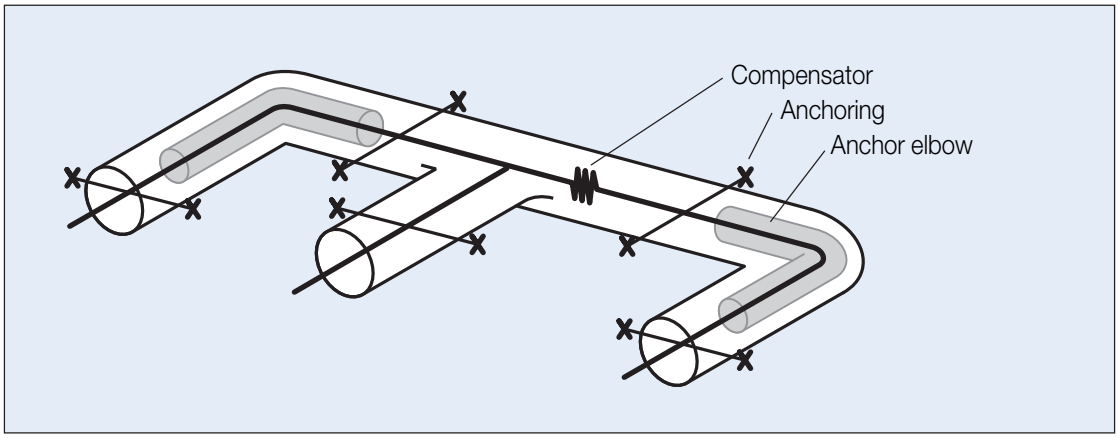
System description

HT3 High temperature

HT3 technique **5.1.1 - 1/1**



Operating temperature from +140°C to +250°C

Directly buried HT3 high temperature systems are laid as compensating sliding systems. In the HT3 system, movements caused by temperature changes are absorbed within the system.

The jacket pipe is held in place by soil friction and thus does not move.

The carrier pipe moves within the insulation, with the movements absorbed by corresponding expansionabsorbing elements such as L, Z or U bends or axial compensators.

When laying, the system is broken down into expansion sections that can be calculated.

Each section is divided from the next at each end using anchors.

The expansionabsorbing elements are placed inside each section, and should ideally be loaded equally from both sides.

Insulation

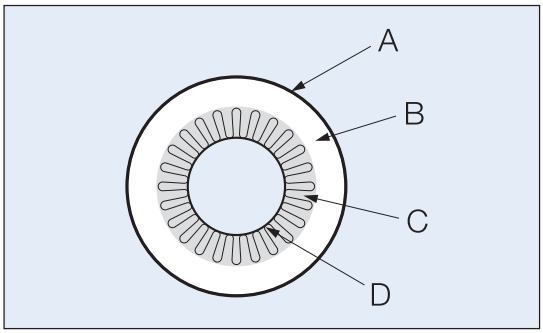
The insulation in the HT 3 system consists of a combination of PUR foam and mineral wool, helping to ensure that neither the PUR foam nor the HDPE jacket temperature capability are exceeded.

A: HDPE jacket

B: PUR foam

C: Mineral wool

D: Carrier pipe

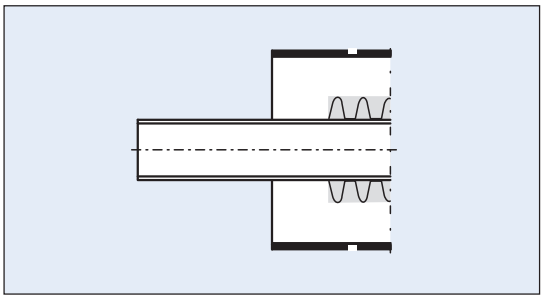


The insulation system is supplied in two standard versions, for medium temperatures of 210°C and 250°C.

Pipe ends

Each pipe and all insulated components are filled with foam in the ends.

This protects the mineral wool ends from moisture seeping during storage and handling.



The pipe ends may only be cut and removed after the carrier pipe have been welded and just before installing of the joint.

A notch is milled into the HDPE jacket to mark the place where the ends should be cut.

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Operating temperature and heat loss

HT3 technique 5.1.2 - 1/2

All pipes and components in the HT 3 system are available as standard for two different levels of maximum operating temperature: 210°C or 250°C.

The wall thickness of the mineral wool and PUR insulation is designed to keep the temperature of the PUR foam below 140°C.

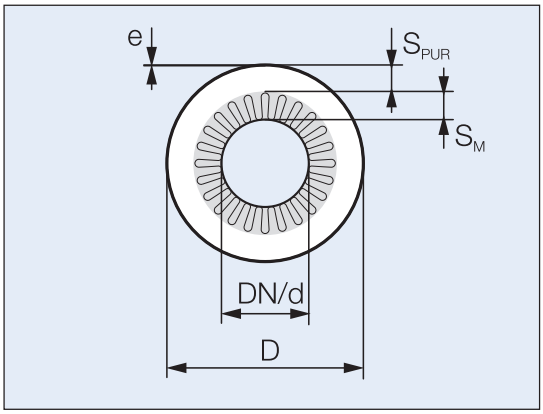
Actual heat loss ϕ is calculated using the following formula:

$$\phi = (t_M - t_E) \times U$$

Where: t_M = Media temperature

t_E = Soil temperature

The U values are calculated on the basis of a soil covering of 600 mm.



DN = Nominel diameter

D = Ext. diameter jacket pipe, mm

e = Wall thickness jacket pipe, mm

d = Ext. diameter carrier pipe, mm

S_M = Mineral wool thickness, mm

S_{PUR} = Insulation thickness PUR, mm

U = Heat trans. coef. total, W/mK

Max. 210°C series

DN	d, mm	D, mm	e, mm	$S_{M,}$ mm	$S_{PUR,}$ mm	U (210°C)
20	26.9	140	3.0	20	34	0.155
25	33.7	140	3.0	20	30	0.180
32	42.4	160	3.0	20	36	0.189
40	48.3	160	3.0	20	33	0.210
50	60.3	200	3.2	30	37	0.219
65	76.1	225	3.5	30	41	0.236
80	88.9	225	3.5	30	35	0.278
100	114.3	250	3.9	30	34	0.327
125	139.7	315	4.9	40	43	0.321
150	168.3	355	5.6	50	38	0.367
200	219.1	400	6.3	50	34	0.455
250	273.0	450	7.0	50	31	0.549
300	323.9	500	7.8	50	30	0.631
350	355.6	560	8.8	50	43	0.576
400	406.4	630	9.8	60	42	0.620

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Operating Temperature and Heat Loss

HT3 technique 5.1.2 - 2/2

Max. 250°C series

DN	d, mm	D, mm	e, mm	S_M ,mm	S_{PUR} ,mm	U (250°C)
20	26.9	180	3.0	40	33	0.153
25	33.7	180	3.0	40	30	0.174
32	42.4	200	3.2	40	35	0.189
40	48.3	225	3.5	50	35	0.191
50	60.3	225	3.5	50	29	0.224
65	76.1	250	3.9	50	33	0.241
80	88.9	280	4.4	60	31	0.258
100	114.3	315	4.9	60	35	0.285
125	139.7	400	6.3	80	44	0.319
150	168.3	400	6.3	80	30	0.336
200	219.1	450	7.0	80	29	0.417
250	273.0	500	7.8	80	26	0.497
300	323.9	560	8.8	80	29	0.536
350	355.6	630	9.8	100	27	0.534
400	406.4	710	11.1	100	41	0.525

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Thermal expansion

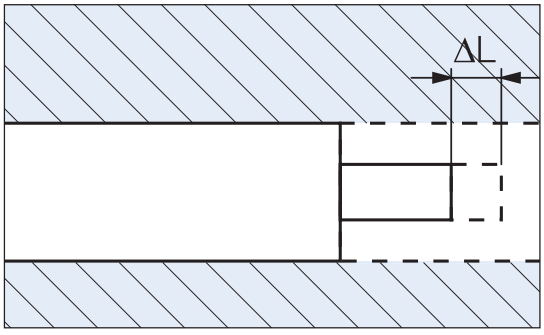
Thermal expansion in straight pipes

The linear thermal expansion in metallic pipes can be calculated using materials depending on expansion coefficients.

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

- ΔL Thermal expansion, mm
- L Pipe section length, m
- α Expansion coefficient, mm/mK
- ΔT Operating-installation temp. K
- α St 37 / St 35.8 at 200°C = 0.0121

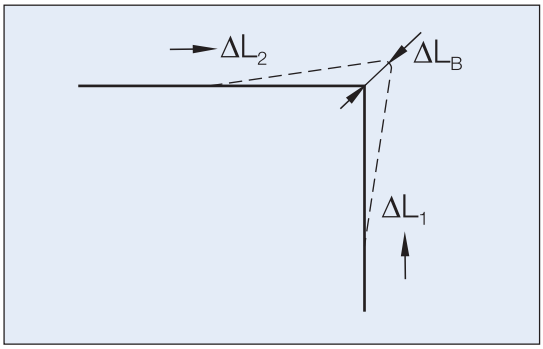
Pure thermal expansion in the HT 3 system is counteracted by friction resistance between the mineral wool and the carrier pipe, soil friction and energy from loading, the pipe bends and compensator.



Thermal expansion in bends

Axial expansion from both directions can occur in bends.

The following figure shows the resultant lateral displacement:



Lateral displacement can be calculated using the following formula:

$$\Delta L_B = \sqrt{\Delta L_1^2 + \Delta L_2^2} \leq \Delta L_{MAX}$$

NB: ΔL_{MAX} for expansion bends must not be exceeded.

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Expansion absorption

Expansion length

The HT 3 system is designed to allow the insulation to absorb expansion of the carrier pipe within the extemal jacket.

Maximum expansion absorption ΔL_{MAX}. for each expansion absorption element can be found in the following catalogue chapters:

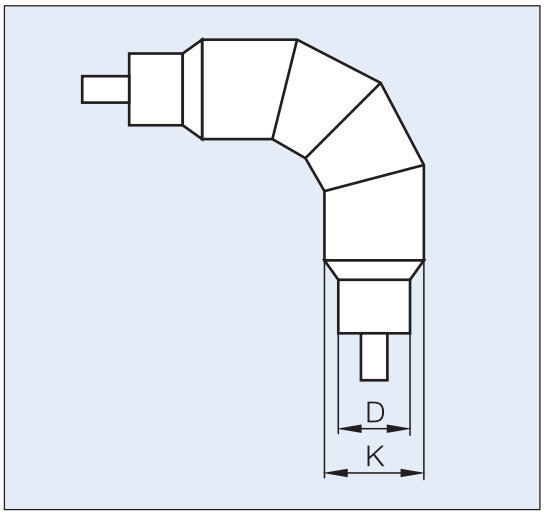
Elbows	5.2.3 and 5.2.4
Axial compensators	5.2.9

The maximum distance L_{MAX} from the anchor to the expansion element is:

$$L_{MAX} = \Delta L_{MAX} / \alpha \times \Delta T$$

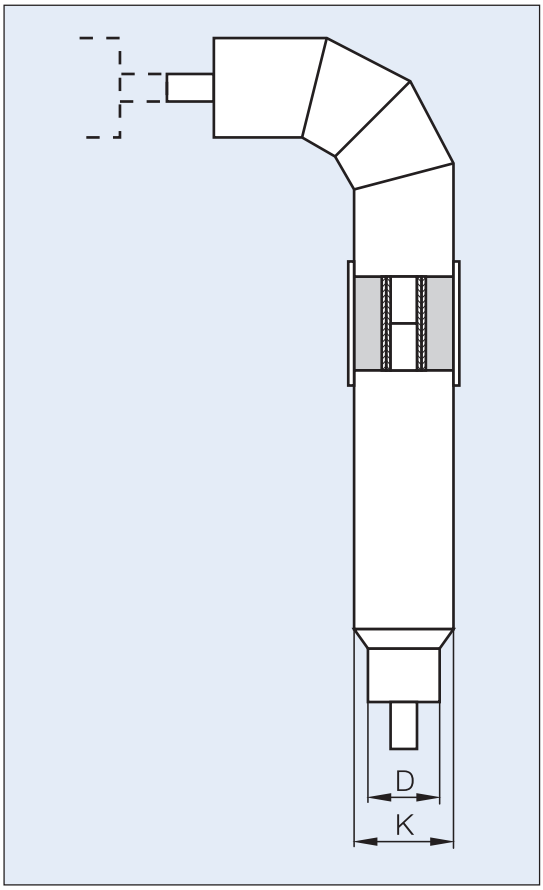
Expansion absorption in 90° bends

Logstor supplies 90° expansion bends for expansion absorption of 20 mm and 40 mm, respectively (see 5.2.3 and 5.2.4)



The bends must be assembled as L, Z or U bends on-site and must not under any circumstances be cut.

When bends are supplied in larger dimensions, the shank length will be too long for transport on a truck and they are therefore divided into three pieces: a short bend and two expansion pipes for assembly on-site.



As a guideline value, the following maximum expansion lengths L_{MAX} can be used from the anchor to the pipe bend.

These distances presume full utilisation of the expansion length and temperatures of 210°C and 250°C respectively.

