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System description

1. General

CASAFLEX district heating pipe is the registered trade name for a flexible house connection pipe from BRUGG Pipe Systems. It is ideal for use in small and midsize district and local heating networks, in industrial and agricultural applications and in solar collector plants and swimming pool installations.

CASAFLEX district heating pipe has a spiral-corrugated carrier pipe made of stainless steel. The design of the corrugated pipe takes account of factors related to fluid dynamics.

The thermal insulation is positioned below the PE-LD casing pipe and consists of a CFC-free, flexible PIR rigid foam (polyisocyanurate foam) with excellent heat insulation properties; a barrier film to impede diffusion of the cellular gases.

The bending capability of CASAFLEX district heating pipe ensures easy adaptation to virtually all pipe routing conditions. It is possible to pass over or under existing supply pipes, and obstacles are easily bypassed.

With CASAFLEX district heating pipe, users can choose the shortest pipe route without considering the classical method of pipe construction.

CASAFLEX district heating pipe is delivered to the site in coils or on drums in the required lengths. The pipe can generally be laid in the ground without joints. This means that the pipe trench can be considerably narrower. This in turn allows considerable savings on underground work. When one considers the very short time required for installation, CASAFLEX district heating pipe is not only a technically perfect solution but also the key to saving time and expense when setting up district heating networks. Less coordination is required on site and the pipes are laid simply and quickly.

The physical characteristics of the spiral-corrugated carrier pipe enable it to be laid without having to consider thermal expansion.

Fitting the connectors is a very simple procedure. The connections are fitted quickly and securely with simple components.

The use of alignment rails and/or bending machines is recommended as installation assistance for the laying process of the CASAFLEX district heating pipes.

2. Range of use

Max. temp. for continuous operation T_{Bmax}	160 °C*
Max. Peak temperature T_{max}	180 °C
Max. permitted operating pressure	PN 16 to PN 25
* Type 60+60/182 T_{max}	130 °C

System description

1. Carrier pipe

Materials	Corrugated carrier pipe made of nickel chromium steel X5 CrNi 18-10 (1.4301, AISI 304) or X2 CrNiMo 17-12-2 (1.4404, AISI 316L)
Requirements:	Steel quality to EN 10088

2. Thermal insulation

Material:	CFC-free, cyclopentane-blown polyisocyanurate rigid foam (PIR) with λ_{50} value: 0.025 W/mK.
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PIR insulation	Reference temperature °C	CASAFLEX value	Test standard
Density	-	> 60 kg/m ³	DIN 53420
Thermal conductivity	50	≤ 0.025 W/mK	DIN 52612
Percentage of closed cells	-	≥ 90 %	EN 253
Water absorption after 24 hours	-	≤ 10 %	EN 253

3. Expanded metal mesh

Material:	Steel
Purpose:	Mechanical reinforcement of the flexible pipe system

4. Barrier film

Material:	Multiple-layer composite film
Purpose:	To impede diffusion of the cyclopentane cellular gas

5. Protective casing

Material:	Low-density polyethylene (PE-LD), seamlessly extruded
Purpose:	Protection against mechanical action and humidity

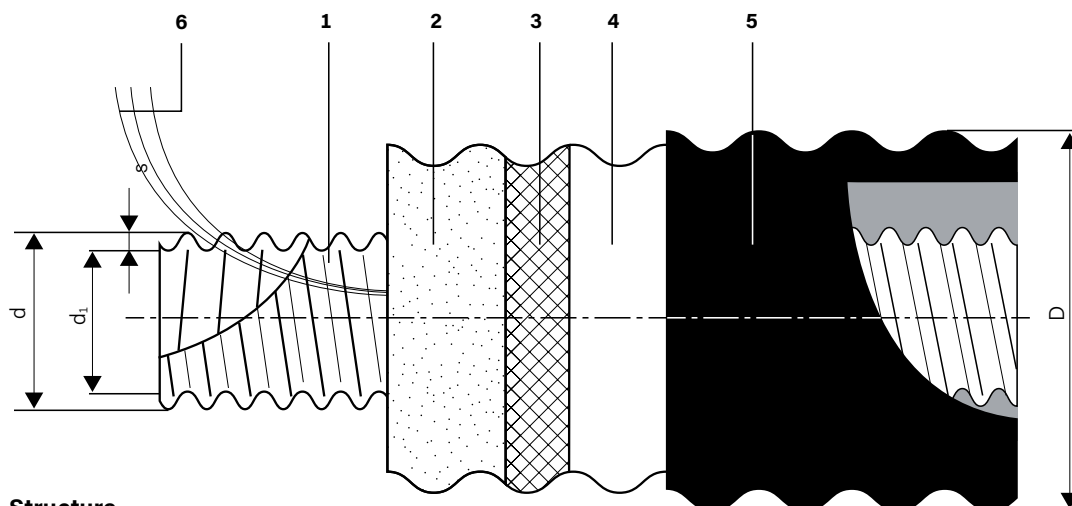
PE-LD protective casing	Reference temperature °C	Value	Test standard
Density	-	931 kg/m ³	ISO 1183
Thermal conductivity	-	0.43 W/mK	DIN 52612
Crystallite melting range	-	122 °C	ISO 11357-3

6. Monitoring wires

Materials:	1 x NiCr, red, insulated/perforated (Ø 0.5 mm without insulation) 1 x Cu, green, insulated (Ø 0.8 mm without insulation) 1 x Cu, white with nonwoven (Ø 1.13 mm without insulation)
Systems:	Conductor pairs: NiCr-red + Cu-green $\hat{=}$ WIREM/Brandes system Cu-green + Cu-white $\hat{=}$ Nordic system
Purpose:	Identification and location of moisture by means of resistance or pulse measurements

CASAFLEX UNO range

Heating, 16 to 25 bar



Structure

- 1 Stainless steel carrier pipe
- 2 PIR foam
- 3 Expanded metal mesh
- 4 Barrier film
- 5 PE-LD casing
- 6 Monitoring wires

CASAFLEX UNO

Type	DN	Inches	Inner pipe d x d ₁ x s	Outer casing D	Minimum Bending radius	Volume Inner pipe	Weight	Maximum delivery lengths			
								Coil ¹⁾	Coil ²⁾	Coil ³⁾	Coil ⁴⁾
		"	mm	mm	m	l/m	kg/m	m	m	m	m
22/ 91	20	¾	25 x 22 x 0.3	91	1.0	0.44	1.30	320	480	560	810
30/111	25	1	34 x 30 x 0.3	111	1.0	0.80	1.93	205	290	360	500
39/126	32	1¼	44 x 39 x 0.4	126	1.2	1.35	2.60	155	230	280	340
48/126	40	1½	55 x 48 x 0.5	126	1.2	2.04	2.92	155	230	280	340
60/142	50	2	66 x 60 x 0.5	142	1.5	3.12	3.54	100	150	200	300
75/162	65	2½	86 x 75 x 0.6	162	1.8	5.12	4.80	55	100	145	190
98/162	80	3	109 x 98 x 0.8	162	2.0	8.43	5.70	55	100	145	190
127/202	100	4	143 x 127 x 0.9	210	2.8	14.30	8.80	-	40	-	75

s = Material strength/Wall thickness

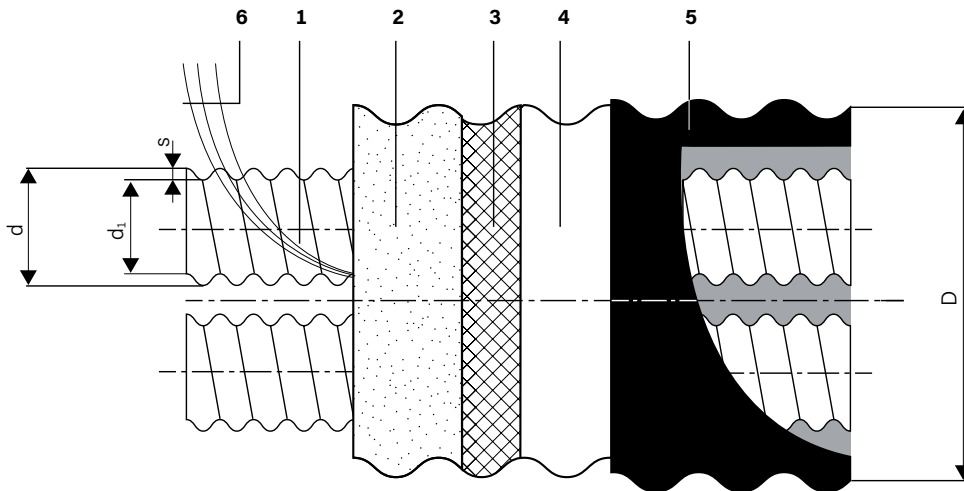
- 1) Coil dimensions Ø 2800 x 800 mm (width)
- 2) Coil dimensions Ø 2800 x 1200 mm (width)
- 3) Coil dimensions Ø 3000 x 1200 mm (width)
- 4) Coil dimensions Ø 3000 x 1600 mm (width) **just ex work Wunstorf**

Supplied in drums on request

Please note the total weight of the coil when ordering for construction site deliveries.

CASAFLEX DUO range

Heating, 16 bar



Structure

- 1 Stainless steel carrier pipe
- 2 PIR foam
- 3 Expanded metal mesh
- 4 Barrier film
- 5 PE-LD casing
- 6 Monitoring wires

CASAFLEX DUO

Type	DN	Inches	Inner pipe d x d ₁ x s mm	Outer casing D mm	Minimum Bending radius m	Volume l/m	Weight Inner pipe kg/m	Maximum delivery lengths			
								Coil ¹⁾ m	Coil ²⁾ m	Coil ³⁾ m	Coil ⁴⁾ m
22 + 22/111	20	¾	25 x 22 x 0.3	111	1.1	0.44	2.5	205	290	360	500
30 + 30/126	25	1	34 x 30 x 0.3	126	1.4	0.80	3.1	155	230	280	340
39 + 39/142	32	1¼	44 x 39 x 0.4	142	1.5	1.35	3.7	100	150	200	300
48 + 48/162	40	1½	55 x 48 x 0.5	162	1.8	2.04	4.2	55	100	145	190
60 + 60/182*	50	2	66 x 60 x 0.5	182	2.0	3.12	5.1	55	80	-	-

s = Material strength/Wall thickness

* Max. permitted operating temp. T_{max.} 130 °C (not available in Germany)

- 1) Coil dimensions Ø 2800 x 800 mm (width)
- 2) Coil dimensions Ø 2800 x 1200 mm (width)
- 3) Coil dimensions Ø 3000 x 1200 mm (width)
- 4) Coil dimensions Ø 3000 x 1600 mm (width) **just ex work Wunstorf**

