

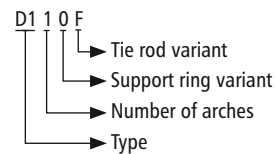
## D110F

NB 20 – NB 1200



- ▶ **Type D110F**  
without vacuum support ring
- ▶ **Type D111F**  
with internal vacuum support ring
- ▶ **Type D112F**  
with embedded vacuum support ring

Type key ▶ page 20

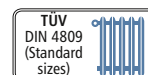


## Angular expansion joint with one arch

- Design:** Hydrodynamic, single-arch rubber bellows with self-sealing rubber bulges and oval backing flanges with support collar and hinge tie rod  
Optionally with vacuum support ring
- Nominal diameters:** NB 20 to NB 1200, intermediate sizes possible
- Installation length:** Standard  $L_e = 130$  to  $350$  mm (▶ page 239–241)  
Other installation lengths on request
- Pressure:** Depending on the nominal diameter up to 25 bar  
Vacuum-proof up to 0.8 bar absolute, with vacuum support ring up to 0.05 bar absolute
- Movement:** For angular movements (▶ page 239–241)

### Application:

Cooling water systems, desalination plants, drinking water supply, plant construction, e.g. in pipelines, on pumps, as dismantling joints, on condensers and vessels



## Rubber bellows

Rubber grades:			Carrier:
up to 100 °C:	EPDM	Cooling water, hot water, seawater, acids, dilute chlorine compounds	Nylon fabric Polyester fabric Kevlar fabric Glass fibre fabric Steel mesh
	EPDM, drinking water approved	Drinking water	
	EPDM, white, food grade	Foodstuffs	
	EPDM, abrasion-resistant	Abrasive materials, Water-sand extraction	
	EPDM, insulating	Electrical systems construction	
	IIR	Hot water, acids, bases, gases	
	CSM	Strong acids, bases, chemicals	
	NBR	Oils, petrol, solvents, compressed air	
	NBR, bright, food grade	Oil, fatty foods	
up to 80 °C	CR	Cooling water, slightly oily water, seawater	
up to 70 °C:	NR	Abrasive materials	
up to 150 °C:	HNBR	Oils, petrol, solvents, compressed air	
up to 180 °C:	FPM	Corrosive chemicals, petroleum distillates	
up to 200 °C:	Silicon (Q)	Air, saltwater atmosphere	
	Silicon (Q), white, food grade	Foodstuffs, medical technology	
PTFE lining:	For severe chemical attacks. Take the restriction on the specified movement into account ( ▶ page 239–241)		

## Flanges

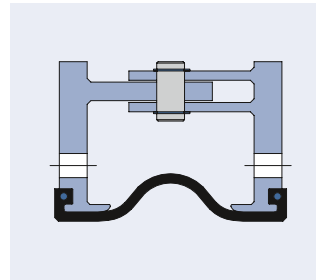
<b>Design:</b>	Single-part, oval backing flanges with support collar, clearance holes, groove to accommodate the rubber bulges and hinge tie rod (control unit type F)
<b>Flange norms:</b>	DIN, ANSI, AWWA, BS, JIS, special measurements ( ▶ page 280)
<b>Materials:</b>	Carbon steel: 1.0038 (S235JRG2) 1.0570 (S355J2G3) Stainless steel: 1.4301 (X5CrNi18-10) 1.4571 (X6CrNiMoTi17-12-2) Other materials on request
<b>Coating:</b>	Primed, hot-dip galvanised, special paint

## Optional accessories

<b>Protective hood:</b>	UV protection cover Ground protective cover Fire protection cover ( ▶ page 50)
<b>Flow liners:</b>	Cylindrical flow liner Conical flow liner Telescoping flow liner ( ▶ page 49)

## Hinge tie rod




- Design:** Dimensions according to design pressure (test pressure)
- Materials:** Carbon steel or stainless steel
- Coating:** Galvanised or hot-dip galvanised



