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Introduction

This catalogue describes Powerpipe and the standard products offered by the company. The purpose being, to give interested parties important information about the company, it's products and their construction, handling and installation.
Consideration has been taken to assure that the information given in this catalogue is correct in regard to standards, norms and regulations at the time of printing.

Attention

Specifications given in this catalogue can be changed without prior notice .
Always check with our website at www.powerpipe.se

Technical Support

Powerpipe has, through its many years in the market , developed a wide and comprehensive knowledge in regard to it's products , production and handling of aforementioned products.
As a customer you will have full access to our resources in the form of our technical and Environmental / Quality Departments. Otherwise our first – line technical support is normally carried out by technically experienced sales personnel and our staff at Backoffice.

Powerpipe – Advantages.

Our combined production facility and administration is in Hisings Kärra outside Göteborg. Our compact facility gives advantages to our customers in the form of flexibility and speedy service and support. We offer individualized solutions for customers to meet the demands of specific applications. We are a company with a focus on the individual customer and to have an extremely high standards for delivery with short delivery times.
First and foremost our standard product portfolio.

District Heating Distribution Systems

Our products are constructed as a bonded system using a steel service pipe surrounded by a polyurethane foam . These are enclosed in an impact-proof polyethylene casing pipe . These combined elements form a rigid structure with no relative movement between the internal steel pipe and external polyethylene casing. Pipe and pipe fittings are delivered as standard with two copper alarm wires. These for connection to an electronic moisture surveillance system.
We also offer the electronic surveillance system as an option.
Powerpipes pipe fittings are developed to cover a wide area of usage for the customer in respect to bends, valves, branching, drainage, air release etc.
All mentioned components conform to the following norms technical specifications.

Norms and Standards

Fundamental for Powerpipe's operations are the European Standards for preinsulated pipes and fittings.
These are:

District heating systems – *Prefabricated buried pipes with solid bond between the insulation and the service pipe for the distribution of hot water.*

EN 253:2009	Fitting assemblies of straight steel service pipes, polyurethane thermal insulation (PUR) and outer casing of polyethylene (PE).
EN 448:2009	Fitting assemblies of steel service pipes, polyurethane thermal insulation (PUR) and outer casing of polyethylene (PE).
EN 488:2009	Steel valve assembly for steel service pipes, polyurethane thermal insulation (PUR) and outer casing of polyethylene (PE).
EN 489:2009	Joint assembly for steel service pipes, polyurethane thermal insulation (PUR) and outer casing of polyethylene (PE).
EN 13941:2009	District heating system - Design and installation of preinsulated bonded pipe systems for district heating with impact proof insulation between service pipe and outer casing.
EN 14419:2009	District heating system - Preinsulated bonded pipe systems for directly buried hot water networks - Surveillance systems
EN 15698-1:2009	District heating system - Preinsulated bonded twin pipe systems for directly buried hot water networks. Twin pipe assembly of steel service pipe, polyurethane thermal insulation and outer casing of polyethylene(PE)

In addition to these there are national standards which regulate our operations and products. For example the technical specifications controlled by Svenska Fjärrvärmeföreningen (Swedish District Heating Associoation)
These technical standards conform with EU standards .

Technical Specifications

Service pipe (Steel)

Unless otherwise stated in the order, in request or quotation, the following steel qualities are delivered as standard. The products are produced as standard for PN16. Most dimensions can withstand 25 bar. Contact Powerpipe!

Straight pipes **Longitudinally or spirally welded steel pipe**

Material:	For dimensions ≥ DN65 P235GH i.a. EN10216-2, EN10217-2 or EN10217-5. For dimensions ≤ DN50 P235TR1 i.a EN10217-1 or EN10217-2.
Certificate	According to EN10204/3 3.1. can be delivered with each shipment provided our customer forwards this requirement with the order.
Joint preparation:	EN ISO 9692-1
Standard:	EN 253:2009

Seamless steel pipe (can be delivered on request).

Material:	As standard P235GH according to EN10216-2.
Certifikat:	Enligt EN 10204/ 3.1.
Standard:	EN 253:2009

Insulation (PUR)

The insulation consists of hard polyurethane foam insulation with excellent thermal insulating ability, good mechanical properties and good resistance to aging.

Material:	Polyurethane produced by the polyol and isocyanate. C-pentane is used as propellants. Production takes place in a modern high-pressure process.
Standard:	EN 253:2009

	Type values: Powerfoam	**Requirements :** EN 253:2009
Cell size, mm	0,20	–
Closed cell content, %	90,6	–
Core density,, kg/m3	73	–
Compression strength, MPa	0,39	≥ 0,30
Water absorption, %	3,50	–
Axial shear strength, MPa		
+23°C, nes	0,30	≥ 0,12
+23°C, aged	0,14	≥ 0,12
+140°C, new	0,22	≥ 0,08
+140°C, aged	0,13	≥ 0,08
Thermal conductivity, W/mK	0,026	≤ 0,029
Maximum continuous working temperature °C	145	≥ 120
i.a. EN 253:2009		
Free steel ends	210 ± 30	≥ 150

Technical Specifications

Jacket pipe

The product is delivered with a casing pipe in polyethylene bimodal PE80 or PE100 produced by Powerpipe in compliance with EN 253:2009 standards.

Production is within the standards issued by the Swedish Plastic Pipe Manufacturers Association . Norm 5100.
All Jacket pipes are treated by corona directly during the extrusion process.

The material fills all the technical specifications stated in EN 253 and is stabilised to withstand thermal, chemical and oxidative degeneration. The material has high impact strength and weather resistance even at low temperatures. In addition the material has excellent welding characteristics and a high resistance to stress corrosion. Pipes with a casing diameter of > 560 mm should be handled with care at outdoor temperatures between 0 and -20° C.
At temperatures below -20°C pipes of these diameters should not be handled without prior instructions from Powerpipe.

Material: High molecular weight Polyethylene (PEH)
Density: $\geq$ 944 kg/m^3
Standard: EN 253:2009
Pipe wall thickness: according to EN 253:2009

Fittings

All fittings are in compliance with the requirements specified in EN 448 and are designed to manage all loads that normally occur within a district heat net.
When in service dependent on the systems design, a number of different loads can affect the fittings which in turn can govern the dimensions and the design used .
Therefore , certain components have a strengthened service pipe to allow greater flexibility in system design.

Steelbends are delivered bended or welded in compliance with DIN 2605. The standard materials used are P235TR1 or P235GH

T- Pieces are normally delivered in a strengthened version which takes into consideration the normal pressure in the main pipe based on a constant pressure specification where the area reduction that the connecting steel pipe governs is limited .

Valves in the Powerpipe product range are as standard delivered according to demands in EN 448. This means they tolerate the normal pressure in the connecting service pipe that corresponds to an axial stress of 300 MPa without the valves functions being compromised.

Joints

Powerpipe offer a complete range of joints to suit different installation conditions and customer demands.
The joints comply with the technical function specifications stated in EN 489

- Weld casing
- Heat- shrinkable casing PEX
- Double –expanded shrinkable casing
- Casing with shrinkable sleeve/tubular sleeve
- Double sealed shringkable casing (PEH) with shrinkable sleeve and tubular sleeve

The joints are manufactured from high density polyethylene (PEH). The heat shrinkable material are in addition cross-linked. Most joints can be installed by use of a gas flame torch. In the case of electro welding joints, while the weld joints are installed with electric welding equipment.

Integrated business system:

Certified in compliance with ISO 9001:2008

Our company has been certified in compliance with ISO 9001:2008 since 1997.
This quality system ensures that customer requirements and wishes are fulfilled.This in addition to compliance with official norms and regulations.

Certified in compliance with ISO 14001:2004

Our company has always had a strong focus on environmental issues. Powerpipe have been certified in compliance with ISO 14001:2004 since early 2004. This ensures that we work continuously with improvements that reduce the environmental impact caused by our business and products.

Quality System

ISO 9001 gives assurances that the company fulfils agreed demands. This encompasses our organization, shared responsibilities, routines, processes, and our use of resources. These, in combination, mean that our delivered product has the correct quality and is compliant with both customer requirements and a consistent quality control policy.

Quality Policy

Powerpipe shall manufacture and adapt products that are compliant with the individual customer's wishes and requirements. This, in addition to fulfilling the demands of the relevant EN standards.
We shall deliver the correct and appropriate products and services to the correct location at the correct time, both of which are to the customers satisfaction in relation to quality.

Testing

Powerpipe have routines and procedures for continuous testing and control of all products and equipment which are consistent with customer demands and official regulation. As a component of our quality control system, a continuous visual inspection and test of alarms on 100% of our products is carried out. In addition, we have constantly test and check foam density on straight pipes and fittings. All testing is fully documented and has a comprehensive follow-up. All our products are labelled and marked in compliance with the relevant norms.

SP
The Swedish Technical Research Institute (SP), is testing our products on a yearly basis. This, in compliance with EN 253. These tests are carried out in the following areas:

- Adhesion
- Tensile test
- Compressive Strength
- Voids and bubbles

The results are documented in official reports and free for inspection

Welds in steel pipe fittings are checked and controlled by X-ray in compliance with EN 253, or to a customer specification over and above this standard.

Environment

Certifierad according to ISO 14001:2004

The system includes a control for the external environment. It describes the activities, emissions and emission status , surveys / inspections, waste management, including recycling and reporting internally and to the authorities. Environment Department carries out an annual inspection of the business.
Every three years, is a third-party inspection.

Recycling

During the production of preinsulated pipes and fittings, different types of waste materials are produced. Such waste comes from the start up of the process and sometimes also from products rejected by our quality control. Powerpipe has defined routines for how to handle these waste materials.

- PEH is re-granulated and re-used
- Steel pipes are re-used, when possible, in our own production or else sent as steel scrap for re-melting.
- PUR foam is sent to an incineration plant where it is burned (generates district heating)
- Alarm wire will be sent as scrap for re-melting

Hazardous waste are collected for transportation to a licensed professional. In cases where the client wants to return the remains of materials, we are able to provide the service against payment.

Environmental policy

Powerpipe Systems AB develops, produce and offer environmental products for district heating and industrial applications. Due to the supply to the Society with high-insulated products, which intend to give a good long-term energy supply. We are convinced that an activity regarding environmental issues is creating a competitive strength on long term and will strengthen our reputation on the market.

This we achieve by:

- Prevent pollution in air, ground and water.
- The Transports internal as external shall encourage for a decreased influencing on environment.
- To do constant improvement in production facilities which leads to effectiveness in increased use of energy and materials.
- Laws and regulation will be followed and provided.

Certificat

EUROHEAT & POWER

certificate

CERTIFICATE NUMBER 01/12

PRODUCT	"Powerpipe" preinsulated district heating pipes and fittings, single and twin pipe system, with service pipes DN 20 – 1000 mm and casing pipes 75 – 1200 mm
LICENSEE	Powerpipe Systems AB
PRODUCTION PLANT	Powerpipe Systems AB Box 44, SE-425 05 Hisings-Kärra, Sweden

EUROHEAT & POWER
GUIDELINES: EHP/001
CERTIFICATE: 01 / 12

VALID UNTIL 31/12/2013

This certificate is granted in accordance with the Euroheat & Power Certification Guidelines for Quality Assessment of District Heating Pipes [001]

Name, Signature
Lennart Månsson

Date, Place
1.10.2010, Borås

SP Technical Research Institute of Sweden
PO Box 857,
SE-50115 Borås,
Sweden
www.sp.se

The production complies with EN 253, EN 448 and EHP Certification Guidelines [001].

The licensee may use the Euroheat & Power Certification Board quality mark.

The certificate is valid only for the production plant mentioned in the certificate.

The materials used are contained in the confidential Annex to this certificate.

The certificate is valid for 3 years subject to periodic surveillance. Re-issue is automatic.

Refer to the Euroheat & Power Certification Guidelines [001] for full requirements and conditions

BUREAU VERITAS
Certification

Certifikat
Utfärdat till
Powerpipe Systems AB
Göteborg, Sverige

Bureau Veritas Certification intygar härmed att ledningssystemet hos ovan nämnda företag har undergått granskning och befunnits vara i överensstämmelse med kraven i ledningssystemstandarden nedan

Standard

SS-EN ISO 9001: 2008
SS-EN ISO 14001: 2004

Giltighetsområde

Utveckling och produktion av förisolerade rörsystem.

Ursprungligt datum ISO 9001: 7 april 1997
Ursprungligt datum ISO 14001: 14 mars 2005

Under förutsättning att ledningssystemets fortsatta funktion befinns vara tillfredsställande, är detta certifikat giltigt till: **10 maj 2015**
För att kontrollera detta certifikats giltighet vänligen ring +46 31 60 65 00
Ytterligare förtydligande rörande certifikatets giltighetsområde och tillämpningen av ledningssystemets krav kan erhållas genom att kontakta företaget

Mikael Lindström, Technical Manager, Bureau Veritas Certification Sverige AB

Datum: 9 maj 2012

Certifikat Nummer: SE002595/2596-1

SWEDAC ACKREDITERING
1236
ISO/IEC 17021

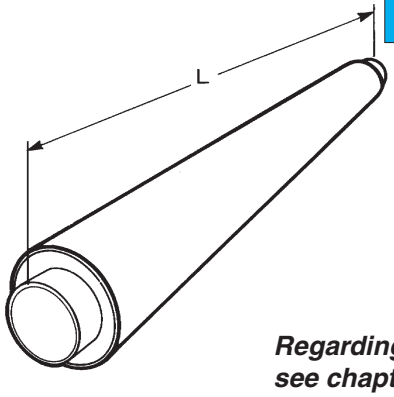
Electronic copy only

Straight pipes

Series 1

Article no 12m, Series 1: 1103-DN-000-000
Article no 16m, Series 1: 1104-DN-000-000
Article no 18m, Series 1: 1105-DN-000-000

PN 16/PN25



Regarding heatloss see chapter 9!

ARTICLE NO 1103, 1104

DN	Service pipe Dy x s [mm]	Jacket pipe DY [mm]	Weight [kg/m]	Water - content [l/m]	Transmission capacity ΔT = 50°C [m/s]	[kW]
L = 12 m						
25	33,7 x 2,3	90	3,1	0,6	0,8	100
32	42,4 x 2,6	110	4,3	1,1	0,8	180
40	48,3 x 2,6	110	4,6	1,5	0,9	230
50	60,3 x 2,9	125	6,1	2,3	0,9	370
65	76,1 x 2,9	140	7,4	3,9	1,0	700
80	88,9 x 3,2	160	9,4	5,3	1,0	1.000
100	114,3 x 3,6	200	13,6	9,0	1,1	1.800
125	139,7 x 3,6	225	16,6	13,8	1,3	3.300
150	168,3 x 4,0	250	21,5	20,2	1,4	5.000
200	219,1 x 4,5	315	31,9	34,7	1,6	10.000
250	273,0 x 5,0	400	43,9	54,3	1,8	18.000
300	323,9 x 5,6	450	60,0	76,8	2,0	28.000
350	355,6 x 5,6	500	68,3	93,1	2,0	34.000
400	406,4 x 6,3	560	86,9	122,0	2,0	45.000
450	457,0 x 6,3	560	91,6	155,0	2,0	65.000
500	508,0 x 6,3	630	105,4	193,0	2,0	80.000
600	610,0 x 7,1	710	138,0	277,0	2,0	110.000
700	711,0 x 8,0	800	190,2	378,0	2,0	160.000
800	813,0 x 8,8	900	222,0	497,0	2,0	210.000
900	914,0 x 10,0	1000	261,0	627,0	2,0	265,000
L = 16 m						
100	114,3 x 3,6	200	13,6	9,0	1,1	1.800
125	139,7 x 3,6	225	16,6	13,8	1,3	3.300
150	168,3 x 4,0	250	21,5	20,2	1,4	5.000
200	219,1 x 4,5	315	31,9	34,7	1,6	10.000
250	273,0 x 5,0	400	43,9	54,3	1,9	18.000
300	323,9 x 5,6	450	60,0	76,8	2,0	28.000
350	355,6 x 5,6	500	68,3	93,1	2,0	34.000
400	406,4 x 6,3	560	86,9	122,0	2,0	45.000
450	457,0 x 6,3	560	91,6	155,0	2,0	65.000
500	508,0 x 6,3	630	105,4	193,0	2,0	80.000
600	610,0 x 7,1	710	138,0	277,0	2,0	110.000
700	711,2 x 8,0	800	190,2	378,0	2,0	160.000
800	812,8 x 8,8	900	222,0	497,0	2,0	210.000
900	914,0 x 10,0	1000	261,0	627,0	2,0	265,000

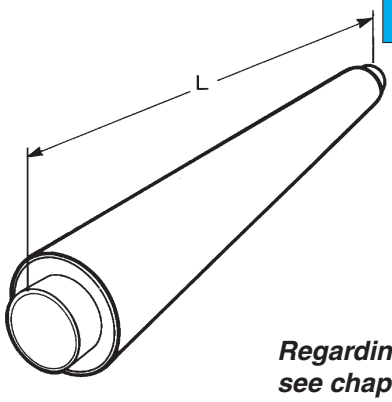
L = 18 m Article D≥ 100 (excl. DN125)

Straight pipes

Series 2

Article no 12m, Series 2: 1203-DN-000-000
Article no 16m, Series 2: 1204-DN-000-000
Article no 18m, Series 2: 1205-DN-000-000

PN 16/PN25



Regarding heatloss see chapter 9!

ARTICLE NO 1203, 1204

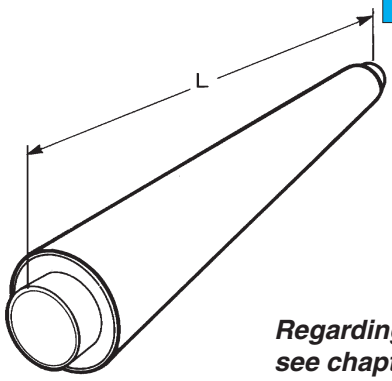
DN	Service pipe Dy x s [mm]	Jacket pipe DY [mm]	Weight [kg/m]	Water - content [l/m]	Transmission capacity ΔT = 50°C [m/s]	[kW]
L = 12 m						
20	26,9x2,0	110	3,3	0,4	0,8	65
25	33,7x2,3	110	3,5	0,6	0,8	100
32	42,4x2,6	125	4,6	1,1	0,8	180
40	48,3x2,6	125	5,0	1,5	0,9	230
50	60,3x2,9	140	6,5	2,3	0,9	370
65	76,1x2,9	160	8,0	3,5	1,0	700
80	88,9x3,2	180	10,1	5,3	1,0	1.000
100	114,3x3,6	225	14,8	9,0	1,1	1.800
125	139,7x3,6	250	17,7	13,8	1,3	3.300
150	168,3x4,0	280	23,6	20,2	1,4	5.000
200	219,1x4,5	355	35,1	34,7	1,6	10.000
250	273,0x5,0	450	47,0	54,3	1,8	18.000
300	323,9x5,6	500	65,5	76,8	2,0	28.000
350	355,6x5,6	560	75,7	93,1	2,0	34.000
400	406,4x6,3	630	96,3	121,7	2,0	45.000
450	457,0x6,3	630	101,0	155,0	2,0	65 000
500	508,0x6,3	710	118,0	193,0	2,0	80.000
600	610,0x7,1	800	153,6	277,0	2,0	110.000
700	711,0x8,0	900	210,0	378,0	2,0	160.000
800	813,0x8,8	1000	246,0	497,0	2,0	210.000
900	914,0x10.0	1100	276,0	627,0	2,0	265,000
L = 16 m						
100	114,3x3,6	225	14,8	9,0	1,1	1.800
125	139,7x3,6	250	17,7	13,8	1,3	3.300
150	168,3x4,0	280	21,5	20,2	1,4	5.000
200	219,1x4,5	355	35,1	34,7	1,6	10.000
250	273,0x5,0	450	47,0	54,3	1,8	18.000
300	323,9x5,6	500	65,5	76,8	2,0	28.000
350	355,6x5,6	560	75,7	93,1	2,0	34.000
400	406,4x6,3	630	96,3	122,0	2,0	45.000
450	457,0x6,3	630	101,0	155,0	2,0	65.000
500	508,0x6,3	710	118,0	193,0	2,0	80.000
600	610,0x7,1	800	153,6	277,0	2,0	110.000
700	711,0x8,0	900	210,0	378,0	2,0	160.000
800	813,0x8,8	1000	246,0	497,0	2,0	210.000
900	914,0x10,0	1100	276,0	627,0	2,0	265,000
L = 18 m Article D≥ 100 (excl. DN125)						

Straight pipes

Series 3

Article no 12m, Series 3: 1303-DN-000-000
Article no 16m, Series 3: 1304-DN-000-000
Article no 18m, Series 3: 1305-DN-000-000

PN 16/PN25



Regarding heatloss see chapter 9!

ARTCLE NO 1303, 1304

DN	Service pipe Dy x s [mm]	Jacket pipe DY [mm]	Weight [kg/m]	Water - content [l/m]	Transmission capacity ΔT = 50°C [m/s]	[kW]
L = 12 m						
20	26,9x2,0	125	3,7	0,4	0,8	65
25	33,7x2,3	125	3,9	0,6	0,8	100
32	42,4x2,6	140	5,0	1,1	0,8	180
40	48,3x2,6	140	5,4	1,5	0,9	230
50	60,3x2,9	160	7,1	2,3	0,9	370
65	76,1x2,9	180	8,7	3,5	1,0	700
80	88,9x3,2	200	10,9	5,3	1,0	1.000
100	114,3x3,6	250	16,2	9,0	1,1	1.800
125	139,7x3,6	280	19,9	13,8	1,3	3.300
150	168,3x4,0	315	25,7	20,2	1,4	5.000
200	219,1x4,5	400	39,0	34,7	1,6	10.000
250	273,0x5,0	500	51,4	54,3	1,8	18.000
300	323,9x5,6	560	76,9	76,8	2,0	28.000
350	355,6x5,6	630	85,1	93,1	2,0	34.000
400	406,4x6,3	710	108,8	122,0	2,0	45.000
450	457,0x6,3	710	113,5	155,0	2,0	65.000
500	508,0x6,3	800	133,6	193,0	2,0	80.000
600	610,0x7,1	900	173,0	277,0	2,0	110.000
700	711,0x8,0	1000	231,8	378,0	2,0	160.000
800	812,8x8,8	1100	267,0	497,0	2,0	210,000
L = 16 m						
100	114,3x3,6	250	16,2	9,0	1,1	1.800
125	139,7x3,6	280	19,9	13,8	1,3	3.300
150	168,3x4,0	315	25,7	20,2	1,4	5.000
200	219,1x4,5	400	39,0	34,7	1,6	10.000
250	273,0x5,0	500	51,4	54,3	1,8	18.000
300	323,9x5,6	560	76,9	76,8	2,0	28.000
350	355,6x5,6	630	85,1	93,1	2,0	34.000
400	406,4x6,3	710	108,8	122,0	2,0	45.000
450	457,0x6,3	710	113,5	155,0	2,0	65.000
500	508,0x6,3	800	133,6	193,0	2,0	80.000
600	610,0x7,1	900	173,0	277,0	2,0	110.000
700	711,0x8,0	1000	231,8	378,0	2,0	160.000
800	812,8x8,8	1100	267,0	497,0	2,0	210,000

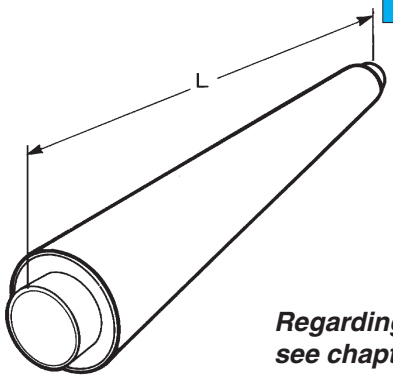
L = 18 m Article D≥ 100 (excl. DN125)

Straight pipes

Series 4

Article no 12m, Series 4: 1403-DN-000-000
Article no 16m, Series 4: 1404-DN-000-000
Article no 18m, Series 4: 1405-DN-000-000

PN 16/PN25



Regarding heatloss see chapter 9!

ARTICLE N0 1403, 1404

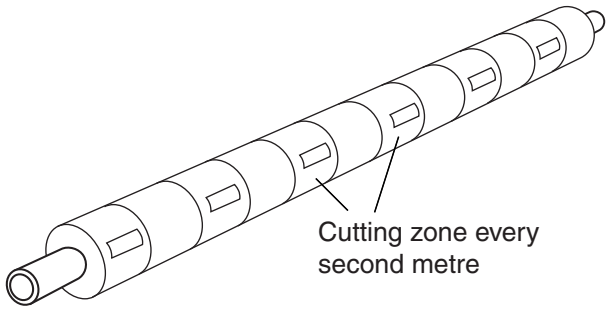
DN	Service pipe Dy x s [mm]	Jacket pipe DY [mm]	Weight [kg/m]	Water - content [l/m]	Transmission capacity ΔT = 50°C [m/s]	[kW]
L = 12 m						
20	26,9x2,3	140	4,1	0,4	0,8	65
25	33,7x2,6	140	4,4	0,6	0,8	100
32	42,4x2,6	160	5,5	1,1	0,8	180
40	48,3x2,6	160	6,0	1,5	0,9	230
50	60,3x2,9	180	7,8	2,3	0,9	370
65	76,1x2,9	200	9,6	3,5	1,0	700
80	88,9x3,2	225	11,9	5,3	1,0	1.000
100	114,3x3,6	280	17,4	9,0	1,1	1.800
125	139,7x3,6	315	22,5	13,8	1,3	3.300
150	168,3x4,0	355	28,0	20,2	1,4	5.000
200	219,1x4,5	450	42,0	34,7	1,6	10.000
250	273,0x5,0	560	56,6	54,3	1,8	18.000
300	323,9x5,6	630	82,5	76,8	2,0	28.000
350	355,6x5,6	710	93,5	93,1	2,0	34.000
400	406,4x6,3	800	119,0	122,0	2,0	45.000
450	457,0x6,3	800	124,0	155,0	2,0	65.000
500	508,0x6,3	900	147,0	193,0	2,0	80.000
600	610,0x7,1	1000	189,0	277,0	2,0	110.000
700	711,0x8,0	1100	248,0	378,0	2,0	160.000
L = 16 m						
100	114,3x3,6	280	17,4	9,0	1,1	1.800
125	139,7x3,6	315	22,5	13,8	1,3	3.300
150	168,3x4,0	355	28,0	20,2	1,4	5.000
200	219,1x4,5	450	42,0	34,7	1,6	10.000
250	273,0x5,0	560	56,6	54,3	1,8	18.000
300	323,9x5,6	630	82,5	76,8	2,0	28.000
350	355,6x5,6	710	93,5	93,1	2,0	34.000
400	406,4x6,3	800	119,0	122,0	2,0	45.000
450	457,0x6,3	800	124,0	155,0	2,0	65.000
500	508,0x6,3	900	147,0	193,0	2,0	80.000
600	610,0x7,1	1000	189,0	277,0	2,0	110.000
700	711,0x8,0	1100	248,0	378,0	2,0	160.000

L = 18 m Article D≥ 100 (excl. DN125)

Straight pipes for cut to-length

Series 1, 2, 3 and 4

PN 16/PN25



Cut-to-length pipes are manufactured in all dimensions. In these pipes the steel service pipe is covered by a plastic foil every second metre along the entire pipe length. This arrangement allows easy removal of the foam from the steel in the sections. These sections of the pipe are indicated on the outside casing pipe. Whole lengths or parts of pipes cut-to-length can be installed at any place in a district heating distribution system.

CUT-TO-LENGTH PIPE 1113, 1213, 1313, 1413

L = 12 m

Article no. Series 1	
1113-DN	
Article no. Series 2	***For measurement details, see straight pipes!***
1213-DN	
Article no. Series 3	
1313-DN	
Article no. Series 4	
1413-DN	

CUT-TO-LENGTH PIPE 1114, 1214, 1314, 1414

L = 16 m

Article no. Series 1	
1114-DN	
Article no. Series 2	***For measurement details, see straight pipes!***
1214-DN	
Article no. Series 3	
1314-DN	
Article no. Series 4	
1414-DN	

CUT-TO-LENGTH PIPE 1115, 1215, 1315, 1415

L = 18 m

Article no. Series 1	
1115-DN	
Article no. Series 2	***For measurement details, see straight pipes!***
1215-DN	
Article no. Series 3	
1315-DN	
Article no. Series 4	
1415-DN	

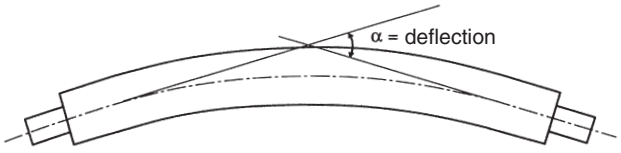
Pipes are available with «center-cut" This will be indicated in separate line of text.

An example of how to order:
Cut-to-length pipe DN 200, series 2, 12 m has Article no. 1213-200-000-000.

Curved pipes

Series 1, 2, 3 and 4

PN 16/PN25



CURVED PIPES 1123, 1124, 1223, 1224, 1323, 1324, 1423, 1424

Single pipes DN	Max. deflection L = 12 m	L = 16 m	Note
25 - 80	35°		To be bent at installation site
80 - 100	35°		Bent at Powerpipe works
125 - 150	30°	25°	Bent at Powerpipe works
200	25°	33°	Bent at Powerpipe works
250	25°	33°	Bent at Powerpipe works
300	20°	25°	Bent at Powerpipe works
350	14°	23°	Bent at Powerpipe works
400	11-(18)°	15-(22)°	Bent at Powerpipe works *
450	7-(11)°	11-(18)°	Bent at Powerpipe works *
500	5-(9)°	8-(12)°	Bent at Powerpipe works *
600	–	8°	Bent at Powerpipe works*
700	–	4°	Bent at Powerpipe works*

* See note below concerning wall thickness. wall thickness below. In paranteses; the specified values relates thickness higher than standard.

Accuracy of manufacture	DN 100 - 200	+/- 2°
	DN 250 - 600	+/- 1°

Steel pipes: For the manufacturing either seamless steel pipes or longitudinally welded steel pipes are used. DN 450, DN 500, DN 600 and DN700 steel pipes with extra wall thickness will be used. Increased wall thickness for smaller dimensions will allow deflection exceeding above normal max. deflection. This can be delivered on request. However, this means increased prices and longer delivery time. For larger sizes (DN700-900) segment-welded curved pipes can be offered.
For manufacturing technical reasons, the alarm wires placed in neutral position, ie c. at. 12 and 6.

Article no. series 1
1123-DN-xxx-000 for 12 m pipe length
1124-DN-xxx-000 for 16 m pipe length

Article no. series 2
1223-DN-xxx-000 for 12 m pipe length
1224-DN-xxx-000 for 16 m pipe length

Article no. series 3
1323-DN-xxx-000 for 12 m pipe length
1324-DN-xxx-000 for 16 m pipe length

Article no. series 4
1423-DN-xxx-000 for 12 m pipe length
1424-DN-xxx-000 for 16 m pipe length

xxx = degrees

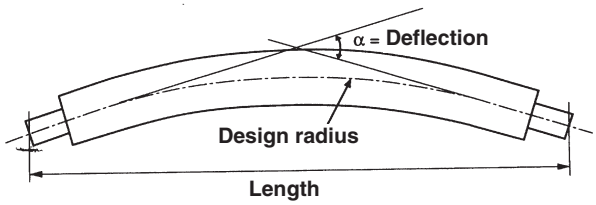
An example of how to order:
Curved pipe series 1, L = 12 m with dim DN 200 and curved 15°
has Article No. 1123-200-015-000, Deflection shall be stated in a separate line of text.

Curved pipes - Horizontal

Deflection versus design radius

Series 1, 2, 3 and 4

PN 16/PN25



CORRELATION BETWEEN DEFLECTION AND DESIGN RADIUS

Deflection	Design radius L = 12 m	L = 16 m	Deflection	Design radius L = 12 m	L = 16 m
1°	690	910	21°	33,0	44,0
2°	345	460	22°	31,0	42,0
3°	230	305	23°	30,0	40,0
4°	170	230	24°	29,0	38,0
5°	140	185	25°	28,0	37,0
6°	115	155	26°	27,0	36,0
7°	98	130	27°	26,0	34,0
8°	86	115	28°	25,0	33,0
9°	76	100	29°	24,0	32,0
10°	69	92	30°	23,2	30,9
11°	62	83	31°	22,5	30,0
12°	57	76	32°	21,8	29,1
13°	53	71	33°	21,1	28,1
14°	49	65	34°	20,5	27,3
15°	46	61	35°	20,0	26,7
16°	43	57	36°	19,4	25,8
17°	40	54	37°	18,9	25,2
18°	38	51	38°	18,4	24,6
19°	36	48	39°	18,0	23,9
20°	34	46	40°	17,5	23,4

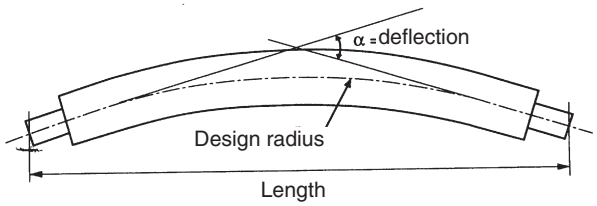
Pipe trench: A pre-insulated pipe DN≥250 cannot be bent along its entire length. At each pipe end a straight part will remain, which shall be approximately 2 meters in length.
This deviation from an ideal curved pipe radius is to be compensated when installing the pipe by making the pipe trench approximately 150 mm wider.
The widening should be ~200 mm at deviation < 10°
The widening should be ~500 mm at deviation > 10°

Curved pipes

Elastic radius

Series 1, 2 , 3 and 4

PN 16/PN25



ELASTIC RADIUS

Dimension DN	Elastic radius m	Deflection 12 m
25	15	45,0°
40	21	31,0°
50	27	25,0°
65	34	20,0°
80	40	17,0°
100	52	13,0°
125	63	11,0°
150	76	9,0°
200	98	7,0°
250	122	5,6°
300	145	4,7°
400	182	3,7°
500	227	3,0°
600	273	2,5°

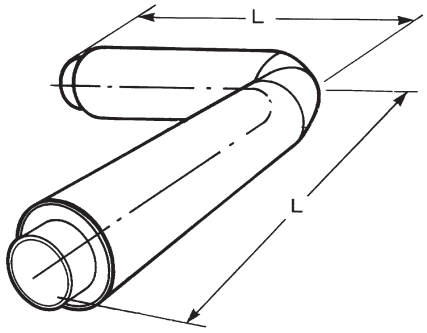
The above table shows the elastic radius which is the maximum radius or deflection that can be allowed without permanent deformation of the steel pipe.

Bend horizontal

Series 1, 2, 3 and 4

Powerpipe bends are manufactured using a special foam with high compressive strength., which means that motionabsorbent material would normally be unnecessary

PN 16/PN25



ARTICLE NO 2100, 2200, 2300, 2400

DN	Service pipe Dy x s [mm]	Jacket pipe Series 1 DY [mm]	Series 2 DY [mm]	Series 3 DY [mm]	Series 4 DY [mm]	L [mm]
20	26,9x2,3	-	110	125	140	1000
25	33,7x2,6	90	110	125	140	1000
32	42,4x2,6	110	125	140	160	1000
40	48,3x2,6	110	125	140	160	1000
50	60,3x2,9	125	140	160	180	1000
65	76,1x2,9	140	160	180	200	1000
80	88,9x3,2	160	180	200	225	1000
100	114,3x3,6	200	225	250	280	1000
125	139,7x3,6	225	250	280	315	1000
150	168,3x4,0	250	280	315	355	1000
200	219,1x4,5	315	355	400	450	1000
250	273,0x5,0	400	450	500	560	1300
300	323,9x5,6	450	500	560	630	1500
350	355,6x5,6	500	560	630	710	1600
400	406,4x6,3	560	630	710	800	1600
450	457,0x6,3	560	530	710	800	1600
500	508,0x6,3	630	710	800	900	1600
600	610,0x7,1	710	800	900	1000	1600
700	711,0x8,0	800	900	1000	1100	1700
800	813,0x8,8	900	1000	1100		1850
900	914,0x10,0	1000	1100			2000

Bends are, as standard, available as 90° and 45°.
Bends having other degrees, such as 75°, 60°, 30° and 15°, and bends having leg lengths other than specified in the above table can be delivered on special request.

Article no. Series 1
2100-DN-degree of bend-000

Article no. Series 2
2200-DN-degree of bend-000

Article no. Series 3
2300-DN-degree of bend-000

Article no. Series 4
2400-DN-degree of bend-000

Space for sleeve
In order to fit the sleeve at installation of DN50-DN200 extended leg 1200x 1200 mm are offered. State suffix 999th

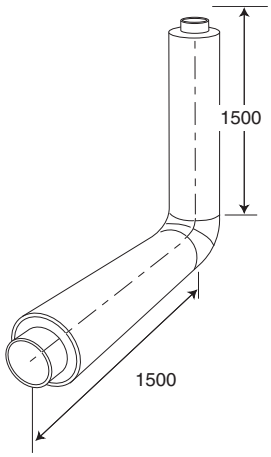
An example of how to order:
Bend, series 1, dim DN100, 90°
has Article No. 2100-100-900-000.

Termination bend 90° Vertical

Series 1, 2, 3 and 4

Termination bends are delivered in 90° as standard.
Can be ordered with end cap

PN 16/PN25



ARTICLE NO 2110, 2210, 2310

DN	Service pipe Dy x s [mm]	Jacket pipe Series 1 DY [mm]	Series 2 DY [mm]	Series 3 DY [mm]	Series 4 DY [mm]
20	26,9x2,3	–	110	125	140
25	33,7x2,6	90	110	125	140
32	42,4x2,6	110	125	140	160
40	48,3x2,6	110	125	140	160
50	60,3x2,9	125	140	160	180
65	76,1x2,9	140	160	180	200
80	88,9x3,2	160	180	200	225
100	114,3x3,6	200	225	250	280
125	139,0x3,6	225	250	280	315
150	168,3x4,0	250	280	315	355
200	219,1x4,5	315	355	400	450
250	273,0x5,0	400	450	500	560
300	323,9x5,6	450	500	560	630

Other degrees and/or leg lengths can be supplied on request.

Article no. series 1
2110-DN-000-000

Article no. series 2
2210-DN-000-000

Article no. series 3
2310-DN-000-000

Article no. series 4
2410-DN-000-000

Can be ordered with end cap (State suffix-811)
Termination bend, 90°, with other leg lengths and deflection can be delivered on request.

An example of how to order:
Termination bend series 1
dim DN 50, has article no. 2110-050-000-000.

Gravel refilling may not reach the alarm wire.

The sealing shall not be below water tabe continuously.

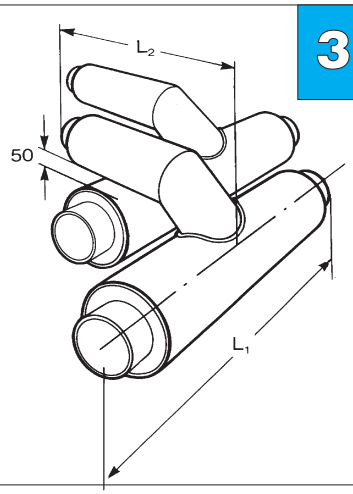
Keep the plastic emballage on during the installation!

T-piece

Series 1, 2, 3 and 4

Powerpipe T-pieces are as standard delivered in a reinforced design if not otherwise is indicated.

PN 16/PN25



ARTICLE NO 3100, 3200, 3300, 3400

Main pipe DN	Branch pipe DN	L1 [mm]	L2 [mm]
25-200	25-80	1200	1000
100-200	100-200	1500	1000
250-900	25-80	1200	1200
250-900	100-200	1500	1200
250-900	250-600	1800	1500
700-900	700-900	2100	1700

The branch pipe cannot be designed in dimensions bigger than the main pipe.

Article no. series 1
3100-DN main pipe-DN branch pipe-000

Article no. series 2
3200-DN main pipe-DN branch pipe-000

Article no. series 3
3300-DN main pipe-DN branch pipe-000

Article no. series 4
3400-DN main pipe-DN branch pipe-000

Space for sleeve
In order to fit the sleeve at installation of T-piece with branch pipe max DN200, product with extended L1-dimensions with 800 mm are offered and L2-dimensions with 400 mm for DN 25-80, L2-dimensions with 700 mm for DN 100-200
State suffix: 999.

An example of how to order:
T-piece series 1 med main pipe DN 200 and branch pipe DN 50,
has article no. 3100-200-050-000.
Alt. (extended T-piece) has article no. 3100-200-050-999

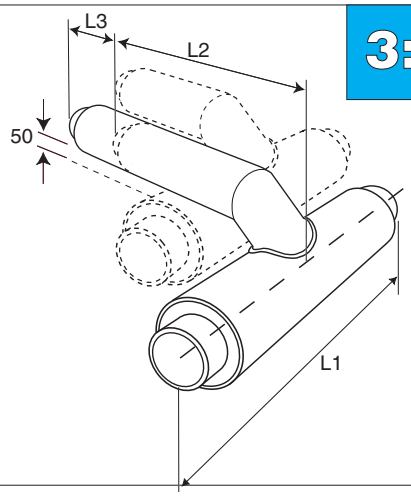
Edition 2013

T-piece with extended branch

Series 1, 2, 3 and 4

Powerpipe T-pieces with extended branch length shall be used in such cases when the systems design require the installation of a valve unit or a transition unit in the branch directly after the T-piece.

PN 16/PN25



ARTICLE NO 3120, 3220, 3320, 3420

Main pipe DN	For L1 and L2 see page 3:301	L3 [mm] Series 1 and 2	L3 [mm] Series 3 and 4
25-50		330	
65-80		370	
100-125		500	
150		530	
200		600	
250		700	
300		750	860
350		850	930
400		930	1000
500		1000	1100
600		1100	1200
700		1200	1300
800		1300	1400
900		1400	1500

The branch pipe cannot be designed in dimensions bigger than the main pipe

Article no. series 1
3120-DN main pipe-DN branch pipe-000

Article no. series 2
3220-DN main pipe-DN branch pipe-000

Article no. series 3
3320-DN main pipe-DN branch pipe-000

Article no. series 4
3420-DN main pipe-DN branch pipe-000

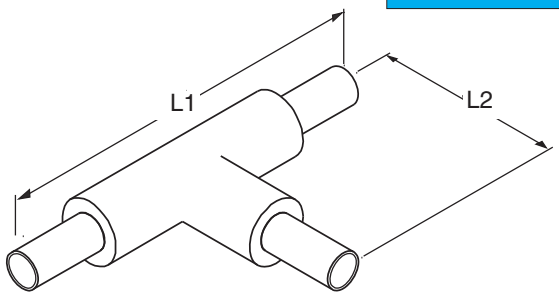
An example of how to order:
T-piece series 1 with main pipe DN 200 and branch pipe DN 50,
has Article No. 3120-200-050-000.

T-piece, straight

Series 1, 2, 3 and 4

Powerpipe T-pieces are as standard delivered in a reinforced design if not otherwise is indicated. With T-piece straight branching can be performed at the same level as the main pipe.

PN 16/PN25



ARTICLE NO 3130, 3230, 3330, 3430

Main pipe DN	Branch pipe DN	L1 [mm]	L2 [mm]
25-200	25-100	1200	700
125-200	125-200	1500	700
250-500	25-100	1200	900
250-500	125-200	1500	900
250-500	250-400	1800	900
600-900	25-100	1200	1100
600-900	125-200	1500	1100
600-900	250-500	1800	1100
600-900	600-800	2100	1100

The branch pipe cannot be designed in dimensions bigger than the main pipe.

Article no. series 1
3130-DN main pipe-DN branch pipe-000

Article no. series 2
3230-DN main pipe-DN branch pipe-000

Article no. series 3
3330-DN main pipe-DN branch pipe-000

Article no. series 4
3430-DN main pipe-DN branch pipe-000

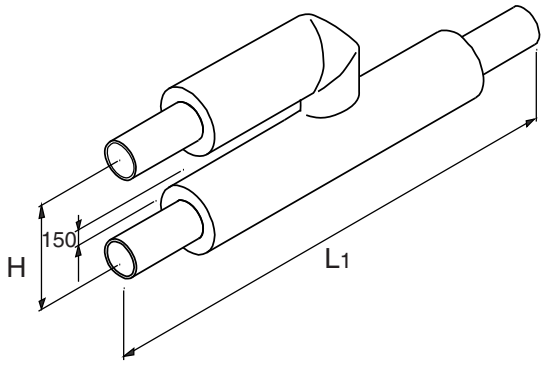
An example of how to order:
T-piece series 1 with main pipe DN 200 and branch pipe DN 50, has Article No. 3130-200-050-000.

T-pieces with parallel branch

Series 1, 2, 3 and 4

Powerpipe T-pieces are as standard delivered in a reinforced design if not otherwise is indicated.

PN 16/PN25



ARTICLE NO 3110, 3210, 3310, 3410

Main pipe DN	Branch pipe DN	L1 [mm]
25-900	25-100	1200
125-900	125-200	1500
250-900	250-400	1800
450-900	450-500	2400

$H = \frac{DY\ Main\ pipe + DY\ Branch\ pipe}{2} + 150$ (For branch pipe DN450 and DN500 the H-dimension will be100 mm more)

Example:
Main pipe DN 100/225
Branch pipe DN 40/125

$H = \frac{225 + 125}{2} + 150 = 325$ mm

The branch pipe cannot be designed in dimensions larger than the main pipe.
See chapter 7:301 for how alarm systems are made

Article no. series 1
3110-DN main pipe-DN branch pipe-000

Article no. series 2
3210-DN main pipe-DN branch pipe-000

Article no. series 3
3310-DN main pipe-DN branch pipe-000

Article no. series 4
3410-DN main pipe-DN branch pipe-000

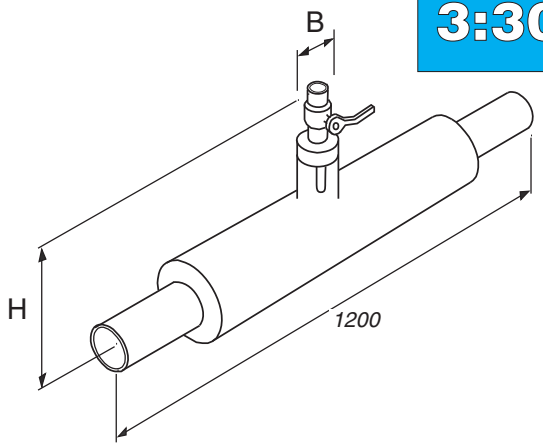
An example of how to order:
T-piece series 1 with main pipe DN 200 and branch pipe DN 50,
has Article No. 3110-200-050-000.

Air release/ drainage units

Series 1, 2, 3 and 4

The built in alarmwires are linked outside the sealing.

PN 16/PN25



ARTICLE NO 3140, 3240, 3340, 3440

Main pipe DN	H [mm]	Air release/ drainage DN	B-measure [mm]
25	409	25	110
32	414	40	110
40	417	50	125
50	423	65	140
65	431		
80	438		
100	450		
125	463		
150	477		
200	502		
250	530		
300	554		
350	570		
400	596		
500	650		
600	700		
700	758		
800	800		
900	850		

Please observe: the included ball valve has to be operated at least twice/year in order to ensure a good function.

The valve is made of stainless steel. Air release/ drainage units are equipped with screwed on plug and comes in DN 25, DN 40, DN 50 and DN65. As air release unit DN25 is recomended and as drain unit DN50 is recomended.

The valve is protected by a end cap as a standard. Se sid 8:102

Please observe: Do not refill above the sealing.
The sealing shall not be below water tabe continuously.

Article no. series 1
3140-DN main pipe-DN release/ drainage-000

Article no. series 2
3240-DN main pipe-DN release/ drainage-000

Article no. series 3
3340-DN main pipe-DN release/ drainage-000

Article no. series 4
3440-DN main pipe-DN release/ drainage-000

An example of how to order:
Air release for main pipe series 1 with main pipe DN 200 and air release DN 25, has Article No. 3140-200-025-000.

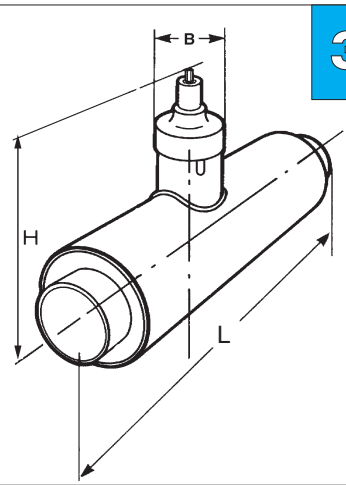
Edition 2013

Valves

Series 1, 2, 3 and 4

The unit consists of a maintenance free ball valve in a fully welded housing together with a corrosion free ball. All valves according to EN448 are supplied to stand the yield strength as the pipe line. The built in alarmwires are linked outside the sealing. When using fixed gear, order the placement for alarm wire separately.

