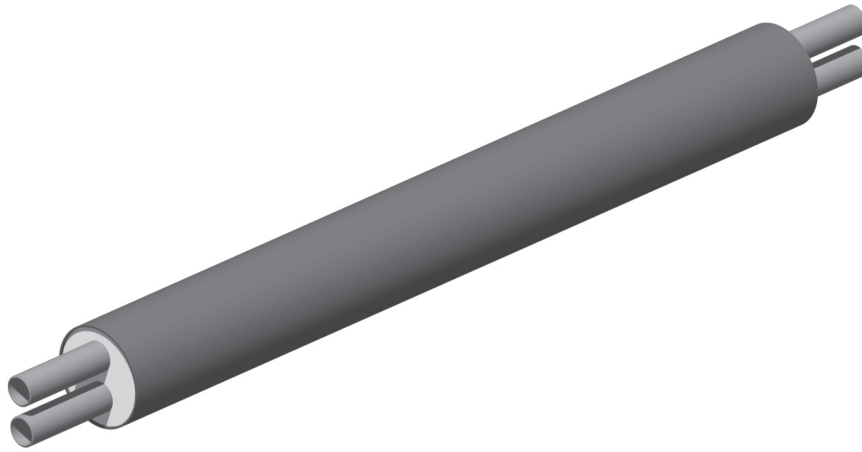
1-pipe, laid in the ground
 $T_E = 10\text{ °C}$
 $H = 0.8\text{ m}$
 $\lambda_{\text{E}} = 1.2\text{ W/mK}$
 $\lambda_{\text{PE}} = 0.4\text{ W/mK}$
 $\lambda_{\text{PUR}} = 0.0260\text{ W/mK}$



District heating pipe – DUO

Medium pipes, pre-insulated in the factory, with plastic casing pipe and 200 mm free pipe ends.

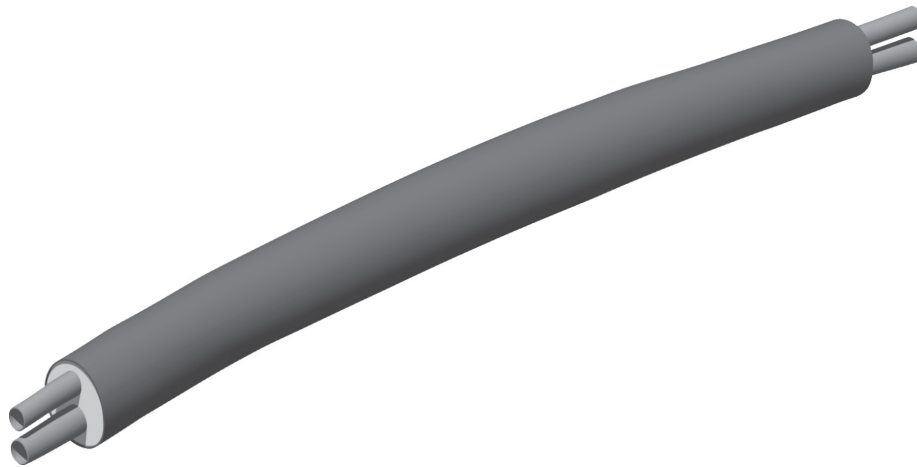
Key features of double pipes are: reduced heat loss, less outlay on underground construction work and faster completion times than single pipes. The temperature difference between the medium pipes causes stresses within the system. This results in additional static requirements which must be considered during installation.



| Nominal width | Steel pipe d | Wall thickness s | Distance x | PE casing pipe | | | | | | delivery lengths | | | Volume Inner pipe l/m |
|---------------|--------------|------------------|------------|----------------|------|-------|------|-------|------|------------------|------|------|-----------------------|
| | | | | D DS1 | kg/m | D DS2 | kg/m | D DS3 | kg/m | 6 m | 12 m | 16 m | |
| DN | mm | mm | mm | mm | kg/m | mm | kg/m | mm | kg/m | | | | |
| 20 | 26.9 | 2.6 | 19 | 125 | 4.9 | 140 | 5.3 | 160 | 5.7 | • | | | 2 x 0.37 |
| 25 | 33.7 | 2.6 | 19 | 140 | 6.1 | 160 | 6.6 | 180 | 7.1 | • | | | 2 x 0.64 |
| 32 | 42.4 | 2.6 | 19 | 160 | 7.6 | 180 | 8.2 | 200 | 8.8 | • | • | | 2 x 1.02 |
| 40 | 48.3 | 2.6 | 19 | 160 | 8.3 | 180 | 8.9 | 200 | 9.5 | • | • | | 2 x 1.38 |
| 50 | 60.3 | 2.9 | 20 | 200 | 11.8 | 225 | 12.6 | 250 | 13.7 | • | • | | 2 x 2.28 |
| 65 | 76.1 | 2.9 | 20 | 225 | 14.8 | 250 | 15.7 | 280 | 17.5 | • | • | | 2 x 3.82 |
| 80 | 88.9 | 3.2 | 25 | 250 | 18.5 | 280 | 19.7 | 315 | 22.0 | • | • | | 2 x 5.35 |
| 100 | 114.3 | 3.6 | 25 | 315 | 27.5 | 355 | 29.5 | 400 | 32.8 | • | • | • | 2 x 9.01 |
| 125 | 139.7 | 3.6 | 30 | 400 | 36.6 | 450 | 39.7 | 500 | 44.4 | • | • | • | 2 x 13.8 |
| 150 | 168.3 | 4.0 | 40 | 450 | 47.3 | 500 | 50.7 | 560 | 57.2 | • | • | • | 2 x 20.2 |
| 200 | 219.1 | 4.5 | 45 | 560 | 70.3 | 630 | 76.2 | 710 | 86.9 | • | • | • | 2 x 34.7 |

x = clear distance between medium pipes

Elbow pipe



Elbow pipes are plastic casing pipes made to customer specifications and pre-insulated at the factory. Elbow pipes are produced as curved plastic casing pipes with a large radius and serve to optimise pipe routing when the direction changes.

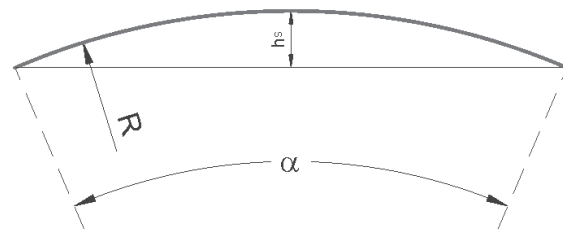
Elbow pipes behave in the same way as straight pipes; in other words, heat expansion does not cause any bending moment. The deflection angle " α " of the pipe routing or the bend radius "R" must be known in order to produce elbow pipes. All elbow pipes have straight ends between 1.2 and 2.0 m due to machine-based production.

The PUR foam is subject to lateral pressure as a consequence of heat expansion and the curve of the pipe. The magnitude of this pressure must not exceed the permissible force of 0.15 MPa. The outcome of this is a maximum permissible deflection angle " α " or a minimum bend radius "R".

The permissible values are contained in the following table.

Deflection angle for elbow pipes à 12m

| Nominal width DN | Deflection angle | | min.perm. radius R [m] |
|---------------------|-------------------------|---------------------|---------------------------|
| | minimum α [°] | maximal α | |
| 32 | 10 | 33 | 20.8 |
| 40 | 8 | 31 | 22.2 |
| 50 | 6 | 29 | 23.7 |
| 65 | 5 | 24 | 28.6 |
| 80 | 3 | 20 | 34.4 |
| 100 | 3 | 18 | 38.2 |
| 125 | 3 | 16 | 43.0 |
| 150 | 3 | 11 | 62.5 |
| 200 | on request | | |

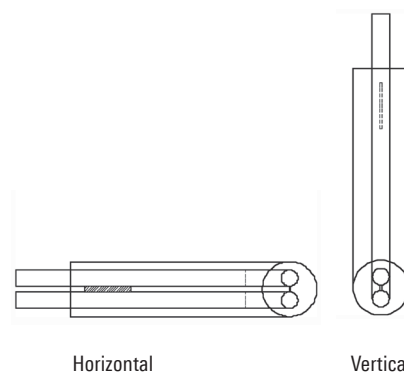
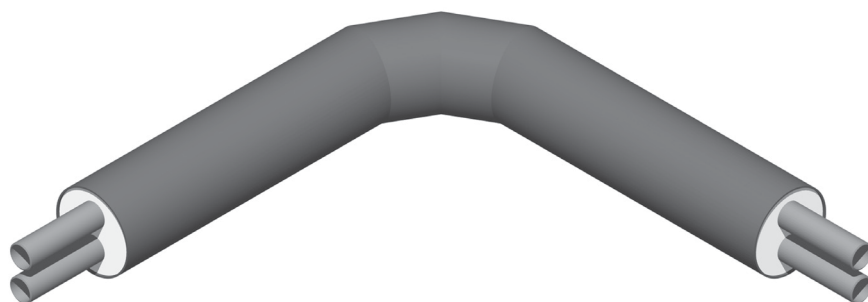


Bend, with equal limbs, 90°

Design versions

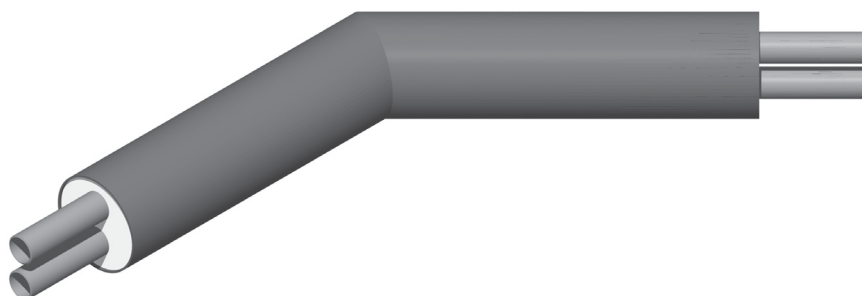
Two versions are offered for double pipe bends. When installing normal pipelines, "horizontal" bends are used whereas for house lead-ins and vertical projections, "vertical" bends are required.