Max. expansion length L_{MAX} for St 37 / St 35.8

Operating temperature	Expansion length 0 mm	20 mm	40 mm
210°C	3.0 m	8 m	18 m
250°C	2.0 m	7 m	14 m

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Expansion absorption

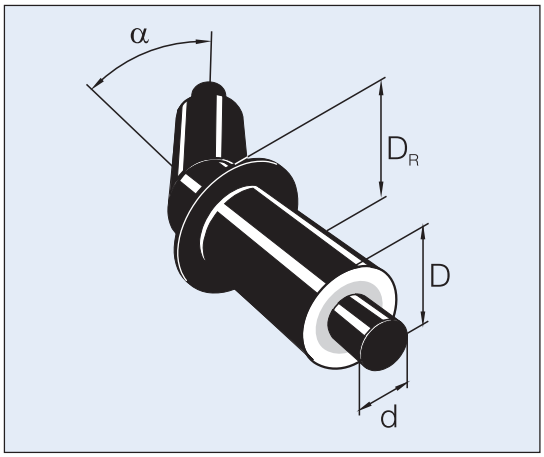
Expansion absorption in 45° - 90° elbows

Elbows of 90° can be used for expansion absorption.

The resulting lateral expansion is calculated as shown in 5.1.3 and must not exceed 20 or 40 mm respectively.

Expansion absorption in 0° - 45° elbows

Pipe elbows with an angle of less than 45° are not suitable for expansion absorption and must usually be built with an anchor elbow.



Expansion absorption in compensators

The expansion absorption capacity of standard compensators ΔL_{MAX} is stated in chapter 5.2.9.

If the customer requires other compensators, all relevant data regarding expansion absorption must be obtained from the manufacturer and submitted to Logstor before they can be approved for insulation.

Only one compensator can be mounted between two anchors, a U-bend or Z-bend for absorption of expansion.

The maximum distance between two anchors ΔL_{MAX} on straight pipe lengths is:

$$L_{MAX} = \Delta L_{MAX} / \alpha \times \Delta T$$

ΔL_{MAX} is the compensator or expansion element's maximum expansion length.

Expansion in T-branches

There are no expansion elements in T-fittings which must always be directly installed together with an anchor in the main pipe.

The maximum distance of a T-fitting to an expansion element in a branch pipe for black steel is:

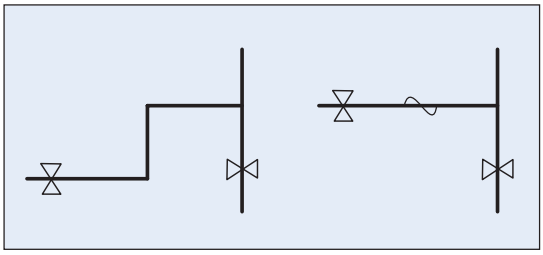
- 6 m for the 210°C series
- 4 m for the 250°C series

Expansion in HT end caps

The maximum distance from a HT end cap to an anchor for black steel is:

- 5 m for the 210°C series
- 3 m for the 250°C series

Installation examples



Absorption of expansion in reductions

Expansions cannot absorb larger expansions, and therefore they are to be installed directly together with a T-fitting or an anchor.

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Anchors

HT3 technique 5.1.5 - 1/2

Anchor forces

Anchor forces exerted by thermal expansion and internal compressive force have to be absorbed by the concrete blocks in the excavation trench. Absorption of the axial forces exerted is sufficient for the calculation.

Consequently, anchor force $F_{P,}$ which is to be absorbed can be calculated as follows:

$$F_P = |S \times F_1 - F_2|$$

Where S is a supplementary safety value and $F_1 > F_2$.

The forces exerted on both sides of the anchor consist of different individual elements, depending on the geometric conditions.

They can include:

- Friction.
- The compensator's spring resistance.
- The compensator's internal resistance.
- Resistance from L, Z and U bends.
- Internal compressive force in bends.
- The compensator's start force.

The compensator's spring resistance and resistance in the bends can be ignored as they are built in to the safety factor.

Friction

The reactive forces resulting from friction between the carrier pipe and the mineral wool can be calculated by:

$$F_R = \pi \times d \times L \times \mu$$

Where: d = The carrier pipe's dimensioning [m].

L = The pipe length under friction [m].

μ = The friction factor (7 kN/m^2)

The compensator's internal compressive force

The internal diameter of the compensator's corrugation is greater than that of the carrier pipe, resulting in the corrugation creating hydraulic axial force F_{KP}

$$F_{KP} = p \times A_B$$

A_B = The effective corrugated area [cm^2]

P = Max. operating pressure [N/mm^2]

A_B is stated in chapter 5.2.9.

Compensator start force

The compensator is factory-set for maximum fluctuation and separation bolts are used to retain this setting. The bolts will part once the compensator becomes active, and the required force P kN, is stated in chapter 5.2.9. P should be calculated as a unilateral force.

Anchor force

Thus, the resultant anchor force is:

$$F_{PR} = |S \times \Sigma F_1 - \Sigma F_2|$$

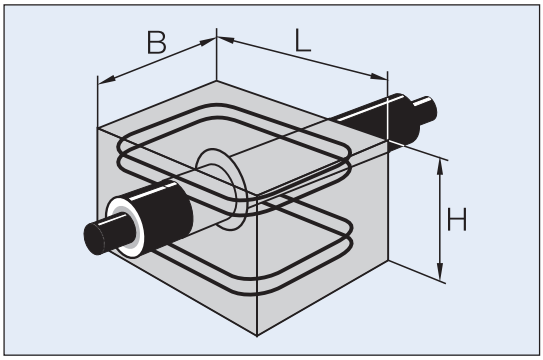
or:

$$F_{PR} = S \times (F_{R1} + F_{KP1}) + P - (F_{R2} + F_{KP2})$$

The supplementary safety factors are given in the local instructions but in most instances S=1.2 will be sufficient.

Anchor construction

Anchors are set in concrete directly onto unprepared ground.



The concrete block must be dimensioned to be able to absorb reaction force F_{PR}

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Anchors

HT3technique 5.1.5 - 2/2

The ground will have a slight elasticity making it impossible to define an anchor precisely, i.e. $\Delta L = 0$. Permitted anchor displacement ΔL_F will require case-by-case evaluation.

Permitted surface pressure σ against the ground, dependent on the ΔL_F that can be tolerated, can then be calculated using the following formula:

$$\sigma = 15 \times \Delta L_F$$

The soil pressure in the vertical direction A_W can be calculated by reaction force F_{PR} and permitted surface pressure σ:

$$A_W = F_{PR} / \sigma$$

The concrete block must be cast to achieve a compressive force of more than 25 MN/m², and must have sufficient height, length and reinforcement to absorb the transmission forces.

Recommended dimensions for the concrete block are calculated on the basis of the following:

Soil pressure	:	150 kN/m² against the entire block
Reinforcement	:	Ks 410 steel bar, $f_{yk} > 410$ N/mm²
Concrete	:	20 N/mm² concrete, $f_{ck} > 20$ N/mm²

Calculating the size of the concrete block is the responsibility of the project engineer.

Steel pipe diameter d, mm	Permitted axial force kN	Concrete block			Reinforcement	
		L, m	H, m	W, m	No. of brackets	Dim, mm
26.9-48.3	30-80	1.0	0.5	1.0	4	8
60.3-76.1	100-130	1.2	0.5	1.0	4	8
88.9-114.3	130-200	1.8	0.7	1.0	4	10
139.7	250	2.3	0.8	1.0	4	12
168.3	350	2.3	0.9	1.0	4	12
219.1	625	2.8	1.2	1.0	6	12
273.0	800	3.0	1.5	1.0	6	16
323.9	1050	3.8	1.5	1.0	6	20
355.6	1300	4.6	1.6	1.2	6	20
406	1600	4.8	1.8	1.4	6	20

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Trenches and soil covering

HT3 technique 5.1.6 - 1/2

Laying depth

Soil friction must be greater than pipe friction for the sliding pipe system to function. In order to ensure this and avoid overloading of the sleeves, a certain amount of soil cover is required. How much depends on the pipe dimensions and the nature of backfill.

The table below shows the minimum soil covering required for the HT 3 system, depending on the nature of backfill and the type of sleeves selected.

Compliance with these recommendations will ensure the pipes that are protected against traffic loads.

Dimensioning the trench

210°C series

Minimum soil covering H				
DN/D	Groundwater under the pipe		Groundwater above the pipe	
	HBXS	HEW	HBXS	HEW
20/140	0.60	-	0.80	-
25/140	0.60	-	0.80	-
32/160	0.60	-	0.90	-
40/160	0.60	-	0.95	-
50/200	0.60	-	1.00	-
65/225	0.75	0.60	1.10	1.00
80/225	0.75	0.60	1.20	1.05
100/250	0.85	0.70	1.40	1.20
125/315	0.90	0.80	1.50	1.25
150/355	-	0.85	-	1.30
200/400	-	0.85	-	1.35
250/450	-	0.90	-	1.50
300/500	-	0.95	-	1.50
350/560	-	1.00	-	1.55
400/630	-	1.00	-	1.60

250°C series

Minimum soil covering H				
DN/D	Groundwater under the pipe		Groundwater above the pipe	
	HBXS	HEW	HBXS	HEW
20/180	0.60	-	0.60	-
25/180	0.60	-	0.60	-
32/200	0.60	-	0.60	-
40/225	0.60	-	0.60	-
50/225	0.60	0.60	0.80	0.80
65/250	0.60	0.60	0.80	0.80
80/280	0.70	0.60	0.80	0.80
100/315	0.80	0.60	0.90	0.90
125/400	-	0.60	-	0.90
150/400	-	0.60	-	1.10
200/450	-	0.70	-	1.30
250/500	-	0.70	-	1.40
300/560	-	0.80	-	1.50
350/630	-	0.90	-	1.60
400/710	-	1.00	-	1.60

Dimensioning of the trench depends on the pipe dimensions. When establishing a trench, local safety regulations must be observed including regulations for shores or other stabilizing soil equipment.

A trench to a minimum depth of 1.7 m with shores or sufficient measures to prevent slippage is recommended in all instances.

The minimum trench width for pipes up to DN 400 are the jacket pipe diameter plus 450 mm. The pipes must rest on minimum 100 mm compressed friction material and the distance between the jacket pipe and trench wall must be no less than 150 mm. A greater distance will be advantageous for welding work and sleeve installation in the trench. Alternatively, proper access around the weld area must be ensured.

Pipes should be supported by supports of polystyrene foam or sandbags. If wooden wedges are used, they must be removed before backfilling.

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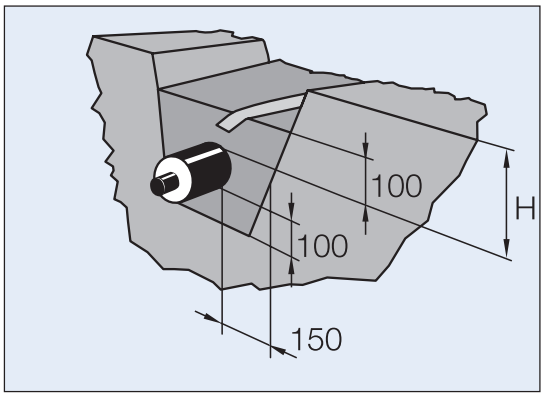
Trenches and soil covering

HT3 technique 5.1.6 - 2/2

The following figure illustrates a support profile:



A minimum 100 mm of friction material must be filled over and around the pipe. Types of friction material are specified below.

Backfill over the jacket pipe must be in accordance with the specifications for the laying depth – and the same applies to any branch pipes.

Once the trench has been dug, check that the soil base is capable of bearing the weight to avoid the risk of settling. If it is not, make the trench deeper and replace the excavated soil with friction material for backfilling.

Compress the material under, around and over the pipes to a standard proctor value of no less than 95. It is vital that the material is also compressed under the pipes to avoid cavities. Compress the material around the sides and between the pipes by hand and finish off with a plate vibrator with a maximum dynamic pressure of 100 Pa.

Friction material

The friction material used must fulfil the following specifications:

Maximum grain size	≤	32	mm
Maximum 9% weight	≤	0.075	mm
or 3% weight	≤	0.020	mm
Non-uniformity figure	>	1.8	

Drainage

Until the sleeve joints are finished and the trench completely backfilled, water must be excluded from the trench as much as possible. Surface water must be diverted away from the trench and if necessary establish a sump using submersible pumps. Beware of the risk of undermining.

When installing the HT 3 system, the trench must not under any circumstances be under water until the sleeve joints are fully installed.

Distance to other directly buried conduits

The immediate surroundings of directly buried heat-conveying pipes are at a higher temperature than normal. This can affect the transmission capacity of underground electrical cables. The maintaining of a minimum distance to other conduits is also necessary with regard to maintenance work.

Refer to the owners of any other directly buried conduits for minimum recommended distance.

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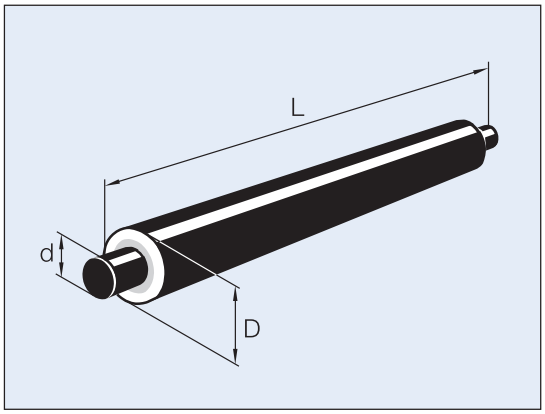
Pipe

HT3 components - Steel pipe system 5.2.1 - 1/1



Component no. 20001L

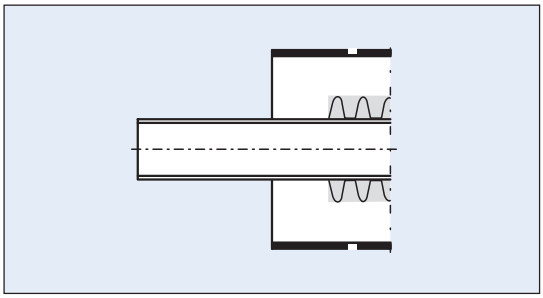
As described in the following table, pipes are supplied in lengths of 6 and 12 m.

