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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 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 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.

2. Range of use

Max. temp. for continuous operation T_{Bmax}	160 °C*
Max. permitted operating temp. 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
X6 CrNiMoTi 17-12-2 (1.4571, AISI 316Ti) 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.

PIR insulation	Reference temperature °C	CASAFLEX value	Test standard
Density	-	> 60 kg/m³	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 (LLD-PE), seamlessly extruded
Purpose: Protection against mechanical action and humidity

PE-LD protective casing	Reference temperature °C	Value	Test standard
Density	-	931 kg/m³	ISO 1183
Thermal conductivity	-	0.43 W/mK	DIN 52612
Crystallite melting range	-	122 °C	ISO 11357-3

6. Monitoring wires

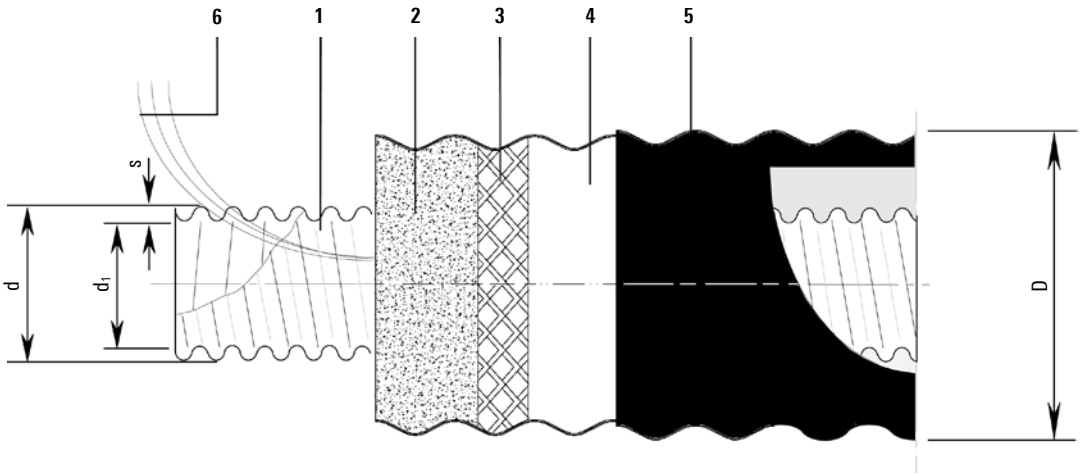
Materials: 1 x NiCr, red, insulated/perforated, Ø 1.1 mm/0.5 mm²
1 x Cu, green, insulated, Ø 1.3 mm/0.8 mm²
1 x Cu, white with nonwoven, Ø 1.55 mm/1.13 mm²

Systems: Conductor pairs: NiCr-red + Cu-green ≙ WIREM/Brandes system
Cu-green + Cu-white ≙ 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

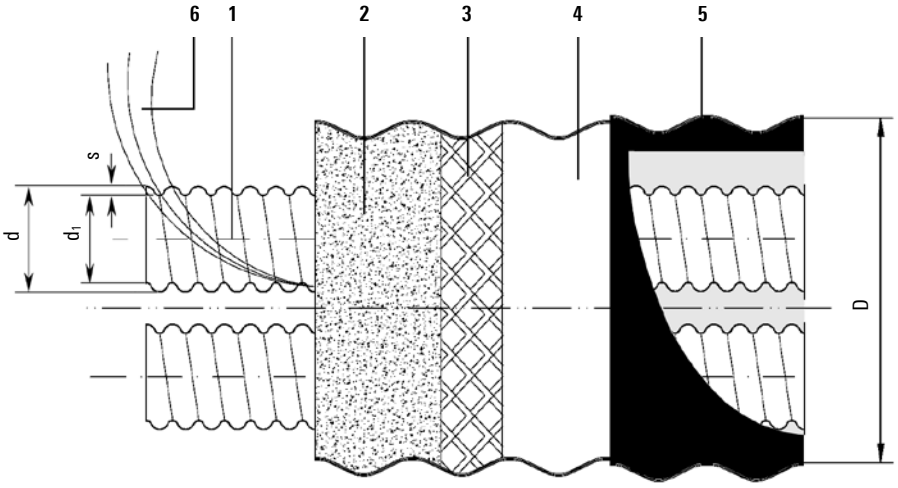
Type	DN	Inches	Inner pipe d x d_1 x s	Outer casing D	Minimum Bending radius	Volume Inner pipe	Weight	Maximum delivery lengths Coil[1]	Coil[2]	Coil[3]	Coil[4]
		″	mm	mm	m	l/m	kg/m	m	m	m	m
22/ 91	**20**	¾″	25 x 22 x 0.3	91	0.8	0.44	1.30	320	480	560	–
30/111	**25**	1″	34 x 30 x 0.3	111	1.0	0.80	1.48	205	290	360	–
39/126	**32**	1 ¼″	44 x 39 x 0.4	126	1.2	1.35	2.15	155	230	250	–
48/126	**40**	1 ½″	55 x 48 x 0.5	126	1.2	2.04	2.46	155	230	250	–
60/142	**50**	2″	66 x 60 x 0.5	142	1.3	3.12	3.02	100	150	200	–
75/162	**65**	2 ½″	86 x 75 x 0.6	162	1.8	5.12	4.10	55	100	145	–
98/162	**80**	3″	109 x 98 x 0.8	162	1.8	8.43	5.70	55	100	145	–
127/202	**100**	4″	143 x 127 x 0.9	210	2.8	14.30	8.80	–	40	–	75

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 1400 mm (width)

Supplied in drums on request

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	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	
22 + 22/111	**20**	¾″	25 x 22 x 0.3	111	1.1	0.44	2 x 2.5	205	290	360	–
30 + 30/126	**25**	1″	34 x 30 x 0.3	126	1.4	0.80	2 x 3.1	155	230	250	–
39 + 39/142	**32**	1 ¼″	44 x 39 x 0.4	142	1.5	1.35	2 x 3.7	100	150	200	–
48 + 48/162	**40**	1 ½″	55 x 48 x 0.5	162	1.8	2.04	2 x 4.2	55	100	145	–
60 + 60/182*	**50**	2″	66 x 60 x 0.5	182	2.0	3.12	2 x 5.1	55	80	–	–

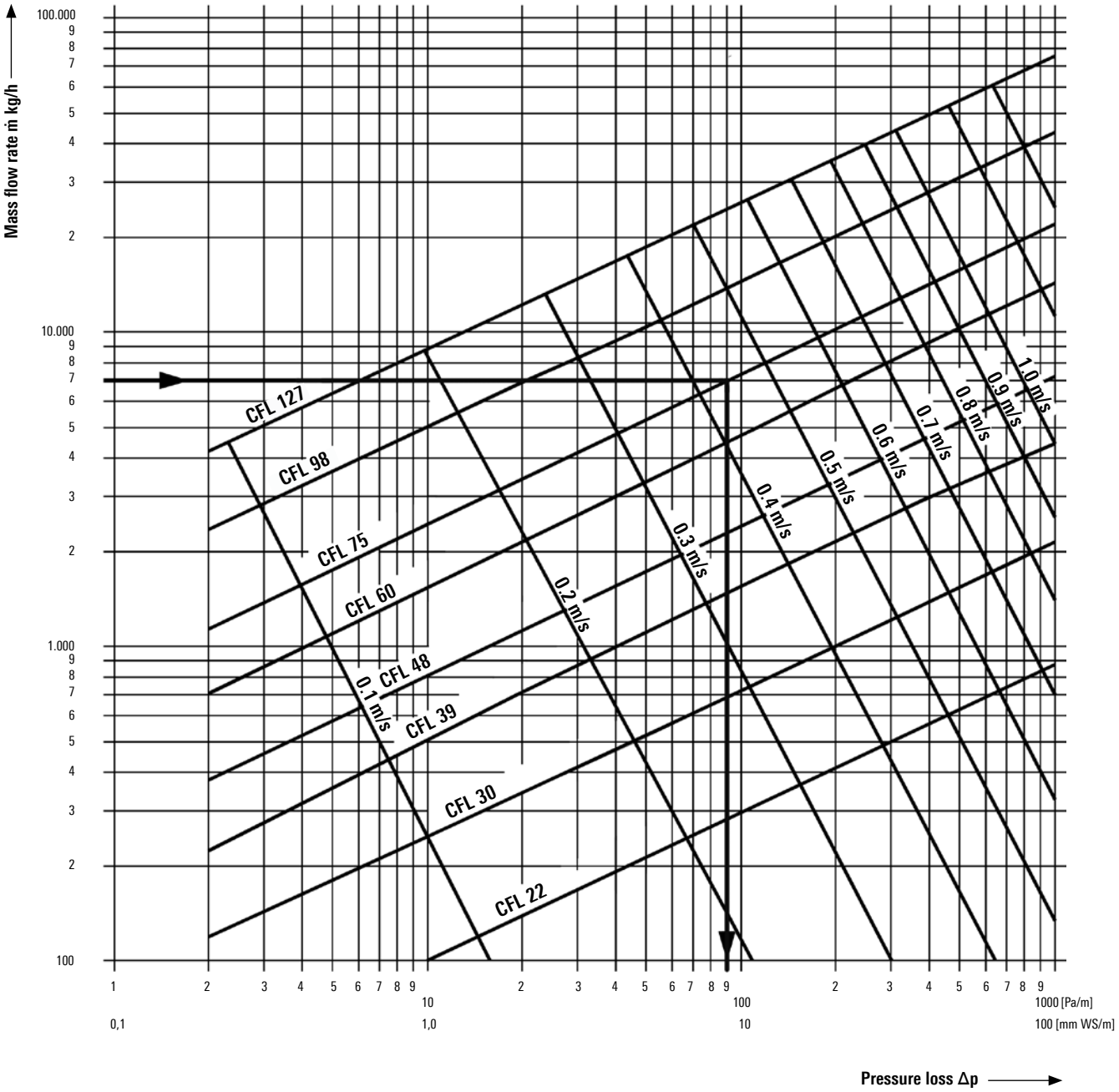
* Max. permitted operating temp. $T_{max.}$ 130 °C (not available in Germany)
1) Coil dimensions Ø 2800 x 800 mm (width)
2) Coil dimensions Ø 2800 x 1200 mm (width)
3) Coil dimensions Ø 3000 x 1200 mm (width)
4) Coil dimensions Ø 3000 x 1400 mm (width)
Supplied in drums on request

