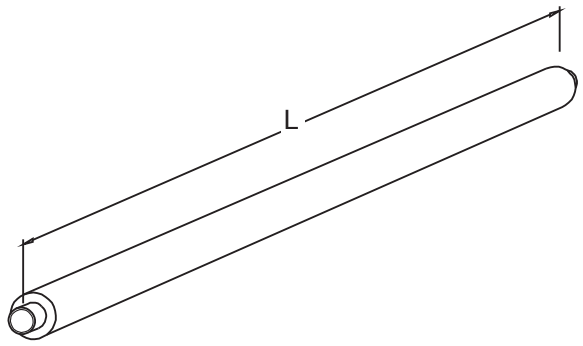
District cooling pipe systems

Straight pipes

Article no. 12 m district cooling: 1003-DN-000-000
16 m district cooling: 1004-DN-000-000



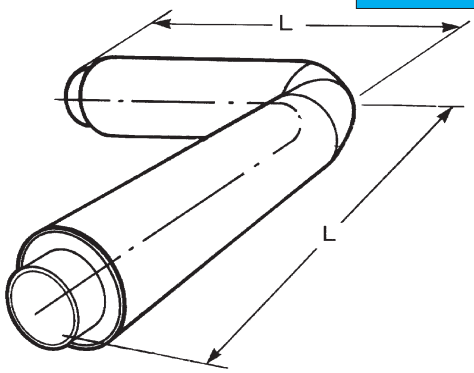
ARTICLE NO. 1003, 1004

DN	Service pipe Dy x s [mm]	Jacket pipe DY [mm]	Weight [kg/m]	Water content [l/m]
L = 12 m				
100	114,3 x 3,6	180	12,5	9,0
125	139,7 x 3,6	200	15,3	13,8
150	168,8 x 4,0	225	20,0	20,2
200	219,1 x 4,5	280	30,0	34,7
250	273,0 x 5,0	355	44,0	54,3
300	323,9 x 5,6	400	58,0	76,8
350	355,6 x 5,6	450	65,0	93,1
400	406,4 x 6,3	500	83,0	122,0
450	457,0 x 6,3	560	87,0	155,0
500	508,0 x 6,3	630	101,0	193,0
600	610,0 x 7,1	710	138,0	277,0
700	711,0 x 7,1	800	190,0	378,0
800	813,0 x 8,8	900	222,0	497,0
900	914,0 x 10,0	1000	261,0	627,0
L = 16 m				
100	114,3 x 3,6	180	12,5	9,0
125	139,7 x 3,6	200	15,3	13,8
150	168,8 x 4,0	225	20,0	20,2
200	219,1 x 4,5	280	30,0	34,7
250	273,0 x 5,0	355	44,0	54,3
300	323,9 x 5,6	400	58,0	76,8
350	355,6 x 5,6	450	65,0	93,1
400	406,4 x 6,3	500	83,0	122,0
450	457,0 x 6,3	560	87,0	155,0
500	508,0 x 6,3	630	101,0	193,0
600	610,0 x 7,1	710	138,0	277,0
700	711,0 x 7,1	800	190,0	378,0
800	813,0 x 8,8	900	222,0	497,0
900	914,0 x 10,0	1000	261,0	627,0

Note: For smaller dimensions than above listed, Series 1 and/or double pipes are recomended. The pipes can be fitted with nordic alarm systems or with Widecos cable 3dc

District cooling pipe systems

Fittings



ARTICLE NO. 2100, 3100, 4100, 5100 etc.

Fittings such as bends, T-pieces, anchor points, curved pipes and valves are all manufactured in preinsulated design described in section 3.

Article No.
2100-DN-degree of bend-000 (Bends)
3100-DN main pipe-DN branch-000 (T-pieces)
4100-DN-000-000 (Valves)
5100-DN-000-000 (Fixed pipes)

An example of how to order:
90 degree preinsulated bend DN 400/500 has Article No. 2100-400-090-000.

High temperature systems

Pipes for transportation of fluids at a temperature exceeding 140°C

Powerpipe offers a system for transportation of steam or other fluids at high temperature. The pipe construction consists of an inner carrier pipe of steel surrounded by shell of mineral wool. This layer of mineral wool is surrounded by polyurethane foam. An HDPE-pipe is a protective cover for the construction.

The quality of the steel pipe shall correspond to the demands in the Pressure directive and other local requirements. Commonly used steel qualities are St 35.8.1 according to DIN1629 (seamless pipes) and St 37.8.1 according to DIN1626 (welded pipes) or P235 GH/P265 GH according to EN10216/EN10217.

Powerpipe works with a self developed computerized program for calculation/optimization of the system. Depending on dimension and temperature the program calculates thickness of mineral wool and polyurethane insulations and also heat losses and amounts of generated condense water in the pipe line.

In service situations the steel pipe will slide in the mineral wool sheet. This means that special fixing points and expansion joints are needed.

A sleeve that can transfer axial forces is needed to eliminate the risk for separation between the jacket pipes at two pipe components.

For above-ground pipelines we can offer spiral welded pipes.