The sketches on the right illustrate the design versions.



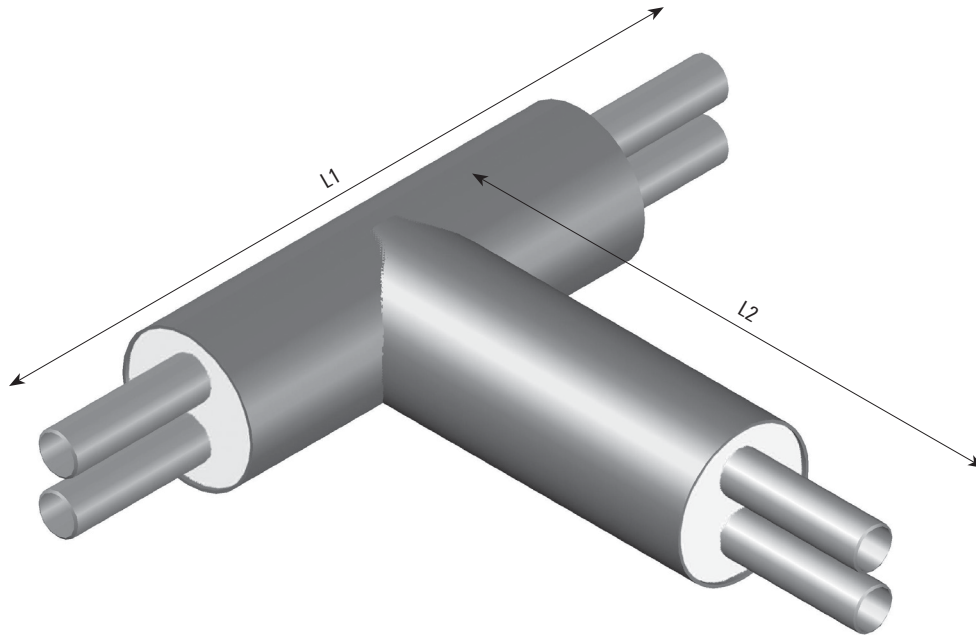
| Nominal width | Diameter d | Limb length L | PE casing pipe | | |
|---------------|------------|---------------|----------------|-------|-------|
| | | | D DS1 | D DS2 | D DS3 |
| DN | mm | mm | mm | mm | mm |
| 20 | 26.9 | 1000 | 125 | 140 | 160 |
| 25 | 33.7 | 1000 | 140 | 160 | 180 |
| 32 | 42.4 | 1000 | 160 | 180 | 200 |
| 40 | 48.3 | 1000 | 160 | 180 | 200 |
| 50 | 60.3 | 1000 | 200 | 225 | 250 |
| 65 | 76.1 | 1000 | 225 | 250 | 280 |
| 80 | 88.9 | 1000 | 250 | 280 | 315 |
| 100 | 114.3 | 1000 | 315 | 355 | 400 |
| 125 | 139.7 | 1000 | 400 | 450 | 500 |
| 150 | 168.3 | 1000 | 450 | 500 | 560 |
| 200 | 219.1 | 1300 | 560 | 630 | 710 |

Bend, with equal limbs, 45°



| Nominal width | Diameter d | Limb length L | PE casing pipe | | |
|---------------|------------|---------------|----------------|-------|-------|
| | | | D DS1 | D DS2 | D DS3 |
| DN | mm | mm | mm | mm | mm |
| 20 | 26.9 | 1000 | 125 | 140 | 160 |
| 25 | 33.7 | 1000 | 140 | 160 | 180 |
| 32 | 42.4 | 1000 | 160 | 180 | 200 |
| 40 | 48.3 | 1000 | 160 | 180 | 200 |
| 50 | 60.3 | 1000 | 200 | 225 | 250 |
| 65 | 76.1 | 1000 | 225 | 250 | 280 |
| 80 | 88.9 | 1000 | 250 | 280 | 315 |
| 100 | 114.3 | 1000 | 315 | 355 | 400 |
| 125 | 139.7 | 1000 | 400 | 450 | 500 |
| 150 | 168.3 | 1000 | 450 | 500 | 560 |
| 200 | 219.1 | 1300 | 560 | 630 | 710 |

T-piece, 90°



| Main pipe | | | | Branch | | | | | | | | | | | |
|-----------|---------|---------|---------|---------|------|------|------|------|------|------|------|------|------|------|------|
| DN | D (DS1) | D (DS2) | D (DS3) | DN | 20 | 25 | 32 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 |
| | | | | D (DS1) | 125 | 140 | 160 | 160 | 200 | 225 | 250 | 315 | 400 | 450 | 560 |
| | | | | D (DS2) | 140 | 160 | 180 | 180 | 225 | 250 | 280 | 355 | 450 | 500 | 630 |
| | | | | D (DS3) | 160 | 180 | 200 | 200 | 250 | 280 | 315 | 400 | 500 | 560 | 710 |
| DN | D (DS1) | D (DS2) | D (DS3) | | | | | | | | | | | | |
| 20 | 125 | 140 | 160 | L2 | 600 | | | | | | | | | | |
| | | | | L1 | 1000 | | | | | | | | | | |
| 25 | 140 | 160 | 180 | L2 | 600 | 600 | | | | | | | | | |
| | | | | L1 | 1000 | 1000 | | | | | | | | | |
| 32 | 160 | 180 | 200 | L2 | 600 | 600 | 600 | | | | | | | | |
| | | | | L1 | 1000 | 1000 | 1000 | | | | | | | | |
| 40 | 160 | 180 | 200 | L2 | 600 | 600 | 600 | 600 | | | | | | | |
| | | | | L1 | 1000 | 1000 | 1000 | 1000 | | | | | | | |
| 50 | 200 | 225 | 250 | L2 | 700 | 700 | 700 | 700 | 700 | | | | | | |
| | | | | L1 | 1000 | 1000 | 1000 | 1100 | 1100 | | | | | | |
| 65 | 225 | 250 | 280 | L2 | 700 | 700 | 700 | 700 | 700 | 700 | | | | | |
| | | | | L1 | 1000 | 1000 | 1000 | 1000 | 1200 | 1200 | | | | | |
| 80 | 250 | 280 | 315 | L2 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | | | | |
| | | | | L1 | 1000 | 1000 | 1000 | 1000 | 1100 | 1300 | 1300 | | | | |
| 100 | 315 | 355 | 400 | L2 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 | | | |
| | | | | L1 | 1000 | 1000 | 1000 | 1000 | 1100 | 1100 | 1400 | 1400 | | | |
| 125 | 400 | 450 | 500 | L2 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | | |
| | | | | L1 | 1000 | 1000 | 1000 | 1000 | 1100 | 1100 | 1200 | 1500 | 1500 | | |
| 150 | 450 | 500 | 560 | L2 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | |
| | | | | L1 | 1000 | 1000 | 1000 | 1000 | 1100 | 1100 | 1200 | 1200 | 1600 | 1600 | |
| 200 | 560 | 630 | 710 | L2 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| | | | | L1 | 1000 | 1000 | 1000 | 1000 | 1100 | 1100 | 1200 | 1200 | 1800 | 1800 | 1800 |

Figures in mm

Y-pipe, type G

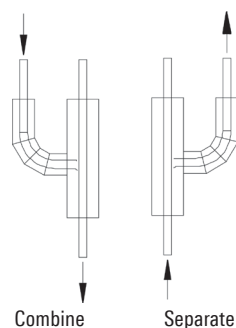
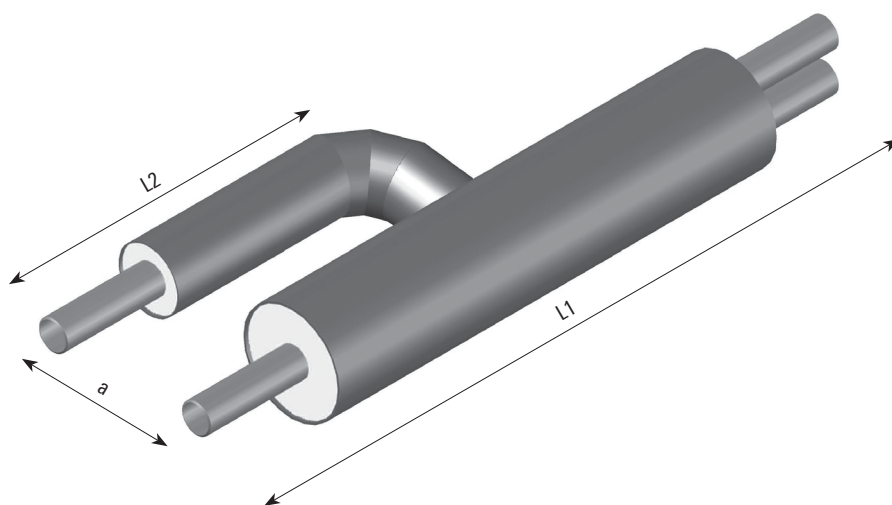
straight, insulation thickness 1

Y-pipes are used to produce a transition from conventional installation with two single pipes to the space-saving PREMANT DUO system.

The upper pipe (preferably the return) runs straight through the Y-pipe, whereas the lower pipe is angled outwards at 90°. With type G, the double and single pipes have parallel axes. Fixing plates are positioned on the side of the double pipe connection.