As standard all our other pre-insulated components are supplied in two series, the 210˚C series and the 250°C series.

All pipes and pre-insulated components are complete foamed at the ends, protecting the mineral wool end sections against damp during storage and handling. The pipe ends may only be cut and removed after the carrier pipes have been welded and just before shrinkage of the sleeves.

For further details, see chapter 5.1.1, System description.

For specifications for carrier pipes, insulations and jackets, see section 1.2 Material specifications, chapter 5.1.2 operating temperature and heat loss.



DN	d	210°C series		250°C series		L 6m	L 12m
		D	Jacket thickness, e	D	Jacket thickness, e		
20	26.9	140	3.0	180	3.0	X	
25	33.7	140	3.0	180	3.0	X	
32	42.4	160	3.0	200	3.2	X	
40	48.3	160	3.0	225	3.5	X	
50	60.3	200	3.2	225	3.5	X	
65	76.1	225	3.5	250	3.9	X	
80	88.9	225	3.5	280	4.4	X	X
100	114.3	250	3.9	315	4.9	X	X
125	139.7	315	4.9	400	6.3	X	X
150	168.3	355	5.6	400	6.3	X	X
200	219.1	400	6.3	450	7.0	X	X
250	273.0	450	7.0	500	7.8	X	X
300	323.9	500	7.8	560	8.8	X	X
350	355.6	560	8.8	630	9.8	X	X
400	406.4	630	9.8	710	11.1	X	X

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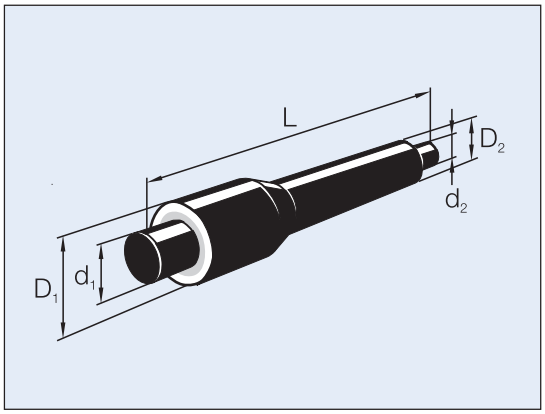
Reductions

HT3 components - Steel pipe system 5.2.2 - 1/1



All pipes and pre-insulated components are complete foamed at the ends, protecting the mineral wool end sections against damp during storage and handling. The pipe ends may only be cut and removed after the carrier pipes have been welded and just before shrinkage of the sleeves.

For further details, see chapter 5.1.1, system description.

For specifications of carrier pipes, insulation and jackets, see section 1.2, Material specifications and chapter 5.1.2, operating temperature and heat loss.

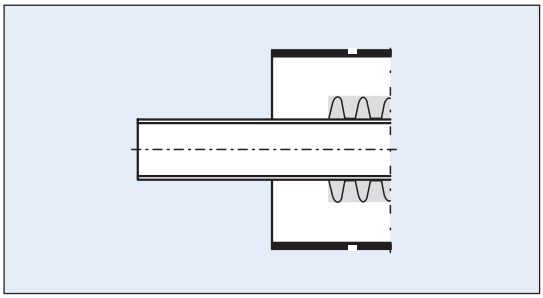
Component no. 49001L

Reductions are supplied complete in lengths as specified in the table below.

Reductions in the carrier pipe are eccentric.

Please observe that the white line must be at the top at installation.

As standard, all reductions and pre-insulated components are manufactured in two series: the 210°C series and the 250°C series.



DN_1	d_1, mm	DN_2	d_2, mm	L, mm	210°C series		250°C series	
					D_1, mm	D_2,mm	D_1, mm	D_2,mm
25	33.7	20	26.9	1500	140	140	180	180
32	42.4	25	33.7	1500	160	140	200	180
40	48.3	32	42.4	1500	160	160	225	200
50	60.3	40	48.3	1500	200	160	225	225
65	76.1	50	60.3	1500	225	200	250	225
80	88.9	65	76.1	1500	225	225	280	250
100	114.3	80	88.9	1500	250	225	315	280
125	139.7	100	114.3	1500	315	250	400	315
150	168.3	125	139.7	1500	355	315	400	400
200	219.1	150	168.3	1500	400	355	450	400
250	273.0	200	219.1	1500	450	400	500	450
300	323.9	250	273.0	1500	500	450	560	500
350	355.6	300	323.9	1500	560	500	630	630
400	406.4	350	355.6	1500	630	560	710	630

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Elbow

As standard, elbows and all other pre-insulated components are supplied in two series, of 210°C and 250°C, respectively.

Elbows are manufactured in three versions, without expansion and with 20 mm or 40 mm absorption insulation. These expansions must not be exceeded, see chapter 5.1.3. Elbows can be supplied with 45°, 60°, 75° and 90° angles as standard. Other angles can be supplied with a tolerance of ± 2.5° on special order.

For elbows of less than 45° anchor elbows must be used, see chapter 5.2.8.

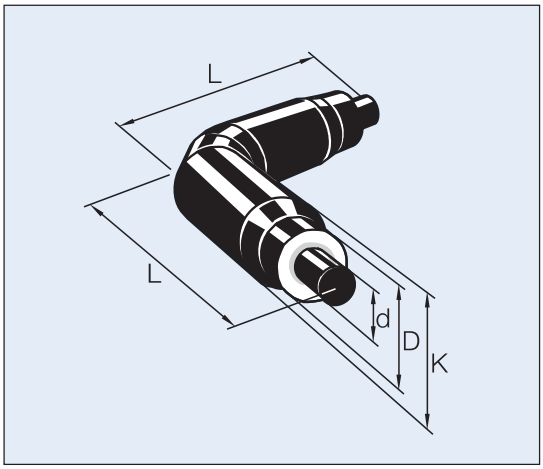
For transporting, large dimensions are manufactured in several components: a short elbow with one or two leg extensions, see chapter 5.2.4, expansion pipes.

All pipes and pre-insulated components are fully foamed at the ends, protecting the mineral wool end sections against damp during storage and handling. The pipe ends may only be cut and removed after the carrier pipes have been welded and just before shrinkage of the sleeves.

For further details, see chapter 5.1.1, system description.

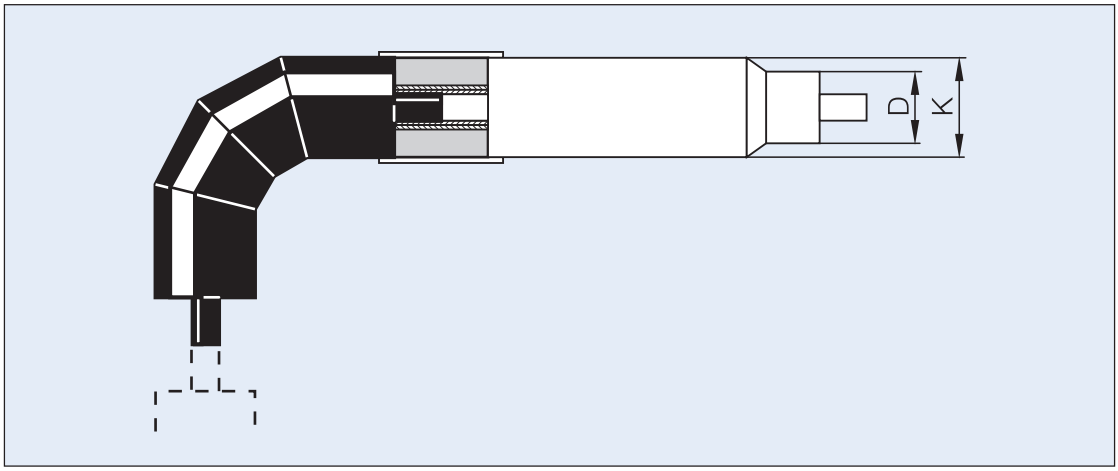
For specifications of carrier pipes, insulations and jackets, see section 1.2 material specifications.

Type 1



Component no. 25001L

Type 2



Component no. 25001L

Version/03.2006.DK

Elbow

HT3 components - Steel pipe system 5.2.3 - 2/2

210°C series

DN	d, mm	D, mm	Without expansion		20 mm expansion			40 mm expansion		
			L, mm	Type	K, mm	L, mm	Type	K, mm	L, mm	Type
20	26.9	140	1000	1	-	-	-	225	1600	1
25	33.7	140	1000	1	-	-	-	225	1800	1
32	42.4	160	1000	1	-	-	-	250	2000	1
40	48.3	160	1000	1	-	-	-	250	2200	1
50	60.3	200	1000	1	-	-	-	280	2500	1
65	76.1	225	1000	1	280	2000	1	315	2600	1
80	88.9	225	1000	1	280	2200	1	315	1200	2
100	114.3	250	1000	1	315	2400	1	355	1200	2
125	139.7	315	1000	1	355	2600	1	400	1200	2
150	168.3	355	1000	1	400	1500	2	450	1200	2
200	219.1	400	1000	1	450	1500	2	500	1500	2
250	273.0	450	1300	1	500	1500	2	560	1500	2
300	323.9	500	1500	1	560	1500	2	630	1500	2
350	355.6	560	1600	1	630	1500	-	-	-	-
400	406.4	630	1600	1	710	1500	-	-	-	-

250°C series

DN	d, mm	D, mm	Without expansion		20 mm expansion			40 mm expansion		
			L, mm	Type	K, mm	L, mm	Type	K, mm	L, mm	Type
20	26.9	180	1000	1	-	-	-	315	1600	1
25	33.7	180	1000	1	-	-	-	315	1800	1
32	42.4	200	1000	1	-	-	-	315	2000	1
40	48.3	225	1000	1	-	-	-	355	2200	1
50	60.3	225	1000	1	-	-	-	355	2500	1
65	76.1	250	1000	1	355	2000	1	400	2600	1
80	88.9	280	1000	1	355	2200	1	400	1200	2
100	114.3	315	1000	1	400	2400	1	450	1200	2
125	139.7	400	1000	1	450	2600	1	560	1200	2
150	168.3	400	1000	1	450	1500	2	560	1200	2
200	219.1	450	1000	1	500	1500	2	630	1500	2
250	273.0	500	1300	1	560	1500	2	710	1500	2
300	323.9	560	1500	1	630	1500	2	800	1500	2
350	355.6	630	1600	1	710	1500	-	-	-	-
400	406.4	710	1600	1	800	1500	-	-	-	-

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Expansion pipe

HT3 components - Steel pipe system 5.2.4 - 1/2

As standard, expansion pipes and all other pre-insulated components are supplied in two series, of 210°C and 250°C, respectively.

Expansion elbows are produced as three components: a short elbow with two expansion pipes as extensions. Expansion pipes are manufactured in two versions, with 20 mm or 40 mm expansion absorption. These expansion absorptions must not be exceeded and expansion pipes must not be cut.

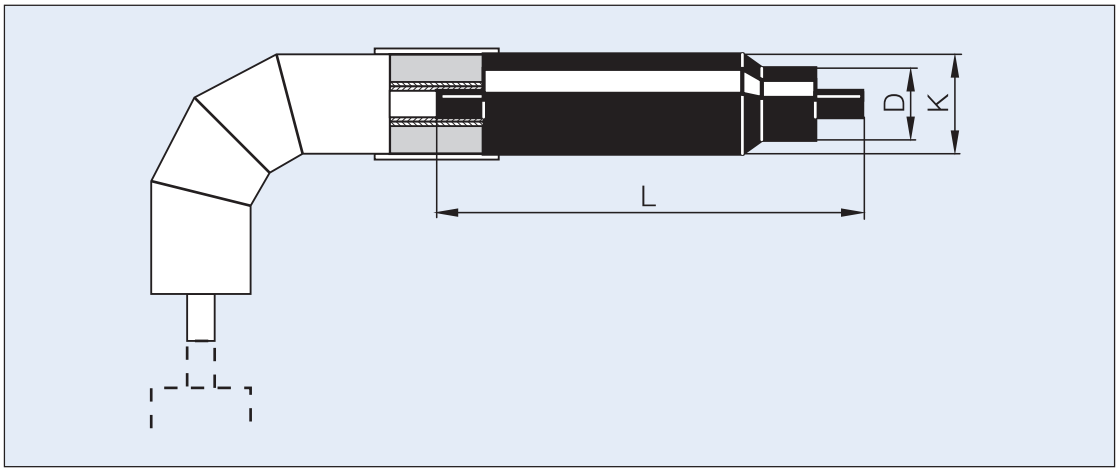
All pipes and pre-insulated components are fully foamed at the ends, protecting the mineral wool end sections against damp during storage and handling. The pipe ends may only be cut and removed after the carrier pipes have been welded and just before shrinkage of the sleeves.

Please note that the text on expansion pipes must be at the top during installation, as expansion is only permitted in a lateral direction to the text.

For further information, see chapter 5.1.1 system description.

For carrier pipe specifications, insulations and jackets, please see section 1.2, material specifications.