PN 16/PN25



ARTICLE NO 4100, 4200, 4300, 4400

Main pipe DN	Service pipe Dy x s mm	L [mm]	H [mm]	B [mm]	Wrench size [mm]	Levereras med
25	33,7 x 2,3	1500	382	110	19	
32	42,4 x 2,6	1500	388	110	19	
40	48,3 x 2,6	1500	401	110	19	
50	60,3 x 2,9	1500	411	110	19	Mount for
65	76,1 x 2,9	1500	415	110	19	T-key
80	88,9 x 3,2	1500	426	110	19	
100	114,3 x 3,6	1500	450	125	27	
125	139,7 x 3,6	1500	455	125	27	
150	168,3 x 4,0	1500	474	125	27	
200	219,1 x 4,5	1500	520	160	50	mount for
250	273,0 x 5,0	1500	557	160	50	portable gear
300	323,9 x 5,6	1800	664	160	50	
350	355,6 x 5,6	1800	906	350		
400	406,4 x 6,3	2000	977	350		Fixed gear
500	508,3x6,3	custom	1056	350		
600	610,0x7,1	custom	1183	350		

H-measure does not include gear, hydraulic or electric actuator. For valves DN700 and DN800 see separate specification. Gate valve can be quoted on request. Other design for example with full bore can be supplied on request. Valves can be supplied with T-key, portable planetary gear and protection pipe for valve stem extension, length 1500 mm, and hydraulic or electric actuator, see accessories!
AS standard the valves are delivered with:
DN25-DN125 with mount for T-key.
DN150-DN300 with mount for portable gear.
DN350-DNxx with fixed gear.

Article no. series 1
4100-DN-000-000

Article no. series 2
4200-DN-000-000

Article no. series 3
4300-DN-000-000

Article no. series 4
4400-DN-000-000

The valve is protected by a end cap of PEH as a standard. See 8:102
Available with separate measuring box as extra order, se 7:302.

An example of how to order:
Valves series 1 with main pipe DN 200,
has Article No. 4100-200-000-000.

Please observe: the included ball valve has to be operated at least twice/year in order to ensure a good function.

Please observe: Do not refill above the sealing.
The sealing shall not be below water tabe continuously.

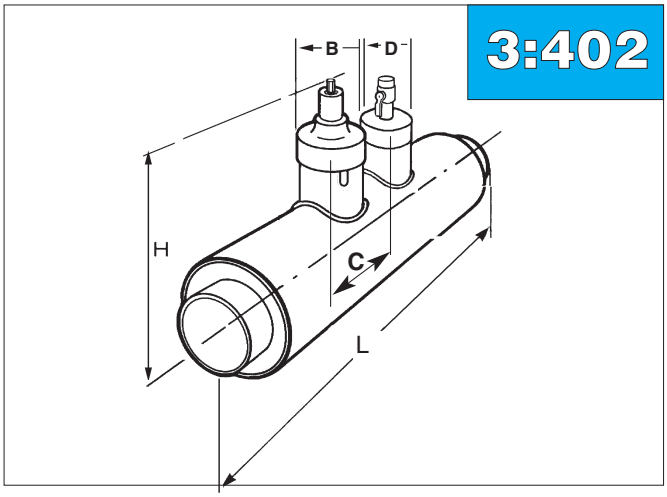
Edition 2013

Preinsulated valve with one air release/ drainage unit

Series 1, 2, 3 and 4

The built in alarmwires are linked outside the sealing.
When using fixed gear, order the placement for alarm wire separately.

PN 16/PN25



ARTICLE NO 4141, 4241, 4341, 4441 — **Air release/ drainage**

Main pipe DN	L [mm]	C [mm]	H [mm]	B [mm]	Wrench size [mm]	Delivered with	DN	D-dim [mm]
25	1500	250	382	110	19		25	110
32	1500	250	388	110	19		40	110
40	1500	250	401	110	19		50	125
50	1500	250	411	110	19	Mount	65	140
65	1500	250	415	110	19	for T-key		
80	1500	250	426	110	19			
100	1500	250	450	125	27			
125	1500	250	455	125	27			
150	1500	250	474	125	27			
200	1500	250	520	160	50	Mount for		
250	1500	350	557	160	50	portable gear		
300	1800	350	664	160	50			
350	1800	350	906	350				
400	2000	450	977	350		Fixed gear		
500	2200	550	1056	350				
600	2400	640	1183	350				

The valve stems are installed in position towards the stop valve. Air release/ drainage units are manufactured in dimension DN25, DN40, DN50 and DN65 are delivered with a screwed on plug. Both air release/ drainage units are delivered in the same dimension.
The valve is protected by a end cap as a standard. Se sid 8:102

Article no. series 1
4141-DN main pipe-DN air release-000

Article no. series 2
4241-DN main pipe-DN air release-000

Article no. series 3
4341-DN main pipe-DN air release-000

Article no. series 4
4441-DN main pipe-DN air release-000

Available with separate measuring box as extra order, see 7:302

An example of how to order:
Valve series 2 with main pipe DN 100 and air release DN 25, has Article No. 4241-100-025-000.

Please observe: the included ball valve has to be operated at least twice/year in order to ensure a good function.

Please observe: Do not refill above the sealing.
The sealing shall not be below water tabe ontinously.

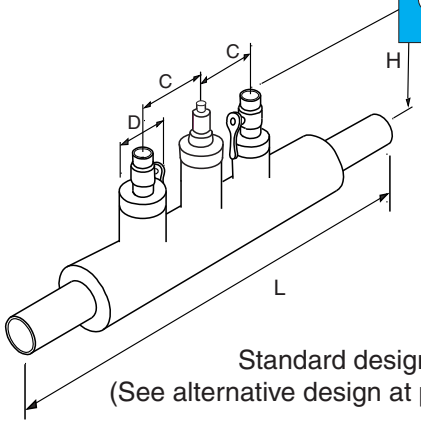
Edition 2013

Valve with double air release/drainage units

Series 1, 2, 3 and 4

The built in alarmwires are linked outside the sealing. When using fixed gear, order the placement for alarm wire separately.

PN 16/PN25



Standard design
(See alternative design at page 3;404)

ARTICLE NO 4142, 4242, 4342, 4442						Air release/ drainage	
Main pipe DN	L Standard [mm]	C [mm]	H [mm]	Wrench size [mm]		DN	D-dim [mm]
25	1500	250	382	19	Mount for T-key	25	110
32	1500	250	388	19		40	110
40	1500	250	401	19		50	125
50	1500	250	411	19		65	140
65	1500	250	415	19			
80	1500	250	426	19			
100	1500	250	450	27			
125	1500	250	455	27			
150	1500	250	474	27	Mount for portable gear		
200	1500	250	520	50			
250	1500	350	557	50			
300	1800	350	664	50			
350	1800	350	906		Fixed gear		
400	2000	450	977				
500	2200	550	1056				
600	2400	640	1183				

The valve stems are installed in position towards the stop valve. Air release/ drainage units are manufactured in dimension DN25, DN40, DN50 and DN65 are delivered with a screwed on plug. Both air release/ drainage units are delivered in the same dimension.
The valve is protected by a end cap as a standard. Se sid 8:102

Article no. series 1
4142-DN main pipe-DN air release-000

Article no. series 2
4242-DN main pipe-DN air release-000

Article no. series 3
4342-DN main pipe-DN air release-000

Article no. series 4
4442-DN main pipe-DN air release-000

An example of how to order:
Valve series 2 with main pipe DN 100 and air release DN 25, has Article No. 4242-100-025-000.

Please observe: the included ball valve has to be operated at least twice/year in order to ensure a good function.

Please observe: Do not refill above the sealing.

The sealing shall not be below water tabe continously.

Edition 2013

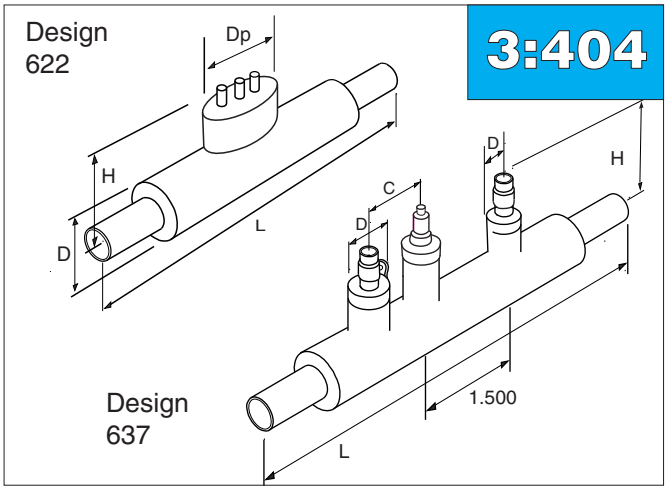
SINGLE PIPES

Valve with 2 pc. air releasear/drainage (optional design)

Series 1, 2, 3 and 4

The built in alarmwires are linked outside the sealing. When using fixed gear, order the placement for alarm wire separately.

PN 16/PN25



ARTICLE NO 4142, 4242, 4342, 4442

Main pipe DN	L 622 [mm]	L 637 [mm]	C [mm]	H [mm]	Dp [mm]	Wrench size [mm]		Air release/ drainage DN [mm]	D-dim [mm]
25	1500	2750	250	382	235	19		25	110
32	1500	2750	250	388	235	19		40	110
40	1500	2750	250	401	235	19		50	125
50	1500	2750	250	411	235	19	Mount for T-Key	65	140
65	1500	2750	250	415	295	19			
80	1500	2750	250	426	295	19			
100	1500	2750	250	450	295	27			
125	1500	2750	250	455	340	27			
150	1500	2750	250	474	415	27	Mount for portabel gear		
200	1500	2750	250	520	415	50			
250	1500	2850	350	557	415	50			
300	1800	2850	350	664	415	50			
350	1800	2850	350	906			Fixed gear		
400	2000	2950	450	977					
500	2200	3050	550	1056					
600	2400	3150	640	1183					

The valve stems are installed in position towards the stop valve. Air release/ drainage units are manufactured in dimension DN25, DN40, DN50 and DN65 are delivered with a screwed on plug. Both air release/ drainage units are delivered in the same dimension.
The valve is protected by a end cap as a standard. Se sid 8:102

Design 622 has suffix 622
Design 637 has suffix 637

An example of how to order:
Valve series 2 with main pipe DN 300 and air release DN 40 in design 622, has Article No. 4242-300-040-622 and design 637 has Article No. 4242-300-040-637

Please observe: the included ball valve has to be operated at least twice/year in order to ensure a good function.

Please observe: Do not refill above the sealing.

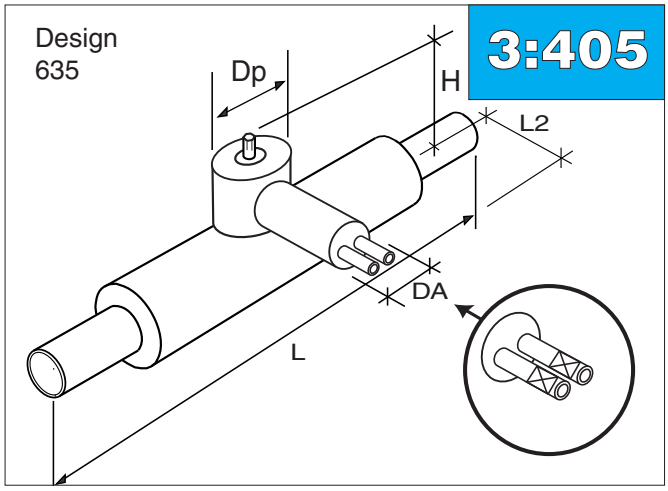
The sealing shall not be below water tabe continously.

Valve with 2 pc. protected air release/ drainage (optional design)

Series 1, 2, 3 and 4

The built in alarmwires are linked outside the sealing.

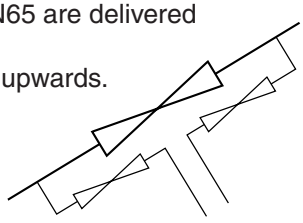
PN 16/PN25



ARTICLE NO 4142, 4242, 4342, 4442 Design 635 **Air release/ drainage**

Main pipe DN	L [mm]	Dp [mm]	Air release DN [mm]	H [mm]	Wrench size [mm]		DN	DA [mm]	L2 [mm]
25	1500			382	19		25	150	300
32	1500			388	19		40	180	350
40	1500	180	25	401	19				
50	1500	180	25	411	19	Mount for T-Key			
65	1500	180	25	415	19				
80	1500	180	25	426	19				
100	1500	180	25	450	27				
125	1500	180	25	455	27				
150	1500	180	25	474	27	Mount for portable gear			
200	1500	225	40	520	50				
250	1500	225	40	557	50				
300	1800	225	40	664	50				

Air release/ drainage units are manufactured in dimension DN25, DN40, DN50 and DN65 are delivered with a screwed on plug.
desired connections can be executed in the threaded end. Valve spindles are facing upwards.
Both air release / drainage units are delivered in the same dimension.
The valve is protected by a hut as a standard. Please see 8:102



An example of how to order:
Valve series 2 with main pipe DN 300 and air release DN 40 in design 635, has Article No. 4242-300-040-635

Please observe: the included ball valve has to be operated at least twice/year in order to ensure a good function.

Please observe: Do not refill above the sealing.

The sealing shall not be below water tabe continously.

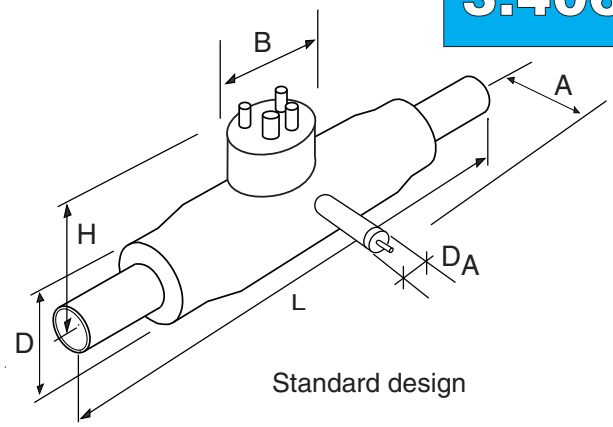
Edition 2013

Combination valve Standard design

Series 1, 2, 3 and 4

- Air release
- Drain
- Bypass

PN 16/PN25



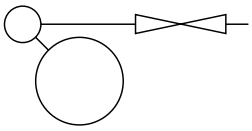
Standard design

ARTICLE NO 4841, 4842, 4843, 4844

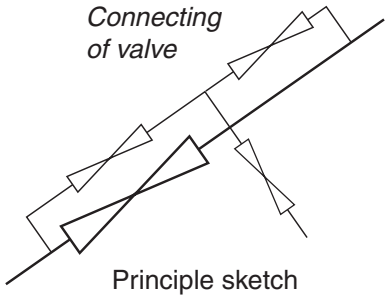
Main pipe DN	D Series 2 [mm]	By pas valves Valves DN (3 st)	L [mm]	A [mm]	D_A [mm]	B [mm]	H [mm]
100	225	25	1800	650	110	415	500
125	250	25	1800	650	125	415	500
150	280	32	1800	700	125	415	530
200	355	40	1800	700	125	415	560
250	450	40	1800	700	125	450	600
300	500	50	2100	750	140	450	700

Ball valve comes with mount for T-key (DN 25-125) or portable gear (DN 150-300).
Drainage pipe and valve are made of stainless steel.
The valve is protected by a hut as a standard. Please see 8:102
Design of model B, see page 3:406, can be adapted to customer specific requirements.

A measuring box is located between the by pas valves, please see 7:302



Connecting of valve



Principle sketch

Article no. 1
4841-DN-000-000.

Article no. 2
4842-DN-000-000.

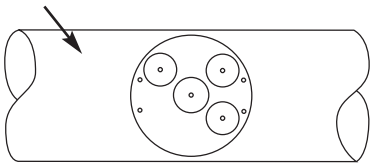
Article no. 3
4843-DN-000-000.

Article no. 4
4844-DN-000-000.

An example of how to order:
Combination valve for DN 200 has article no. 4843-200-000-000.

Seen from above

Alarm wire penetration



Please observe: the included ball valve has to be operated at least twice/year in order to ensure a good function.

Please observe: Do not refill above the sealing.
The sealing shall not be below water tabe ontinously.

Edition 2013

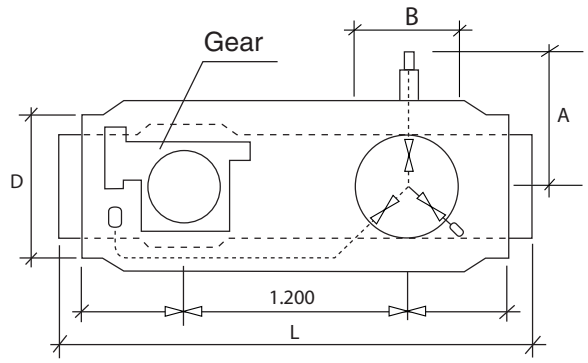
Combination valve option design

Series 1, 2, 3 and 4

- Air release
- Drain
- Bypass

PN 16/PN25

Model B



ARTICLE NO 4843 i design 637

Main pipe DN	D Series 2 [mm]	Bypass valves DN (3 st)	L [mm]	A [mm]	D_A [mm]	B [mm]	H [mm]
200	355	40	3000	650	125	650	560
250	450	40	3000	700	125	650	600
300	500	50	3000	750	140	700	700
350	560	50	3200	800	140		940
400	680	50	3400	800	140		940
500	710	50	3600	900	140		1135

Drainage pipe and valve are made of stainless steel.

The optional design can be adapted to specific customer requirements.

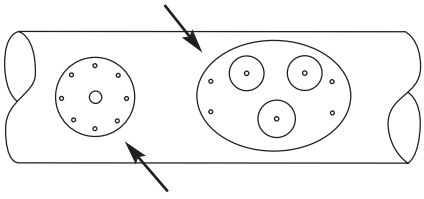
The valve can be fitted with fixed gear, hydraulic actuator or electric compnent. The design can be adapted for air release or bleed. The length of the outlet pipes can be customised

Article no.
4843-DN-000-637.

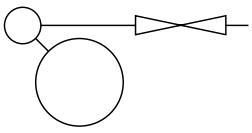
An example of how to order:
Combination valve for DN 200 has article no. 4843-200-000-000.

Seen from above

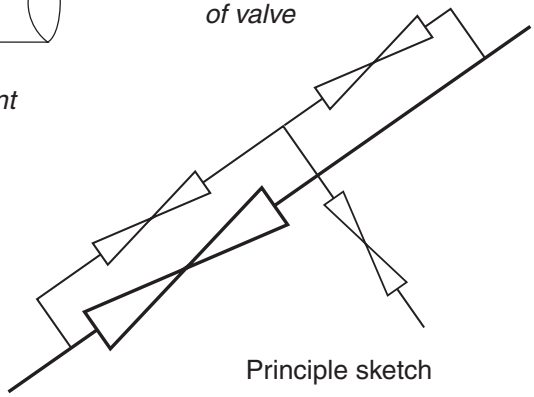
Alarm wire penetration



Mount for gear or component



Connecting of valve

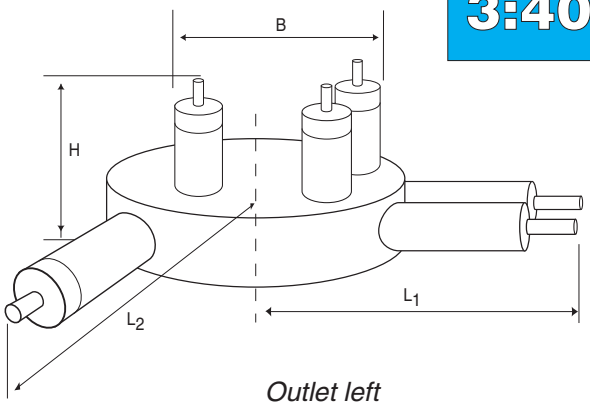


Principle sketch

Valve unit compact Series 1, 2, 3 and 4

The valve unit is being used for the bleed or air release.
It is built to fit in a standard well.

PN 16/PN25



Outlet left

ARTICLE NO 4170, 4270, 4370, 4470

DN	C-C	H Standard [mm]	H Min [mm]	B [mm]	L1 [mm]	L2 [mm]
25	310	480	190	316	550	570
40	330	495	200	364	560	600
50	360	500	210	398	600	625
65	420	505	210	412	610	625
80	450	515	225	447	620	700

The stem height «H» is available with standard height or min. height i.a. to the table above.
The valve unit can be supplemented with loose stem extensions of 250, 500, 750 or 1000 mm.
The outlet pipe is made of stainless steel. The valves are supplied with mount for T-key.
The valve is protected by a end cap as a standard. Please see 8:102

This product replaces previous «Valve unit, straight» and «Unit Valve, bend»

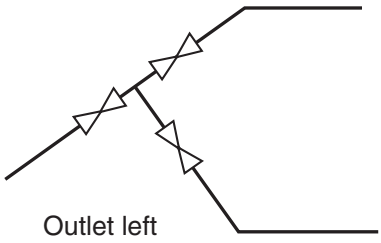
Article no. series 1
4170-DN-000-000

Article no. series 2
4270-DN-000-000

Article no. series 3
4370-DN-000-000

Article no. series 4
4470-DN-000-000

Outlet 45° right has prefix 032
Outlet 45° left has prefix 031.
Valve unit with minimal spindle height has mid-prefix = H-min.



Outlet left

An example of how to order:
Valve unit, compact, right series 2 dim DN50 has article no. 4270-050-000-031.

When ordering a minimum stem height, state as indicated below:
Valve unit, compact, right, Series 2. DN50 with minimal spindle height has article no. 4270-050-210-031

Please observe: the included ball valve has to be operated at least twice/year in order to ensure a good function.

Please observe: Do not refill above the sealing.

The sealing shall not be below water tabe ontinously.

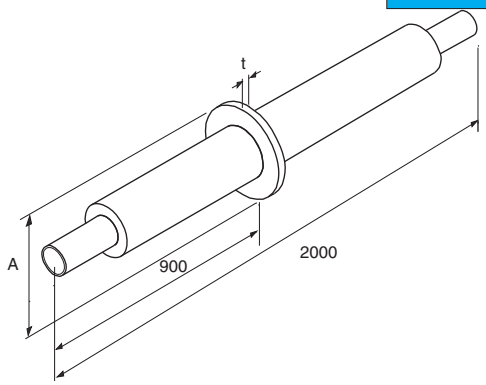
Edition 2013

Anchor units

Series 1, 2, 3 and 4

The anchor unit is designed for casting into concrete of quality K 250. Dimensioning pressure force:
In concrete 5 MN/ m² (50 kg/cm²), standard value
In ground 0,15 MN/ m² (1,5 kg/cm²), standard value

PN 16/PN25



ARTICLE NO 5100, 5200, 5300, 5400

DN	Max load (kN) ØT = 60°C	A [mm]	t [mm]	Pressure area (Series 2) [cm²]
25	38	200	25	191
32	49	220	25	243
40	56	220	25	243
50	78	240	25	289
65	100	280	25	452
80	129	300	30	392
100	187	350	30	565
125	230	400	30	765
150	310	450	30	875
200	455	550	35	1385
250	630	650	40	1730
300	840	700	40	1885
400	1200	850	40	2560
500	1500	1000	65	4000
600	2000	1200	65	6200

A and t measurement are given above for Series 2.

Article no. series 1
5100-DN-000-000

Article no. series 2
5200-DN-000-000

Article no. series 3
5300-DN-000-000

Article no. series 4
5400-DN-000-000

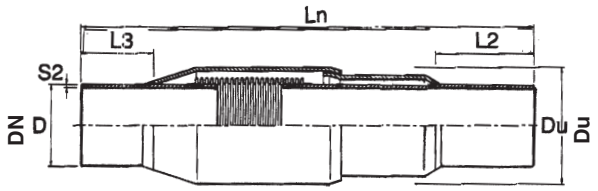
An example of how to order:
Ancor unit series 1 with dim DN 200,
has article no. 5100-200-000-000.

Edition 2013

Single-use compensator

The single-use compensator can be used for pre-stressing of the pipe line in places where pre-heating for practical reasons cannot be made.

PN 16/PN25



ARTICLE NO 7810

DN	Max pre-stressing [mm]	Ln	Du
40	50	450	60
50	50	450	70
65	70	500	90
80	70	500	102
100	80	550	127
125	80	550	152
150	100	630	178
200	120	700	232
250	120	700	286
300	140	730	338
350	140	730	371
400	140	730	426
450	150	800	477
500	150	800	528
600	150	800	635
700	150	780	735
800	150	850	838

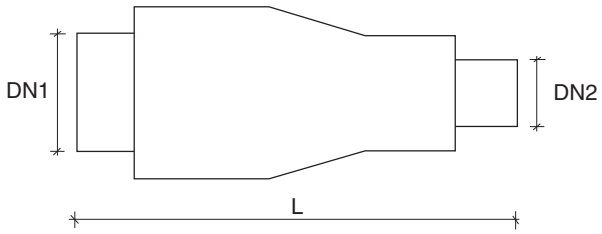
Article no.
7810-DN-000-000

An example of how to order:
Single-use compensator for a DN200 pipe line, Article No. 7810-200-000-000,
Relatet casing is described in section 6:205

Reduction unit

The reduction unit is used at change of dimension.
An optioin is steel cone + PEH reduction.

PN 16/PN25



ARTICLE NO 1571, 1572, 1573, 1574

DN1/ DN2	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250	DN 300	DN 350	DN 400	DN 500	DN 600	DN 700	DN 800
25	x	x															
32		x	x														
40			x	x													
50				x	x												
65					x	x											
80						x	x										
100							x	x									
125								x	x								
150									x	x							
200										x	x						
250											x	x					
300												x	x				
350													x	x			
400														x	x		
500															x	x	
600																x	x
700																	x

The reduction unit is used at change of dimension. The table lists the default reduction unit.

Article no. series 1
1571-DN1-DN2-000

Article no. series 2
1572-DN1-DN2-000

Article no. series 3
1573-DN1-DN2-000

Article no. series 4
1574-DN1-DN2-000

DN1	L [mm]
DN 25–300	900
DN 350–500	1100
DN 600-800	1300

An example of how to order:
Reduction unit series 1 with dim DN 200 to DN 150 has article no. 1571-200-150-000.

NOTE:
Consult with the designer where the reduction shall be placed and what dimension to choose.

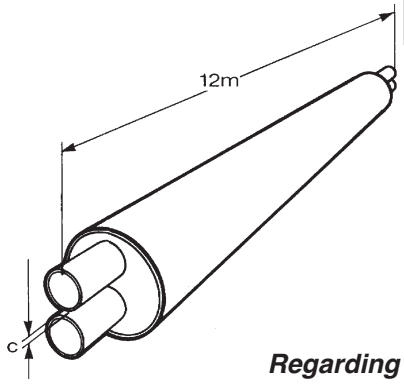
Edition 2013

Straight pipes, standard

Powerpipes Double pipes are layed vertically with the flow pipe installed below the return pipe.

Article No. Standard, 12 m: 1503-DN-000-000
Article No. Standard, 16 m: 1504-DN-000-000
Article No. Standard, 18 m: 1505-DN-000-000

PN 16/PN25



Regarding heat losses Please see chapter 9!

ARTICLE NO. STANDARD, 12 m, 1503

DN	Dy x s [mm]	Service pipe DY [mm]	Weight [kg/m]	C-C [mm]	Transmission capacity ΔT = 50°C [m/s]	[kW]
20	26,9 x 2,0	140	6,1	19	0,8	65
25	33,7 x 2,3	140	7,1	19	0,8	100
32	42,4 x 2,6	160	9,1	19	0,8	180
40	48,3 x 2,6	160	9,6	19	0,9	230
50	60,3 x 2,9	200	13,1	20	0,9	370
65	76,1 x 2,9	225	16,5	20	1,0	700
80	88,9 x 3,2	250	20,7	25	1,0	1.000
100	114,3 x 3,6	315	30,7	25	1,1	1.800
125	139,7 x 3,6	400	41,5	30	1,3	3.300
150	168,3 x 4,0	450	51,0	40	1,4	5.000
200	219,1 x 4,5	560	76,0	45	1,6	10.000

ARTICLE NO. STANDARD, 16 m, 1504

DN	Dy x s [mm]	Service pipe DY [mm]	Weight [kg/m]	C-C [mm]	Transmission capacity ΔT = 50°C [m/s]	[kW]
100	114,3 x 3,6	315	30,7	25	1,1	1.800
125	139,7 x 3,6	400	41,5	30	1,3	3.300
150	168,3 x 4,0	450	51,0	40	1,4	5.000
200	219,1 x 4,5	560	76,0	45	1,6	10.000

ARTICLE NO STANDARD, 18 m, 1505

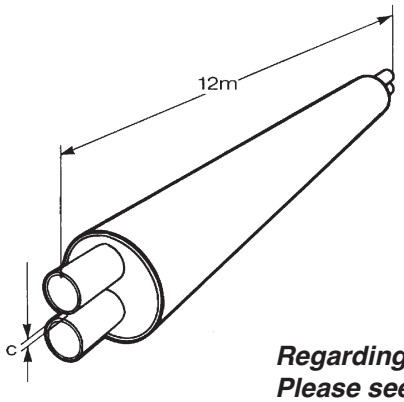
DN	Dy x s [mm]	Service pipe DY [mm]	Weight [kg/m]	C-C [mm]	Transmission capacity ΔT = 50°C [m/s]	[kW]
100	114,3 x 3,6	315	30,7	25	1,1	1.800
150	168,3 x 4,0	450	51,0	40	1,4	5.000
200	219,1 x 4,5	560	76,0	45	1,6	10.000

Straight pipes, double+

Powerpipes Double pipes are layed vertically with the flow pipe installed below the return pipe.

Article No. Double+, 12 m: 1603-DN-000-000
Article No. Double+, 16 m: 1604-DN-000-000
Article No. Double+, 18 m: 1605-DN-000-000

PN 16/PN25



Regarding heat losses Please see chapter 9!

ARTICLE NO. DOUBLE+, 12 m, 1603

Transmission capacity Δ T = 50°C

DN	Dy x s [mm]	Service pipe DY [mm]	Weight [kg/m]	C-C [mm]	[m/s]	[kW]
20	26,9 x 2,0	160	6,7	19	0,8	65
25	33,7 x 2,3	160	7,8	19	0,8	100
32	42,4 x 2,6	180	9,9	19	0,8	180
40	48,3 x 2,6	180	10,3	19	0,9	230
50	60,3 x 2,9	225	14,0	20	0,9	370
65	76,1 x 2,9	250	17,6	20	1,0	700
80	88,9 x 3,2	280	22,8	25	1,0	1.000
100	114,3 x 3,6	355	33,9	25	1,1	1.800
125	139,7 x 3,6	450	46,3	30	1,3	3.300
150	168,3 x 4,0	500	56,5	40	1,4	5.000

ARTICLE NO. DOUBLE+, 16 m, 1604

Transmission capacity ΔT = 50°C

DN	Dy x s [mm]	Service pipe DY [mm]	Weight [kg/m]	C-C [mm]	[m/s]	[kW]
100	114,3 x 3,6	355	33,9	25	1,1	1.800
125	139,7 x 3,6	450	46,3	30	1,3	3.300
150	168,3 x 4,0	500	56,5	40	1,4	5.000

ARTICLE NO. DOUBLE+, 18 m, 1605

Transmission capacity ΔT = 50°C

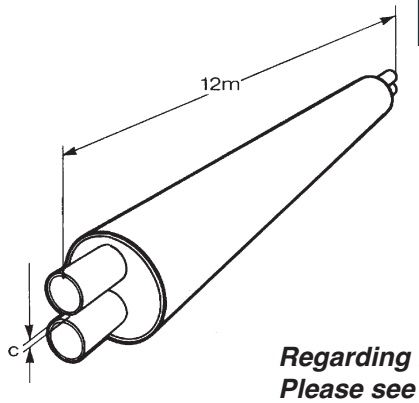
DN	Dy x s [mm]	Service pipe DY [mm]	Weight [kg/m]	C-C [mm]	[m/s]	[kW]
100	114,3 x 3,6	355	33,9	25	1,1	1.800
150	168,3 x 4,0	500	56,5	40	1,4	5.000
200	219,1 x 4,5	630	82,9	45	1,6	10.000

Straight pipes, double++

Powerpipes Double pipes are layed vertically with the flow pipe installed below the return pipe.

Article No. Double++, 12 m: 1603-DN-000-000
Article No. Double++, 16 m: 1604-DN-000-000
Article No. Double++, 18 m: 1605-DN-000-000

PN 16/PN25



Regarding heat losses Please see chapter 9!

ARTICLE NO. DOUBLE++, 12 m, 1703

Transmission capacity Δ T = 50°C

DN	Dy x s [mm]	Service pipe DY [mm]	Weight [kg/m]	C-C [mm]	[m/s]	[kW]
20	26,9 x 2,0	180	7,4	19	0,8	65
25	33,7 x 2,3	180	8,5	19	0,8	100
32	42,4 x 2,6	200	10,6	19	0,8	180
40	48,3 x 2,6	200	11,1	19	0,9	230
50	60,3 x 2,9	250	15,1	20	0,9	370
65	76,1 x 2,9	280	19,7	20	1,0	700
80	88,9 x 3,2	315	24,9	25	1,0	1.000
100	114,3 x 3,6	400	37,8	25	1,1	1.800
125	139,7 x 3,6	500	51,8	30	1,3	3.300
150	168,3 x 4,0	560	63,7	40	1,4	5.000
200	219,1 x 4,5	710	91,2	45	1,6	10.000

ARTICLE NO. DOUBLE++, 16 m, 1704

Transmission capacity ΔT = 50°C

DN	Dy x s [mm]	Service pipe DY [mm]	Weight [kg/m]	C-C [mm]	[m/s]	[kW]
100	114,3 x 3,6	400	37,8	25	1,1	1.800
125	139,7 x 3,6	500	51,8	30	1,3	3.300
150	168,3 x 4,0	560	63,7	40	1,4	5.000
200	219,1 x 4,5	710	91,2	45	1,6	10.000

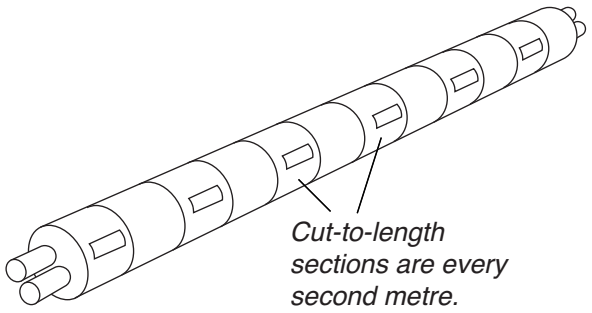
ARTICLE NO DUBBEL++, 18 m, 1705

Transmission capacity ΔT = 50°C

DN	Dy x s [mm]	Service pipe DY [mm]	Weight [kg/m]	C-C [mm]	[m/s]	[kW]
100	114,3 x 3,6	400	37,8	25	1,1	1.800
150	168,3 x 4,0	560	63,7	40	1,4	5.000
200	219,1 x 4,5	710	91,2	45	1,6	10.000

Straight pipes for cut-to-length

PN 16/PN25



Cut-to-length pipes are manufactured in all dimensions, as given in section 4:101. In these pipes the steel service pipe is covered by a plastic foil every second metre along the entire pipe length. This arrangement allows easy removal of the foam from the steel in the sections. These sections of the pipe are indicated on the outside casing pipe. Whole lengths or parts of pipes cut-to-length can be installed at any place in a district heating distribution system.

ARTICLE NO. 1513, 1613, 1713 (12m)

L = 12 m

Article No.

1513-DN-000-000 (STANDARD)
1613-DN-000-000 (DOUBLE+)
1713-DN-000-000 (DOUBLE++)

L = 16 m

Article No.

1514-DN-000-000 (STANDARD)
1614-DN-000-000 (DOUBLE+)
1714-DN-000-000 (DOUBLE++)

L = 18 m

Article No.

1515-DN-000-000 (STANDARD)
1615-DN-000-000 (DOUBLE+)
1715-DN-000-000 (DOUBLE++)

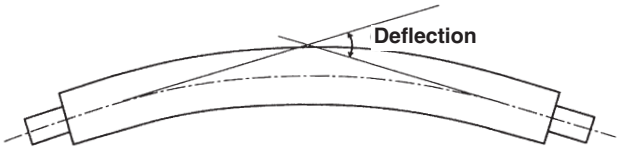
An example of how to order:
Cut- to-length pipe Double pipe Standard DN 2*100, has Article No. 1513-100-000-000.

For measurement details, please see straight pipes!

Pipes are available with «center cut» Above should be indicated in a separate line of text.

Curved pipes

PN 16/PN25



ARTICLE NO. 1523, 1623, 1723 (12 m)
ARTICLE NO. 1524, 1624, 1724 (16 m)

Double pipe DN	Max. deflection L = 12 m	L= 16 m	Anm.
25 - 65	30°		To be bent at installation site
50 - 80	30°		Bent at Powerpipe works
100	30°	20°	Bent at Powerpipe works
125 - 150	30°	25°	Bent at Powerpipe works
200	25°	32°	Bent at Powerpipe works

Accuracy of manufacture	DN 2*80 - 2*200	+/- 2°
Steel service pipe	In the manufacturing of curved pipes welded steel pipes are used. For manufacturing reasons alarm wires are placed in the neutral position.	

Article No..
1523-DN-xxx-000 (STANDARD)
1623-DN-xxx-000 (DOUBLE+)

xxx = degrees

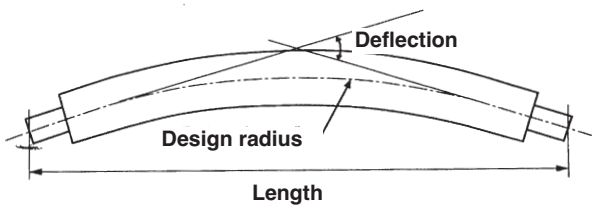
An example of how to order:
Curved Double pipe L = 12m with dim DN 2*100 curved 15°, standard,
has Article No. 1523-100-015-000.

Deflection shall be stated in a separate line of text.

Curved pipes

Deflection versus design radius

PN 16/PN25



CORRELATION BETWEEN DEFLECTION AND DESIGN RADIUS

Deflection	Design radius L = 12 m	Deflection	Design radius L = 12 m
1°	690	21°	33,0
2°	345	22°	31,0
3°	230	23°	30,0
4°	170	24°	29,0
5°	140	25°	28,0
6°	115	26°	27,0
7°	98	27°	26,0
8°	86	28°	25,0
9°	76	29°	24,0
10°	69	30°	23,2
11°	62	31°	22,5
12°	57	32°	21,8
13°	53	33°	21,1
14°	49	34°	20,5
15°	46	35°	20,0
16°	43	36°	19,4
17°	40	37°	18,9
18°	38	38°	18,4
19°	36	39°	18,0
20°	34	40°	17,5

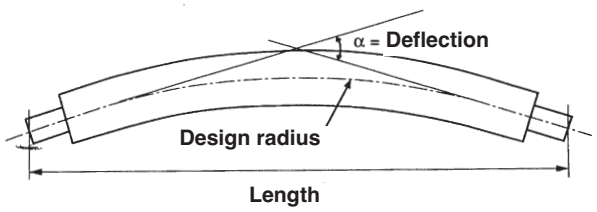
The pipes cannot be bent along its entire length. At each pipe end a straight part will remain, which shall be approximately 2 meters in length.

This deviation from an ideal curved pipe radius is to be compensated when installing the pipe by making the pipe trench approximately wider at center.
The widening should be ~200 mm at deviation < 10°
The widening should be ~500 mm at deviation > 10°

Curved pipes

Elastic radius

PN 16/PN25



ELASTIC RADIUS

Dimension	Elastic radius m	Deflection/ 12 m
25	15	45°
40	21	31°
50	27	25°
65	34	20°
80	40	17°
100	52	13°
125	63	11°
150	76	9°
200	98	7°

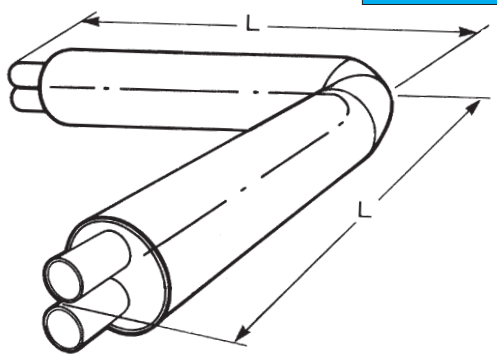
The above table shows the elastic radius which is the maximum radius or deflection that can be allowed without permanent deformation in the steel pipe.

DOUBLE PIPES

Bend

Horizontal

PN 16/PN25



ARTICLE NO. 2500, 2600, 2700

		STANDARD 2500	DOUBLE+ 2600	DOUBLE++ 2700	
DN	Service pipe Dy x s [mm]	Jacket pipe DY [mm]	Jacket pipe DY [mm]	Jacket pipe DY [mm]	L [mm]
20	26,9 x 2,0	140	160	180	1000
25	33,7 x 2,3	140	160	180	1000
32	42,4 x 2,6	160	180	200	1000
40	48,3 x 2,6	160	180	200	1000
50	60,3 x 2,9	200	225	250	1000
65	76,1 x 2,9	225	250	280	1000
80	88,9 x 3,2	250	280	315	1000
100	114,3 x 3,6	315	355	400	1000
125	139,7 x 3,6	400	450	500	1000
150	168,3 x 4,0	450	500	560	1000
200	219,1 x 4,5	560	630	710	1000

Bends are, as standard, available as 90° and 45°.
Bends having other degrees such as 75°, 60°, 30° and 15° and bends having leg lengths other than specified in the above table can be delivered on special request.

Article No..
2500-DN-degree of bend-000 (STANDARD)
2600-DN-degree of bend-000 (DOUBLE+)
2700-DN-degree of bend-000 (DOUBLE++)

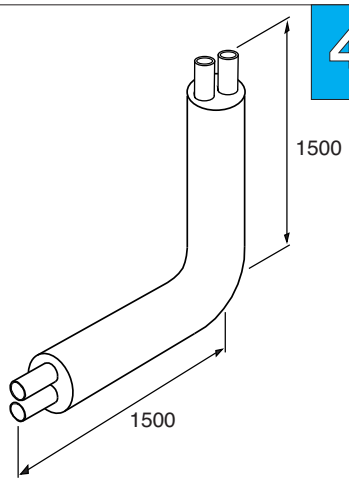
An example of how to order:
Bend Double pipe Standard dim DN 2*80, 90°
has Article No. 2500-080-900-000.

Space for sleeve
In order to adequately fit sleeve
Installation of DN2*50–2*125 an
Extended shank 1200 x 1200 mm
is offered. State suffix: 999

Termination bend, 90° vertical

Can be ordered with end cap.

PN 16/PN25



TERMINATION BEND 2510, 2610, 2710		STANDARD 2510	DOUBLE+ 2610	DOUBLE++ 2710
DN	Service pipe Dy x s [mm]	Service pipe Dy [mm]	Service pipe Dy [mm]	Service pipe Dy [mm
20	26,9 x 2,0	140	160	180
25	33,7 x 2,3	140	160	180
32	42,4 x 2,6	160	180	200
40	48,3 x 2,6	160	180	200
50	60,3 x 2,9	200	225	250
65	76,1 x 2,9	225	250	280
80	88,9 x 3,2	250	280	315
100	114,3 x 3,6	315	355	400
125	139,7 x 3,6	400	450	500
150	168,3 x 4,0	450	500	560

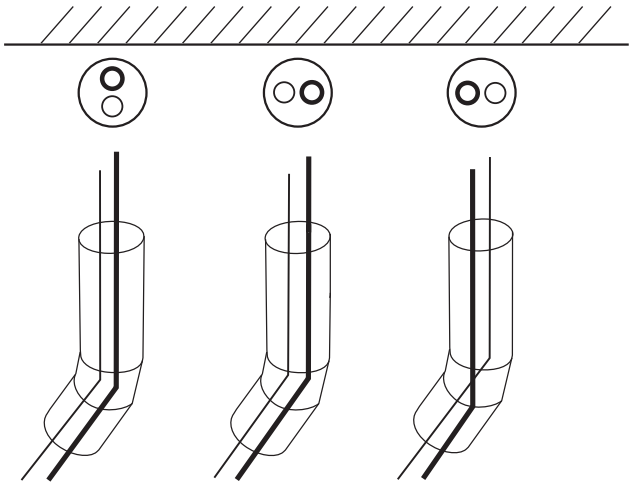
The termination bend is also available in versions with the upward rise of 90 °, see figure below!
Termination bend 90°, with another leg length and other degree of bend can be supplied on request.

Article No.
2510-DN-000-000 (STANDARD)
2610-DN-000-000 (DOUBLE+)
2710-DN-000-000 (DOUBLE++)

Can be ordered with end cap. (State suffix -811)

Pipe under - right prefix 032
Pipe under - left prefix 031

An example of how to order:
Termination bend Double Standard pipe with dim DN 2*50, standard design under - rise right
has Article No. 2510-050-000-032.



-000

-032
pipe under-
right

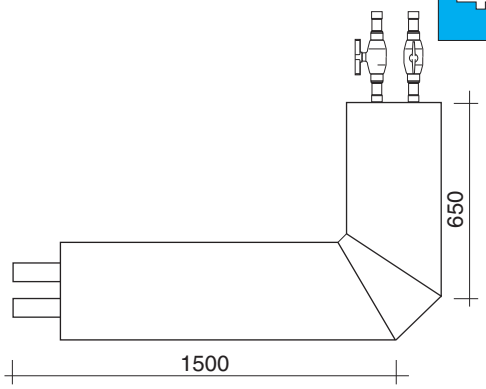
-031
pipe under-
left

Keep the plastic emballage on during installation!

Edition 2014

Termination bend for Facade adaptering, DN 20-25

PN 16/PN25



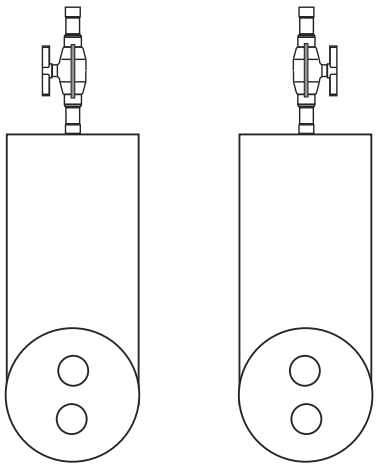
ARTIKEL NO 2540, 2640, 2740

DN	Service pipe Dy x s [mm]	Standard 2540 Jacket pipe Dy [mm]	Double+ 2640 Jacket pipe Dy [mm]	Double++ 2740 Jacket pipe Dy [mm]
20	26,9 x 2,0	140	160	180
25	33,7 x 2,3	140	160	180

Termination bend designed for façade installation comes with DN 20 valve and extended neck.
Red handles are adaptered on the front line, blue on the return line.
Termination bend can be delivered with exteded length of bend length - max 7 m.
Available in angled design.

Article No..
2540-DN-000-000 (STANDARD)
2640-DN-000-000 (DOUBLE+)
2740-DN-000-000 (DOUBLE++)

An example of how to order:
Termination bend for facade installation, DN25 with handle right has Article No. 2540-025-000-032.



– 031
Handle left

– 032
Handle right

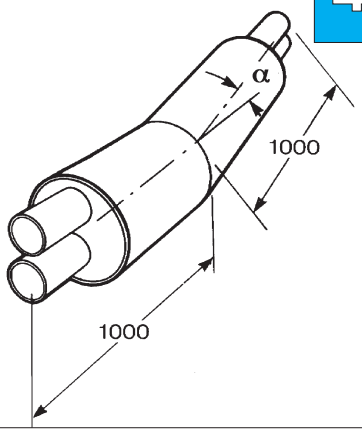
NOTE: The valves must be operated at least twice a year to ensure proper function.

Edition 2014

DOUBLE PIPES

Profile bend

PN 16/PN25



PROFILE BEND 2520, 2620, 2720		STANDARD 2520	DOUBLE+ 2620	DOUBLE++ 2720
DN	Service pipe Dy x s [mm]	Jacket pipe Dy [mm]	Jacket pipe Dy [mm]	Jacket pipe Dy [mm]
25	33,7 x 2,3	140	160	180
32	42,4 x 2,6	160	180	200
40	48,3 x 2,6	160	180	200
50	60,3 x 2,9	200	225	250
65	76,1 x 2,9	225	250	280
80	88,9 x 3,2	250	280	315
100	114,3 x 3,6	315	355	400
125	139,7 x 3,6	400	450	500
150	168,3 x 4,0	450	500	560
200	219,1 x 4,5	560		

Bend can be obtained by any angle.

Article No.
2520-DN-xxx-000 (STANDARD)
2620-DN-xxx-000 (DOUBLE+)
2720-DN-xxx0-000 (DOUBLE++)

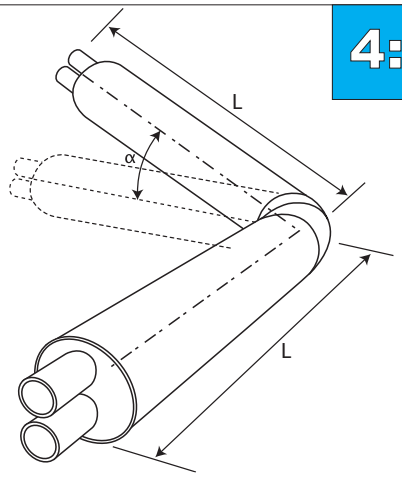
xxx = degrees

An example of how to order:
Profile bend Dobule pipe with dim DN 2*80, angle 8°
has Article No. 2520-080-008-000.