Design versions

Two different design versions are offered for Y-pipes. The relevant type must be stated when ordering. The arrows in the sketch show the direction of flow in the forward flow pipe.



A reducing sleeve must be used on single pipe side, to connect the pipe that passes straight through.

| Nominal width DN | Diameter d | Overall (installed) length L1 | Junction L2 | Distance a | PE casing pipe | |
|---------------------|---------------|----------------------------------|----------------|---------------|----------------|----------|
| | mm | mm | mm | mm | D1 mm | D2 mm |
| 20 | 26.9 | 1000 | 450 | 250 | 125 | 90 |
| 25 | 33.7 | 1000 | 460 | 250 | 140 | 90 |
| 32 | 42.4 | 1000 | 480 | 300 | 160 | 110 |
| 40 | 48.3 | 1200 | 480 | 300 | 160 | 110 |
| 50 | 60.3 | 1200 | 500 | 300 | 200 | 125 |
| 65 | 76.1 | 1200 | 510 | 350 | 225 | 140 |
| 80 | 88.9 | 1400 | 510 | 400 | 250 | 160 |
| 100 | 114.3 | 1400 | 510 | 450 | 315 | 200 |
| 125 | 139.7 | 1400 | 530 | 500 | 400 | 225 |
| 150 | 168.3 | 1500 | 570 | 550 | 450 | 250 |
| 200 | 219.1 | 1800 | 700 | 660 | 560 | 315 |

Y-pipe, type G

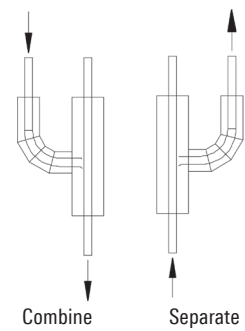
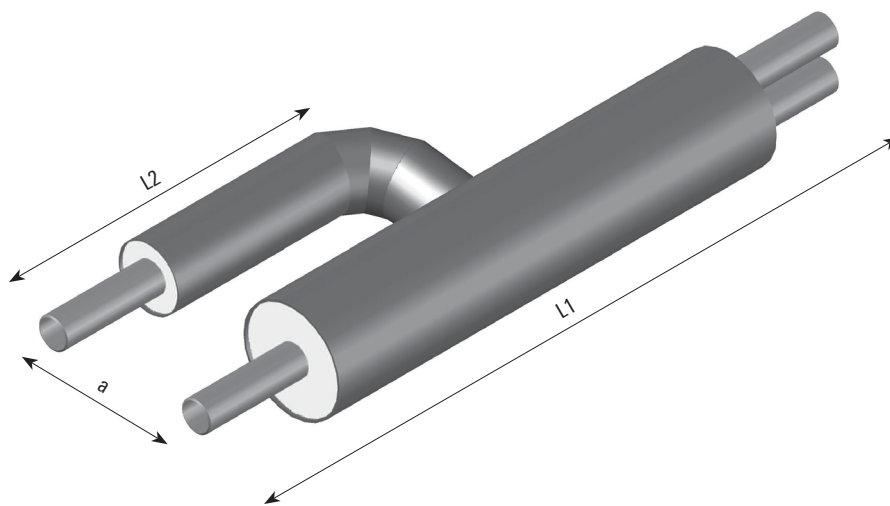
straight, insulation thickness 2

Y-pipes are used to produce a transition from conventional installation with two single pipes to the space-saving PREMANT DUO system.

The upper pipe (preferably the return) runs straight through the Y-pipe, whereas the lower pipe is angled outwards at 90°. With type G, the double and single pipes have parallel axes. Fixing plates are positioned on the double pipe connection side.

Design versions

Two different design versions are offered for Y-pipes. The relevant type must be stated when ordering. The arrows in the sketch show the direction of flow in the forward flow pipe.



A reducing sleeve must be used on single pipe side, to connect the pipe that passes straight through.

| Nominal width DN | Diameter d | Overall (installed) length L1 | Junction L2 | Distance a | PE casing pipe | |
|---------------------|---------------|----------------------------------|----------------|---------------|----------------|----------|
| | mm | mm | mm | mm | D1 mm | D2 mm |
| 20 | 26.9 | 1000 | 450 | 250 | 140 | 110 |
| 25 | 33.7 | 1000 | 460 | 250 | 160 | 110 |
| 32 | 42.4 | 1000 | 480 | 300 | 180 | 125 |
| 40 | 48.3 | 1200 | 480 | 300 | 180 | 125 |
| 50 | 60.3 | 1200 | 500 | 300 | 225 | 140 |
| 65 | 76.1 | 1200 | 510 | 350 | 250 | 160 |
| 80 | 88.9 | 1400 | 510 | 400 | 280 | 180 |
| 100 | 114.3 | 1400 | 510 | 450 | 355 | 225 |
| 125 | 139.7 | 1400 | 530 | 500 | 450 | 250 |
| 150 | 168.3 | 1500 | 570 | 550 | 500 | 280 |
| 200 | 219.1 | 1800 | 700 | 660 | 630 | 355 |

Y-pipe, type G

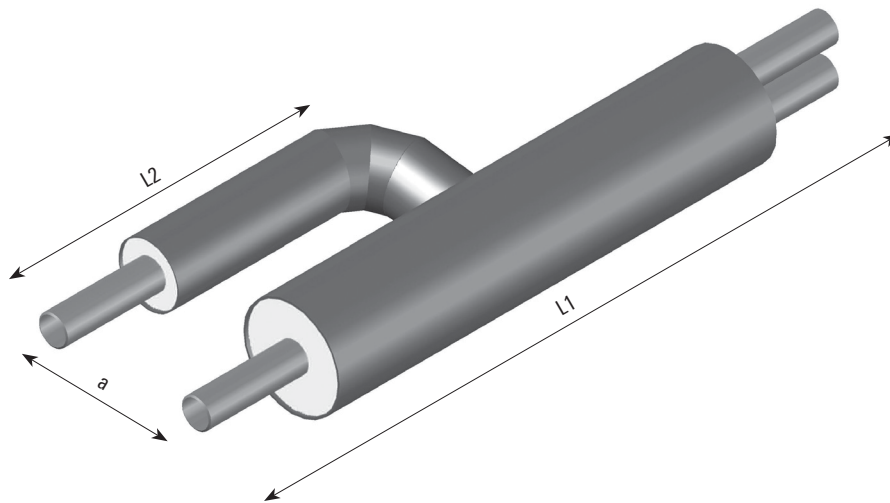
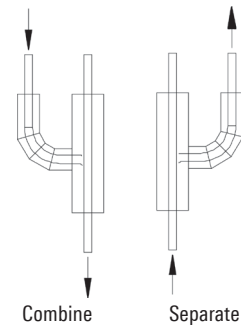
straight, insulation thickness 3

Y-pipes are used to produce a transition from conventional installation with two single pipes to the space-saving PREMANT DUO system.

The upper pipe (preferably the return) runs straight through the Y-pipe, whereas the lower pipe is angled outwards at 90°. With type G, the double and single pipes have parallel axes. Fixing plates are positioned on the double pipe connection side.

Design versions

Two different design versions are offered for Y-pipes. The relevant type must be stated when ordering. The arrows in the sketch show the direction of flow in the forward flow pipe.



A reducing sleeve must be used on single pipe side, to connect the pipe that passes straight through.

| Nominal width DN | Diameter d | Overall (installed) length L1 | Junction L2 | Distance a | PE casing pipe | |
|---------------------|---------------|----------------------------------|----------------|---------------|----------------|----------|
| | mm | mm | mm | mm | D1 mm | D2 mm |
| 20 | 26.9 | 1000 | 450 | 270 | 160 | 125 |
| 25 | 33.7 | 1000 | 460 | 280 | 180 | 125 |
| 32 | 42.4 | 1000 | 480 | 300 | 200 | 140 |
| 40 | 48.3 | 1200 | 480 | 300 | 200 | 140 |
| 50 | 60.3 | 1200 | 500 | 330 | 250 | 160 |
| 65 | 76.1 | 1200 | 510 | 350 | 280 | 180 |
| 80 | 88.9 | 1400 | 510 | 400 | 315 | 200 |
| 100 | 114.3 | 1400 | 510 | 460 | 400 | 250 |
| 125 | 139.7 | 1400 | 530 | 540 | 500 | 280 |
| 150 | 168.3 | 1500 | 570 | 580 | 500 | 315 |
| 200 | 219.1 | 1800 | 700 | 740 | 710 | 400 |

Y-pipe, type W

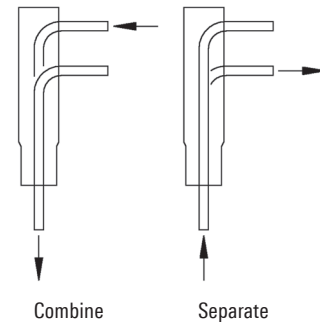
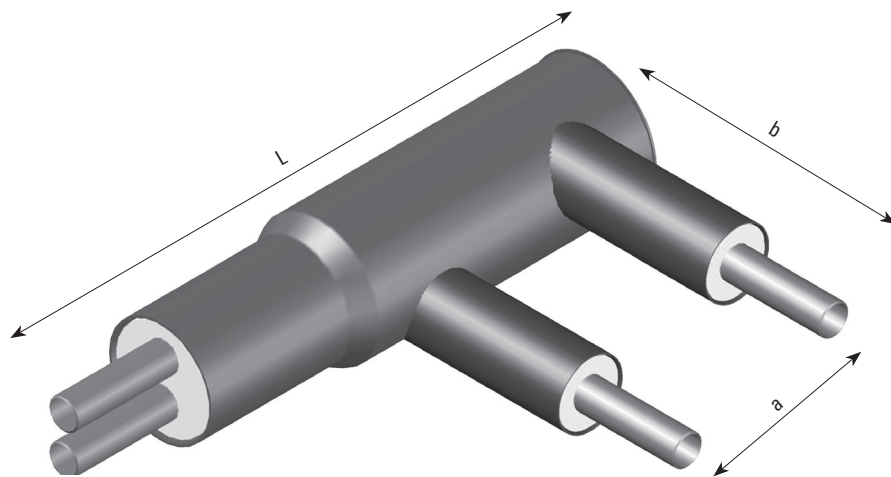
angled, insulation thickness 1

Y-pipes are used to make a transition from a conventional installation with two single pipes to the space-saving PREMANT DUO system.

