

## The bonded pipe system

### Overview

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**Introduction** This section contains a description of the preinsulated single pipes which LOGSTOR offers.

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**Alternatives** Pipes in other dimensions and according to other specifications can be delivered as special orders.

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## The bonded pipe system

### Material specifications

#### Application

The pipe system is a complete transmission and distribution system for district heating.

All specifications in section 2 of this catalogue are based on:

Max. operating pressure = 25 bar. The pressure class for large T-pieces of standard design may however be lower. If needed, please contact our Technical Department.

Max. temperature difference when following the design instructions:  $\Delta t = 130^{\circ}\text{C}$

Continuous operating temperature =  $140^{\circ}\text{C}$

Max. temperature (short) =  $150^{\circ}\text{C}$ .

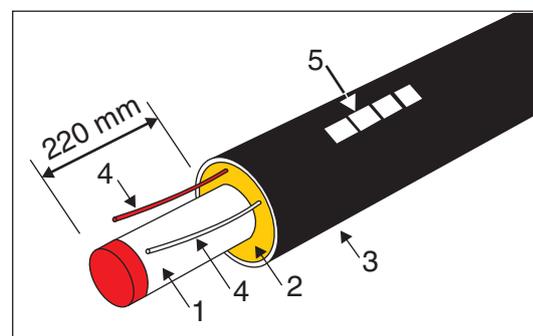
Max. external temperature load (outer casing) =  $50^{\circ}\text{C}$

In connection with other conditions please contact LOGSTOR's Technical Department.

#### Description

A preinsulated pipe consists of:

Pos.	Part	Material
1	Service pipe	Steel
2	Insulation	Polyurethane foam
3	Outer casing	Polyethylene, PE-HD
4	Two 1.5 mm <sup>2</sup> copper wires for surveillance	One wire is tinned
5	Pipe label	



#### Production methods

LOGSTOR uses various production methods to manufacture pipes which all comply with EN 253, but still have different application properties.

Traditionally foamed pipes are manufactured by injecting the insulating foam between the service pipe and the outer casing, which is produced in another process. In this process one pipe is manufactured at a time. Minor differences between the pipes may occur.

The process applies to all pipe dimensions.

In the axial conti process pipes are made by casting the insulation onto the service pipe in a moving mould, after which the casing is extruded onto the insulation. The production takes place in a continuous process.

An effective diffusion barrier foil, preventing diffusion of insulating gases is embedded between the insulation and the casing.

Consequently, continuously produced pipes with diffusion barrier foil do not age.

The method is used for pipes with casing dimensions  $\varnothing 90 - \varnothing 315$  mm.

The total heat loss over a 30 years' period is 10-25% lower than that of a corresponding, traditional pipe. The smallest dimensions yield the greatest savings.

In the spiral conti process the insulation is sprayed onto the service pipe or it is cast in a mould around the outer casing, after which the casing is extruded onto the insulation in a spiral movement.

The method applies to casing dimensions  $\varnothing 355 - \varnothing 1200$  mm. They are available with diffusion barrier foil as special products.