Bend out of plane

90° degree bend out of plane to cover changes in direction in profile.

PN 16/PN25



ARTICLE NO. 2510, 2610, 2710

		STANDARD 2510	DOUBLE+ 2610	DOUBLE++ 2710	
DN	Service pipe Dy x s [mm]	Jacket pipe DY [mm]	Jacket pipe DY [mm]	Jacket pipe DY [mm]	L x L [mm]
25	33,7 x 2,3	140	160	180	1000 x 1000
32	42,4 x 2,6	160	180	200	1000 x 1000
40	48,3 x 2,6	160	180	200	1000 x 1000
50	60,3 x 2,9	200	225	250	1000 x 1000
65	76,1 x 2,9	225	250	280	1000 x 1000
80	88,9 x 3,2	250	280	315	1000 x 1000
100	114,3 x 3,6	315	355	400	1000 x 1000
125	139,7 x 3,6	400	450	500	1000 x 1000
150	168,3 x 4,0	450	500	560	1200 x 1200
200	219,1 x 4,5	560			1200 x 1200

Standard degree of bend horisontally is 90°
Angle in profile is optional.

α°	3	5	7,5	10	12,5	15	20	25
h(mm)	50	90	180	170	215	260	240	420

Article No..

2510-DN-000-032	STANDARD, Right hand design
2510-DN-000-031	STANDARD, Left hand design
2610-DN-000-032	DOUBLE+, Right hand design
2610-DN-000-031	DOUBLE+, Left hand design
2710-DN-000-032	DOUBLE++, Right hand design
2710-DN-000-031	DOUBLE++, Left hand design

An example of how to order:
Bend Double pipe with dim DN 2*80, 90° , standard, right hand design has Article No. 2510-080-000-032.
Angle of deflection has to be written in a separate text line.

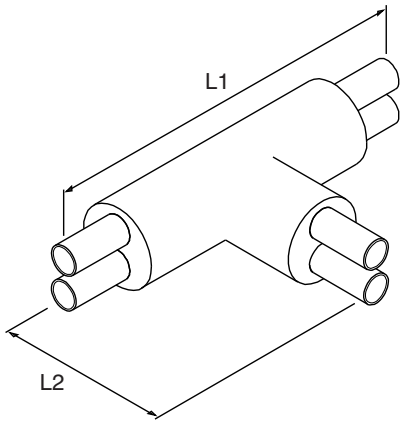
Edition 2014

DOUBLE PIPES

T-piece

Powerpipe T-pieces are as standard delivered in a reinforced design, increased thickness and, if necessary, increased steel quality.
Branch can be installed without discharging dog leg.

PN 16/PN25



ARTICLE NO. 3510, 3610, 3710

					STANDARD 3510	DOUBLE+ 3610	DOUBLE++ 3710
Main pipe DN	**Branch pipe DN**	**L1 [mm]**	**L2 [mm]**	**DN**	**Jacket pipe Dy [mm]**	**Jacket pipe Dy [mm]**	**Jacket pipe Dy [mm]**
25-200	25-100	1200	700	25	140	160	180
125-200	125-150	1500	900	32	160	180	200
200	150	1600	900	40	160	180	200
200	200	1600	900	50	200	225	250
				65	225	250	280
				80	250	280	315
				100	315	355	400
				125	400	450	500
				150	450	500	560
				200	560	630	710

The branch pipe cannot be designed in dimensions bigger than the main pipe.

Article No..
3510-DN main pipe -DN branch pipe-000 (Standard)
3610-DN main pipe -DN branch pipe-000 (Double+)
3610-DN main pipe -DN branch pipe-000 (Double++)

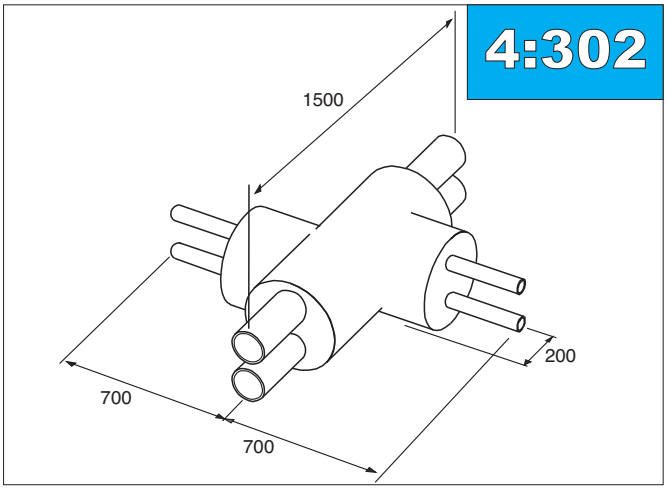
An example of how to order:
T-piece Double pipe with main pipe DN 2*100, standard, and branch pipe DN 2*50, has Article No. 3510-100-050-000.
Alt. (extended T-piece) has Article No. 3510-100-050-999

Space for sleeve
In order to adequately fit sleeve when Installing T-piece, we offer a version with extension:
L1- dimension by 200 mm.
L2- dimension by 1.000 mm.
State suffix: 999.

Intersection unit

T-pieces are as standard delivered in a reinforced design, increased thickness and,if necessary, increased steel quality. Branch can be installed without discharging dog leg.

PN 16/PN25



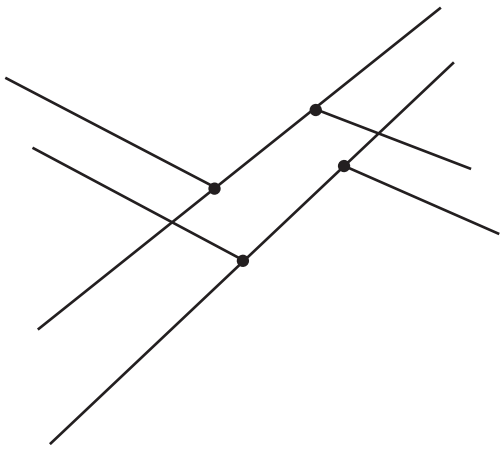
ARTICLE NO. 3570, 3670, 3770

			STANDARD 3570	DOUBLE+ 3670	DOUBLE++ 3770
Main pipe DN	**Branch pipe DN**	**DN**	**Jacket pipe Dy [mm]**	**Jacket pipe Dy [mm]**	**Jacket pipe Dy [mm]**
25-200	25-65	25	140	160	180
		32	160	180	200
		40	160	180	200
		50	200	225	250
		65	225	250	280
		80	250	280	315
		100	315	355	400
		125	400	450	500
		150	450	500	560
		200	560		

The branch pipe cannot be designed in dimensions larger than the main pipe.
Powerpipe can on request deliver T-pieces in a non reinforced design.

Article No.
3570-DN main pipe-DN branch pipe-000 (STANDARD)
3670-DN main pipe-DN branch pipe-000 (DOUBLE+)
3770-DN main pipe-DN branch pipe-000 (DOUBLE++)

An example of how to order:
Intersection unit with main pipe
DN 2*65, standard, and branch pipe DN 2*32
has Article No. 3570-065-032-000.



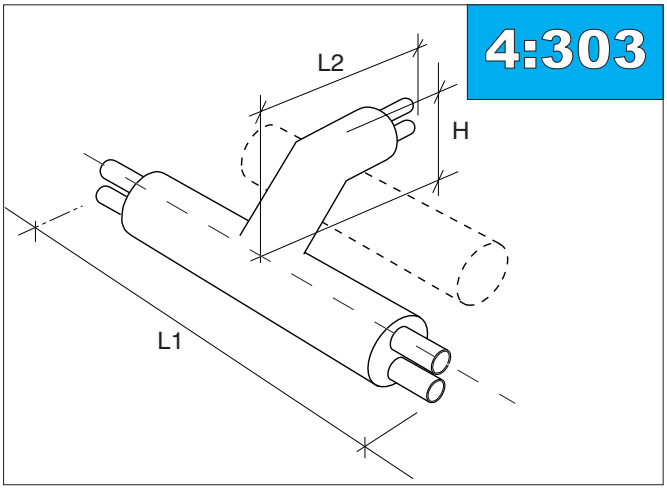
Edition 2014

DOUBLE PIPES

T-piece with horisontal deflection

Powerpipe T-pieces are as standard delivered in a reinforced design and if necessary with increased steel quality.
Must be installed with discharging dog leg.

PN 16/PN25



ARTICLE NO. 3510, 3610, 3710

					STANDARD 3510	DOUBLE+ 3610	DOUBLE+ 3710
Main pipe DN	**Branch pipe DN**	**L1 [mm]**	**L2 [mm]**	**DN**	**Jacket pipe Dy [mm]**	**Jacket pipe Dy [mm]**	**Jacket pipe Dy [mm]**
25-100	25-100	1200	1000	25	140	160	180
				32	160	180	200
				40	160	180	200
125-200	25-100	1200	1200	50	200	225	250
125-200	125-200	1500	1500	65	225	250	280
				80	250	280	315
				100	315	355	400
				125	400	450	500
				150	450	500	560
				200	560		

H= Dy main pipe + 50 mm.
The branch pipe cannot be designed in dimensions bigger than the main pipe.
NOTE! The branch pipe on the T-piece out of plane will need a discharging dog leg.

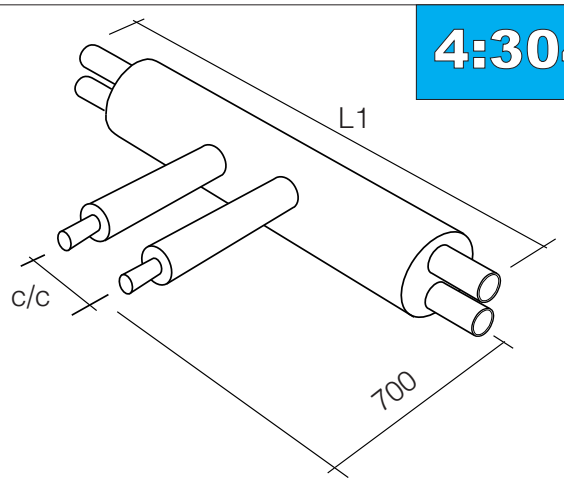
Article No..
3510-DN main pipe-DN branch pipe-238 (STANDARD)
3610-DN main pipe-DN branch pipe-238 (DOUBLE+)
3710-DN main pipe-DN branch pipe-238 (DOUBLE++)

An example of how to order:
T-piece Double pipe
with main pipe DN 2*100, standard, and branch pipe DN 2*50,
has Article No. 3510-100-050-238.

T-piece Double/single

Powerpipe T-pieces are as standard delivered in a reinforced design and if necessary with increased steel quality.
Branch pipe can be installed without discharging dog leg.

PN 16/PN25

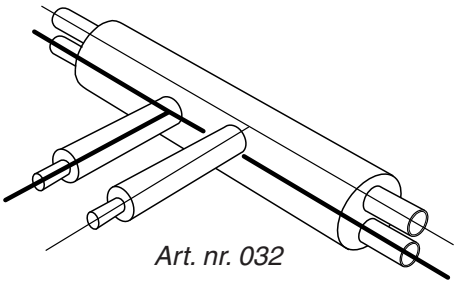


ARTICLE NO. 3520, 3620, 3720

Main pipe DN	Branch pipe [mm]	L1 [mm]	Branch pipe	c/c
DN 2*25-200	DN20-80	1500	20	310
			25	310
			32	325
			40	325
			50	340
			65	360
			80	380

As standard the branch pipe is insulated according to Series 2.

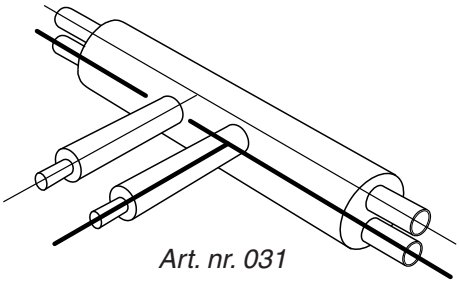
Article No..
3520-DN main pipe-DN branch pipe-000 (STANDARD)
3620-DN main pipe-DN branch pipe-000 (DOUBLE+)
3720-DN main pipe-DN branch pipe-000 (DOUBLE++)



Art. nr. 032

An example of how to order:
T-piece Double/single standard design with main pipe DN 2*65 and branch pipe DN 25 (Series 2) has Article No. 3520-065-025-000

Right 032
Left 031

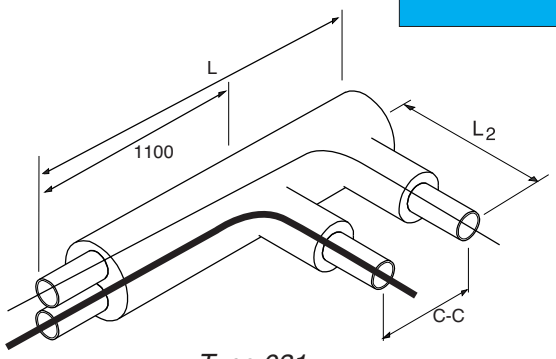


Art. nr. 031

Edition 2014

Transition unit single-double pipe, knee type

PN 16/PN25



Type 031

ARTICLE NO. 1580, 1680, 1780

Dim DN	C-C [mm]	L [mm]	L2 [mm]
25	265	1410	700
32	280	1430	700
40	280	1430	700
50	295	1440	700
65	315	1460	700
80	335	1480	700
100	430	1575	700
125	460	1600	700
150	535	1630	700
200	615	1705	900

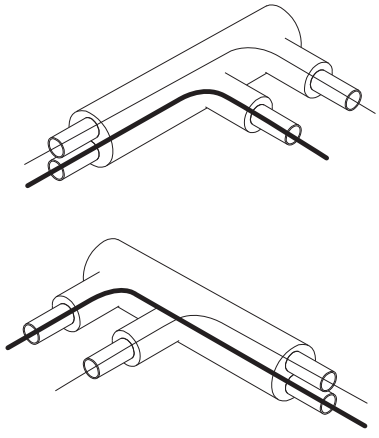
NOTE! This solution is not designed to absorb axial forces or movements from single pipes.
As standard branches for single pipes are delivered in Series 2 for 1580, 1680 = S3, 1780 = S4.

F = Flow (marked with a white dot on the steel pipe).

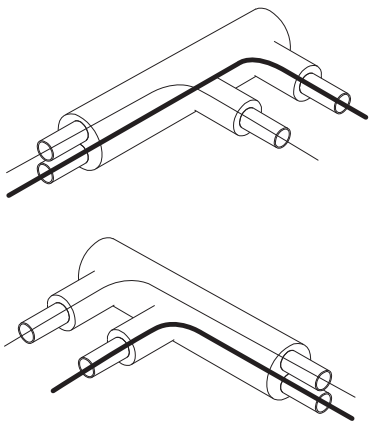
R = Return

Article No..
1580-DN-000-031 (STANDARD)
1580-DN-000-032 (STANDARD)
1680-DN-000-031 (DOUBLE+)
1680-DN-000-032 (DOUBLE+)
1780-DN-000-031 (DOUBLE++)
1780-DN-000-032 (DOUBLE++)

An example of how to order:
Transition unit DN 50, standard, right hand flow has Article No. 1580-050-000-032.



Left hand flow with flowpipe under
031



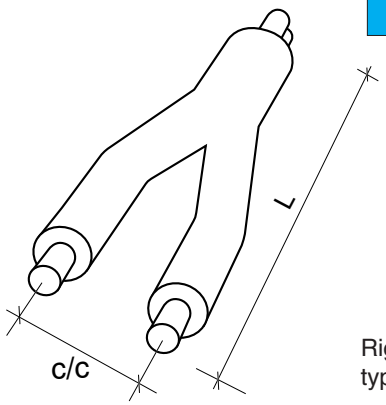
Right hand flow with flowpipe under
032

Edition 2014

Transition unit single – double pipe, straight type

Can be used between single and double pipes at big expansion forces.

PN 16/PN25



Right hand flow
type 032

ARTICLE NO. 1590, 1690, 1790

DN	C-C [mm]	L [mm]
25	270	1973
32	280	1971
40	280	1971
50	305	1966
65	330	1966
80	360	1962
100	425	1955
125	530	2500
150	570	2500
200	710	2500

Branches for single pipe are delivered 1590 in Series 2. 1690 = S3, 1790 = S4

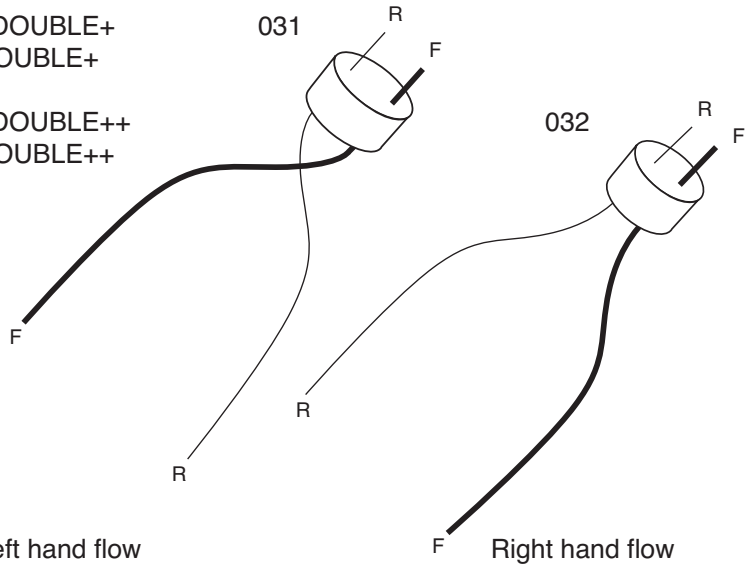
Article No..

1590 DN main pipe-000-032 right hand flow STANDARD
1590 DN main pipe-000-031 left hand flow STANDARD

1690 DN main pipe-000-032 right hand flow DOUBLE+
1690 DN main pipe-000-031 left hand flow DOUBLE+

1790 DN main pipe-000-032 right hand flow DOUBLE++
1790 DN main pipe-000-031 left hand flow DOUBLE++

An example of how to order:
Transition unit single-double pipe, straight, DN 50, standard, left hand flow has Article No. 1590-050-000-031.



Left hand flow
Flowpipe under
031

Right hand flow
Flowpipe under
032

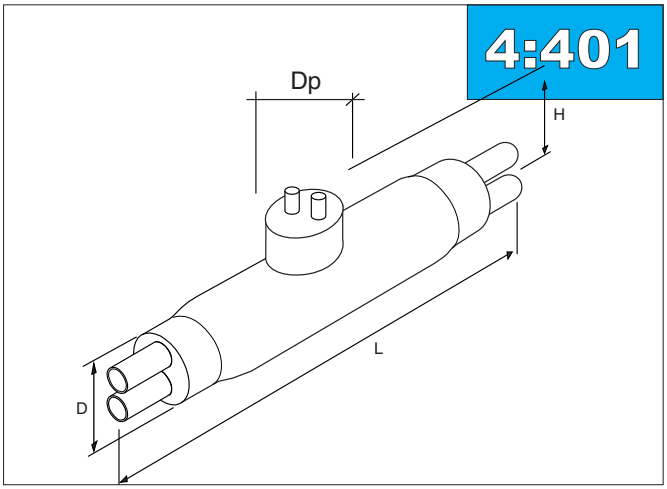
Edition 2014

Preinsulated valves

The unit consists of a maintenance free ball valve in a fully welded housing together with a corrosion free ball. All valves according to EN448 are supplied to stand the yield strength as the pipe line.

The alarmwire are linked through the stainless steel

PN 16/PN25



ARTICLE NO. 4500, 4600, 4700

		STANDARD 4500	DOUBLE+ 4600	DOUBLE++ 4700					
DN	Service pipe 2 pc Dy x s [mm]	Jacket pipe DY [mm]	Jacket pipe DY [mm]	Jacket pipe DY [mm]	L [mm]	H [mm]	Dp [mm]	Wrench size [mm]	
25	33,7 x 2,3	140	160	180	2300	409	150	19	
32	42,4 x 2,6	160	180	200	2300	422	170	19	
40	48,3 x 2,6	160	180	200	2300	435	170	19	Adapter for T-key
50	60,3 x 2,9	200	225	250	2400	451	190	19	
65	76,1 x 2,9	225	250	280	2400	463	190	19	
80	88,9 x 3,2	250	280	315	2600	483	190	19	
100	114,3 x 3,6	315	355	400	2800	519	235	27	
125	139,7 x 3,6	400	455	500	3200	540	235	27	
150	168,3 x 4,0	450	500	560	3400	578	295	27	Adapter for portablel gear
200	219,1 x 4,5	560			3600	652	295	50	

The valve is protected by a hut of stainless steel as a standard. Please see 8:102

Article No..
4500-DN-000-000 (STANDARD)
4600-DN-000-000 (DOUBLE+)
4700-DN-000-000 (DOUBLE++)

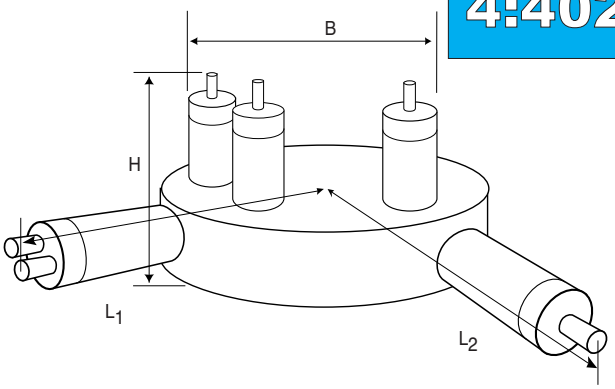
An example of how to order:
Preinsulated valve for main pipe dim DN 2*100, standard has Article No. 4500-100-000-000.

Please observe: the included ball valve has to be operated at least twice/ year in order to ensure a good function.

Please observe: Do not refill above the sealing.
The sealing shall not be below water table continously.

Valve unit, Compact

PN 16/PN25



Right hand outlet

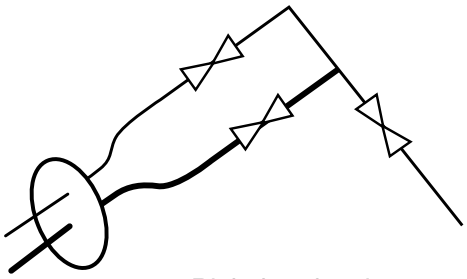
ARTICLE NO. 4570, 4670, 4770

DN	Standard 4570 Service pipe Dy[mm]	Double+ 4670 Dy[mm]	Double++ 4770 Dy[mm]	H Standard [mm]	H Min [mm]	B [mm]	L1 [mm]	L2 [mm]
25	140	160	180	480	190	400	800	500
40	160	180	200	495	200	450	920	705
50	200	225	250	500	210	450	1020	725

The drainage pipe is manufactured in stainless steel.

Article No..
4570-DN-000-000 (STANDARD)

Right hand outlet has prefix 032
Left hand outlet has prefix 031.
Valve unit with minimal stem height specifies separately.



Right hand outlet

An example of how to order:
Valve unit, compact, right hand outlet standard design dim DN50 has Article No. 4570-050-000-032.

Please observe: the included ball valve has to be operated at least twice/ year in order to ensure a good function.

Please observe: Do not refill above the sealing.
The sealing should not be lying under water continously.

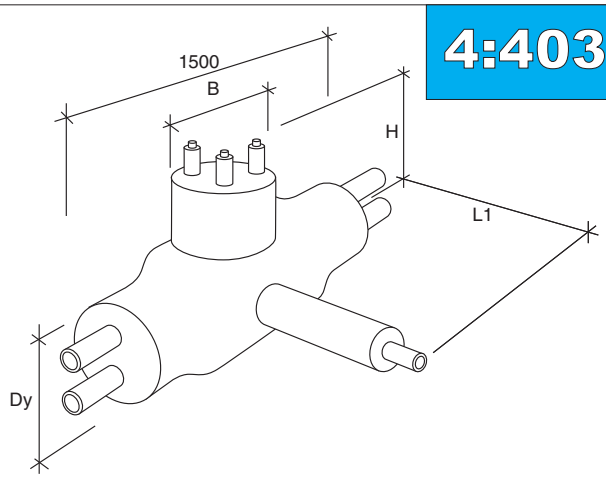
Edition 2014

Valve unit, direct

The unit can be used as both drainage and air release.

The alarmwire are linked through the stainless steel.

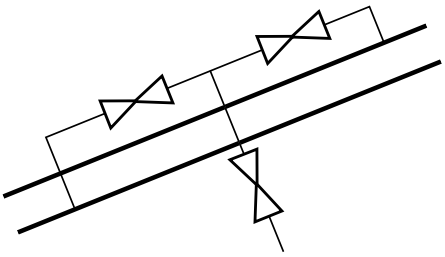
PN 16/PN25



ARTICLE NO. 4575, 4675, 4775

		STANDARD 4575	DOUBLE+ 4675	DOUBLE++ 4775					
DN	Dy x s [mm]	Jacket pipe DY [mm]	Jacket pipe DY [mm]	Jacket pipe DY [mm]	L1 [mm]	DN Out	Wrench size [mm]	B [mm]	H [mm]
40	48,3 x 2,6	160	180	200	550	25	19	295	480
50	60,3 x 2,9	200	225	250	555	25	19	295	480
65	76,1 x 2,9	225	250	280	565	25	19	295	480
80	88,9 x 3,2	250	280	315	640	32	19	295	485
100	114,3 x 3,6	315	355	400	720	40	27	295	485
125	139,9 x 3,6	400	450	500	720	40	27	315	485
150	168,3 x 4,0	450	500	560	720	40	27	315	485

Article No.
4575-DN main pipe-000-000 (STANDARD)
4675-DN main pipe-000-000 (DOUBLE+)
4775-DN main pipe-000-000 (DOUBLE++)



An example of how to order:
Valve unit left, double pipe standard with Dim DN 2 * 50 (with air realese/drainage DN 25) has Article No. 4575-050-000-000.

Please observe: the included ball valve has to be operated at least twice/ year in order to ensure a good function.

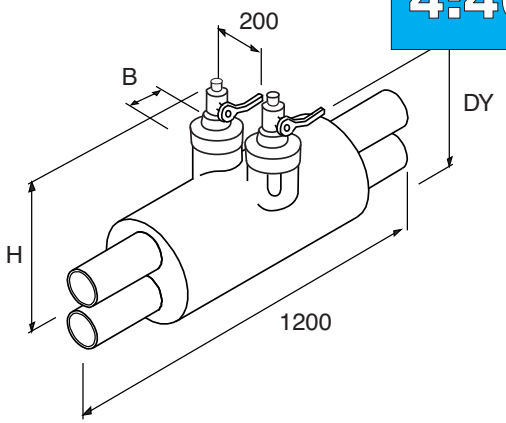
Please observe: Do not refill above the sealing.
The sealing shall not be lying under water continously.

Edition 2014

Air release/ drainage

The alarmwires are linked outside the sealing.

PN 16/PN25



ARTICLE NO. 3540, 3640, 3740

Main pipe DN	Service pipe 2 pc Dy x s [mm]	STANDARD 3540 Jacket pipe DY [mm]	DOUBLE+ 3640 Jacket pipe DY [mm]	DOUBLE++ 3740 Jacket pipe DY [mm]	H [mm]	Air release/ drainage DN	B-measure [mm]
25	33,7 x 2,3	140	160	180	437	25	110
32	42,4 x 2,6	160	180	200	445	40	110
40	48,3 x 2,6	160	180	200	451	50	125
50	60,3 x 2,9	200	225	250	463	65	140
65	76,1 x 2,9	225	250	280	479		
80	88,9 x 3,2	250	280	315	495		
100	114,3 x 3,6	315	355	400	520		
125	139,7 x 3,6	400	450	500	548		
150	168,3 x 4,0	450	500	560	581		
200	219,1 x 4,5	560			634		

Air release/ drainage units manufactured in dimensions dim. DN 25, DN 40, DN 50 och DN 65.

Air release/ drainage units are delivered with a screwed on plug.

The valve is protected by a end cap as a standard. Please see 8:102

Article No..
3540-DN main pipe-DN air release-000 (STANDARD)
3640-DN main pipe-DN air release-000 (DOUBLE+)
3740-DN main pipe-DN air release-000 (DOUBLE++)

An example of how to order:
Air release unit for main pipe dim DN 2*100, standard
and air release unit DN 25, has Article No. 3540-100-025-000.

Please observe: the included ball valve has to be operated at least twice/year in order to ensure a good function.

Please observe: Do not refill above the sealing.
The sealing should not be lying under water continously.

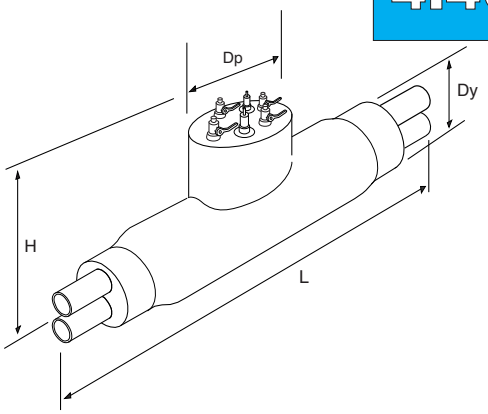
Edition 2014

Valve unit with air release on one or both sides

Valve units are delivered in conformance with Swedish District Heating Association's delivery requirements and EN 488.

The alarmwire are linked through the stainless steel.

PN 16/PN25



VALVE UNIT WITH AIR RELEASE ON ONE OR BOTH SIDES 4541, 4542, 4641, 4642

	STANDARD 4541, 4542	DOUBLE+ 4641, 4642	DOUBLE++ 4741, 4742					
DN	Jacket pipe Dy [mm]	Jacket pipe Dy [mm]	Jacket pipe Dy [mm]	L [mm]	H [mm]	Dp [mm]	Wrench size [mm]	
40	160	180	200	2300	440	235	19	Adapter for T-key
50	200	225	250	2400	451	295	19	
65	225	250	280	2400	463	295	19	
80	250	280	315	2600	483	295	19	
100	315	355	400	2800	519	295	27	
125	400	450	500	3200	540	340	27	
150	450	500	560	3400	578	415	27	Adapter for portablel gear

Air release delivered in DN25.

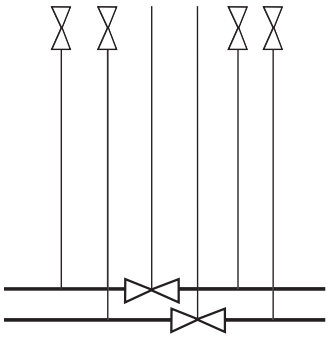
Available with pulled-up alarm wires
Air release on one side has Article no 4541
Air release on both sides has Article no 4542

Article No..
4541-DN-000-000 (STANDARD) with one air release
4542-DN-000-000 (STANDARD) with two air releases

4641-DN-000-000 (DOUBLE+) with one air release
4642-DN-000-000 (DOUBLE+) with two air releases

4741-DN-000-000 (DOUBLE++) with one air release
4742-DN-000-000 (DOUBLE++) with two air releases

An example of how to order:
Valve unit with air release on both sides DN 2*80, standard has Article No. 4542-080-000-000.



Principle sketch

Please observe: the included ball valve has to be operated at least twice/year in order to ensure a good function.

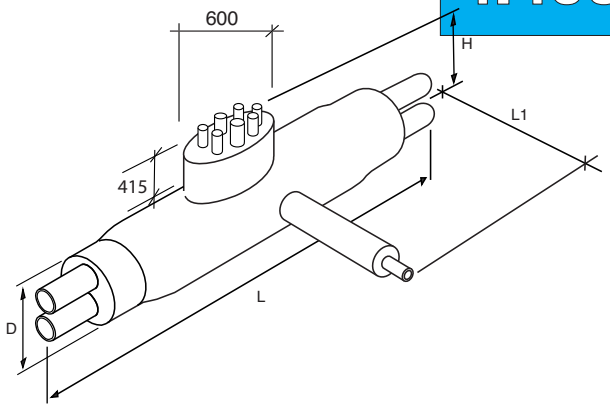
Please observe: Do not refill above the sealing.
The sealing should not be lying under water continously.

Combination valve Double, double sided

Valve units are delivered in conformance with Swedish District Heating Association's delivery requirements and EN 488.

The alarmwires are linked through the stainless steel.

PN 16/PN25

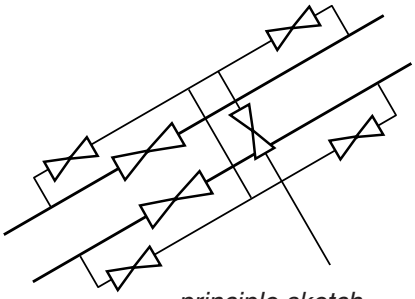


ARTICLE NO. 4845, 4846, 4847

		STANDARD 4845	DOUBLE+ 4846	DOUBLE++ 4847					
DN	Service pipe 2 pc Dy x s [mm]	Jacket pipe DY [mm]	Jacket pipe DY [mm]	Jacket pipe DY [mm]	L [mm]	H [mm]	L1 [mm]	Dp [mm]	Wrench size [mm]
40	48,3 x 2,6	160	180	200	1600	435	700		19 *
50	60,3 x 2,9	200	225	250	1700	451	700	230	19 *
65	76,1 x 2,9	225	250	280	1700	463	700	230	19 *
80	88,9 x 3,2	250	280	315	1900	483	700	230	19 *
100	114,3 x 3,6	315	355	400	2150	519	700	230	27 *
125	139,7 x 3,6	400	455	500	2200	540	700	230	27 *
150	168,3 x 4,0	450	500	560	2550	578	700		27 **
200	219,1 x 4,5	560			2600	652	900		50 **

* Adapter for T-key
** Adapter for portablel gear

Air release in DN25
The valve is protected by a end cap as a standard.
See page 8:102



principle sketch

Article No.
4845-DN-000-000 (STANDARD)
4846-DN-000-000 (DOUBLE+)
4847-DN-000-000 (DOUBLE++)

An example of how to order:
Combination valve, double pipe standard design in dim DN 2* 100, has Article No.
4845-100-000-000.

Please observe: the included ball valve has to be operated at least twice/year in order to ensure a good function.

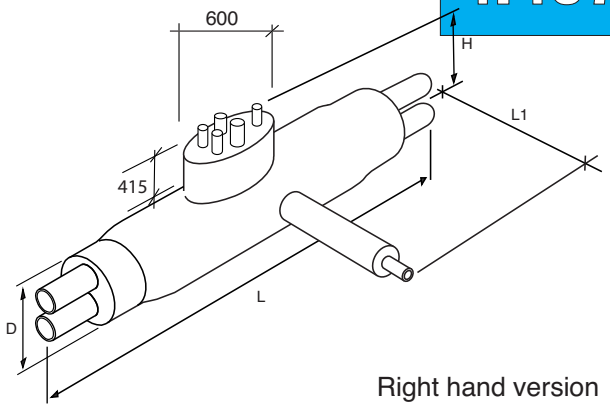
Please observe: Do not refill above the sealing.
The sealing shall not be below water table continously.

Combination valve Double, double sided

Valve units are delivered in conformance with Swedish District Heating Association's delivery requirements and EN 488.

The alarmwires are linked through the stainless steel.

PN 16/PN25



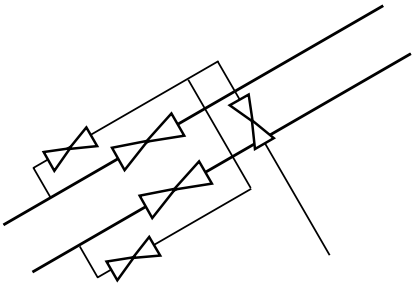
Right hand version

ARTICLE NO. 4745, 4746, 4747

		STANDARD 4745	DOUBLE+ 4746	DOUBLE++ 4747					
DN	Service pipe 2 pc Dy x s [mm]	Jacket pipe DY [mm]	Jacket pipe DY [mm]	Jacket pipe DY [mm]	L [mm]	H [mm]	L1 [mm]	Dp [mm]	Wrench size [mm]
40	48,3 x 2,6	160	180	200	1600	435	700		19 *
50	60,3 x 2,9	200	225	250	1700	451	700	230	19 *
65	76,1 x 2,9	225	250	280	1700	463	700	230	19 *
80	88,9 x 3,2	250	280	315	1900	483	700	230	19 *
100	114,3 x 3,6	315	355	400	2150	519	700	230	27 *
125	139,7 x 3,6	400	455	500	2200	540	700	230	27 *
150	168,3 x 4,0	450	500	560	2550	578	700		27 **
200	219,1 x 4,5	560			2600	652	900		50 **

* Adapter for T-key
** Adapter for portablel gear

Air release in DN25
The valve is protected by a end cap as a standard.
See page 8:102



principle sketch,
right hand version 032 prefix

Article No.
4745-DN-000-000 (STANDARD)
4746-DN-000-000 (DOUBLE+)
4747-DN-000-000 (DOUBLE++)

Right hand version has prefix 032
Left hand version has prefix 031

An example of how to order:
Combination valve, double pipe, right hand version dim DN 2* 100, has Article No. 4745-100-000-032.

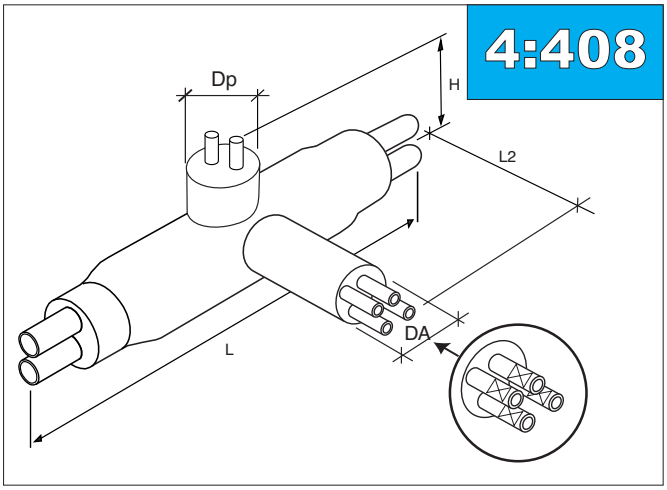
Please observe: the included ball valve has to be operated at least twice/year in order to ensure a good function.

Please observe: Do not refill above the sealing.
The sealing shall not be below water table continously.

Valve unit with prodtected air release/drainage

The alarmwires are linked outside the sealing.

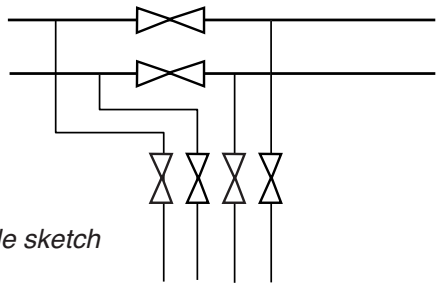
PN 16/PN25



ARTICLE NO. 4542, 4642, 4742, in design 635							Air release/drainage		
Main pipe DN	L [mm]	Dp [mm]	Air release DN [mm]	H [mm]	Wrench size [mm]		DN	DA [mm]	L2 [mm]
40	1700	230	25	435	19		25	305	300
50	1700	230	25	451	19				
65	1700	230	25	463	19	Adapter for T-key			
80	1900	230	25	483	19				
100	2150	230	25	519	27				
125	2200	230	25	540	27				
150	2250	230	25	578	27	Adapter for portable gear			
200	2600		25	652	50				

Air release-/drainage valves are equipped with stainless steel screw plugs and are available in dimensions DN 25.
Connections can be made in the threaded end.
Valve stems are facing upwards. Delivered with the same dimensions on both air release / drainage valves.

The valve is supplied with end cap for spindle as standard.
See page 8:102



principle sketch

An example of how to order:
Ventil series 2 with main pipe DN 2*100 and air release DN 25 in 635 design, has Article No.4542-100-025-635.

Please observe: the included ball valve has to be operated at least twice/year in order to ensure a good function.

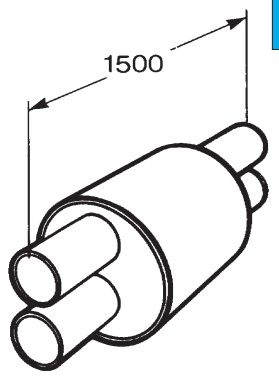
Please observe: Do not refill above the sealing. The sealing shall not be below water table continously.

Edition 2014

Fixed pipe section

Pipe lines installed with double pipes which are not terminated by a bend, transition unit, valve or T-piece shall be completed with a fixed pipe section before pre-heating/ commissioning of the pipe line. Alternatively, steel pipes fixed with fixplates according to the manufacturer's instructions.

PN 16/PN25



FIXED PIPE SECTION 1520, 1620

DN	STANDARD 1520 Jacket pipe Dy [mm]	DOUBLE+ 1620 Jacket pipe Dy [mm]	DOUBLE++ 1720 Jacket pipe Dy [mm]
25	140	160	180
32	160	180	200
40	160	180	200
50	200	225	250
65	225	250	280
80	250	280	315
100	315	355	400
125	400	450	500
150	450	500	560
200	560		

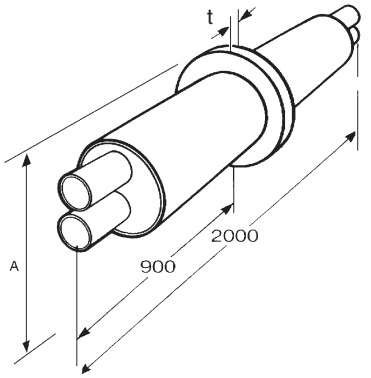
Article No..
1520-DN-000-000 (STANDARD)
1620-DN-000-000 (DOUBLE+)
1720-DN-000-000 (DOUBLE++)

An example of how to order:
Fixed pipe section for a main Double pipe DN 2 x 50, standard has Article No. 1520-050-000-000.

Anchor unit

The anchor unit is designed for casting into concrete. Dimensioning pressure force in concrete 5 MN/ m² (50 kg/ cm²), standard value in ground 0,15 MN/ m² (1,5 kg/ cm²), standard value.

PN 16/PN25



ANCOR UNIT 5500, 5600, 5700

DN	Max load (kN) Δ T = 60°C	A [mm]	t [mm]	Pressure area [cm²]
25	63	250	20	337
32	82	300	20	505
40	93	300	20	505
50	130	300	20	390
65	167	350	30	565
80	215	400	30	765
100	315	450	30	810
125	385	550	35	1120
150	515	650	40	1720
200	750	750	40	1950

Δ T is the deviation from the average operating temperature of the pre-insulated pipe line

$$\frac{(Tf \times Tr)}{2}$$

Tp = flow line temperature
Tr = return line temperature

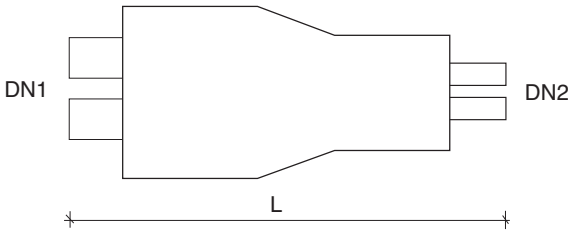
Article No.
5500-DN-000-000 (STANDARD)
5600-DN-000-000 (DOUBLE+)
5700-DN-000-000 (DOUBLE++)

An example of how to order:
Anchor unit for DN 2*50, standard, hasArticle No.5500-050-000-000.

Reduction unit

Alternatively, the reduction can becarried out in the field with eccentric steel cones and reducer casings.

PN 16/PN25



REDUCTION UNIT 1575, 1675, 1775

DN1/DN2	DN25	DN32	DN40	DN50	DN65	DN80	DN100	DN125	DN150	Length [mm]
32	x									1100
40	x	x								1100
50		x	x							1100
65			x	x						1100
80				x	x					1100
100					x	x				1100
125						x	x			1100
150							x	x		1300
200								x	x	1300

The detail is used at change of dimentsion
Table gives the standard dimension for reduction unit.

Article No..
1575-DN1-DN2-000 (STANDARD)
1675-DN1-DN2-000 (DOUBLE+)
1775-DN1-DN2-000 (DOUBLE++)

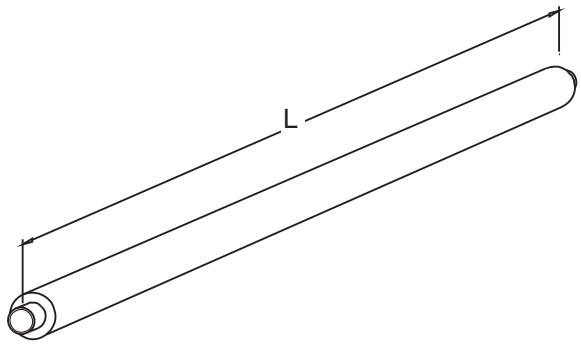
An example of how to order:
Reduction unit for pipes DN 2*50 to DN 2*40
has Article No. 1575-050-040-000.

NOTE:
Consult the designer where the reduction has to be placed and what size.

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	42,0	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	42,0	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

ARTICLE N0 2100, 3100, 4100, 5100 mfl.
Bends, T-pieces, Anchor points, Curved pipes and valves are manufactured in accordance with the implementation of district heating pipes, series 1. See Ch. 3!

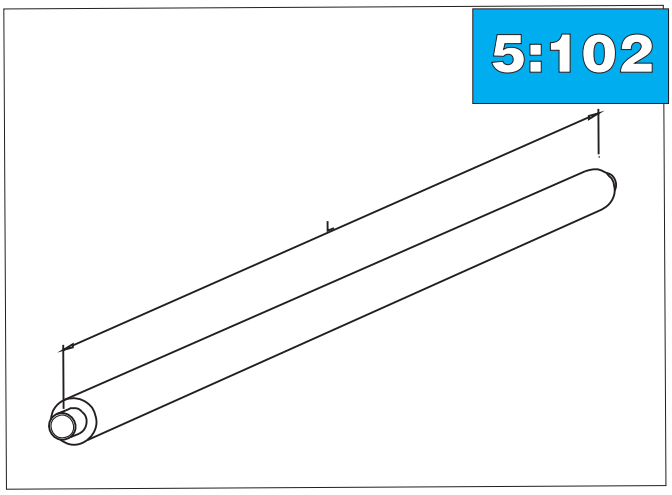
Article no.
2100-DN-degrees-000 (Bends) 3100-DN main pipe-DN branch-000 (T-pieces)
4100-DN-000-000 (Valves) 5100-DN-000-000 (Anchor point)

Order example: A 90° bend / DN 400/500 has Article No. 2100-400-900-000.

District cooling pipe systems

Insulated pressure pipes

Article no. 12 m district cooling: 1903-DN-000-000
16 m district cooling: 1904-DN-000-000



According EN12001/EN 13244. the free end states when placing order, depending on the welding method on the service pipe

ARTIKEL NR 1903, 1904

Dy Pressure pipe	SDR 26/PN6 Service pipe *[mm]	SDR 17/PN10 Service pipe *[mm]	SDR11/PN16 Service pipe *[mm]	Series 0 Jacket pipe DY [mm]	Series 1 Jacket pipe DY [mm]
20			2,5	90	90
25			2,7	90	90
32		2,0	2,9	90	90
40		2,4	3,7	110	110
50		3,0	4,6	110	110
63	2,5	3,8	5,8	125	125
75	2,9	4,5	6,8	140	140
90	3,5	5,4	8,2	160	160
110	4,2	6,6	10,0	180	200
125	4,8	7,4	11,4	200	200
140	5,4	8,3	12,7	200	225
160	6,2	9,5	14,6	225	250
180	6,9	10,7	16,4	250	250
200	7,7	11,9	18,2	280	315
225	8,6	13,4	20,5	280	315
250	9,6	14,8	22,7	355	400
280	10,7	16,6	25,4	355	400
315	12,1	18,7	28,6	400	450
355	13,6	21,1	32,3	450	500
400	15,3	23,7	36,4	500	560
450	17,2	26,7	40,9	560	560
500	19,1	29,7	45,4	630	630
560	21,4	33,2	50,8	710	710
630	24,2	37,4	57,2	710	710
710	27,2	42,1	64,5	800	800
800	30,6	47,4	72,6	900	900
900	34,4	53,3	81,7	1000	1000

*Wall thickness

Details such as bends,T-pieces, valves, etc.
Article no. 2900, 3900, 4900 etc.

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.

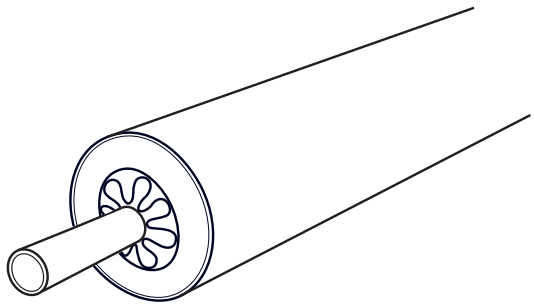
Pipes for condensated water are delivered as standard high temperature pipes or standard Powerpipe district heating pipes. The pipes are delivered with alarm wires for moisture monitoring.