With type W, the double and single pipes run at an angle of 90°. Fixing plates are positioned on the double pipe connection side.

Design versions

Two different design versions are offered for Y-pipes. The relevant type must be stated when ordering. The arrows in the sketch show the direction of flow in the forward flow pipe.



| Nominal width | Diameter | Overall (installed) length | Junction | Distance | PE casing pipe | |
|---------------|----------|----------------------------|----------|----------|----------------|-----|
| | d | | | | L | b |
| DN | mm | mm | mm | mm | mm | mm |
| 20 | 26.9 | 1000 | 500 | 320 | 125 | 90 |
| 25 | 33.7 | 1000 | 500 | 320 | 140 | 90 |
| 32 | 42.4 | 1000 | 500 | 340 | 160 | 110 |
| 40 | 48.3 | 1000 | 500 | 340 | 160 | 110 |
| 50 | 60.3 | 1000 | 550 | 355 | 200 | 125 |
| 65 | 76.1 | 1100 | 550 | 420 | 225 | 140 |
| 80 | 88.9 | 1200 | 600 | 440 | 250 | 160 |
| 100 | 114.3 | 1350 | 600 | 480 | 315 | 200 |
| 125 | 139.7 | 1450 | 650 | 505 | 400 | 225 |
| 150 | 168.3 | 1600 | 700 | 530 | 450 | 250 |
| 200 | 219.1 | 2000 | 750 | 700 | 560 | 315 |

Y-pipe, type W

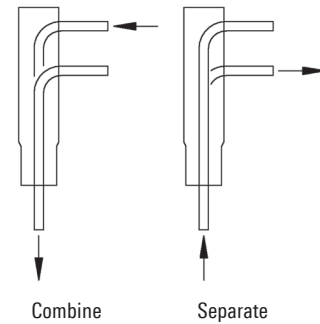
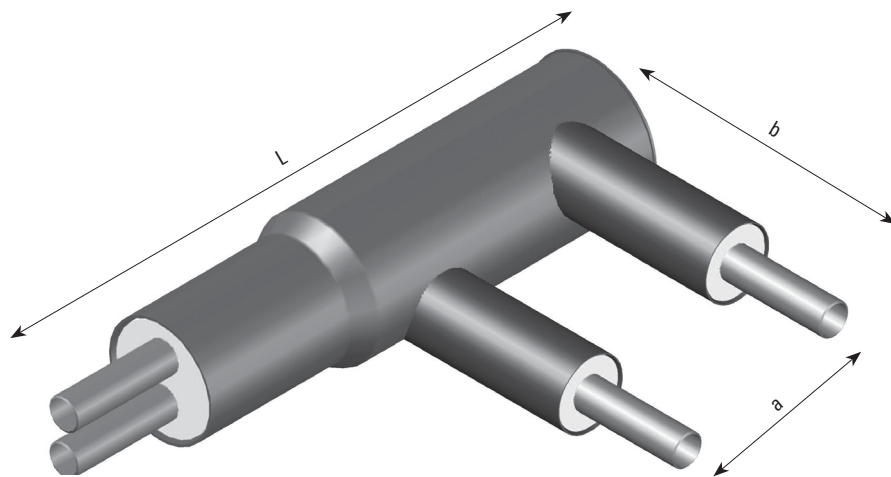
angled, insulation thickness 2

Y-pipes are used to make a transition from a conventional installation with two single pipes to the space-saving PREMANT DUO system.

With type W, the double and single pipes run at an angle of 90°. Fixing plates are positioned on the double pipe connection side.

Design versions

Two different design versions are offered for Y-pipes. The relevant type must be stated when ordering. The arrows in the sketch show the direction of flow in the forward flow pipe.



| Nominal width | Diameter | Overall (installed) length | Junction | Distance | PE casing pipe | |
|---------------|----------|----------------------------|----------|----------|----------------|-----|
| | d | | | | L | b |
| DN | mm | mm | mm | mm | mm | mm |
| 20 | 26.9 | 1000 | 500 | 320 | 140 | 110 |
| 25 | 33.7 | 1000 | 500 | 320 | 160 | 110 |
| 32 | 42.4 | 1000 | 500 | 340 | 180 | 125 |
| 40 | 48.3 | 1000 | 500 | 340 | 180 | 125 |
| 50 | 60.3 | 1000 | 550 | 355 | 225 | 140 |
| 65 | 76.1 | 1100 | 550 | 420 | 250 | 160 |
| 80 | 88.9 | 1200 | 550 | 440 | 280 | 180 |
| 100 | 114.3 | 1350 | 600 | 480 | 355 | 225 |
| 125 | 139.7 | 1450 | 600 | 505 | 450 | 250 |
| 150 | 168.3 | 1600 | 700 | 530 | 500 | 280 |
| 200 | 219.1 | 2000 | 750 | 700 | 630 | 355 |

Y-pipe, type W

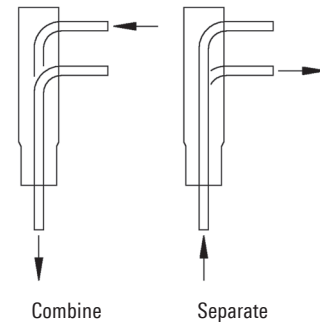
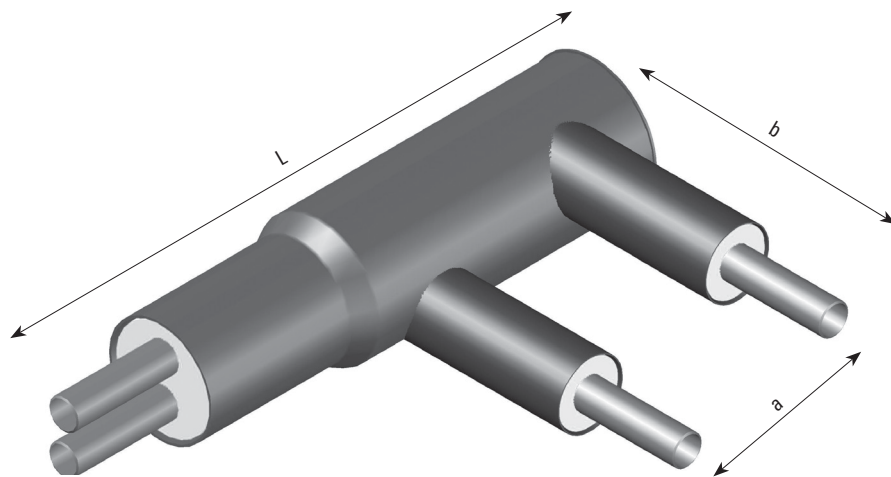
angled, insulation thickness 3

Y-pipes are used to make a transition from a conventional installation with two single pipes to the space-saving PREMANT DUO system.

With type W, the double and single pipes run at an angle of 90°. Fixing plates are positioned on the double pipe connection side.

Design versions

Two different design versions are offered for Y-pipes. The relevant type must be stated when ordering. The arrows in the sketch show the direction of flow in the forward flow pipe.

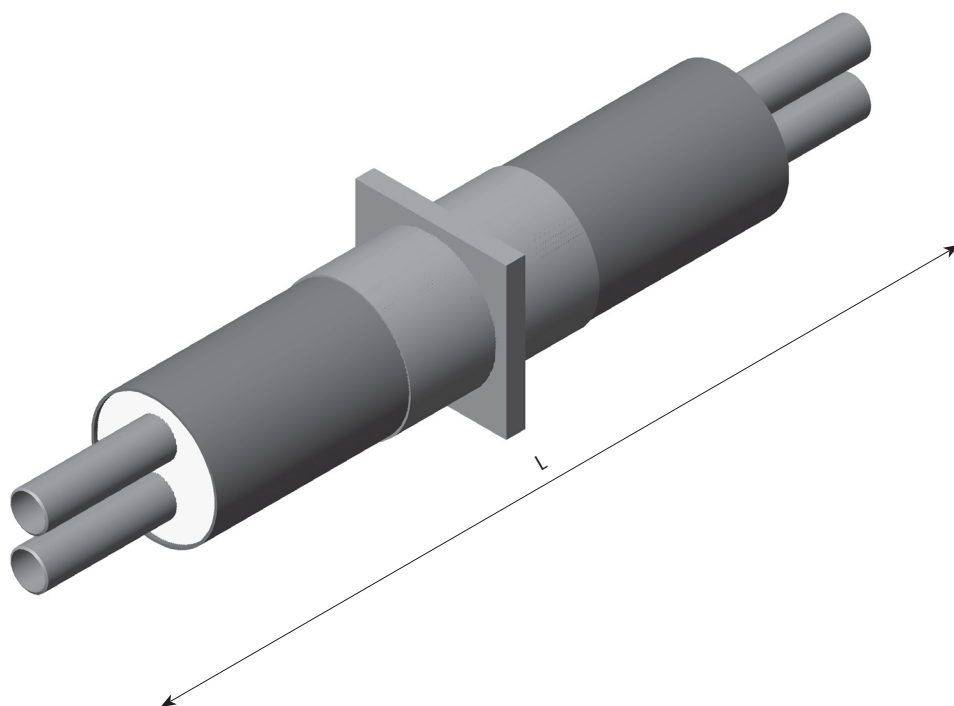


| Nominal width | Diameter | Overall (installed) length | Junction | Distance | PE casing pipe | |
|---------------|----------|----------------------------|----------|----------|----------------|-----|
| | d | | | | L | b |
| DN | mm | mm | mm | mm | mm | mm |
| 20 | 26.9 | 1000 | 500 | 320 | 160 | 125 |
| 25 | 33.7 | 1000 | 500 | 320 | 180 | 125 |
| 32 | 42.4 | 1000 | 500 | 340 | 200 | 140 |
| 40 | 48.3 | 1000 | 500 | 340 | 200 | 140 |
| 50 | 60.3 | 1000 | 550 | 355 | 250 | 160 |
| 65 | 76.1 | 1100 | 550 | 420 | 280 | 180 |
| 80 | 88.9 | 1200 | 550 | 440 | 315 | 200 |
| 100 | 114.3 | 1350 | 600 | 480 | 400 | 250 |
| 125 | 139.7 | 1450 | 600 | 505 | 500 | 280 |
| 150 | 168.3 | 1600 | 700 | 530 | 560 | 315 |
| 200 | 219.1 | 2000 | 750 | 700 | 710 | 400 |