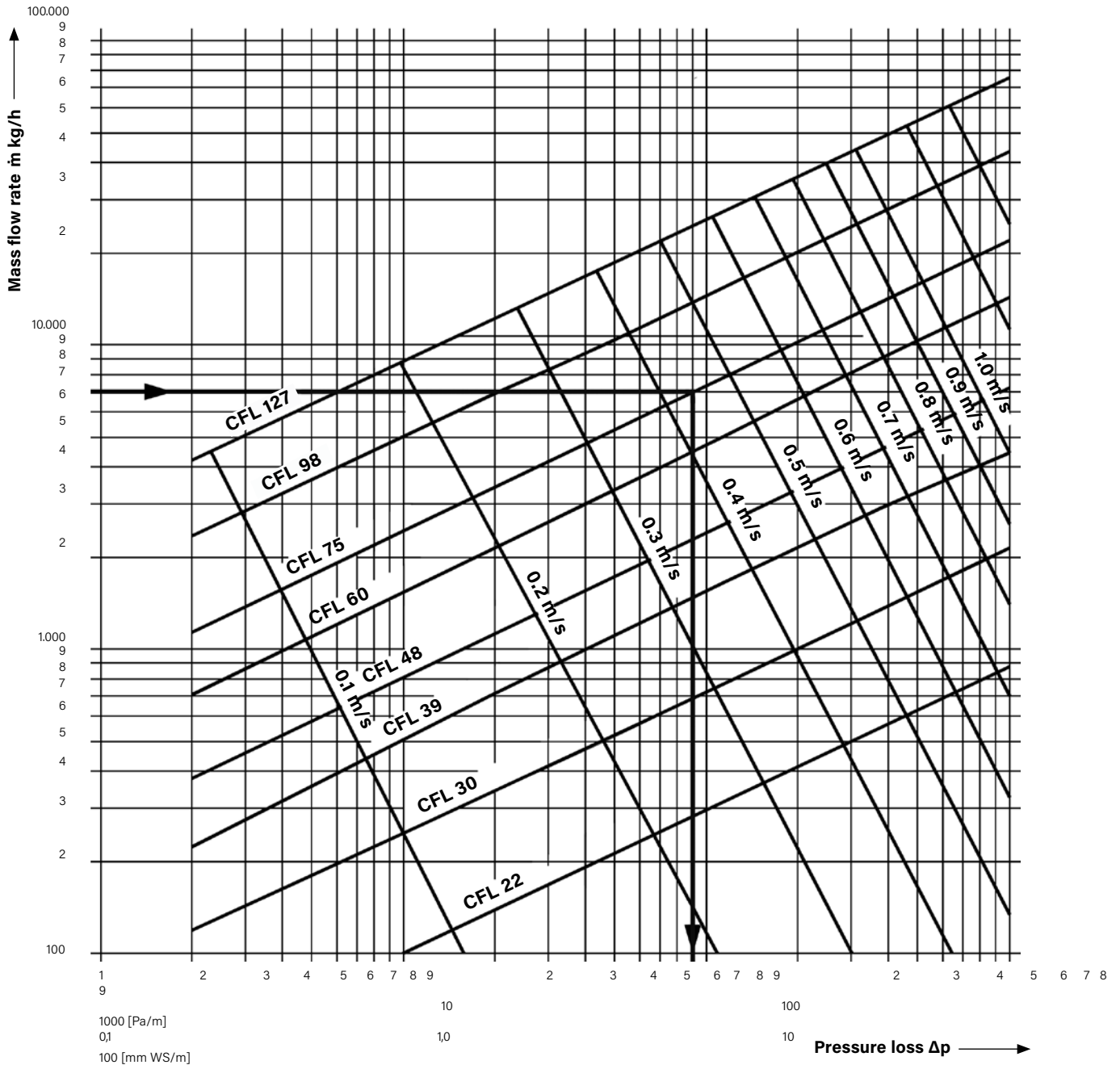
Supplied in drums on request

Please note the total weight of the coil when ordering for construction site deliveries.

Pressure loss chart

Water temperature 80 °C

$\dot{m} \approx \frac{Q \cdot 860}{\Delta T}$	\dot{m} = Flow rate in kg/h
	Q = Power requirement in kW
	ΔT = Temperature difference
	VL (flow) / RL (return) in °C



Example:

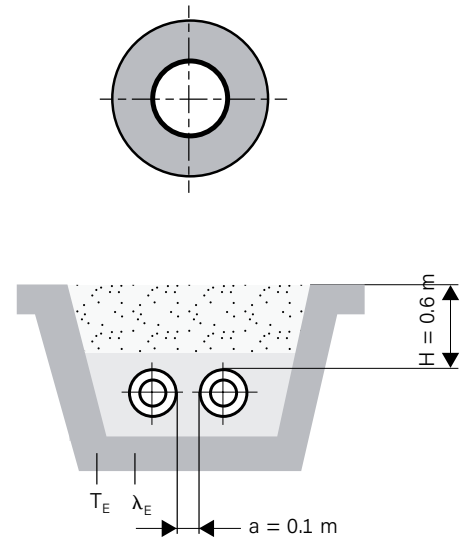
Mass flow rate 7000 kg/h; CASAFLEX type CFL 75
 -> Pressure loss 90 Pa/m

Heat loss

CASAFLEX UNO

Heat loss q [W/m] for one UNO pipe

CASAFLEX UNO	U-value [W/mK]	Average operating temperature T_B [°C]									
		40°	50°	60°	70°	80°	90°	100°	110°	120°	130°
22/ 91	0.113	3.4	4.5	5.7	6.8	7.9	9.0	10.2	11.3	12.4	13.5
30/111	0.123	3.7	4.9	6.1	7.3	8.5	9.8	11.0	12.2	13.4	14.6
39/126	0.137	4.1	5.5	6.8	8.2	9.6	10.9	12.3	13.6	15.9	16.4
48/126	0.170	5.1	6.8	8.5	10.2	11.8	13.5	15.2	16.9	18.6	20.3
60/142	0.187	5.6	7.4	9.3	11.2	13.0	14.9	16.8	18.6	20.5	22.4
75/162	0.218	6.5	8.7	10.9	13.0	15.2	17.4	19.5	21.7	23.9	26.1
98/162	0.355	10.1	13.4	16.8	20.1	23.5	26.8	30.2	33.5	36.9	40.2
127/202	0.366	11.0	14.7	18.3	22.0	25.6	29.3	33.0	36.6	40.3	44.0

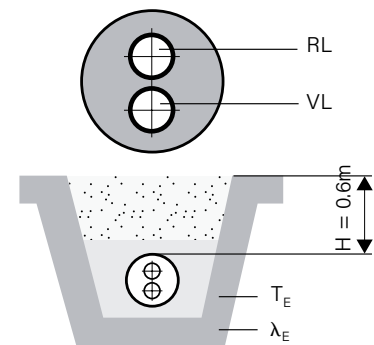


CASAFLEX DUO

Heat loss q [W/m] for one DUO pipe

CASAFLEX DUO	U-value [W/mK]	Average operating temperature T_B [°C]									
		40°	50°	60°	70°	80°	90°	100°	110°	120°	130°
22 + 22/111	0.156	4.7	6.2	7.8	9.4	10.9	12.5	14.0	15.6	17.2	18.7
30 + 30/126	0.181	5.4	7.2	9.0	10.9	12.7	14.5	16.3	18.1	19.9	21.7
39 + 39/142	0.224	6.7	8.9	11.2	13.4	15.7	17.9	20.2	22.4	24.6	26.9
48 + 48/162	0.251	7.5	10.0	12.5	15.0	17.6	20.1	22.6	25.1	27.6	30.1
60 + 60/182*	0.271**	8.1	10.8	13.6	16.3	19.0	21.7	24.4	27.1	29.8	32.5

*not available in Germany



- Pipe distance: $a = 0.10$ m
- Coverage height: $H = 0.60$ m
- Ground temperature: $T_E = 10$ °C
- Soil conductivity: $\lambda_E = 1.2$ W/mK
- Conductivity of PIR foam: $\lambda_{PIR} = 0.0250$ W/mK at average temperature of 50 °C
- **Conductivity of PUR foam: $\lambda_{PIR} = 0.0234$ W/mK at average temperature of 50 °C
- Conductivity of PE casing: $\lambda_{PE} = 0.43$ W/mK

Heat loss during operation:

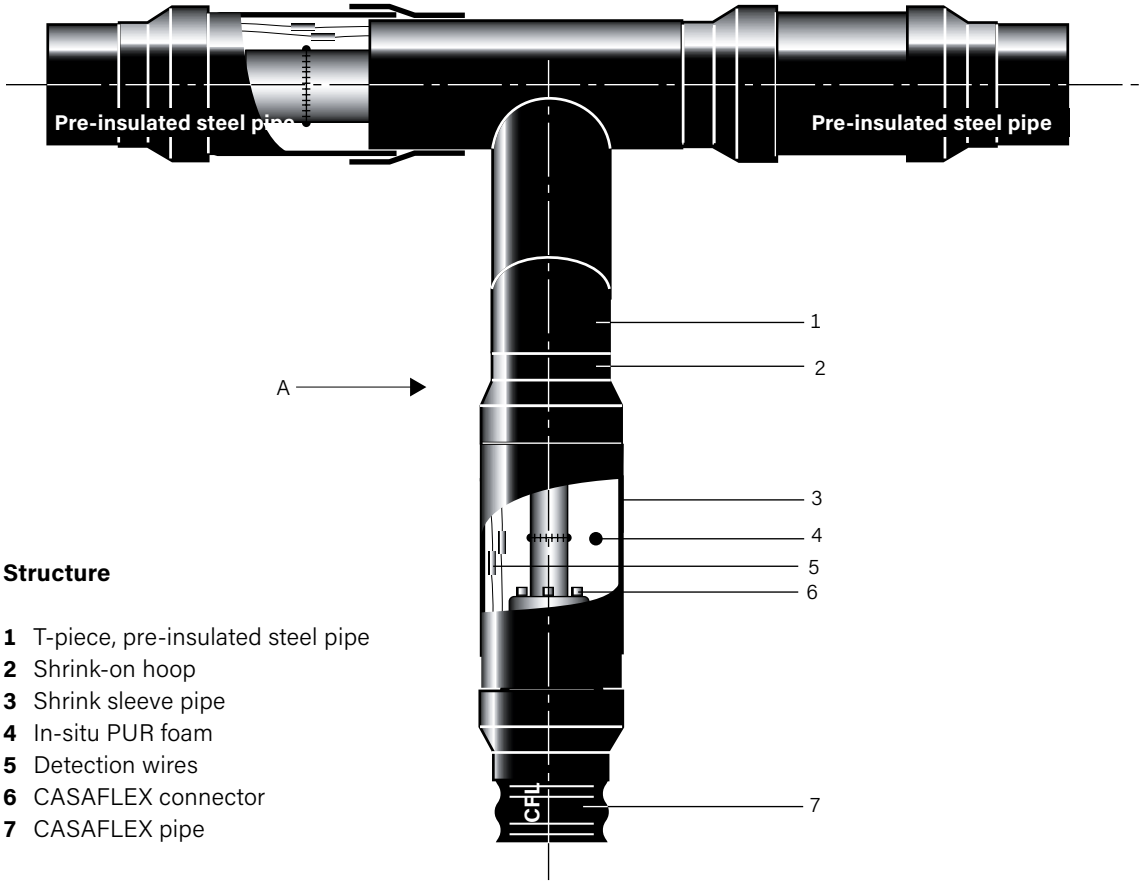
$$q = U (T_B - T_E) \text{ [W/m]}$$

- U = Heat transfer coefficient [W/mK]
- T_B = Average operating temperature [°C]
- T_E = Average ground temperature [°C]
- VL = Flow
- RL = Return

T-joint

CASAFLEX connected to pre-insulated steel pipe

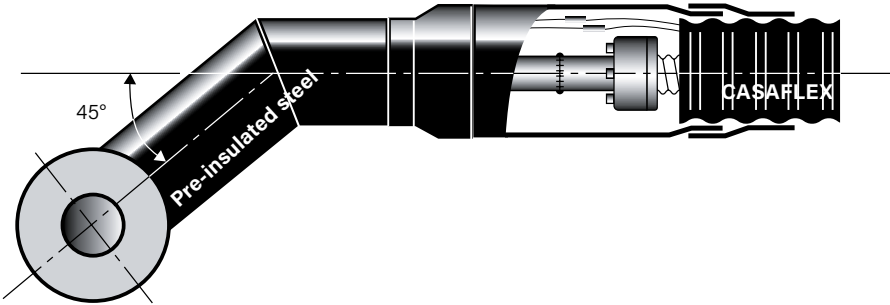
Structure of T-joint



Structure

- 1 T-piece, pre-insulated steel pipe
- 2 Shrink-on hoop
- 3 Shrink sleeve pipe
- 4 In-situ PUR foam
- 5 Detection wires
- 6 CASAFLEX connector
- 7 CASAFLEX pipe

View A



Y-branch pipe Type G (straight)

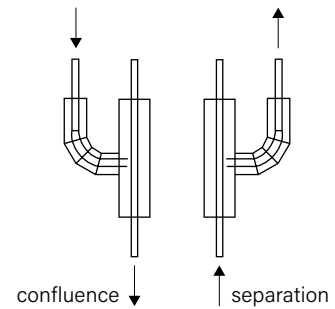
CASAFLEX UNO

Y-branch pipes are employed to provide a transition from conventionally laid piping using two single pipes CASAFLEX UNO to the space-saving PREMANT DUO format. The upper pipe (preferably the return pipe) runs straight ahead through the Y-branch pipe while the lower pipe is angled at 90°. In the Type G pipe the double pipe and the single pipe are axially parallel. Mounting plates are fixed to the side of the double pipe connection joint.