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

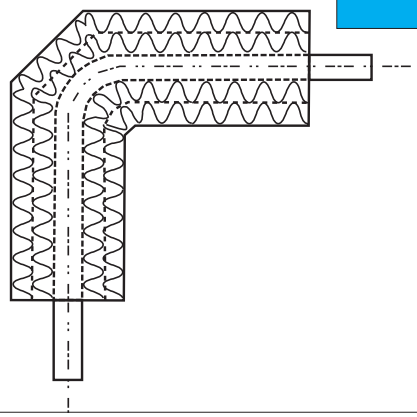
xxx = steel quality where St 35.8.1 is labelled as 003 / St 37.8.1 is labelled as 004.
P235GH is labelled as 479
P265GH is labelled as 480
In need of other material qualities please consult Powerpipe.

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.

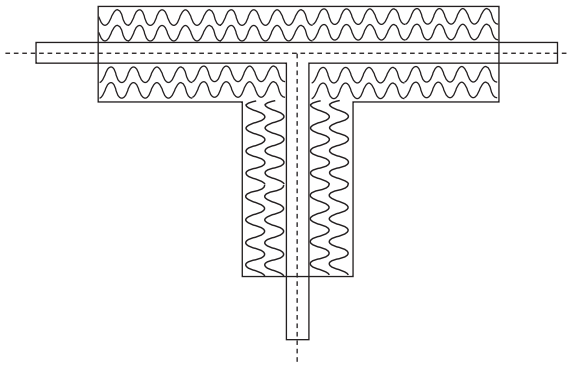
An example of how to order:
Connecting bend with steel DN 100 med PEH Jacket pipe 315 mm with steel quality St 37.8.1
has Article No. 2810-100-315-004.

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.

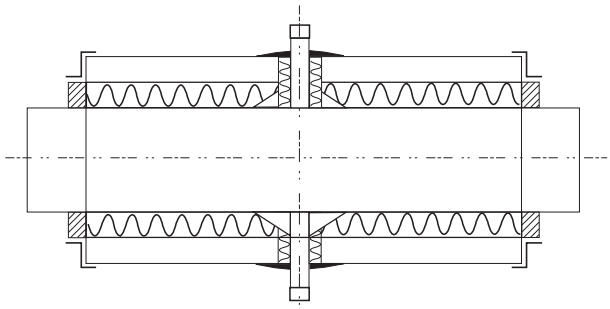
An example of how to order:
Straight T-piece with main pipe DN100 and branch DN65
and steel quality St 37.8.1
has Article No. 3830-100-065-004.

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.

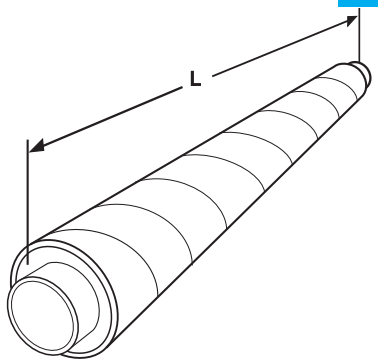
Article No.
5800-DN-Dy-xxx

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

Series 1 and Series 2



ARTICLE NO. 1103, 1203						Transmission capacity Δ T = 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.

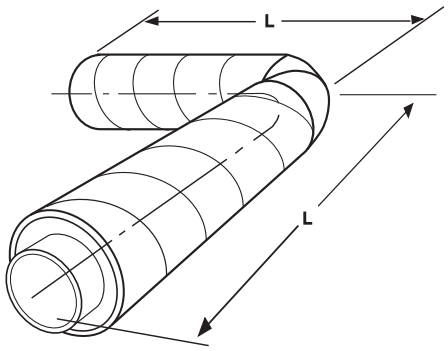
Pipes and insulation can be delivered in fire classed performance according to NT FIRE 036, class P1 on demand.

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

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

Edition 2013

District heating for small houses 5:401

General

Powerpipe´s 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

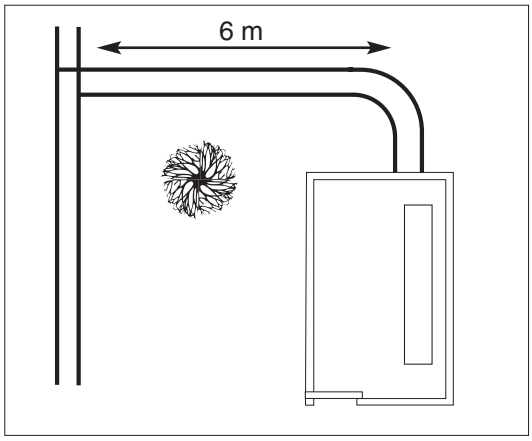
Flexpipe, copper single pipes	5:502
Flexpipe, copper double pipes	5:502
Flexpipe, steel single pipes	5:503
Standard double pipes	Chapter 4
Extra insulated double pipes	Chapter 4

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

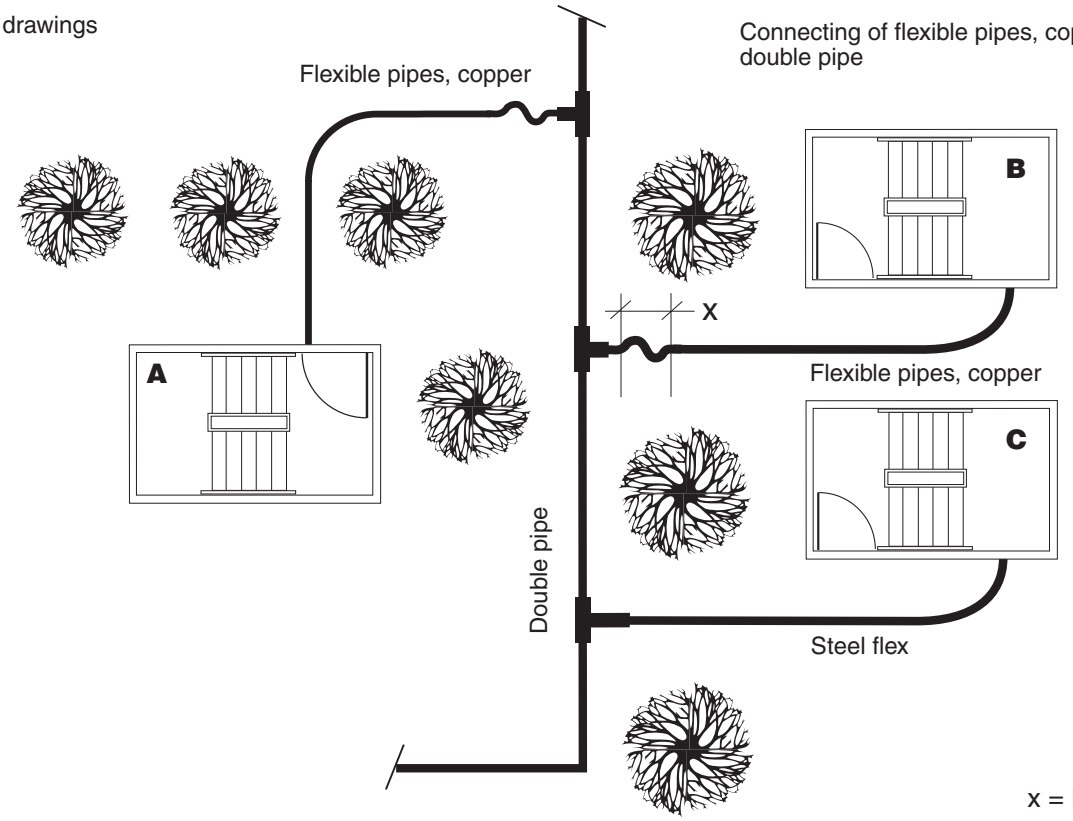
- The system is assembled as a solid system and are mounted cold without any special expansion. absorbing details. Pre-heating of the pipe before insulation / backfill is recomended.
- The service pipe of the branch is welded to the main pipeline. Branch installed between flexible pipe and main pipe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

Connection main pipe

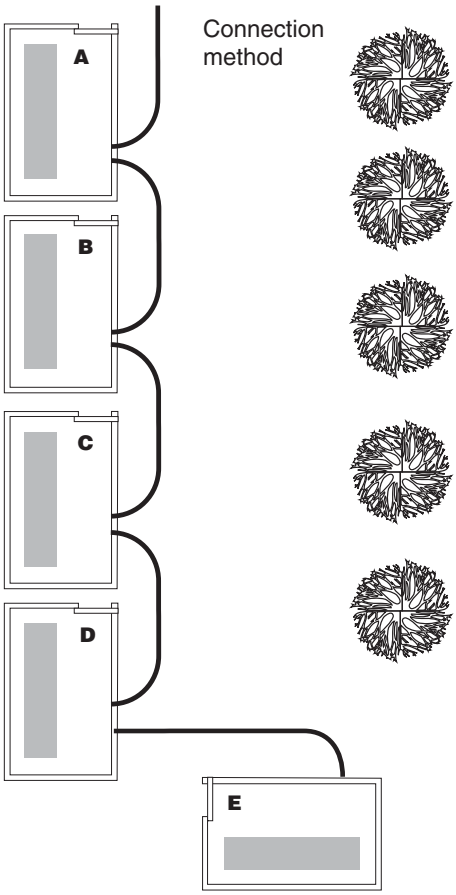
- Connecting to main pipe including foaming takes place according to Chapter 10 and with details, see the ex Joints 6:503 and 6:504..
- Special expansion absorbing details are required.

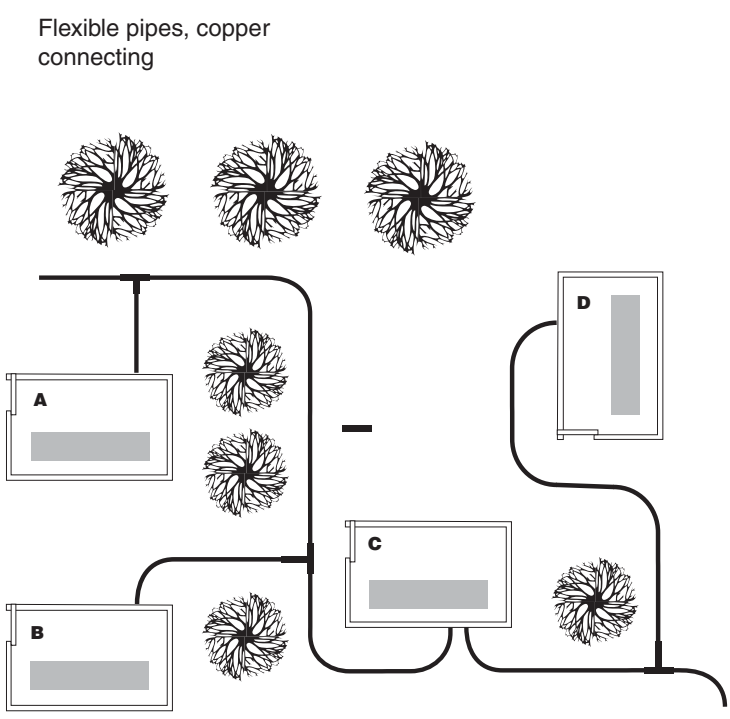
Laying of steel- and copper pipes 5:403

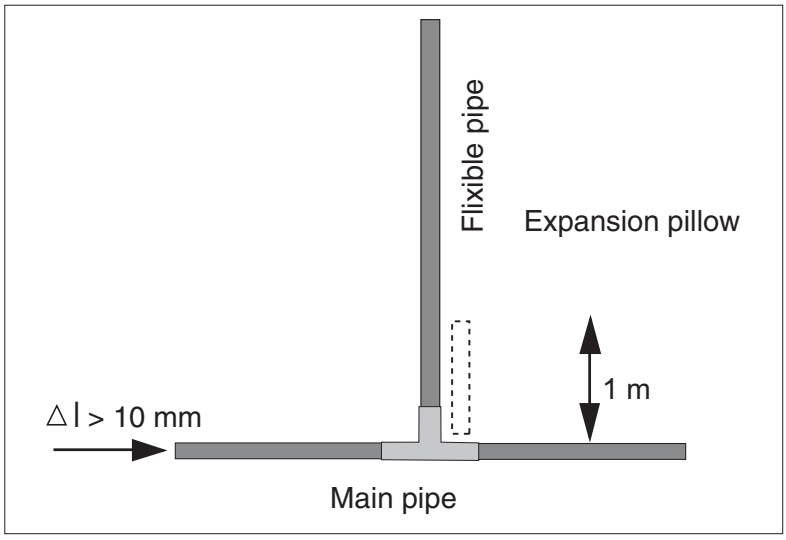
Type drawings



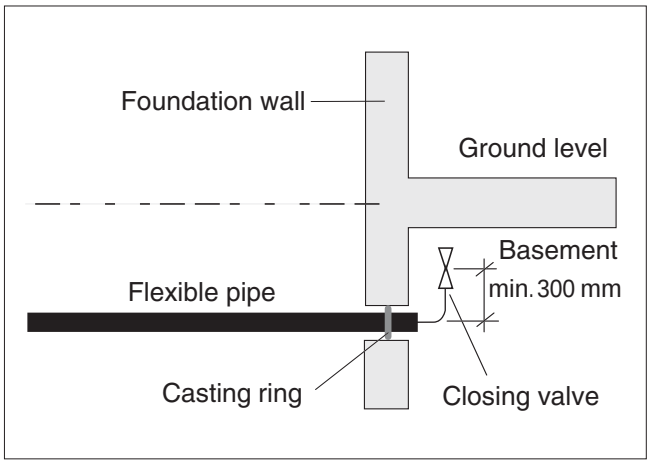
x = Min. 50 cm.



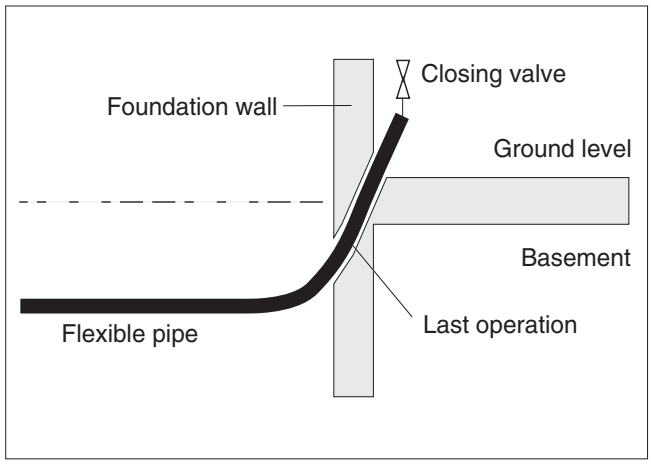




Relief of flexible pipe at large axial movement.



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.

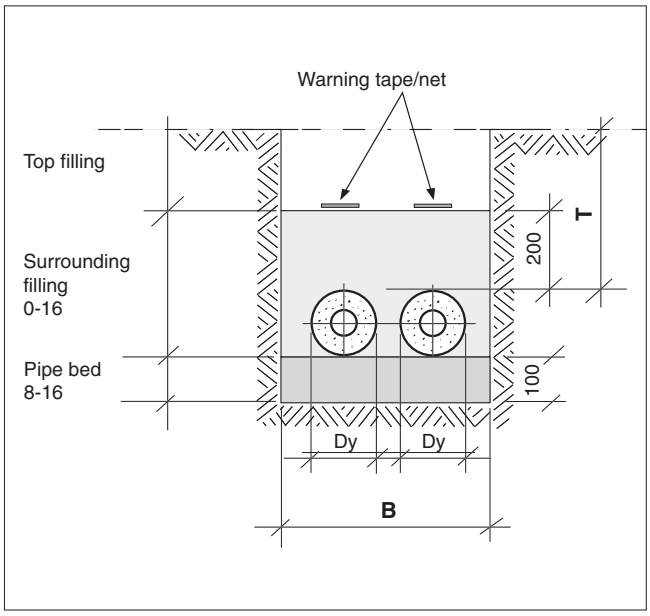
For house connecting, the pipe is bent up from the ground with Powerpipe bending tool type B.
Connecting to main pipeline is performed with Powerpipe T-sleeve, see Chapter 6, Joints.

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

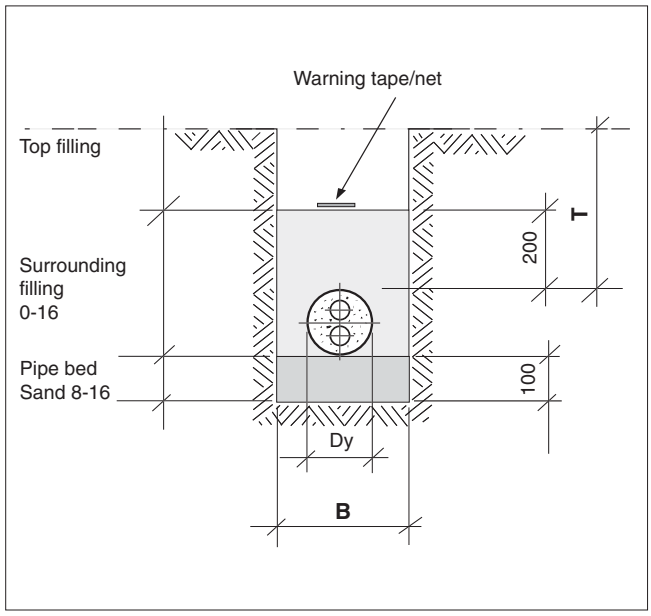


Alternatively, pipes can be layed without sand directly on the trench bottom and backfilled with stone-free existing soil.

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..

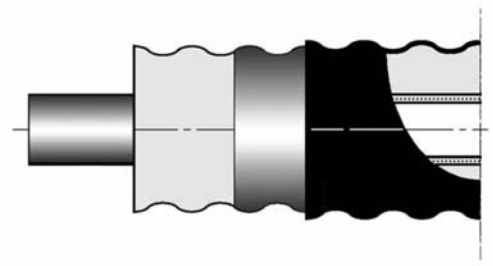
Propellant:	Cyclopentane
Qualities	
Density	>60 kg/m3
Heat transfer-ability	0,024 W/m°K (Koppar, stålflex) 0,025 W/m°K (Casaflex)
Number of closed cells	>90%
Water absorption	<10%

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 Δ T = 50°C, Δ p = 1 mbar/m kW	Bend radius min m	Delivery-length m
1366-022	22x1,0	91x2,2	1,61	0,31	27	0,8	* 100
1266-028	28x1,2	91x2,2	1,90	0,51	50	0,8	* 100
1266-035*)	35x1,5	91x2,2	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 Δ T = 50°C, Δ p = 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.

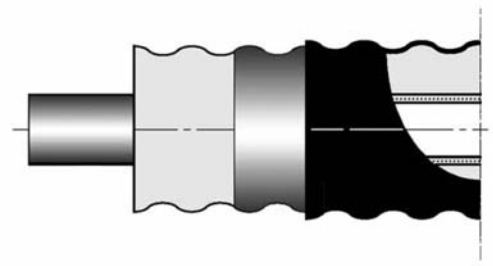
*) NOTE! These single and double flexible pipes can be purchased on special order. Not in stock.

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 Δ T = 50°C, Δ p = 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.

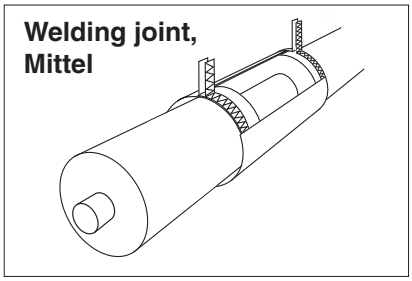
Overview

Welding joint
A welding connection of the Jacket pipe on a District heating pipe means that PEH-materials in the pipe and sleeve are welded together at the touching surfaces.

Material Requirements

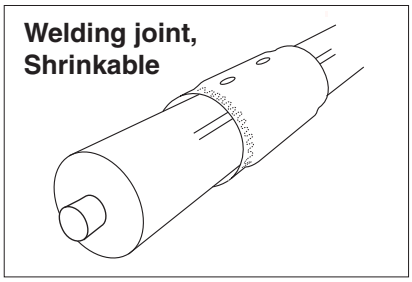
Welding joint, Mittel
The sleeve consists of a slotted sleeve which are welded to the jacket pipe and extruder-welded longitudinally.

- Casing
- Welding sleeve
- Welding plugs

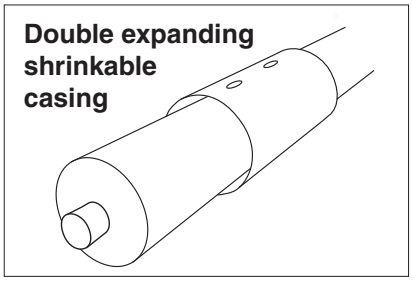


Welding joint, Shrink
The sleeve consists of a sleeve of PEH that first shrinks against the jacket pipe and then is weldet to the pipe.

- Casing
- Welding sleeve
- Welding plugs

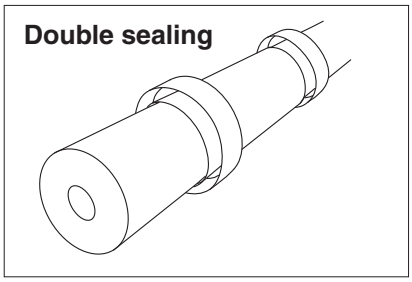


Shrinkable casing
Shringkable casing is a bond between the jacket pipess where the sleeve by shrinkage is joining the jacket pipe and produces a seal/power transmission. The seal consists of a layer of mastic between the sleeve and the pipe.



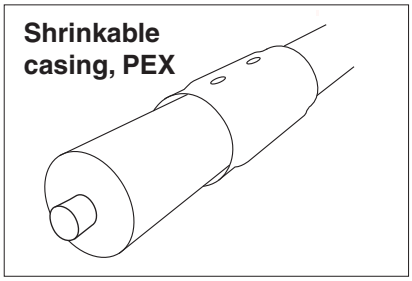
Double expanding PEH
The shrink sleeeve is made of PEH and expanded in two stages.

- Shrink casing DX
- Extra wide mastic band
- Welding plugs
- Fops



Shrinkable casing, PEH, double sealing
The casing is made of PEH and is always fitted with shrink sleeves as an extra seal and are then called double sealing.

- Shrink casing DTK
- Mastic band
- Shrinkable sleeve
- Welding plugs
- Fops



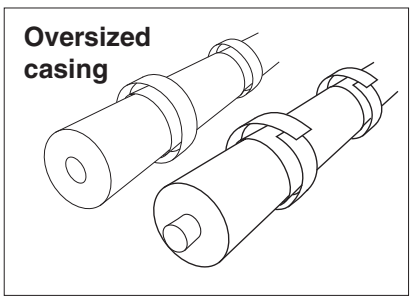
Shrinkabel casing, PEX
The casing is made of PEX. This casing can be used without heat shrink sleeves.

- Shrink casing PEX
- Mastic band
- Welding plugs
- Fops

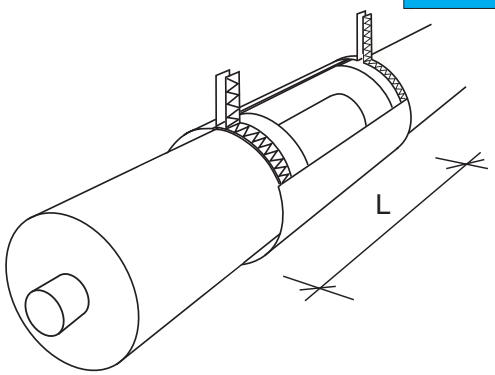
Oversized casing
Oversized casing is a bond between the jacket pipes where the sealing between the casing and pipe consists of shrinkable sleeves.

Oversized casing are primarily used at low dsensity requirements. For example indoor, installation in tunnels etc.

- Oversized casing
- Wedger
- Shrinkable sleeve
- Welding plugs
- Fops



Electro welded joint Mittel



ARTICLE NO 6110

Powerpipe offers a joint made by Mittel AB. The method involves a slotted sleeve assembled to the district heating pipe, which is surrounded by a conductive metal net.
Connecting surfaces are welded together under pressure and under controlled temperature conditions.
Finally, the longitudinal slit is welded together by a specially designed extruder equipment.
The joint can be pressure tested before foaming.
Can be delivered in different lengths (standard = 700 mm) used for example for repairs.

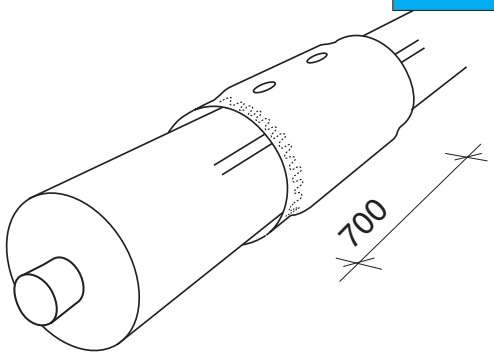
Joint set, Mittel

Article No.	Dim PEH jacket pipe [mm]
6110-DY jacket pipe	90-1000

For dimensions Ø500 and bigger the joint is delivered slotted.

An example of how to order:
Welding joint set, Mittel for DN 500/710 (seies 2)
has Aricle No. 6110-710-000-000.

Welding joint, shrinkable



ARTICLE NO 6112

Powerpipe offers a joint named Welding joint, shrinkable. The method involves a shrinking sleeve assembled to the district heating pipe, which is surrounded by a conductive copper element between sleeve and jacket pipe. Connecting surfaces are, after the shrinking process welded together under pressure and under controlled temperature conditions. The joint can be pressure tested before foaming.

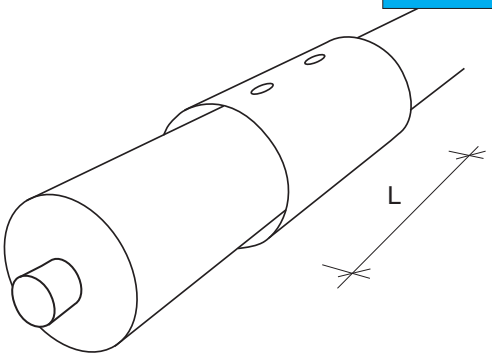
Joint set Welding joint, shrinkable

Article No.	Dim PEH jacket pipe [mm]
6112-DY jacket pipe	225-1000

An example of how to order:
Welding joint, shrinkable for DN 500/710 (seies 2)
has Aricle No. 6112-710-000-000.

Double expanded shrinkable sleeve

HDPE



ARTICLE NO 6361

Double expanded shrinkable casing DX is a shrinkable casing, made of HDPE. An extra wide sealant mastic strip positioned between the casing and jacket pipe. Installation is done with a soft gas torch and thanks to the double expanding sleeves large casing, a cohesive and reliable joint is obtained.
The joint is pressure tested after cooling and after foam insulation, the foam- and air holes are welded.

Joint set, Double expanding shrinkable sleeve

HDPE jacket pipe DY [mm]	Max possible shrinking L[mm]	D[mm] (combined with shrink sleeve)
90	700	
110	700	90
125	700	110
140	700	125
160	700	140
180	700	160
200	700	180
225	730	200
250	730	225
280	730	250
315	730	280
355	730	315
400	730	355
450	730	400
500	730	450
560	730	500
630	730	560
710	730	630
800	730	710
900	730	800

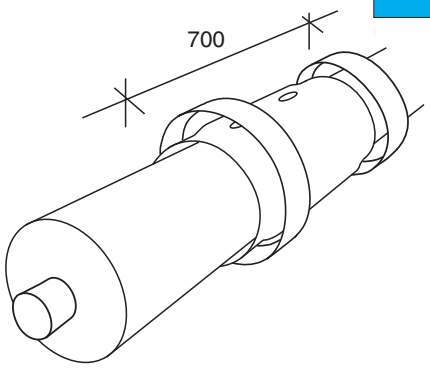
Article No.
6361-DY jacket pipe-000-000

An example on how to order:
Shrinkable sleeve PEX to DN 80/180
has Aricle No. 6361-180-000-000.

Required wide woven mastic band: See page 8:301

Double sealing shrinkable sleeve (kit)

HDPE



ARTICLE NO 6364

Double shrink DTK is a shrinkable sleeve, made of HDPE. A wide sealant mastic strip is placed between the sleeve and jacket pipe. Installation is done with a gas torch . The shrinkable sleeve comes with shrink-sleeves and therefore the joint is double sealed.
The joint is pressure tested after cooling and after foam insulation, the foamholes are closed.

JOINT SET

Article No.	Jacket pipe DY [mm]	Shrinkable sleeve D [mm]	Tubular sleeve Width [mm]	
6364-090	90	103	150	
6364-110	110	125	150	
6364-125	125	140	150	
6364-140	140	156	150	
6364-160	160	177	150	shrink sleeve
6364-180	180	197	150	tubular
6364-200	200	218	150	
6364-225	225	244	150	
6364-250	250	269	150	
6364-280	280	300	150	
6364-315	315	336	225	
6364-355	355	377	225	
6364-400	400	425	225	
6364-450	450	474	225	
6364-500	500	530	225	
6364-560	560	590	225	
6364-630	630	660	300	
6364-710	710	749	300	shrink sleeve
6364-800	800	838	300	open
6364-900	900	949	300	

Required mastic is supplied separately.

Article No.
6364 - Dy jacket pipe-000-000 includes two shrink sleeves / tubular sleeves.

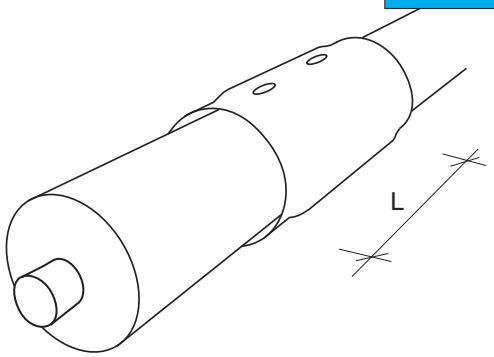
An example on how to order:
Double sealing shrink casing DN 80/180
has Aricle No. 6364-180-000-000.

For casing in dimensions <Ø315 increased thickness (4,5 mm) can be obained.
State suffix 777

Separate woven mastic strip (width approximately 60 mm, length 25 m) has Article No. 6550-012-000-000
Separate plastic mastic strip (width approximately 70 mm, length 25 m) has Article No. 6550-004-000-000

Heat-shrinkable sleeve,

PEX



ARTICLE NO 6362

Shrinkable sleeve, PEX is a heat-shrinkable oversized casing constructed of multiple, crosslinked, high density polyethylene layers. A wide sealant mastic strip is wrapped around the ends of the pipe under the sleeve. Installation is made with a gas torch and due to the crosslinked material, both shrinking behaviour and shrink forces are predicted and controlled. The shrinkable sleeve can be used in combination with heat-shrinkable tubular casing as additional outside sealing. see 6:401.
The joint is recommended to be pressure tested after cooling and the holes are welded after foaming.

Joint set Heat shrinkable sleeve PEX

PEH jacket pipe DY [mm]	L[mm]	Sleeve as supplied D[mm]	Max possible shrinked D[mm]
90	700	103	90
110	700	125	110
125	700	140	125
140	700	156	140
160	700	177	160
180	700	197	180
200	700	218	200
225	730	244	212
250	730	270	230
280	730	300	256
315	730	335	285
355	730	378	327
400	730	425	366
450	730	478	413
500	730	530	460
560	730	592	510
630	730	672	592
710	730	755	665
800	730	845	753
900	730	944	851

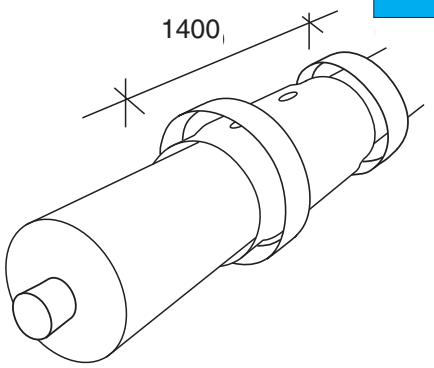
The product is supplied in the kit with separate mastic and the required distances.

Article No.
6362-DY jacket pipe-000-000

An example on how to order:
Heat shrinkable casing PEX to DN 80/180
has Aricle No. 6362-180-000-000.

Double sealing shrinkable sleeve (kit)

HDPE



ARTICLE NO 6364

Double sealing shrinkable sleeve DTK is produced of HDPE. A wide sealant mastic strip is wrapped around the ends of the pipe under the sleeve. Installation is made with a gas torch. The additional use of shrink sleeves make the joint double sealed.
The joint is pressure tested after cooling and the holes are welded after foaming. Minimal wall tickness on the casing is 4,5 mm.

REPARI KIT

Jacket pipe DY [mm]	Shrinkable sleeve D [mm]	Tubular sleeve width [mm]	
90	103	150	
110	125	150	
125	140	150	
140	156	150	
160	177	150	Tubular sleeve
180	197	150	
200	218	150	
225	244	150	
250	269	150	
280	300	150	
315	336	225	

Required mastic is supplied separately.

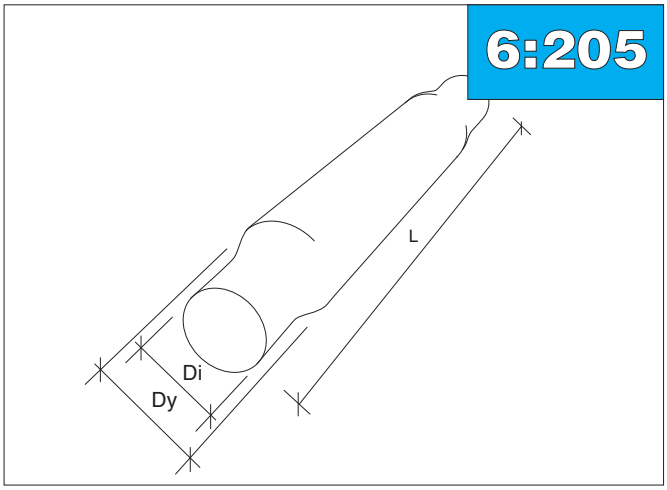
Article No.
6364 - Dy jacket pipe-140-000 for repair contains two shrinking sleeves.

An example on how to order:
Double sealing repair kit to DN 80/180
has Aricle No. 6364-180-140-000.

Required Extra wide vowen mastic strip: see page 8:301

Double sealed Extended sleeve

For single use compensator and valve (kit)



ARTICLE NO 6113

The Extended sleeve is produced of HDPE; A wide sealant mastic strip is wrapped around the ends of the pipe under the sleeve. Installation is made with a gas torch. The additional use of shrink sleeves make the joint double sealed. The joint is pressure tested after cooling and the holes are welded after foaming.

DY Jacket pipe [mm]	Di Sleeve [mm]	Dy [mm]	Length (L) [mm]	Tubular sleeve width [mm]
110	125	140	1150	150
125	140	160	1150	150
140	156	180	1200	150
160	177	200	1200	150
180	197	225	1250	150
200	218	250	1250	150
225	244	280	1330	150
250	269	315	1400	150
280	300	355	1400	150
315	336	400	1430	225
355	377	450	1430	225
400	425	500	1430	225
450	474	560	1500	225
500	530	637	1500	225
560	590	710	1500	225

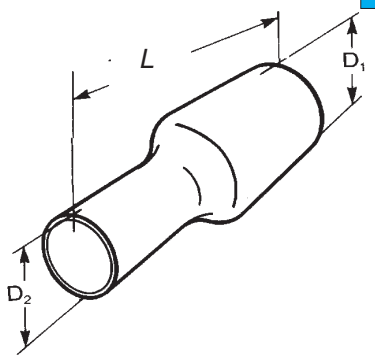
The extended Sleeve is shrinkable at both ends.
Required vowen mastic is supplied separately, see page 8:301

Extended Sleeve Article No.
6113 - DY includes two shrinkable sleeves/tubular sleeves

An example on how to order:
Extended sleeve for valve DN 200/355 (Seies 2) has Aricle No. 6113-355-000-000.

Double sealed Reduction sleeve

The reduction sleeve is made of PEH and used to connect two district heating jacket pipes in different dim.



ARTICLE NO 6124

Reduction sleeve is produced of HDPE; A wide sealant mastic strip is wrapped around the ends of the pipe under the sleeve. Installation is made with a gas torch. The additional use of shrink sleeves make the joint double sealed. The joint is pressure tested after cooling and the holes are welded after foaming.

Dimension connected pipe [mm]	Sleeve dimension D_1–D_2 [mm]	Length [mm]
125 - 110	140 - 125	900
140 - 125	156 - 140	900
160 - 140	177 - 156	900
160 - 140	197 - 177	900
200 - 160	218 - 197	900
225 - 200	244 - 218	900
250 - 225	269 - 244	900
280 - 250	300 - 269	900
325 - 280	336 - 300	900
355 - 315	377 - 336	900
400 - 355	485 - 377	900
450 - 400	476 - 425	900
500 - 450	528 - 476	1100
560 - 500	591 - 528	1100
630 - 560	663 - 591	1200
710 - 630	746 - 663	1200
800 - 710	839 - 746	1200

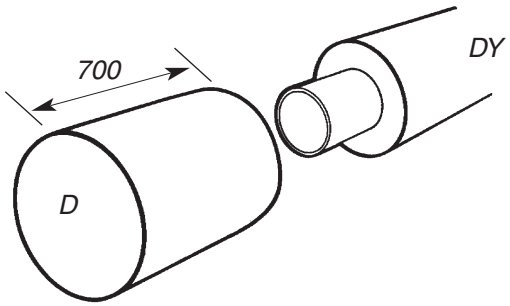
Reduction sleeve of multiple step and alternative length is manufactured against specific order.
Required mastic is supplied separately, see page 8:301.

Article No.
6124-D1-D2-000 include two shrinkable tubular sleeves

An example on how to order:
Reduction sleeve inclusive two tubular sleeves to DN 80/180-65/160
has Article no. 6124-180-160-000.

Double sealed Termination sleeve (kit)

Termination sleeve is used for closing a district heating pipeline



ARTICLE NO 6134

The termination sleeve is produced of HDPE; A wide sealant mastic strip is wrapped around the ends of the pipe under the sleeve. Installation is made with a gas torch. The additional use of shrink sleeves make the joint double sealed.
The joint is pressure tested after cooling and the holes are welded after foaming.
The casing can, as an alternative be insulated with halv shells.

Jacket pipe DY [mm]	Termination sleeve D [mm]
110	122
125	138
140	155
160	177
180	196
200	216
225	245
250	271
280	299
315	339
355	380
400	428
450	477
500	530
560	590
630	660
710	749
800	838
900	949

Required mastic is supplied separately. Sleeve can be supplied with length = 1100 mm. State suffix 110

Article No.
6134-DY-000-000 shrinkable termination sleeve including shrinkable sleeve.

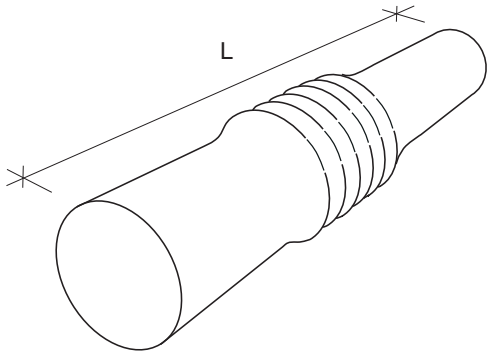
An example of how to order:
Termination sleeve with shrinkable sleeve DN 80/180 has article no. 6134-180-000-000.

Art.no. 9604-DN steel pipe-thickness of shell-000

Extended termination sleeve for off valve has length 1100 mm
Article No.
6115-DY-000-000

Heat shrinkable flexible joint (kit)

PEX



ARTICLE NO 6200

Flexible joint is a shrinkable flexible sleeve, made of PEX. A wide sealant mastic strip is wrapped around the ends of the pipe under the casing. Installation is made with a gas torch and due to the crosslinked material, both shrinking behaviour and shrink forces are predicted and controlled.
The powerjoint is pressure tested after cooling and the holes are welded after foaming.

Double sealed flexible joint

PEH jacket pipe DY [mm]	Sleeve as supplied Di [mm]	Radius steel pipe bend [mm]	Length [mm]
90	103	200	980
110	125	200	980
125	140	200	1050
140	156	240	1050
160	177	240	1050
180	197	240	1050
200	218	240	1120
225	244	300	1220
250	269	380	1340
280	345	420	1225
315	345	550	1225

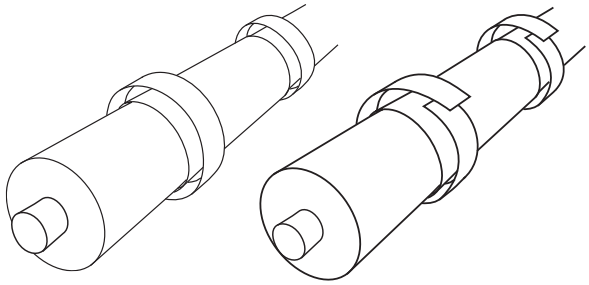
Double sealed flexible sleeve (kit) are available for Series 2 and double pipes

Article No.
6200 - Dy jacket pipe - DN steel pipe - 000 enkelrör includes steel pipe bend, spacer and shrink sleeve.

NOTE! For double pipe bend, a fixing plate between the steel pipes is needed.

An example on how to order:
Flexible joint (kit) for double pipe DN 2 x 40/160 including details as above has Article No. 6500-040-160-000.

Tubular and open shrinking sleeve



Tubular sleeve *Open sleeve*

TUBULAR SHRINKING SLEEVE 6210, OPEN SHRINKING SLEEVE 6240

The shrinking sleeves are thick-walled, internally coated with mastic and has high tensile strength. Supplied individually wrapped in protective plastic, which protect it from contamination before assembly.

The open sleeve is connected with a closural seal. The sleeve is delivered pre cut in a cover.

DY Jacket pipe [mm]	DY Casing [mm]	Width [mm] Double sealing Tubular Art. no 6241	Open Art. no 6240	Width [mm] Other sleeves Tubular/Open	Shrink ratio Tubular*	Open
90	110	150		225	121/81	25%
110	125	150		225	141/93	25%
125	140	150		225	156/104	25%
140	153	150		225	172/127	25%
160	174	150		225	196/153	25%
180	193	150		225	215/150	25%
200	215	150		225	230/170	25%
225	242	150		225	255/190	25%
250	267	150		225	300/225	25%
280	299	150		225	340/255	25%
315	336	225		300	380/285	25%
355	377	225		300	405/325	25%
400	425	225	225	300	460/360	25%
450	477	225	225	300	510/410	25%
500	533	225	225	300	565/450	25%
560	595	225	225	300	605/490	25%
630	666		300	300		25%
710	750		300	300		25%
800	846		300	300		25%
900	947		300	300		25%

*** Original / shrinked condition D [mm] / D [mm]**

Tubular shrink sleeve article no.
6210-OD jacket pipe-000-000

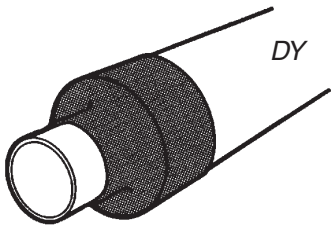
An example of how to order:
Tubular shrink sleeve DN 80/180 has art. no. 6210-180-000-000.

Open shrink sleeve article no.
6240-OD jacket pipe-000-000

An example of how to order
Open shrink sleeveDN 200/400 has art. no. 6240-400-000-000.

End cap

Heat-shrinkable district heating end cap is installed at the pipe end and used to protect the thermal insulation between jacket and service pipes.
It is coated with an adhesive, specially designed for performance at high temperature conditions.



ARTICLE NO 6291, 6292

The end caps are available for jacket pipe dimensions Ø 90–Ø 500

Single pipe			Double pipe		
Article No. To be delivered	**Intervall DI**	**Intervall DY**	**Article No. To be delivered**	**Intervall DI**	**Intervall DY**
6291- 010	30– 10	105– 47	6292-010	12-20	90-125
6291- 020	30– 15	140– 75	6292-020	19-34	85-144
6291- 030	40– 24	105– 75	6292-030	24-60	105-160
6291- 040	55– 24	135– 75	6292-070	24-60	135-235
6291- 050	60– 24	148– 75			
6291- 060	60– 30	175–135			
6291- 070	90– 40	150– 90			
6291- 080	95– 50	195–130			
6291- 090	145– 68	240–145			
6291- 100	150– 68	270–145			
6291- 110	180–120	295–220			
6291- 120	255–120	360–220			
6291- 130	280–200	420–340			
6291- 140	415–200	540–340			
6291- 150	530–260	650–360			

Article No.
6291 – OD jacket pipe-000-000 for single pipe
6292 – OD jacket pipe-000-000 for double pipe

An example of how to order:
An end cap for a preinsulated pipe DN 80/180 has Aricle No. 6291-180-080-000.

Hot tapping T-joint with or without a valve

Powerpipe offers a complete system for installation of hot tapping T-joints.

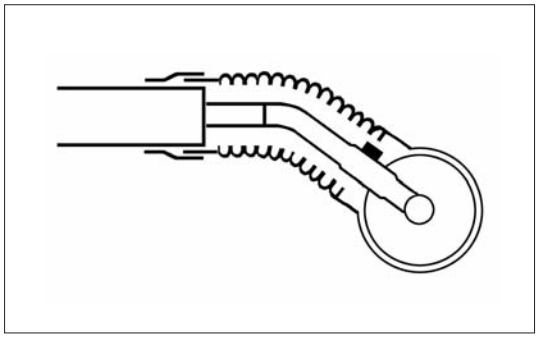
Details and instructions are available for

- 45° branches Single pipe DN 20 - DN 150
- Banches Double pipe DN 20 - DN 100

All details for hot tapping T-joints are delivered as double sealing system.

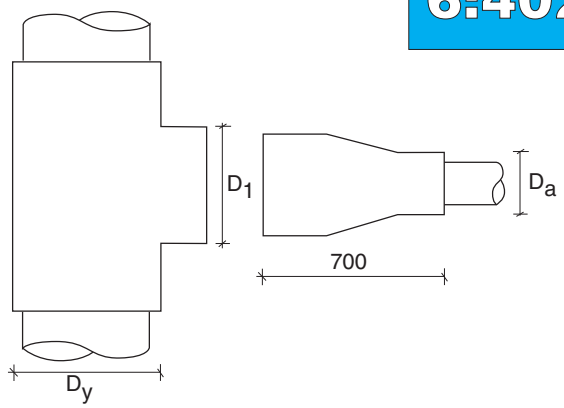
The casing to the main pipe is cut in axial direction before entering main pipe. The cut in the casing is extruder welded.

After shrinking the casing the sleeves are installed.



Ordinary 45 ° T-joint

T-joint for connecting double pipe to double pipe



ARTICLE NO 6530

T-joint for connecting double pipe to double pipe is a shrinkable sleeve, made of HDPE. A wide mastic strip is placed between the sleeve and jacket pipe. Installation is done by extruder welding the split casing and shrink withgas torch. Delivered with the required heat shrink tubular/open sleeves.

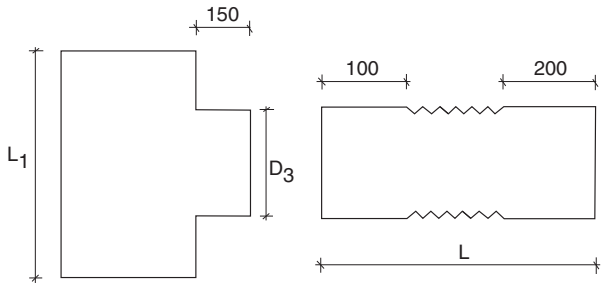
Dy1 = Outer diameter, main pipe in mm
Dy2 = Outer diameter, branch in mm

Article No.
6530-Dy_1-Dy_2-000 includes a shrinkable casing, two tubular and two open shrinkable sleeves.

An example on how to order:
joint double-double for the main pipe, two tubular and two open shrinkable sleeves
DN 2x100/315 and branch DN 2x50/200 has Article No. 6530-315-200-000.

T-joint, 45° flexible, for branches ≤ OD 140

Double sealed type



ARTICLE NO 6540

T-joint, 45° flexible is produced of HDPE; A wide sealant mastic strip is wrapped around the ends of the pipe under the casing. Installation is made with a gas torch. The additional use of shrink sleeves make the joint double sealed.
The joint is pressure tested after cooling and the holes are welded after foaming.

Main pipe [mm]		Branch jacket [mm]													
Jacket		75		90		110		125		140		160		180	
[mm]	L_1	D_3	L	D_3	L	D_3	L	D_3	L	D_3	L	D_3	L	D_3	L
90	1000	103	690	125	690										
110	1000			125	690	140	690								
125	1000			125	690	156	820	156	820						
140	1000			125	690	156	820	177	820	197	820				
160	1000			125	690	156	820	177	820	218	820	218	820		
180	1000			125	690	156	820	177	820	218	820	244	820	218	820
200-250	1000			125	690	156	820	177	820	218	820	244	820	269	820
280-710	1200			125	690	156	820	177	820	218	820	244	820	269	820

OBS! The corrugated pipe requires a carefully performed heating to be flexible.
Space available to mount Naval's tapping valve for Series 2 and Series 3.
The mounted steel bend radius shall be 5s or greater.
c-c measure at drilling should be min. 650 mm.