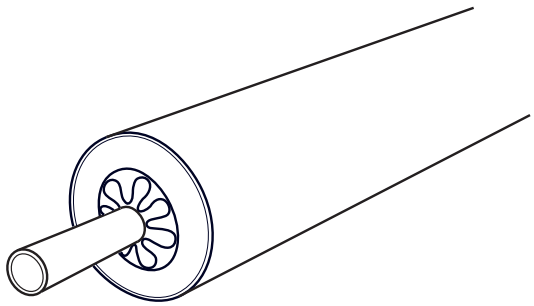
Pipes for condensated water are delivered as standard high temperature pipes or standard Powerpipe district heating pipes. The pipes are delivered with alarm wires for moisture monitoring.

The system consists of:

- Insulated pipes
- Insulated fittings as bends, T-pieces
- Fixpoints
- Expansion absorbing units
- Connection systems for PEH jacket
- Quality assurance

High temperature pipe systems. Straight pipes

For steam and other media with temperature exceeding +140° C



ARTICLE NO. 1803, 1804

PIPES FOR STEAM

Preinsulated pipes for temperatures above 140° C

The steel service pipe is covered with an inside mineral wool insulation layer combined with an outside polyurethane insulation.

During operation of the high temperature system, the steel service pipe will slide in the mineral wool jacket. For this reason, the system has to be designed with special anchor points and expansion devices.

Contact Power Pipe Systems for further details.

Manufactured by special order.

Article No.
1803-DN-Dy-xxx L = 12 m

Article No.
1804-DN-Dy-xxx L = 16 m

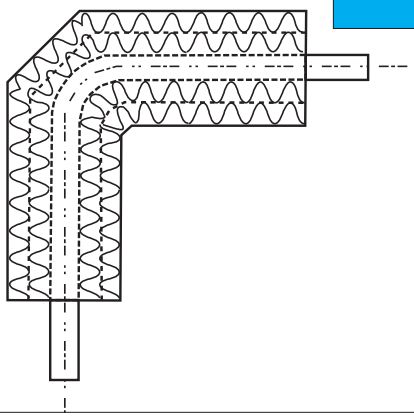
xxx = steel quality where St 35.8.1 is labelled as 003 / St 37.8.1 is labelled as 004.
P235GH is labelled as 479
P265GH is labelled as 480
In need of other material qualities please consult Powerpipe.

An example of how to order:
Straight pipe DN 65 with outer jacket Ø250 mm and steel quality St 37.8.1, 12 m
has Article No. 1803-065-250-004

PIPES FOR CONDENSATE WATER
Please see Straight pipes chaper 3!

High temperature pipe systems, bend

For steam and other fluids with temperatures exeeding +140°C. Bends are made with a mineral-wool jacket around the service pipe of steel to provide the pipe greatest ability for movement.



ARTICLE NO. 2800 (BEND)

Article No.
2800-DN-Dy-xxx

xxx = steel quality according St 35.8.1 is labelled as 003 / St 37.8.1 term 004.
P235GH is labelled as 479
P265GH is labelled as 480
At need of other steel qualities please contact Powerpipe.
The length of bend can be adapted to customer requirements.

An example of how to order:
Bend with steel DN 65 and jacket pipe Ø250 mm with steel quality St 37.8.1,
has Article No. 2800-065-250-003.

ARTICLE NO. 2810 (CONNECTING BEND)

Article No.
2810-DN-Dy-xxx

xxx = steel quality according St 35.8.1 is labelled as 003 / St 37.8.1 term 004.
P235GH is labelled as 479
P265GH is labelled as 480
At need of other steel qualities please contact Powerpipe.

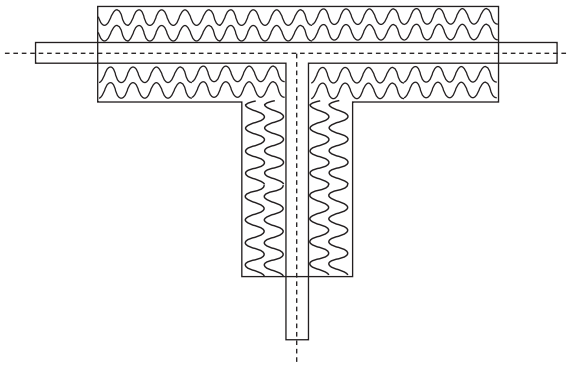
An example of how to order:
Connecting bend with steel DN 100 med PEH Jacket pipe 315 mm with steel quality St 37.8.1
has Article No. 2810-100-315-004.

PIPES FOR CONDENSAT WATER

Please see Straight pipes chapter 3!

High temperature pipe systems, T-piece

For steam and other fluids with temperatures exeeding +140°C. Bends are made with a mineral-wool jacket around the service pipe of steel to provide the pipe greatest ability for movement.



ARTICLE NO. 3800, 3810, 3830

Article No.

3800-DN (main pipe)-DN(branch)-xxx	Branch out of level
3810-DN (main pipe)-DN(branch)-xxx	Parallell branch
3830-DN (main pipe)-DN(branch)-xxx	Straight branch

xxx = steel quality according St 35.8.1 is labelled as 003 / St 37.8.1 term 004.
P235GH is labelled as 479
P265GH is labelled as 480
At need of other steel qualities please contact Powerpipe.

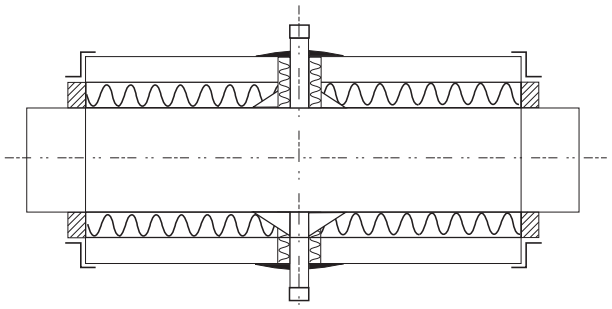
An example of how to order:
Straight T-piece with main pipe DN100 and branch DN65
and steel quality St 37.8.1
has Article No. 3830-100-065-004.