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

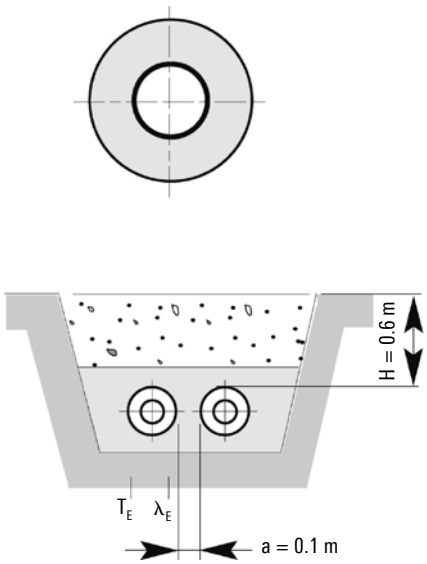


Example:
Mass flow rate 7000 kg/h; CASAFLEX type CFL 75
–> Pressure loss 90 Pa/m

Heat loss

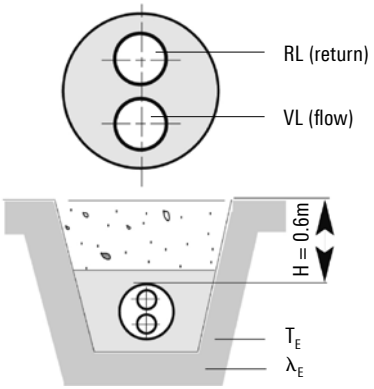
CASAFLEX UNO

Heat loss q [W/m] for one UNO pipe											
CASAFLEX	U-value	Average operating temperature T_B [°C]									
UNO	[W/mK]	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	U-value	Average operating temperature T_B [°C]									
DUO	[W/mK]	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



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

Heat loss during operation:

$q = U (T_B - T_E)$ [W/m]

U = Heat transfer coefficient [W/mK]

T_B = Average operating temperature [°C]

T_E = Average ground temperature [°C]

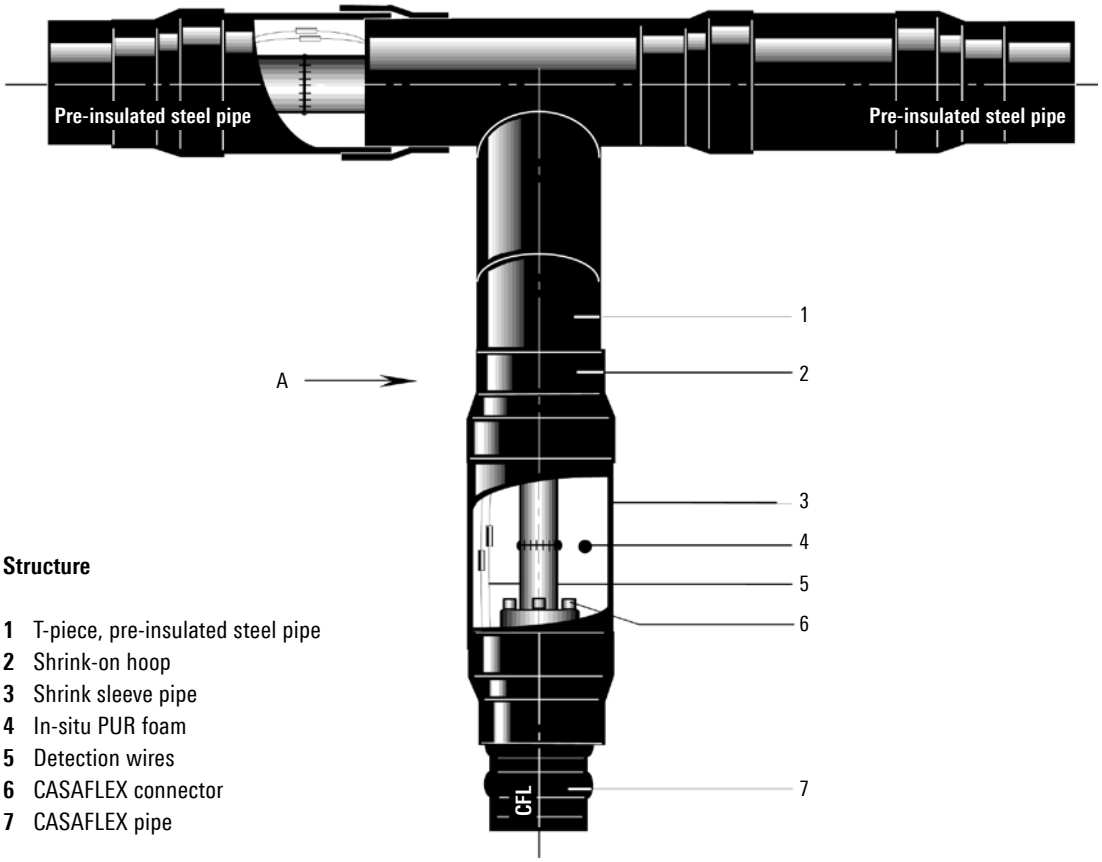
VL = Flow

RL = Return

T-joint

CASAFLEX connected to pre-insulated steel pipe

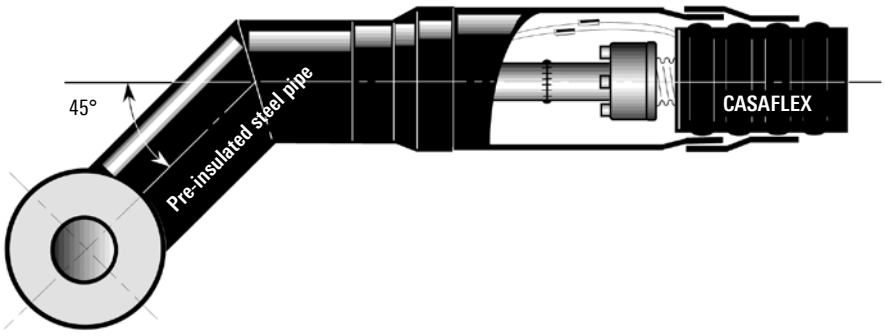
Structure of T-joint



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

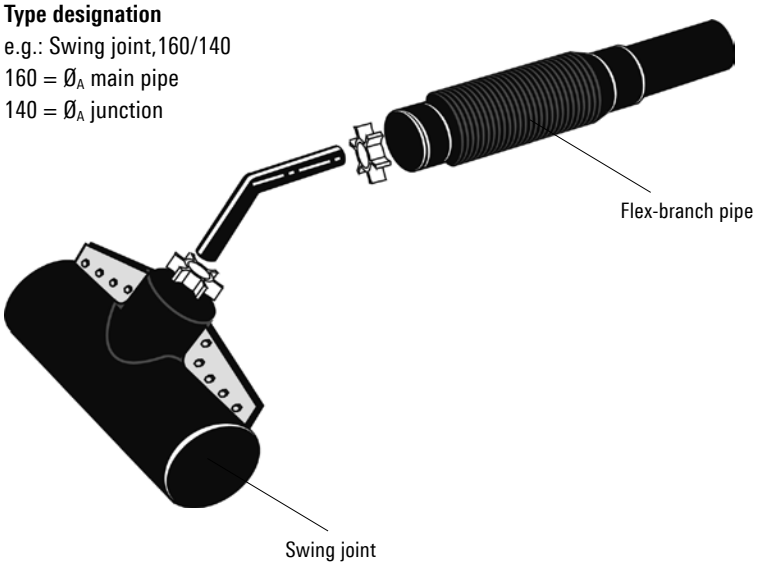


Flex-T-branch, 45°

Branch, main pipe

CASAFLEX to steel pipe – 45° connection

Type designation
e.g.: Swing joint,160/140
160 = $Ø_A$ main pipe
140 = $Ø_A$ junction