Fixed point

Pre-insulated in the factory, design as per EN 448, steel quality and dimensions of steel pipe and PE outer casing correspond to those of the straight pipe.

The anchor is a square steel plate that is designed according to the load it must take. The medium pipe and the anchor plate are thermally and electrically separated from each other.



| Nominal width | Diameter d | Overall (installed) length L | PE casing pipe | | |
|---------------|------------|------------------------------|----------------|-------|-------|
| | | | D DS1* | D DS2 | D DS3 |
| DN | mm | mm | mm | mm | mm |
| 20 | 26.9 | 2000 | | 140 | 160 |
| 25 | 33.7 | 2000 | | 160 | 180 |
| 32 | 42.4 | 2000 | | 180 | 200 |
| 40 | 48.3 | 2000 | | 180 | 200 |
| 50 | 60.3 | 2000 | | 225 | 250 |
| 65 | 76.1 | 2000 | | 250 | 280 |
| 80 | 88.9 | 2000 | | 280 | 315 |
| 100 | 114.3 | 2000 | | 355 | 400 |
| 125 | 139.7 | 2000 | | 450 | 500 |
| 150 | 168.3 | 2000 | | 500 | 560 |
| 200 | 219.1 | 2000 | | 630 | 710 |

* Due to the internal structure of the electrical isolation, DUO fixed points only in DS2 are available. When DUO fixed points in DS1 systems be installed, so shrink-on sleeves (7.342) are necessary to connect the jacket pipes.

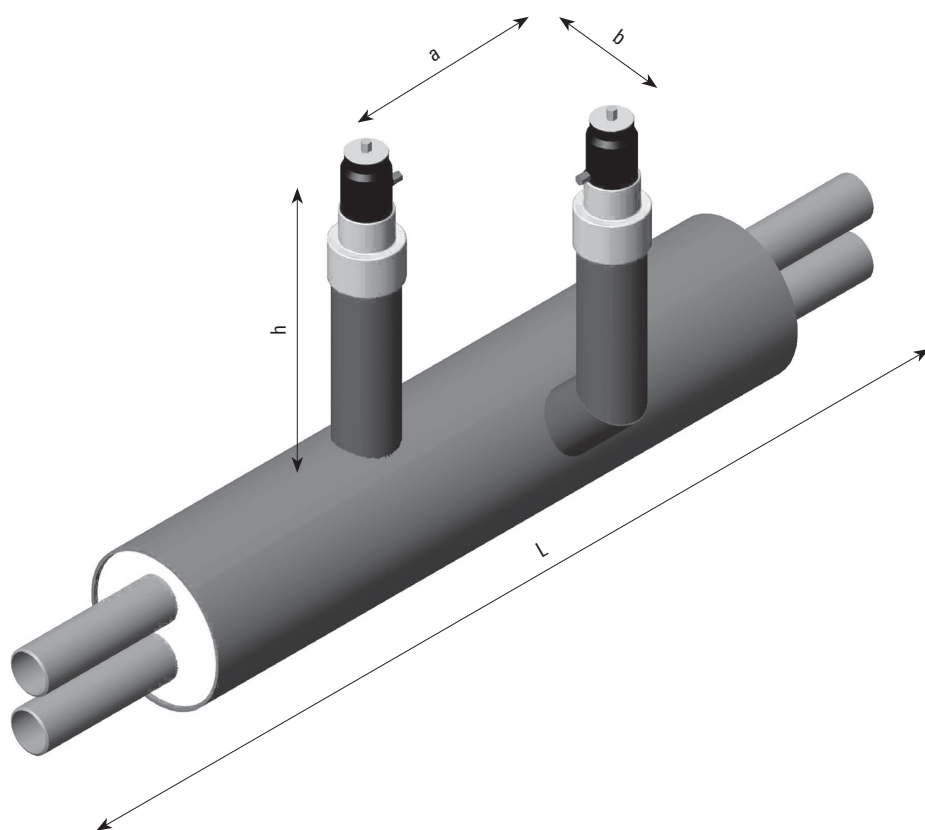
Vent

Pre-insulated in the factory, design as per EN 448, produced with a T-piece as per DIN 2615-1.

With inbound and outbound venting ball valves made of stainless steel. A heat-shrunk end cap is used for frontal insulation protection on the vent nozzle. The nozzle height is 600 mm above the top of the base pipe.

The standard design for this vent fitting is as follows:

- non-insulated stainless steel ball valve with inner thread and plug
- reduced through passage
- for key operation

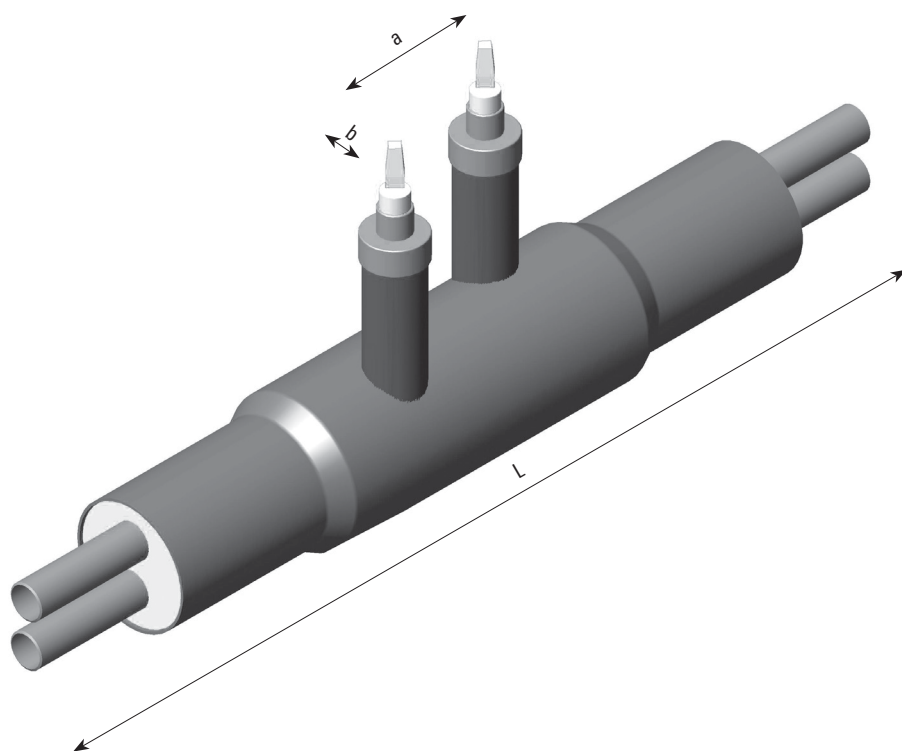


| Nominal width | Diameter d | Overall L | Distance a | Offset b | Height h | PE casing pipe | | | Vent DN | D |
|---------------|------------|-----------|------------|----------|----------|----------------|-------|-------|---------|-----|
| | | | | | | D DS1 | D DS2 | D DS3 | | |
| DN | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm |
| 25 | 33.7 | 1200 | 200 | 100 | 600 | 140 | 160 | 180 | 25 | 90 |
| 32 | 42.4 | 1200 | 200 | 100 | 600 | 160 | 180 | 200 | 25 | 90 |
| 40 | 48.3 | 1200 | 200 | 100 | 600 | 160 | 180 | 200 | 25 | 90 |
| 50 | 60.3 | 1200 | 200 | 140 | 600 | 200 | 225 | 250 | 25 | 90 |
| 65 | 76.1 | 1200 | 200 | 140 | 600 | 225 | 250 | 280 | 32 | 110 |
| 80 | 88.9 | 1200 | 200 | 140 | 600 | 250 | 280 | 315 | 32 | 110 |
| 100 | 114.3 | 1400 | 200 | 100 | 600 | 315 | 355 | 400 | 32 | 110 |
| 125 | 139.7 | 1400 | 200 | 100 | 600 | 400 | 450 | 500 | 40 | 110 |
| 150 | 168.3 | 1400 | 200 | 100 | 600 | 450 | 500 | 560 | 40 | 110 |
| 200 | 219.1 | 1400 | 200 | 175 | 600 | 560 | 630 | 710 | 40 | 110 |

Ball valve

Pre-insulated shut-off fittings for direct installation in the ground, design as per EN 488, pre-insulated in the factory, frontal insulation protection on the dome with heat-shrunk end cap, ball valve with fully welded housing, yield strength fitting, version for max. axial stress up to 300 N/mm².