Article No.
6540-DY main pipe avstick-000 includes a shrinkable casing and two tubular and shrinking sleeves.

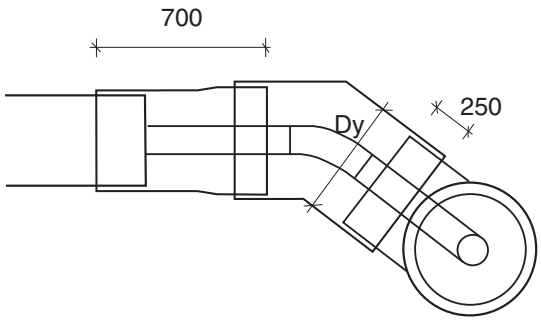
An example of how to order:
T-joint, 45°, flexible including two tubular and two open shrinkable sleeves for main pipe DN 400/630 and branch DN 80/180 has article no. 6540-630-180-000.

The branch must be at least one DN smaller than the main pipe.

Tubular/open shrink sleeve, see 6:302

T-joint, 45° for branches ≥ OD 160

Double sealed type



ARTICLE NO 6540

T-joint 45° for branches is produced of HDPE; A wide sealant mastic strip is wrapped around the ends of the pipe under the casing. Installation is made with a gas torch. The additional use of shrink sleeves make the joint double sealed.
The joint is pressure tested after cooling and the holes are welded after foaming.

Jacket main pipe	Branch jacket [mm] 225	250	280
[mm]	Dy [mm]	Dy [mm]	Dy [mm]
225	280		
250	280		
280	280	355	
315	280	355	
355 - 710	280	355	355

Dimensions are adopted to hot tapping valves (Naval) for Series 2 and Series 3.

Article No.
6540-DY main pipe-Dy branch-000 includs sharinkable main casing, 45° knee, reduction, three tubular and two open shrink sleeves.

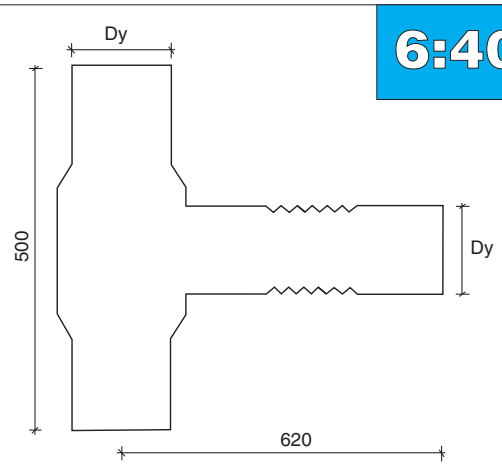
An example of how to order:
T-joint for main pipe DN 400/630 and branch DN 200/355
has article no. 6540-630-355-000.

Please observe:
The branch has to be of a smaller dimension than the main pipe.

Please see 8:401 regarding need of foaming liquids!

Double sealed T-joint for flexible pipes

For branching from the flexible pipe to flexible pipe.



ARTICLE NO 6540

Joint for flexible pipes is a heat shrinkable joint, A wide sealant mastic strip is wrapped around the ends of the pipe under the casing. Installation is made with a gas torch. The additional use of shrink sleeves make the joint double sealed.
The joint is pressure tested after cooling and the holes are welded after foaming.

Article No.	Jacket pipe branch/main pipe [mm]	Dy [mm] shrinkable
6540-090	90	105
6540-110	110	125

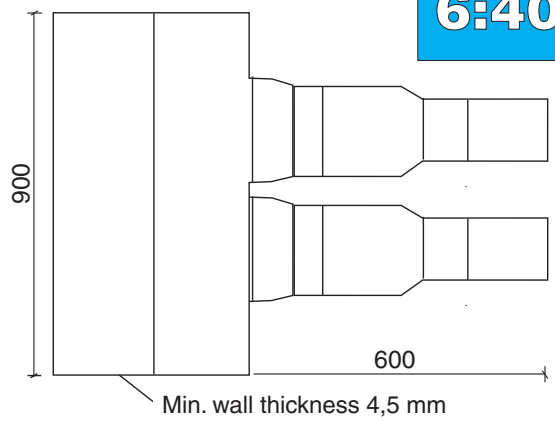
T-joint for flexible pipes is designed for simple assembly of flexible pipes to flexible pipes.

NOTE! The corrugated pipe of PEH requires a carefully performed heating to be flexible.

Article No.
6540-DY main pipe-DY branch-395 includes joint, one tubular shrink sleeve and a two open shrink sleeves.

An example on how to order:
T-joint with main pipe Dy 110 for branch Dy 90 mm has Article No. 6540-110-090-395

T-joint for connecting single pipe to double pipe



ARTICLE NO 6535

T-joint for double/singe pipe is a shrinkable casing made of HDPE. A wide sealant mastic strip is wrapped around the ends of the pipe under the casing. The splitted main casing is extruder welded and shrinked with a gas torch. The additional use of shrink sleeves make the joint double sealed.
The joint is pressure tested after cooling and the holes are welded after foaming.

DN / DY main pipe	Dy1 [mm]	Dy branch [mm]	Dy2 [mm]	Dy2 (connection) [mm]	c/c [mm]
2 x 25 / 140	174	90	110	125	260
2 x 32 / 160	193	90	125	140	260
2 x 40 / 160	193	90	140	160	260
2 x 50 / 200	242	90	153	180	260
2 x 65 / 225	255	90	174	200	300
2 x 80 / 250	281				300
2 x 100 / 315	348				300
2 x 125 / 400	435				
2 x 150 / 450	533				
2 x 200 / 560	660				

If T-sleeves are to be used for connected vale, please indicate this separately.

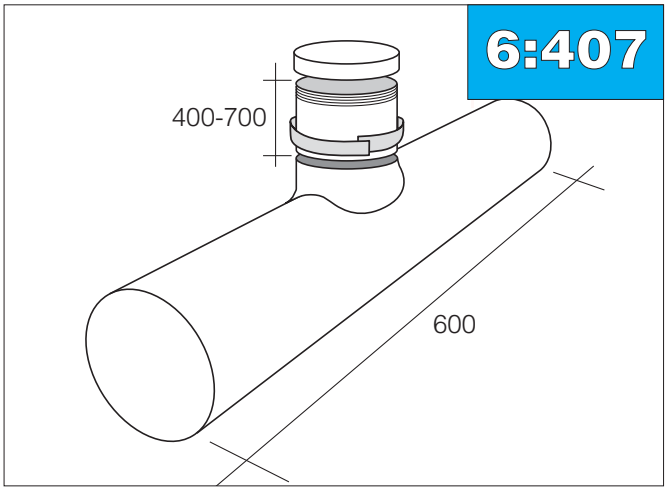
Article no.
6535-Dy1-Dy2-000 includes a shrinkable casing, two tubular shrinking sleeves and two open shrinking sleeves.

An example of how to order:
T-joint double/single including 2 tubular and 2 open sleeves DN 2x80/250 and branch DN 25/90 has Article No. 6535-250-090-000.

Please observe:
The branch has to be of a smaller dimension than the main pipe.

Measure joint

Control unit for single pipes

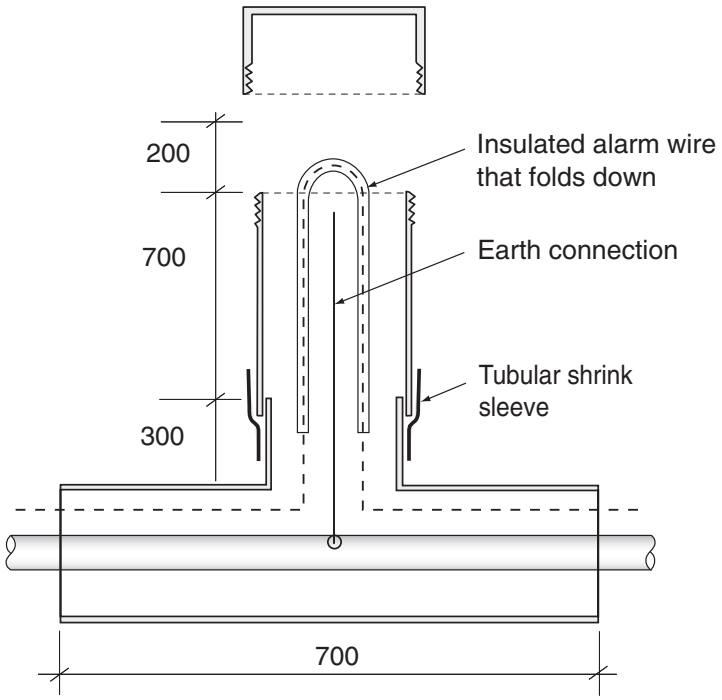


ARTICLE NO 6270

Measure joint is used when and where you want a simple access to the alarm wires to easily measure for any errors. Delivered with cap. Branch can be adjusted in hight (400-700 mm).

Article No.
6270-DY jacket pipe-000-000

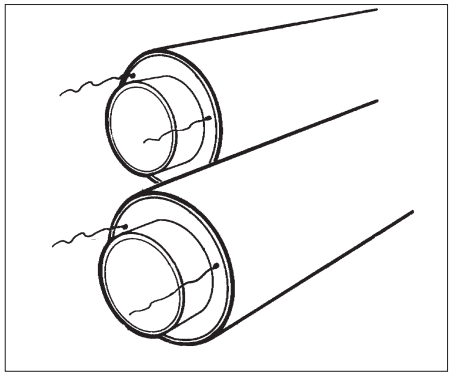
An example on how to order:
Measure joint for DN 300/500 has Article No. 6270-500-000-000



Example how to use

Edition 2013

Monitoring systems



The purpose of a moisture monitoring is to detect and locate moisture in the pipe insulation. This provides a cost effective and easy to use tool to monitor and troubleshoot the pipeline throughout their entire lifetime.

ALARM WIRES, DISTRICT HEATING

Two alarm wires (1.5 mm2 soft copper wire) are embedded in all isolated pipes and fittings. The position of the alarm wires as standard, are at 10 and 14 o´clock. TDR-speed PVF (Propagation Velocity Factor) is normaly 273 m / microseconds (0.91%). The resistance of the copper wire is 1.2-1.3 meters ohm/100 meter alarm wire.

DISTRICT COOLING

The Alarm Cable, **Cable 3dc**, is intended to be used for district cooling pipes with steel or plastic service pipe. The cables unique design avoids problems with condensation-moisture in the pipes and joints in the pipeline but especially on the pipes and pipe sections gables and in other parts of the joints.

When producing the district cooling pipes and fittings, Cable 3dc is mounted directly to the service pipe - a quick and easy handling. Even in the joints and branches in the field the cable is mounted directly to the pipe. The cables special construction allows changes in impedance from wet insulation of a certain size, can be detected even if the cable is insulated along the whole pipe length.

Alarm cable should be placed at 17 o´clock TDR rate PVF (Propagation Velocity Factor) is typically 238 m/ microseconds. The resistance of the copper wire is 2.54 meters ohm/100 alarm wire.

The alarm cable is monitored by the alarm unit WiDetect X3 that continuously transmits information from the alarm cable /pipe insulation to the system software XTool.

Note that the cable must be handled with great care to avoid damages to the cable during transport etc.

FIXED INSTALLED ALARM SYSTEM

Permanently installed alarm system is used to continuously monitor the lines. When the system detects moisture in the pipes, or fault in the alarm wires, it automatically sends a message to the maintenance staff. This lets you detect any damage and can apply actions in time, so you avoid breakdowns and expensive leaks.

Powerpipe markets two alarm systems,, WiDetect™ and Pipeguard™, and accessories compatible with both systems.

7.1 WiDetect™ system

WiDetect™ system
Even small leaks can do great harm. The result may be loss of heat, corrosion of the pipeline or malfunctions. WiDetect ™ system is designed to ensure continuous monitoring of the entire pipeline and gives an early alert for possible errors.
WiDetect ™ is used to automatically monitor the insulated pipes for district heating, cooling and non-conductive media, such as oil. The system consists of both alarm units for easy monitoring without software as well as more advanced units for central monitoring and analysis.

Its main strengths are:

- Wide range of proven measurement units.
- High reliability
- Easy to expand with more devices when your network grows.
- Easy to maintain because the devices can be updated wirelessly.
- WiDetect Online service for easier management of software
- Flexible communication via network or wireless.
- You can monitor via the SCADA system.

WiDetect™ monitoring devices
WiDetect™ X1e
WiDetect X1e ™ is designed to monitor and detect errors on insulated pipes. WiDetect ™ X1e is the easiest way to monitor each section. Connect the alarm wires to WiDetect ™ X1e in an alarm loop of 2 x 2500 meter of pipe. WiDetect ™ X1e can be connected to both the forward and return lines. Alarm central alarms at a change of resistance in the insulation, break of the alarm wire or short circuit between the alarm wire and service pipe. Reporting may be optical (red light on the central station), buzzer and alarm can be passed on through relay output. After an alarm, the error must be located using a portable TDR (TDR) or WiDetect ™ XPM.
For more information read pages 7:102.

Available as an option an integrated GPRS modem for wireless communication to superior software and integrated battery pack with an operation length of up to 8 years.

WiDetect X1L
WiDetect X1L is designed to monitor and detect errors on insulated pipelines. Connect the alarm wires to WiDetect X1L in an alarm loop of 4 x 3500 meters pipes. WiDetect X1L can be connected to both the forward and return lines.

WiDetect X2
WiDetect X2 measures the insulation resistance, loop resistance, battery force and analog/digital values and measurement data can be collected automatically based on a configured schedule in the software. To make use of all features of the alarm unit, monitoring software XTool is used.

WiDetect X3
WiDetect X3 is designed and optimized to detect and locate faults of district cooling pipelines, which often have condensation problems which often occurs in warmer regions ex. In the Middle East but also in Scandinavia. WiDetect X3 is a newly developed version of the Pulsecometer, TDR ver 2 for best performance.
WiDetect X3 is used together with the alarm cable WiDetect 3dc cable.

WiDetect

WiDetect X3s
WiDetect X3s is developed and optimized to detect and locate faults in flexible pipelines (flexible pipe) alternative pipeline systems with singlewire systems and is a simpler version than the X3.
WiDetect X3s is a newly developed version of the pulsecometer, TDR ver 2 for best performance and measures alarm wire lengths up to 1000 meters. WiDetect X3s is used together with the alarm cable WiDetect 3dc cable but can also be used on non-insulated copper wires.

WiDetect X4
X4 is designed to monitor and detect errors on insulated pipes. X4 measures the insulation resistance, loop resistance, battery effect, analog/digital values as well as the impedance of the pipeline (TDR). To make use of all features of the alarm unit ,, the XTool monitoring software must be used.

WiDetect X5
The monitoring unit WiDetect X5 is designed and optimized to detect and locate the fault in insulated pipelines with oil-based liquids as media.

WiDetect A1E chamber alarm
WiDetect A1E is a monitoring unit for registration of humidity, temperatures, water levels, etc. in the chambers VA-wells, data floors or other low points and for the detection of moisture in the insulated pipes. WiDetect A1E has four pcs PT 1000 inputs and 4 analog, respective. digital inputs (4-20mA, 0-10V) to measure eg room temperature and humidity, flow and return temperatures of service pipe, and water levels in several steps, in the chamber and other wet areas. The unit can also record insulated pipelines loops and insulation resistance. WiDetect A1E is available in various models with battery or network operation and with modem for different communication methods.

WiDetect XPortable
XPortable used as measuring box for maintenance and troubleshooting of your pipeline or moisture bands. the system is integrated with XTool 4 where measuring points can easily be handled. XPortable measuring box consists of a bag where we have built in our most optimized leak detection device. The bag is prepared for netwok AC and/or battery pack and can be used in field for longer periods without charging. Via WiFi modem, you can smoothly work with the software without beeng near the box. The major advantage of XPortable if you have many alarm units of type X1e or A1E connected to your district heating pipes is that you can run around and create reference measurements.
This can also be done at measurement locations without alarm unit. The big advantage is that all the measurements and reports is beeing integrated in XTool 4 and not in separate systems.

WiDetect XTool

XTool is WiDetect system software for managing data, devices, reports and users.
With XTool you get full control of alarm devices, channels, markers, etc.. The system is very easy to install and use. XTool include measurement-database, language-database, OPC server (optional), documentary database, comparison function, group classifications, dynamic report management, GPS positioning, automatic measurement reports, manual measurements and more. XTool automatically detects which alarm devices you connects and configures your system thereafter.

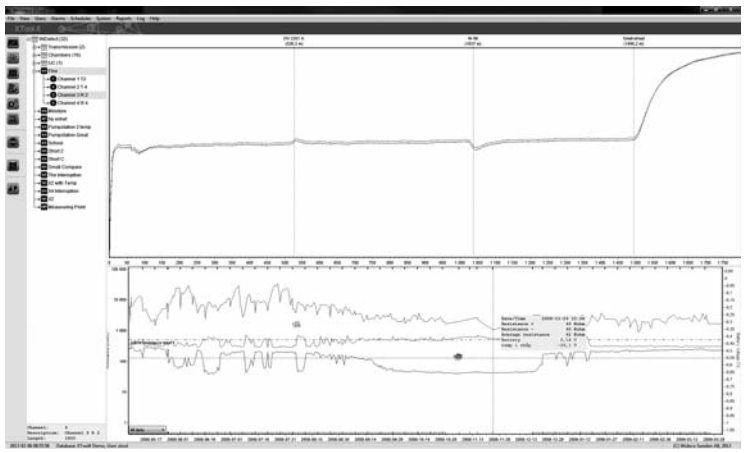
XTool is available in the languages Swedish, German, Finnish, Swedish and Danish.

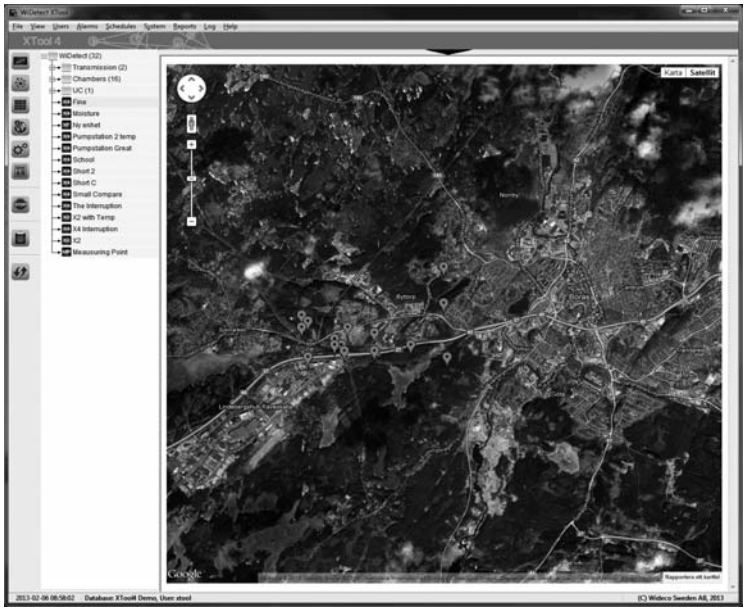
WiDetect Online

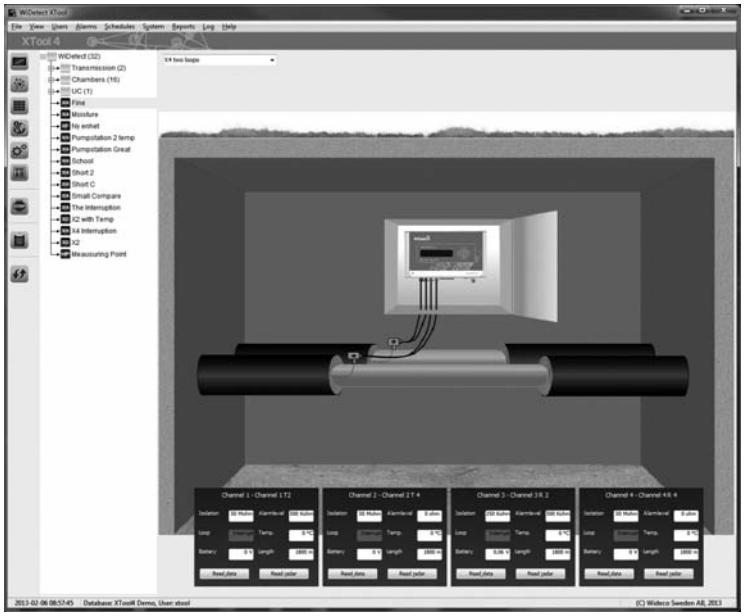
WiDetect Online - monitors your isolated pipelines, anytime, anywhere.
WiDetect Online contains what is needed: Wireless communication via GPRS, a XTool software on our server for analysis and presentation of data, as well as continuous operation, maintenance and support.

Benefits:

- Own XTool account at Widecos server for analysis, documentation and presentation of data.
- Plug & Play monitoring units.
- Wireless Communication
- More efficient maintenance and support

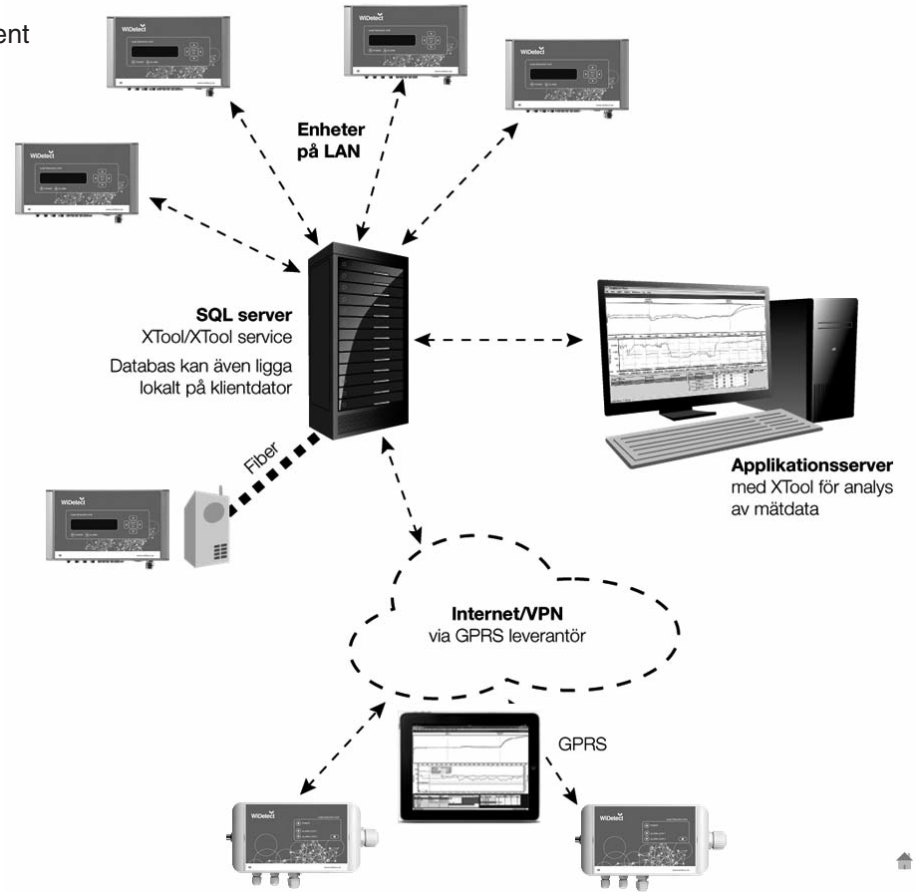






Flexible system

The picture shows examples of different communication services.
The software XTool is developed to cope With multiple users and alarm units simultaneously and works in client/server environment. It is also possible to use remote access, via Citrix solutions to control software.
In the XTool software it is also a integrated OPC server that makes it possible to pass parameters the superior SCADA systems.



There are many accessories to WiDetect™ system. For more information visit www.wideco.se.

Connection box
Connection box (MultiBox) come in various designs and is used for connecting the alarm wires to other cables.

Technical cabinet
Technical cabinet IP67 for safe installation of alarm equipment.

Communications Modem
In case that existing networks can not be used, we recommend GPRS communications via the Internet. We can help with subscription and modem.

Antennas
We have several different types of antennas that are designed and tested with the WiDetect™ system.

Cables
Coaxial cable RG62, 93 Ohm for connection of alarm devices WiDetect™, X4, X4e for heating- or cooling pipelines. Available in lengths of 5 and 2.5 m incl. BNC connectors. Comes with red and blue bending protection. Can be extended. Network cables are available in various lengths for connecting WiDetect™ alarm devices to the network equipment or external modems.

Survey of surveillance components

Model	Rec. max measuring length (m)	Requires loop	Antal resistans ingångar	Optinal inputs (pc)	Alarm limits	Power-supply	Remarks
X1e	5000	Yes	2	Potential free relay output	1 kohm-1 Mohm	Extern transformator (12 VDC) or Battery pack	Optional; integrated GPRS modem /Battery pack
X1L	7000	Yes	4	Relay output	1 kohm-1 Mohm	Extern transformator (12 VDC) or Battery pack	Optional; integrated GPRS modem /Battery pack
X2	5000	Yes	2	Potential free relay output 4 st (4-10mA or 0-10V)	1 Mohm	Transformator (12 VDC) or Battery pack	Can be upgraded to X4
X3S	1000	Nei	4	Potential free relay output Analog Output (4-20 mA or 0-10V)	1 kohm – 50 Mohm	110/230 VAC	TDR modul version 2
X3	3000	Nei	4	Potential free relay output Analog Output (4-20 mA or 0-10V)	1 kohm – 50 Mohm	110/230 VAC	TDR modul version 2
X4	5000	No	4	1 pc Potential free relay output Analog Output (4-20mA or 0-10V)	1 kohm – 50 Mohm	110/230 VAC	Integrated TDR version 1
X5	1500	No	4	1 pc Potential free relay output Analog Output (4-20mA or 0-10V)	1 kohm – 50 Mohm	110/230 VAC	TDR modul version 2
A1e	5000	Yes	2	12 pcs PT1000 0-10V4-20mA Wake up	1 kohm-1 Mohm	External transformator (12 VDC) or Battery Pack	Optional; integrated GPRS modem /Battery pack
XPM (portable)	5000	no	4	1 pc Potential free relay output Analog Output (4-20mA or 0-10V)	1 kohm – 50 Mohm	110/230 VAC	TDR modul version 3

Survey of surveillance components

Article No.	
WiDetect X1e	6810-901-000-000
WiDetect X1L	6810-901-001-000
WiDetect X2	6810-902-000-000
WiDetect X3	6810-903-000-000
WiDetect X3S	6810-903-001-000
WiDetect X4	6810-904-000-000
WiDetect X5	6810-905-000-000
WiDetect A1e	6810-906-000-000
WiDetect XTool	6810-907-000-000
Multibox C2	6810-900-000-000
Multibox S2	6810-910-000-000
Multibox CS	6810-915-000-000
Multibox M1	6810-920-000-000

Please inform regarding needed length in a separate text line!

Use the connection box MultiBox C2 for easy connection of alarm wires.

7.2 Pipeguard

Pipe Guard provides the maintenance staff a current picture of the status of the pipeline. The system is particularly suitable for facilities where data from many different sensors need to be stored and presented in an orderly manner. Pipe Guard's main benefits are:

- That you handle alarms, history and settings from a variety of sensors in a single system.
- That you can easily customize the system to your needs as it is a modular designed flexible software. (The devices can operate as both stand-alone and against a parent.)
- That it is easy to operate the system since the modules are updated and configured from a remote.
- Open and proven communication. Works with eg. Wonderware, Citect, iFix, and others.

microPG (Pipeguard Micro)

microPG is a compact alarm unit with built-in GPRS modem. A special measurement method allows the length of the alarm loop does not affect measured values. This means it will be easier to understand alarms and trend curves, because the same amount of moisture always gives the same response. mikroPG send alarms via SMS or delivers data to the System Pipe Guard via GPRS. With an application extension you can download the log data directly from the device to Microsoft Excel ®. mikroPG is designed to be configured and updated from a remote.

		Section length	
Insulation resistans	0-10000 Kohm	Pipe	2 x 4000 m
Loop resistans	0–100 ohm	Alarm wire	2 x 8000 m
Terminal voltage	0-1000 mV@1Mohm	**I/O**	
Communication	GSM, GPRS och SMS	Alarm input	Input break / closure
Power supply	Mains, Battery	Alarm output	48 V / 200 mA
Voltage	10-30 Volt (14,4 Volt)	LED display	Yes
Current	15 mA (Max 500 mA)	**Protiction class**	IP 67

pulsPG (Pipeguard Puls)

PulsPG is a new type of locating emergency center, designed to monitor the district heating district cooling and pipes with for example oil. The unit consists of a gateway, and 1-8 loose measurement modules. Transmission between the gateway and the measuring modules are wireless, with a range of up to 1000 m Unique benefits of pulsPG:

- Measuring modules are connected directly to the the pipe without signal cables.
- You can collect measurement data from measuring points in for example separate buildings.
- You only pay for the equipment you really need.
- You can easily customize the system when the ground layout is changing.

Measuring modules includes a 2-channel TDR and a measurement card. pulsPG collect and submit the data to System Pipe Guard via GPRS or Ethernet. The system is fully compatible with StatView System II.

Specifications pulsPG:

Ekometer	
Range (PVF 0.90)	8000 m
Measurement card	
Insulation resistans	0-10000 Kohm
Loop resistance	0–100 ohm
Terminal voltage	0-1000 mV@1Mohm
Communication	GPRS, ethernet

Power Supply	Mains or battery
Voltage	10-30 Volt (14,4 Volt)
Current	15 mA (Max 500 mA)
Protection class	IP 65

System Pipeguard, SPG 4.0

System Pipe Guard is a superior program that collects measured values from alarm devices and other sensors,and presents them in a way that enables you to have an overview and quickly can make the right decisions.
The program has a clear and well thought out interface, where all alarms, log values and settings are easy found. System Pipe Guard communicates with the leading automation platforms Wonderware ® and Citect ®. This means you can be sure to always have the best possible support for the equipment you want to integrate in the system, and that it will continuous be updated to newest versions of Microsoft Windows ®.

Pipeguard MT

By using MT modules you can eg. collect data from sensors for humidity, pressure, flow, air and pipe temperature, door alarm and tamper alarm. The modules have a long life even in harsh environments. They have protection class IP 67/68 and as extra protection the circuit boards are equipped with humidity and temperature alarms to alert directly in System Pipe Guard if in danger.
For more information, please contact your sales representative at Powerpipe or visit **www.pipeguard.se.**

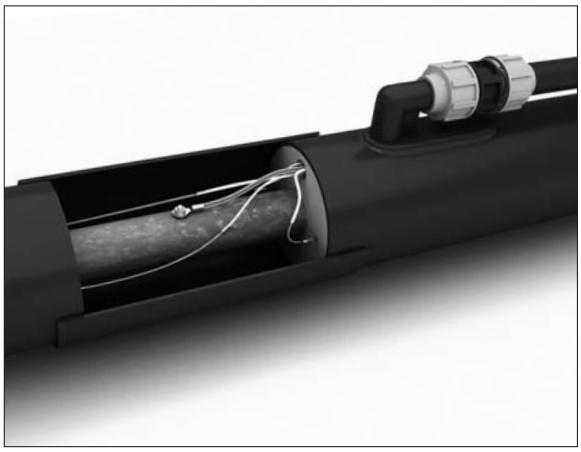
Ordering:

Pipe Guard Micro (microPG)	6810-801-000-000
Pipe Guard Pulse (pulsPG)	6810-802-000-000
System Pipe Guard	6810-803-000-000
Battery pack	6810-804-000-000
Mobile data connection, simcard (Sweden)	6810-805-000-000
Fixbox ® AC (installed in the building, chamber)	6810-806-000-000
Fixbox ® I (installed in the wiring cabinet)	6810-807-000-000

cTubeTM Alarm disarming

cTube ™ provides secure and flexible access to the district heating alarm wires. This means time savings, better working environment and simpler, more economical alarm system.

Benefits:



- Easily accessible measuring points.
- Better working environment.
- Less interference for end users.
- Rationalises inspection and service by connecting multiple circuites to a central point.
- The cables are protected by rugged PEM hose.
- Molded weld detail - fully waterproof.
- Low Profile - clear of ground movements.
- Flexible cable length.
- Minimum damping of ekometerpuls.
- Allows monitoring where no chambers or buildings
- Alarm and communications equipment are placed above ground -no flood risk, better transmission from wireless devices.
- Comes with Fixbox ® for easy and safe connection of test equipment.
- Enabled pressure testing

Specifications

Standard lengths	8 m, 12 m
Other lengths	According to the order
Number of wires	2 or 4
Contacts	BNC + Fixbox ®
Impedance	180 Ω
Mounting	Extruder weld, shrink sleeve

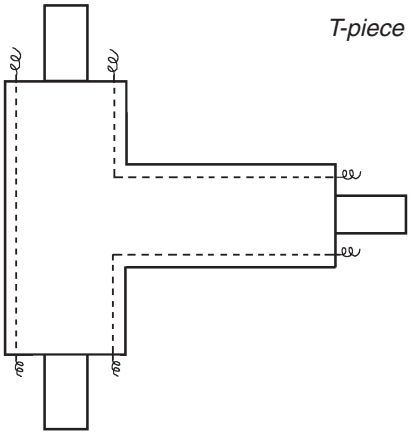
Ordering

Enter the desired length of cable on a separate line.

cTube, 2 alarm wires	6890-020-000-000
cTube, 4 alarm wires	6890-025-000-000

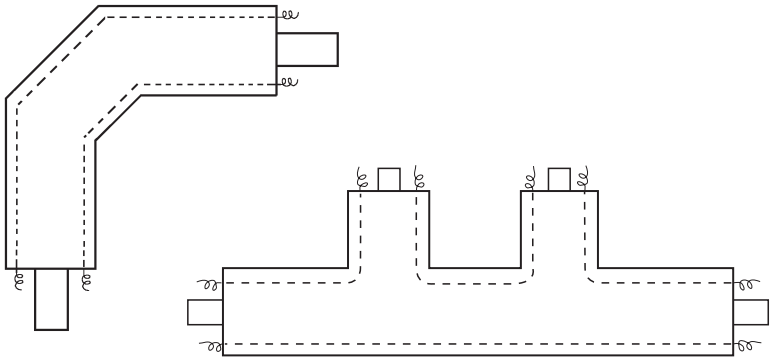
Alarm Systems Design

T-piece

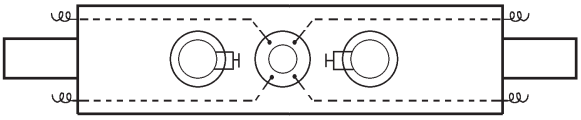


Bend

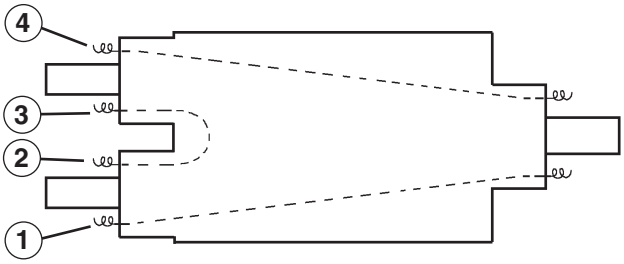
T-piece, double/single



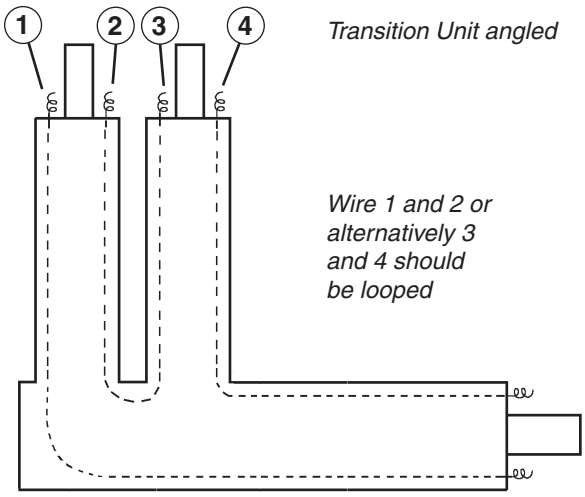
Valve
drain/air release



Transition Unit , straight



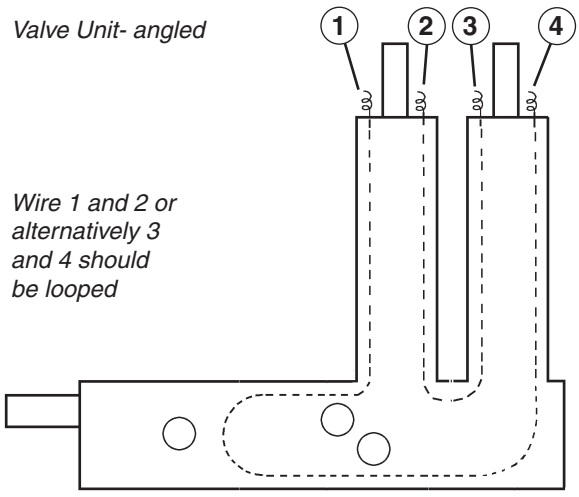
Wire 1 and 2 or 3 and 4 should be looped



Transition Unit angled

Wire 1 and 2 or alternatively 3 and 4 should be looped

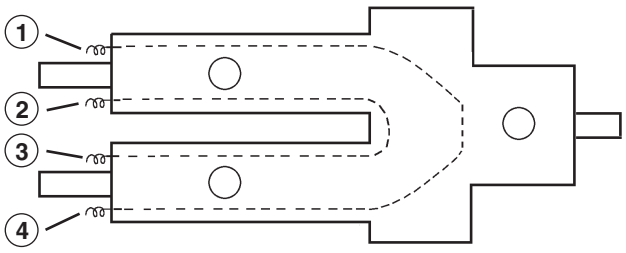
Valve Unit- angled



Wire 1 and 2 or alternatively 3 and 4 should be looped

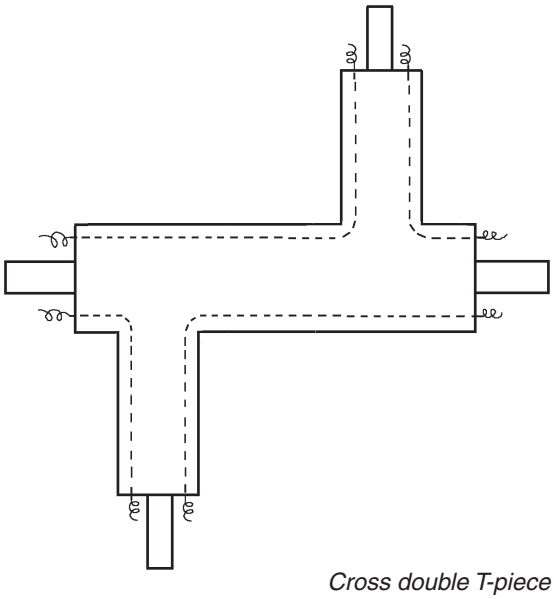
With regard to alarm wire lengths see Page 7:303

Alarm Systems Design

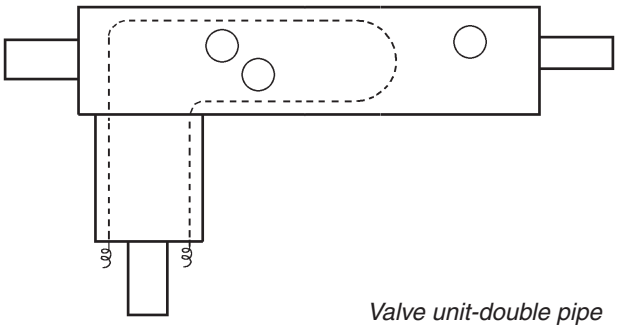


Wire 1 and 2 or alternatively 3 and 4 should be looped

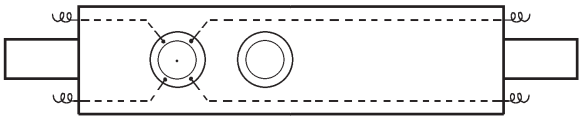
Valve unit-straight



Cross double T-piece

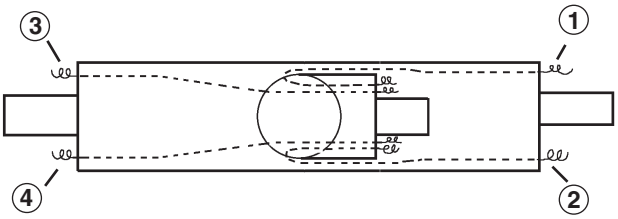


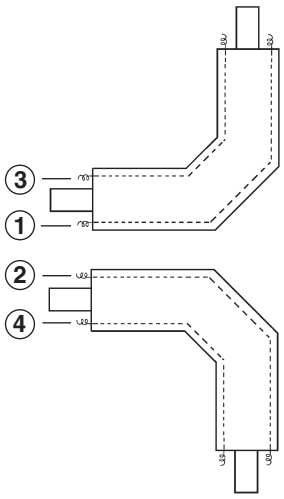
Valve unit-double pipe

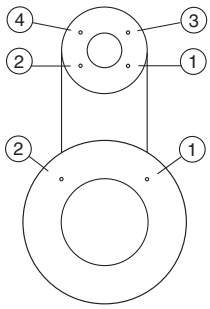


Measuring box with earth connedtion

T-piece paralelle







Wire 1 and 3 are blank. Those wires not to be used shall be looped. (Wire 1 and 3 alternatively 2 and 4).

With regard to alarm wire lengths see Page 7:303

Length of alarm wires for use with various components

The information below regarding the length of alarm wires is to be used in combination with various components installed in the district heating system and ensures accurate locating of any future faults.
The lengths are calculated from the edge of the steel pipe.

Valve

	DN 25 - 125	*DN 150 - 250*	*DN 300*
Drawn alarm wires	2,3 m	2,5 m	3,0 m
Standard	1,5 m	1,5 m	1,5 m

Transition Unit – straight

	DN 25 - 50	*DN 65 - 150*
	L = 1400	L = 2250 mm
Wire 1,3	1,4 m	2,3 m
Wire 2	0,8 m	0,9 m

Transition Unit - angled

	DN 25 - 40	*DN 50 - 100*	*DN 125 - 150*
Wire 1	2,0 m	2,3 m	2,5 m
Wire 2	1,5 m	1,7 m	1,8 m
Wire 3	1,7 m	1,7 m	1,8 m

Valve Unit, angled, single pipe

	DN 25 - 80
Wire *1*	*1,3 m*
Wire *2*	*3,7 m*

Valve Unit, straight, single pipe

	DN 25 - 80
Wire *1*	*1,9 m*
Wire *2*	*1,4 m*

Parallel T-piece

	DN 20 - 400 / DN 20 - 100	*DN 125 - 400 / DN 125 - 300*
	L = 1200 m	L = 1500 m
Wire 1,2,3,4	1,4 m	1,7 m

Valve Unit, straight, double pipe

DN 25 - 80
Wire length 3,3 m

Valve Unit, angled, double pipe

DN 25 - 80
Wire length 2,3 m

Measuring Box

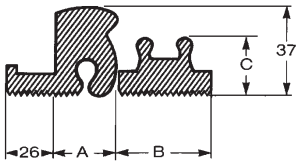
When choosing Measuring box, add for normal assembeling depth:

DN 25 - 125	*DN 150 - 250*	*DN 300*
0,8 m	1,0 m	1,5 m

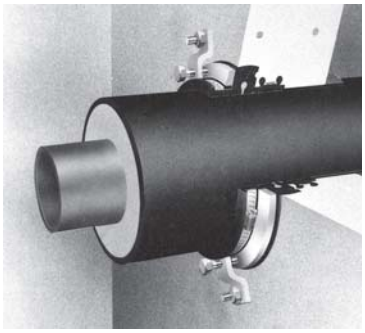
In wall seals

LEAD THROUGH SEAL, 6510

Our original Sealing Ring F801 is intended as a water seal when embedding a pipe in a concrete wall or floor. It is designed to function trouble free in both high and low water pressure conditions.
The F801 is also a so called " movement friendly" seal which allows axial movement of the embedded pipe. The seal can be adjusted after embedment.



Dimension	A	B	C
DY 110-180	25	40	22
DY 200-1000	31	50	27



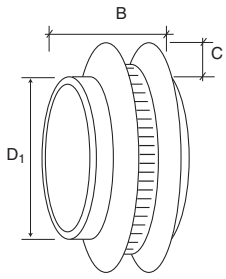
Lead Through Seal F801 is intended for use as a seal between the pipe and the concrete wall where there is axial movement and/or a great risk of high ground water pressure.

Article No.
6510 +OD HDPE jacket pipe -000-000

An example of how to order:
Lead Through Seal for a pre-insulated pipe DN 200/355, Article No. 6510-355-000-000.

EMBEDMENT RING, 6520

The embedment ring, water barrier F802 is used for water and/or radon sealing when embedding a circular pipe in a concrete wall or floor. It is suitable for all types of piping, for example, plastic, cast iron, steel, concrete etc., and should be mounted directly onto a pipe so that they are cased together. In certain cases the ring can be used on corrugated plastic piping.
The unique profile of the ring, combined with the accompanying hose-clip, provides efficient sealing between the pipe and the concrete. The excellent sealing qualities are partly due to the ability of the hose-clip to hold the rubber ring tightly against the pipe during the casting process. The "ears" of the ring are also fastened completely in the concrete when the concrete hardens. The F 802 ring can advantageously be used when a pipe is not under stress from any axial movement.



Dimension	B	C
DY 63-180	40	22
DY 200-1000	50	27

Embedment ring is used as a seal between the District Heating pipes and the concrete wall where the axial movement is small.

Article No.
6520-HDPE jacket pipe-000-000

An example of how to order:
Embedment ring for dimension DN 200/355 has Article No. 6520-355-000-000.

Location of the F802 in concrete

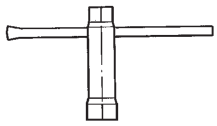
If holes is to be drilled in the concrete wall for later embedding of pipes/rubber ring in concret, we recommend following min. drill holes:

HDPE dim	Hole
40-180	HDPE Jacket dim. + 100 mm.
>200	HDPE Jacket dim. + 120 mm.

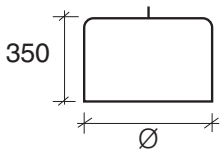
When mounting in other types of holes (for example rectangular), there should be a clear space above the rubber ring of 20 mm.

Shut-off valves

T-WRENCH FOR VALVE AND AIR-RELEASE
Article No. 4130-019-027-000 - Wrench size 19 and 27 mm.
Article No. 4130-019-000-000 - Wrench size 6K-19 DN25-80
Article No. 4130-027-000-000 - Wrench size 6K-27 DN100-150
Article No. 4130-050-000-000 - Wrench size 6K-50 PN200-250

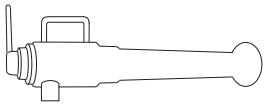


PROTECTION CAP FOR VALVES AND AIR RELEASE UNITS
Article No. 6136 - Dim valve 000-000.



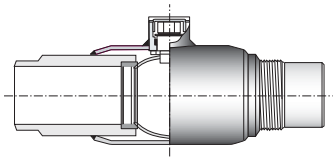
PORTABLE REDUCTION GEAR

Valve	Article No.
DN 100–150	7801-027-000-000
DN 200–400	7801-050-000-000



HOT TAPPING VALVE
DN 32–150
Article No. 9260-DN-000-000

	Length [mm]
DN 25	209
DN 32	207
DN 40	226
DN 50	262
DN 65	280
DN 80	312
DN 100	352
DN 125	265
DN 150	305



HOT TAPPING TOOL

Valve	Article No.
DN 20	7871-002-000-000
DN 25-100	7871-001-000-000

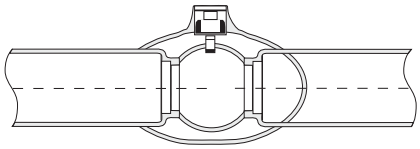
ADAPTER FOR VALVE

Dim:	Article No.
DN 125-150	7871-003-000-000

SINGLE USE VALVE
DN 20 – DN 200

Article No. 9247-DN-000-333.
A extendet casing is recommende for the single use valve, see 6:205

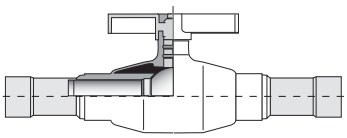
	Length [mm]
DN 20-25	230
DN 32-40	260
DN 50-80	300
DN 100-125	325
DN 150	350
DN 200	390



Shut-off valves

SERVICE VALVE FOR SINGLE HOUSE CONNECTION

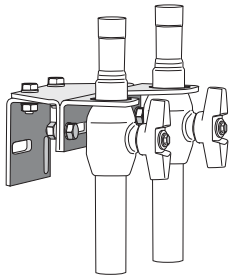
Copper / internal thread	Ø 15-88, DN 10-25
Copper / copper	Ø 15-54
Welding / copper	DN 15-50, Ø 15-54



Article No. 9247-DN-000-332.