PIPES FOR CONDENSAT WATER

Please see Straight pipes chapter 3!

High temperature pipe systems, anchor point

For steam and other fluids with temperatures exeeding +140°C, anchor points are made with a mineral wool jacket around the service pipe of steel and Jacket pipe of PEH.



ARTICLE NO. 5800

The product is equipped with a steam diffusion barrier along the pipe.

Power transmission from pipe to flange is made by small steel elements to minimize the heat transfer to the flange.

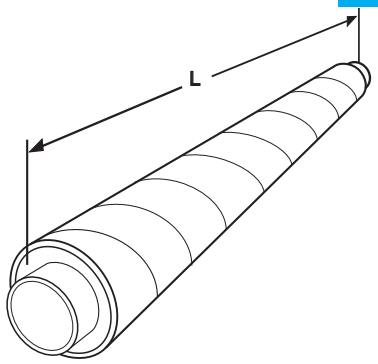
Article No.
5800-DN-Dy-xxx

xxx = steel quality according St 35.8.1 is labelled as 003 / St 37.8.1 term 004.
P235GH is labelled as 479
P265GH is labelled as 480
At need of other steel qualities please contact Powerpipe.

An example of how to order:
Anchor point for DN100 and jacket pipe Ø315 and steel quality St 37.8.1 has Article No. 5800-100-315-004.

Staight pipes with spiral folded jacket pipe

Series1 and Series2



ARTICLE NO. 1103, 1203						Transmission capacity ΔT = 50°C	
DN	Service pipe Dy x s [mm]	Jacket Series 1 Dy [mm]	Jacket Series 2 Dy [mm]	Weight [kg/m]	Water content [l/m]	[m/s]	[kW]
L = 12 m							
25	33.7 x 2.3	100	125	2.6-3.0	0.6	0.8	100
32	42.4 x 2.6	100	125	3.4-3.3	1.1	0.8	180
40	48.3 x 2.6	100	125	3.7-4.1	1.5	0.9	230
50	60.3 x 2.9	125	160	5.2-5.8	2.3	0.9	370
65	76.1 x 2.9	160	200	7.0-8.0	3.9	1.0	700
80	88.9 x 3.2	160	200	8.4-9.5	5.3	1.0	1.000
100	114.3 x 3.6	200	225	12.2-13.2	9.0	1.1	1.800
125	139.7 x 3.6	225	250	15.4-16.4	13.8	1.3	3.300
150	168.3 x 4.0	250	315	19.8-21.3	20.2	1.4	5.000
200	219.1 x 4.5	315	400	28.9-31.0	34.7	1.6	10.000
250	273.0 x 5.0	400	450	40.9-44.0	54.3	1.8	18.000
300	323.9 x 5.6	450	500	52.9-56.0	76.8	2.0	28.000
350	355.6 x 5.6	500	560	60.6-65.0	93.1	2.0	34.000
400	406.4 x 6.3	560	630	76.2-83.0	122.0	2.0	45.000

Type of material, thickness of material and surface treatment of the jacket pipe has to be defined for each order in a specification.

Pipes and insulation can be delivered in fire classed performance according to NT FIRE 036, class P1 on demand.

Suffix for jacket pipe of spiral folded metal is 323.
Article No.
1103-DN-000-323.

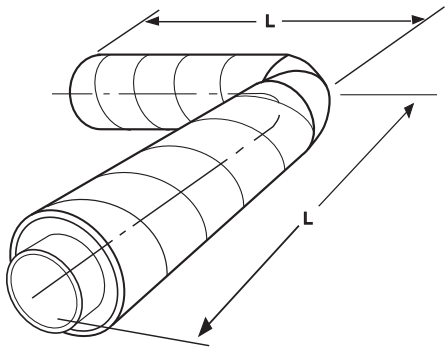
An example of how to order:
Straight pipe with spiral foldet jacket pipe, DN 100
has Article No. 1103-100-000-323

Edition 2010-2501

SPECIAL PIPES

Bend with spiro as jacket pipe

Series 1, 2



ARTICLE NO. 2100, 2200

Art.nr. Series 1	DN	Service pipe Dy x s [mm]	Jacket pipe Series 1 Dy [mm]	Jacket pipe Series 2 Dy [mm]	L [mm]
2100-025	25	33.7x2.6	100	125	1000
2100-032	32	42.4x2.6	100	125	1000
2100-040	40	48.3x2.6	100	125	1000
2100-050	50	60.3x2.9	125	160	1000
2100-065	65	76.1x2.9	160	200	1000
2100-080	80	88.9x3.2	160	200	1000
2100-100	100	114.3x3.6	200	225	1000
2100-125	125	139.7x3.6	225	250	1000
2100-150	150	168.3x4.0	250	315	1000
2100-200	200	219.1x4.5	315	400	1000
2100-250	250	273.0x5.0	400	450	1300
2100-300	300	323.9x5.6	450	500	1500
2100-350	350	355.6x5.6	500	560	1600
2100-400	400	406.4x6.3	560	630	1600

Type of material, thickness of material and surface treatment of the jacket pipe has to be defined for each order in a specification.