T-branch, steel pipe with CASAFLEX junction

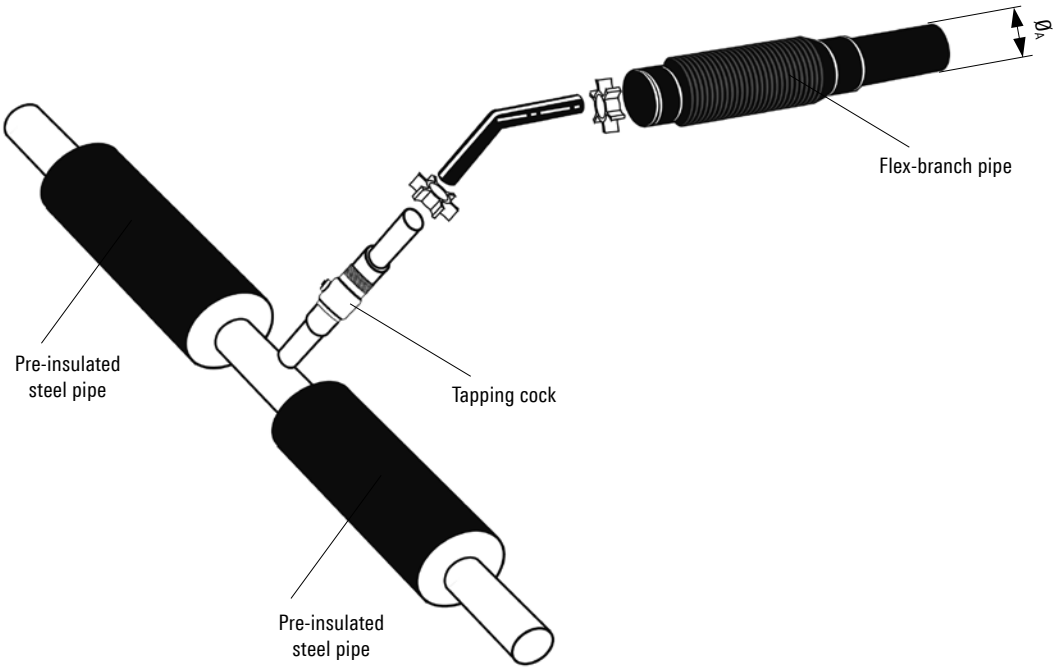
Main pipe $Ø_A$ mm	Junction $Ø_A$ mm	Branch pipe Type	Swing joint Type
110	90	90	110/ 90
125	90 or 110	110	125/110
140	90 or 110	110	140/110
140	125	125	140/125
160	90 or 110	110	160/110
160	125 or 140	140	160/140
180	90 or 110	110	180/110
180	125 or 140	140	180/140
200	90 or 110	110	200/110
200	125 or 140	140	200/140
225	90 or 110	110	225/110
225	125 or 140	140	225/140
250	90 or 110	110	250/110
250	125 or 140	140	250/140
280	90 or 110	110	280/110
280	125 or 140	140	280/140
315	90 or 110	110	315/110
315	125 or 140	140	315/140

Supplied on request.

Flex-T-branch, 45°

with and without tapping cock

Insulated steel pipe – Flex-T-branch 45°, with or without tapping cock



Flex-branch pipe for connection with or without tapping cock

CASAFLEX Type	DN	Junction $Ø_A$ Type: Flex-branch pipe without tapping cock	Junction $Ø_A$ Type: Flex-branch pipe with tapping cock, through passage	
			full	reduced
		mm	mm	mm
CFL 22/ 91	20	110	110	110
CFL 30/111	25	110	110	110
CFL 39/126	32	140	140	140
CFL 48/126	40	140	140	140
CFL 60/142	50	140	–	140

Supplied on request

Execution example

Desired execution:	45° branch with tapping cock, with full through passage
Pre-insulated steel pipe:	$Ø_A$ = 315 mm
Branch	DN 40

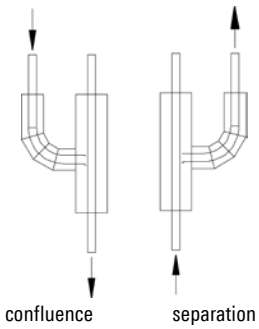
Table on CFL 4.315:
CASAFLEX type 48/111, tapping cock - full through passage - results in junction $Ø_A$ or flex-branch pipe type = 125 mm

Table on CFL 4.310:
Main pipe $Ø_A$ = 315 mm, results in flex-T-branch, type 315/125

Y-branch pipe Type G (straight)

CASAFLEX UNO

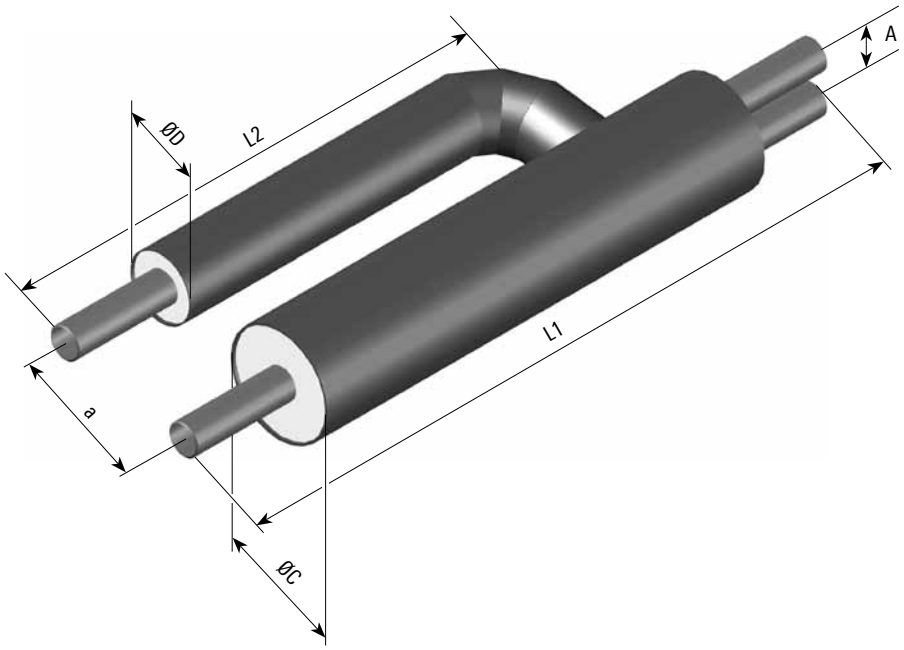
Y-branch pipes are employed to provide a transition from conventionally laid piping using two single pipes CASAFLEX UNO to the space-saving PREMANT DUO format. The upper pipe (preferably the return pipe) runs straight ahead through the Y-branch pipe while the lower pipe is angled at 90°. In the Type 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.



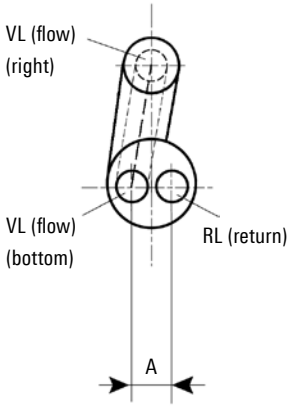
Construction variants

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 da mm	Installation length L1* mm	Junction L2** mm	Distance a mm	Ø C mm	A mm	2 x single steel pipe mm	Ø D mm
20	26.9	1500	1000	250	125	45.9	26.9 x 2.6	90
25	33.7	1500	1000	250	140	52.7	33.7 x 2.6	90
32	42.4	1500	1000	300	160	61.4	42.4 x 2.6	110
40	48.3	1500	1000	300	160	67.3	48.3 x 2.6	110
50	60.3	1500	1000	300	200	80.3	60.3 x 2.9	125

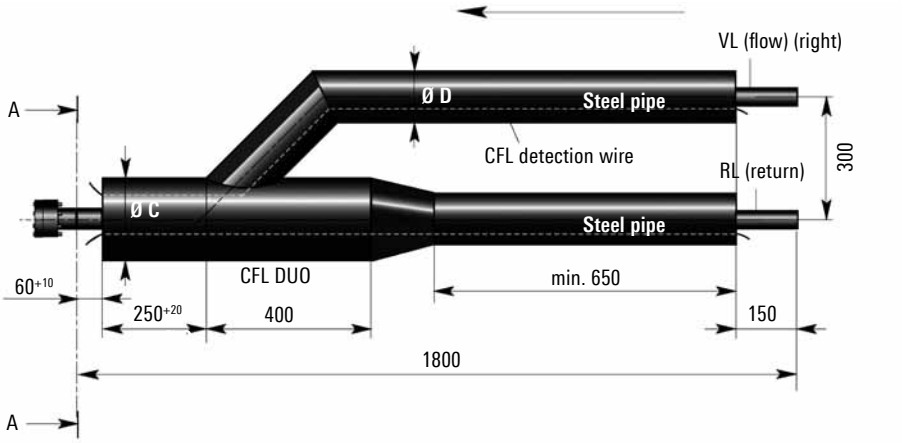
* free pipe end 200 mm
** measured from the middle of the branch line

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

Y-branch pipe

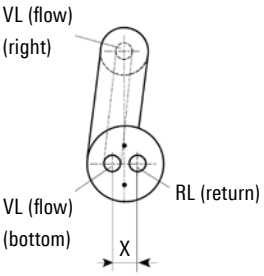
CASAFLEX-DUO

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.