Ball valves can be supplied with reduced or full-size through passages. The stem height depends on the desired brand of ball valve. A socket wrench or plug-on gear is used for operation. Fixing plates are installed on both sides of the connection.



| Nominal width | Diameter d | Overall L | Junction a | Distance b | PE casing pipe | | |
|---------------|------------|----------------|------------|------------|----------------|-------|-------|
| | | | | | D DS1 | D DS2 | D DS3 |
| DN | mm | mm | mm | mm | mm | mm | |
| 20 | 26.9 | 2000 | 225 | 50 | 125 | 140 | 160 |
| 25 | 33.7 | 2000 | 225 | 55 | 140 | 160 | 180 |
| 32 | 42.4 | 2000 | 225 | 65 | 160 | 180 | 200 |
| 40 | 48.3 | 2000 | 225 | 85 | 160 | 180 | 200 |
| 50 | 60.3 | 2000 | 225 | 110 | 200 | 225 | 250 |
| 65 | 76.1 | 2000 | 225 | 145 | 225 | 250 | 280 |
| 80 | 88.9 | 2100 | 225 | 165 | 250 | 280 | 315 |
| 100 | 114.3 | 2300 | 225 | 225 | 315 | 355 | 400 |
| 125 | 139.7 | 2500 | 225 | 275 | 400 | 450 | 500 |
| 150 | 168.3 | 2800 | 300 | 315 | 450 | 500 | 560 |
| 200 | 219.1 | not available* | | | | | |

* will be integrated into subsequent UNO pipes

Sleeve joints

Shrink sleeve, non-cross-linked/cross-linked

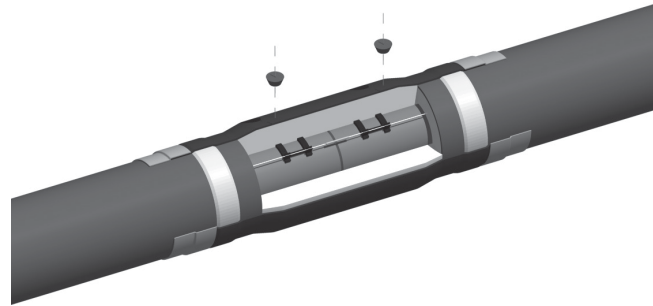
1. PE shrink sleeve, non-cross-linked

The non-cross-linked shrink sleeve consists of a heat-shrunk PE sleeve pipe and the following accessories:

- Shrink-on collars
- Permanently elastic sealing strip, butyl rubber
- Venting plug
- Welded-in PE plug

The shrink sleeves are pushed onto the casing pipe when the pipe is being laid, before the medium pipe weld seams are made. The connection points are then fitted with additional insulation by trained fitting staff who have been tested as per AGFW Worksheet FW 603.

This produces a watertight, non-positive connection between the casing pipe and the sleeve. The sealing strip and the shrink-on collars are used to double-seal the sleeve joint. Technical requirements as per EN 489, AGFW Worksheet FW401, parts 6, 14, 16 and 17.

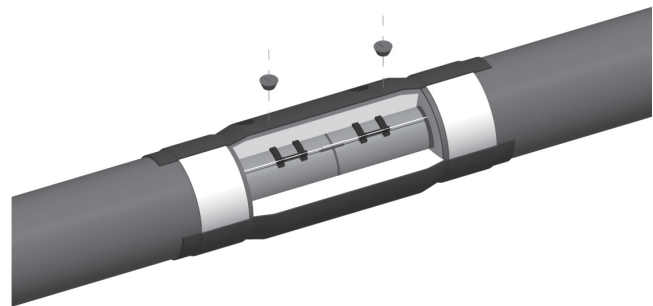


| | |
|-----------------------|--------------------|
| Nominal width: | 125 ... 710 |
| Length: | 700, 1000, 1400 mm |

2. Shrink sleeve made of cross-linked PE

The cross-linked shrink sleeve consists of molecular cross-linked polyethylene, so only limited welding is possible. The very high shrinkage capacity of this material, combined with the sealing strip inserted between the casing pipe and the sleeve, produces a very strong non-positive connection.

Because this type of sleeve can withstand high mechanical loads, it is especially suitable for plastic casing pipe sections that are subject to higher stresses (e.g. frequent load alternation, pipes laid in the groundwater zone).



| | |
|-----------------------|-------------|
| Nominal width: | 125 ... 710 |
| Length: | 700 mm |

Sleeve joints

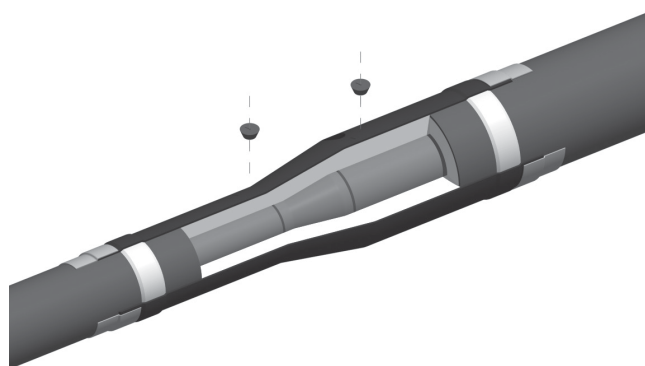
Reduction sleeves, fitting sleeves and shrink-on end sleeves

3. Shrink-on reduction sleeves

For reasons related to statics, shrink-on reduction sleeves to insulate steel reduction joints that are welded in by the pipelayer (provided by the customer or others) are designed to reduce the dimension by a maximum of three steps. Their structure corresponds to that of the non-cross-linked PE shrink sleeve, and they must be pushed onto the outer casing before the medium pipe is welded.

The non-cross-linked reduction shrink sleeve consists of a heat-shrunk PE sleeve pipe and the following accessories:

- Shrink-on collars
- Permanently elastic sealing strip, butyl rubber
- Venting plug
- Welded-in PE plug

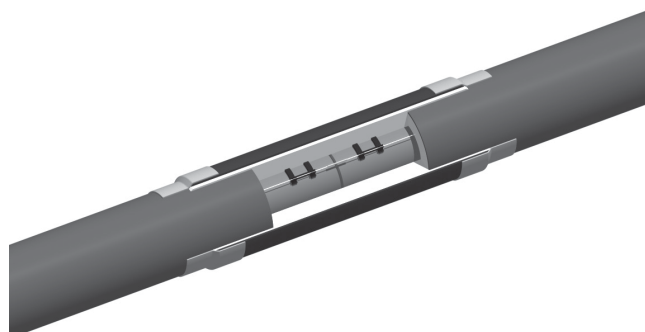


| Nominal D mm | Reduction joint | | | Length L mm |
|--------------------|-----------------|---------|---------|-------------------|
| | D mm | D mm | D mm | |
| 140 | 125 | | | 700 |
| 160 | 140 | 125 | | 700 |
| 180 | 160 | 140 | 125 | 700 |
| 200 | 180 | 160 | 140 | 900 |
| 225 | 200 | 180 | 160 | 900 |
| 250 | 225 | 200 | 180 | 900 |
| 280 | 250 | 225 | 200 | 900 |
| 315 | 280 | 250 | 225 | 900 |

| Nominal D mm | Reduction joint | | | Length L mm |
|--------------------|-----------------|---------|---------|-------------------|
| | D mm | D mm | D mm | |
| 355 | 315 | 280 | 250 | 900 |
| 400 | 355 | 315 | 280 | 900 |
| 450 | 400 | 355 | 315 | 900 |
| 500 | 450 | 400 | 355 | 1200 |
| 560 | 500 | 450 | 400 | 1200 |
| 630 | 560 | 500 | 450 | 1200 |
| 710 | 630 | 560 | 500 | 1200 |

4. Fitting sleeve

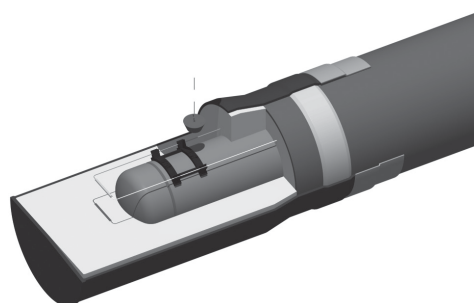
Fitting sleeves made of non-cross-linked PE are used when lack of space makes it impossible to push the joint sleeves on. The fitting sleeve is separated in the axial direction and it can then be moved into position over the points where the pipes are connected. This separation point is welded to guarantee the tightness of the sleeve.



| | |
|-----------------------|--------------------|
| Nominal width: | 125 ... 710 |
| Length: | 700, 1000, 1400 mm |

5. Shrink-on end sleeve

The shrink-on end sleeve is used to insulate pipe closures in the ground and in buildings or shafts. It has the same structure as a non-cross-linked PE shrink-on sleeve, but is sealed on one side with a PE end cover.



| | |
|----------------------------|-------------|
| Nominal width: | 125 ... 710 |
| Length with closure | |
| with cap: | 700 mm |
| with 1x ball valve: | 1200 mm |

In Switzerland, it is preferable not to use shrinkable end sleeves.

Brugg VISUCON

Brugg VISUCON is a connection technology which is fundamentally different from the processing of other sleeve systems. VISUCON makes possible visual inspection of the polyurethane foam. This means it is not necessary to destroy the sleeve or the foam.

With the VISUCON connection sleeve, the annular space for the external foaming process is not limited by a polyethylene sleeve, but by reusable forming shells. With this technology, the external sealing connection is not made until after the foaming process is complete. The result and quality of the polyurethane foam can be reliably tested for every sleeve.