TWIN VALVE FOR SINGLE HOUSE CONNECTION

Copper / copper	Ø 18-28
Copper / internal thread	Ø 22 / ¾" – Ø 28 / 1"
Welding / copper	DN 20 / Ø 18, 22, 28 – DN 25 / Ø 22, 28
Welding / welding	DN 20, 25
Welding / internal thread	DN 20 / ¾"
internal thread / internal thread	¾"

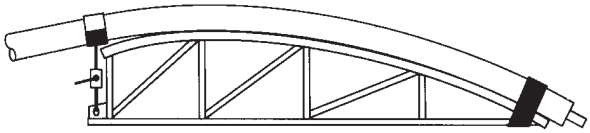


Article No. 7750-DN-000-000.

Miscellaneous

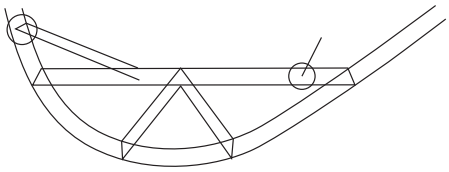
BENDING TOOL TYPE A
Curve radius 2 m. Can be used for dimensions up to DN 80 alt. DN2*50.
Article No. 7860-001-000-000.

Before use please see “Use and safety instructions”!



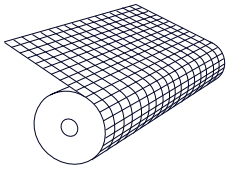
ENDING TOOL TYPE B
Curve radius 0.8 m. Used for flexible pipes
Article No. 7860-002-000-000

Before use please see “Use and safety instructions”!



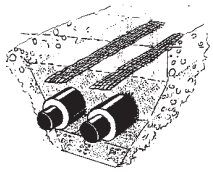
PROTECTION NET OF HDPE
Protection net is used as mechanical protection for all joints in exposed environments. Width 1000 mm, thickness 6 mm, 20 meter/roll
Article No. 6190-006-000-000.

Clips to protection net
Article No. 6190-001-000-000.

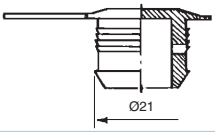


WARNING NET
Width 500 mm, length 100 m, purple color
Article No. 6990-000-000-000.

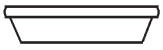
WARNING BAND
Width 150 mm, length 250 m.
Article No. 6990-002-000-000 (Marked district cooling).



PLUG FOR JOINTS, NON WELDING TYPE
Dimension 21 mm.
Article No. 6550-035-000-000.



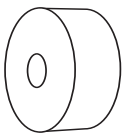
WELDINGPLUGG
Dimension 22 mm. For plugging of foam holes. Requires special tools. See §10.3.37!
Package size: 2000 pc.
Article No. 6550-050-000-000.



FOPS (COVER PATCH)
Diameter 90 mm. Used to cover weldingplugg to provide extra security.
Package size: 100 pc.
Article No. 6550-040-000-000

PLASTIC COVERED MASTIC
Width c:a 70 mm. 25 meter/roll. **Article No.** 6550-004-000-000.

WOVEN MASTIC
Width c:a 60 mm, 25 meter/roll **Article No.** 6550-012-000-000
Width c:a 100 mm, 25 meter/roll **Article No.** 6550-011-000-000



Miscellaneous

HEAT PROTECTION FABRIC
30 m. roll: **Article Nor.** 6890-001-000-000

WELDING WIRE PEH
Black. Diameter 4 mm. approximately 2 kg/roll
Article No. 9551-001-000-000.

SPACER FOR ALARM WIRE
Length 400mm. Package size: 100 pc.
Article No. 6890-010-000-000.

HYGROSCOPIC FELT
400 x 100 mm. Package size: 100 pc.
Art.nr. 6890-011-000-000

SPLICING SLEEVE FOR ALARM WIRE
Package size: 1000 pc.
Article No. 6890-100-000-000.

INSULATED ALARM WIRE
(For special applications, such as when clamping in real estate, houses).
Article No. 9720-020-000-000

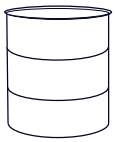
STANDARD ALARM WIRE
Roll with approximately 10 kg. wire. 1,5 mm^2
Article No. 9720-000-000-000

RAIL FOR ALARM WIRE (Cable 3 dc)
Box with approximately 100 pc.
Article No. 6890-013-000-000 (for cooling and steam).

SPLICING PLIER
Used to contact-pressure alarm wire in the joint bushing.
Article No. 6890-100-100-000.

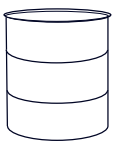
POLYOL (DELIVERED IN A DRUM)
A drum contains ~220 kg. For need of smaller quanties please contact
Please study the instruction Chap. 10 prior to use.

Article No. 6706-000-000-000.



ISOCYANATE (DELIVERED IN A DRUM)
Article No. 6720-000-000-000
A drum contains ~250 kg. For need of smaller quanties please contact Powerpipe!
Please study the instruction in Chap. 10 prior to use.

Article No. 6720-000-000-000.



Miscellaneous

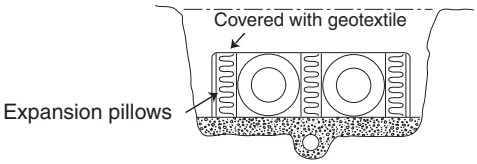
MEGGER ISOLATION VOLTAGE TESTER MIT 400
Article No. 6870-000-000-000.

MEGGER ISOLATION VOLTAGE TESTER 240
Article No. 6870-000-000-000

PULSE ECHO MEASUREMENT UNIT TYPE TDR 2000-2
Article No. 6871-000-000-000.

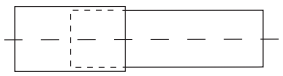
EXPANSION PILLOWS
L: 1200 mm, thickness 40 mm, width 2000 mm:
Article No. 9607-005-000-000
L: 1000 mm, thickness 40 mm, width 1000 mm:
Article No. 9607-000-000-000

For installation see chapter 9:401



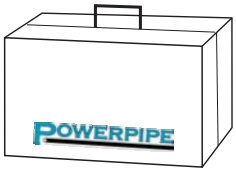
TRANSITION COPPER-STEEL
Straight Ø 22 - DN 20 (26,9)
Ø 28 - DN 25 (33,7)
Ø 35 - DN 32 (42,4)

Article No. 6800-ØCu-000-000.



BOX FOR EQUIPMENT AT JOINTING WORK
- Voltage tester
- Plug
- Splicing plier
- conical drill
- Welding equipment
- Splicing sleeves
- fops press
- Pressuretest equipment..

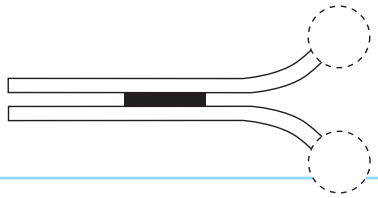
Article No. 9908-000-000-000.



PLUG-WELDING EQUIPMENT
Plug-welding, electronic MSG 41E incl. required equipment.
Article No. 6890-100-200-000.

BRANCHING PIPE
Used when connecting of double pipe to double pipe.
Available for DN 25, 32, 40 and 50.

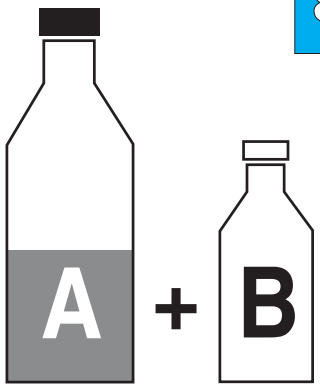
Article No. 8205-DN-000-000.



COLD BENDED BEND 5S
Article No. 8201-DN-900-000

Portion foam Joints, single pipes

Ready to use portion foam for field installation of pre-insulated pipe joints.
The portion foam is delivered in bottles.



PORTION FOAMS, 6480
Dimensioning table for single pipe systems

Dim. DN [mm]	Series 1 PEH Dy	Bottle No. Stand.	Flex	Series 2 PEH Dy	Bottle No. Stand.	Flex	Series 3 PEH Dy	Bottle No. Stand.	Flex	Series 4 PEH Dy	Bottle No. Stand.	Flex
20				110	3	4	125	4	5	140	6	8
25	90	2	2	110	3	4	125	4	5	140	6	8
32	110	3	4	125	4	5.1	140	5	5.1	160	6.1	9
40	110	3	4	125	4	5.1	140	5	5.1	160	6.1	9
50	125	4	5.1	140	5	6.1	160	6	8	180	7	9.1
65	140	4	6.1	160	6	8	180	6.1	9	200	8	10
80	160	5.1	8	180	6.1	8.1	200	8		225	9	10.1
100	200	6		225	8.1		250	10		280	11	
125	225	7		250	9		280	10.1		315	11.1	
150	250	8		280	10		315	11.1		355	9.1+9.1	
200	315	10		355	11.1		400	12		450	11+11.1	
250	400	11.1		450	13		500	13.1		560	12+12	
300	450	11.1		500	13.1		560	13.1+8		630	12+13	
350	500	13		560	13.1+10		630	13.1+11.1		710	13.1+13.1	
400	560	13.1		630	13.1+11		710	13.1+13.1				
450	560	12		630	13.1+10		710	12+13				
500	630	13.1		710	13.1+11.1		800	13.1+13.1				
600	710	13.1		800	13.1+12							

The "Flex" above refers to T-piece with bend and flexible casiong for flexible pipe.
The amounts above are based upon the free casing length 500 mm shrink casing dimesions and temperature +15° C - +40° C on the casing and steel pipe. Foam liquids must have a temperature of approximately 20°C

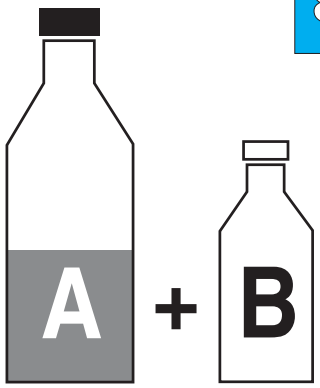
Article No.
6480-bottle No.-000-000.

An example of how to order:
Bottle size 5.1 has Article No. 6480-051-000-000

Please observe: Increased amount of foam is needed at cold pipes.
A solution could be to use next bigger size of bottle.

Portion foam Joints, double pipes

Ready to use portion foam for field installation of pre-insulated pipe joints.
The portion foam is delivered in bottles.



PORTION FOAM, 6480
Dimensioning table for double pipe systems

Dimension DN	STANDARD PEH Dy [mm]	Bottle No.	DOUBLE+ PEH Dy [mm]	Bottle No.	DOUBLE++ PEH Dy [mm]	Bottle No.
2 x 20	140	5	160	6	180	7
2 x 25	140	5	160	6	180	7
2 x 32	160	6	180	6.1	200	8
2 x 40	160	6	180	6.1	200	8
2 x 50	200	8	225	8.1	250	10
2 x 65	225	8.1	250	10	280	10.1
2 x 80	250	10	280	10.1	315	11.1
2 x 100	315	11.1	355	9+9	400	10.1+10.1
2 x 125	400	12	450	13	500	11.1+12
2 x 150	450	13	500	13.1	560	12+12
2 x 200	560	12+12	630	11.1+12		

The "Flex" above refers to T-piece for flexible pipe.
The amounts above are based upon the free casing length 500 mm shrink casing dimesions and temperature 15° C - +40° C on the casing and steel pipe. Foam liquids must have a temperature of approximately 20°C

Article No.
6480-bottle No.-000-000.

An example of how to order:
Bottle size 8.1 has Article No. 6480-081-000-000

For calculating relations Polyol / Isocyanate please see 10.3.38

Please observe: Increased amount of foam is needed at cold pipes.
A solution could be to use next bigger size of bottle.

A new pipe-Standard EN 13941

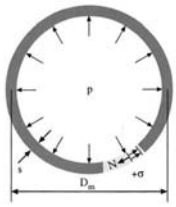
The standard EN 13941:2009 provides regulations for calculation, design and installation of pre-insulated pipes layed in trenches and covered by soil.
The standard is not harmonized with Pressure Equipment Directive (PED) and may only be used for buried district heating pipes.

The standard requires the calculation of the pipes in three respects:

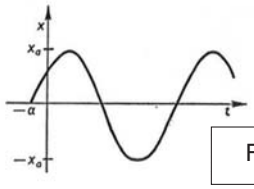
1. Stresses due to internal pressure (force controlled action) Limitations is listed in the "Limit State A"

2. Stresses resulting from repeated loads, "Fatigue." The restriction is specified in the "Limit State B".
   This applies to:
   Main lines shall be capable of 100 cycles.
   Distribution lines shall be capable of 250 cycles.
   Service pipes shall be capable of 1000 cycles.
   Each cycle is based on a change of temperature of 110°C.

3. Stresses which may lead to instability or deformation. (dilation controlled action).
   The limitations are specified in the "Limit-state C".
   The pipelines are divided into three project classes:
   Project class A (secondary plant)
   Project class B (primary plant with DN ≤300)
   Project class C (primary plant with DN >300)

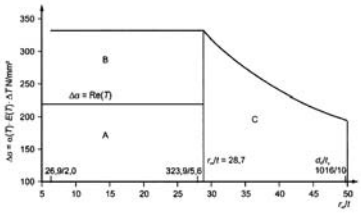


Internal pressure



Fatigue

Projet class	Weld Inspection at installation	Safety factor fatigue	Documentation
A	≥ 5%	5	Generalized
B	≥10%	6,67	Generalized
C	≥ 20%	10	Specific



Project classes

The generalized documentation can be business standards or manufacturer manuals. The specific doumentationen shall include:

- Calculated pressure and temperature and the number of expected cycles including estimates related to "Limit State A-C."
- Pipe line information such as, drawings, dimensions, material specifications, installation prerequisites, relational drawings.
- Quality assurance.

Forces, movements and expansion types

Expansion
When a buried pipeline is exposed to temperature increase, this will lead to an expansion of the pipe.

The expansion is counter acted by friction that occurs between the moving pipe and the surrounding sand (soil).

The friction builds up an axial stress in the pipe and counteract free expansion.

You get two different zones of the district heating pipe:

1. The part that is fixed (may be in the middleton of a straight length) (zone 1).
2 The part of the pipe that moves (in both ends of a straight length) (Zone 2).

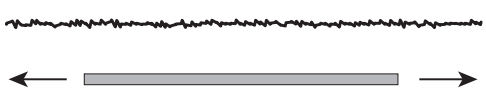
The stress in the fixed part depends only on the temperature change from the temperature when the trench was filled.
The force in the pipe can be calculated as the stress multiplied by the steel pipes cross area.

The part of the pipe that moves is called "Friction Length".
It acts as a fixative for the fixed part.

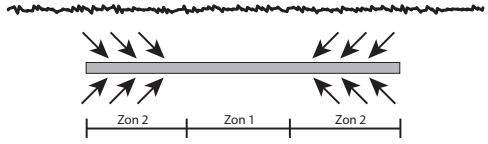
Preheating
To limit tensions and movements, it is common that the pipes are heat-preloaded.
This means that you get compressive stresses in the pipe at high temperatures and tensile stresses at low temperatures.

Cold Laying
Small and medium-sized dimensions can be layed cold. This means that you may get exremly high (but in term of norms acceptable) axial stresses. The movements e.g. of a bend can be up to four times as large as by pre-heating.

Table of friction lengths and movements
Table of friction length and movements are shown on the next page. Shown values are based on a number of conditions, as indicated. When change in the conditions, of course, specified data will change.



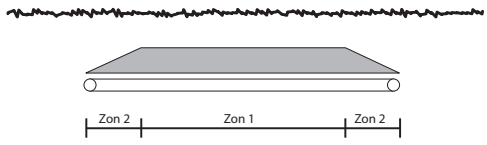
The pipe will expand when temperatur rises.



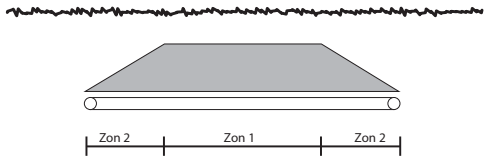
Movement counter acted by friction.

$$\sigma = E \cdot \alpha \cdot \Delta T$$

σ = Stress
E = Modulus of elasticity
α = Koefficient of thermal expansion
ΔT = Temperature Change



Tension in a preladed pipe



Stresses in a cold layed pipe

Assumptions for calculations

Maximum axiell stress is 150 Mpa for single pipes (equivalent ΔT=60°C). Maximum axiell stress is 150+50 Mpa for double pipes (temperature difference between supply and returning line is 40°C, soil covering 0,6 m; Bending Radius 3s. Number of full cycles: 1000 cycles for DN 25-65; 250 cycles for DN80-300; 100 cycles for DN 350-900.

Series 1

Dimension	Friction force N/m	Friction length m	Movement mm	Length L-bend mm
25	956	36	13	0,7
32	1189	42	15	0,8
40	1192	48	18	1,0
50	1376	58	22	1,2
65	1565	65	24	1,6
80	1822	72	27	1,6
100	2359	81	30	1,9
125	2719	87	32	2,4
150	3102	102	38	2,9
200	4130	113	42	3,6
250	5584	116	43	4,2
300	6556	131	48	4,5
350	7524	125	46	5,0
400	8808	138	51	5,6
450	8958	153	56	6,5
500	10516	145	54	6,9
600	12252	163	60	8,2
700	15152	179	66	9,4
800	181216	188	70	10,4

Series 2

Dimension	Friction force N/m	Friction length m	Movement mm	Length L-bend mm
25	1185	29	11	0,5
32	1365	36	13	0,7
40	1368	42	15	0,9
50	1556	52	19	1,2
65	1811	56	21	1,5
80	2075	64	24	1,5
100	2693	71	26	1,8
125	3064	77	28	2,2
150	3530	90	33	2,7
200	4749	98	36	3,4
250	6439	100	37	4,0
300	7449	115	43	4,2
350	8652	109	40	4,6
400	10201	119	44	5,2
450	10351	132	49	6,1
500	12211	125	46	6,4
600	14664	141	52	7,6
700	17568	154	57	8,7
800	20711	165	61	9,8

Series 3

Dimension	Friction force N/m	Friction length m	Movement mm	Length L-bend mm
25	1361	26	9	0,6
32	1545	32	12	0,7
40	1548	37	14	0,9
50	1801	44	16	1,1
65	2063	50	18	1,4
80	2334	57	21	1,6
100	3038	63	23	1,7
125	3492	68	25	2,1
150	4049	78	29	2,5
200	5478	85	31	3,2
250	7326	88	33	3,7
300	8577	100	37	4,4
350	10045	94	35	4,8
400	11897	102	38	5,4
450	12046	113	42	5,6
500	14249	107	40	6,0
600	17080	121	45	7,1
700	20152	134	50	8,2
800	23466	145	54	9,2

Series 4

Dimension	Friction force N/m	Friction length m	Movement mm	Length L-bend mm
25	1539	23	9	0,6
32	1784	28	10	0,7
40	1790	32	12	0,8
50	2062	39	14	1,0
65	2320	44	17	1,3
80	2654	50	19	1,4
100	3461	55	21	1,7
125	4005	59	22	2,0
150	4648	68	25	2,4
200	6204	75	28	3,0
250	8487	76	28	3,5
300	9950	86	32	3,9
350	11621	81	30	4,0
400	13843	88	33	4,5
450	13920	98	37	5,3
500	16612	92	34	5,8
600	19645	105	39	6,6
700	23012	117	44	7,7

Double, standard

Dimension	Friction force N/m	Friction length m	Movement mm	Length L-bend mm
2*20	1550	23	9	0,4
2*25	1552	33	12	0,6
2*32	1805	36	14	0,9
2*40	1811	41	15	0,8
2*50	2338	45	17	1,1
2*65	2691	50	19	1,4
2*80	3058	56	21	1,4
2*100	4052	62	23	1,7
2*125	5445	57	21	1,9
2*150	6370	65	24	2,3
2*200	8544	71	27	2,9

Double+

Dimension	Friction force N/m	Friction length m	Movement mm	Length L-bend mm
2*20	1805	20	8	0,4
2*25	1805	28	11	0,6
2*32	2319	28	11	0,7
2*40	2328	32	12	0,8
2*50	2675	39	15	1,0
2*65	3040	44	17	1,3
2*80	3402	51	19	1,3
2*100	4523	55	21	1,6
2*125	6234	49	18	1,8
2*150	7116	58	22	2,2

Backfilling with alternative materials

Shown below are the guidelines and potential limitations for the use of alternative backfill materials. If coarse grain materials are used as backfill around culvert pipes, special attention must be paid to controll during the operation. Extreme caution must be exercised when handling the backfill mass to avoid damage to pipes and fittings.

	Not congested traffic area	Traffic Congested paved surface	Traffic Congested not paved surface
Comments	No exterior load on the pipes	The pipline assumes to be below the paved surface, ie. in earlier existing hard packed soil.The upper level distributes the traffic loads so that point loads not occurs on the pipes. Surrounding material must be possible to be compacted.	Risk of point load on the pipes due to insufficient overfilling belived missing. Surrounding material must be possible to be compacted.
Friction Fixed distance	Existing natural and/or mixed material with largest grain size 50 mm Joints are enclosed with protection net of HDPE.	Existing natural and/or mixed material with largest grain size 50 mm Joints are enclosed with protection net of HDPE.	Existing not sharp-edged nature-natural material and/or mixed material with largest grain size 50 mm Joints are enclosed with protection net of HDPE.
Expansion distance (axiell movement)	Existing not sharp-edged natural material and/or mixed material with largest grain size 50 mm or mixed material 4-32 mm grain size. Joints are enclosed with mech mat of polyethylene.	Existing not sharp-edged natural material and/or mixed material with largest grain size 50 mm or mixed material 4-32 mm grain size. Joints are enclosed with mech mat of polyethylene.	Not sharp-edged trench gravel according to AMA tableCEC/1 with the largest grain size 32 mm. Joints are enclosed with mech mat of polyethylene.
Expansion-device (radiell movement). For limited movement at preheated systems.	Not sharp-edged trench gravel according to AMA tableCEC/1 with the largest grain size 32 mm.	Not sharp-edged trench gravel according to AMA tableCEC/1 with the largest grain size 32 mm + foam pads that absorbe the expansion that exceeds 20 mm.	Not sharp-edged trench gravel according to AMA tableCEC/1 with the largest grain size 32 mm.
Expansions-device (radiell movement). For limited movement at cold layed systems.	Not sharp-edged trench gravel according to AMA table CEC/1 with the largest grain size 32 mm + foam pads with thickness = least equal to the estimated movement or natural and/or mixed material with largest grain size 50 mm. Foam pads with thickness approx 1,6 times the estimated movement.	Not sharp-edged trench gravel according to AMA table CEC/1 with the largest grain size 32 mm + foam pads with thickness = least equal to the estimated movement or natural and/or mixed material with largest grain size 50 mm. Foam pads with thickness approx 1,6 times the estimated movement.	Not sharp-edged trench gravel according to AMA table CEC/1 with the largest grain size 32 mm + foam pads with thickness = least equal to the estimated movement or natural and/or mixed material with largest grain size 50 mm. Foam pads with thickness approx 1,6 times the estimated movement.

Calculating the pressure-drop for flexible pipes

Required flow

Each connected house has a power requirement according the design-temperature.
This power requirement with available temperature-drop determines the required flow.

Ex. Power Requiremen	Q	12kW.	
Temperature drop	Δ T	40°C	
Required flow	m	258 kg/h	m = Q*860/∅T

Required dimension

For copper pipes see calculation chart 9:102
With a pressure-drop of 1 mbar/m (10 mm vp/m) the required dimension for the above-stated example is, 18*1 mm.

Total pressure-drop

The available pressure drop is divided on the longest pipe line from the connection point to the district heating central located farthest.

Ex: Average pressure-drop can be calculated in terms of type of 1mbar/m.
The pressure-drop on the connecting pipe (Copper-Flex 18*1) if it is 14 m it will be 2*14 * 1 = 28 mbar

Higher pressure-drops can be calculated on the connecting lines located closer to the connection points. However, water flow should not exceed 2 m/s in a copper pipe.

Steel flexible pipes

Average Temperature, water 80°C

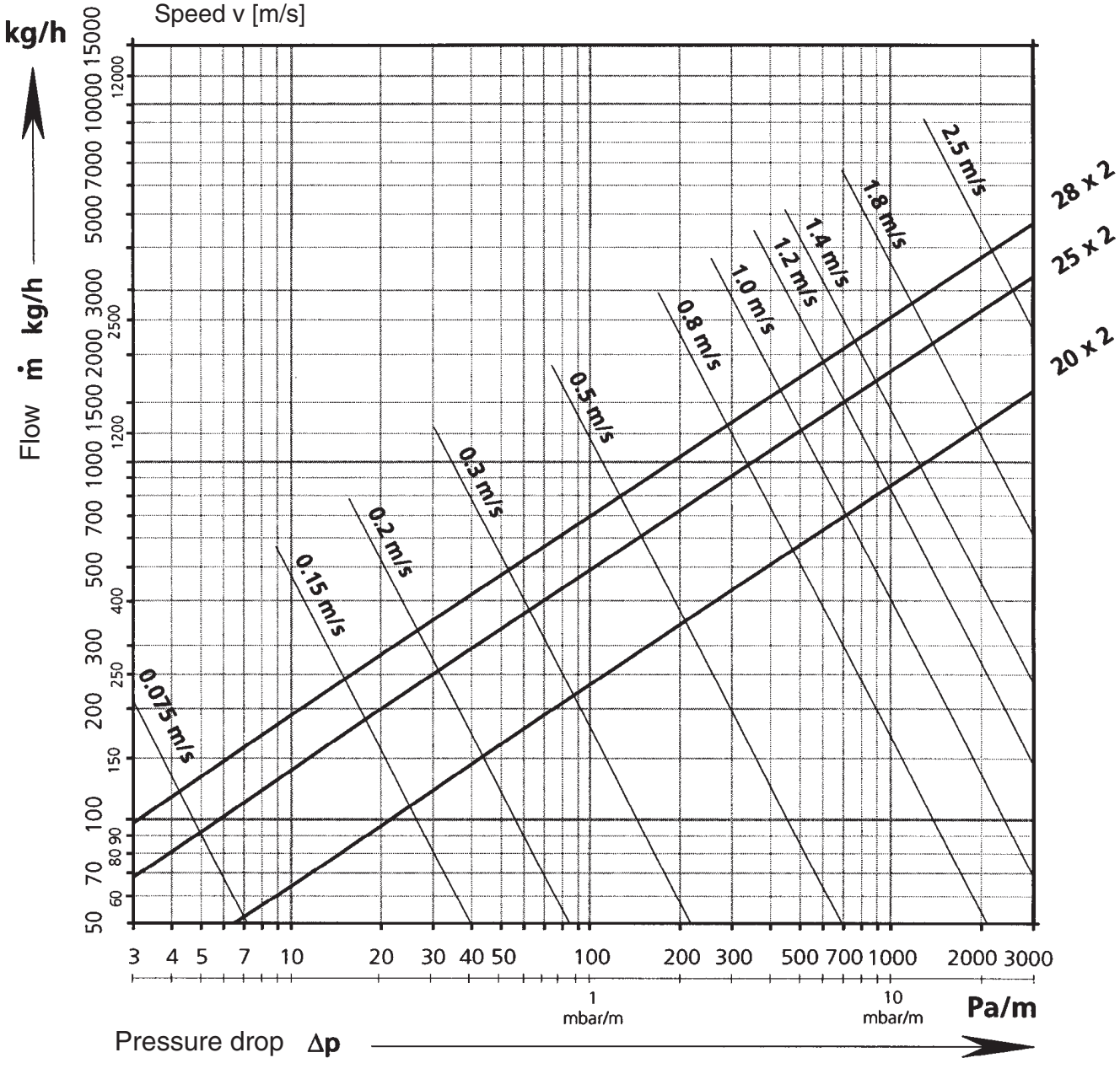
Roughness ε = 0.0016 mm steelflex

(1 mm vp = 9.81 Pa)

$$\dot{m} \approx \frac{Q \cdot 860}{\Delta T}$$

$\dot{m}$ = flow in kg/h
Q = effect kW
ΔT = temperature difference °C

Example: Power needs 30kW
∅T = 40°C
Required flow = $\frac{30 \times 860}{40}$ = 645 kg/h



Copper flexible pipes

Average Temperature, water 80°C

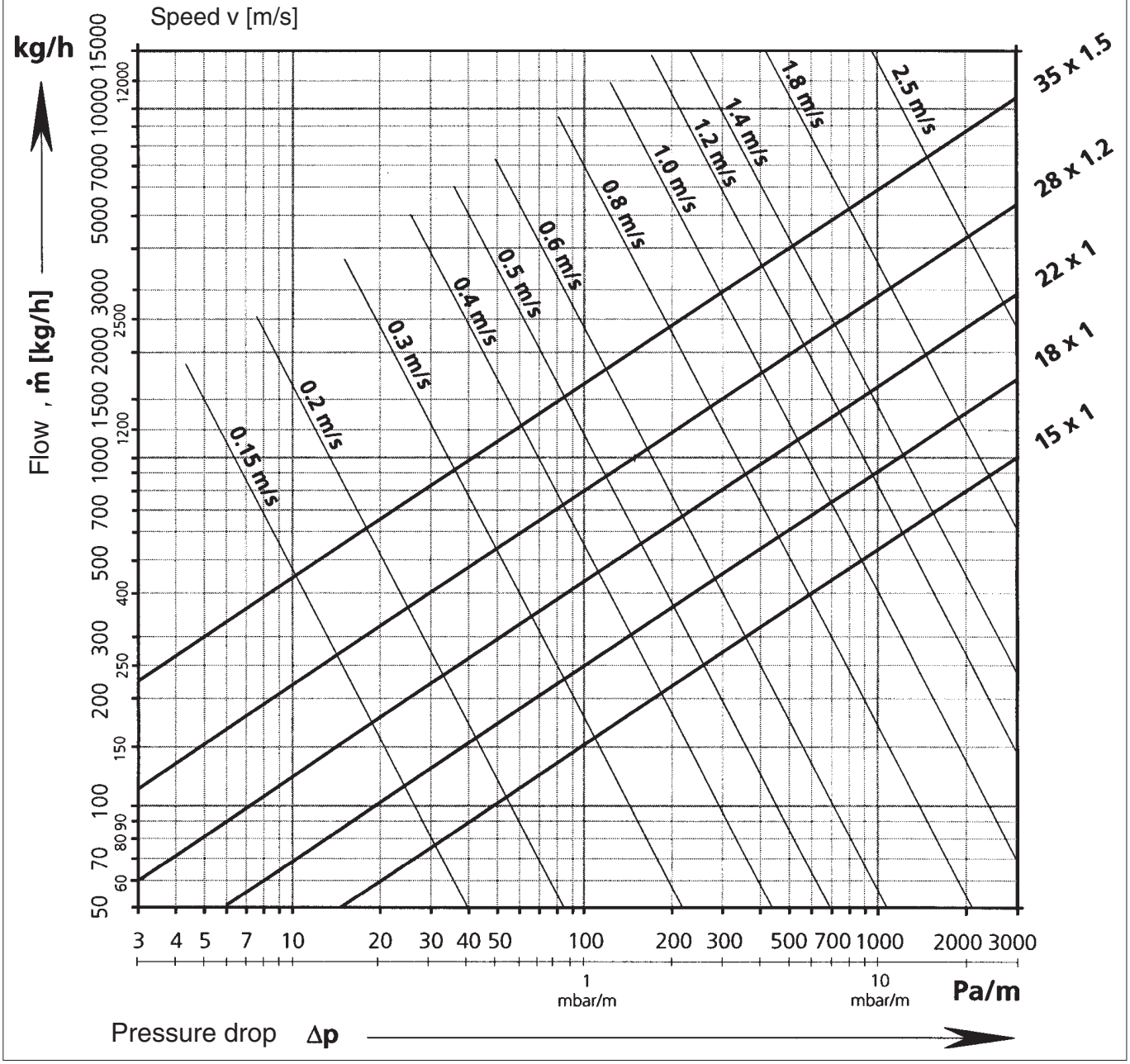
Roughness ε = 0.0015 mm copper

(1 mm vp = 9.81 Pa)

$$\dot{m} \approx \frac{Q \cdot 860}{\Delta T}$$

$\dot{m}$ = flow in kg/h
Q = effect kW
ΔT = temperature difference °C

Example: Power needs 30kW
ØT = 40°C
Required flow = $\frac{30 \times 860}{40}$ = 645 kg/h



Heat losses

Calculation prerequisites for single and double pipe systems

Conditions of installation

Height of back-filling	0,80 m	
Distance between pipes	0,20 m	Ø 110≤Dy≤ Ø 180
	0,25 m	Ø 200≤Dy≤ Ø 500
	0,30 m	Ø 630≤Dy≤ Ø 900

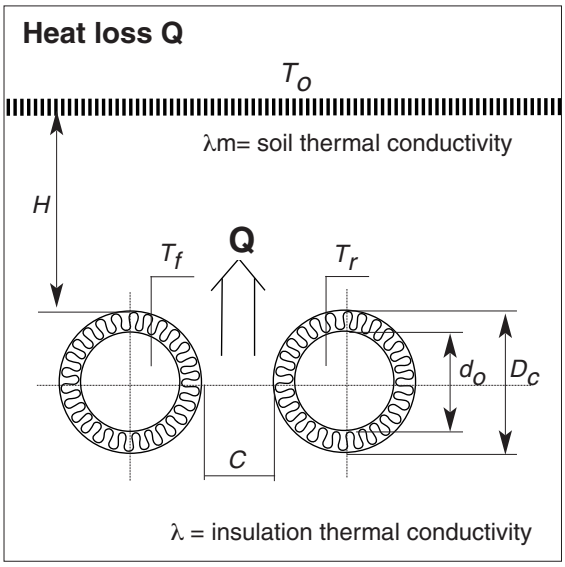
Ground

Thermal conductivity: λ m = 1,5 W/m° K

PUR foam insulation:

Thermal conductivity λ i = 0,026 W/m° K

Heat loss Q



Temperatures, yearly average (primary system):

Flow pipelines	Tf	= 85° C
Return pipelines	Tr	= 55° C
Ambient temperature	To	= 5° C
	Δ T	= 65° C

$$\Delta T = \frac{T_f + Tr}{2} - To$$

If ∅T is changed 10°, the heat losses are influenced by $\frac{10}{65}$ = 15%

Heat Losses in district heating pipes in the ground depends on:

1-Thermal resistance of soil: $Rm = \frac{1}{2\pi\lambda_m} \ln\left(\frac{4Z_c}{D_c}\right)$

2- Thermal resistance of pipe insulation $Rr = \frac{1}{2\pi\lambda_i} \ln\left(\frac{D_{pur}}{d_o}\right)$

3- The interactions between the supply and return line $R_2 = \frac{1}{4\pi\lambda_s} \ln\left(1+\left(\frac{2Z_c}{C}\right)^2\right)$

For calculation see EN 13941

Single pipe systems

Heat losses at ΔT = 65° C (includes supply and return lines)

DN	Series 1 W/m	kWh/m.year	Series 2 W/m	kWh/m.year	Series 3 W/m	kWh/m.year	Series 4 W(m	kWh/m.year
20			14,6	128	13,4	117	12,5	109
25	20,8	182	17,3	151	15,6	137	14,4	126
32	21,3	186	18,8	164	17,0	149	15,3	134
40	24,5	214	21,2	186	19,0	167	17,0	148
50	27,3	239	23,7	208	20,6	180	18,5	162
65	32,1	281	26,6	233	23,1	203	20,7	182
80	33,0	289	27,8	244	24,4	214	21,5	188
100	34,5	302	29,0	254	25,3	221	22,3	195
125	39,9	350	33,4	292	28,2	247	24,4	214
150	47,1	413	37,8	331	31,1	272	26,5	232
200	51,1	448	39,8	349	32,4	284	27,5	241
250	49,2	431	38,8	340	32,4	284	27,8	243
300	56,4	494	44,2	387	35,7	312	29,9	262
350	54,8	480	42,6	373	34,3	301	28,8	253
400	58,1	509	44,1	387	35,2	308	29,5	258
450	85,5	749	58,4	511	43,7	383	35,2	309
500	82,2	720	56,5	495	42,7	374	34,6	303
600	109,8	962	68,4	599	49,3	432	39,8	349
700	134,6	1179	77,7	681	55,8	488	44,8	392
800	152,0	1332	87,3	765	62,4	546		

Double pipe systems

Heat losses at ΔT = 65° C

DN	STANDARD W/m	kWh/m.year	DOUBLE+ W/m	kWh/m.year	W/m	DOUBLE++ kWh/m.year
2 x 20	10,1	88	8,9	78	8,1	71
2 x 25	13,2	116	11,2	97	9,9	87
2 x 32	14,6	128	12,2	107	10,8	95
2 x 40	16,6	145	14,3	125	12,4	109
2 x 50	16,4	144	13,8	121	12,2	107
2 x 65	20,2	177	16,3	143	13,7	120
2 x 80	22,8	200	17,8	156	14,6	128
2 x 100	22,9	201	17,4	152	14,4	126
2 x 125	20,8	182	16,7	146	13,6	119
2 x 150	25,6	224	19,7	173	16,1	141
2 x 200	30,5	267	21,8	191	17,3	152

When calculating the heat consumption, the computer program "Ekodim", has EN13941 and the ISO-value = 0.026 W / moC been used, and consideration has been taken that jacket pipes expanded 1%.
When calculating future heat loss confirm the computerized program «Ekodim».

Heat losses, flexible pipes

Conditions of installation

Filling Height	0,6 m
Free distance between the pipes	0,1 m

Ground

Thermal conductivity: $\lambda_m = 1,5$ W/m°K

Insulation PUR foam

Thermal conductivity: $\lambda_i = 0,024$ W/m°K

Temperatures, annual average

	Primary-system	Secondary-system
Supply pipe temp.	85°C	70°C
Return pipe temp.	55°C	40°C
Ambient temp.	5°C	5°C
Δ T	65°C	50°C

Heat losses, copper flexible pipes, single

Dimension	Primary System W/m	kWh/m, year	Secondary System W/m	kWh/m, year
22/91	13,4	118	10,3	90
28/91	16,1	141	12,4	108
35/91	19,7	172	15,1	133

Heat losses, copper flexible pipes, double

2*15/91	7,4	64	5,7	50
2*18/91	9,3	81	7,2	63
2*22/91	11,5	101	8,9	78
2*28/91	14,9	130	11,5	101
2*18/110	7,5	66	5,8	51
2*22/110	8,7	76	6,7	59
2*28/110	10,2	89	7,8	68

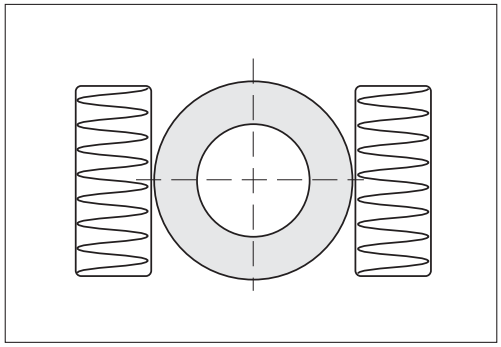
Heat losses, Steel flexible pipes, single

20/78	14,0	122	10,8	94
28/91	16,1	141	12,4	108

The heat losses above are both supply and return direction. If T is changed, the heat losses are affected linearly.
OBS! Heat losses increases with time for all District Heating pipes. Ask Powerpipe for optimization.

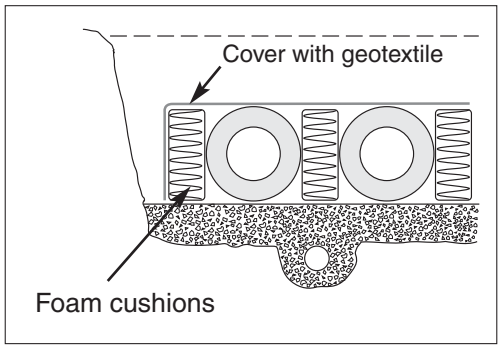
Planning

Foam Pillows
Foam cushions shall be used to protect the bends, T-pieces, etc. at large axial movements and when using different backfill material than natural sand.
Foam Cushions needs to be used often by cold laying.



Material
Dimensions 2000 x 1200 x 40 mm.
The material can withstand a 70% compression.
If the surfaceboard made of mineral wool is used the compression up to 50%

Placement
Cut to correct size
Height = Jacket pipe diameter.
Width and length calculation / description.

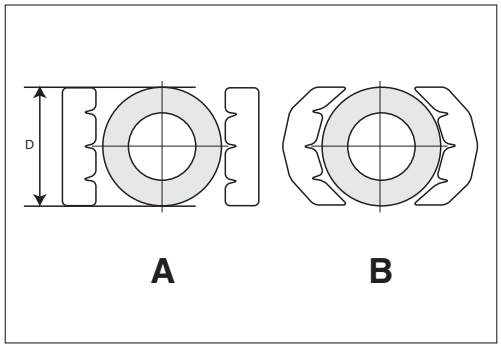


Assembly
Foam cushions are placed on both sides of the pipe.
Expansion cushions and pipes are recommended to be covered with geotextile to prevent above penetrating materials.

At cold laying with large initial movements the thickness of the cushions at the bends abdomen can be reduced by 50%.

The cushions are mounted standing (version A) or around the pipe (type B) as shown.

Configuration B should be avoided around double sealing shrink joint.



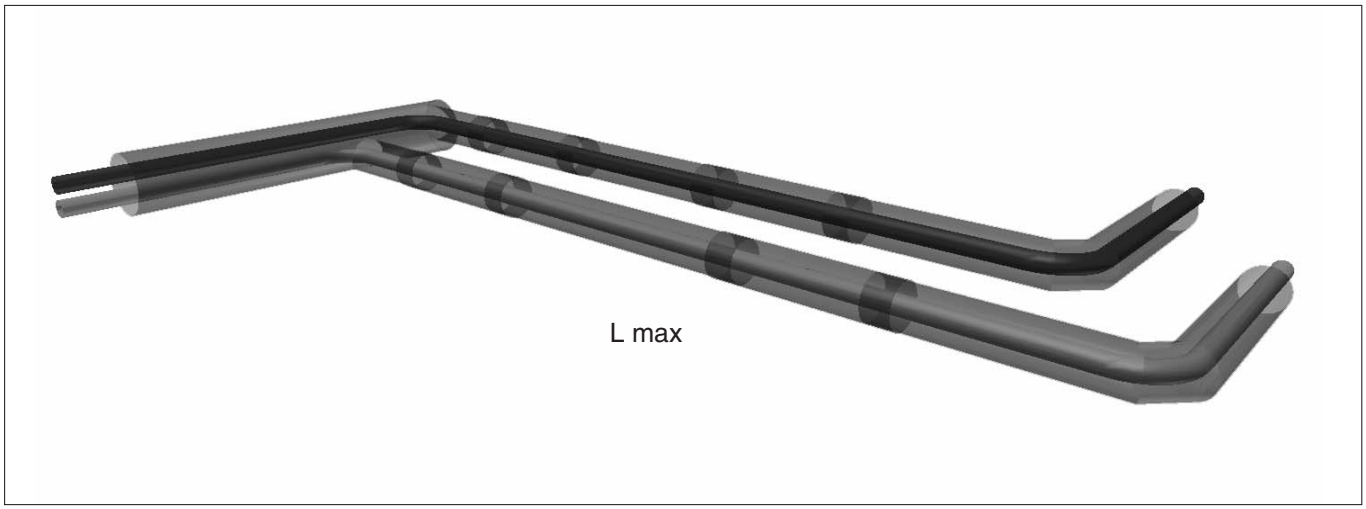
Installation of transition unit in angle Art. No. 1580, 1680 and 1780

Bakgrund
Transition unit in angle art. No. 1580, 1680 and 1780 have a limited ability to absorb forces and expansion movements of the single pipes.

Maximum temperature of	120°C
Min. orientation temperature	0°C

Max length
Maximum length of the single pipe from the transition pipe-bend to the next 90° bend for heat preloaded and Cold layed system are:

DN 25-80	14 m.
DN 100	12 m.
DN 125	8 m.
DN 150	4 m.
DN 200	2 m.



NOTE: Calculate the supply pipe

These directions complement what is specified in EN 13941 and procedures produced by the local government.

10.1 Transportation and storage

Normally the pipes and fittings are delivered to the site on a truck and the consignee is responsible for unloading of the same.

For unloading and further handling, wide nylon web slings are to be used. Chains, ropes or other round lifting equipment may not be used. If unloading and handling are carried out with a fork lift, flat forks are to be used. Pipes or fittings must not be dropped or thrown off the truck as the outer jacket and the insulation may be damaged.

NOTE! T-pieces should not be lifted by the branch pipe only. Particular care must be taken, to ensure that the jacket pipe is not damaged.

Storage of pipes and fittings should be on level and dry ground. The insulation should not be allowed to come into contact with water. The steel pipes shall be protected from corrosion.

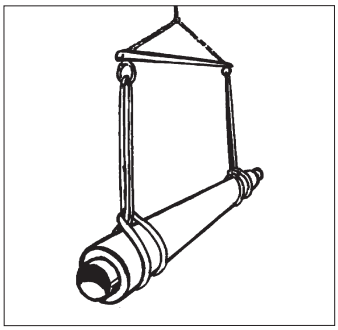
Pipe work larger than DN 125 should be stored with spacers between lengths. Maximum stacking height is 2 m. Width and distance between spacers are to be arranged so that the pressure on the jacket does not exceed 400 kPa (4 kg/cm^2).

Permanent compressive stress on the polyurethane foam should not exeed 50 kPa.

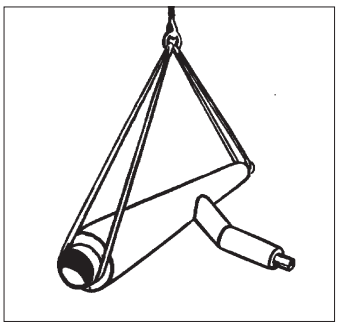
It is recommended to use the spaces that are delivered together with the pipes. These spacers make the stacking safer as well as preventing accidents due to collapse of the pipe stack.

Fittings are to be stored with the steel pipe ends facing down.

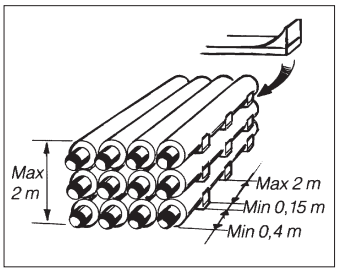
Pipes with an outer jacket diameter ≥ 560 mm are to be handled with special care at temperatures between 0°C and –20°C. At temperatures below –20°C, ask Powerpipe Systems for advice.



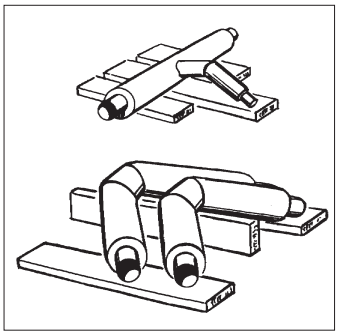
For unloading and further handling wide nylon web slings shall be used. Chains, ropes or other round lifting equipment may not to be used.



T-pieces may not be lifted by branch of pipe only.



It is recommended to use the spaces that are delivered together with the pipes. These spacers make the stacking safer as well as preventing accidents due to collapse of the pipe stack.

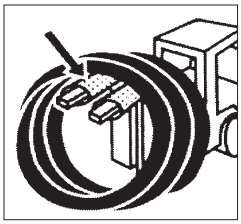


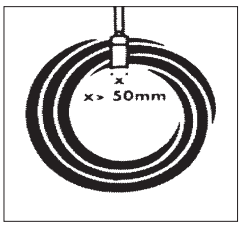
Fittings are to be stored with the steel pipe ends facing down.

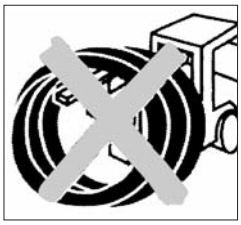
Transportation and handling of flexible pipes

Loading, unloading

Flexible pipes are delivered in large rolls.
The rolls may not be lifted with narrow straps or unprotected forks.
Minimum width of the strap is 50 mm.
Fork protection may consist of steel pipes or pressure water pipes.



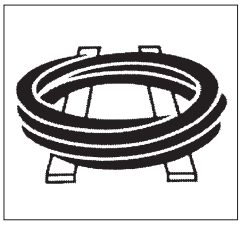


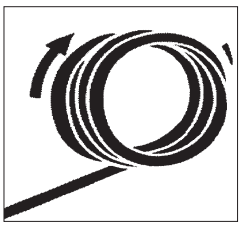


Storage, unwinding

- The rolls are stored horizontally on a pallet to avoid soil moisture / sharp-edged objects.
- The rolls may be stored standing on a totally flat surface. The storage area must then be entirely free from foreign / sharp-edged materials.

Unwinding can occur from:
1. Vertical roll which is rolled out.
   Make sure that the roll will not roll over sharp-edged materials.
2 Laying rotating roll, for example on a unwinding device.
3 Laying fixed roll. In this situation, the pipe is wrapped off the roll.