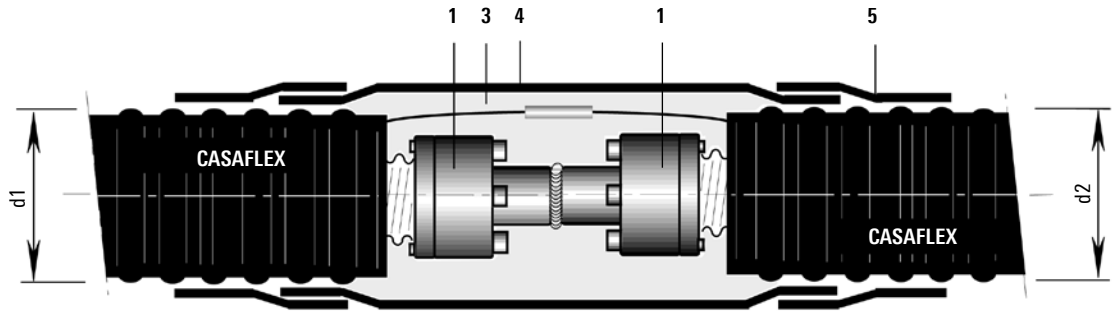


Figures in mm

Type	DN	Inches	Pipe connection d x s	Ø C	A	2 x single steel pipes	Ø D
		"	mm	mm	mm	mm	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**	1 ¼"	42.4 x 3.2	200	81	42.4 x 2.6	110 / 125
48 + 48/162	**40**	1 ½"	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

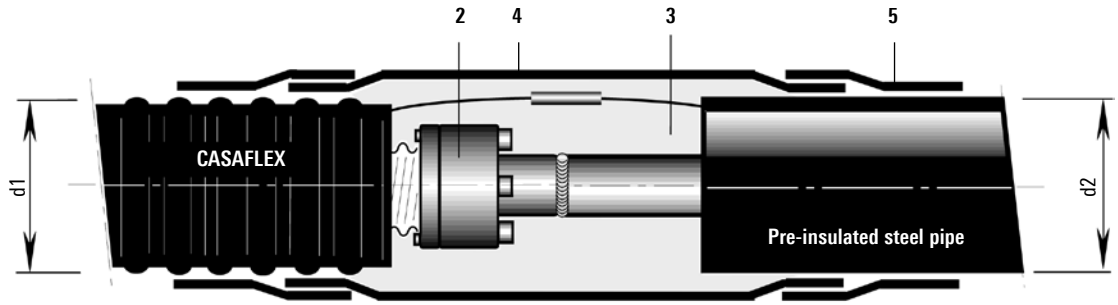
Joint

CASAFLEX to CASAFLEX joint



Ø inner pipe identical

CASAFLEX to steel pipe joint



Structure

1 Through coupling (2 connectors, welded by customer or others)
2 ME connector; see sheet CFL 4.335, item 3
3 Insulating material (PUR foam); see sheet CFL 4.345
4 Shrink sleeve pipe
5 Shrink hose

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

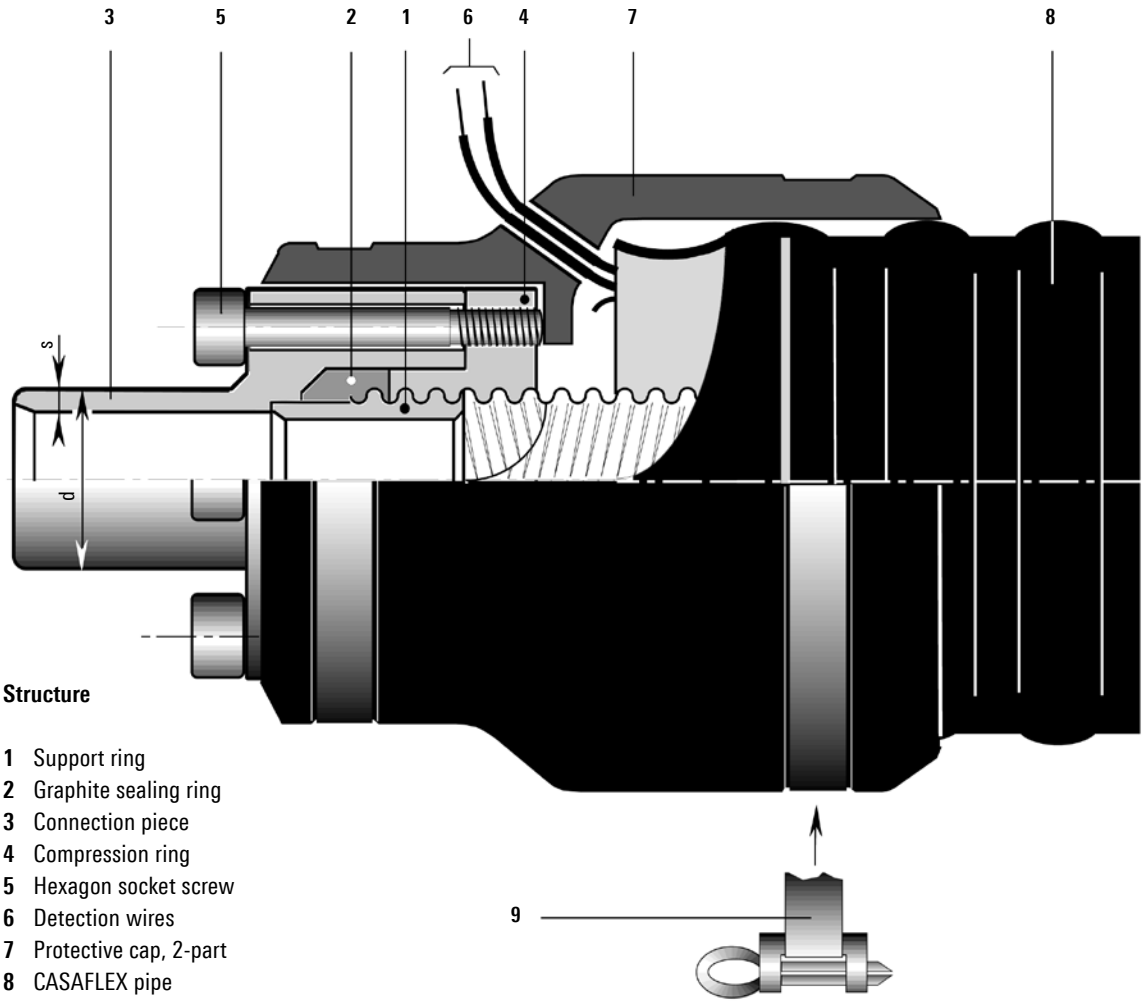
* further joint systems and reduction sleeves are available on request

Figures in mm

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
4 Compression ring
5 Hexagon socket screw
6 Detection wires
7 Protective cap, 2-part
8 CASAFLEX pipe
9 Retainer strap

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**	1 ¼"	42.4 x 3.2
48/126	**40**	1 ½"	48.3 x 3.2
60/142	**50**	2"	60.3 x 3.6
75/162	**65**	2 ½"	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

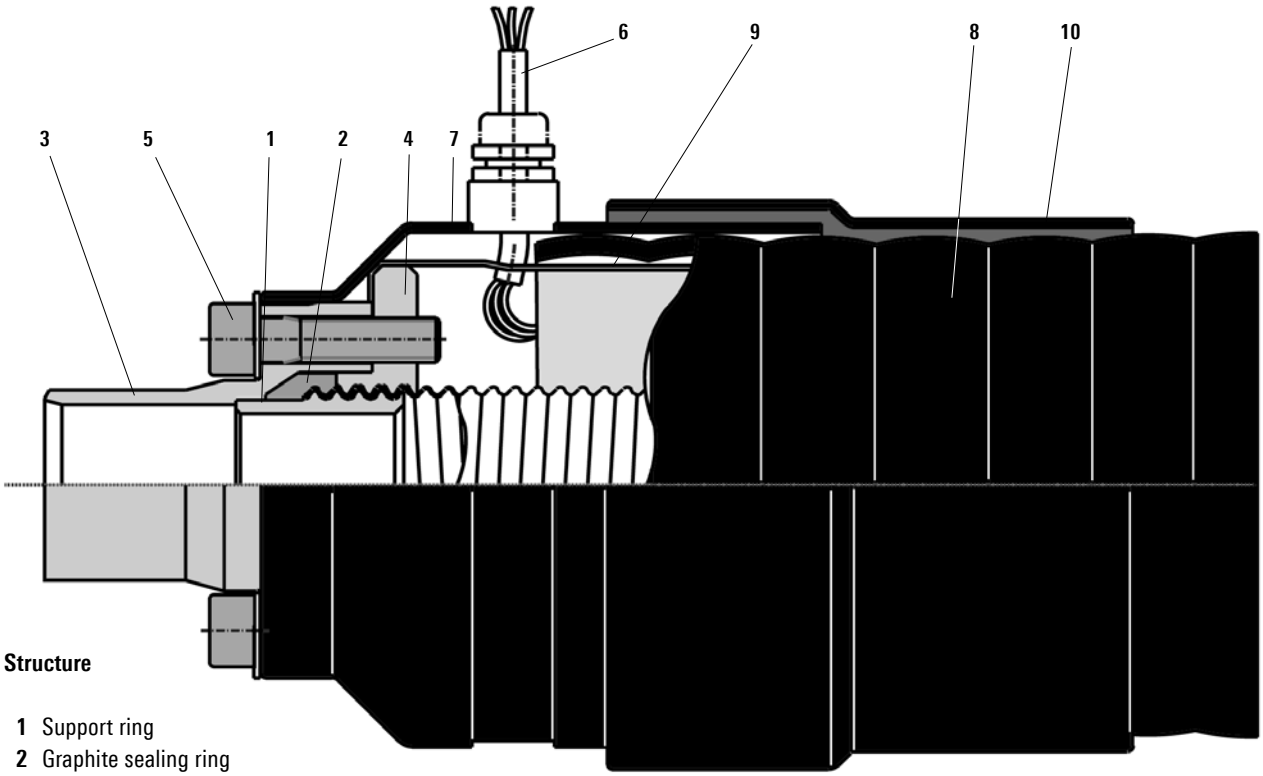
Connector

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.