Sleeve system parts:

- Polyurethane foam, made of liquid components polyol and isocyanate (cf. PRE 7.410)
- Sealing shrink film
- Sealing tape
- VISUCON sleeve bodies made of integrated shrinkable HDPE

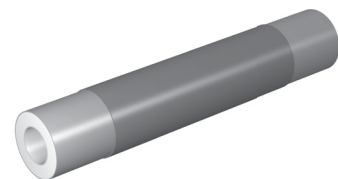
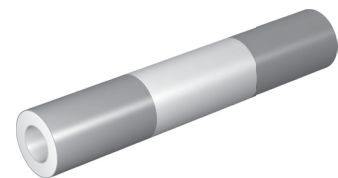
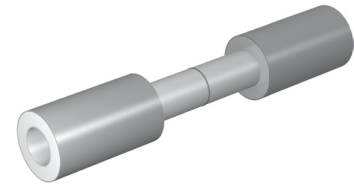
A cylindrical VISUCON shell is used for installation, which is then removed after the polyurethane foam hardens. The two sealing systems are then installed. Due to the system design, no foaming holes are necessary, meaning the plug welding process can also be omitted. The VISUCON sleeve body shrinks across its entire length during installation, whereby the sleeve area does not expand. This unchanging pipe diameter can be advantageous during pipe installation in empty tubes or when driving over cable links.

| | |
|---------------|--------------|
| Nominal size: | 160...710 mm |
| Length: | 780 mm |

Brugg VISUCON is only available as a straight connection sleeve. Non-integrated shrink sleeves should be used for reducing sockets and stop ends.

Polyurethane half shells

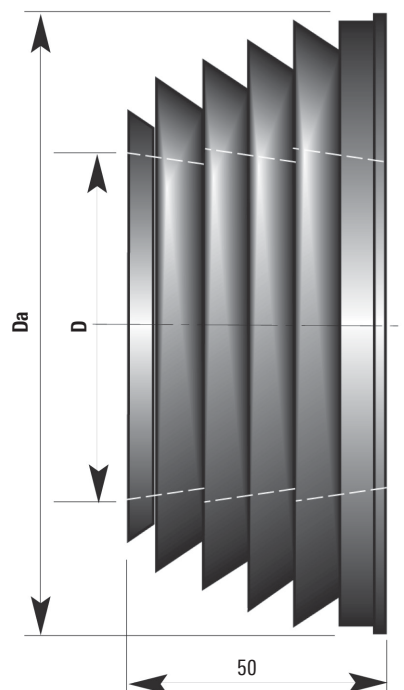
The VISUCON connection sleeve can also be used together with the prefabricated polyurethane half shells. In this case, forming VISUCON shells are not necessary. The remaining installation is identical.



Welding - Foaming - Sealing

Wall sealing ring, pipe warning tape

Wall sealing ring



Data table: sealing ring

| D | Da |
|-----|-----|
| 90 | 133 |
| 110 | 153 |
| 125 | 168 |
| 140 | 183 |
| 160 | 203 |
| 180 | 223 |
| 200 | 240 |
| 225 | 265 |
| 250 | 290 |
| 315 | 355 |
| 355 | 395 |
| 400 | 440 |
| 450 | 490 |
| 500 | 540 |
| 560 | 600 |
| 630 | 670 |
| 710 | 750 |

Figures in mm

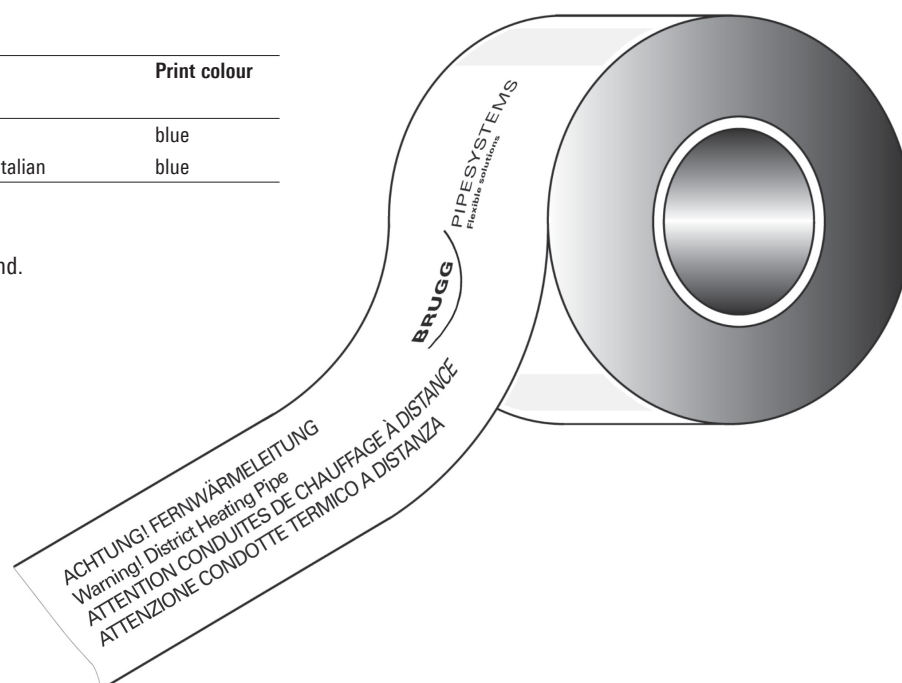
Pipe warning tape

| Material width mm | Language | Print colour |
|----------------------|-------------------------------|--------------|
| 40 | German | blue |
| 100 | German/English/French/Italian | blue |

Pipe warning tape to be laid in the ground.

Standard roll length, 250 m

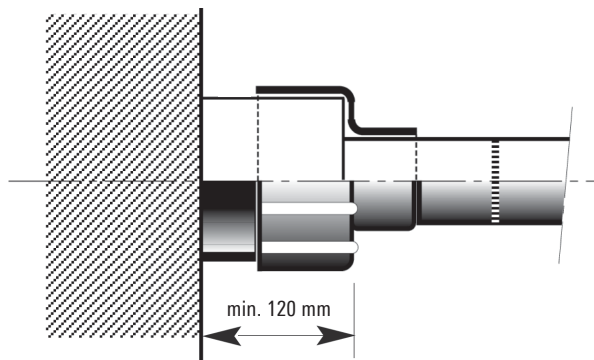
Installation depth; see sheet PRE 6.500



Shrink-on closure

Shrink-on closure/end cap

PREMANT DUO shrink-on closures protect the PUR insulation on the front of the PREMANT district heating pipes against splashing water in buildings and shafts. The shrink-on closure is not necessarily watertight in contact with water (flooding). The shrink-on closure also stops gas escaping from the PUR insulation at the end of the pipe.

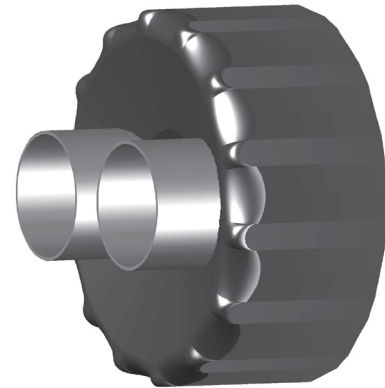


Material:
Heat-shrunk, cross-linked polyolefin. Coated with sealing adhesive

Important fitting note
PREMANT DUO shrink-on closures must be pushed onto the end of the PREMANT DUO district heating pipe before welding the inner pipes, and must be protected against the action of heat during welding.

Allocation of PREMANT DUO dimensions to type of shrink-on closure

| Nominal width DN | Insulation thickness, DS1 | | Insulation thickness, DS2 | | Insulation thickness, DS3 | |
|------------------|---------------------------|--------------|---------------------------|--------------|---------------------------|--------------|
| | Casing pipe mm | End cap Type | Mantelrohr mm | End cap Type | Casing pipe mm | End cap Type |
| 20- 20 | 125 | 2-30 | 140 | 2-50 | 160 | 2-50 |
| 25- 25 | 140 | 2-30 | 160 | 2-60 | 180 | 2-60 |
| 32- 32 | 160 | 2-70 | 180 | 2-70 | 200 | 2-70 |
| 40- 40 | 160 | 2-70 | 180 | 2-70 | 200 | 2-70 |
| 50- 50 | 200 | 2-90 | 225 | 2-90 | 250 | 2-110 |
| 65- 65 | 225 | 2-90 | 250 | D-110 | 280 | D-120 |
| 80- 80 | 250 | D-110 | 280 | D-120 | 315 | D-120 |
| 100-100 | 315 | D-120 | 355 | D-130 | 400 | D-130 |
| 125-125 | 400 | D-130 | 450 | D-140 | 500 | D-140 |
| 150-150 | 450 | D-140 | 500 | D-140 | 560 | D-355 |
| 200-200 | 560 | D-355 | 630 | D-355 | 710 | D-355 |



Rigid foam bar



| Nominal size | Thickness | Length |
|--------------|--------------|---------|
| 1 | 100 x 100 mm | 1000 mm |

| Properties | Value | Unit |
|----------------------------|-------------|-------------------|
| Material | Polystyrene | |
| Pressure resistance | 150 | kPa |
| Apparent (bulk) density | 30 | kg/m ³ |
| Thermal conductivity group | 040 | |

Rigid foam bars are used as supports for plastic casing pipes in the pipe trench. Rigid foam bars can remain sanded into the pipe trench.