Type 2



Component no. 25001L – expansion pipes

DN	d, mm	210°C series						315°C series					
		20 mm expansion			40 mm expansion			20 mm expansion			40 mm expansion		
		L	D	K	L	D	K	L	D	K	L	D	K
80	88.9	-	-	-	2000	225	315	-	-	-	2000	280	400
100	114.3	-	-	-	2200	250	355	-	-	-	2200	315	450
125	139.7	-	-	-	2500	315	400	-	-	-	2500	400	500
150	168.3	1700	355	400	3000	355	450	1700	400	450	3000	400	500
200	219.1	2000	400	450	3500	400	500	2000	450	500	3500	450	560
250	273.0	2300	450	500	4000	450	560	2300	500	560	4000	500	630
300	323.9	2700	500	560	4500	500	630	2700	560	630	4500	560	710
350	355.6	2900	560	630	-	-	-	2900	630	710	-	-	-
400	406.4	3100	630	710	-	-	-	3100	710	800	-	-	-

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Expansion pipe

HT3 components - Steel pipe system 5.2.4 - 2/2

Joint for connection of expansion elbow, type 2, and expansion pipes should not be ordered separately. The joint is automatically supplied with the expansion elbow as a HEW joint with extra mineral wool for expansion absorption. On ordering, DN 65 and DN 80 with 40 mm expansion in series 210° are available with HBXS instead. In this case, the HBXS is provided with extra mineral wool.

Joint for expansion elbow, type 2

20 mm expansion

DN	d, mm	Serie 210°C					Serie 250°C				
		L, mm	D, mm	S_M, mm	PUR, liter	Foam pack size	L, mm	D, mm	S_M, mm	PUR, liter	Foam pack size
150	168.3	750	400	70	15.3	8	800	450	100	21.2	10
200	219.1	800	450	70	17.3	9	800	500	100	24.1	10
250	273.0	800	500	70	18.7	9	800	560	100	29	11
300	323.9	800	560	70	23.4	10	800	630	100	38.3	12
350	355.6	800	630	70	35.8	11	800	630	120	19.4	9
400	406.4	800	710	80	43.3	12	800	710	120	32	11

40 mm expansion

DN	d, mm	Serie 210°C					Serie 250°C				
		L, mm	D, mm	S_M, mm	PUR, liter	Foam pack size	L, mm	D, mm	S_M, mm	PUR, liter	Foam pack size
80	88.9	750	315	70	11.1	7	800	400	100	22.5	10
100	114.3	750	355	70	14.5	8	800	450	100	29.9	11
125	139.7	750	400	80	16.6	9	800	500	120	31.5	11
150	168.3	800	450	90	19.2	9	800	500	120	26.2	11
200	219.1	800	500	90	21.4	10	800	560	120	32.1	11
250	273.0	800	560	90	25.5	10	800	630	120	40.9	12
300	323.9	800	630	90	33.9	11	800	710	120	65.1	-

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Straight T-fitting

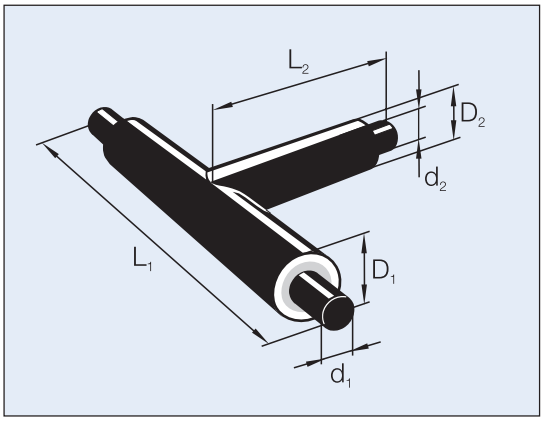
As standard, T-fittings and all other pre-insulated components are supplied in two series, of 210°C and 250°C, respectively. Carrier pipes are made exclusively to the customer's specification and the branch pipe is welded on at an angle of 90°.

T-fittings cannot be used as expansion-absorbing components and must therefore always be directly placed together with an anchor in the main pipe.

All pipes and pre-insulated components are completely foamed at the ends, protecting the mineral wool end sections against damp during storage and handling. The pipe ends may only be cut and removed after the carrier pipes have been welded and just before shrinkage of the joints.

See also pipe-laying instructions in chapter 5.1.4.

For further information see chapter 5.1.1 system description and for specifications for carrier pipes, insulations and jackets, see section 1.2 material specifications.



Component no. 34001L

T-fittings are supplied in the diameter combinations indicated in the table below. Other combinations are supplied on special order. If the branch pipe of the T-fitting is to be further reduced, use reduction pipes – see chapter 5.2.2. Logstor offers T-fittings with terminations as special products.

210°C series

		DN	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400
		d_1	26.9	33.7	42.4	48.3	60.3	76.1	88.9	114.3	139.7	168.3	219.1	273.0	323.9	355.6	406.4
		D_1	140	140	160	160	200	225	225	250	315	355	400	450	500	560	630
d_2	D_2	L_1	1000	1000	1000	1000	1200	1200	1200	1200	1200	1400	1400	1600	1600	1800	2000
26.9	140		500	500	500	500	500										
33.7	140			500	500	500	500	500									
42.4	160				500	500	500	500	500								
48.3	160					500	500	500	500	600							
60.3	200						500	500	500	600	600						
76.1	225							500	500	600	600	600					
88.9	225								500	600	600	600	600				
114.3	250									600	600	600	600	700			
139.7	315										600	600	600	700	700		
168.3	355											600	600	700	700	700	
219.1	400												600	700	700	700	800
273.0	450													700	700	700	800
323.9	500														700	700	800
355.6	560															700	800
406.4	630																800

L_2 is shown in the table.

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Straight T-fitting

250°C series

		DN	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400
		d_1	26.9	33.7	42.4	48.3	60.3	76.1	88.9	114.3	139.7	168.3	219.1	273.0	323.9	355.6	406.4
		D_1	200	200	225	250	315	315	315	355	450	450	500	560	630	630	710
d_2	D_2	L_1	1000	1000	1000	1000	1200	1200	1200	1200	1200	1400	1400	1600	1600	1800	2000
26.9	180		500	500	500	500	500										
33.7	180			500	500	500	500	500									
42.4	200				500	500	500	500	500								
48.3	225					500	500	500	500	600							
60.3	225						500	500	500	600	600						
76.1	250							500	500	600	600	600					
88.9	280								500	600	600	600	600				
114.3	315									600	600	600	600	700			
139.7	400										600	600	600	700	700		
168.3	400											600	600	700	700	700	
219.1	450												600	700	700	700	800
273.0	500													700	700	700	800
323.9	560														700	700	800
355.6	630															700	800
406.4	710																800

L_2 is shown in the table.

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T-fitting

HT3 components - Steel pipe system 5.2.6 - 1/2

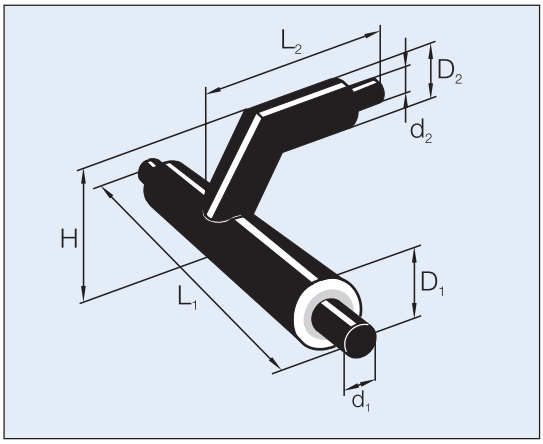
As standard, T-fittings and other pre-insulated components are supplied in two series, of 210°C and 250°C, respectively.

Carrier pipes are made exclusively to the customer's specifications and the branch pipe is cranked at an angle of 45°.

T-fittings cannot be used as expansion-absorbing components and must therefore always be directly placed together with an anchor.

All pipes and pre-insulated components are completely foamed at the ends, protecting the mineral wool end sections against damp during storage and handling. The pipe ends may only be cut and removed after the carrier pipes have been welded and just before shrinkage of the sleeves.

For further information see chapter 5.1.1 system description and for specifications of carrier pipes, insulation and jackets, see section 1.2 material specifications.



Component no. 30001L

T-fittings are supplied in diameters indicated in the table below. Other combinations can be supplied on order. If the branch pipe of the T-fitting is to be further reduced, use reductions – see chapter 5.2.2.

210°C series

			DN	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400
			d_1	26.9	33.7	42.4	48.3	60.3	76.1	88.9	114.3	139.7	168.3	219.1	273.0	323.9	355.6	406.4
			D_1	140	140	160	160	200	225	225	250	315	355	400	450	500	560	630
d_2	D_2	L_2	L_1	1000	1000	1000	1000	1200	1200	1200	1200	1400	1400	1600	1600	2000	2000	2000
26.9	140	1000		215	215	225	225	245										
33.7	140	1000			215	225	225	245	258									
42.4	160	1000				235	235	255	268	268								
48.3	160	1000					235	255	268	268	280							
60.3	200	1000						275	288	288	300	333						
76.1	225	1000							300	300	313	345	365					
88.9	225	1000								300	313	345	365	388				
114.3	250	1000									325	358	378	400	425			
139.7	315	1000										390	410	433	458	508		
168.3	355	1000											430	453	478	528	558	
219.1	400	1000												475	500	550	580	615
273.0	450	1000													525	575	605	640
323.9	500	1200														600	630	665
355.6	560	1200															660	695
406.4	630	1200																730

The height of the offset H is indicated in the table.

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T-fitting

HT3 components - Steel pipe system 5.2.6 - 2/2

250°C series

			D2	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400
			d1	26.9	33.7	42.4	48.3	60.3	76.1	88.9	114.3	139.7	168.3	219.1	273	323.9	355.6	406.4
			D1	180	180	200	225	225	250	280	315	400	400	450	500	560	630	710
d2	D2	L2	L1	1000	1000	1000	1000	1200	1200	1200	1400	1400	1600	1600	1800	2000	2000	2000
26.9	180	1000		255	255	265	277	277										
33.7	180	1000			255	265	277	277	290									
42.4	200	1000				275	287	287	300	315								
48.3	225	1000					300	300	312	327	345							
60.3	225	1000						300	312	327	345	387						
76.1	250	1000							325	340	357	400	400					
88.9	280	1000								355	372	415	415	440				
114.3	315	1000									390	433	433	458	508			
139.7	400	1000										475	475	500	550	580		
168.3	400	1000											475	500	550	580	615	
219.1	450	1200												525	575	605	640	680
273	500	1200													600	630	665	705
323.9	560	1600														660	695	735
355.6	630	1600															730	770
406.4	710	1600																810

The height of the offset H is indicated in the table.

Total height from the bottom to the top of the jacket < ø450, H = D1 +D2 + 75 mm.

Total height from the bottom to the top of the jacket > ø500, H = D1 +D2 + 100 mm.

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Anchoring

HT3 components - Steel pipe system 5.2.7 - 1/1

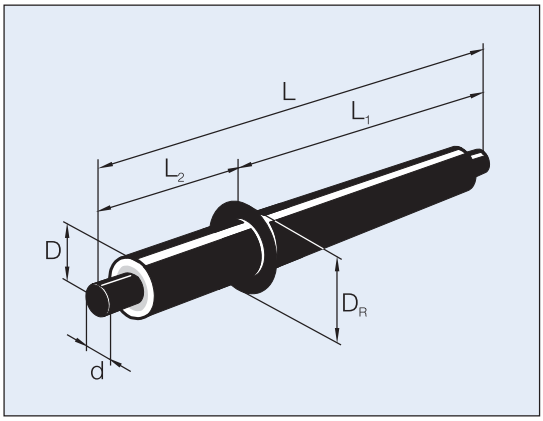
As standard, anchors and all other pre-insulated components are supplied in two series, of 210°C and 250°C, respectively.

The anchor plate is sufficiently thermally insulated to ensure that the jacket pipe and shrink seals are not overheated. Its thickness and diameter are designed to ensure that any applied forces are transferred to the concrete block, see chapter 5.1.6.

All pipes and pre-insulated components are fully foamed at the ends, protecting the mineral wool end sections against damp during storage and handling. The pipe ends may only be cut and removed after the carrier pipes have been welded and just before shrinkage of the sleeves.

For further details see chapter 5.1.1, system description.

For specifications of carrier pipes, insulations and jackets, see section 1.2, material specifications.



Component no. 40011L

DN	d	L	L_1	210°C series D	210°C series D_R	315°C series D	315°C series D_R
20	26.9	2000	1150	140	240	180	280
25	33.7	2000	1150	140	240	180	280
32	42.4	2000	1150	160	260	200	300
40	48.3	2000	1150	160	260	225	325
50	60.3	2000	1150	200	300	225	325
65	76.1	2000	1150	225	325	250	350
80	88.9	2000	1150	225	325	280	380
100	114.3	2000	1150	250	350	315	415
125	139.7	2000	1150	315	415	400	500
150	168.3	2000	1150	355	455	400	500
200	219.1	2000	1150	400	500	450	550
250	273.0	2000	1150	450	550	500	600
300	323.9	2000	1150	500	600	560	660
350	355.6	2000	1150	560	660	630	730
400	406.4	2000	1150	630	730	710	810

Anchors can be supplied with HT end cap in L_1 or L_2 ends. See also chapter 5.3.3.

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Anchor elbow

HT3 components - Steel pipe system 5.2.8 - 1/1

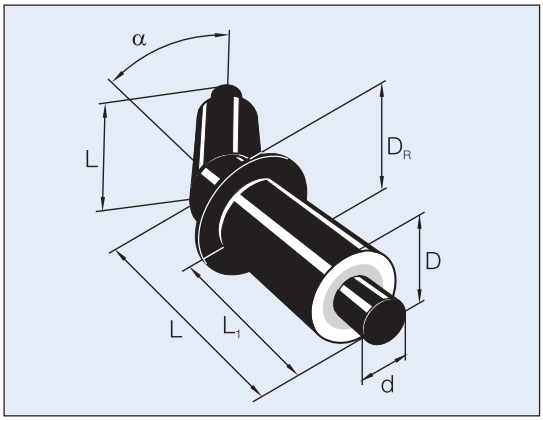
As standard, anchor elbows and all other pre-insulated components are supplied in two series, of 210°C and 250°C, respectively.