On connector type PN 25, the expanded mesh (9) is drawn in over a metal plate cap; 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
4 Compression ring
5 Hexagon socket screw
6 Detection wires
7 Protective cap and wire outlet
8 CASAFLEX pipe
9 Expanded metal mesh
10 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**	1 ¼"	42.4 x 3.2
48/126	**40**	1 ½"	48.3 x 3.2
60/142	**50**	2"	60.3 x 3.6

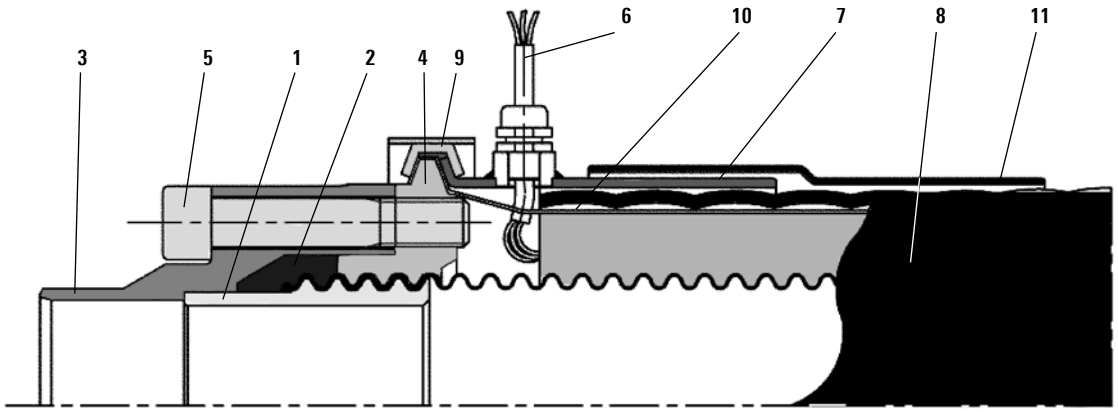
Connector

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 Back-up ring
2 Graphite sealing ring
3 Connection piece
4 Pressure ring
5 Hexagonal socket head screw
6 Monitor leads
7 Protective cap and monitor lead exit
8 CASAFLEX pipe
9 Clamping ring
10 Expanded metal
11 Shrink sleeve

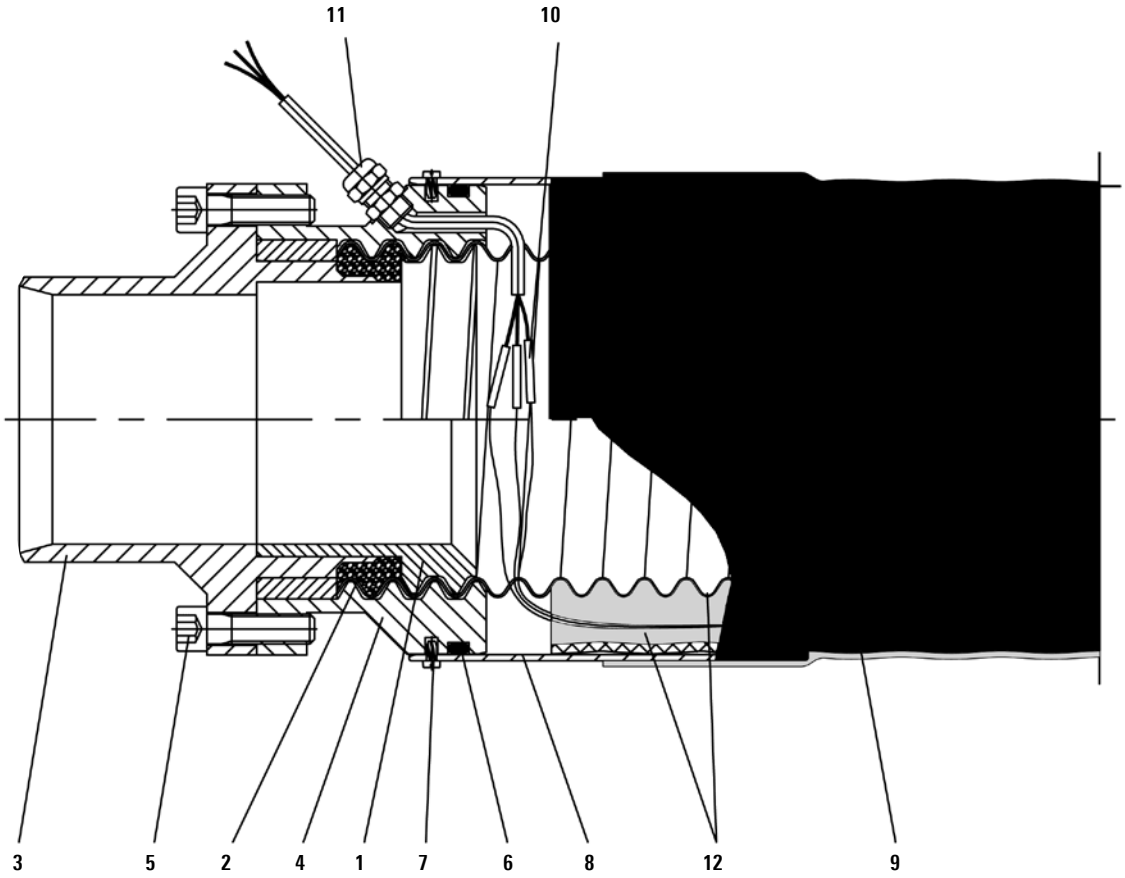
CASAFLEX UNO / PN 25

Type	DN	Inches	Pipe connection d x s
		″	mm
75/162	**65**	2 ½″	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 Internal backing sleeve
2 Graphite packing
3 Connection piece
4 Thrust collar
5 Cylindrical screw
6 O-ring
7 screw
8 Protective cap
9 Shrink sleeve
10 Detection conductor
11 Connector for monitoring wires
12 CASAFLEX pipe

CASAFLEX UNO / PN 16

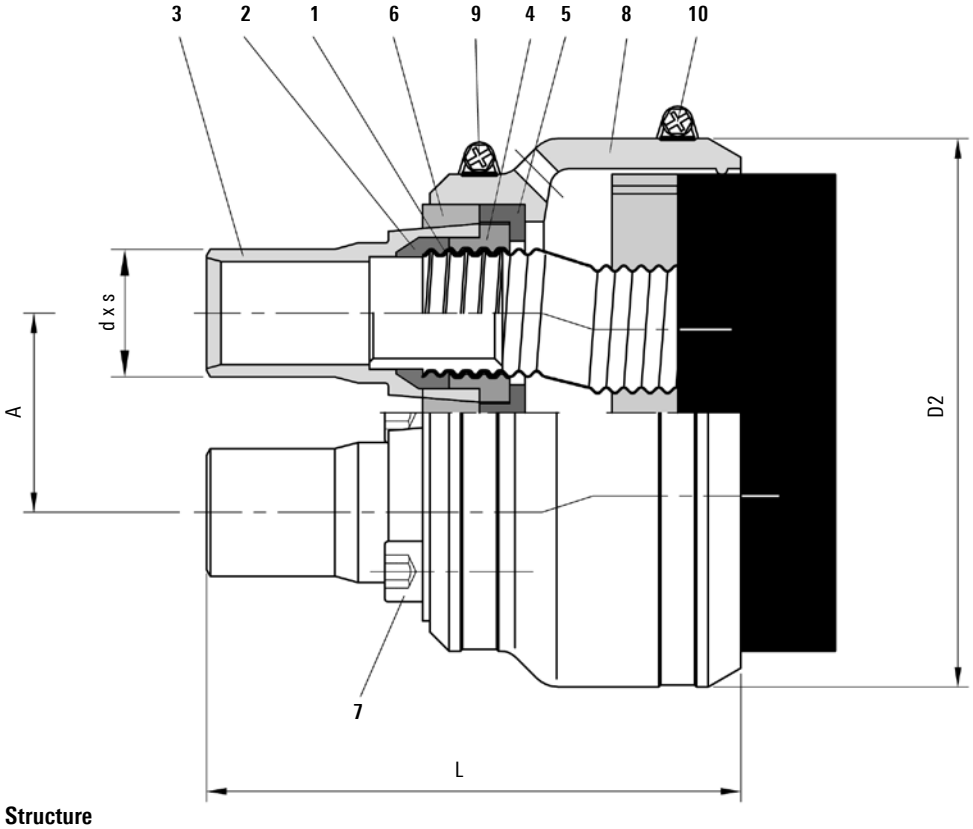
Type	DN	Inches	Pipe connection d x s
		″	mm
127/202	**100**	4″	114.3 x 4.5

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.

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
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	Axis distance A	Length L	D2
		″	mm	mm	mm	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**	1 ¼″	42.4 x 3.2	61.4	≈208	164
48 + 48/162	**40**	1 ½″	48.3 x 3.2	69.0	≈232	184
60 + 60/182	**50**	2″	60.3 x 2.9	79.7	≈210	245

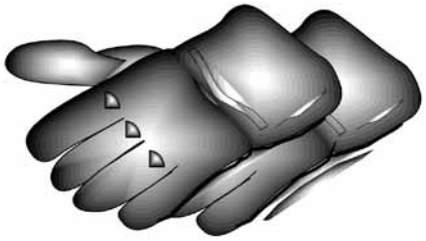
Accessories

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

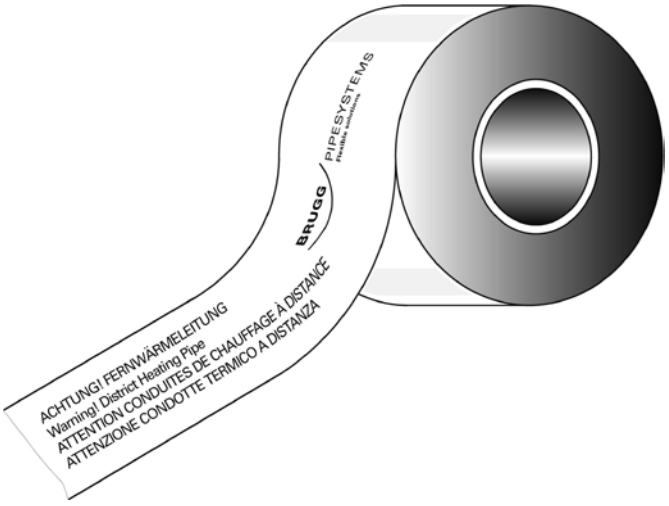


Protective goggles

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.