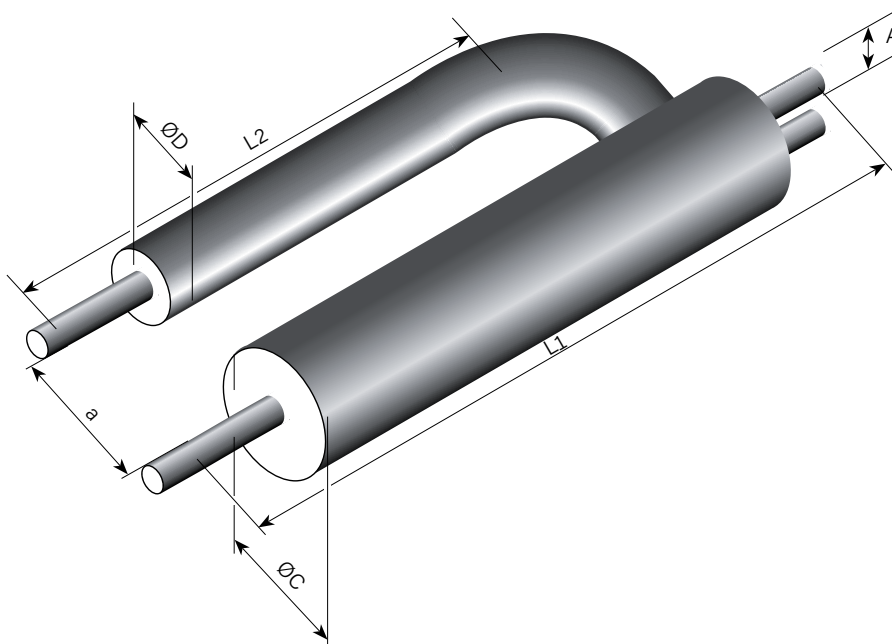
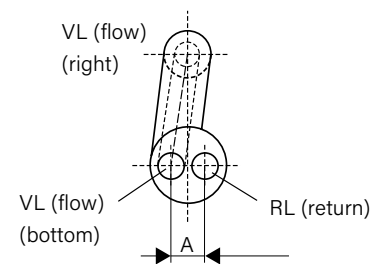
Construction variants

Two different construction variants of the Y-branch pipe Type G are available. The type required should be given when ordering. The arrows in the sketch show the flow direction of the feed.

- Carrier pipe:** welded steel pipe DIN EN 253
- Heat insulation:** PUR hard foam
- Casing pipe:** PE-HD
- Insulation thickness:** N – standard



Note: The flow (VL) in UNO pipes is always on the right in the direction of flow. The flow (VL) in DUO pipes it is always at the bottom in the direction of flow.



DN	Diameter	Installation length	Junction	Distance	$\varnothing C$	A	2 x single steel pipe	$\varnothing D$
	da	L1*	L2**	a	mm	mm	mm	mm
	mm	mm	mm	mm				
20	26.9	1000	450	250	125	45.9	26.9 x 2.6	90
25	33.7	1000	460	250	140	52.7	33.7 x 2.6	90
32	42.4	1000	480	300	160	61.4	42.4 x 2.6	110
40	48.3	1200	480	300	160	67.3	48.3 x 2.6	110

* free pipe end 200 mm

** measured from the middle of the branch line

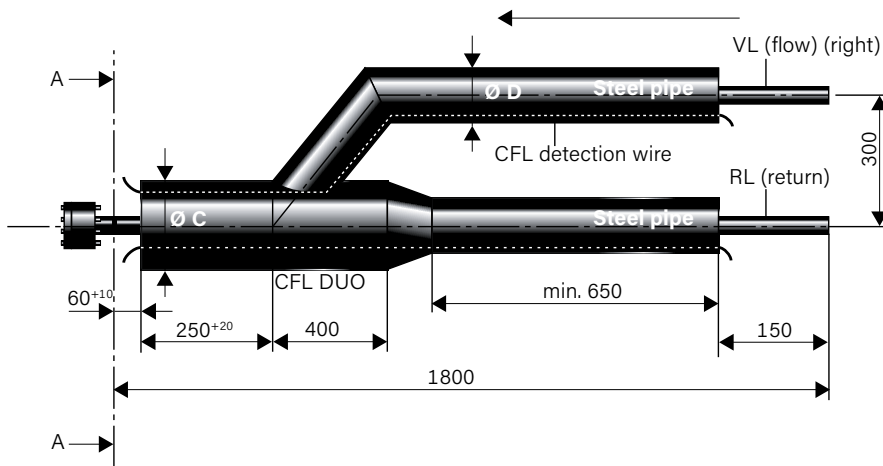
A reducing socket must be used on the side with the single pipe to connect the straight through pipe.

Not available in Switzerland.

Y-branch pipe

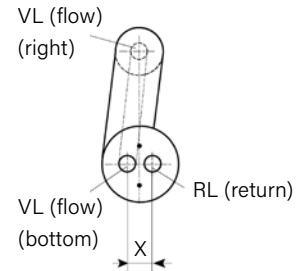
CASAFLEX-DUO

Y-branch pipes are employed to provide a transition from conventionally laid piping using two single pipes PREMANT UNO to the space-saving CASAFLEX DUO format.



View: A - A

Note: The flow (VL) in UNO pipes is always on the right in the direction of flow. The flow (VL) in DUO pipes it is always at the bottom in the direction of flow.



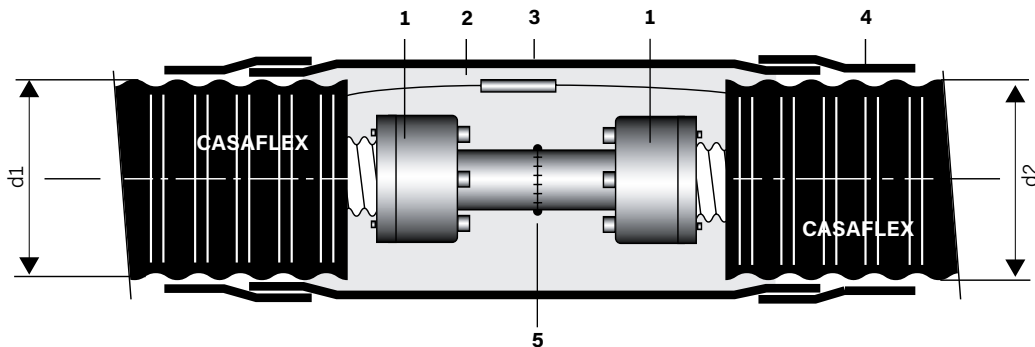
Figures in mm

Type	DN	Inches	Pipe connection d x s mm	Ø C mm	A mm	2 x single steel pipes mm	Ø D mm
22 + 22/111	20	¾	26.9 x 2.6	140	55	26.9 x 2.6	90 / 110
30 + 30/126	25	1	33.7 x 3.2	160	65	33.7 x 2.6	90 / 110
39 + 39/142	32	1¼	42.4 x 3.2	200	81	42.4 x 2.6	110 / 125
48 + 48/162	40	1½	48.3 x 3.2	225	93	48.3 x 2.6	110 / 125
60 + 60/182	50	2	60.3 x 3.6	250	109	60.3 x 2.9	125 / 140

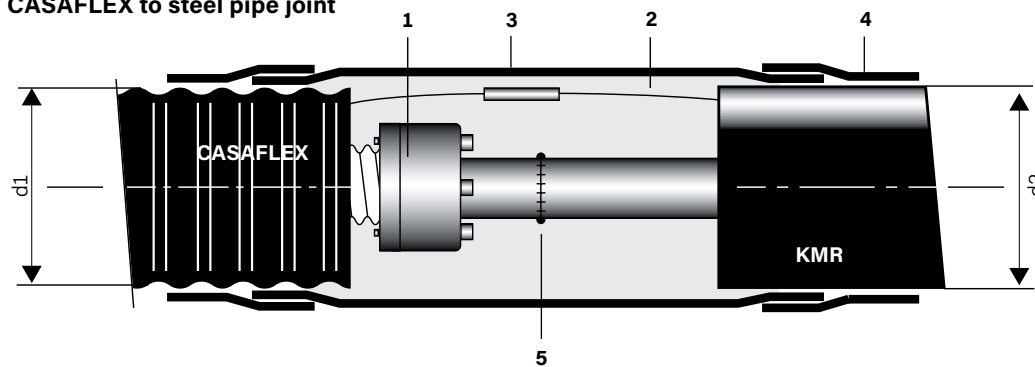
not available in Germany

Joint

CASAFLEX to CASAFLEX joint



CASAFLEX to steel pipe joint



Structure

- 1 ME connector; see sheet CFL 4.335, item 3
- 2 Insulating material (PUR foam); see sheet CFL 4.345
- 3 Shrink sleeve pipe
- 4 Shrink hose
- 5 Welding seam

CASAFLEX - CASAFLEX

d2	91	111	126	142	162	182	202
d1	91	X					
	111		X				
	126			X			
	142				X		
	162					X	
	182						RMBD
	202						RMBD

CASAFLEX - steel pipe

d2	90	110	125	140	160	180	200
d1	91	X	X	X			
	111	X	X	X			
	126			X	X		
	142				X	X	
	162					X	
	182						RMBD RMBD
	202						RMBD

Figures in mm

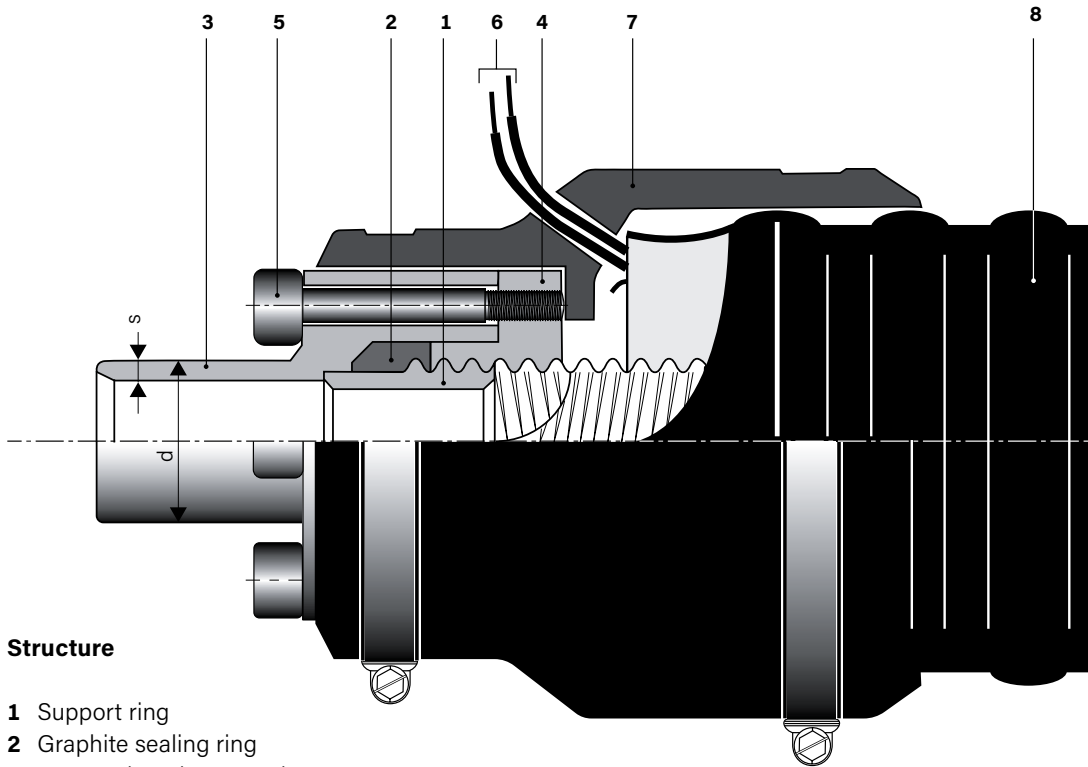
* further joint systems and reduction sleeves are available on request

When transitioning to CASAFLEX - DUO and using standard connections with pressure rating PN 25, the connection points in the ground generally have to be insulated with special RMBD sleeves to ensure sufficient insulation thickness.