## The bonded pipe system

### Material specifications

<b>Steel pipes</b>	<p>Dimensions and tolerances: Standard pipes:</p> <p>Melt analysis (max. %): Yield stress: Ultimate stress: Elongation at break: Weld factor: Inspection certificate: Bevelling: Surface quality:</p>	<p>According to EN 253 Longitudinally or spirally welded, P235TR1, P235TR2 according to EN 10217-1 or P235GH according to EN 10217-2 or EN 10217-5 <math>C_{\max}</math> 0,16; <math>P_{\max}</math> 0,025; <math>S_{\max}</math> 0,020; <math>Mn_{\max}</math> 1,20; <math>Si_{\max}</math> 0,35 Min. 235 N/mm<sup>2</sup> 360-500 N/mm<sup>2</sup> Min. 23% <math>V = 1.0</math> EN 10204 - 3.1 EN ISO 9692-1 All pipes are centrifugally cleaned with steel sand in order to ensure an optimum adhesion between pipe and insulation.</p>
<b>Insulation</b>	<p>Polyurethane foam:</p> <p>Blowing agent: Thermal conductivity:</p>	<p>Properties: Minimum as required in EN 253. Calculated continuous operating temperature (CCOT): &gt; 140° C for 30 years. Max. short-term operating temperature: 150° C. Cyclopentane. - Traditionally manufactured pipes (50°C): 0.027 W/m K.* - Axial conti pipes (50°C): 0.023 W/m K.* - Spiral conti pipes (50°C): 0.026 W/m K. *) These lambda values are based on an average of the continuous measurements. The updated values are always included in the calculation program "Calculator". See <a href="http://www.logstor.com/Calculator">www.logstor.com/Calculator</a>.</p>
<b>Outer casing</b>	<p>Polyethylene:</p> <p>Thermal stability:</p> <p>Resistance against crack formation:</p> <p>Internal surface treatment:</p>	<p>PE-HD, bimodal (Minimum PE 80, ISO 12162). Properties: Minimum as required in EN 253. All parts are fully weldable within the melt flow index: MFR variation ≤ 0.5 g/10 min. Calculated continuous surface temperature ≥ 50° C for 30 years. Oxydation induction time (OIT): &gt; 30 min. at 210° C. Slow crack formation (notch sensitivity) &gt; 2000 h (notch, 4 MPa, 80°, EN 253). Rapid crack propagation, RCP (cold sensitivity) &gt; 5 bar (0° C, ISO 13477). All traditionally produced outer casings are corona-treated during production. This ensures an optimum adhesion between outer casing and insulation. As for conti pipes the adhesion takes place automatically during the production process.</p>

## The bonded pipe system

### Material specifications

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#### Finished pipes

All pipes are as a minimum produced according to EN 253, but with a wider field of application:

The calculated continuous operating temperature has been increased to 140° C for 30 years.

The maximum short peak operating temperature has been increased to 150° C.

The calculated continuous surface temperature has been increased to 50° for 30 years.

Free service pipe end: 220 ± 10 mm

Lengths delivered: 6, 12, and 16 m

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#### Surveillance system

The pipes are supplied with 2 copper wires, embedded in the insulation, Nordic System.

Wires: 1.5 mm<sup>2</sup> copper wires (one is tinned)

Distance to steel pipe: 15 mm

Position in top: ± 3-20 cm from 12 o'clock position

The embedded copper wires are the backbone of the electronic surveillance systems which is available for most of our pipe systems.

See description in section 16 of this catalogue.

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## The bonded pipe system

### District heating pipes - Insulation series 1

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#### Application

Preinsulated pipes of insulation series 1 are used for all common construction works where it is not necessary to make allowance for e.g. extreme outside temperature influences, especially high energy prices etc.

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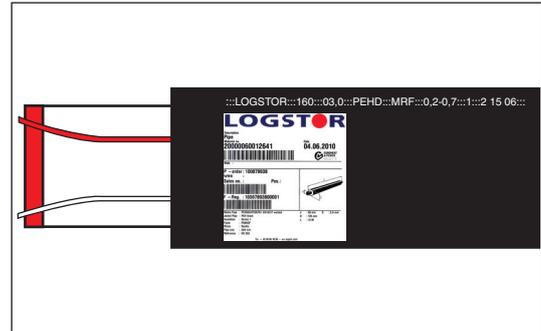
#### Description

A preinsulated pipe of insulation series 1 can be immediately identified by its pipe label, from which other data also appear, see page 1.3.0.2.

All preinsulated pipes are delivered with embedded copper wires for surveillance.

The dimensions  $\varnothing 26.9/90$  -  $\varnothing 219.1/315$  mm are available with diffusion barrier. See page 2.0.1.1.