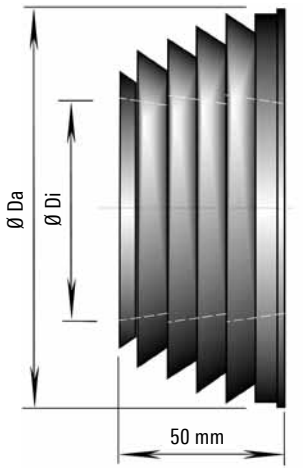
Pipe warning tape
Pipe warning tape to be laid in the ground
Standard roll length: 250 m

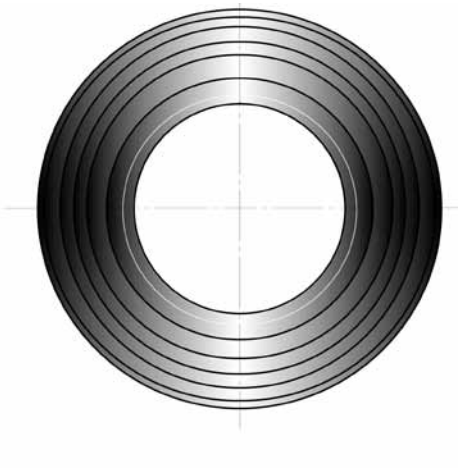
Installation depth; see sheet CFL 4.505



Wall seal

for wall openings





CASAFLEX UNO/DUO

Outer casing diameter	Neoprene wall sealing ring	
	Ø Di, inner	Ø Da, outer
mm	mm	mm
91	93	133
111	113	153
126	128	168
142	144	183
162	164	203
202	204	240

Building entry (see sheet CFL 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

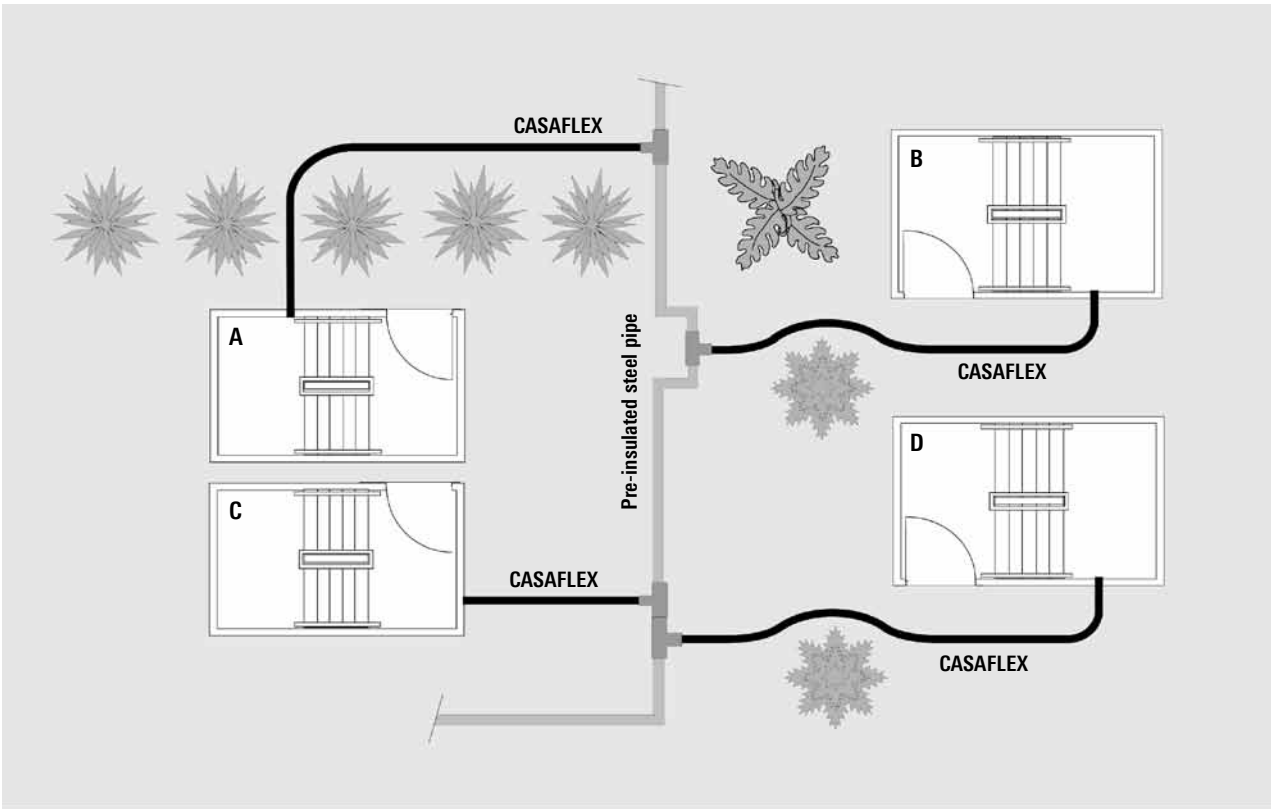
CASAFLEX UNO/DUO

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
202	300	210	300

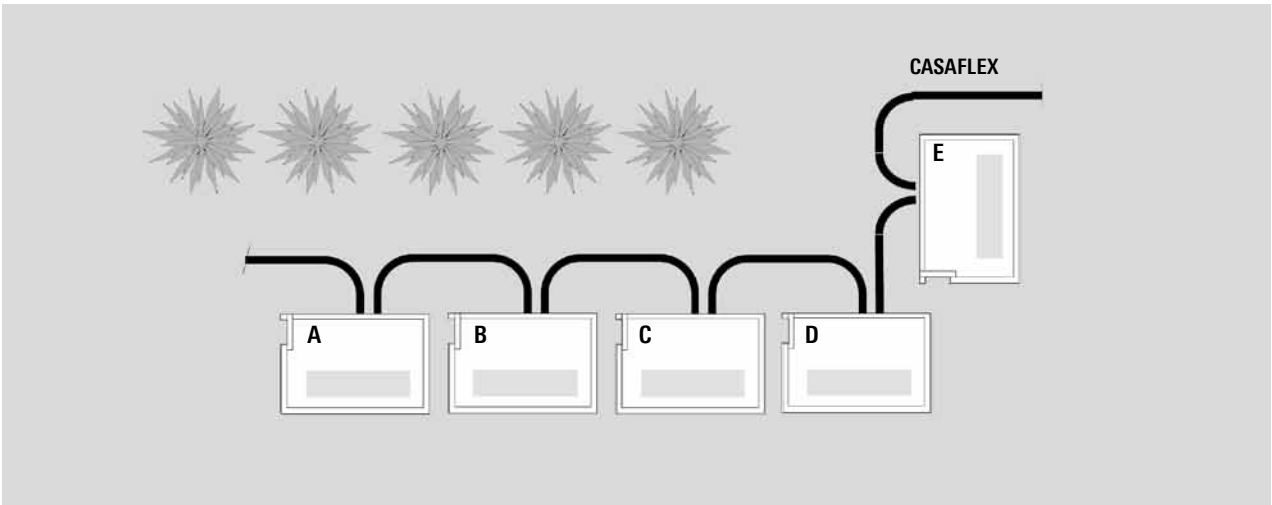
Building entry/core bore (see sheet CFL 4.525)

Pipe routing

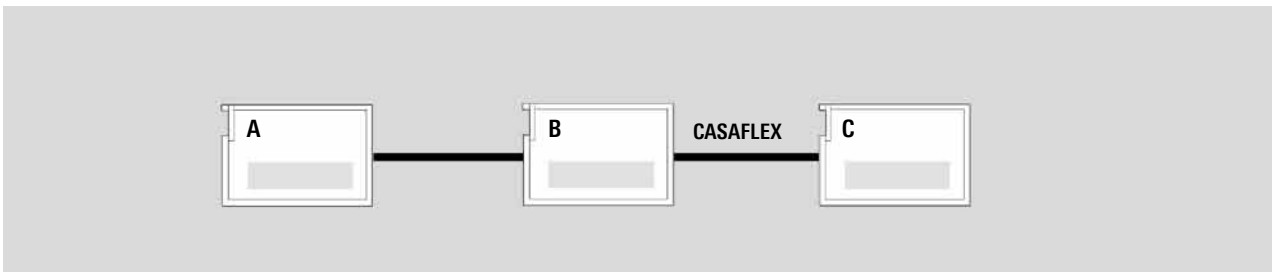
CASAFLEX – pre-insulated steel pipe connection



Loop-in method

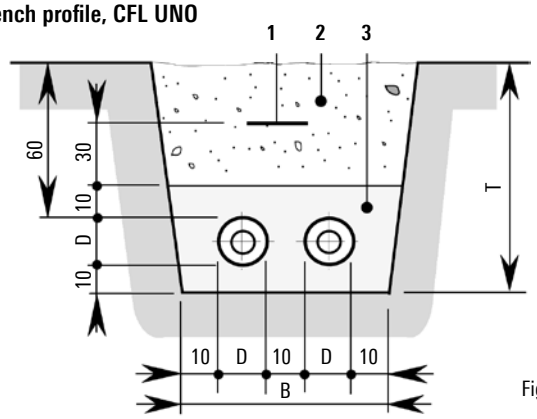


House-to-house connection



Trench dimensions

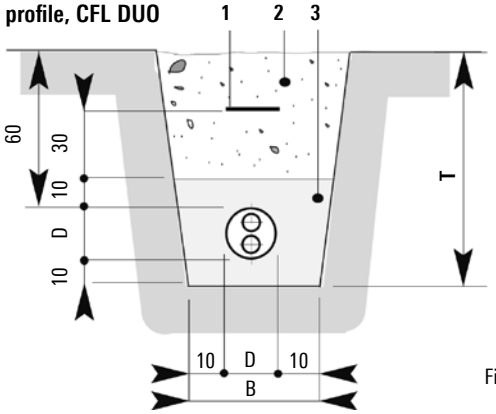
Trench profile, CFL UNO



Figures in cm

CASAFLEX Outer casing Ø D	Width B	Depth T	Minimum Bending radius
mm	cm	cm	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