Connector

CASAFLEX UNO, DN 20 - DN 80 (PN 16)

The CASAFLEX connector is specifically designed for CASAFLEX district heating pipes. It is used to make all connections on pipe installations in buildings and shafts and for through-type and T-joints. The connectors are intended for hot water pipes up to operating pressures of 16 bar.



Structure

- 1 Support ring
- 2 Graphite sealing ring
- 3 Connection piece/Steel S 355 J2, DIN/EN 10025
- 4 Compression ring
- 5 Hexagon socket screw
- 6 Detection wires
- 7 Protective cap, 2-part
- 8 CASAFLEX pipe

CASAFLEX UNO / PN 16

Type	DN	Inches	Pipe connection d x s
		"	mm
22/ 91	20	¾	26.9 x 2.6
30/111	25	1	33.7 x 3.2
39/126	32	1¼	42.4 x 3.2
48/126	40	1½	48.3 x 3.2
60/142	50	2	60.3 x 3.6
75/162	65	2½	76.1 x 3.6
98/162	80	3	88.9 x 4.0

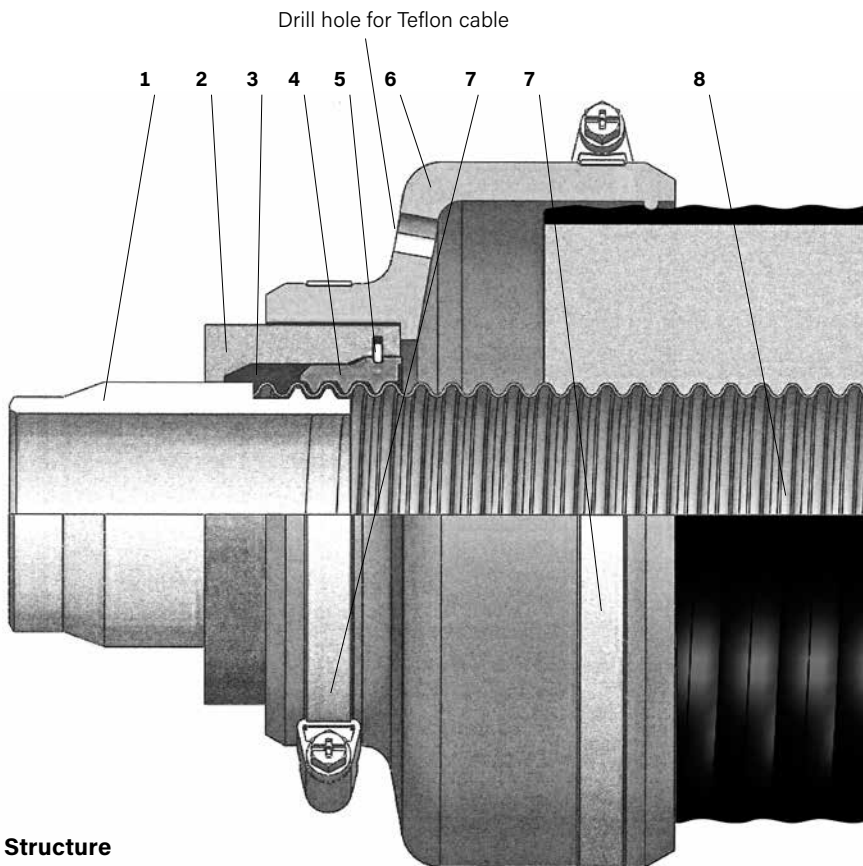
Uses

Type	Execution
Dry building	as per drawing
T-piece/joint	Pos. 7, no protective cap
Shaft	see CFL 4,530

Connector Mini

CASAFLEX-UNO / PN 25

The CASAFLEX Mini pipe connector has been specially developed for connecting branch pipes of up to DN 40. It forms a permanent connection which is made via a compression process and has been designed for hot-water pipelines with an operating pressure of up to 25 bar. Like the Standard pipe connectors, it is used for connecting CASAFLEX district heating pipes with distribution pipes in buildings and in the ground.



Structure

- 1 Connection piece/Steel S 355 J2, DIN/EN 10025
- 2 Sliding sleeve
- 3 Graphite sealing ring
- 4 Protective cap, 2-part
- 5 Retaining ring
- 6 Compression ring
- 7 CASAFLEX pipe

CASAFLEX-UNO / PN 16

Type	DN	Inches	Pipe connection d x s mm
22/ 91	20	¾	26.9 x 2.6
30/111	25	1	33.7 x 3.2
39/126	32	1¼	42.4 x 3.2
48/126	40	1½	48.3 x 3.2

Uses

Typ	Execution
Dry building	as per drawing
T-piece/joint	Pos. 7, no protective cap
Shaft	see CFL 4.530

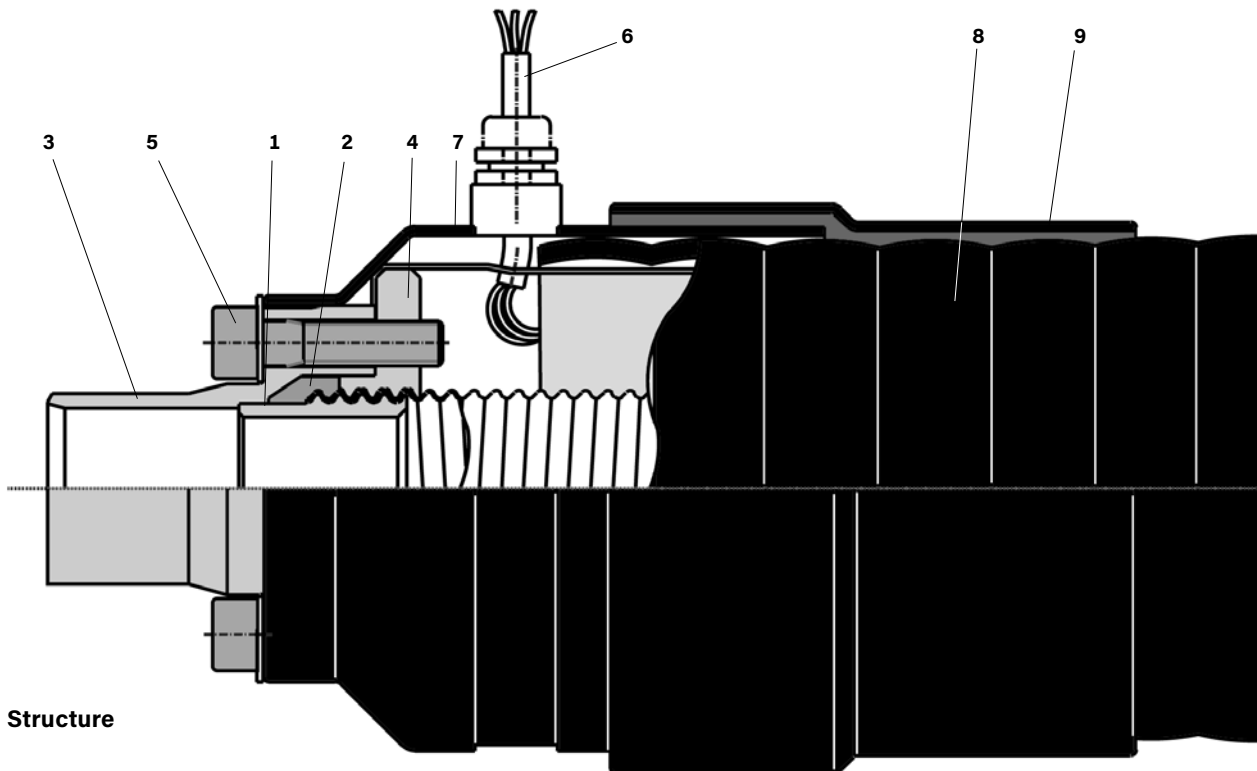
Connector

CASAFLEX UNO, DN 20 - DN 50 (PN 25)

The CASAFLEX connector is specifically designed for CASAFLEX district heating pipes. It is used to make all connections on pipe installations in buildings and shafts and for through-type and T-joints.

The connectors are intended for hot water pipes up to operating pressures of 25 bar.

Only trained personnel may install this connector.



Structure

- 1 Support ring
- 2 Graphite sealing ring
- 3 Connection piece/Steel S 355 J2, DIN/EN 10025
- 4 Compression ring
- 5 Hexagon socket screw
- 6 Detection wires
- 7 Protective cap and wire outlet
- 8 CASAFLEX pipe
- 9 Shrink-on collar

CASAFLEX UNO / PN 25

Type	DN	Inches	Pipe connection d x s mm
22/ 91	20	¾	26.9 x 2.6
30/111	25	1	33.7 x 3.2
39/126	32	1¼	42.4 x 3.2
48/126	40	1½	48.3 x 3.2
60/142	50	2	60.3 x 3.6

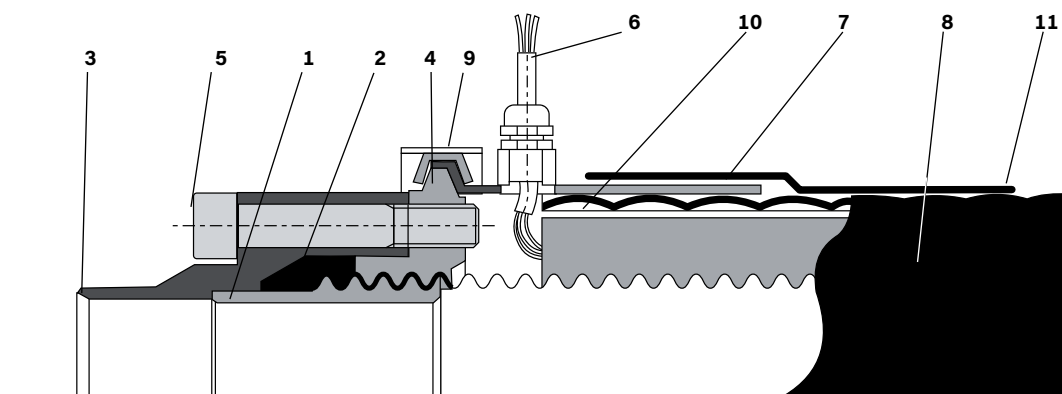
Connector

CASAFLEX UNO, DN 65 - DN 80 (PN 25)

The CASAFLEX connector is specifically designed for CASAFLEX district heating pipes. It is used to make all connections on pipe installations in buildings and shafts and for through-type and T-joints.

On connector type PN 25, the expanded mesh (9) is fixed by a metal clamp; this increases mechanical stability, as is necessary for operating pressures above 16 bar.

The connectors are intended for hot water pipes up to operating pressures of 25 bar.