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## The bonded pipe system

### District heating pipes - Insulation series 1

#### Component overview/data

Component No. 2000

Steel pipe			Outer casing			Pipe			Water content
ø nom. mm	ø out. mm	Wall thick. mm	ø out. mm	Wall thick. mm	6 m pipe	12 m pipe	16 m pipe	Weight kg/m	l/m
20	26.9	2.6	90	3.0	x	x		2.9	0.4
25	33.7	2.6	90	3.0	x	x		3.3	0.6
32	42.4	2.6	110	3.0	x	x		4.2	1.1
40	48.3	2.6	110	3.0	x	x		4.6	1.5
50	60.3	2.9	125	3.0	x	x		6.1	2.3
65	76.1	2.9	140	3.0	x	x		7.5	3.9
80	88.9	3.2	160	3.0	x	x		9.4	5.3
100	114.3	3.6	200	3.2	x	x	x	14	9.0
125	139.7	3.6	225	3.4	x	x	x	16	14
150	168.3	4.0	250	3.6	x	x	x	21	20
200	219.1	4.5	315	4.1	x	x	x	31	35
250	273	5.0	400	4.8	x	x	x	45	54
300	323.9	5.6	450	5.2		x	x	58	77
350	355.6	5.6	500	5.6		x	x	66	93
400	406.4	6.3	520*	5.7		x	x	79	120
450	457	6.3	560	6.0		x	x	88	160
500	508	6.3	630	6.6		x	x	100	190
600	610	7.1	780*	7.8		x	x	140	280
700	711	8.0	900	8.7		x	x	180	380
800	813	8.8	1000	9.4		x	x	230	500
900	914	10.0	1100	10.2		x	x	280	630
1000	1016	11.0	1200	11.0		x	x	340	780
1100	1118	11.0	1300	11.8		x	x	378	943
1200	1219	12.5	1400	12.5		x	x	460	1120

\*) The dimensions ø 520 and 780 mm do not comply with the dimensional range, recommended in EN 253.

They are specially produced to optimise the insulation thickness of the dimensional range. As an alternative the dimensions ø 560 and 800 mm, recommended in EN 253 may be delivered to order.

## The bonded pipe system

### District heating pipes - Insulation series 2

#### Application

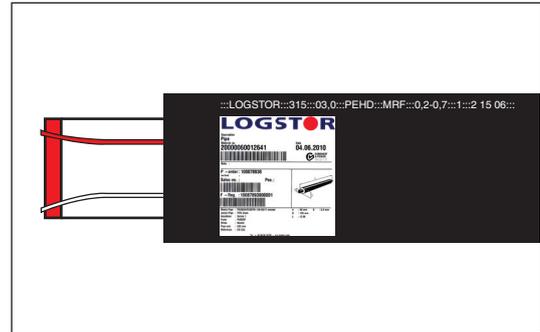
Preinsulated pipes with extra insulation thickness, series 2, are used where there are special temperature conditions such as constant low ambient temperatures, constant high media temperatures, demand for slow cooling at shutdown, high production costs on the energy side etc.

#### Description

A preinsulated pipe of insulation series 2 can be immediately identified by its pipe label, from which other data also appear, see page 1.3.0.2.

All preinsulated pipes are delivered with embedded copper wires for surveillance.

The dimensions  $\varnothing$  26.9/110 -  $\varnothing$  168.3/280 mm are available with diffusion barrier. See page 2.0.1.1.



#### Component overview/data

Component No. 2000

Steel pipe			Outer casing		Pipe			Water content	
$\varnothing$ nom. mm	$\varnothing$ out. mm	Wall thick. mm	$\varnothing$ out. mm	Wall thick. mm	6 m pipe	12 m pipe	16 m pipe	Weight kg/m	l/m
20	26.9	2.6	110	3.0	x	x		3.3	0.4
25	33.7	2.6	110	3.0	x	x		3.7	0.6
32	42.4	2.6	125	3.0	x	x		4.6	1.1
40	48.3	2.6	125	3.0	x	x		5.0	1.5
50	60.3	2.9	140	3.0	x	x		6.5	2.3
65	76.1	2.9	160	3.0	x	x		8.0	3.9
80	88.9	3.2	180	3.0	x	x		10	5.3
100	114.3	3.6	225	3.4	x	x	x	15	9.0
125	139.7	3.6	250	3.6	x	x	x	18	14
150	168.3	4.0	280	3.9	x	x	x	23	20
200	219.1	4.5	355	4.5	x	x	x	34	35
250	273	5.0	450	5.2	x	x	x	49	54
300	323.9	5.6	500	5.6		x	x	63	77
350	355.6	5.6	520*	5.7		x	x	68	93
400	406.4	6.3	560	6.0		x	x	83	120
450	457	6.3	630	6.6		x	x	97	160
500	508	6.3	710	7.2		x	x	110	190
600	610	7.1	800	7.9		x	x	140	280

\*) See footnote page 2.0.2.2.