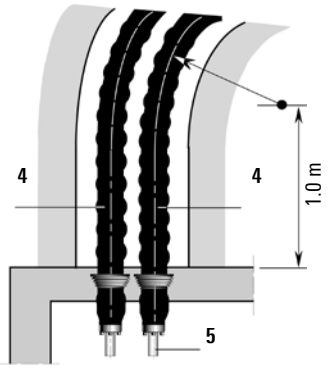
Trench profile, CFL DUO



Figures in cm

CASAFLEX Outer casing Ø D	Width B	Depth T	Minimum Bending radius
mm	cm	cm	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 Sand, washed, grain size 0 - 8 mm
4 CASAFLEX district heating pipe
5 Connector; see sheet CFL 4.330 - CFL 4.350

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

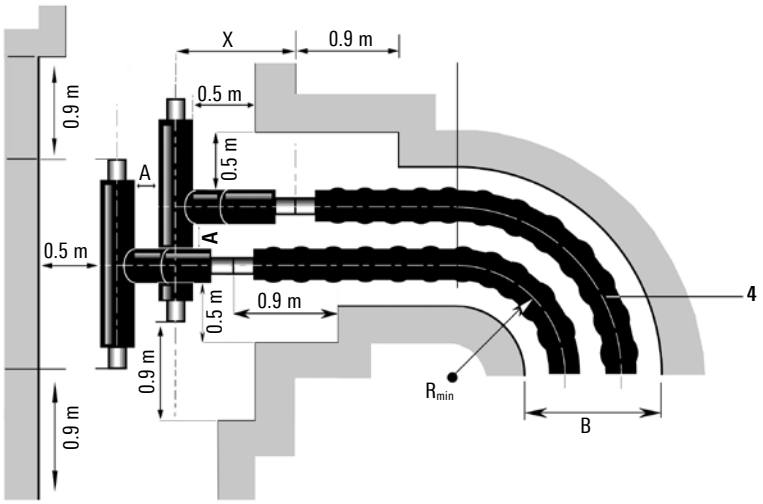
When connecting KMR DUO to CASAFLEX DUO the same dimensions are valid for one pipe axis

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 RSt075 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

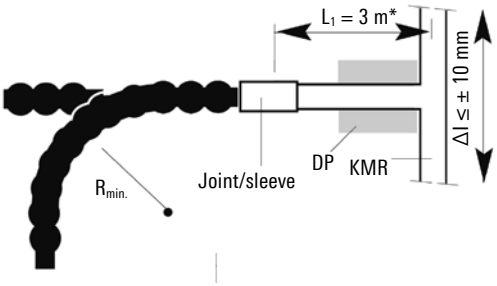


Connection (rigid/flexible)

CASAFLEX – pre-insulated steel pipe

Installation instructions for transition from CASAFLEX to pre-insulated steel pipe

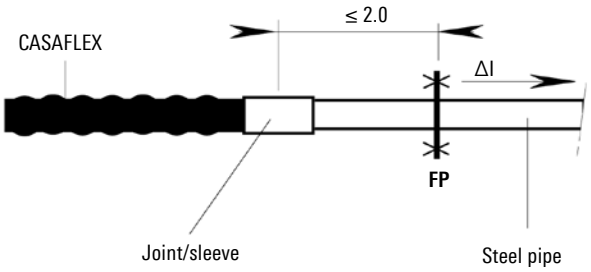
1. Junction with T-piece



The transverse expansion ΔI must not exceed the expansion that can be accommodated by junction pipe L1 and the CASAFLEX pipes.

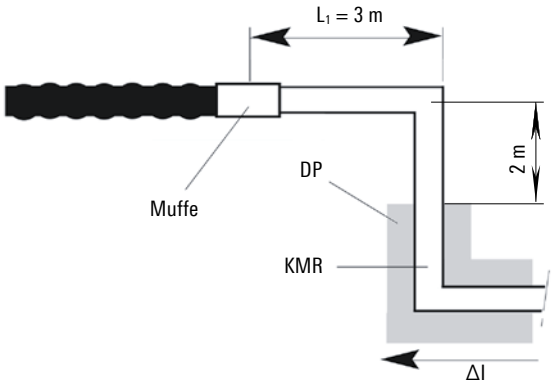
2. Transition with fixed point

All figures in m



The expansion ΔI of the plastic casing pipe (due to the increase in temperature) cannot be compensated by the CASAFLEX pipes. Installation requires a fixed point.

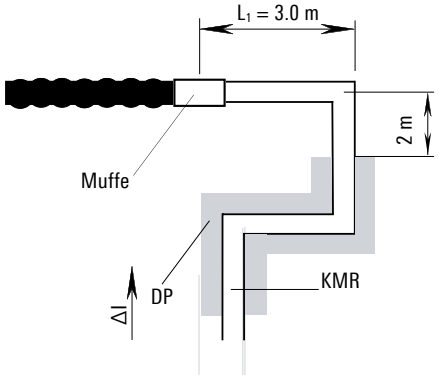
3. Transition with Z-bend



Static design of the Z-bend according to expansion variable ΔI.

4. Transition with expansion bend

All figures in m



ΔI = Expansion
FP = Fixed point (pre insulated steel pipe)
EP = Expansion pad

- **Design of expansion components**
- **Positioning of expansion pads**

as per the section on PREMANT

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:

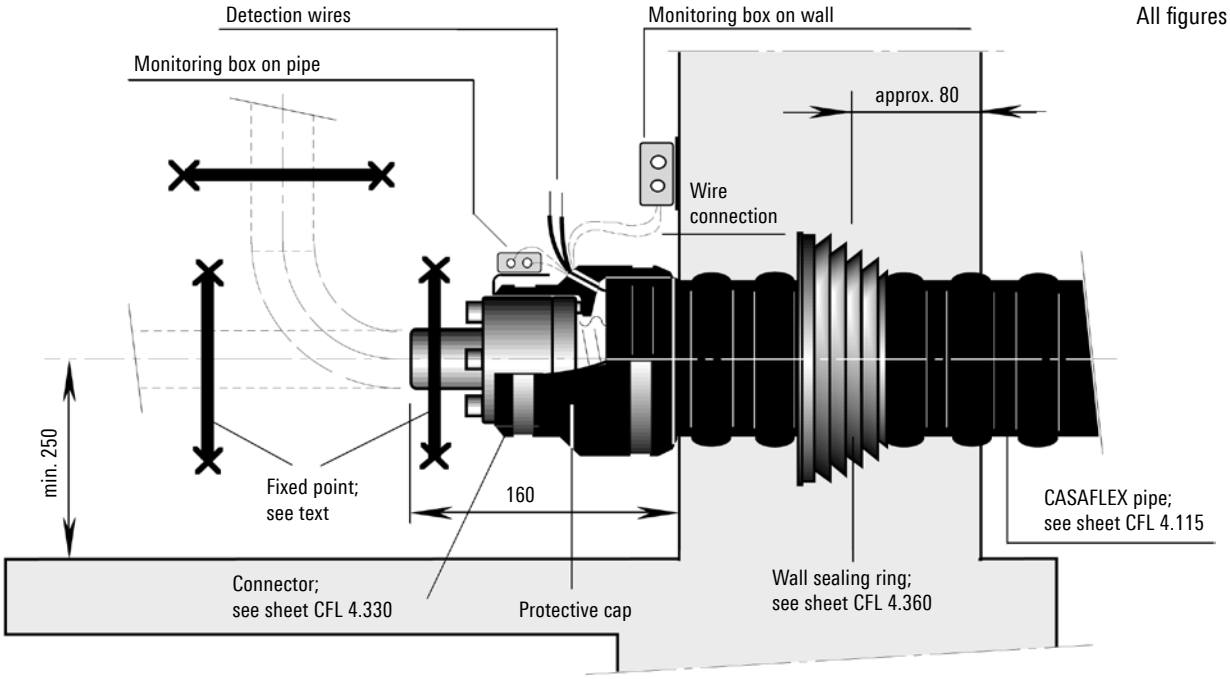
Fixed point forces per pipe

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

Entry into building

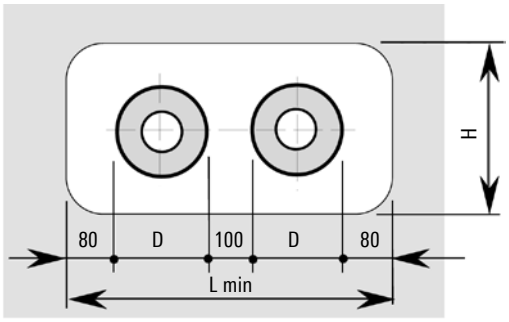
Wall opening



All figures in mm

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).