Structure

- 1 Support ring
- 2 Graphite sealing ring
- 3 Connection piece/Steel S 355 J2, DIN/EN 10025
- 4 Compression ring
- 5 Hexagonal socket head screw
- 6 Detection wires
- 7 Protective cap and monitor lead exit
- 8 CASAFLEX pipe
- 9 Clamping ring
- 10 Expanded metal
- 11 Shrink-on cellar

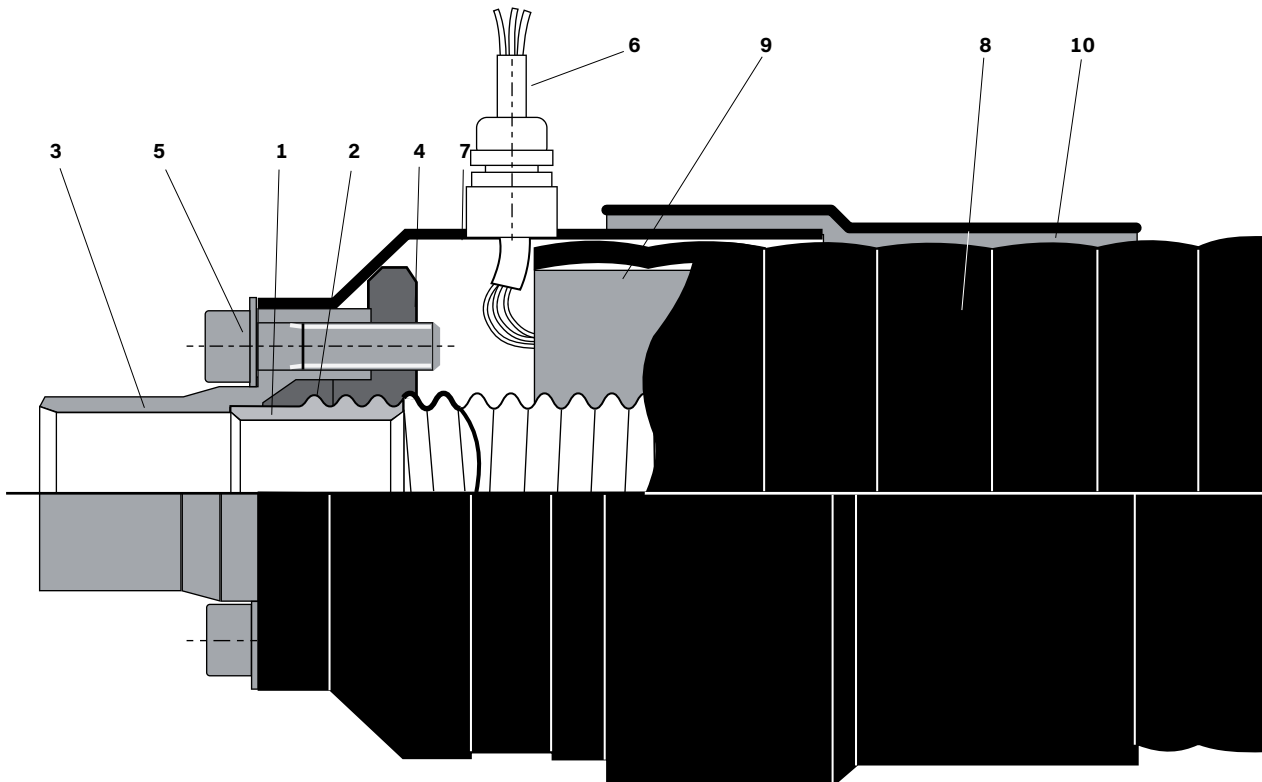
CASAFLEX UNO / PN 25

Type	DN	Inches	Pipe connection d x s
		"	mm
75/162	65	2½	76.1 x 3.6
98/162	80	3	88.9 x 4.0

Connector

CASAFLEX UNO, DN 100 (PN 16)

The CASAFLEX connector is specifically designed for CASAFLEX district heating pipes. It is used to make all connections on pipe installations in buildings and shafts and for through-type and T-joints. The connectors are intended for hot water pipes up to operating pressures of 16 bar.



Structure

- 1 Support ring
- 2 Graphite sealing ring
- 3 Connection piece/Steel S 355 J2, DIN/EN 10025
- 4 Compression ring
- 5 Hexagonal socket head screw
- 6 O-ring
- 7 screw
- 8 Protective cap
- 9 Shrink-on cellar
- 10 Detection conductor
- 11 Connector for monitoring wires
- 12 CASAFLEX pipe

CASAFLEX UNO / PN 16

Type	DN	Inches	Pipe connection d x s
		"	mm
127/202	100	4	114.3 x 4.5

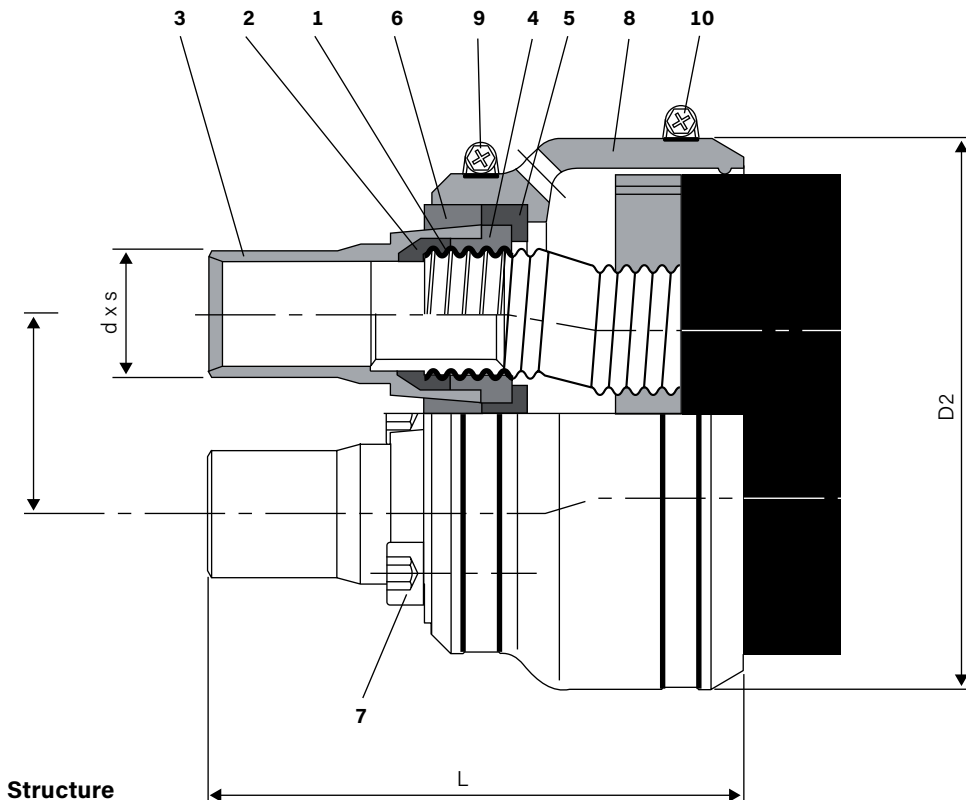
Connector

CASAFLEX DUO, DN 20 - DN 50 (PN 16)

The CASAFLEX connector is specifically designed for CASAFLEX district heating pipes. It is used to make all connections on pipe installations in buildings and shafts and for through-type and T-joints.

DUO connections cannot be installed more than once. Unlike with the standard UNO connections, after disassembling a DUO connection, it is not possible to reinstall it with a graphite seal. DUO connections must be completely replaced once they are disassembled.

A plastic protective cap is used with type CASAFLEX DUO. The connectors are intended for hot water pipes up to operating pressures of 16 bar.



Structure

- 1 Support ring
- 2 Graphite seal
- 3 Connection piece/Steel S 355 J2, DIN/EN 10025
- 4 Compression ring
- 5 Pressure plate A
- 6 Conical plate B
- 7 Hexagon socket screw
- 8 Protective cap (2-part)
- 9 Hose clamp
- 10 Hose clamp

CASAFLEX DUO / PN 16

Type	DN	Inches	Pipe connection d x s mm	Axis distance A mm	Length L mm	D2 mm
22 + 22/111	20	¾	26.9 x 2.6	45.9	≈138	131
30 + 30/126	25	1	33.7 x 3.2	52.7	≈141	145
39 + 39/142	32	1¼	42.4 x 3.2	61.4	≈208	164
48 + 48/162	40	1½	48.3 x 3.2	69.0	≈232	184
60 + 60/182*	50	2	60.3 x 2.9	79.7	≈210	245

*not available in Germany

Connector Mini

Installation set

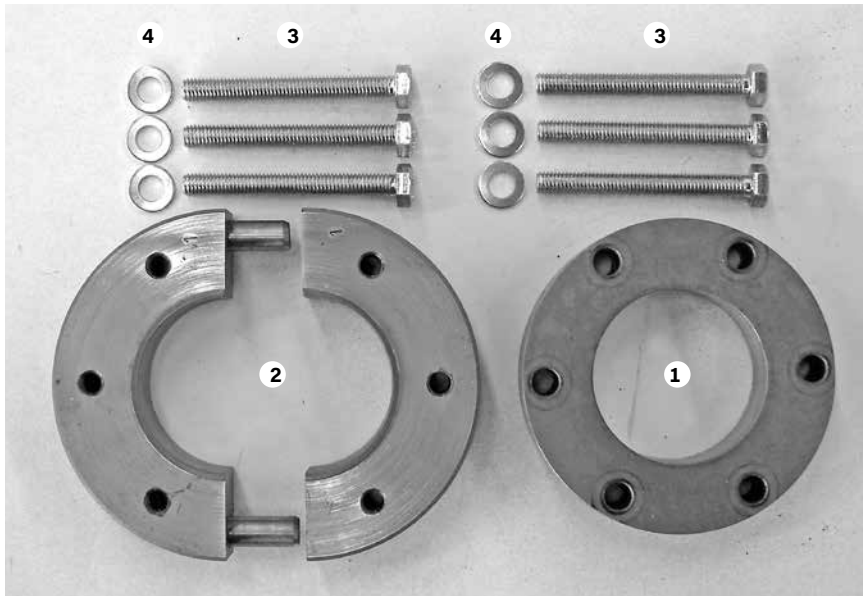
Installation set for compression connection CASAFLEX - Mini for

CASAFLEX - district heating pipe 22/ 91

CASAFLEX - district heating pipe 30/111

CASAFLEX - district heating pipe 39/126

CASAFLEX - district heating pipe 48/126



Consisting of:

- 1 Flange
- 2 Divided flange
- 3 Hexagonal screw
- 4 Washer

Accessories

PUR foam containers, pipe warning tape

PUR foam containers

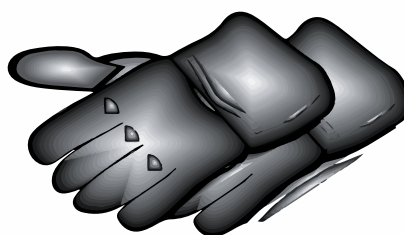
The required quantity of CFC-free polyurethane foam is delivered in suitable container sizes for the various joints and T-pieces. The components are supplied separately in two bottles and are only mixed together when needed.

Important:

Please note the safety regulations in the installation instructions supplied with the product.



Synthetic gloves



Protective goggles



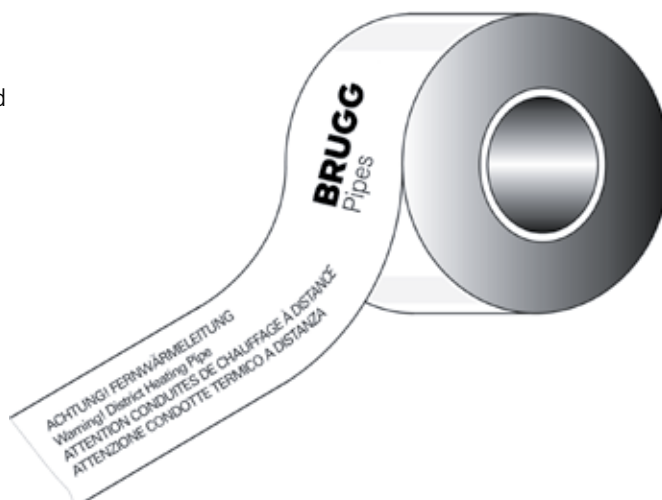
Important:

The PUR foam can be used up to a maximum temperature of 130°C. For higher operating temperatures (max. 160°C), please consult BRUGG.