Pipes and insulation can be delivered in fire classed performance according to NT FIRE 036, class P1 on demand.

Suffix for jacket pipe of spiral folded metal is 323.

Article No. Series1
2100-DN-deviation-323.

Article No. Series 2
2200-DN-deviation-323.

An example of how to order:
Bend with spiral folded jacket pipe, DN 50, Series 2 90°
has Article No. 2203-050-090-323

District heating for small houses 5:401

General

Power Pipes product line for small house connection is wide and gives you greater opportunities to select unique solutions for each property or project.

The prerequisite for the viability of these areas is that investment costs are kept low.
Of course this may not be at the expense of quality and dependability.

The right quality is the Key-word

The heat losses in relation to its high energy consumption is high, up to 40% in some cases.
To obtain as low investment costs and heat loss as possible, double pipes are recomended.
As the number of joints in the double pipe system is reduced, even the risk of future leaks in the system is minimized.

Design of district heating pipes and stations are also of great value to lower costs, oversizing costs money both in investment and operating costs.

Right dimensioning is the Key-word

We offer several different options to build district heating for small house areas.
All types contain Double pipes (supply and return in the mantle), as main pipeline.
This is to obtain low cost of ground works and lower heat losses.
In order to reduce both heat losses as temperature losses double pipes with extended insulation (DOUBLE+ or DOUBLE+ +) is often prefered.

Options

We offer several different options to connect a house from a main pipeline (usually double pipes) in the street.
The choice of the type controlled by

- Dimension
- Simplicity when assembling
- Size of heat loss
- Cost

We offer

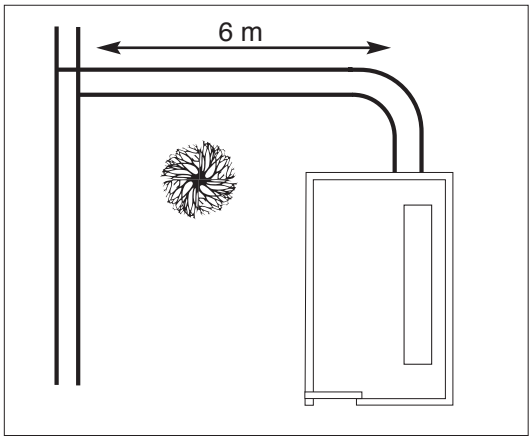
Flexpipe, copper single pipes	5:502
Flexpipe, copper double pipes	5:502
Flexpipe, steel single pipes	5:503
Standard double pipes	Chapter 4
Extra insulated double pipes	Chapter 4

System requirements

Temperature: **Max 120°C**
Pressure: **Max 16 bar**

Design

See chart for pressure drop calculation 9:101-9:104.



For lengths ≥ 6 m, see sketch at page 5:403

Flexible pipes, single and double, copper

Installation and jointing of service pipe

- The system is assembled as a solid system that utilizes the glowing coppers floating characteristics.
  Pre-heating of the pipe before insulating / backfilling.
- The pipes are joined together by use of capillary fittings (EN 1254-1) and performed by hard soldering.
  Capillary fittings with groove may not be used.
- Solder parts shall be of reinforced type.
- For soldering, a silver-phosphorus-kopparlod according to EN 1044 must be used.
- Solder skills is required.
- For soldering techniques see SMS 3209.
- Otherwise, see District Heating Association's technical regulations for copper pipes in district heating systems FVF D: 213th

Connecting main pipe

Main pipe assumed to be double pipe.

- Transition from steel to copper to take place through a transition piece. See accessories 8:106.
- In order to protect the connection point from harmful load, expansion opportunity option is made as shown in Figure page 5:403 when L ≥ 6m
- Connection to the main pipe including foaming takes place according to Chapter 10 and with details, see ex Joints 6:503, 6:504.
- Special expansion absorbing details are normally not required.
- If the expansion of the main pipeet is expected to be longer than 10 mm, the flexible pipe connection shall be protected with expansion-absorbing material. See fig 5:404.