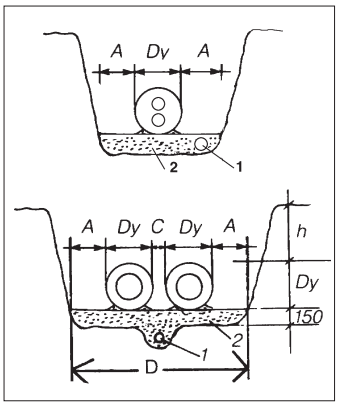




10.2.1 Dimensions

The pipe lengths from Powerpipe are laid directly on the prepared pipe bed (2). A recommended typical section of a trench is shown in the figure. The draining layer (2) and draining pipe (1) decrease the heat losses from the mains since dryer conditions around the pipe work gives better insulation.

The top of the trench must be refilled with a covering height of minimum of
500 mm for roads with heavy traffic
300 mm for other places



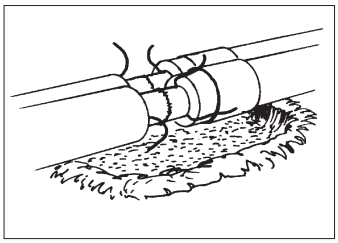
1: Draining pipe
2: Pipe bed.

10.2.2 Pipe bed

The bed is to be a minimum of 150 mm thick, and to be formed by material free from stones and with a maximum particle size of 20 mm. If material with sharp edges is used, the bed must have a 50 mm thick top layer consisting of stone-free material.

The bed is performed according to the type section with dimensions:
A=C= 200 mm for ≤ Dy 180 mm
A=C= 250 mm for 200 ≤ Dy ≤ 560 mm
A=300 mm for Dy ≥ 630 mm
C= 400 mm for Dy ≥ 630 mm

When mounted at the pagee of the pipe trench A-dimension may be reduced to 100 mm.

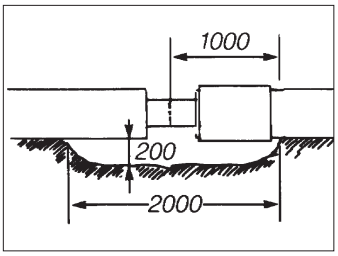


Excavation at the sleeves, or lift of pipes shall be made so that a free-mounting space is obtained

Excavation at the casing, or build-up of the pipes shall be executed to obtain a free space around the joint location at a length of 2 m - see Figure!
The space shall be min 200 mm to dim <500 and 300 mm in dim> 560 mm.
At joints where the pipes can not be rolled, the free installation space is increased to 400 mm at a width of 2 x 600 mm (from the welding point) so that the welding work can be performed.

10.2.3 Drainage

Trenches should always be kept drained. Dry trenches during the installation period decrease the risk of damp in the insulation. During operation of the system a dry trench will decrease the heat losses and reduces the risk of moisture coming from outpagee in the insulation. Rigid drainage pipes of an approved type must be used. The drain pipes should not be connected to crossing drain water pipes. Instead, they are to be connected at a low point to an existing pipe.



Space for installation

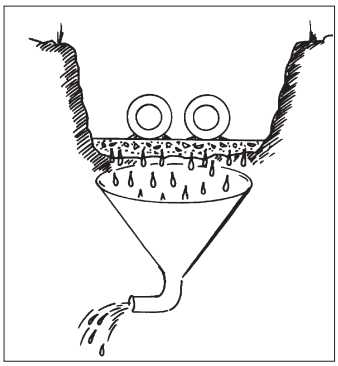
Surrounding filling for drainage pipe is executed according to drainwater local standards.

10.2.4 Installation Prerequisites

The assembly will be performed and guaranteed according to the providers documented instructions. To perform a proper joint the following general installation conditions must be met:

- The pipe trench shall have a functioning drainage so that the joint location is dry. In addition, it must be free from snow and ice.
- Before jointing and insulation are carried out, the carrier pipe must be installed and finally tested.
- Alarm and signal wires are connected according to prepared drawings .
- At the joint location, shall the joint casing, jacket pipe end, steel pipe ends and free foam surfaces be dry and clean.
- Surfaces against which the polyurethane foam is molded, shall normally maintain the temperature 15-40°C. In cold weather this can be achieved through circulation of hot water through the pipes.

Joint sites must be protected from rainfall between different operations and when foaming and joining.



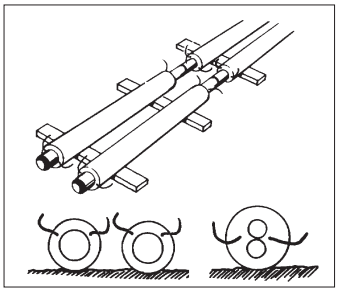
Trenches should always be kept drained.

10.3.11 Pipe laying

Before pipe laying is started, the pipe bed should be checked to ensure that it has been constructed in accordance with 10.2.2 and is free from foreign material. The full length of the pipe should rest on the bed. The pipes can also be laid on special stacking wood or on rollers.
The size of the stacking wood should be at least 150x150 mm. The wood or rollers are to be aligned before the pipe is laid.

Check that the alarm wires in each pipe and detail are faced upwards. In curved pipes and profile bends, however alarm wires of manufacturing reasons layes otherwise.

Throughout the assembly period be ensured that no water is collected at some point in the pipe trench bottom. The insulation must be kept dry. Wet insulation in the pipe ends are causing problems at the joint insulation and gives alarm-errors.



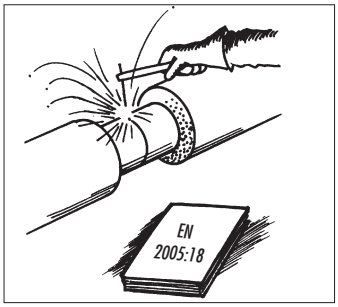
District heating pipes placed on special pallets or on rolls. Palets or roll are positioned before the pipe is layed. Make sure the alarm wires in pipes and fittings is facing upwards.

10.3.12 Welding, testing and control of weld

Welding of steel pipes is to be performed, where specified, by a company which is certified for welding. The welder shall have a valid certificate showing his qualifications. Each weld is to be marked so that the welder can be traced. At welding of straight pipes, the pipes are gradually turned around on rollers/wooden foundation. This will minimize the problematic welding. “Hatch-welds” shall be avoided.

Testing is performed in accordance to standards. Pressure test and leak detection is carried out with cold water by 1.43 times maximum allowable operating pressure. The pressure shall be held one hour prior to inspection. All joints shall be visible.

Leak test can also be carried out with air whereby leak detection is done by brushing with soapy water or similar. Maximum pressure 3 kPa (0,03 kp/cm2).
Radiography shall be made in the extent the program documents specifies.
Before starting daily operation, the pipelineis cleaned with a cleaning-plug or pressure cleaning tools.



Non-destructive testing executed in the amount which is specified in manuals.

10.3.13 Pipes for cutting to length

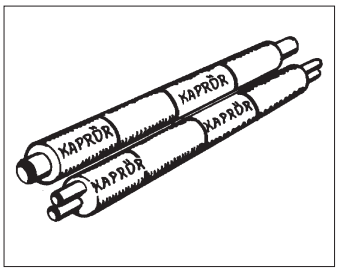
When short pipe sections are required pipes for cutting to length are to be used. The construction of the pipe makes it easy to remove the insulation from the steel pipe which gives a totally clean surface. This assists the installation and eliminates the risks of generation of unhealthy gases from insulation while welding or soldering.

The particular pipes that are for cutting to length are marked "Pipes for cutting to length".

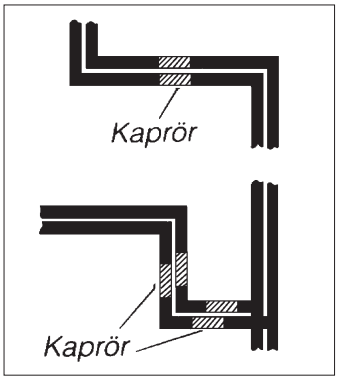
The "pipe for cutting to length" piece is to be located where the friction movement is as small as possible, which means as far as possible from a change of direction.

The cutted piece may not be cast into a wall or the similar on a straight length.

At cutting of the HDPE-pipe it is essential to start with tangential cuts to avoid scratches or damages in axial direction in order to avoid cracks in the jacket pipe.
This is specially essential at low temperature. At very low temperature it is recommended to preheat the jacket pipe before cutting



The part of the pipeline forming cut-to-length pipes is labeled



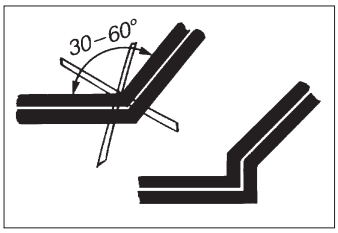
The "pipe for cutting to length" piece is to be located where the friction movement is as small as possible, which means as far as possible from a change of direction.

10.3.14 Angles of alteration

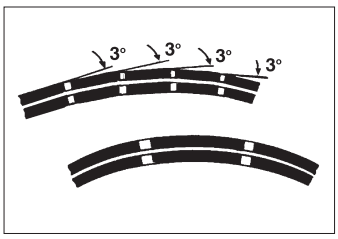
Where a change of direction is needed, standard bends are to be used if possible. Bends with an angle less than 60° and more than 30° are only allowed to be used if at least one of the legs is kept short.

For stress reasons, changes of direction 10°–30° are not allowed to move pageeways if the bend has long straight sections before and after. The packing around these changes of direction has to be done particularly carefully.

For angles of alteration smaller than 3°, the completely joined service pipe can be pulled in a wide curve. Several mitres after each other are acceptable. Mitring can be substituted with the completely jointed service pipe being pulled in a wide curve. The angle of alteration can also be done with the help of specially bent pipes. These are fabricated in 12- or 16-metre sections and shaped as a curve with a maximum angle of alteration equal to 35°. For further information, please see page 3:105 or 4:105. Mitering may not be used at cold installations.



For stress reasons, changes of direction larger than 10°–30° are not allowed to move sideways if the bend has straight sections before and after.



Bends with an angle less than 60° and more than 30° are only allowed to be used if at least one of the legs is kept short.

10.3.15 Branch pipes

Single pipes

The tee-pieces from Powerpipe have equal strength i.e. the tee-piece has the same strength as a straight pipe. Although the single pipe tee-piece is reinforced, it cannot withstand large forces from the branched off pipe. The main pipe must then be released from the load from the branch pipe with a bend or an anchor point and due conpageeration taken of possible axial movements in the main pipe.

Double pipes

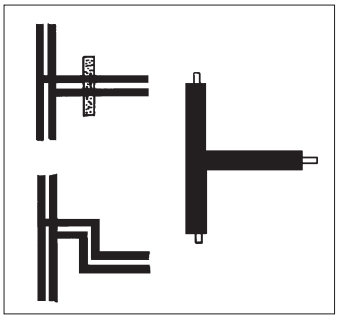
Tee-pieces for double pipes are fabricated to withstand full force from branched off pipes. Stress releasing bends or anchor points are not needed for straight T-pieces.

Flexiblepipes

For instruction on the flexible pipes, see page 5:402-403.

Direct connection

Direct connection is allowed on non-pressurized main pipe, without specific permission.



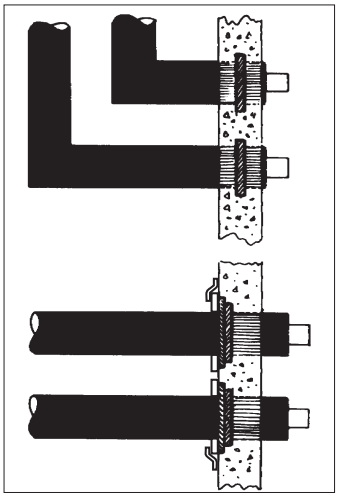
The main pipe must be released from the load from the branch pipe with a bend or an anchor point.

10.3.16 Wall penetrations

Wall penetrations must be made with care in order to avoid locking of pipes or penetration of ground water.

In cases where the pipes have no axial movement and where the ground water pressure is normal, the embedment ring 6520 (see page 8.101) is to be used. The grouting ring is to be located in the centre of the wall, and the hose clip is tightened before casting.

Where movement can be expected and where the probability of ground water pressure is high wall embedment ring 6510 is used- see 8:101.



The grouting ring is to be located in the centre of the wall, and the hose clip is tightened before casting.

10.3.17 Valves, drain and air release devices

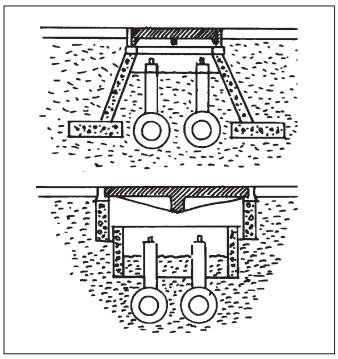
Valves

Valves must be located in such a manner that they are not exposed to bending forces or pageeway movements. Axial movements must be kept to a minimum. When installing the valves shall always be in fully open position.

The valve stem is protected for example by concrete pipes Ø 600 mm, standing on a concrete slab or equivalent. These are placed so that concrete pipe will not damage the District heating pipes. The concrete pipe ends on the ground level with adjustable well covering

In streets or other areas with a heavy traffic load, valve pits must be constructed, to avoid forces from the traffic load being transmitted to the stem sleeves.

The sleeve must be located so that the valve can move longitudinally without forcing load to the valve stem extension.

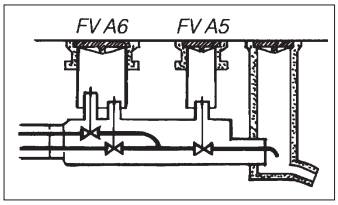


The spindle is protected by Concrete pipes standing on a concrete pad or equivalent. In streets or in soil with traffic loads use adjustable well covering for relief, so that the traffic load is not transferred to the concrete pipes.

Drain and air release units

Low- and high points with corresponding drain and air release units are preferable to be fitted where the main pipe has no movement, i.e. at least one friction length from a 90º bend.

Air release should be fitted on branch pipe if possible.

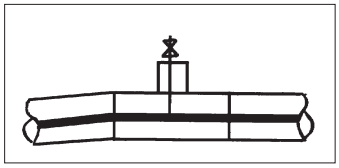


Prefabricated drain and air release units.

Prefabricated components

Tee-pieces for single pipes are connected to valve fitting, see 3:402–408 (single pipes) or 4:402–408 (double pipes), As an alternative, air release/drain, see 3:402 (single pipes) or 4:404 (double pipes).

With single pipes a joint can be avoided by use of Extended t-piece, see 3:302. By using the Combination valve, see 3:406, air release/drain are coordinated.

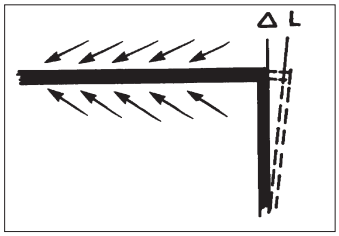


Drain and air release detail.

Fittings built on site

Drain and air release fittings for use in descentable concrete chambers and in buildings, are fitted on site.

After welding, the valves and pipes are to be painted with rust protective coating. The valves must be insulated up to the connecting service pipe. In order to avoid freezing damage a by-pass pipe with choke valve can be installed.
The choke valve is adjusted to a low flow rate. If possible, the valve shall be fitted with a thermost.



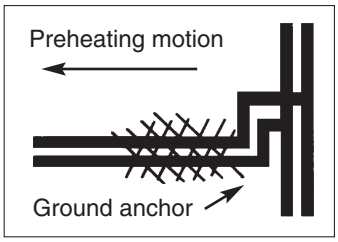
The thermal forces occurring in the pipe are normally transmitted to the ground via friction at certain small movements of the service pipe. In most cases these movements are absorbed in bends.

10.3.18 Pipe anchor points

The thermal forces occurring in the pipe are normally transmitted to the ground via friction at certain small movements of the service pipe. In most cases these movements are absorbed in bends. In certain cases, however, the pipe must be anchored in order to prevent, limit or guide the expansion movement.

Ground anchoring

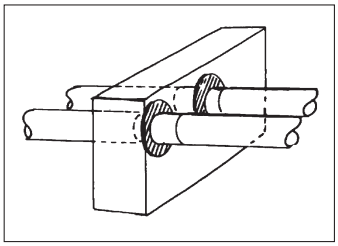
In case of preheating it may be desirable to guide the expansion movement in a certain direction. This can be achieved by backfilling on top of one or two pipe lengths (ground anchoring).



Anchor point

An Anchor point is used when it is desirable to limit the axial movement or to ensure that a length of service pipe does not slide from one expansion point to another, for example by strong slope, or when using compensators.

The anchor point is assembled in such a way that the distance between the respective anchor point flange is 100-200 mm. The flange package is cast in a re-inforced concrete block. This should be designed to allow the transfer of anchor forces and the pressure to the ground.

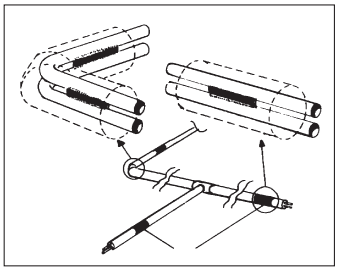


The anchor point is assembled in such a way that the distance between the respective anchor point flange is 100–200 mm. The flange package is cast in an reinforced concrete block.

Anchor pipes

For double pipe systems two pipes are connected to each other in bends, anchoring points, tee-pieces, valves and transition pipes.

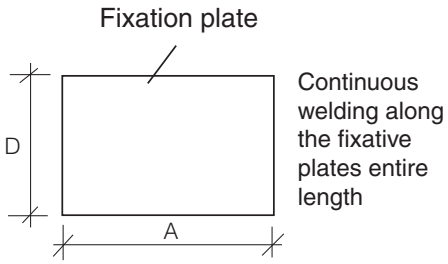
If a long length of pipe is not terminated with any of these fittings, for instance after passing a ground wall, or on a long run of pipe work, anchor pipes are to be used in order to prevent the insulation from being ripped off from the steel pipes when there are different temperatures in the flow and return pipes.

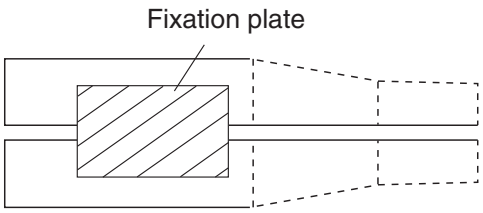


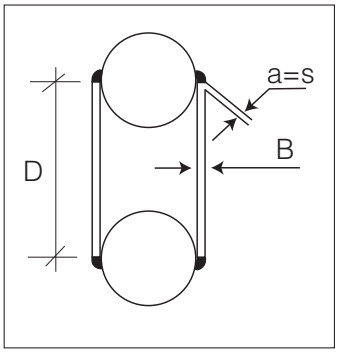
For double pipe systems two pipes are connected to each other in bends, anchoring points, tee-pieces, valves and transition pipes.

Alternative for ancor pipes

Steel plates with the following dimensions and assembled as shown in Figure substitute for ancor pipes



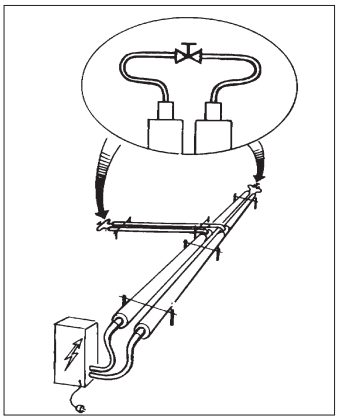




DN	DY X S	D	A	B
		Fixation plate		
20	26,9 X 2,3	38	65	5
25	33,7 X 2,3	48	65	5
32	42,4 X 2,6	58	80	5
40	48,3 X 2,6	64	90	5
50	60,3 X 2,9	76	115	5
65	76,1 X 2,9	92	115	8
80	88,9 X 3,2	100	140	10
100	114,3 X 3,6	134	165	10
125	139,7 X 3,6	165	200	10
150	168,3 X 4,0	203	260	10
200	219,1 X 4,5	260	300	12

10.3.19 Preheating and expansion absorption

When the temperature changes during operation, thermal forces are created in the steel pipe. Natural bends and expansion devices transfer these forces wholly or partly to linear movements. The size of the movement depends mainly on the dimension of the pipe, temperature differential and depth of laying.



In order to minimize movements, the pipe can be prestressed by heating to a temperature in the range between the lowest surrounding and the highest operational temperature. The prestress temperature is stated in the project documents.

Preheating

In order to minimize movements, the pipe can be prestressed by heating to a temperature in the range between the lowest surrounding and the highest operational temperature. The prestress temperature is stated in the project documents.

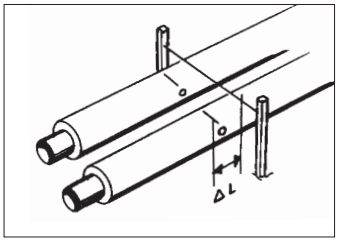
Prestress heating is normally done with water and often with the same water as that used for pressure testing. The water is heated by means of either an electrical boiler or water from the existing heating network. If water from an existing system is used, the water must be introduced into the new system via a shunt, in order to avoid fast temperature changes.

In cases of large dimensions and long runs, the pipes can be preheated with air. Ask Powerpipe for advice.

Before preheating is executed, the expansion movements must be calculated and control points must be defined. This is in order to make it possible to check calculated expansion movements in a practical way. During preheating the pipes must be free to move.

When the correct preheat temperature is reached, the expansion movements must correspond to the calculated ones. If this is not achieved, the preheat temperature may be increased a few degrees in order to reach the correct expansion.
The pipes can also be mechanically helped to correct the expansion by means of lifting and stretching at certain points.

The preheat temperature must be kept constant during packing and refill work.



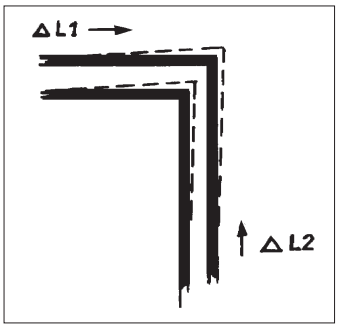
Before preheating is executed, the expansion movements must be calculated and control points be defined.
This to make it possible to check calculated expansion movements in a practical way.

Expansion absorption

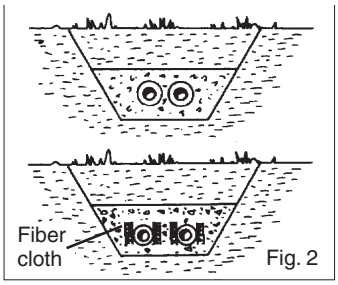
Since the temperature varies during operation, movements occur in expansion parts, bends etc. These movements can be absorbed by the surrounding backfill. If the temperature difference between installation temperature (preheat temp.) and max/min temp. is larger than about 50°C and if the surrounding soil is compressed, bends must be protected against arising ground pressure by use of cusions e.g. mineral wool, or soft plastic material.

The movement is simplified if the pipes in the expansion zone is surrounded by mineral wool or foam pads - see Figure 2 on the right.

In case of large movements the protecting cover can be formed as a concrete duct or as a special steel structure. These must be ventilated in order to avoid too high temperatures. When using concrete ducts or steel structures, special installation instructions must be used.
For large movements (cold laying) the expand-devices (90° bends) are protected when these parts are backfilled after operation startup.



When the temperature change during operation, movements of expansion occures in expansi-ons devices, bends etc.These movements can be absorbed by the surrounding sand.

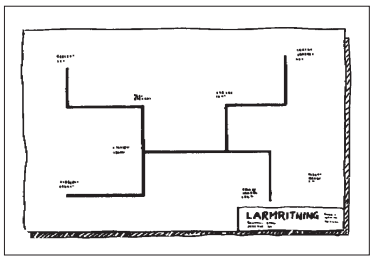


The pipes in the expansion zone can be surrounded with pads made of mineral wool or foam.

10.3.20 Monitoring systems

All pipes and pipe fittings from Powerpipe are delivered with two separately premoulded alarm wires. These shall be connected as joints and finally to a monitoring system.
The pipe net is divided into sections of max. 2 x 1000 m service lengths (1000 m flow and 1000 m return). For further information please see chapter no. 7.
Each section makes one alarm circuit and is connected to the Powerpipe alarm unit. The unit can be utilized either as a separate alarm circuit or as a part in a larger monitoring system.

10.3.21 Monitoring system drawings and installation instructions

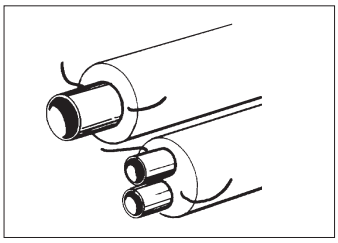


The alarm wire connections must be made in accordance with the alarm system connection diagram. The drawing shows the extent of the system, the connection of the alarm wires and how the sections should be divided. It also shows where the signal wires terminate and what part of the system that is connected to the various alarm units. The position of alarm wires in fittings is shown on page 7:301, 7:302. Lengths of alarm wires in these fittings are shown on page 7:303.

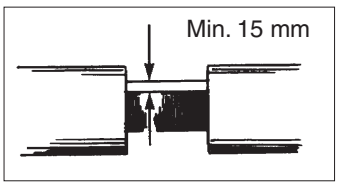
In order to get a proper alarm function, i.e. that the system works and does not give false alarms, make sure that no water has penetrated into the insulation of the pipes during transport and installation.

In order to get a proper alarm function, i.e. that the system works and does not give false alarms, the following is required:

- The pipes for the steel pipes are welded/ soldered in such a way that the alarm wires are oriented like digits 2 and 10 on a watch.
- No water has penetrated into the insulation of the pipes during transport and installation.
- The alarm wires are installed in a straight line from end to end of the pipe without crossing one another.
- The alarm wires are installed parallel to the pipe.



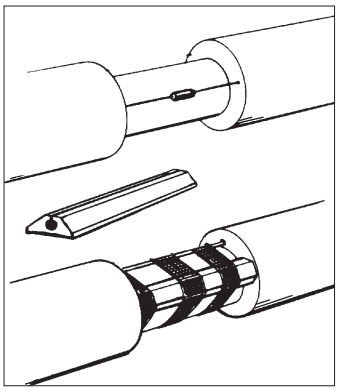
Pipes and pipe fittings from Powerpipe are delivered with two separately premoulded alarm wires.



The position of alarm wires in fittings are shown on pages 7:301–7:302.

10.3.22 Connection of alarm wires

1. Straighten out the alarm wires carefully. Pull the wires carefully and check that they are continuous and undamaged.
2. Clean the alarm wires with emery cloth.
3. Cut off excessive length of the stretched wire.
4. Join the wire in a stretched condition, with approved splicing sleeve (Art. No. 6890-100-000-000) using the approved special tool (Art. No. 6890-100-100-000).
5. Slide the alarm spacer of PUR under the stretched wires and press the wires into position in the alarm distance pieces.
6. Fasten the alarm spacer pieces abrasive felt with tape.
7. Insulation should be executed as soon as possible after the alarm wire installation.



Slide the alarm distance pieces under the stretched wires and press the wires into position. Tape the alarm spacers.

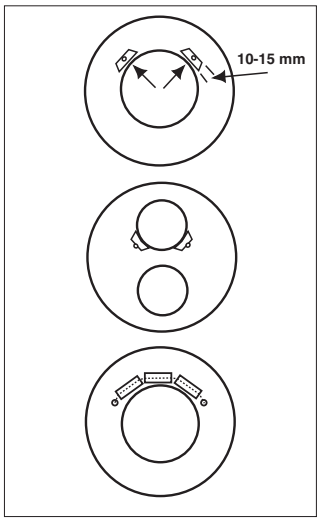
Abrasive felt

Abrasive felt can be used as an alternative to alarm spacer for single pipe and is recommended for use at double pipes.

Looping of alarm wire

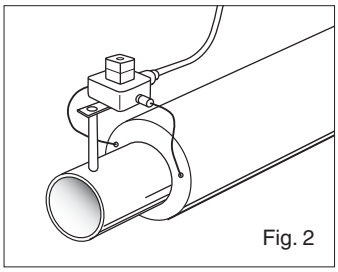
Unless otherwise stated in the alarm drawing, the wire must always be connected in a loop at the termination of a section length.

When looping, the alarm wire is joined and installed according to figure below. The uninsulated wire must be insulated with an insulation cartridge or alarm distance piece. The alarm distance piece is cut and put in segments around the steel pipe. The distance between alarm wire and pipe must not be less than 15 mm. Unless otherwise indicated in the alarm drawing, insulated wire type EK 1.5 sq mm must be used in chambers or similar walls, where two ends are connected together.

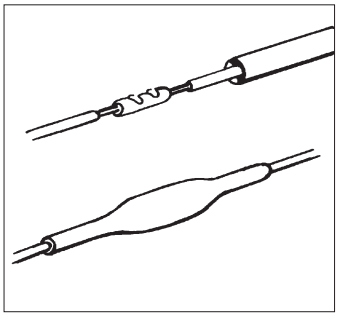


The uninsulated wire must be insulated with an insulation cartridge or alarm distance piece. The alarm distance piece is cut and put in segments around the steel pipe. The distance between alarm wire and pipe must not be less than 15 mm.

At those termination points, that will be connected to the Powerpipe section unit, an earthing boss shall be welded to the steel pipe for earthing, see figure 2.



An earthing boss shall be welded to the steel pipe for earthing at the termination point.



The uninsulated part of the signal wire and the joining cartridge must be insulated with a shrink tube sleeve.

Signal wire

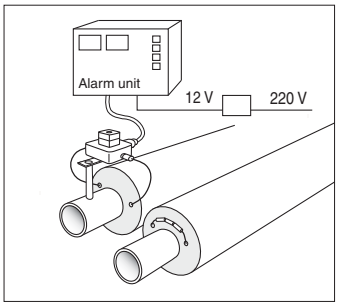
The Powerpipe system has pipes with insulated signal wire embedded in the insulation available to special order. This wire should be joined as mentioned above. However, the uninsulated part of the wire and the joining cartridge must be insulated with a shrink tube sleeve. Where pipes are terminated without further continuity of the wires, the ends must be insulated with shrink sleeves.

10.3.23 Testing of alarm connections

Testing of circuit continuity and insulation resistance must be performed **after every connection** of wires and after foaming work has been completed as well as before refilling of trench is started.

OHM-meter.

Insulation resistance measured with the ohmmeter. The resistance is the benchmark to be 1.3 ohms per 100 m connected alarm wire. Other values are not allowed. Low values indicate a short circuit and high levels of bad contact in the joints.
Insulation resistance after the completion of the work to be lowest 10MΩ/1000 m alarm wire (500 m pipe). Temporarily lower values can occur, especially during foaming of cold pipes. Approved value must be achieved at least 4 weeks after system-start.
Note that the indication of moisture leaking in by stating that insulation resistance decreases at any point.



The joined alarm wires must be connected to Powerpipes alarm unit or cable radar.

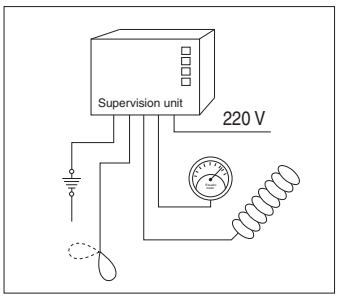
Test of insulation resistance should be made not earlier than 1 hour after foaming is completed.

These values should be documented in consultation with the inspector.

NOTE! Check the instrument and the batteries before each measurement.

10.3.24 Installation of alarm and information units

The joined alarm wires shall be connedted to the Powerpipe alarm unit or cableradar. This unit is installed in a suitable position along the system section.
The alarm unit is powered with 220 V or via signal wire.
The alarm wires and earth wire are connected to the section unit with a 3x1.5mm² cable. The signal wires are connected either through an external signal cable or through signal wires fitted in the service pipes to a alarm unit.



Alarm centrals can accommodate inputs from water level indictor, detector units, etc.

Different alarm units and their capacities are shown in chapter 7.

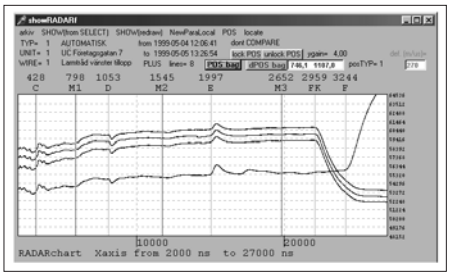
Propagation Velocity Factor (PVF) is 0.90 – 0.92.

Function test

When the alarm and information unit are connected, a function test shall be performed as follows:

1. Test of alarm limit

When testing the alarm limit a resistor with a value 10% below the set point of the alarm unit is to be connected.



2. Test of open circuit

Open circuit is to be simulated as far from the alarm unit as possible.

3. All alarm functions are to be tested

All function tests carried out shall be documented in consultation with the inspector. Circuit loop resistance and insulation resistance are measured separately for each loop and shall be documented in consultation with the inspector. Establish a protokoll.

Monitors 5000 m/ channel. Registers changes. Reports errors from computer by cable, telephone, GSM. 4 channels for alarmcircuits.

Monitors 2500 m/ channel Records the alarm (on/off) by signal-cable in the trench. Errors reported bu pulsecometer 2 channels of alarm wires.

10.3.30 Installation instruction - insulation of joints

General

The insulation of a district heat system shall not have any weak points. Each joint must be carefully insulated on site. Insulation material shall consist of Powerpipe freon-free foam.
Normally the insulation shall be made by trained staff, equipped with a mobile foaming machine which has automatic pressure, volume-, and temperature control. In certain cases manual foaming can be performed.
With all foaming work the locally valid safety rules e.i. the Swedish regulations AFS 1996:4

When pressure testing of a joint is called for, the joint insulation must be made after the pressure test.
Cutting of the jacket pipe must be mad so that indications of rupture in the axial direction do not occur.
Overlapping of casing- jacket pipe will be about 100 mm.

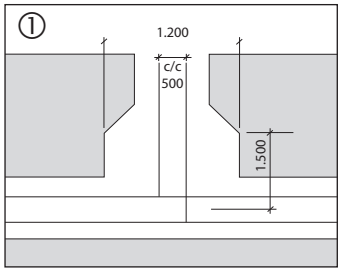
Installation Instruction welding, T-pieces

1 Required material

- T-piece double/double Art. No. 6530
- T-piece flexibel, Art. No. 6540
- Bend with long radius bend-5S or greater for branch.
- Check that the casing and accessories are intact and has the right dimension.

2 Trench

The trench size needs to increase. See fig ①



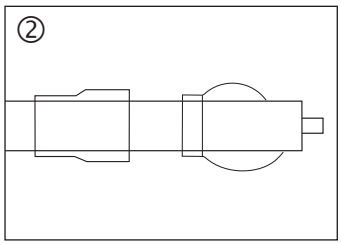
Measure, trench an welding.

3 Cleaning

Clean the jacket of the branch and main pipe that will touch the casing.

4 Peeling

Cut the appropriate amount of the outer mantle and insulation for a branch installation.
NOTE Avoid axial cut or wounds in the jacket when peeling.



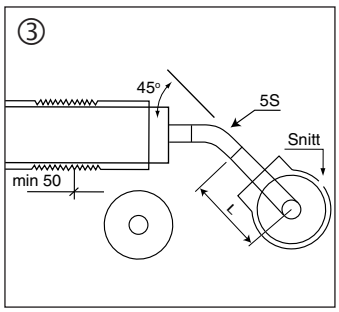
Thread casing and sleeves on the branch.

5 Plade the casing

Slice the bottom casing with a straight cut on the upperside (90˚ from branch) See fig. ③ and ④

6A Welding Flex-T-piece

Thread the flexible casing/reduction with tubular shrink sleeve on the branch. See fig. ②
NOTE the shrinkable end shall be placed far from the main pipe. The bottom casing are pulled over the branch.



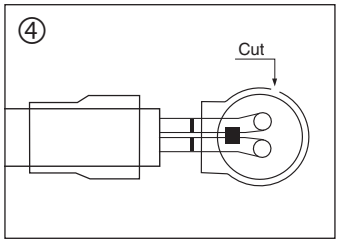
Installation flexible T-piece.

7 Mounting bottom casing

Weld the branch with the bend to the main pipe. See fig. ③ NOTE the bend must be 5S or greater. The branch is welded to the welded pipe connection. A adjusted piece of pipe may be needed. For sizes up to DN100 in Series 2 the piece of pipe should be of 200 mm. L= see ③. c-c dimension between branches shall be ≈ 500 mm.

6A Welding Straight-T-piece

Bottom casing is pulled over back on the main pipe.
NOTE The longitudinal cut shall be at the top.



Installation straight T-piece.

Spread the branches free steels ends so that they can be welded into the main pipe. Weld-in the branch pipes (Art. No. 8205, see 8:303!) against the main pipe. Any reinforcements according to the constructor's instructions.

10.3.31 Weld casing, Mittel

General

The Mittel method shall be carried out by personnel with special training. Below is a synoptic description of the working method.

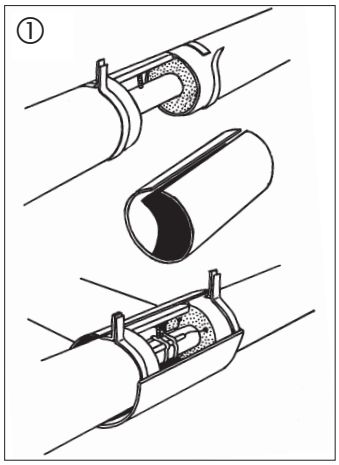
Material

The required material art. no 6112 (page 6:701) is delivered in batches for each dimension of outer jacket. Alarm Spacers, mastic, plugs and fops are delivered by the casing contractor.

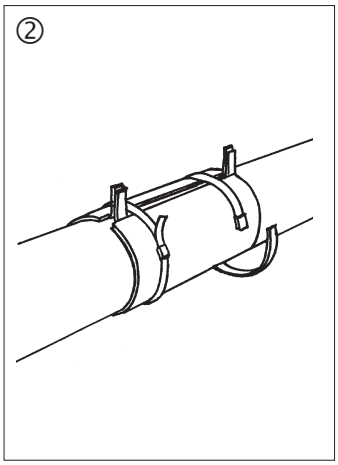
A special electrical equipment is used to weld the Mittel-joint.

Performance

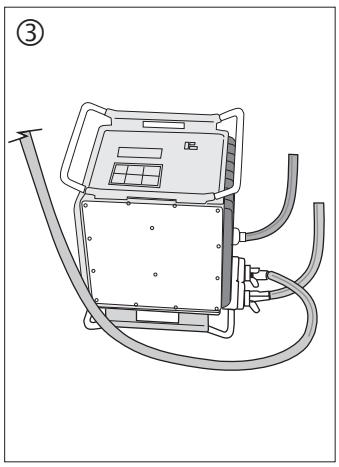
- Sleeve and outer jacket to be cleaned from dirt, grease, moisture etc..
- Connect alarmwires (See § 10.3.22)!
- Sand the surface of the sleeve and pipe which are to be covered with the casing and the casings inside. Clean with ethanol
- Assemble the guide and welding net. ①
- Cut and assemble the sleeve on the pipe.②
- Assemble and connect the welding equipment to the electrodes. ③
- Weld the radial weld. ③
- Cut and weld the axial trace. ④
- Drill holes for pressure testing/Foaming/ air release. The holes shall be placed at the edge of the jacket pipe.
- Pressure test ⑤
- Make the foaming of the joint. ⑥
- Foam the air holes and weld to close.



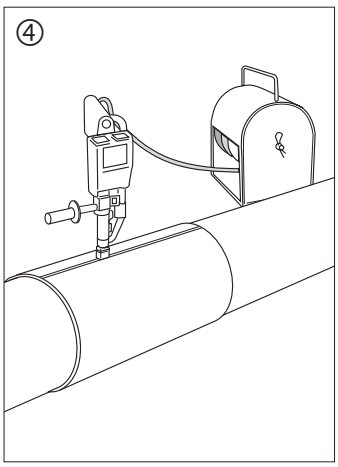
Assemble the welding net around the jacket pipe.



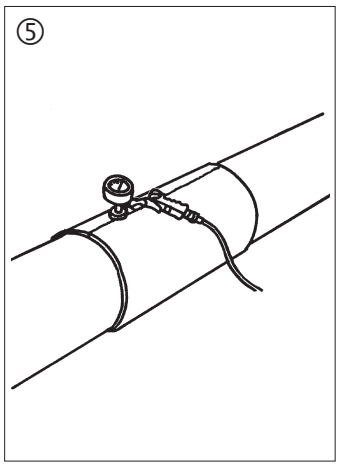
The casing is mounted on the jacket pipe.



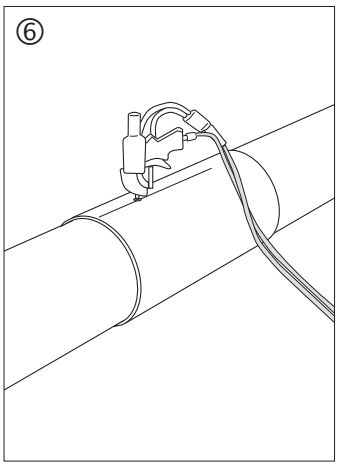
The computer-controlled welding process takes 3-4 minutes.



The longitudinal seam is closed by extruder-welding.



Pressure test



Foaming of the joint

10.3.32 Shrinkable sleeve

General

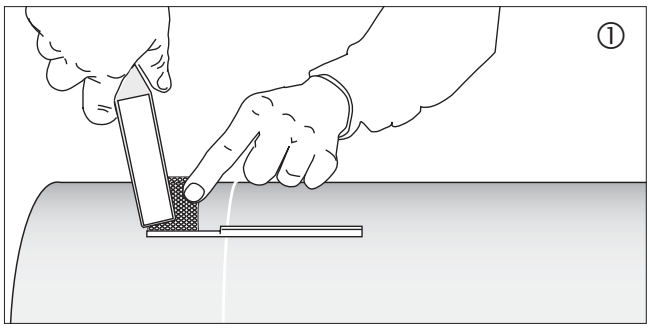
Scrinkable sleeve shall be installed by an authorized company and by personnel with special training. Below is a short description of the work.

Material

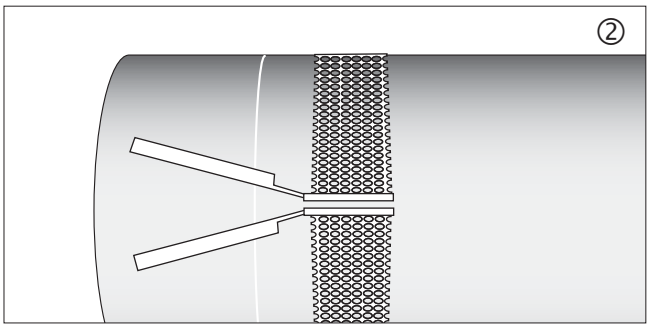
Shrinkable sleeve Article No. 6112 (page 6:602)is delivered in batches for each dimension of outer jacket. casing must be installed on the district heating pipe prior to welding of the steel pipes. Alarm spacers, mastic, plugs and fops are delivered by the casing contractor.
A special electrical equipment is used to weld the Mittel-joint.

Performance

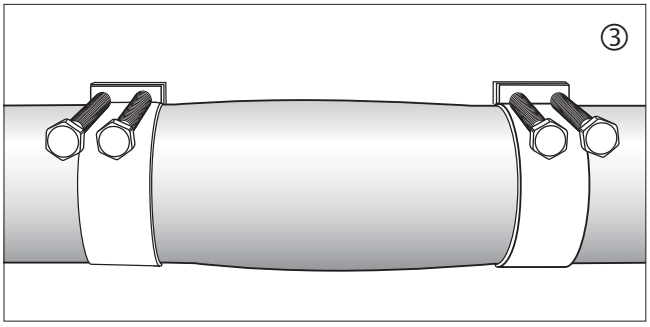
- Sleeve and outer jacket to be cleaned from dirt, grease, moisture etc..
- Connect alarmwires (See § 10.3.22)!
- Sand the surface of the sleeve and pipe which are to be covered with the casing and the casings inside. Clean with ethanol
- Measure and mark where welding net and casing shall be placed. ①
- Assemble the welding net ②
- Install the clamping tools. ③
- Connect the welding equipment to the electrodes.
- Cut and weld the radial trace. ④
- Drill holes for pressure testing/foaming/ air release. The holes shall be placed at the edge of the jacket pipe.
- Pressure test. ⑤
- Foam the joint ⑥
- Weld the air holes to be closed. ⑩



Location of the sleeve and welding net are marked.

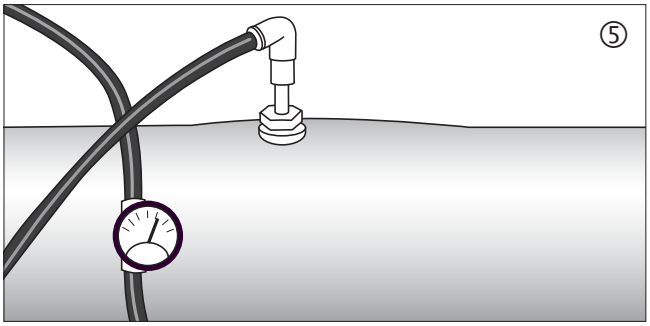


Place the welding net around the jacket pipe.

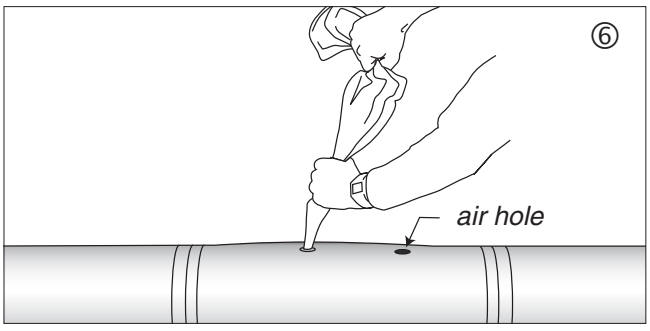


Clamping Tools are installed.

The computer-controlled welding process is started.



Pressure test.



The casing is foamed

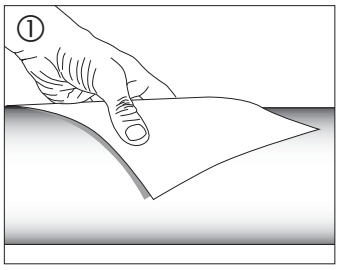
10.3.34 Double expanding sleeve

General
Double expanding sleeve (HDPE) shall be performed by an authorized company and carried out by spedial trained personnel. Below an overview of the operating.

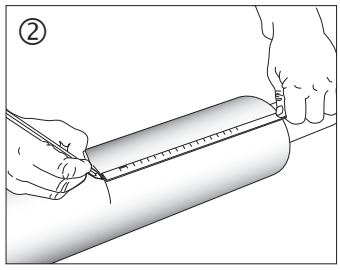
Material
Required materials Art. No. 6361 (page 6:201) is delivered in batch for each dimension of the Jacket pipe. The casing shall be mounted on the district heating pipe before welding of the steel pipes. Alarm Spacers, mastic, plugs and fops are delivered by the contractor.

Performance
- Casing outer jacket, foam and steel pipe are to be completely cleaned from dirt, grease, moisture etc. with etanol. ①
- Connect the alarm wires (Se page 10.3.16).
- Sand the surface of the pipe which are to be covered with the casing and the casings inside. ①
- Mark the position of the sleeve and mastic. ②
- Preheat the sanded areas. ③
- Remove the protective plastic around the sleeve and shrink sleeves. ④
- Sweep a wide (about 60/100 mm) woven mastic around the jacketed pipe. ⑤
- Center the sleeve and remove the outer protective plastic on the mastic band. ⑤
- Use a soft gas flame and heat one side of the casing. Ensure that the sleeve under side gets enough heat. Use a silicon cloth around the pipe to protect from overheating ⑥
- Check shrinkage around. Mastics shall be visible at the edge of the sleeve ⑦
- Pressure test. Let the casing cool to max to 40˚ C before pressure testing and foaming.
- Drill 19 mm. holes for pressure testing/foaming/ air release.
  The holes shall be placed at the edge of the jacket pipe. ⑧
- Foam the casing. ⑨
- Foam and air holes are closed by welding. Sand the weld-plug and preheat the surface to 40˚ C; Preheat the fops pressit over the welding plug with your hand or a roller. ⑩

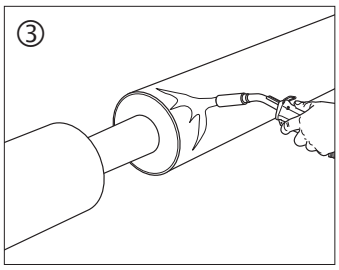
See instruction 10.3.18



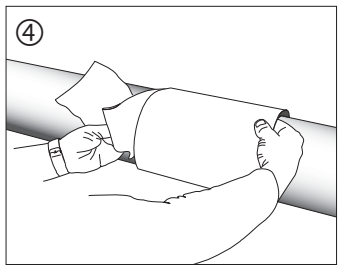
Clean and sand the jacket and the casings inside.