Pipe warning tape

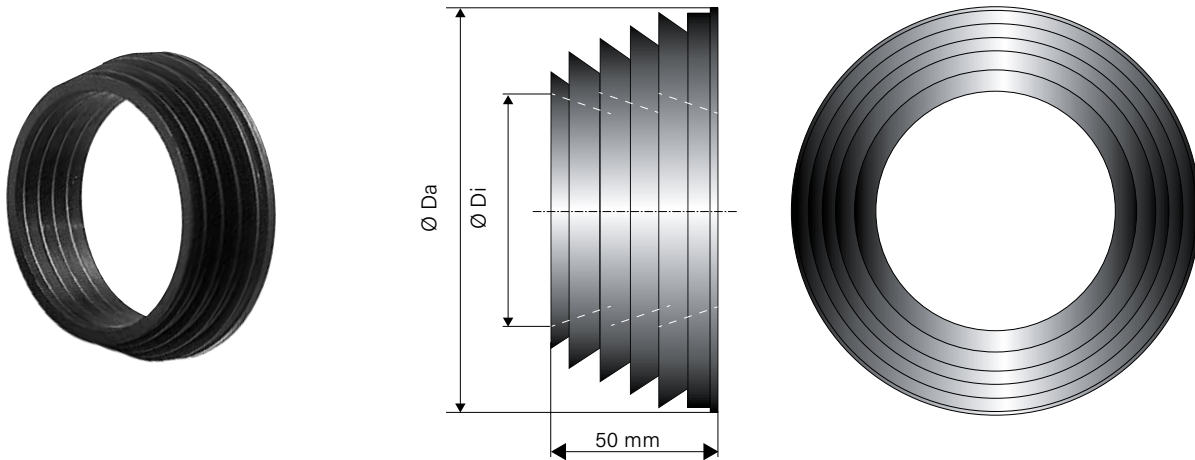
Pipe warning tape to be laid in the ground
Standard roll length: 250 m

Installation depth; see sheet CFL 4.505



Wall seal

for wall openings



CASAFLEX UNO/DUO

Outer casing diameter mm	Neoprene wall sealing ring Ø Di, inner mm	Ø Da, outer mm
91	79	125
111	99	145
126	114	160
142	128	174
162	146	192
182	166	210
202	204	240

For wall opening/core bores size, see CFL worksheet 4.520.

Ring seal

For core bore / fiber cement liner pipes

Ring seal set, type C40
1 x per opening

Ring seal set, type A
1 x per opening



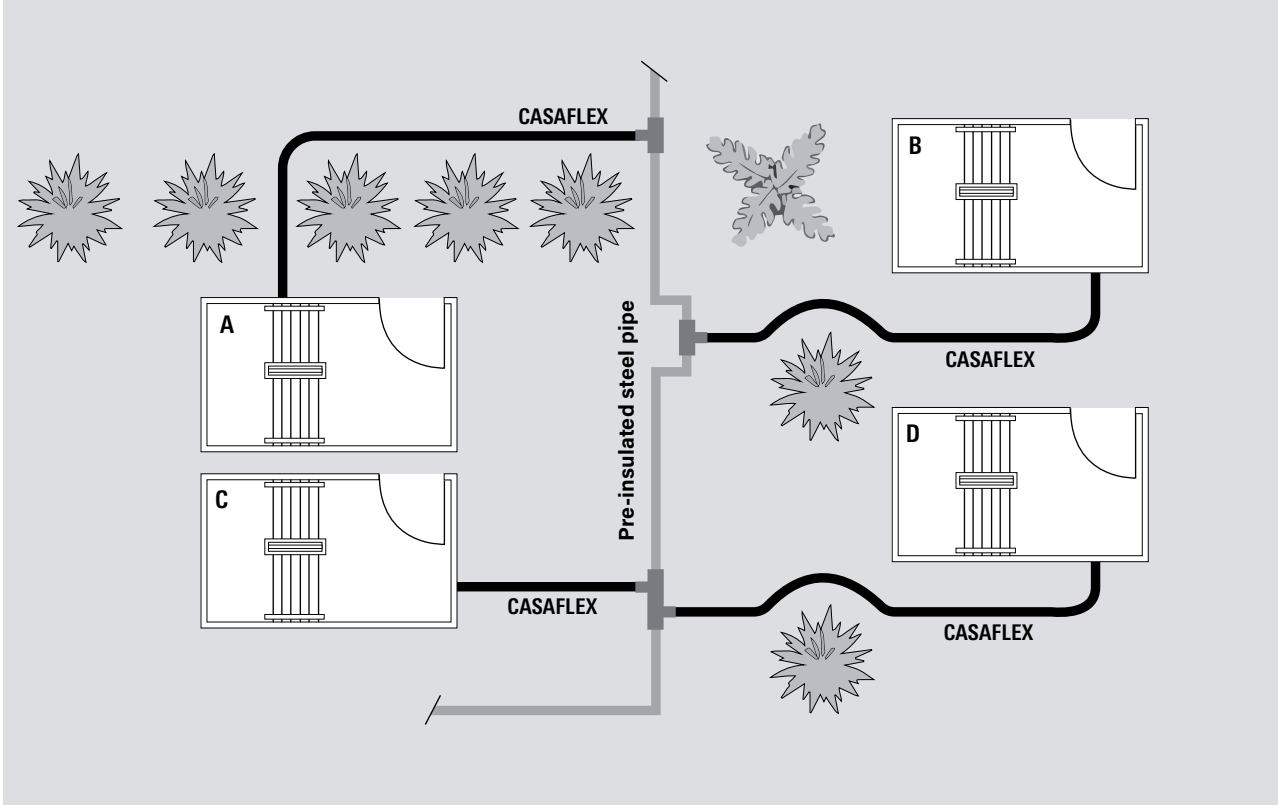
CASAFLEX UNO/DUO

Outer casing Ø mm	Liner pipe, core bore Ø mm	Seal set Ø D, inner mm	Seal set Ø D, outer mm
91	150	93	150
111	200	113	200
126	200	128	200
142	200	144	200
162	250	163	250
182	250	183	250
202	300	210	300

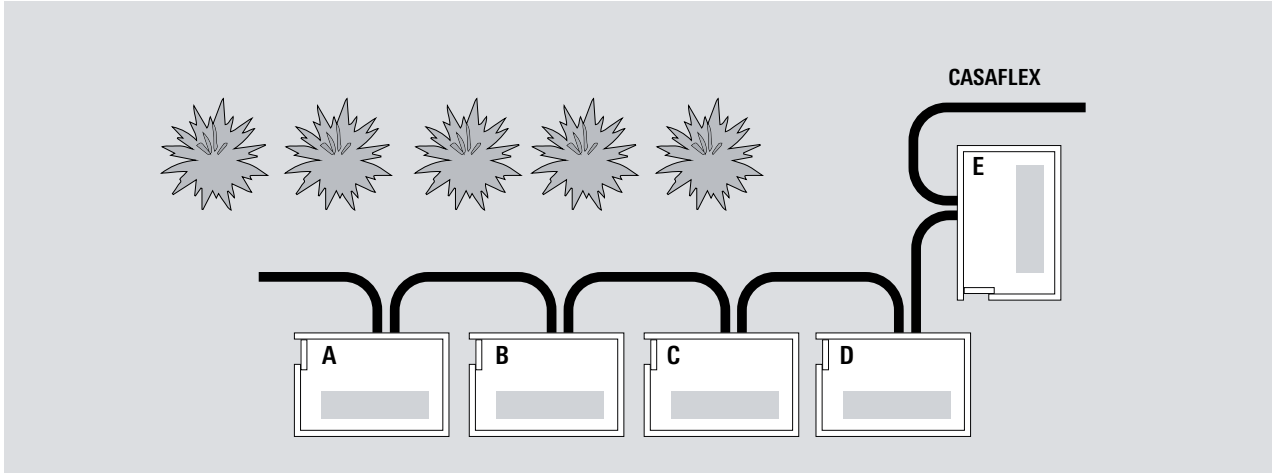
For wall opening/core bores size, see CFL worksheet 4.520.

Pipe routing

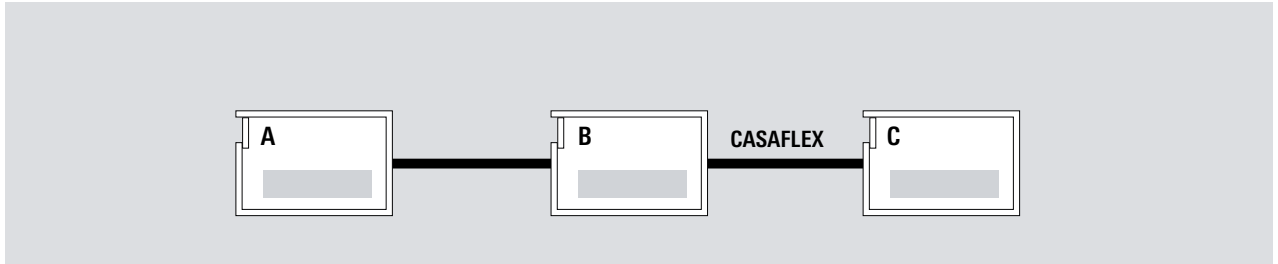
CASAFLEX – pre-insulated steel pipe connection



Loop-in method



House-to-house connection

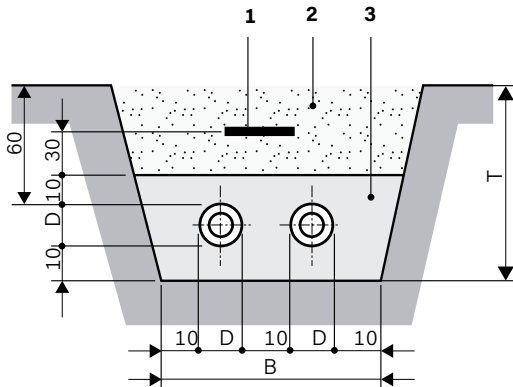


Trench dimensions

The fill material in the embedment must comply with EN 13941-2 and satisfy the following minimum requirements:

- Friable, round-edged sand-gravel mixture
- Permissible grain size: 0...8 mm
- Coefficient of uniformity according to DIN EN ISO 14688-2 larger than 1.8
- Maximum 10 percent by mass ≤ 0.075 mm
- Maximum 3 percent by mass $\leq 0,02$ mm
- Proctor density min. 94%; optimal 97...98%

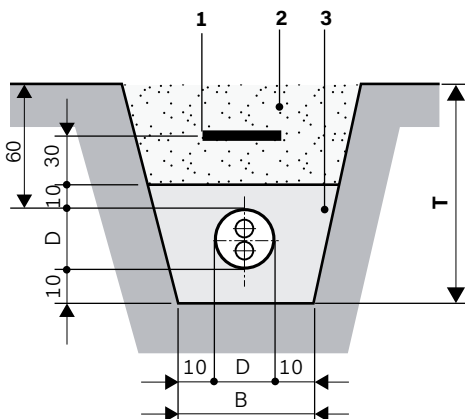
Trench profile, CFL UNO



Figures in cm

CASAFLEX Outer casing Ø D mm	Width B cm	Depth T cm	Minimum Bending radius m
91	50	80	1.0
111	55	85	1.0
126	55	85	1.2
142	60	85	1.5
162	65	90	1.8
202	70	95	2.8

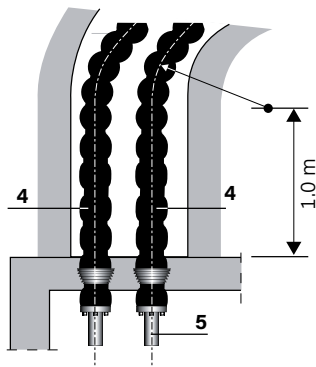
Trench profile, CFL DUO



Figures in cm

CASAFLEX Outer casing Ø D mm	Width B cm	Depth T cm	Minimum Bending radius m
111	30	85	1.1
126	35	85	1.4
142	35	85	1.5
162	35	90	1.8
182	38	90	2.0

Ground plan of trench for house connection



Structure

- 1 Pipe warning tape; see sheet CFL 4.345
- 2 Excavated material, compactable
- 3 Filling material, described above
- 4 CASAFLEX district heating pipe
- 5 Connector; see sheet CFL 4.330 - CFL 4.350

X = 1 m when connecting a T-piece to CFL
or 3 m when connecting a T-piece to KMR
A = Pipe distance see sheet PRE 6.500

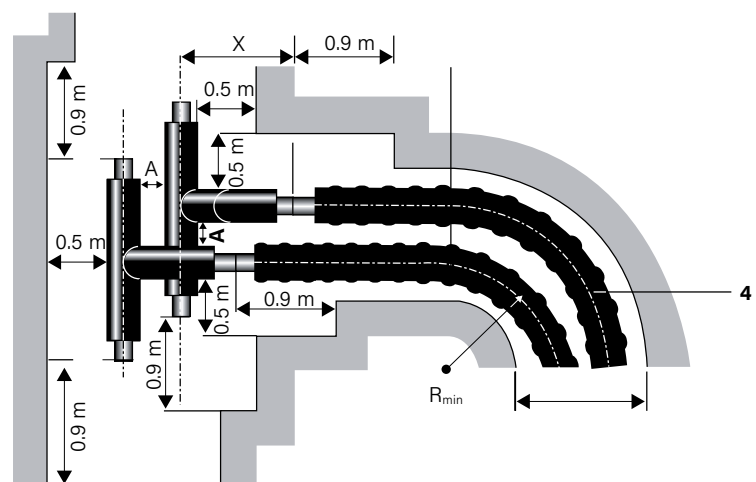
When connecting KMR DUO to CASAFLEX DUO the same dimensions are valid for one pipe axis

Installation depth

Max. installation depth: 2.6 m
Our approval is required for deeper installations.