Flexible pipe, single, steel

Installation and jointing of service pipe

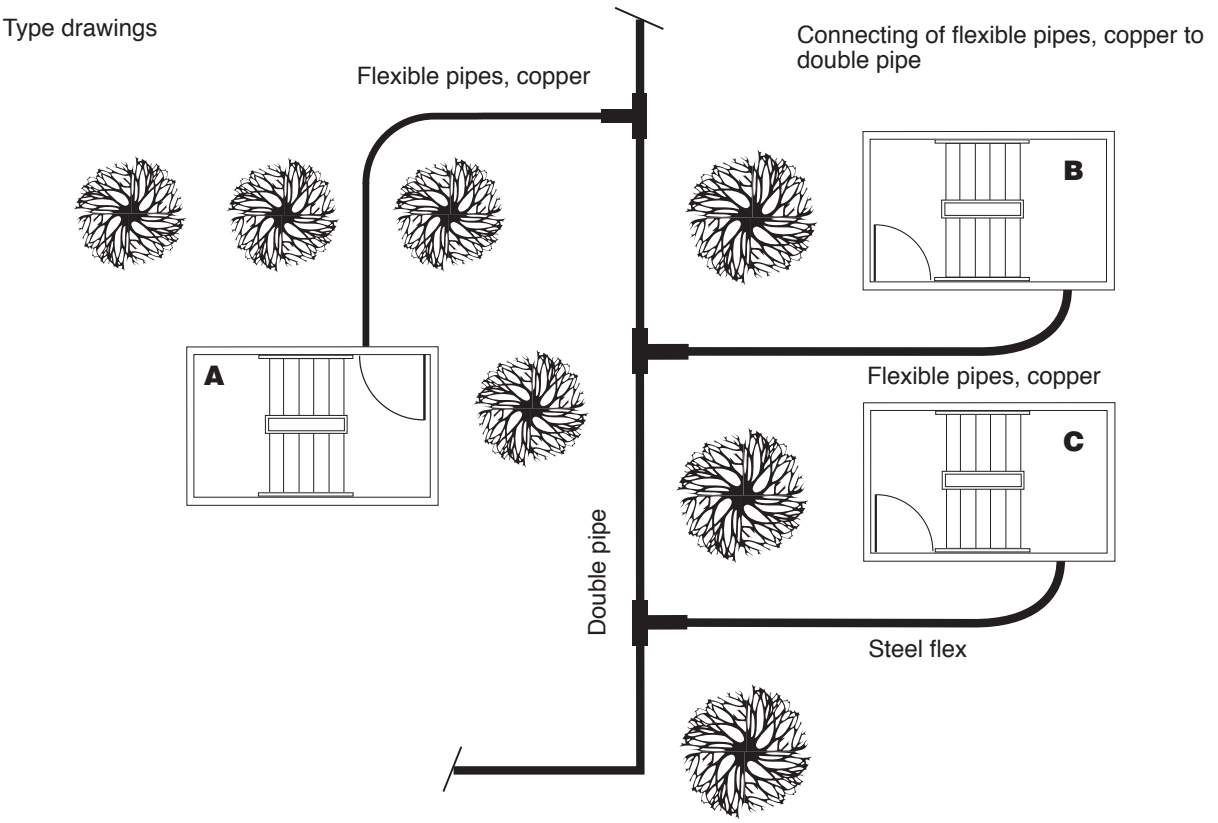
- The system is assembled as a solid system and are mounted cold without any special expansion . absorbing details. Pre-heating of the pipe before insulation / backfill is recomended.
- The service pipe of the branch is welded to the main pipeline.
- Welding skills required.

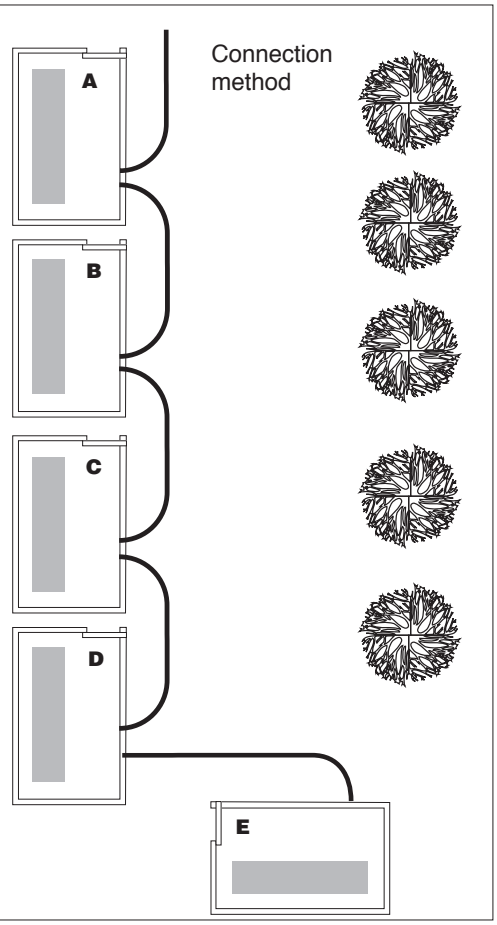
Connection main pipe

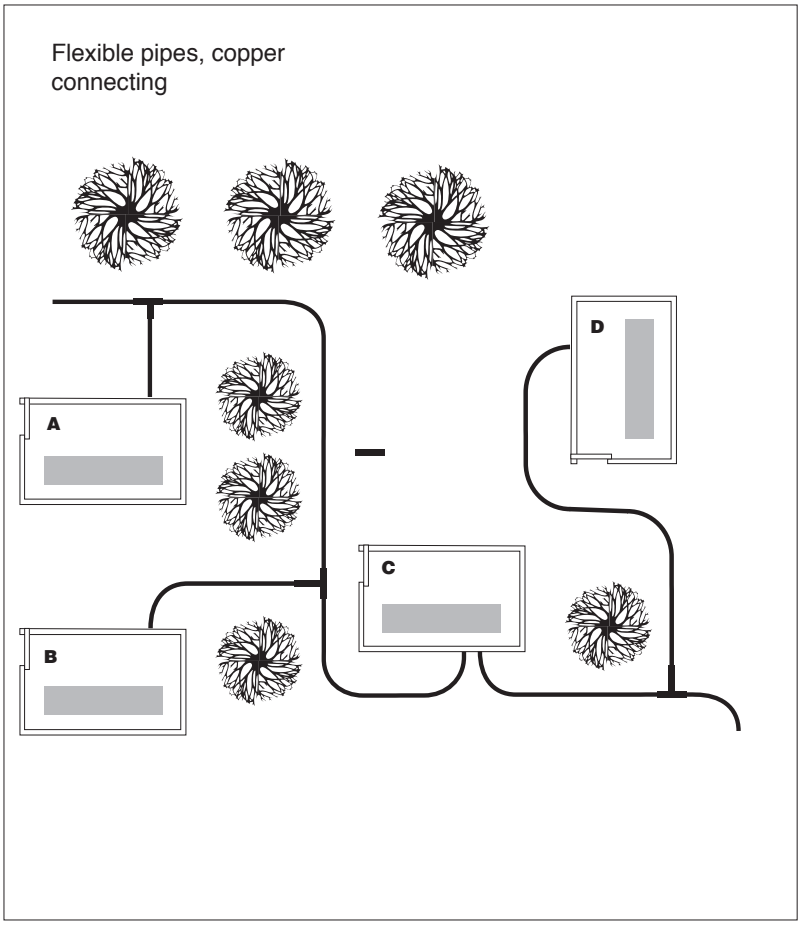
- Connecting to main pipe including foaming takes place according to Chapter 10 and with details, see the ex Joints 6:503 and 6:504..
- Special expansion absorbing details are required.