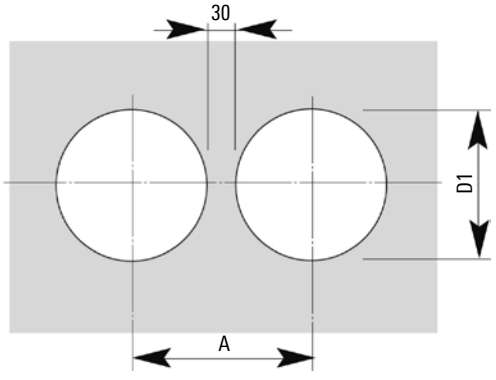
Wall opening



All figures in mm

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

Core bores

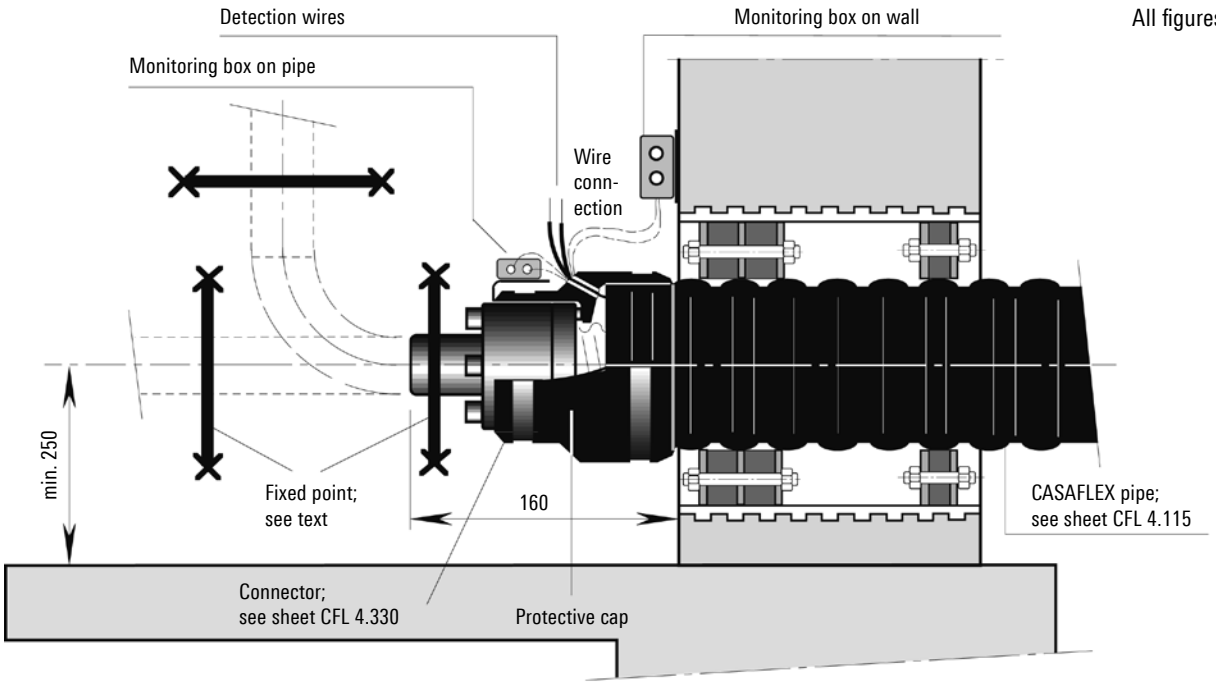


All figures in mm

Outer casing Ø D	D1	A
mm	mm	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.

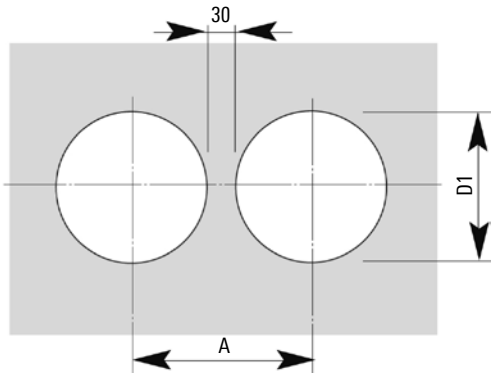
Seal set type A single-seal
1 x 40 mm, Shore hardness D 35

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



All figures in mm

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

Shaft structures

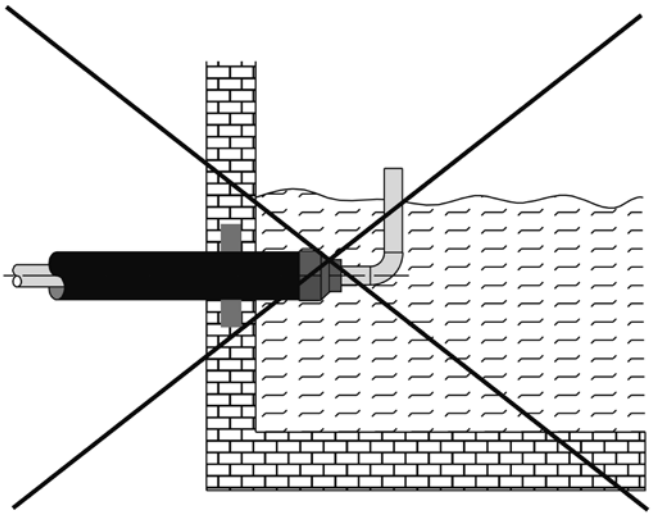
Entry into building

Planning and engineering of shaft structures

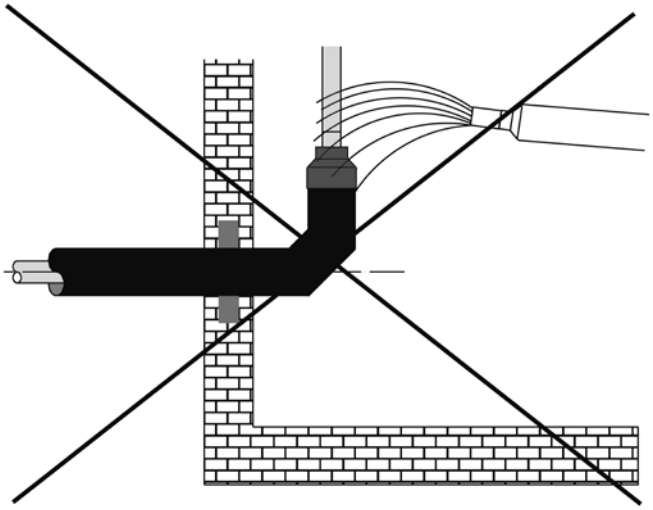
The construction and maintenance of shaft structures in local and district heating networks is usually very expensive and time-consuming. They must include inbound and outbound ventilation and must be built so that they are watertight; any surface water which penetrates should be removed as quickly as 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

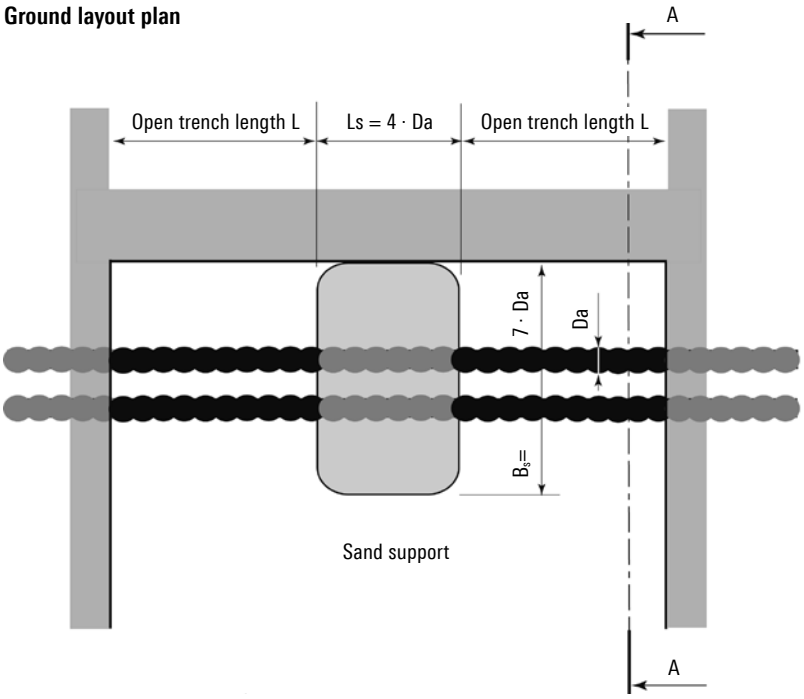
Open trench lengths

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 (6 bar) m	L (10 bar) m	L (16 bar) m	L (21 bar) m	L (25 bar) m	A 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	2	4	3	2	2	0.6
DN 100	5	4	3	2	2	0.6

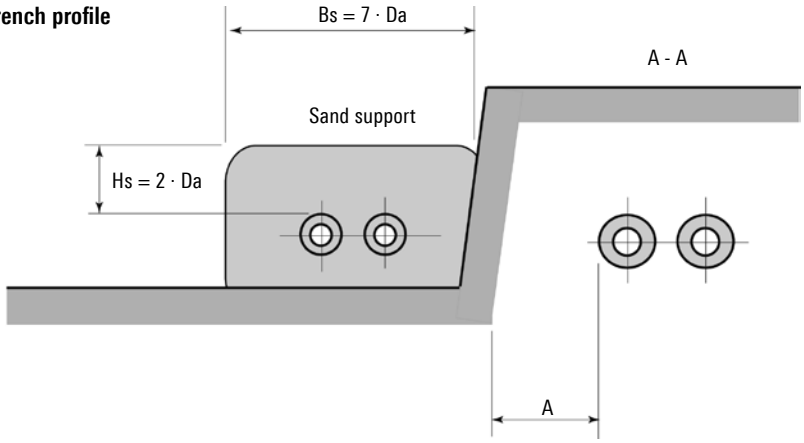
Ground layout plan



Sand support dimensions:

Hs = 2 x Da
Bs = 7 x Da
Ls = 4 x Da

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

CASAFLEX Type radius	Angle steel (galvanized)	Distance between clamps	Minimum bending
	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 127/225	90 x 90 x 9	2	2.0