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## CFL **4.100**

# 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

\* Type 60+60/182 T<sub>max</sub> 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  $\lambda_{\rm 50}$  value: 0.025 W/mK.

PIR insulation	Reference temperature	°C CASAFLEX value	Test standard
Density	-	> 60 kg/m³	DIN 53420
Thermal conductivity	50	$\leq$ 0.025 W/mK	DIN 52612
Percentage of closed cells	-	≥ 90 %	EN 253
Water absorption after 24 hours	-	$\leq$ 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 temperatu	Reference temperature °C Value				
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, insulate	1 x NiCr, red, insulated/perforated (Ø 0.5 mm without insulation)						
	1 x Cu, green, insula	1 x Cu, green, insulated (Ø 0.8 mm without insulation)						
	1 x Cu, white with no	onwoven (Ø 1.13 mm without insulation)						
Systems:	Conductor pairs:	NiCr-red + Cu-green≜ WIREM/Brandes system						
		Cu-green + Cu-white≜ Nordic system						
Purpose:	Identification and loo	cation 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**

Туре	DN	Inches	Inner pipe	Outer casing	Minimum	Volume	Weight	Maxin	num de	livery l	engths
			d x d₁ x s	D	Bending	Inner pipe					
					radius			Coil <sup>1)</sup>	Coil <sup>2)</sup>	Coil <sup>3)</sup>	Coil <sup>4)</sup>
		"	mm	mm	m	l/m	kg/m	m	m	m	m
22/ 91	20	3⁄4	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	11⁄4	44 x 39 x 0.4	126	1.2	1.35	2.60	155	230	280	340
48/126	40	11/2	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	21⁄2	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

Coil dimensions Ø 2800 x 800 mm (width)
Coil dimensions Ø 2800 x 1200 mm (width)
Coil dimensions Ø 3000 x 1200 mm (width)

4) Coil dimensions @ 2000 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

Туре	DN	Inches	Inner pipe	Outer casing	Minimum	Volume	Weight	Maxim	num del	ivery le	ngths
			d x d <sub>1</sub> x s	D	Bending radiu	s	Inner pipe	Coil <sup>1)</sup>	Coil <sup>2)</sup>	Coil <sup>3)</sup>	Coil <sup>4)</sup>
		"	mm	mm	m	l/m	kg/m	m	m	m	
22 + 22/111	20	3⁄4	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	11⁄4	44 x 39 x 0.4	142	1.5	1.35	3.7	100	150	200	300
48 + 48/162	40	11/2	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<sub>max.</sub> 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



#### 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	Ave	Average operating temperature T <sub>B</sub> [°C]									
UNO	[W/mK]	<b>40</b> °	<b>50</b> °	<b>60</b> °	<b>70</b> °	<b>80</b> °	90°	<b>100°</b>	<b>110°</b>	<b>120°</b>	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	



– a = 0.1 m

### CASAFLEX DUO

Heat loss q [W/m] for one DUO pipe											
CASAFLEX	U-value	Ave	/erage operating temperature T <sub>B</sub> [°C]								
DUO	[W/mK]	<b>40</b> °	<b>50</b> °	<b>60</b> °	<b>70</b> °	<b>80</b> °	<b>90</b> °	<b>100</b> °	<b>110°</b>	<b>120°</b>	<b>130°</b>
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
*net eveilek											

\*not available in Germany



 $T_E = \lambda_E$ 

Pipe distance:	а	
Coverage height:	Н	
Ground temperature:	$T_E$	
Soil conductivity:	$\lambda_{E}$	
Conductivity of PIR foam:	$\lambda_{\text{PIR}}$	
**Conductivity of PUR foam:	$\lambda_{\text{PIR}}$	
Conductivity of PE casing:	$\lambda_{\text{PE}}$	

### Heat loss during operation: $q = U (T_B - T_E) [W/m]$

- $\begin{array}{l} U &= Heat \mbox{ transfer coefficient [W/mK]} \\ T_{_B} &= Average \mbox{ operating temperature [°C]} \\ T_{_E} &= Average \mbox{ ground temperature [°C]} \end{array}$
- VL = FlowRL = Return



## T-joint

CASAFLEX connected to pre-insulated steel pipe

### Structure of T-joint



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: Heat insulation: Casing pipe: Insulation thickness: welded steel pipe DIN EN 253 PUR hard foam PE-HD 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	ØC	А	2 x single steel pipe	ØD
	da	L1*	L2**	а				
	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

Ð

A reducing socket must be used on the side with the single pipe to connect the straight through pipe. **Not available in Switzerland.** 



### | CFL 4.311

## 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

VL (flow)

**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

Туре	DN	Inches	Pipe connection	ØC	Α	2 x single	ØD
			d x s			steel pipes	
		"	mm	mm	mm	mm	mm
22 + 22/111	20	3⁄4	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	11⁄4	42.4 x 3.2	200	81	42.4 x 2.6	110 / 125
48 + 48/162	40	11/2	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**





### 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**



**CASAFLEX - steel pipe** 

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.