The anchor plate is sufficiently technically isolated to ensure that the jacket pipe and shrink seals are not overloaded. Its thickness and diameter are designed to ensure that any applied forces are transferred to the concrete block, see chapter 5.1.5.

All pipes and pre-insulated components are fully foamed at the ends, protecting the mineral wool end sections against damp during storage and handling. The pipe ends may only be cut and removed after the carrier pipes have been welded and just before shrinkage of the sleeves.

Further details are given in chapter 5.1.1, system description.

For specifications of carrier pipes, insulation and jackets, see section 1.2, Material specifications.



Component no. 40012L

DN	d	L	L_1	210°C series D	210°C series D_R	250°C series D	250°C series D_R
20	26.9	1700	1015	140	240	180	280
25	33.7	1700	1015	140	240	180	280
32	42.4	1700	1015	160	260	200	300
40	48.3	1700	1015	160	260	225	325
50	60.3	1700	1015	200	300	225	325
65	76.4	1700	1015	225	300	250	350
80	88.9	1700	1015	225	300	280	380
100	114.3	1700	1015	250	350	315	415
125	139.7	1700	1015	315	415	400	500
150	168.3	1700	1015	355	455	400	500
200	219.1	1700	1015	400	500	450	550
250	273.0	1700	1015	450	550	500	600
300	323.9	1700	1015	500	600	560	660
350	355.6	1700	1015	560	660	630	730
400	406.4	1700	1015	630	760	710	810

Anchors can be supplied with HT end caps in L_1 or L_2 ends. See also chapter 5.3.3.

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Compensator

HT3 components - Steel pipe system 5.2.9 - 1/1

As standard, compensators and all other pre-insulated components are supplied in two series, of 210°C and 250°C, respectively.

Compensators are available in standard format of PN 16 or PN 25.

Compensators for higher pressures are made to customer's specifications.

Nominal pressure applies at 120°C.

At 200°C, a pressure reduction factor of 0.91 and at 300°C a factor of 0.82 is required.

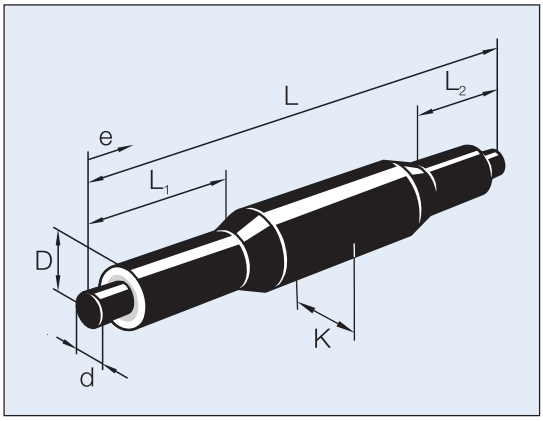
All pipes and pre-insulated components are fully foamed at the ends, protecting the mineral wool end sections against damp during storage and handling. The pipe ends may only be cut and removed after the carrier pipes have been welded and just before shrinkage of the sleeves.

The compensator is factory-set for maximum expansion absorption and retaining bolts are used to retain this setting. The bolts will burst once the compensator becomes active, and the required burst force P, is stated below.

The expansion-absorbing element is a corrugated section consisting of several layers of stainless steel welded to both ends of the pipe. This section is approved to max. 1000 full load cycles.

A housing of either steel or stainless steel protects this construction and the compensator exerts spring force at a constant C_A.

The effective corrugated surface A_B mm^2 is stated below.



Component no. 41001L

Further details are given in chapter 5.1.1, system description.

For specifications of carrier pipes, insulation and jackets, see section 1.2, material specifications.

d, mm	L, mm	210°C / PN 16						250°C / PN 25					
		D, mm	K, mm	ΔLe, mm	P, kN	C_A, N/mm	A_B, mm^2	D, mm	K, mm	ΔLe, mm	P, kN	C_A, N/mm	A_B, mm^2
48.3	2500	160	200	100	18	15	4100	-	-	-	-	-	-
60.3	2500	200	250	100	18	43	5500	-	-	-	-	-	-
76.1	2500	225	280	100	18	51	7600	-	-	-	-	-	-
88.9	2500	225	280	100	18	45	10800	280	400	90	18	37	10900
114.3	2500	250	315	125	18	27	17300	315	400	90	18	31	16700
139.7	2500	315	400	125	23	58	23700	400	500	90	23	58	24800
168.3	2500	355	400	125	23	63	33200	400	500	90	23	45	35100
219.1	3000	400	450	125	23	53	56000	450	560	90	23	66	57600
273.0	3000	450	500	125	41	81	81000	500	630	90	41	106	85700
323.9	3000	500	560	125	41	91	110700	560	710	90	41	153	121600
355.6	3000	560	630	125	64	101	130500	630	710	90	64	105	136500
406.4	3000	630	710	125	64	108	173800	710	800	90	64	119	179300

The compensators can be supplied with double expansion on request.

Version/03.2006.DK

HBXS

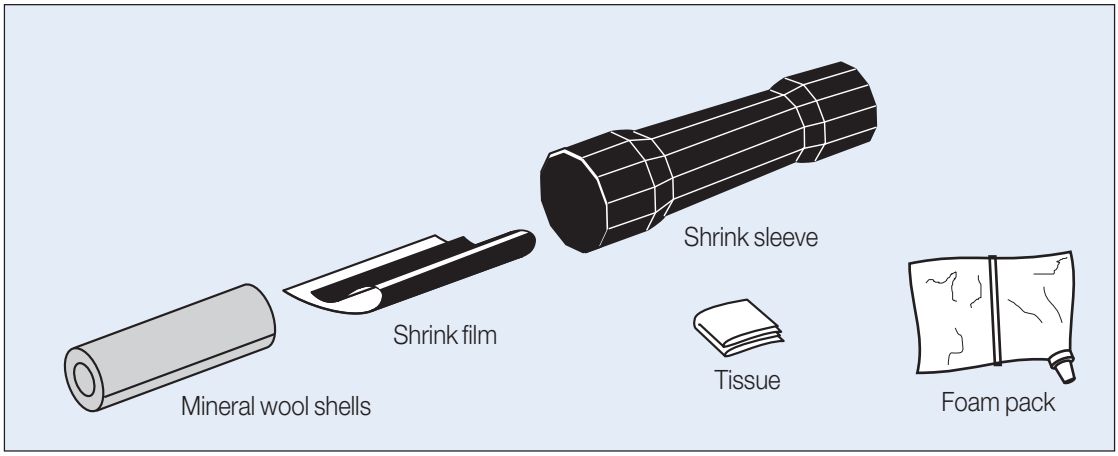
High temperature joint for foaming

HT3 components - Joints **5.3.1 - 1/1**

The HBXS joint consists of a half sleeve of mineral wool covered by foamed PUR insulation in an aluminium sleeve.

The joint is double sealed. Once the sleeves are fitted, a shrink film is applied as the initial seal. For further sealing of the joint and as a mechanically fixed jacket pipe joint, a thick walled PEX shrink sleeve is fitted using a hotmelt adhesive on both ends.

The HBXS joint can be used anywhere it has been established that soil friction can firmly hold the jacket pipe in place. See chapter 5.1.6.



Component no. 50111LC

DN	d, mm	L, mm	210°C series					250°C series				
			D, mm	S_M,mm	S_{PUR}, mm	PUR litre	Foam pack size	D, mm	S_M,mm	S_{PUR}, mm	PUR litre	Foam pack size
20	26.9	580	140	20	34	3.6	1	180	40	33	9.1	5
25	33.7	580	140	20	30	3.4	1	180	40	30	9.0	5
32	42.4	580	160	20	36	4.4	2	200	40	35	8.1	5
40	48.3	580	160	20	33	4.2	2	225	50	35	9.5	6
50	60.3	580	200	30	37	6	3	225	50	29	8.7	5
65	76.1	580	225	30	41	7.6	5	250	50	33	10.1	6
80	88.9	580	225	30	35	6.8	4	280	60	31	11.5	7
100	114.3	580	250	30	34	7.6	5	315	60	36	13.7	8
125	139.7	580	315	40	43	12.1	7	400	80	44	21.0	10

S_M : Mineral wool thickness in the insulation sleeve

S_{PUR}: PUR insulation thickness

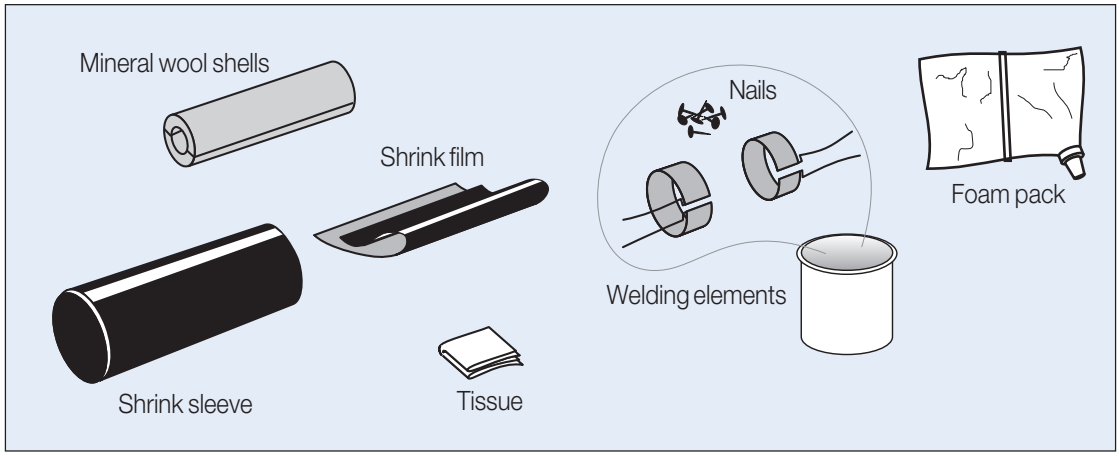
Version/03.2006.DK

HEW

High temperature joint for foaming

The HEW joint consists of mineral wool insulation covered by foamed PUR insulation in an aluminium sleeve. A shrink film is applied as the initial seal. A thick walled HDPE shrink sleeve is fitted to the joint for additional sealing in order to obtain a mechanically solid jacket pipe joint. The sleeve is welded at both ends using electrically-heated welding strips, making the joint tensile resistant and load carrying from one end to another.

The HEW sleeve should be used in instances where it cannot be ascertained that soil friction alone can hold the jacket pipe in place. See chapter 5.1.6.



Component no. 50111LC

HEW joint, standard

DN	d, mm	210°C series					250°C series				
		L, mm	D, mm	S_M, mm	PUR, litre	Foam pack size	L, mm	D, mm	S_M, mm	PUR, litre	Foam pack size
50	60.3	-	-	-	-	-	750	225	50	8.7	5
65	76.1	750	225	30	7.6	5	750	250	50	10.1	6
80	88.9	750	225	30	6.8	4	750	280	60	11.5	7
100	114.3	750	250	30	7.6	5	750	315	60	13.7	8
125	139.7	750	315	40	12.1	7	800	400	80	21.0	10
150	168.3	750	355	50	12.8	7	800	400	80	16.8	9
200	219.1	750	400	50	13.7	8	800	450	80	19.3	9
250	273	800	450	50	14.9	8	800	500	80	21.3	10
300	323.9	800	500	50	16.7	9	800	560	80	26.6	11
350	355.6	800	560	50	25.1	10	800	630	100	30.2	11
400	406.4	800	630	60	28.3	11	800	710	100	43.8	12

S_M : Mineral wool thickness in insulation sleeve

S_{PUR}: PUR insulation thickness

Version/03.2006.DK

HDHEC

High temperature end cap

The HDHEC end cap is designed to protect all pipe ends in the system against moisture and air seepage. All open pipe ends MUST be fitted with HT caps, as mistakes will reduce the thermal life of the system and no claims for deficiencies will be entertained.

HDHEC consists of:

- A cone of stainless steel that slots into the carrier pipe at one end and into the insulation between the mineral wool and the PUR at the other. The cone is welded to the carrier pipe.
- To insulate the cone from the carrier pipe, a half shell of mineral wool is positioned into the cone.
- The foam is protected by a cross-linked shrinkable termination which shrunks around the jacket and the cone.

HDHEC must never be insulated externally as this will cause an unacceptable temperature increase in the shrink-materials.

HDHEC can only tolerate a certain amount of expansion so the maximum distance from an HDHEC end cap to an anchor cannot exceed:

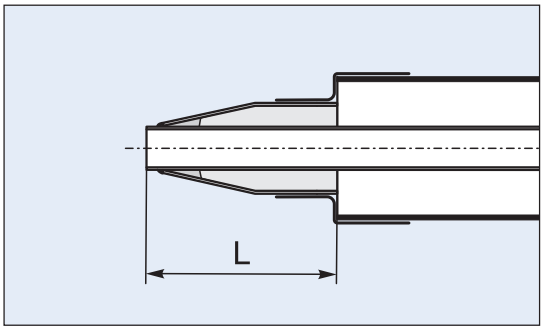
For black steel.

- 5 m in the 210°C series
- 3 m in the 250°C series

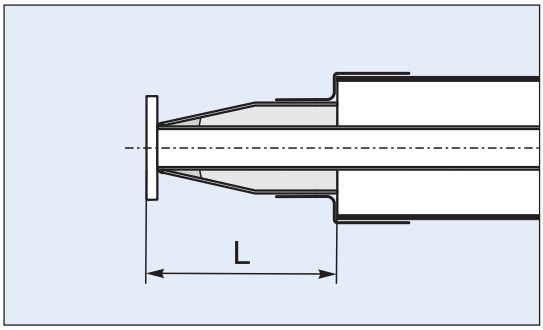
For stainless steel.