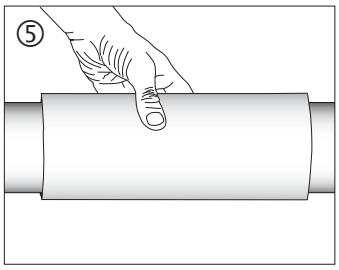
Mark on jacket pipe casing and mastic.



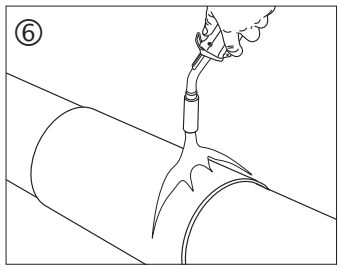
Preheat the jacket pipe to 40-50˚C



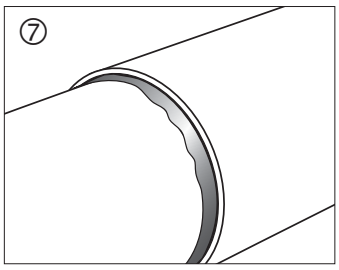
Unpack the casing.



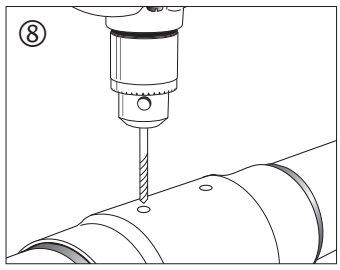
Remove the protective and sweep the mastic around the pipe jacket.



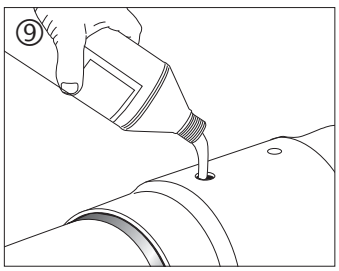
Shrink with a soft gas flame with gentle movements.



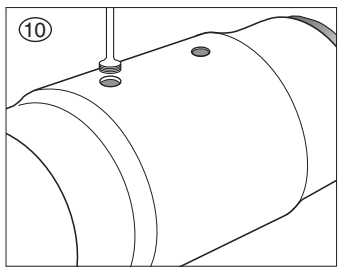
After shrinkage mastic is visible at the sleeve end.



The temperature must not exceed 40˚ C on the sleeve for pressure testing.
Drill holes for foaming.



Foaming of the casing



Weld air- and foaming holes with welding plugs.

NOTE: Ensure that water (snow and rain) can not enter into the casing during installation.

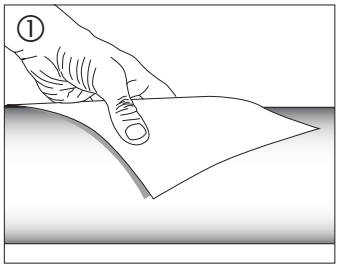
10.3.34 Double sealed sleeve (HDPE)

General
Double sealed sleeve (HDPE) shall be performed by an authorized company and carried out by spedial trained personnel. Below an overview of the operating

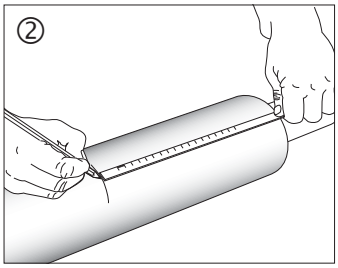
Material
Required materials Art. No. 6364 (page 6:203)
Delivered in batch for each dimension of the jacket pipe. The casing shall be mounted on the district heating pipe before welding of the steel pipes.
Alarm spacers, mastic, plugs and fops is delivered by the contractor.

Performance
- Sleeve and outer jacket, foam and steel pipe are to be completely cleaned from dirt, grease, moisture etc. wikth etanol. ①
- Connect the alarm wires (Se § 10.3.22).
- Sand the pipe surface which shall be covered by the casing and the casings inside ①
- Mark the position of the sleeve and mastic. ②
- Preheat the sanded areas. ③
- Remove the protective plastic around the casing and shrink sleeves. ④
- Sweep the mastic around the jacketed pipe. ⑤
- Center the casing and remove the outer protection on the mastix .
- Drill holes for pressure testing/foaming/air release.
- Center the sleeve. Remove remaining sheet of mastic. Drill 2 x 20 dia holes ⑤
- Use a soft gas flame and heat one side of the casing. Ensure that the sleeve under side gets enough heat. Use a silicon cloth around the pipe to protect from overheating ⑥
- Check the shrinking ⑦

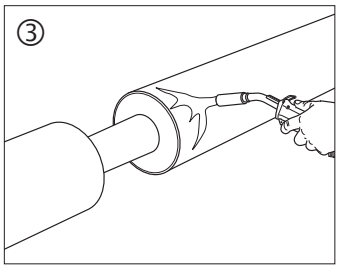
See next page!



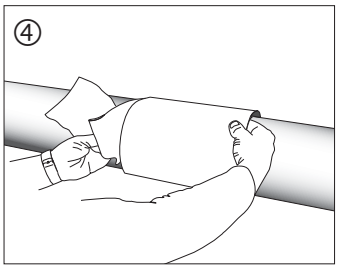
Clean and sand the jacket and the casings inside.



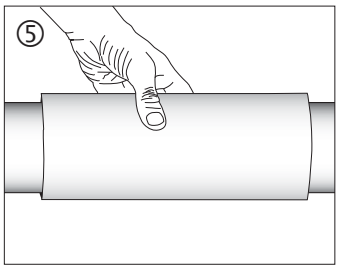
Mark on jacket pipe casing and mastic.



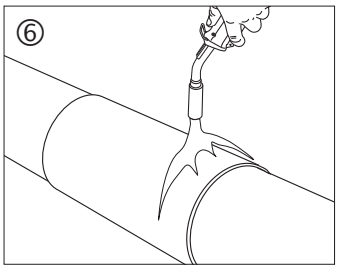
Preheat the jacket pipe to 40-50˚C



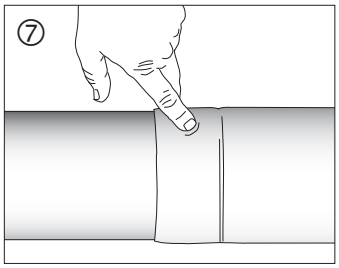
Unpack the casing.



Remove the protective and sweep the mastic around the pipe jacket.



Shrink with a soft gas flame with gentle movements.

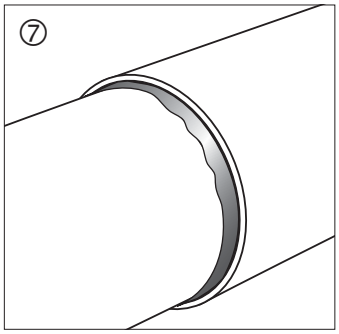


Check the shrinking.
After shrinkage is mastic visible at the sleeve end.

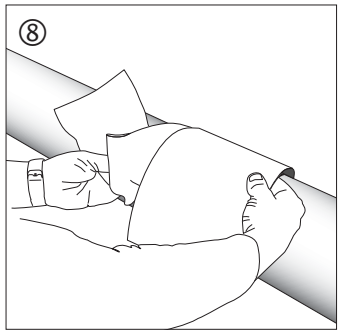
- Check the shrinking work. The mastic sholuld be visible at the edge of the sleeve. ⑦
- Unpack the shrink sleeves, centre the sleeve over the edge of the casing. ⑧
- Shrink the sleeve/tubular sleeve with a soft flame. Use gentle movement from the center and outwards ⑨
- Check the result. ⑩
- Drill 19 mm. holes for pressure testing/foaming/ air release.
  The holes shall be placed at the edge of the acket pipe. ⑪
- Pressure test. Let the casing cool to max to 40˚C before pressure testing and foaming.
- Foam the joint. ⑫
- Foam and air holes are closed by welding. Sand the weld-plug and preheat the surface to 40˚C. Preheat the fops and press them over the welding plug with your hand or a roller. ⑬

  Se Weld-plug instructions 10.3.18

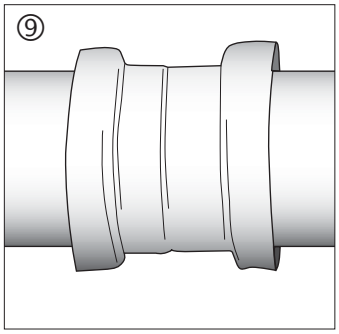
NOTE: Ensure that water (snow and rain) can not enter into the casing during installation.



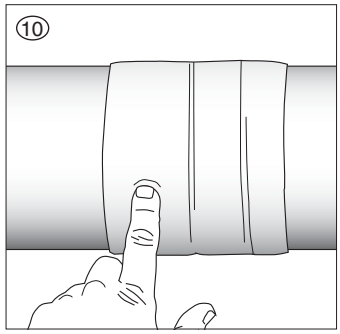
After shrinkage mastic is visible at the sleeve end.



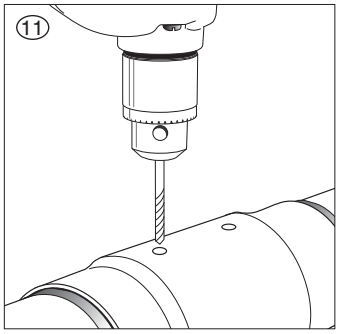
Remove the protective plastic from the shrinking sleeves.



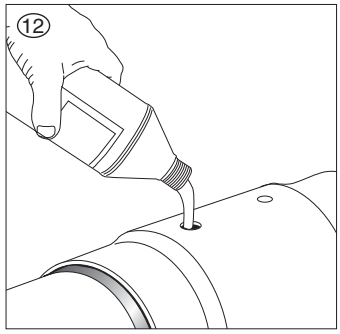
Shrink from the center.



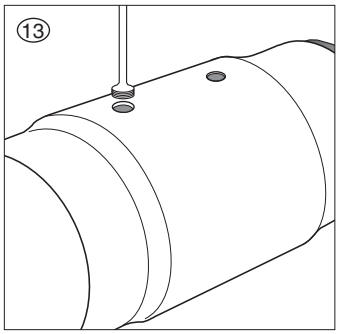
Check the result



The temperature must not exceed 40˚ C on the sleeve for pressure testing.
Drill holes for foaming.



Foam the casing



Weld air- and foaming holes with welding plugs.

10.3.32 Shrinkable sleeve (PEX)

General

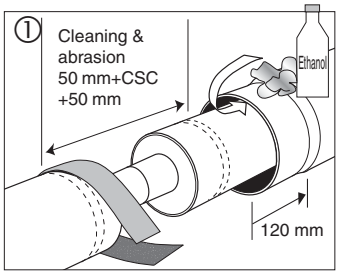
Scrinkable sleeve shall be installed by an authorized company and by personnel with special training. Below is a short description of the work.

Material

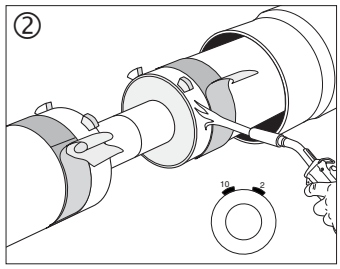
Required materials including mastic (page 6:203) is delivered in batch for each dimension of the Jacket pipe. The casing shall be mounted on the district heating pipe before welding of the steel pipes. Alarm Spacers, mastic, plugs and fops are delivered by the contractor.

Performance

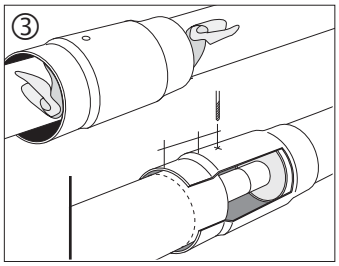
- Sleeve and outer jacket are to be completely cleaned from dirt, grease, moisture etc.
- Connect the alarm wires (Se page 10.3.16)
- Positioning the sleeve and mark for sand-papering as well as for the mastic ①
- Sand the surfaces of the pipe covered with PEX casing and the casings inside. Clean with ethanol ①
- Preheat the sanded areas to 40-50˚C. Place spacers (for dimensions greater than 200 mm) at 10 and 2 o clock.②
- Remove the protective and sweep the mastic around the jacket pipe. ②
- Center the sleeve and remove the outer protection on the mastic band③
- Drill 2 pc holes dia 20 mm for pressure testing/ foaming/air release. Holes shall be located at jacketed pipe edge. ③
- Use a soft gas flame and begin to shrink the casings one end. Move the flame gently around the casing. Ensure that the underside gets enough heat. Use the supplied protective foil to protect the pipe against overheating (for sizes greater than 355 mm) ④
- Check shrinkage around.
- Let the casing cool down to max. 40°C before pressure testing and foaming. ⑤
- Drill an additional hole for air release.
- Foam the casing ⑤
- Drill conical holes and weld air- and filling hole with welding plugs.



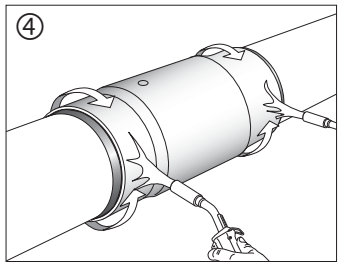
Clean, mark out and grind.



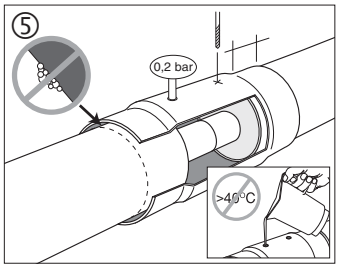
Preheat to 40-50˚ C. Place spacers.



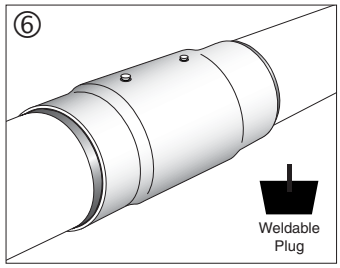
Center the casing. Drill holes for pressure test/foaming/air release.



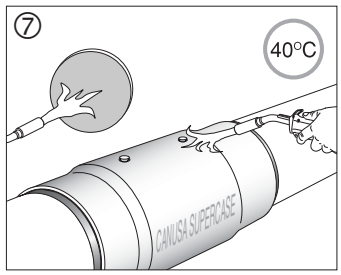
Shrink with a soft gas flame with gentle movements.



Pressure test. Injection of foam in the casing.



After foaming conical drill the holes and seal the holes by welding.



Foam and air realese holes are sealed.

- Sand the weld-plug and preheat the surface to 40˚C. Preheat the fops and press them over the welding plug with your hand or a roller. ⑥⑦

10.3.35 End cap

General

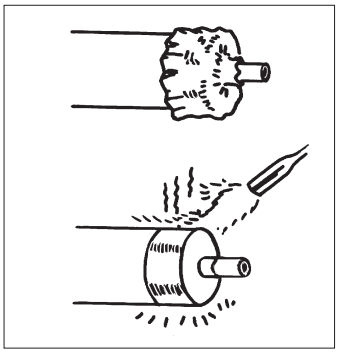
The end cap is designed to be used inside ground walls, in chambers or wells and where it might be continuously under water.

Material

end cap, see 6:401.

Performance

- Outer jacket, foam and steel pipe are to be completely cleaned from dirt, grease, moisture etc. at least 150 mm from the end of the pipe.
- Sand the pipe surface that shall be covered by the termination cover. Install the alarm according to special instructions.
- Apply correct size cover.
- Heat shrink the part of the cover that is over the outer jacket until mastic creeps out.
- Heat shrink the rest of the cover until mastic creeps out and closes tight.



End cap: Heat and shrink the part of the cover that is ouside the jacket pipe untill mastic seeps out around the edges.

10.3.36 Termination casing

General

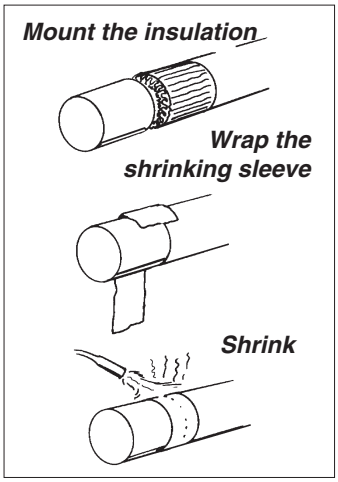
The termination sleeve is used as mechanical protection and insulation for a pipe end in a chamber inside a wall or in the ground.

Material

Termination casing, see 6:207.

Performance

- Outer jacket, foam and steel pipe to be completely cleaned from dirt, grease, moisture etc. at least 150 mm from the end of the pipe.
- Sand the casing and the pipe surface that will be covered by the shrink tape.
- Install the alarm according to separate instructions.
- Fit insulation on the pipe:
  a) Pipe insulation with a length of 300 mm, an insulation plug at the end of the insulation, or
  b) Prefabricated insulation casing.
- Fit the termination casing.
- Seal with shrink sleeve using a suitable method according to item 10.3.33.
- Please also see instructions 10.3.34



End cap and shrink-sleeve.

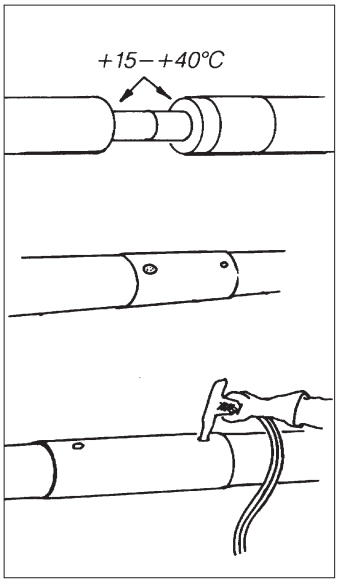
10.3.37 Insulation of joints

Machine foaming

- Check that the surfaces concerned are dry and clean.
- In order to achieve the best results, the temperature of the surfaces to which the insulation is to be applied should be between + 15°C and + 40°C. The ideal temperature is 22°C. In order to reach the correct temperature, the steel pipe can be heated with circulating hot water, air or a gas flame. The sleeve can be gently heated with a soft gas flame.

- The sleeve shall be centred over the joint.
- If necessary, centre the sleeve with a wedger
- Drill filling- and air release holes if the insulation shall be performed after installation of joint materials.
- Fill with required amount of foam. Fit a tightening plug.
- Let the sleeve cool down minimum 1 hour before the sleeve fitting is completed.

If the temperature is lower than + 15°C or higher than + 40°C, foaming is still possible under certain circumstances. Please ask Powerpipe for advice.



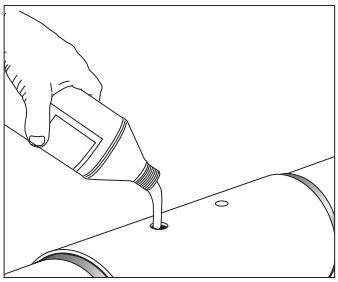
The ideal temperature is 22°C Fill with the required amount of foam. Fit a tightening plug.

Handfoamning

This can be done in two ways. By using the foam portion, see 8:401-402 or manual mixing in a bowl. Portion Foam is recommended from the security point of view.

Common to both methods are that they are difficult to carry out when insulating larger dimensions. Machine foaming is recommended.

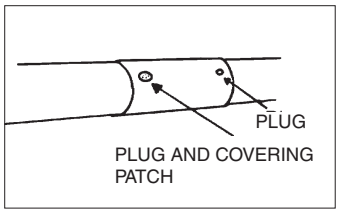
- The same preparations as for machine foaming as above.
- Check that the temperature of the foaming liquids is 20°C
- Measure the correct amount of “Polyol” and “Isocyanat” in separate bowl according to the table below or choose the correct size one-way package.
- Mix and stir thoroughly until the mixture gets a uniform colour (approx. 15-20 sec.).
- Pour the mixture into the filling hole.
- Continue with the same procedure as for machine foaming.



Manual foaming.

Sealing of filling- and air release holes

- Sand
- Use a soft gas flame
- Preheat the area around the plug to about 60°C.
- Check the temperature with a temperature indicator
- Preheat the melt-glue surface on the cover patch 2-3 sec. untill it gets a shiny semi-liquid nature
- Press the cover patch in place, centered over the plug.
- Heat the patch until the structure of the patch disappears and the glue seeps out around the edge.
- Press the cover patch from the center outwards.
- Check that the patch is in tatal contact with the surface without air bubbles.



The plugs must be sealed with a special covering sheet with a sealing surface of melt-adhesive.

10.3.24 Plug Instruction Powerpipe

1 Connect the welder 230 volt.

2 Make sure the tool is in stroke, cleaned and heating element becomes hot, indicated by the light that shines steadily, the thermostat should be set to 240°C. +/- 10°C.

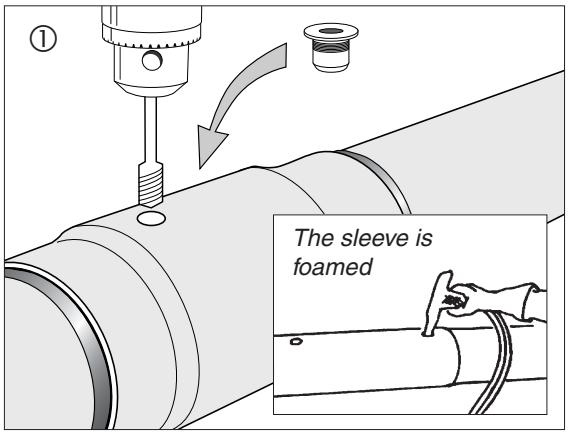
3 Check the temperature with a temperature sensor, if required the temperature has to be adjusted to the correct amount.

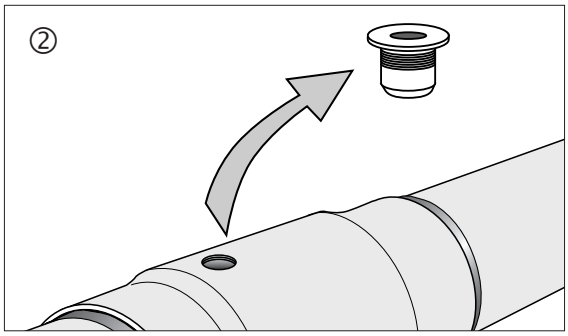
4 Drill out the foaminghole to 20 mm, For the air release plug 21 mm. Foam the sleeve, must harden min 20 minutes. See picture 1!

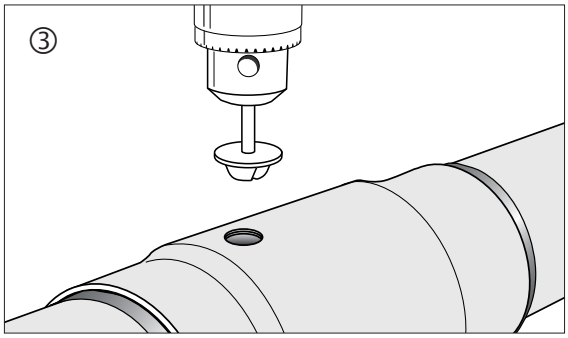
5 The vent plug is removed and the hole modifies with conical drill, clean the hole and the surrounding jacket pipe from any foam-leftovers. See image 2 and 3!

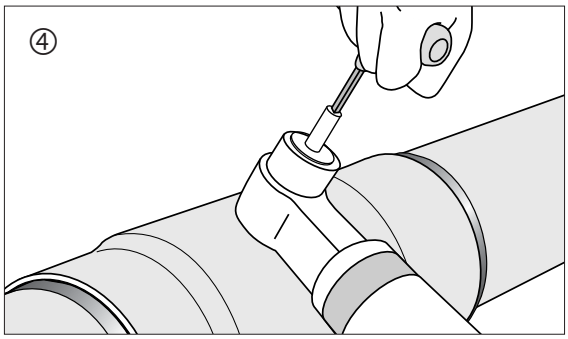
6 Place the plugwelder in the hole and the plug in the holder to preheat until a weld bead of about 1-2 mm appears. Remove the tool and push the melted plug into the hole. Press with the presstool about 1 min until the plastic has cooled.
See picture 4 and 5!

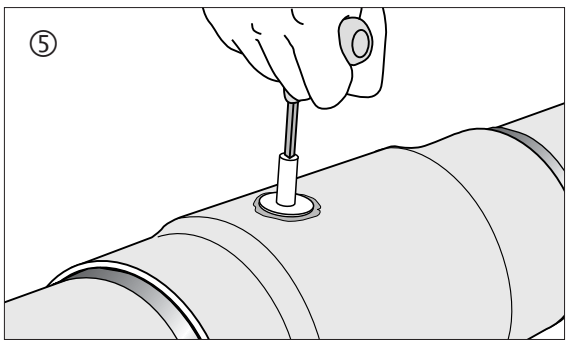
See next page!





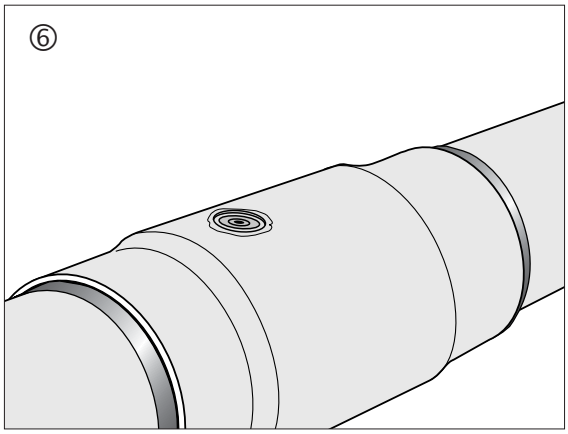


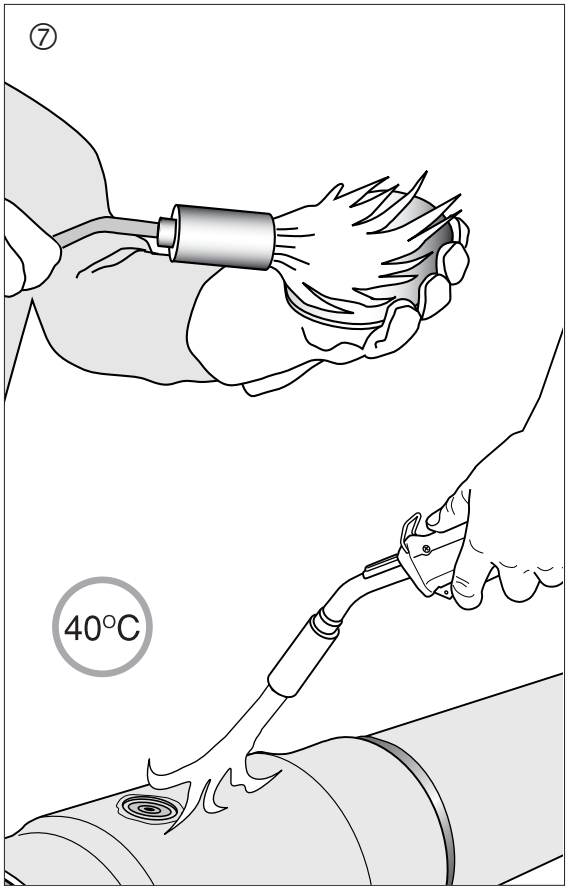


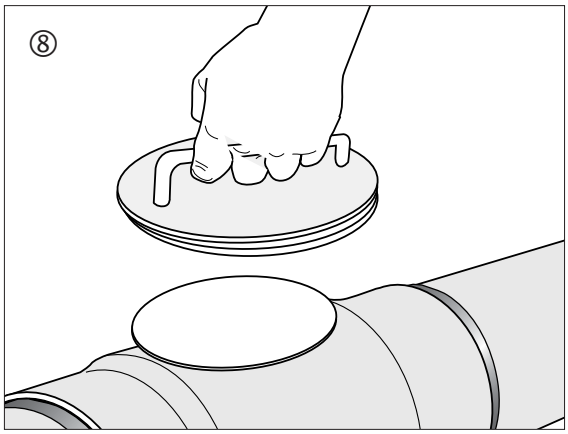


7 If FOPS (Cover patch) are to be installed, the weld cap must be sanded down to a smooth surface.
See Figure 6.

8 Preheat The fops and the surface around the plug.
Place the fops over the plug heat with propane and press with fops-presser.
See Figure 7 and 8.







10.3.39 Table for needed foam by machine and bottles for joints

Double pipe

DN	DOUBLE STANDARD			DOUBLE +			DOUBLE++		
	PEH DY	Polyuretane kg/casing	Foam bottles	PEH Dy	Polyuretane kg/casing	Foam bottles	PEH Dy	Polyuretane kg/casing	Foam bottles
2 x 20	140	0,72	5	160	0,94	6	180	1,15	7
2 x 25	140	0.70	5	160	0.92	6	180	1.12	7
2 x 32	160	0.89	6	180	1.14	7	200	1.36	8
2 x 40	160	0.84	6	180	1.09	7	200	1.32	8
2 x 50	200	1.27	8	225	1.68	9	250	1.90	10
2 x 65	225	1.52	8.1	250	1.94	10	280	2.40	10.1
2 x 80	250	1.80	10	280	2.37	10.1	315	2.90	11.1
2 x 100	315	2.75	11.1	355	3.45	9+9	400	4.60	10.1+10.1
2 x 125	400	4.47	10.1+10.1	450	5.20	13	500	7.10	11.1+12
2 x 150	450	5.34	13	500	6.55	13.1	560	8.60	12+12
2 x 200	560	8.03	12+12	630	10.2	13.1+12			

Single pipes

DN	SERIES 1			SERIES 2		
	PEH DY mm	Polyuretane kg/casing	Foam bottles	PEH Dy mm	Polyuretane kg/casing	Foam bottles
20				110	0,50	3
25	90	0.32	2	110	0.46	3
32	110	0.45	3	125	0.58	4
40	110	0.43	3	125	0.55	4
50	125	0.51	4	140	0.65	5
65	140	0.60	4	160	0.81	6
80	160	0.75	5.1	180	0.98	6.1
100	200	1.04	6	225	1.47	8.1
125	225	1.21	7	250	1.68	9
150	250	1.34	8	280	1.97	10
200	315	1.98	10	355	2.99	11.1
250	400	3.21	11.1	450	4.84	13
300	450	3.09	11.1	500	5.52	13.1
350	500	4.63	13	560	7.08	13.1+10
400	560	5.60	13.1	630	8.77	13.1+11
450	560	4.31	12	630	7.42	13.1+10
500	630	5.62	13.1	710	9.56	13.1+11.1

Series 3 and 4, see next page!

The amount is based on:

- Free casing length 2 x 250 = 500 mm.
- Shrimk casing dimensions
- Temperature +15°C – +40°C on casing and steel pipe.
- The table above has added (≈ 10%) included for fluid remaining in the mixing vessel.

NOTE! Cold pipes may require an increased amounts of foam. (Proposal is the next larger size bottle).
Hot pipes requires a smaler amount of foam. Leakage may be allowed.

Portion foam, see 8:401-402.

10.3.40 Table for needed foam by machine and bottles for joints

Single pipes part 2

DN	SERIES 3			SERIES 4		
	PEH DY mm	Polyuretane kg/casing	Foam bottles	PEH Dy mm	Polyuretane kg/casing	Foam bottles
20	125	0,57	4	140	0,71	6
25	125	0.56	4	140	0,70	6
32	140	0.73	5	160	0,89	6.1
40	140	0.70	5	160	0,92	6.1
50	160	0.88	6	180	1,12	6.1
65	180	1.04	6.1	200	1,35	8
80	200	1.25	8	225	1,65	9
100	250	1.88	10	280	2,50	11
125	280	2.24	10.1	315	3,0	11.1
150	315	2.69	11.1	355	3,65	9.1+9.1
200	400	3.93	12	450	5,70	11+11.1
250	500	6.05	13.1	560	8,10	12+12
300	560	7.26	13.1+8	630	10,0	12+13.1
350	630	9.34	13.1+11.1	710	12,2	13.1+13
400	710	11.65	13.1+13.1			
450	710	9.70	12+13			
500	800	12.44	13.1+13.1			

The amount is based on:

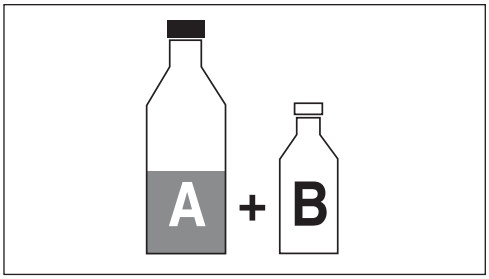
- Free casing length 2 x 250 = 500 mm.
- Shrink casing dimensions
- Temperature +15°C – +40°C on casing and steel pipe.
- The table above has added (≈ 10%) included for fluid remaining in the mixing vessel.

NOTE! Cold pipes may require an increased amounts of foam. (Proposal is the next larger size bottle).
Hot pipes requires a smaler amount of foam. Leakage may be allowed.

Portion foam, see 8:401-402.

Foam liquids for hot tappings/ connections, single pipe

Assessment of the need for foam liquids can be made with guidance of the following tables



Bottle set for foaming 6480

Branch (single pipes)

Dimension	Series 1 kg	Series 2 kg	Series 3 kg	Series 4 kg
DN 25	0,40	0,55	0,70	0,80
DN 32	0,56	0,65	0,85	1,0
DN 40	0,52	0,62	0,80	1,0
DN 50	0,60	0,80	1,0	1,2
DN 65	0,71	1,0	1,1	1,4
DN 80	1,09	1,2	1,4	1,7

Main pipe:

Dimension	Series 1 kg	Series 2 kg	Series 3 kg	Series 4 kg
DN 40	0,43	0,55	0,70	0,92
DN 50	0,51	0,65	0,88	1,12
DN 65	0,60	0,81	1,04	1,35
DN 80	0,75	0,98	1,25	1,65
DN 100	1,04	1,47	1,88	2,50
DN 125	1,21	1,68	2,24	3,00
DN 150	1,34	2,97	2,69	3,65
DN 200	1.98	2,99	3,93	5,70
DN 250	3,21	4,84	6,05	8,10
DN 300	3,09	5,52	7,26	10,0
DN 350	4,63	7,08	9,34	12,2
DN 400	5,60	8,77	11,65	15,6
DN 450	4.31	7,42	9,70	14,4
DN 500	5,62	9,56	12,44	18,3

Amount kg	Bottle No.
0,2–0,25	1
0,25–0,35	1
0,35–0,45	2
0,45–0,55	3
0,55–0,70	4
0,70–0,75	5
0,75–0,85	5.1
0,85–1,00	6
1,00–1,15	6.1
1,15–1,30	7
1,30–1,60	8
1,60–1,75	8.1
1,75–1,90	9
1,90–2,30	10
2,30–2,60	10.1
2,60–3,0	11
3,0–3,5	11.1
3,5–4,8	12
4,8–6,0	13
6,0–7,0	13.1

NOTE! Table values are calculated for:

- An opening about 500 mm on the main pipe. At a smaller opening the amount is reduced.
- Shrink casing dimensions.

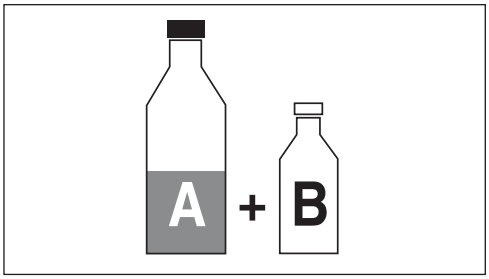
Calculate and add together the needs for main pipe and branch. The table above has added (≈ 10%) included for fluid remaining in the mixing vessel.

NOTE: When pipes are cold an increased amount foam isneeded. Proposal: use next larger bottle size.

Article No. 6480-flasknr.-000-000

Foam liquids for hot tappings/ connections, double pipes

Assessment of the need for foam liquids can be made with management of the following tables



Bottle set for foaming 6480

Branch (double pipes)

Dimension	STANDARD Kg	DOUBLE+ Kg	DOUBLE++ Kg
DN 25	0,55	0,70	0,90
DN 32	0,70	0,90	1,10
DN 40	0,67	0,87	1,10
DN 50	1,11	1,45	1,60
DN 65	1,60	2,05	2,50

Main pipe: (double pipes)

Dimension	STANDARD Kg	DOUBLE+ Kg	DOUBLE++
DN 32	0,89	1,14	1,36
DN 40	0,84	1,09	1,32
DN 50	1,27	1,68	1,90
DN 65	1.52	1,94	2,40
DN 80	1,80	2,37	2,90
DN 100	2,75	3,45	4,60
DN 125	4,47	5,20	7,10
DN 150	5,34	6,55	8,60
DN 200	8,03	10,2	

Amount kg	Bottle No.
0,2–0,25	1
0,25–0,35	1
0,35–0,45	2
0,45–0,55	3
0,55–0,70	4
0,70–0,75	5
0,75–0,85	5.1
0,85–1,00	6
1,00–1,15	6.1
1,15–1,30	7
1,30–1,60	8
1,60–1,75	8.1
1,75–1,90	9
1,90–2,30	10
2,30–2,60	10.1
2,60–3,0	11
3,0–3,5	11.1
3,5–4,8	12
4,8–6,0	13
6,0–7,0	13.1

NOTE! Table values are calculated for:

- An opening about 500 mm on the main pipe. At a smaller opening the amount is reduced.
- Shrink casing dimensions.

Calculate and add together the needs for main pipe and branch. The table above has added (≈ 10%) included for fluid remaining in the mixing vessel.

Article No. 6480-flasknr.-000-000.

NOTE: When pipes are cold an increased amount foam is needed.
Proposal: use next larger bottle size.

10.3.43 Foam liquids for hot tapping/connection

If the correct bottle size is unavailable, the table below can help

Bag	Can be replaced by the bottles		
4 5 5.1	1+1 1+2 2+2	 2+2 3+1	
6 6.1 7	2+3 3+4 4+4	3+3 5+2 3+4	1+4 5.1+1 6+1
8 8.1 9	5+5.1 5.1+5.1 6+6	6+4 6+5 6.1+5.1	6.1+2 6.1+3 7+5
9.1 10 10.1	6+6.1 6.1+6.1 7+7	7+5.1 7+6 8+6	7+6 8+5.1 8.1+5.1
11 11.1 12	8.1+7 8.1+8.1 10+10	9+6.1 9+8 10.1+9.1	9.1+5.1 9.1+7 11+8.1
13 13.1	11+11 11.1+11.1	11.1+8 12+10	12+8.1 13+6

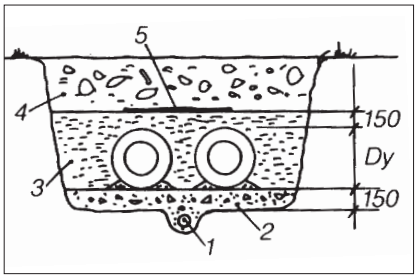
10.4. Backfilling of trenches

Surrounding refilling

Surrounding fillingis performed with material 0-16 mm, stone-free gravel materials regarding Construction AMA 2007 CEC. 3131. Surrounding backfill is compressed according to Class 2, Table CE / 4.

Single particles with maximum grain size of 50 mm may be present - but not near the mantle pipe joints without an approval from Powerpipe.

Underlay filling is to be made with the same material as for the pipe bed and to be evenly packed. Special care to be taken when filling and packing material **under** the pipes. Care is to be taken when filling material is packed around **at angles between 10° and 30**.
If temporary base work has been used, it is necessary that this is removed before refilling. Warning tape or net is to be laid on top of the surrounding filling material



1. Draining pipe
2. Pipe bed
3. Surrounding filling
4. Top fill
5. Warning tape/net.

Refilling with alternative materials

See complete information page 9:104!

Warning Tape

The use of warning tape in order to ease location of the pipes is recommended. Performance according to AMA 07. Warning tape and nets must have purple color, see 8:301.

The remaining filling

Construction is performed according to AMA 2007 CEC. 413. Maximum stone size of 100 mm may be evenly distributed in the filling.

10.5. Safety rules and directions

The service pipes from Powerpipe are insulated with a high quality rigid polyurethane cellular plastic. This is produced by a reaction and a fermentation process when mixing "Polyol" and "Isocyanate".

Working environment risks

Three working procedures can cause particular risks when working with service pipes if safety precautions are not taken.

When:

- Welding/soldering of the pipes creates a high temperature (above 150°C) in some part of the insulation whereby harmful vapours are produced.
- Mixing of the agents "Polyol" and "Isocyanate" for insulation at joints.
- Joining of the outer jacket which gives a high temperature (above 150°C) in a part of the insulation whereby harmful vapours are produced.

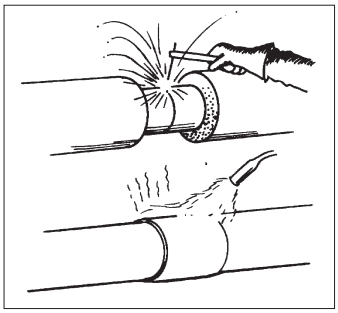
Guide and protection

Work with polyurethane foam insulation creates a risk to the staff involved. These risks can be eliminated when using the right method and the right protective equipment.

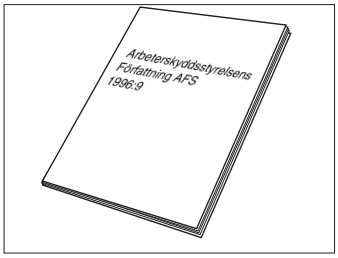
As a general rule no smoking is allowed when working with polyurethane. Personnel involved in work with polyurethane products must have special training regarding, among other things, safety work legislation and handling of the products. The personnel must also be in good health and have received permission from a doctor to work with polyurethane.

Work environment issues are governed by the “Arbetarskyddsstyrelsens författning AFS 2005:18 "Härd plaster".

No smoking while working with Polyuretane



Use protective equipment: *Welding/soldering of the pipes which creates a high temperature (above 150°C) in a part of the insulation whereby harmful vapours are produced.*



Working environment risks are regulated in: Standard Health and Safety procedures produced by Government and Industry.

10.5.1 Welding

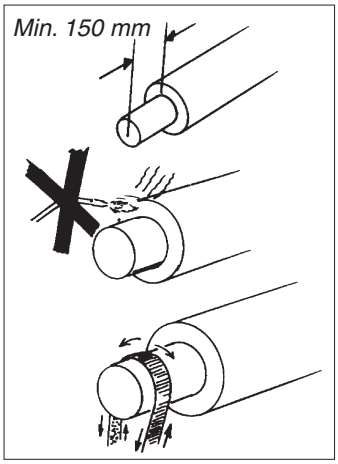
Welding/soldering of pipes and pipe fittings

Check that the uninsulated pipe (min. 150 mm) is completely free from polyurethane remains.

1. When welding/soldering, keep the flame away from the insulation.
2. Do not heat the pipe more than necessary in order to make a good joint.

Welding/soldering of pipes and fittings cut on the work site

1. Cut and remove outer jacket and insulation over a length of min. 150 mm from the end.
   If work is done using a cutting wheel when removing insulation, a breathing mask is required.
2. The pipe (min. 150 mm) is to be scrapped/emery grounded in order to remove all remains of insulation.
3. If small remains of insulating are left, a breathing mask with charcoal filter is to be used when welding/soldering. In restricted areas a fresh air breathing mask is re-commended. Alternatively, smaller remains can be burnt away – using a breathing/fresh air mask – before the welding/soldering work starts.
4. When welding/soldering: Do not put the flame against the insulation.
   Do not heat the pipe more than necessary in order to get a good joint.



The gas flame must not be directed towards the free insulation. Jaket pipe (min. 150 mm) is sanded so that all remnants of the insulation is removed.

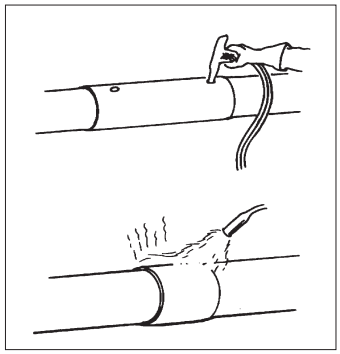
10.5.2 Joint insulation

Closed handling of the foaming agents minimize the risk of leakage of harmful vapours. A certain amount will, however, leak out from the sleeve when the foam is fermenting. Good ventilation is necessary in restricted and badly ventilated areas. A breathing mask with gas filter and dust filter class II against organic vapour must be used.

Water must not be added to vessels which have contained "Isocyanat" if they are later closed otherwise, high development of carbon dioxide will occur.

Joining of outer jacket

The outside and the edge of HDPE-pipes are to be fully cleaned so that possible remains of insulation material are completely removed before all joining of the outer jacket is made. The gas flame must not be directed towards the free polyurethane cellular plastic.



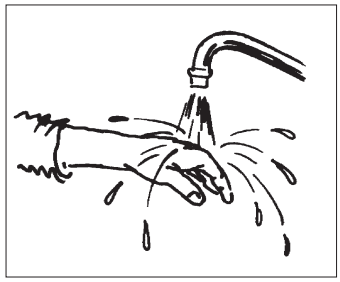
A certain amount will however leak out from the sleeve when the foam is fermenting. Good ventilation is necessary.

10.5.4 In case of an accident

"Isocyanat" on the skin is to be washed off immediately with water.
"Isocyanat" in the eyes is to be washed off immediately with large amounts of water. Thereafter consult a doctor.

If "Isocyanat" has been swallowed, large amounts of warm, clean water or milk are to be drunk. Thereafter consult a doctor.

Polyurethane cellular plastic on naked skin is t be scraped away and washed off with soap and water.



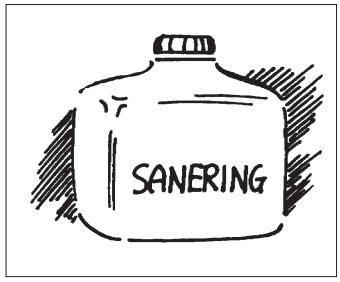
"Isocyanat" on the skin is to be washed off immediately with water.

Decontamination solvent for "Isocyanat":

5% ammonia
50% alcohol
45% water

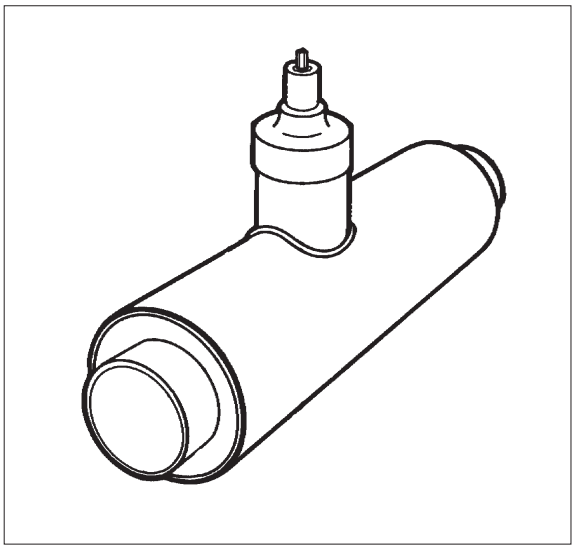
Decontamination powder for removal of "Isocyanat":

25% saw dust
37% kieselguhr
20% alcohol
4% triethanolamin
4% ammonia
10% water



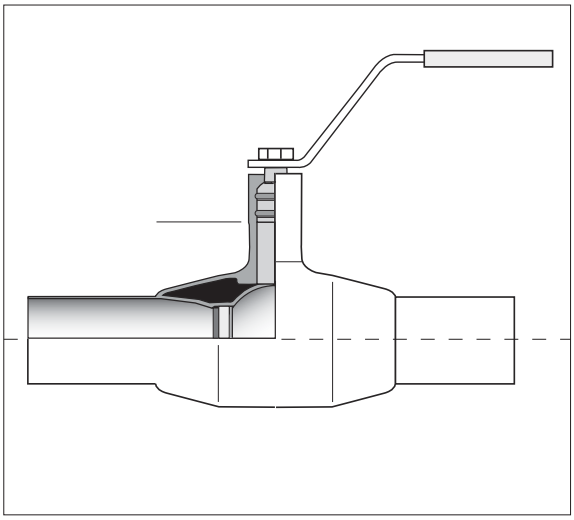
Wear protective equipment: Welding/soldering of jacket pipes developes a high temperature.

10.5.3 Instructions for installation, operation and maintenance of ball valves



Installation
Make sure that the product with ball valve/s have the right dimension and that it is free of dirt or foreign particles in valve/pipe. The valve must be mounted in a place that is not exposed to uncontrolled thermal forces or high bend-tensions. The valve must be open when welding and may not be operable before the fitting has cooled.

Pressure testing
When the valve is installed in the network, you can perform prussure test 1.1*PN against a closed valve and 1.5*PN with a open valve. After pressure testing valve can be leak tested.



Usage
In order to avoid pressure surges, close the valve slowly. For larger dimensions> DN200 a gear is recommended.

Maintenance
The valve must be exercised twice a year. At that time also check that the spindle tip is not soaked or contaminated with dirt.

Stem Leakage
If necessary, the spindle O-ring replaced according to special instruction.

ORDER

POWERPIPE

Order customer		Customer code	Date
Reference (name)		Telephone	
Delivery address			
Postcode	City	Country	
Announces the		Telephone	
Goods marking		Best delivery date	
Your reference No.		Latest delivery date	

	ARTICLE NO.	DESCRIPTION	DN	Length	Number	Price
1						
2						
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Others

Please fax to +46 31 57 78 99