SLW 30 ± 300 kN total load to DIN 1072;
if subject to higher traffic loads (e.g. SLW 60), a load-distributing superstructure as per RStO75 is required.
With no traffic load, the minimum trench depth T can be reduced by 20 cm.

Ground plan of trench for T-piece connection

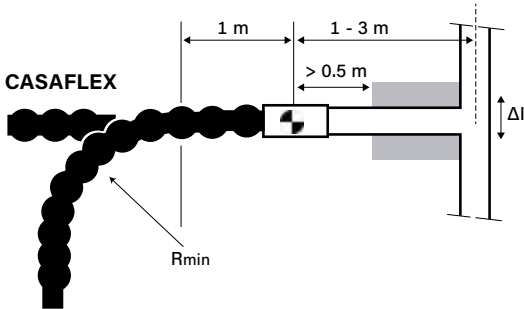


Connection (rigid/flexible)

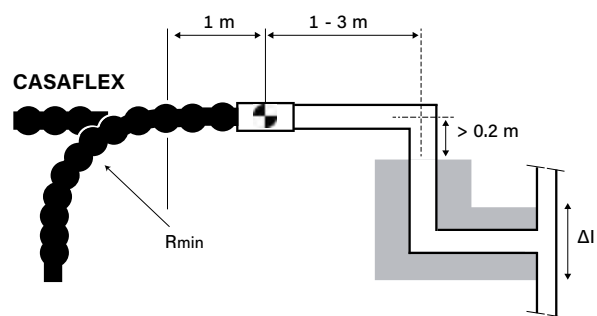
CASAFLEX to insulated steel pipes

Installation instructions for transition from CASAFLEX to insulated steel pipe (KMR)

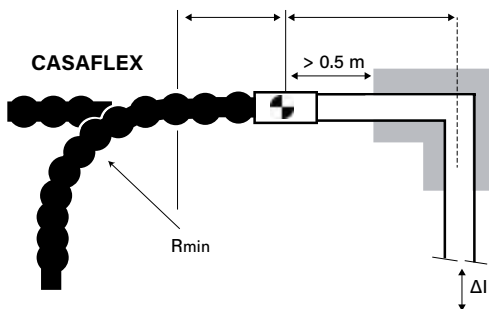
1. Connection to T-piece (Δl small)



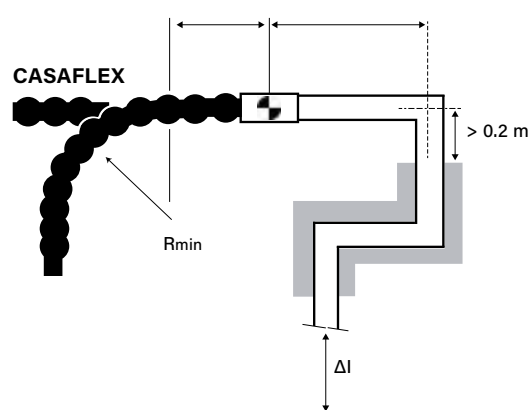
2. Connection to T-piece (Δl large)



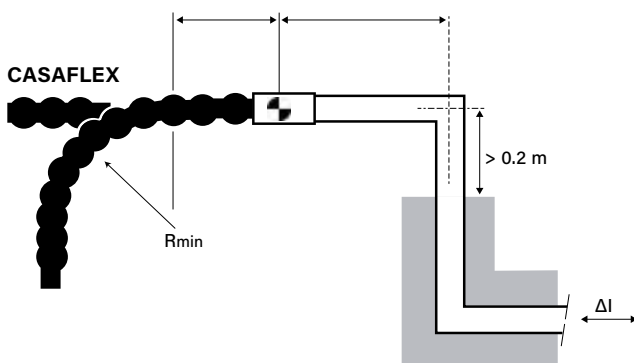
3. Connection to L-bend (Δl small)




4. Connection to L-bend (Δl large)



5. Connection to Z-bend



Comments:

1. Thermal elongation Δl of the KMR system that is transferred to the centre of the connector  must be less than: axial 3 mm
2. Grey = expansion pad for the KMR system, designed in line with the state of the art

Entry into building

Fixed point forces

CASAFLEX district heating pipe is a self-compensating, statically resolved system, i.e. it accommodates thermally induced changes in length within the system. The system itself only has a limited ability to accommodate loads and deformations acting from outside. Connections to conventional systems must be executed on a 'low-load' basis. The following fixed point forces must be taken into account for each pipe, depending on self-compensation and inner pressure:

Fixed point forces per pipe

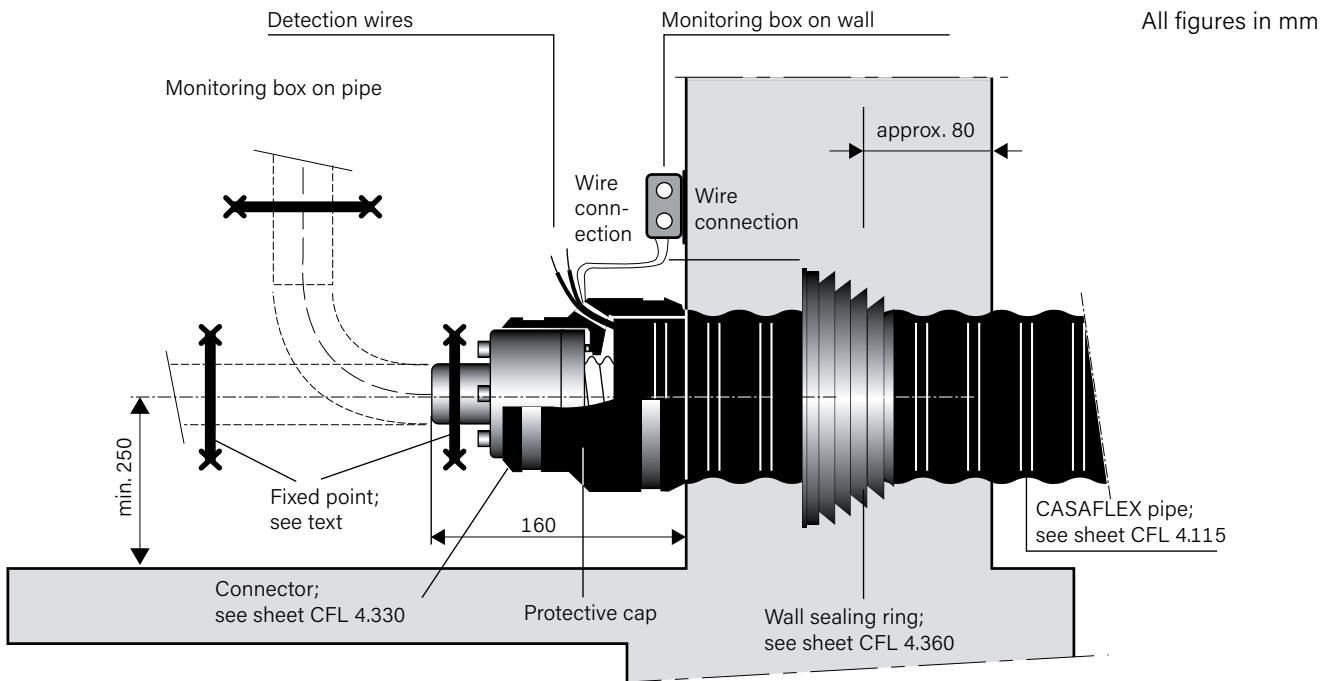
Type	F (6 bar) KN	F (10 bar) KN	F (16 bar) KN	F (21 bar) KN	F (25 bar) KN	F* (37.5 bar) KN
DN 20	0.3	0.5	0.8	1.0	1.2	1.8
DN 25	0.5	0.8	1.4	1.8	2.1	3.2
DN 32	0.8	1.4	2.2	2.9	3.5	5.3
DN 40	1.3	2.1	3.4	4.5	5.4	8.1
DN 50	1.9	3.2	5.1	6.7	8.0	12.0
DN 65	3.1	5.2	8.3	10.9	12.9	19.4
DN 80	5.1	8.5	13.7	17.9	21.3	32.0
DN 100	8.6	14.4	23.0	30.2	36.0	54.0

* test pressure

The construction of the fixed points must be determined by the planner due to the structural conditions, taking these forces into account!

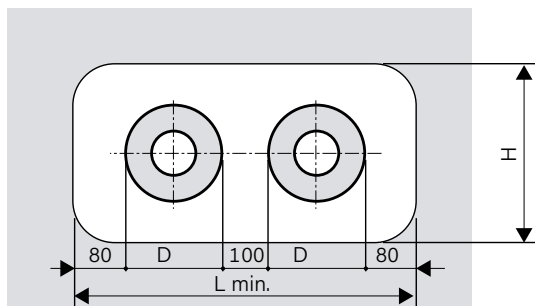
Entry into building

Wall opening



The connector and/or the CASAFLEX pipe are not suitable for accommodating expansion of ongoing pipes. A fixed point clamp must be fitted for this reason (see worksheet CFL 4.515).

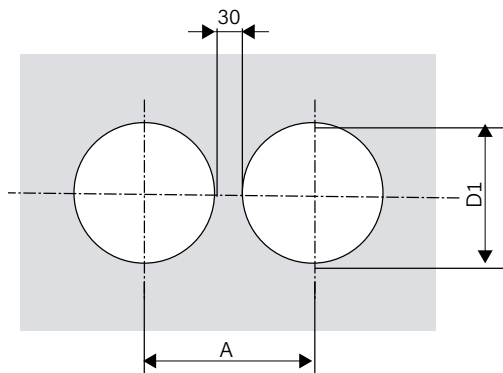
Wall opening



All figures in mm

Outer casing Ø D mm	L min mm	H min mm
91	500	300
111	500	300
126	550	300
142	600	350
162	650	350
202	700	400