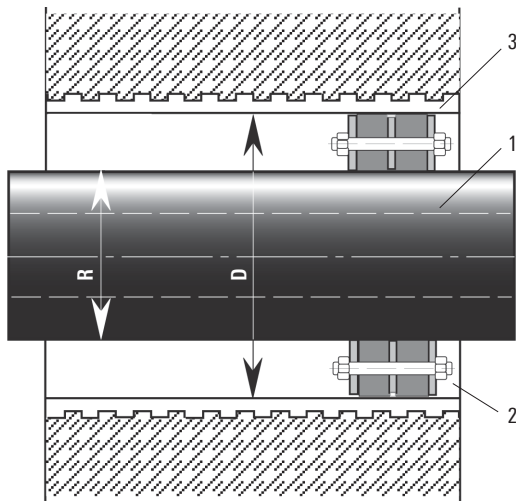
Rigid foam bars are only partially suitable for large pipes. They tend to break under high loads if they are not properly supported. In most cases, the additional outlay for a flat trench floor is not justified. For PREMANT DUO district pipe from DN 100 upwards, GERMAN PIPE recommends sandbags, sand beds or timber strips.

If timber strips are used for alignment, it must be ensured that they are removed again after the welding work is completed, prior to sanding-in. Otherwise, the casing may be damaged due to thermal expansion.

Ring seal

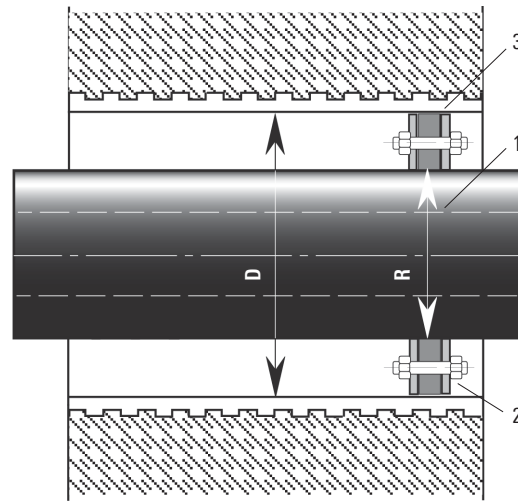
Seal against water (exerting pressure/not exerting pressure) in water-impermeable components

Wall leadthrough with double seal, impermeable to water exerting pressure



- 1 PREMANT DUO district heating pipe
- 2 Sealing kit, double seal
- 3 Liner pipe made of fibre cement or coated core bore

Wall leadthrough, impermeable to water not exerting pressure



- 1 PREMANT DUO district heating pipe
- 2 Sealing kit, single seal
- 3 Liner pipe made of fibre cement or coated core bore

| Casing pipe diameter PE Ø R mm | Liner pipe Core bore Ø D mm |
|---|--------------------------------------|
| 125, 140 | 200 |
| 160, 180 | 250 |
| 200, 225 | 300 |
| 250, 280 | 350 |
| 315 | 400 |
| 355 | 450 |
| 400 | 500 |
| 450 | 600 |
| 500 | 700 |
| 560 | 700 |
| 630 | 800 |
| 710 | 800 |

Core bores

Perfect bores are required for installation. As hairline cracks may be present in the concrete or could be caused by processing, it is advisable to seal the entire length of the borehole wall with suitable sealant (such as AQUAGARD).

Tightness can only be guaranteed if this recommendation is followed.

Installation / trench infill

To avoid deformations at the sealing point, it is especially important during installation and when filling the trench to ensure that no subsequent sinking of the pipe can occur. We also recommend that the pipe is supported or suspended inside the building. Tightness cannot be guaranteed unless these recommendations are followed.

Expansion pad

Description

In order to absorb expansion movements of the underground pipe system in bends, branches and reduction pieces, expansion pads must be applied to the outer PE casing in these areas. Expansion pads are manufactured from cross-linked closed-cell polyethylene, are permanently elastic, do not decay and are resistant to chemicals. The expansion zone is designed on the basis of pipe statics calculations.

Delivery

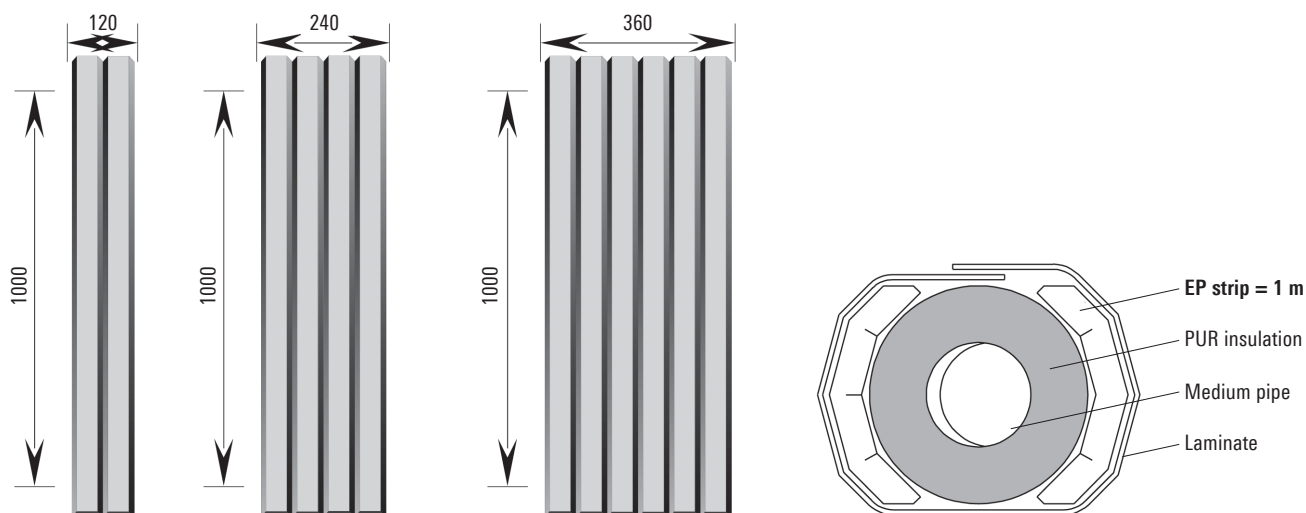
The delivery scope for an expansion zone of 1 m comprises 2 pieces of expansion pad strip, length 1000 mm, which are glued onto the outer casing at the 3 o'clock and 9 o'clock positions. Laminate is then wrapped around the entire zone in order to prevent sand or soil particles from penetrating between the expansion pad and the PE casing.

Material: Polyethylene particle foam

Nominal width: Size I 120mm
 Size II 240mm
 Size III 360mm

Nominal thickness: 40 mm

| Properties | Value | Unit |
|---|-------|-------------------|
| Apparent (bulk) density | 32 | Kg/m ³ |
| Tensile strength | 160 | kPa |
| Compressive stress | | |
| 50 % deformation at 23 °C | 100 | kPa |
| Vibration fatigue test, 80,000 load changes | | |
| - Change in thickness | 2,4 | % |
| - Change in hardness number | 2,4 | % |
| Absorption of water (volume fraction) | | |
| - after 1d | 2,0 | % |
| - after 7d | 3,0 | % |
| Thermal conductivity at 10 °C | 0,040 | W/mK |



| Diameter Outer casing mm | Nominal size | | Weight | | Volume | |
|--------------------------------|--------------|----------------------|---------|-------|---------------------|-------------------|
| | Name | Existing designation | kg/unit | kg/m | m ³ /pce | m ³ /m |
| 125 to 160 | Size 1 | I | 0.154 | 0.307 | 0.0048 | 0.0096 |
| 180 to 280 | Size 2 | II | 0.307 | 0.614 | 0.0096 | 0.0192 |
| 315 to 355 | Size 3 | III | 0.461 | 0.922 | 0.0144 | 0.0288 |
| 400 to 450 | Size 4 | II+II | 0.614 | 1.229 | 0.0192 | 0.0384 |
| 500 to 560 | Size 5 | II+ III | 0.768 | 1.536 | 0.0240 | 0.0480 |
| 630 | Size 6 | III+ III | 0.922 | 1.843 | 0.0288 | 0.0576 |
| 710 | Size 7 | III+ II+II | 1.075 | 2.151 | 0.0336 | 0.0672 |

Assembly Foam



| Characteristics | Value | Unit |
|---------------------|-----------|-------------------|
| Component A | Polyol | |
| Colour | ocker | |
| Density | 1.04 | kg/m ³ |
| Solubility in water | yes | |
| Component B | Isocyanat | |
| Colour | brown | |
| Density | 1.23 | kg/m ³ |
| Solubility in water | no | |

Storage

The components of the foam system may only be stored and transported in the original canisters. The canisters have to be stored in a dry environment. They should stay airtight closed and sealed. Direct solar radiation and frost have to be avoided.

Are the foam components stored in a closed room, the room has to be ventilated. The minimum ventilation is an air change twice in 24 h. The temperature ought to be between 10 and 25 °C.

While storing together with other substances, these have to be basically compatible. Furthermore we refer to the "VCI-Konzept zur Zusammenlagerung von Chemikalien" of the "Verband der chemischen Industrie".

PUR-foam-components should not be stored for longer then 6 months.

| Storage | Value | Unit |
|-------------|-----------|-----------|
| Temperature | 10 ... 25 | °C |
| Ventilation | twice | each 24 h |
| Period | < 180 | days |

Disposal

Basically a disposal of the fluent components should be avoided. The disposal of this product hat to occur at all times in compliance with the standards of environmental protection and laws of waste disposal as well as the requirements of the local authorities. It is recommended to clarify the details with the responsible waste management company.

| Classification | | | | |
|-------------------------|---------------|--------------------|---------------|----------------------|
| Substance | ADR/RID-class | Water hazard class | Storage class | Waste class EAK Code |
| Component A (Polyol) | 3 | 1 | Class 3 | 08 04 09 |
| Component B (Isocyanat) | – | 1 | Class 10 | 08 05 01 |