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.



- 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

Туре	DN	Inches	Pipe connection
		"	mm
22/ 91	20	3⁄4	26.9 x 2.6
30/111	25	1	33.7 x 3.2
39/126	32	11⁄4	42.4 x 3.2
48/126	40	11⁄2	48.3 x 3.2
60/142	50	2	60.3 x 3.6
75/162	65	21/2	76.1 x 3.6
98/162	80	3	88.9 x 4.0

Uses					
Туре	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.



- 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

Туре	DN	Inches	Pipe connection
			d x s
		п	mm
22/ 91	20	3⁄4	26.9 x 2.6
30/111	25	1	33.7 x 3.2
39/126	32	11⁄4	42.4 x 3.2
48/126	40	11/2	48.3 x 3.2

Uses					
Execution					
as per drawing					
Pos. 7, no protective cap					
see CFL 4.530					



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.



- 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

Туре	DN	Inches	Pipe connection		
			d x s		
		"	mm		
22/ 91	20	3⁄4	26.9 x 2.6		
30/111	25	1	33.7 x 3.2		
39/126	32	11⁄4	42.4 x 3.2		
48/126	40	11/2	48.3 x 3.2		
60/142	50	2	60.3 x 3.6		



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

Туре	DN	Inches Pipe co d x s	
		"	mm
75/162	65	21/2	76.1 x 3.6
98/162	80	3	88.9 x 4.0



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

- $\mathbf{1} \text{ Support ring}$
- 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

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



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.



- 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**

Туре	DN	Inches	Pipe connection	Axis distance	Length	
			d x s	Α	L	D2
		"	mm	mm	mm	mm
22 + 22/111	20	3⁄4	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	11⁄4	42.4 x 3.2	61.4	≈208	164
48 + 48/162	40	11/2	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



### CFL 4.355

## **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



### CFL 4.356

## **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.



### 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.

Synthetic gloves



**Protective goggles** 







## 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	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	Liner pipe, core bore	Seal set	Seal set
Ø	Ø	Ø D, inner	Ø D, outer
mm	mm	mm	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**





### Loop-in method



### House-to-house connection





### CEL 4.505

## **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

### Trench profile, CFL UNO



Trench profile, CFL DUO



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 = 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

- Maximum 10 percent by mass ≤ 0.075 mm
- Maximum 3 percent by mass  $\leq$  0,02 mm
- Proctor density min. 94%; optimal 97...98%

CASAFLEX	Width	Depth	Minimum
Outer casing			Bending
ØD	В	т	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

CASAFLEX	Width	Depth	Minimum
Outer casing			Bending
ØD	В	т	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

### Installation depth

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

SLW  $30 \triangleq 300$  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



Pipes





### CFL 4.510

## **Connection (rigid/flexible)**

**CASAFLEX to insulated steel pipes** 

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

**1.** Connection to T-piece (ΔI small)



2. Connection to T-piece (ΔI large)



3. Connection to L-bend ( $\Delta I$  small)



4. Connection to L-bend (∆I large)



5. Connection to Z-bend



#### **Comments:**

- 1. Thermal elongation ΔI of the KMR system that is transferred to the centre of the connector S 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:

Туре	F	F	F	F	F	F*
	(6 bar)	(10 bar)	(16 bar)	(21 bar)	(25 bar)	(37.5 bar)
	KN	KN	KN	KN	KN	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

#### Fixed point forces per pipe

\* test pressure

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



### CFL 4.520

## **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	L min	H min
ØD	mm	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





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



### CFL 4.525

# Entry into building



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			
	→30		
			D1
	A	All figures	s in mm

Outer casing	D1	Α
ØD		
mm	mm	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.

Туре	L	L	L	L	L	Α
	(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
					٨	

### Ground layout plan



Sand support dimensions:

 $Hs = 2 \times Da$  $Bs = 7 \times Da$  $Ls = 4 \times Da$ 



## **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	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