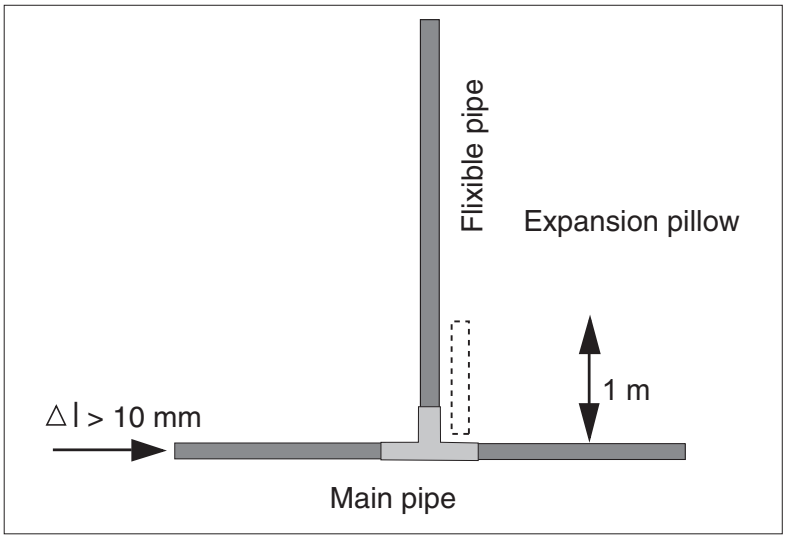
Laying of steel- and copper pipes 5:403

Type drawings

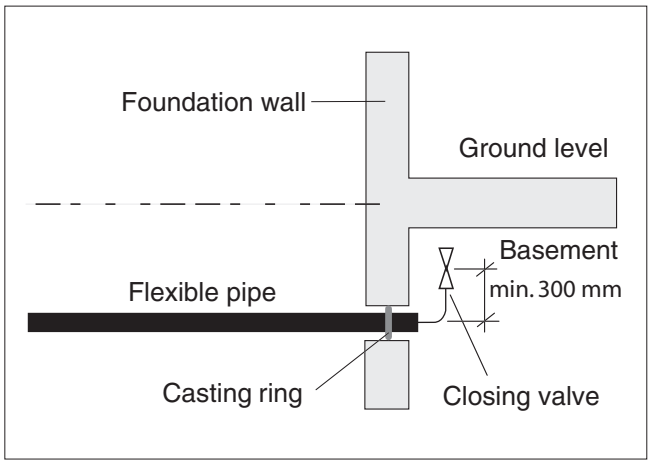




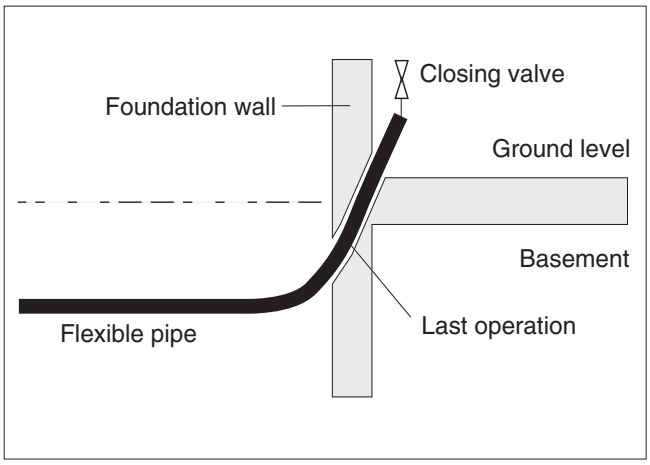




Relief of flexible pipe at large axial movement.



Examples of insertion of the branch in a basement.



Examples of insertion of the branch in a basement.

Trenches and backfilling

Powerpipe flexible pipes has a high strength and can withstand high loads in terms of pressure, impact and abrasion.

Lines in the street

Trench depth of the lines in the street can be minimized and only respect to the street owners demands has to be taken. A minimum coverage of 400 mm.

Excavated soil can be reused and refilled around the pipes. The largest particle size, however is limited to 16 mm at the joint sites and to 32 mm around the pipes.

Trench width can be minimized to about 20 cm wider than the pipe DY. At each joint point the trench must be made wider to accommodate the installation work. The pipes can even be mounted above ground, to be layed into the trench later.