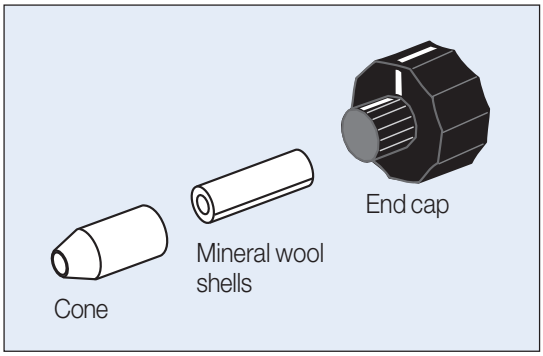
- 3 m in the 210°C series
- 2 m in the 250°C series

Example 1



Example 2





Component no. 55101L

Version/03.2006.DK

HDHEC

High temperature end cap

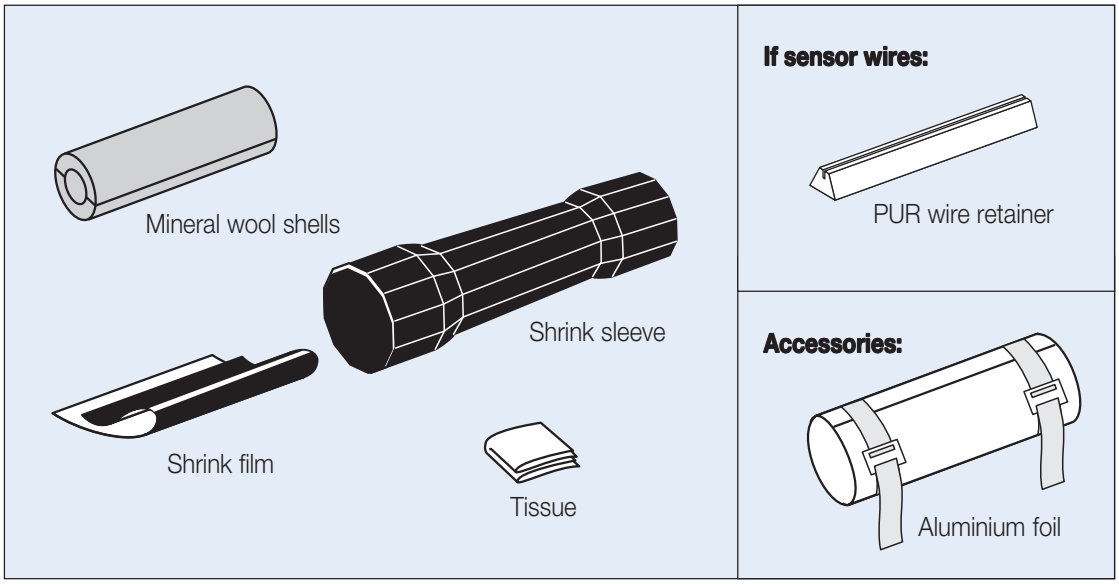
DN	d	Serie 210°C		Serie 250°C	
		D	L	D	L
20	26,9	140	175	180	175
25	33,7	140	195	180	195
32	42,4	160	205	200	205
40	48,3	160	215	225	215
50	60,3	200	215	225	215
65	76,1	225	235	250	235
80	88,9	225	235	280	235
100	114,3	250	235	315	235
125	139,7	315	255	400	255
150	168,3	355	255	400	255
200	219,1	400	275	450	275
250	273,0	450	425	500	425
300	323,9	500	455	560	455
350	355,6	560	485	630	485
400	406,4	630	515	710	515

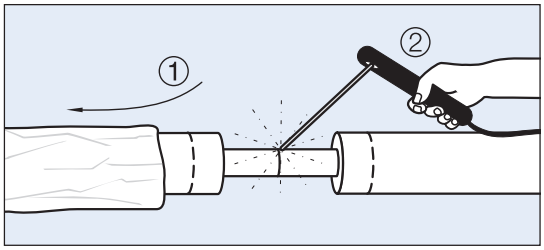
Version/03.2006.DK

HBXS

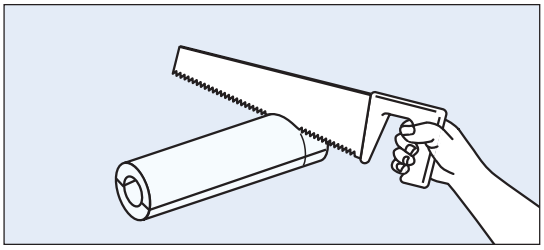
High temperature joint for foaming

HT3 installation 5.4.1 - 1/3

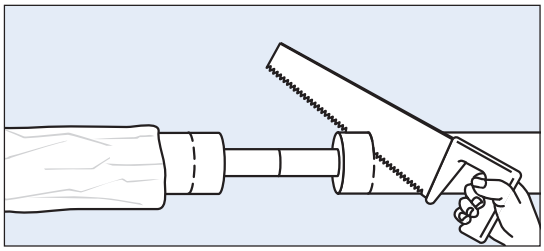




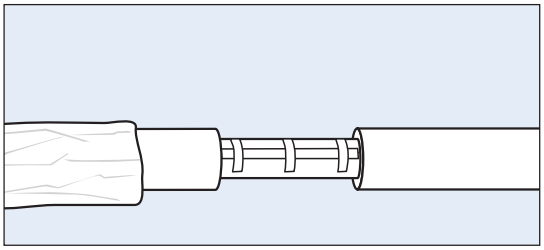
1. Place the shrink sleeve with packing on one of the pipes, before the carrier pipes are joined.



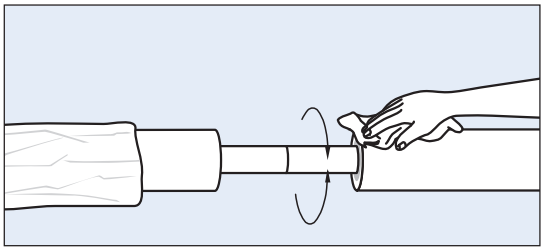
4. Shorten the mineral wool shells to make them fit tightly between the jacket pipes.



2. Cut the jacket pipes at the markings.



5. Fit the mineral wool shells tightly on the carrier pipe using adhesive tape to seal gaps.



3. Clean all surfaces in the mounting area.

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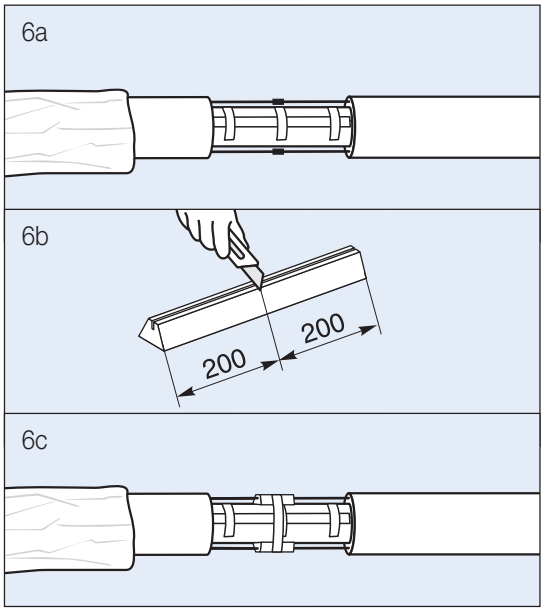
HBXS

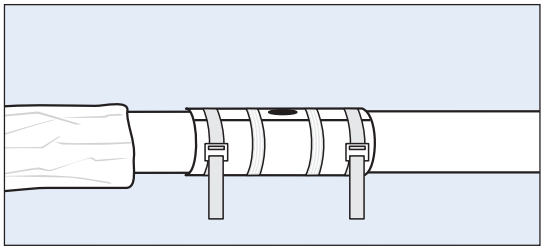
High temperature joint for foaming

HT3 installation 5.4.1 - 2/3

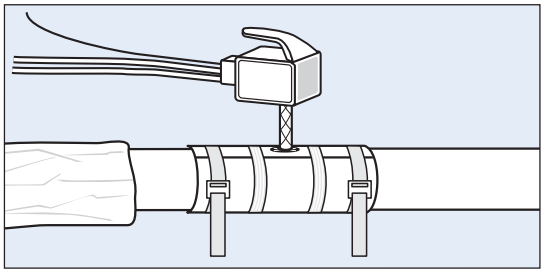


6. The following only applies for sensor wires:

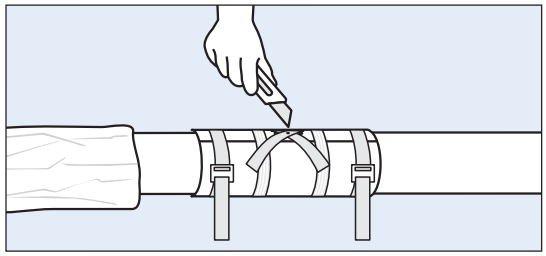
Connect the sensor wires according to the supplier's instructions. Divide the PUR wire retainer in 2 sections. Centre the wire retainers under the sensor wires and fasten them with canvas tape.



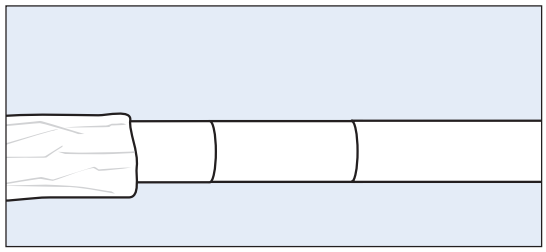
7. Centre the aluminium foil over the joint. Tighten the straps. Wind filament tape round the foil on both sides of the hole.



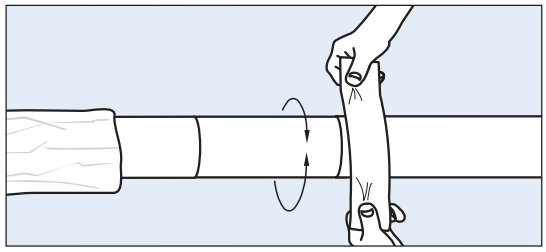
8. Foam the aluminium foil.



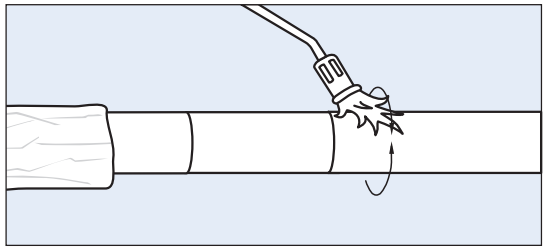
9. Close the opening with canvas tape. Prick a ventilation hole.



10. Wait minimum 30 minutes for degassing. Remove the aluminium foil.



11. Activate the jacket pipes with abrasive cloth grain size 80 at least 150 mm from both jacket ends.



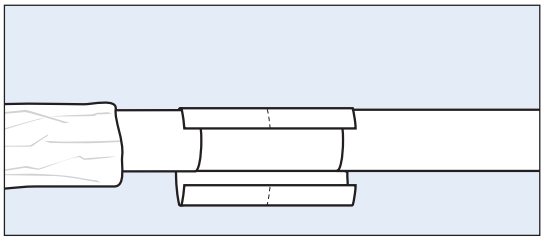
12. Activate the jacket pipes with a gas burner at least 150 mm from both jacket ends, until the surface has a matt, silky look.

Version/07.2005.DK

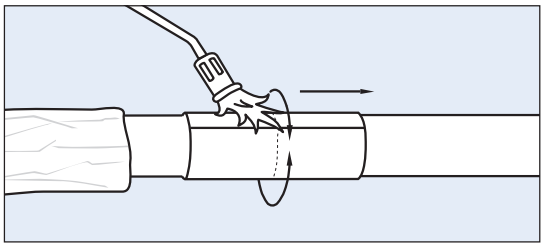
HBXS

High temperature joint for foaming

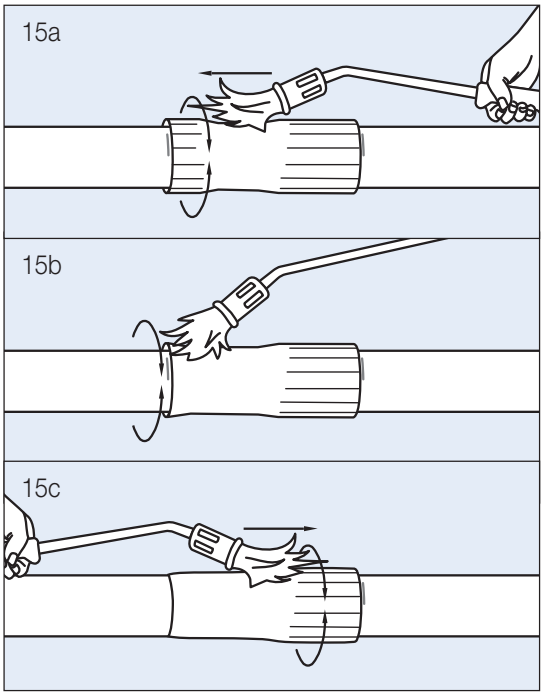
HT3 installation 5.4.1 - 3/3



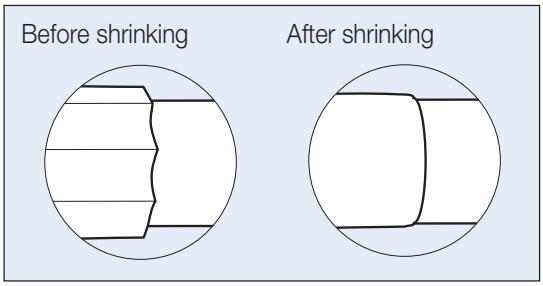
13. Place the shrink film so that the marking line encircles the pipe. Attach one edge of the shrink film at „10 o'clock" position. Pull the film around the pipe by removing the adhesive paper so that the film adheres to the surface beneath.