## The bonded pipe system

### District heating pipes - Insulation series 3

**Application**

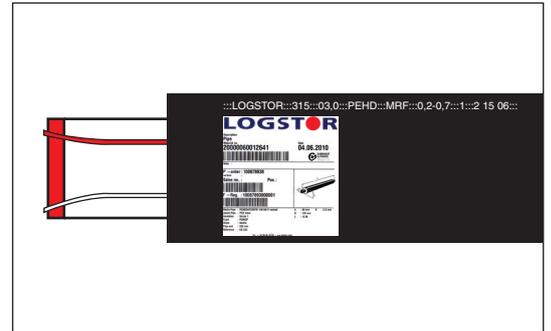
Preinsulated pipes with extra much insulation thickness, series 3, are used where there are special temperature conditions such as constant low ambient temperatures, constant high media temperatures, demand for slow cooling at shutdown, high production costs on the energy side etc.

**Description**

A preinsulated pipe of insulation series 3 can be immediately identified by its pipe label, from which other data also appear, see page 1.3.0.2.

All preinsulated pipes are delivered with embedded copper wires for surveillance.

The dimensions  $\varnothing$  26.9/125 -  $\varnothing$  168.3/315 mm are available with diffusion barrier. See page 2.0.1.1.



**Component overview/data**

Component No. 2000

Steel pipe			Outer casing					Pipe	Water content
$\varnothing$ nom. mm	$\varnothing$ out. mm	Wall thick. mm	$\varnothing$ out. mm	Wall thick. mm	6 m pipe	12 m pipe	16 m pipe	Weight kg/m	l/m
20	26.9	2.6	125	3.0	x	x		3.7	0.4
25	33.7	2.6	125	3.0	x	x		4.1	0.6
32	42.4	2.6	140	3.0	x	x		5.0	1.1
40	48.3	2.6	140	3.0	x	x		5.4	1.5
50	60.3	2.9	160	3.0	x	x		7.0	2.3
65	76.1	2.9	180	3.0	x	x		8.6	3.9
80	88.9	3.2	200	3.2	x	x		11	5.3
100	114.3	3.6	250	3.6	x	x	x	16	9.0
125	139.7	3.6	280	3.9	x	x	x	19	14
150	168.3	4.0	315	4.1	x	x	x	25	20
200	219.1	4.5	400	4.8	x	x	x	38	35
250	273	5.0	500	5.6	x	x	x	54	54
300	323.9	5.6	520*	5.7		x	x	65	77
350	355.6	5.6	560	6.0		x	x	72	93
400	406.4	6.3	630	6.6		x	x	92	120
450	457	6.3	710	7.2		x	x	110	160
500	508	6.3	780*	7.9		x	x	120	190

\*) See footnote page 2.0.2.2.

## The bonded pipe system

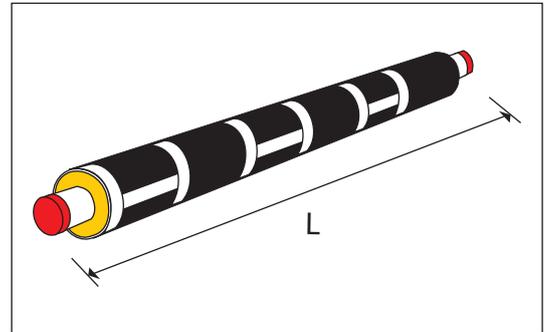
### District heating pipes - Zebra pipe

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**Application** Zebra pipes are used to facilitate the removal of insulation when adjusting pipe lengths.

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**Description** Depending on the length of the pipe the zebra pipe is divided into sections of 0.5 - 1.5 m, marked with transverse tape. Every second section has no adhesion between the insulation and the service pipe. These sections are marked with longitudinal tape.



**Materials** Zebra pipes are produced according to the same specifications as other straight pipes.

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**Component No./** Component No. 2490.

**data** The pipes are available in 6, 12 and 16 m lengths.  
The dimensions of insulation series 1, 2 and 3 are the same as for straight pipes.  
Max. steel pipe dimension is  $\varnothing$  508 mm.

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