Service pipes

Trench depth is minimized, 400 mm coverage in non-traffic loaded surfaces is sufficient. Warning nets should be placed 100-200 mm above the pipes to prevent future damage.

Excavated soil can be reused and refilled around the pipes. Limitations, see above.

Trench width is minimized, about 150-200 more.
Bushes, stones etc. can be passed without problems.

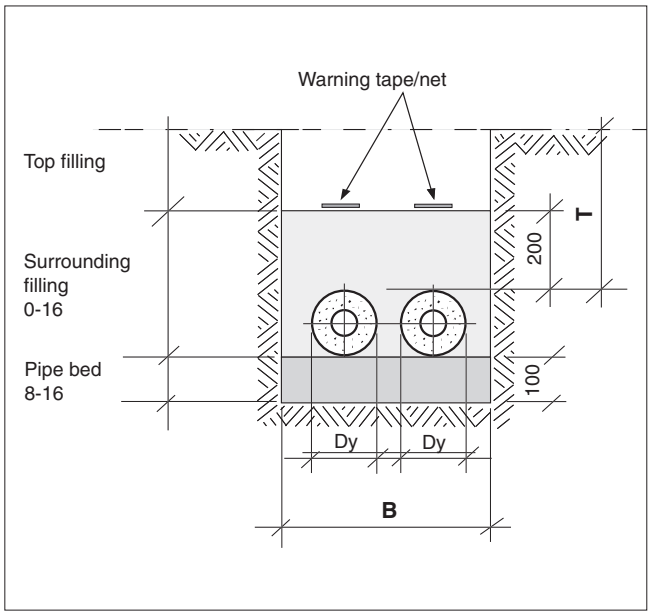
For house connecting, the pipe is bent up from the ground with Powerpipe bending tool type B.
Connecting to main pipeline is performed with Powerpipe T-sleeve, see Chapter 6, Joints.

For type sections Flexible pipes, see 5:406.

For type sections, solid single and double, see 10.2.1.

Type section for flexible pipes 5:406

TYPE SECTION FLEXIBLE SINGLE PIPES

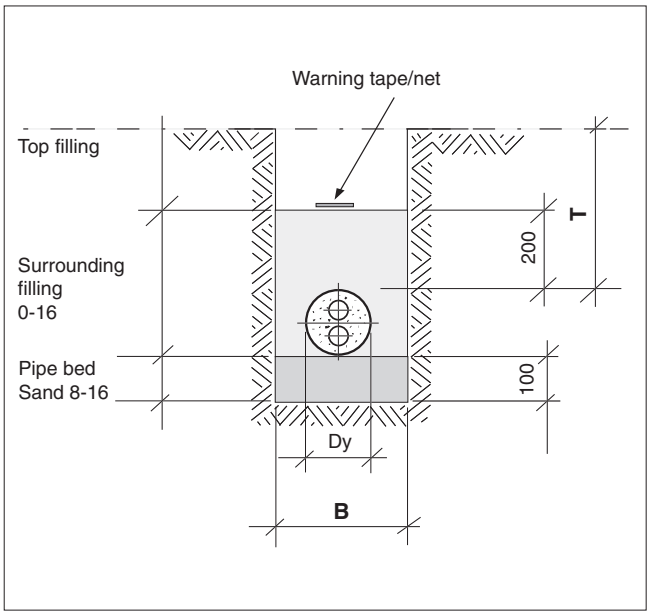


Alternatively, pipes can be layed without sand directly on the trenchbottom and backfilled with stone-free existing soil.

T = min 600 in street surface.
min 400 in non-drivable surface.

Dy (mm)	B (mm)
< 100	350
100–150	500
150–200	600

TYPE SECTION FLEXIBLE DOUBLE PIPES



Alternatively, pipes can be layed without sand directly on the trenchbottom and backfilled with stone-free existing soil.

T = min 600 in street surface.
min 400 in non-drivable surface.

Dy (mm)	B (mm)
≤ 150	300
> 150	400

Depending on the trench method and materials the lower requirement B > Dy can be leading.

Flexpipe, copper or steel 5:501

1. System description

Flexpipe is a flexible pre-insulated pipe systems useful for temperatures up to 120° C. The Pipe is typically used for connecting small houses to a larger pre-insulated pipe line who usually is made of steel.
The media pipe is made of copper and the practical use is very simple. The thermal insulation consists of flexible polyurethane insulation with excellent insulating qualities.
The flexibility of Flexpipe means it can adapt to virtually any conditions in piping systems without problems.
The tubes can pass intersecting lines either above or below. Other barriers can easily be crossed on installation.

Flexpipe makes it possible to choose the shortest route without having to take the conventional considerations. Flexpipe is delivered to the constructions site in 100 meter coils. Usually the pipes can be layed without branching in the pipe-trench which therefore can be minimum wide. This means significant cost reductions. Another advantage is that construction time is reduced when using the Flexpipe. The above advantages mean that Flexpipe is not only an excellent technical solution but also involves both time and cost savings.