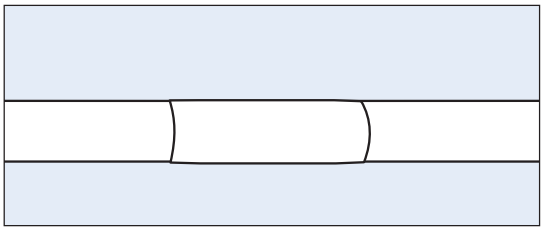
14. Heat the whole film from the centre outwards, ensuring that the mastic becomes visible at all edges and that the shrink film is tightly fitted.



15. Remove the packing from the shrink sleeve. Check that the sleeve is CLEAN and DRY, inside and out. Centre the shrink sleeve on the joint and mark it. First, shrink from the middle towards one end, then from the middle towards the other end. Avoid heating directly on the jacket.



16. Shrink until all expansion marks have vanished and the ends of the sleeve form a smooth encircling edge.



17. The joint is complete.

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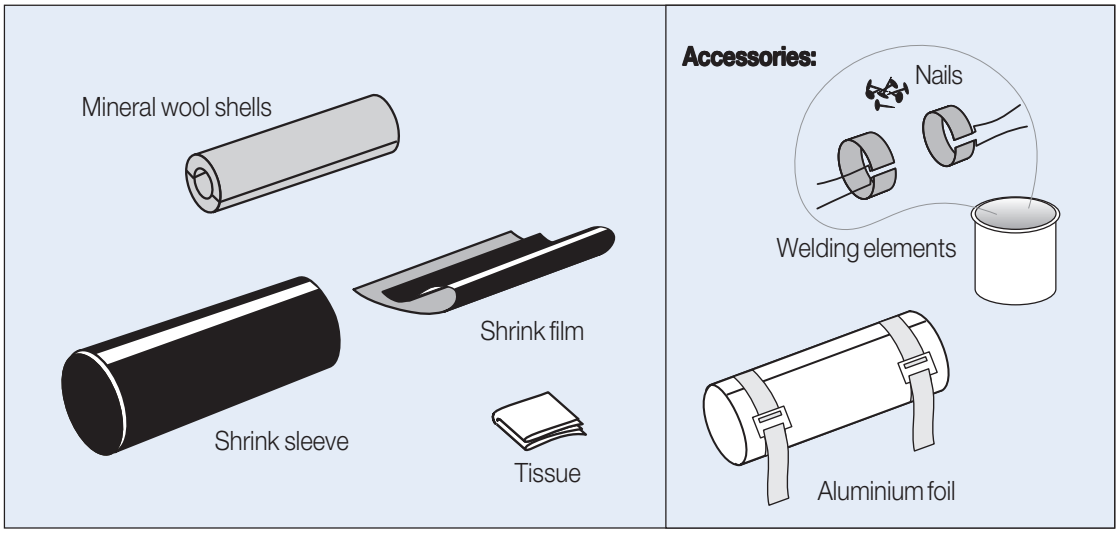
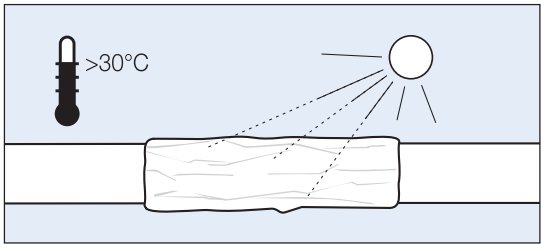
HEW

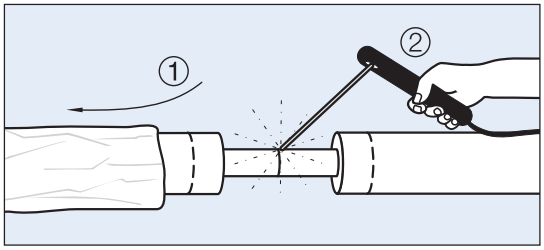
High temperature joint for foaming

HT3 installation 5.4.2 - 1/4

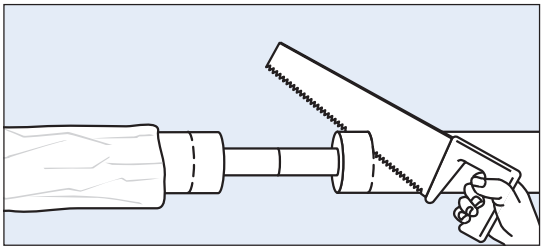




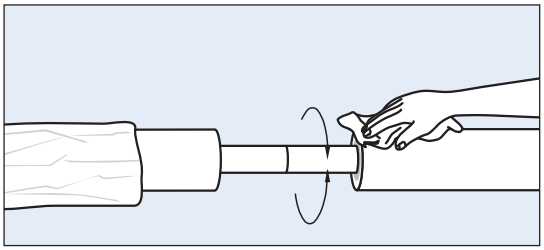
If the surrounding temperature is >30° or the shrinking sleeve is exposed to sunlight, the wrapping foil must remain on the pipeline until the shrinking sleeve has been shrunk. The shrink sleeve must be covered up with wrapping foil when it is not being processed.



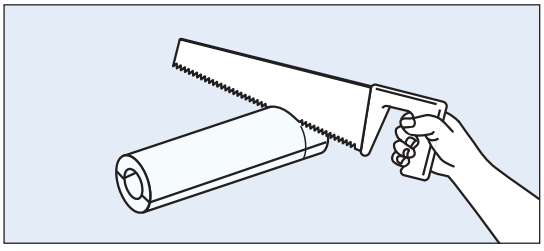
1. Place the shrink sleeve with packing on one of the pipes, before the carrier pipes are joined.



2. Cut the jacket pipes at the markings.



3. Clean all surfaces in the mounting area.



4. Shorten the mineral wool shells to make them fit tightly between the jacket pipes.

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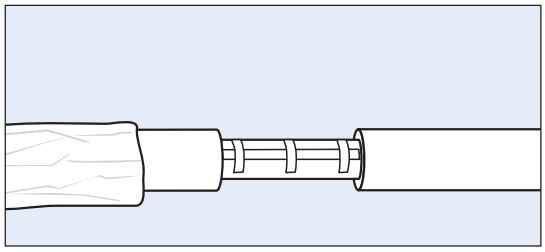
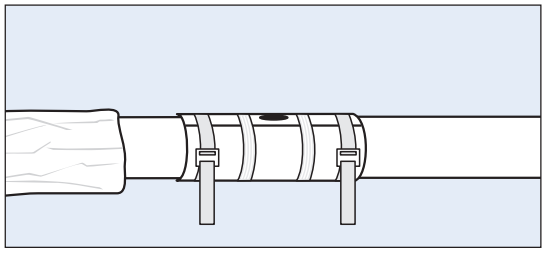
HEW

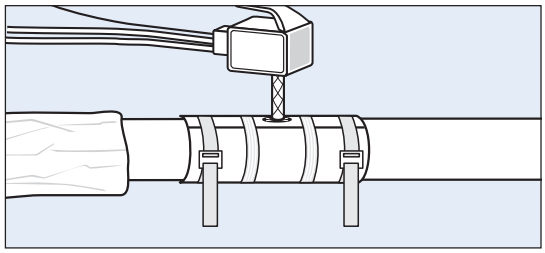
High temperature joint for foaming



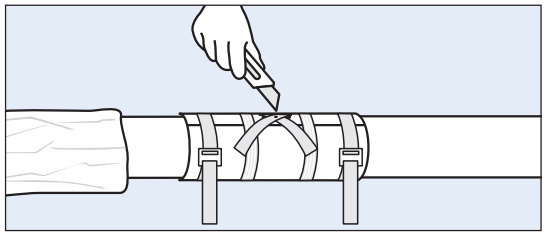
5. Fit the mineral wool shells tightly between the jacket pipes, using canvas tape if required.



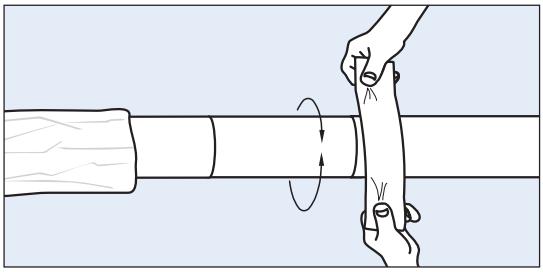
6. Centre the aluminium foil over the joint. Tighten the straps. Wind filament tape round the foil on both sides of the hole.



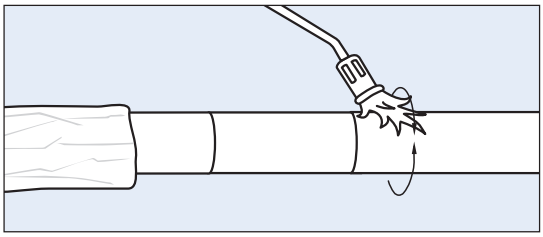
7. Foam the aluminium foil.



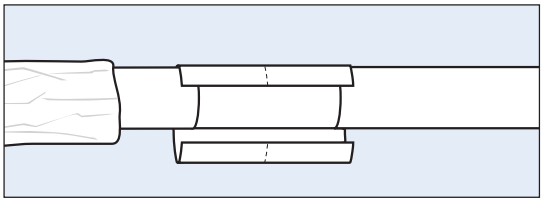
8. Close the opening with canvas tape. Prick a ventilation hole.



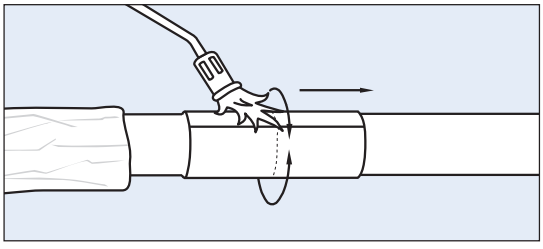
9. Wait minimum 30 minutes for degassing. Remove the aluminium foil. Activate the jacket pipes with abrasive cloth grain size 80 at least 150 mm from both jacket ends.



10. Activate the jacket pipes with gas burner at least 150 mm from both jacket ends, until the surface has a matt, silky look.



11. Place the shrink film so that the marking line encircles the pipe. Attach one edge of the shrink film at „10 o'clock" position. Pull the film around the pipe by removing the adhesive paper so that the film adheres to the surface beneath.



12. Heat the whole film from the centre outwards, ensuring that the mastic becomes visible at all edges and that the shrink film is tightly fitted.

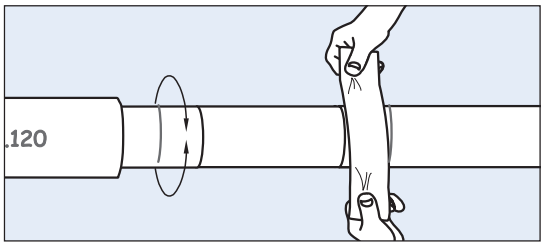
Version/07.2005.DK

HEW

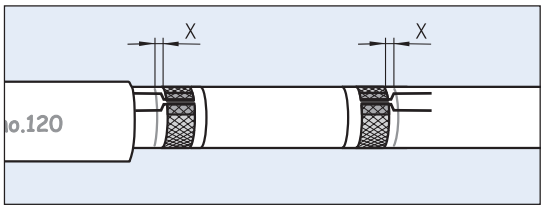
High temperature joint for foaming

HT3 installation 5.4.2 - 3/4

13. Remove the packing from the shrink sleeve. Do not use cutting tools. Leave the packing on the pipeline. Check that the sleeve is CLEAN and DRY, inside and out. Centre the sleeve over the jointing area. Mark the placing of the sleeve on the jacket pipes. Write the sleeve number on the sleeve. Fill in the documentation form.



14. Pull the sleeve away on the cleaned pipe end. Thoroughly activate the jacket pipes with abrasive cloth, grain size 36-40, exactly touching the marking.

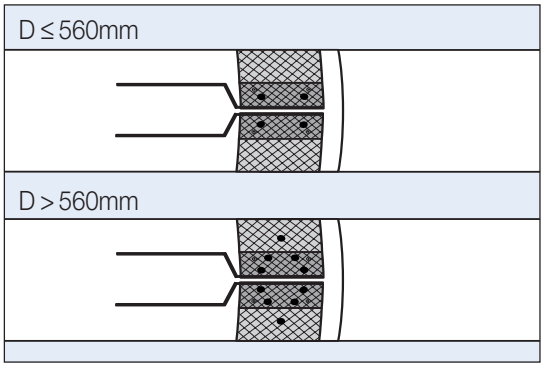


15. Mount the welding elements with the distance X to the marks.

D ≤ 560 mm ⇒ X = 20 mm.

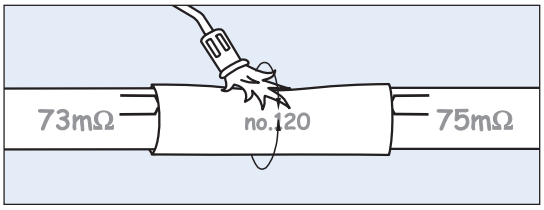
D > 560 mm ⇒ X = 30 mm.

Stretch the elements uniformly so that the element ends exactly do NOT touch.