Core bores for wall sealing rings

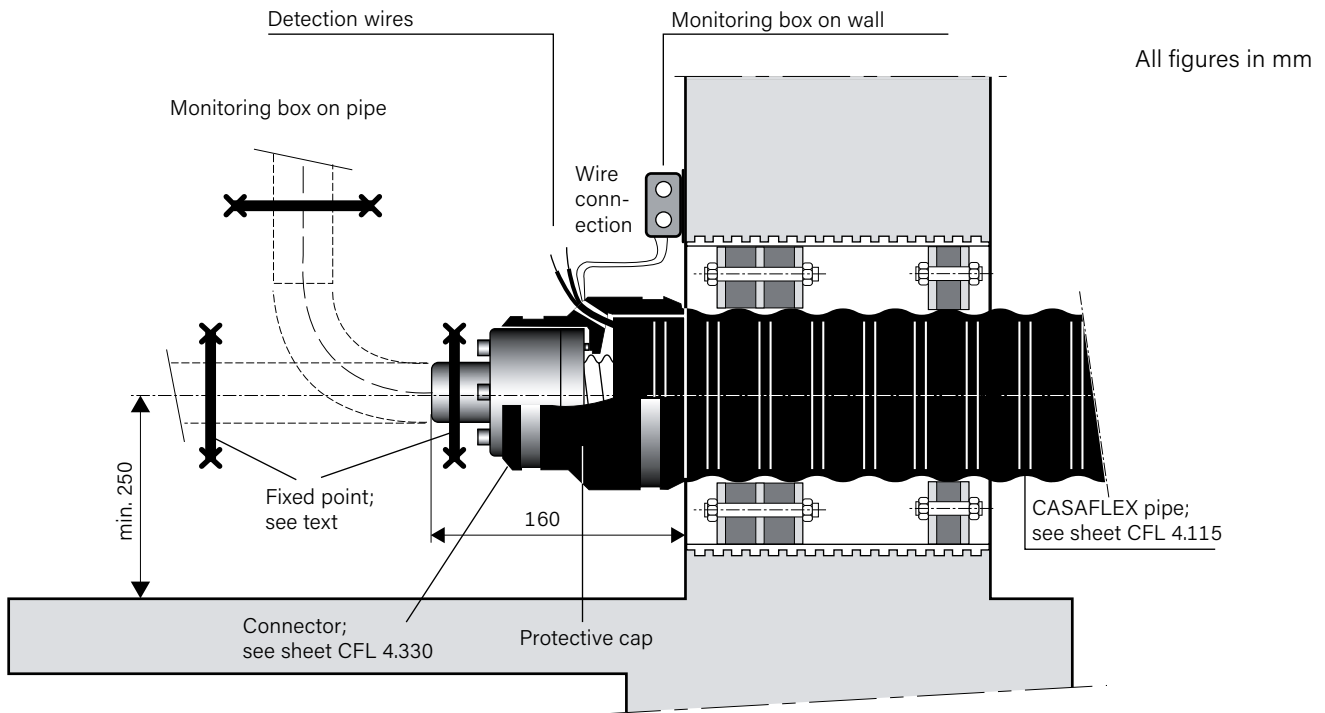


All figures in mm

Outer casing Ø D mm	D1 mm	A mm
91	200	230
111	220	250
126	240	270
142	260	290
162	280	310
202	320	350

Entry into building

Core bore



The connector and/or the CASAFLEX pipe are not suitable for accommodating expansion of ongoing pipes. A fixed point clamp must be fitted for this reason (see worksheet CFL 4.515).

Core bores

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

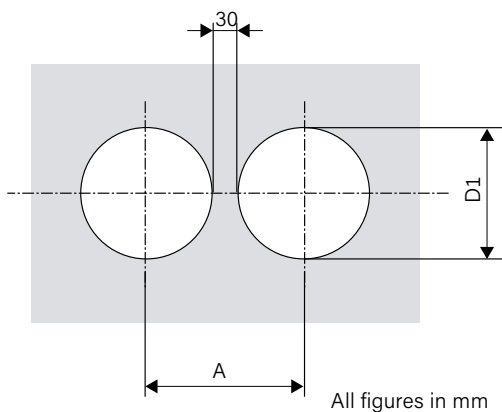
Seal set type A single-seal
1 x 40 mm, Shore hardness D 35

Seal set type C40 double-seal*
2 x 40 mm, Shore hardness D 35

Liner pipe made of fiber cement, or **core bore** coated

* Suitable for pressure from water up to 0.5 bar

Core bores



Outer casing Ø D mm	D1 mm	A mm
91	150	180
111	200	230
126	200	230
142	200	230
162	250	280
182	250	280
202	300	330

Shaft structures

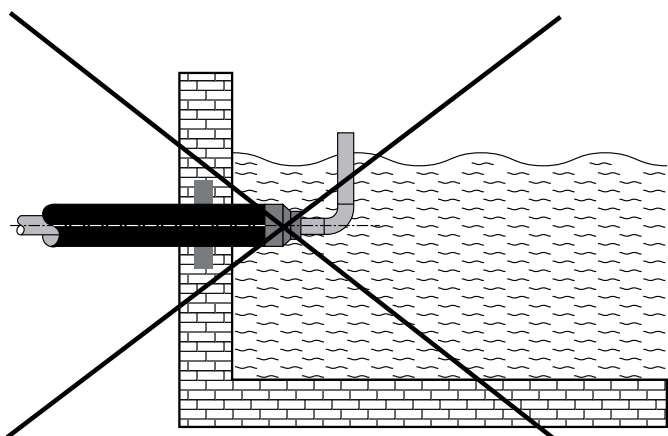
Entry into building

Planning and engineering of shaft structures

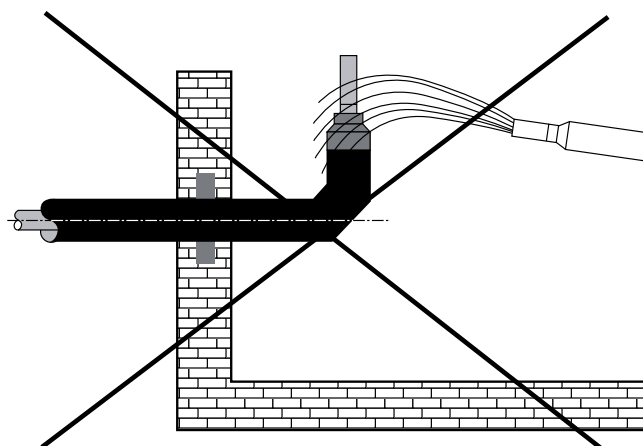
The construction and maintenance of shaft structures in local and district heating networks is usually very expensive and time-consuming. They must include inbound and outbound ventilation and must be built so that they are watertight; any surface water which penetrates should be removed as quickly as possible so as to prevent damage to the shaft installations and the heat insulation for the inbound pipes (insulated steel pipes and flexible district heating pipes).

Depending on local conditions, the pipe entries must be fitted with seals. For surface water which does not exert pressure, simple labyrinth seals are usually adequate. For groundwater an adjustable packing seal is generally required. As a rule, the pipe end seals are only designed to protect against water splashes. A design which is impermeable to surface water is also possible in principle, but flooding of lengthy duration, especially below operating temperature, should be avoided.

Due to these requirements, little use is made of shaft constructions nowadays. Instead, pre-insulated T-pieces and (if necessary) pre-insulated shut-off and drainage/venting fittings are used. This makes it possible to avoid the substantial costs of producing and maintaining shaft constructions and to increase the operational reliability of the system.



Do not immerse in water.



Do not use in wet situations.

Construction work

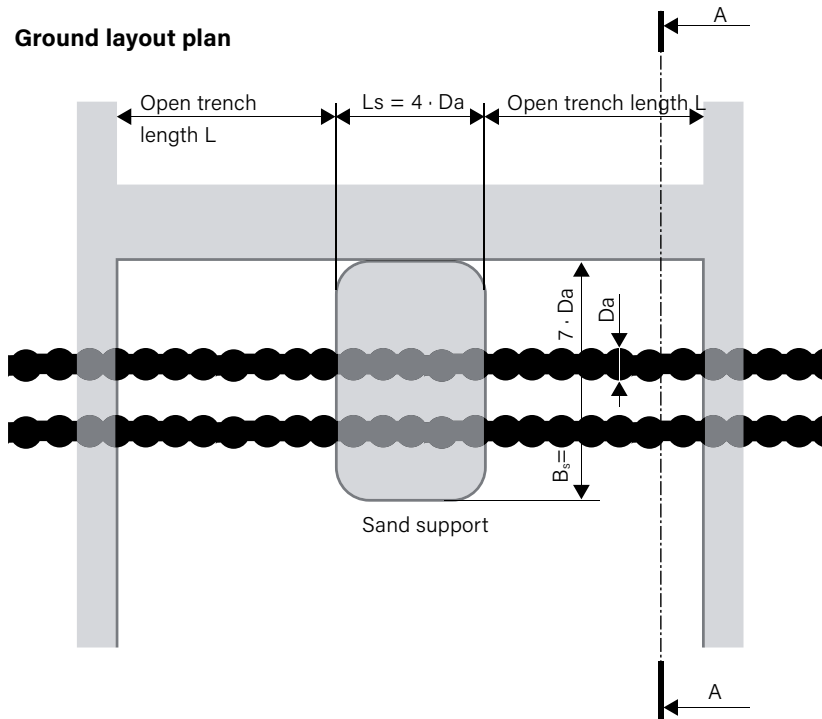
Open trench lengths

The static equilibrium of the CASAFLEX district heating pipe must be maintained during construction work; see the open trench lengths (L) stipulated in the table. If greater lengths have to be left unsupported, sand supports must be positioned at the intervals indicated. T-pieces must be separately fixed by means of sand supports.

In case of open digging parallel with the CASAFLEX pipe route, distance (A) must be respected. Where other trenches are parallel to the CASAFLEX route, the distance A must be maintained.

Type	L	L	L	L	L	A
	(6 bar)	(10 bar)	(16 bar)	(21 bar)	(25 bar)	
	m	m	m	m	m	m
DN 20	6	4	3	2	2	0.5
DN 25	6	4	3	2	2	0.5
DN 32	6	4	3	2	2	0.5
DN 40	5	4	3	2	2	0.5
DN 50	5	4	3	2	2	0.5
DN 65	5	4	3	2	2	0.6
DN 80	5	4	3	2	2	0.6
DN 100	5	4	3	2	2	0.6

Ground layout plan



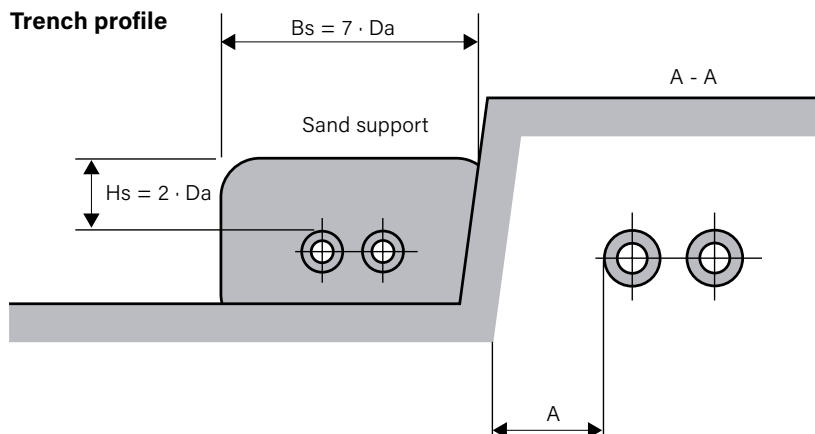
Sand support dimensions:

$$H_s = 2 \times D_a$$

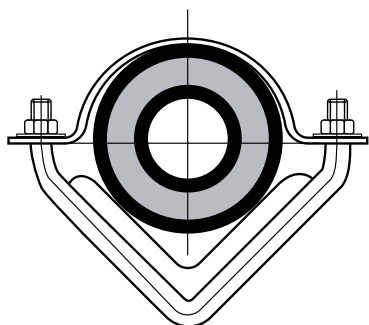
$$B_s = 7 \times D_a$$

$$L_s = 4 \times D_a$$

Trench profile



Open installation



Special measures are required for open installation of CASAFLEX district heating pipes:

- Installation on a continuous mounting rail (steel angle profile, galvanized)
- Changes of direction must also be supported
- In a 90° bend secure with clamps and pressure distribution plates at specified intervals
- Clamps
- Limitation to PN 10
- Fix ends with anchor points
- Assistance with design engineering and planning from BRUGG

CASFLEX Type	Angle steel (galvanized)	Distance between clamps	Minimum bending radius
	mm	m	m
CFL 22/ 91	60 x 60 x 6	2	0.8
CFL 30/111	70 x 70 x 7	2	1.0
CFL 39/126	80 x 80 x 8	2	1.2
CFL 48/126	80 x 80 x 8	2	1.2
CFL 60/142	90 x 90 x 9	2	1.3
CFL 75/162	90 x 90 x 9	2	1.8
CFL 98/162	90 x 90 x 9	2	1.8
CFL 127/202	90 x 90 x 9	2	2.0