2. Area of use

Copper pipe:	max 120°C / max 16 bar
Steel pipe:	max 120°C / max 16 bar

3. Specifications

3.1 Service pipe , copper — Glowed copper pipe, R220 — EN 1057

Qualities	
Stretch strength	<140 N/mm^2
Fracture strength	220 N/mm^2
Modulus of elasticity	125 000 N/mm^2
Liniar expansion-coefficient	16,6*10^{-4} 1/°C

Steel pipe — Soft steel pipe St 35.8 (SS1330-05) — DIN 17175

Qualities	
Stretch strength	225 N/mm^2
Fracture strength	360 N/mm^2
Modulus of elasticit	205 000 N/mm^2
Liniar expansion-coefficient	12,3*10^{-4} 1/°C

3.2 Insulation — Polyurethane foam made from polyol and isocyanate..

Propellant:	Cyclopentane

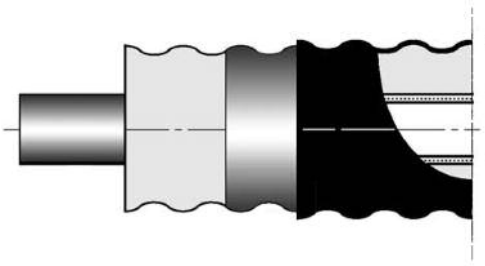
Qualities	
Density	>60 kg/m3
Heat transfer-ability	0,024 W/m°K (Koppar, stålflex) 0,025 W/m°K (Casaflex)
Number of closed cells	>90%
Water absorption	<10%

3.3 Jacket pipe — Jacket pipe is made of low density polyethylene (PEL)

Qualities	
Density	928–938 kg/m^3
Crystalline Melting temperature	105°C

Flexible pipe, copper

Flexible pipes for connecting to small houses delivered on a reel.



SINGLEFLEX, COPPER 1366, 1266, 1566, 1567

Art.nr.	Media-pipe Dy x s (mm)	Jacket-pipe DY (mm)	Weight (kg/m)	Water-content (l/ m)	Transfer-capacity ΔT = 50°C, Δp = 1 mbar/m kW	Bend radius min m	Delivery-length m
1366-022	22x1,0	93x2,2	1,61	0,31	27	0,8	* 100
1266-028	28x1,2	93x2,2	1,90	0,51	50	0,8	* 100
1266-035*)	35x1,5	93x2,2	2,27	0,83	85	0,8	* 100

DOUBLEFLEX COPPER 1566

Art.nr.	Media-pipe Dy x s (mm)	Jacket-pipe DY (mm)	Weight (kg/ m)	Water-content (l/ m)	Transfer-capacity ΔT = 50°C, Δp = 1 mbar/m kW	Bend radius min m	Delivery-length m
1566-015*)	2x15x1,0	91x2,2	1,35	2*0,31	9	0,8	* 100
1566-018*)	2x18x1,0	91x2,2	1,50	2*0,20	15	0,8	* 100
1566-022	2x22x1,0	91x2,2	1,72	2*0,31	27	0,8	* 100
1566-028	2x28x1,2	91x2,2	2,30	2*0,51	50	0,8	* 100
1567-018*)	2x18x1.0	113x2,4	1.95	2*0.20	15	1.0	* 100
1567-022*)	2x22x1,0	113x2,4	2,17	2*0,31	27	1,0	* 100
1567-028*)	2x28x1,2	113x2,4	2,75	2*0,51	50	1,0	* 100

Flexible pipe has a corrugated outer jack that eases the laying.
Flexible pipe is delivered as complete reel (100 m). Delivered length may differ slightly from the ordered length.
With regard to heat losses, see 9:203.
For mounting the T-piece, see 6:503-6:504.
Flexble Pipe, copper, can be delivered with alarm by spesific order of min. 500 m. The alarm wire is flexible.
The alarm function can not be guaranteed after bending.

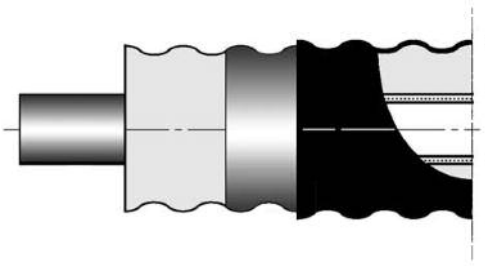
*) NOTE! These single and double flexible pipes can be purchased on special order. Not in stock.

An example on how to order
Double flex, copper 2*22/91 mm has Aricle No. 1566-022-022-000.

For more information regarding alarm, etc. consult Powerpipe.

Flexible pipe, steel

Flexible pipes for connecting to small houses delivered on a reel.



SINGLEFLEX STEEL 1206, 1306

Art.nr.	Media-pipe Dy x s (mm)	Jacket-pipe DY (mm)	Weight (kg/ m)	Water-content (l/ m)	Transfer-capacity ΔT = 50°C, Δp = 1 mbar/m kW	Bend radius min m	Delivery-length m
1306-020	20x2,0	91x2,2	1,52	0,2	14	0,8	* 100
1206-028	28x2,0	91x2,2	2,23	0,45	40	1,0	* 100

Flexible pipe has a corrugated outer jack that eases the laying.
Flexible pipe is delivered as complete reel (100 m). Delivered length may differ slightly from the ordered length.
With regard to heat losses, see 9:203.
For mounting the T-piece, see 6:503-6:504.
Flexble Pipe, steel, can be delivered with alarm by spesific order of min. 500 m. The alarm wire is flexible.
The alarm function can not be guaranteed after bending.

*) NOTE! These single and double flexible pipes can be purchased on special order. Not in stock.

An example of how to order:
Double flex, copper 2*22/91 mm has Aricle No. 1206-028-000-000.

For more information regarding alarm, etc. consult Powerpipe.