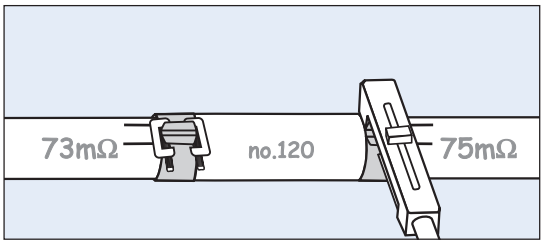


16. Mount the welding elements with nails as shown above and with a nail each 250 mm around the jacket pipes.

17. Place the sleeve between the marks. Write the joint number and resistance values for the welding element on the sleve/jacket pipes and in the documentation form.



18. Shrink the sleeve from the middle towards the ends. Shrink the sleeve until it is in full contact with welding elements, insulation and jacket pipe.



19. Mount clamps 5-10 mm over the sleeve ends. Press the clamps until the jacket pipe starts to deform (max. 0.1 mm). Keep the clamps tightly positioned by using a clamping tool.

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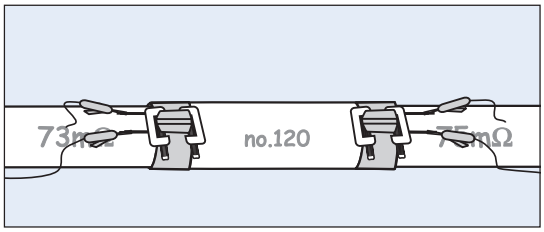
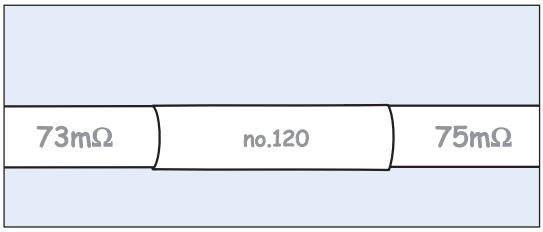
HEW

High temperature joint for foaming



20. Adjust the cutoff voltage on the welding machine for each welding element according to the actual welding parameters. Mount the welding clips at the tip of the terminal wires. Start welding. After completed welding wait until the sleeve is hand-warm, at least 30 minutes. Wait until the clamps are handwarm underneath, before they are removed.



21. Check the joint.

Criteria for approval of EW joint:

- No visible welding elements
- No severe local melt out
- No deformation

After approval of the joint, cut off the terminal wires at the joint edge.

The joint is complete.

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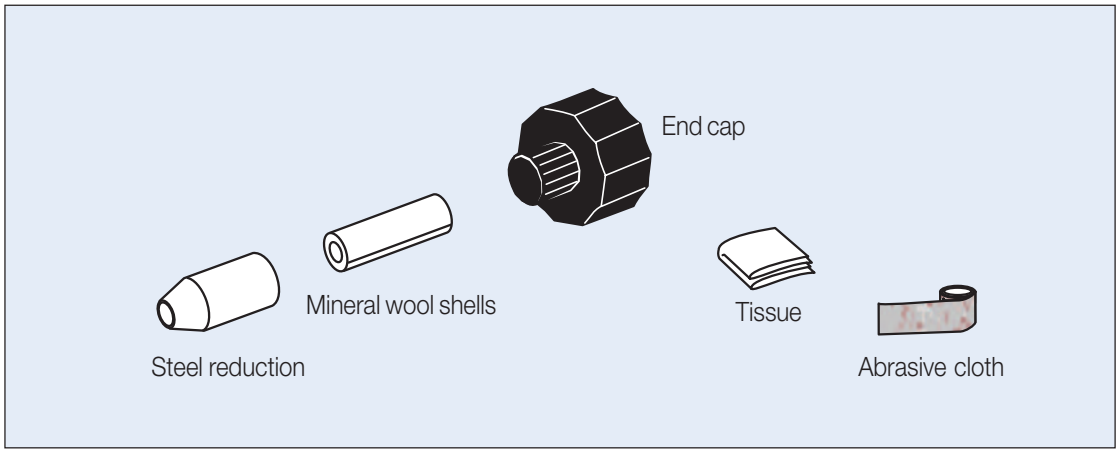
HDHEC

High temperature end cap

HT3 installation **5.4.3 - 1/3**



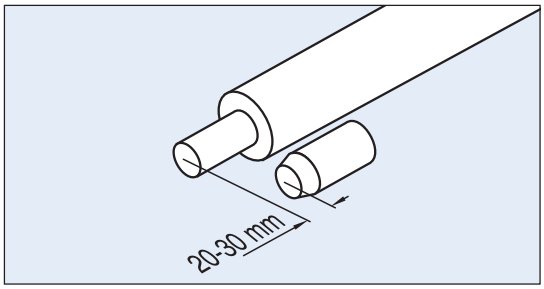
Important:

Never apply heat to creases, if any, since the material will be discoloured and the surface will crack.

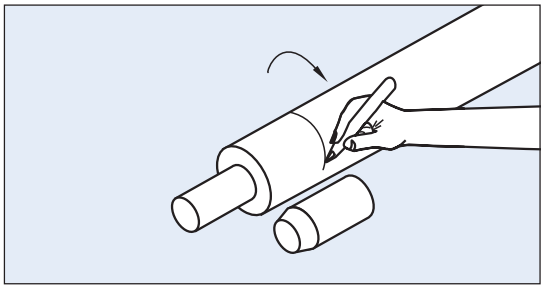
Never apply heat underneath the end cap, as this may damage the end cap permanently.

Pockets of air under the end cap can be removed by bending a piece of welding wire into U-shape and pushing it underneath the end cap while it is still warm.

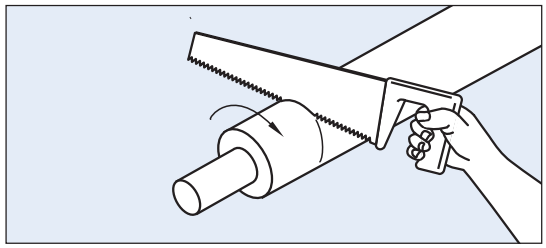
Use burner head dia. 51 mm for all dimensions.



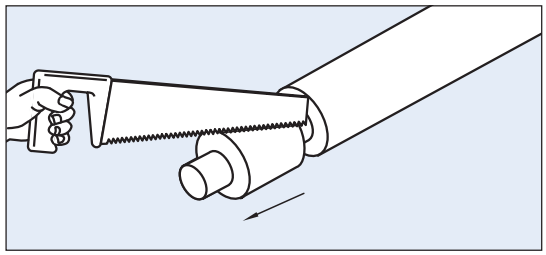
1. Place the steel reduction 20-30 mm from the steel pipe end.



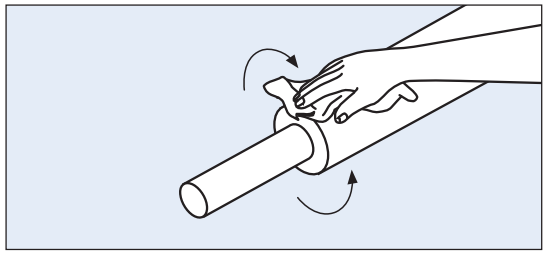
2. Mark the length of the steel reduction on the jacket.



3. Cut the jacket and insulation using the marks as a guide.



4. Cut lengthwise through the jacket and remove jacket and insulation material.



5. Clean all surfaces in the mounting area.

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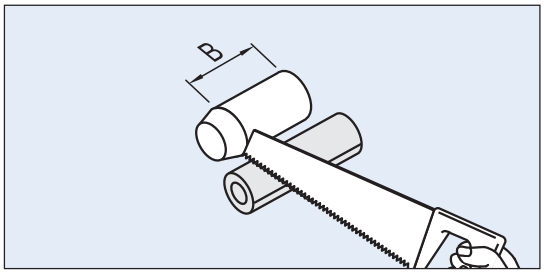
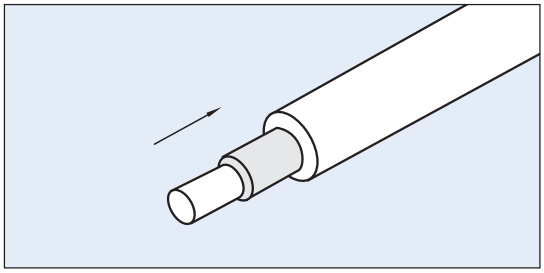
HDHEC

High temperature end cap

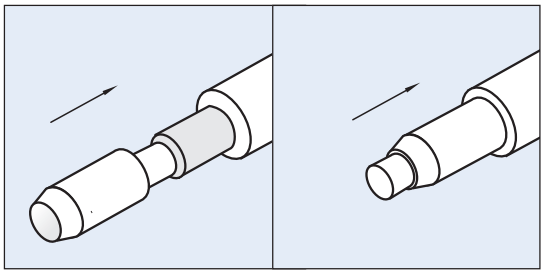
HT3 installation 5.4.3 - 2/3



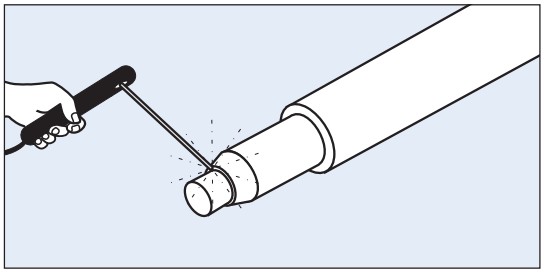
6. Adjust the mineral wool shells to the length (B) of the steel reduction.



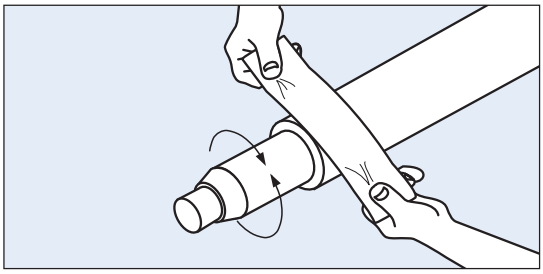
7. Place the mineral wool shells on the carrier pipe as close to the PUR insulation as possible.



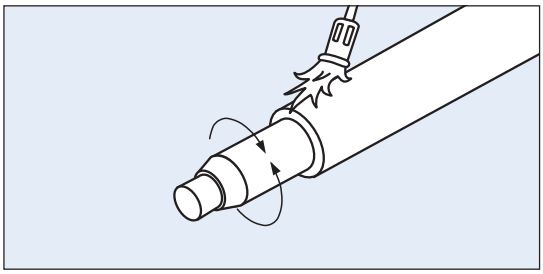
8. Pull the steel reduction onto the carrier pipe and the mineral wool shells. The steel reduction is placed correctly when it is in contact with the PUR insulation.



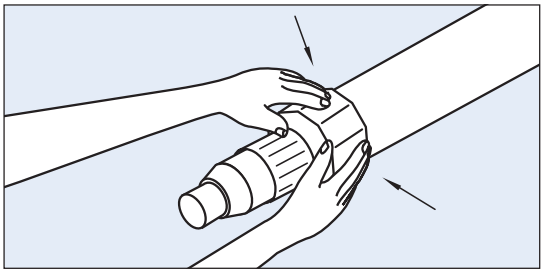
9. Weld the steel reduction to the carrier pipe. The welding has to be tightly.



10. Activate the steel reduction and the jacket pipe with abrasive cloth grain size 80 at least 60 mm from the end of the jacket pipe.



11. Activate the steel reduction and the jacket with gas burner at least 60 mm from the end of the jacket pipe until the jacket surface has a matt, silky look.



12. Remove the foil inside the end cap. Check that it is CLEAN and DRY, inside and out. Pull the end cap onto the steel reduction and jacket.

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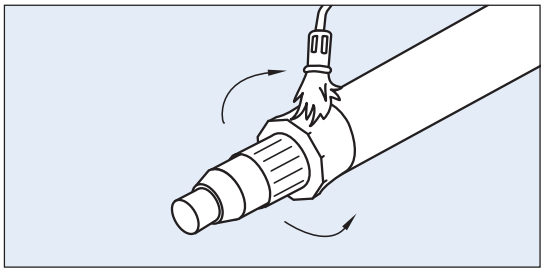
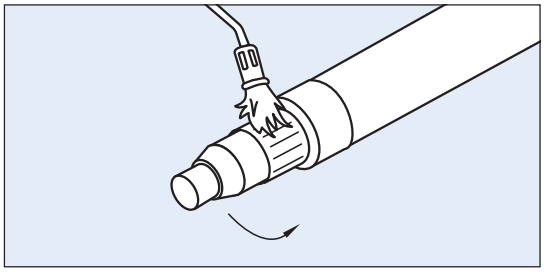
HDHEC

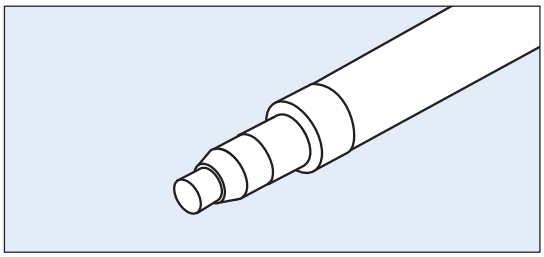
High temperature end cap



13. Start shrinking the end cap onto the jacket pipe only. DO NOT YET shrink the edge of the end cap nor the end surface onto the jacket pipe. The flame must be held at a right angle to the pipe surface.



14. After a pause of approx. 3 min. shrink the end cap onto the steel reduction and at the same time the edge of the end cap and the end surface onto the jacket pipe. The flame must be held at a right angle to the pipe surface.



15. The end cap is complete when the sealing becomes visible on the steel reduction and the end cap is smooth.

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