### Type D110F

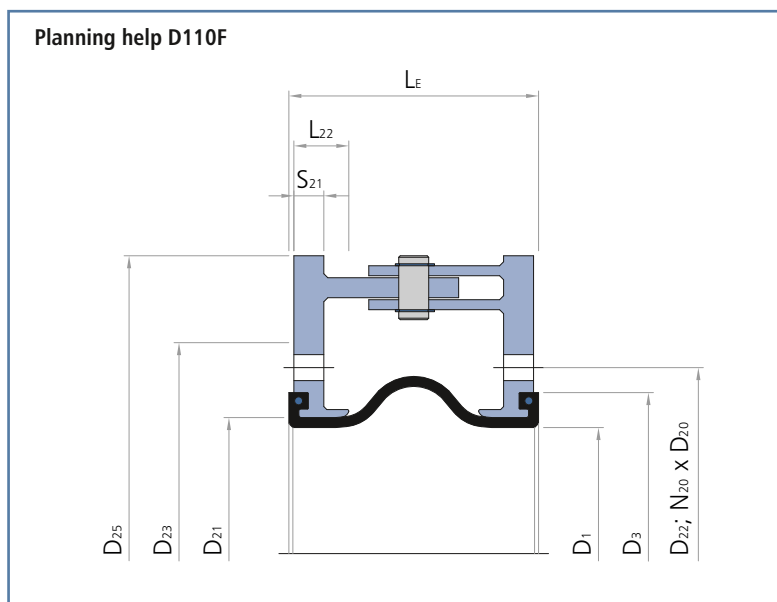
Hinge tie rod for angular movements on one level with plates and bolts to absorb the reaction forces in the event of pressure and vacuum. Axis of rotation in the middle of the installation gap

## Support rings





TYPE		Vacuum support ring	Pressure	Movement
D110F		Without	Depending on the nominal diameter up to 25 bar, for vacuum up to 0.8 bar absolute	▶ page 239
D111F		Vacuum support ring spiral (1.4310) up to NB 300, vacuum support ring starting at NB 350 Medium contact, inside the arch apex	Depending on the nominal diameter up to 25 bar, for vacuum up to 0.05 bar absolute	▶ page 240
D112F		No medium contact, embedded into the arch apex of the rubber bellows starting at NB 200	Depending on the nominal diameter up to 25 bar, for vacuum up to 0.05 bar absolute	▶ page 241





### Materials

- Stainless steel: 1.4301 (X5CrNi18-10)      Other materials on request  
 1.4539 (X1NiCrMoCu25-20-5)  
 1.4571 (X6CrNiMoTi17-12-2)
- Carbon steel: 1.0570 (S355J2G3) rubber coated





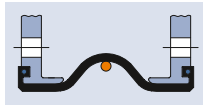
Installation length (L <sub>E</sub> ) at design pressure								
	up to 10 bar L <sub>E</sub> = 130 mm		up to 10 bar L <sub>E</sub> = 150 mm		up to 10 bar L <sub>E</sub> = 175 mm		up to 10 bar L <sub>E</sub> = 200 mm	
	higher pressures on request							
NB	Movement	A	Movement	A	Movement	A	Movement	A
	 ±°	cm <sup>2</sup>	 ±°	cm <sup>2</sup>	 ±°	cm <sup>2</sup>	 ±°	cm <sup>2</sup>
20	30.0	17						
25	30.0	17						
32	30.0	17						
40	35.0	18						
50	30.0	32						
65	30.0	53						
80	30.0	85	30.0	85				
100	20.0	128	20.0	128				
125	20.0	187	20.0	187				
150	20.0	259	20.0	259				
200	12.0	410			12.0	409	16.7	564
250	12.0	596			12.0	599	13.5	799
300	12.0	822			7.8	903	12.0	822
350					6.7	1,134	8.0	907
400					5.9	1,521	8.0	1,018
450					5.2	1,878	7.6	2,116
500					4.7	2,290	8.0	1,692
600					3.9	3,187	8.0	3,078
700					3.4	4,312	4.9	4,669
800					2.9	5,555	4.3	5,958
900					2.6	6,910	3.8	7,359
1000					2.3	8,462	3.4	8,958
1100					2.1	10,171	3.1	10,715
1200					2.0	12,037	2.9	12,628

Installation length (L <sub>E</sub> ) at design pressure								
	up to 10 bar L <sub>E</sub> = 250 mm		up to 10 bar L <sub>E</sub> = 275 mm		up to 10 bar L <sub>E</sub> = 300 mm		up to 10 bar L <sub>E</sub> = 350 mm	
	higher pressures on request							
NB	Movement	A	Movement	A	Movement	A	Movement	A
	 ±°	cm <sup>2</sup>	 ±°	cm <sup>2</sup>	 ±°	cm <sup>2</sup>	 ±°	cm <sup>2</sup>
20								
25								
32								
40								
50								
65								
80								
100								
125								
150								
200	17.7	573	17.7	573	22.8	707	29.2	897
250	14.4	809	14.4	809	24.1	968	24.1	1,188
300	12.0	1,081	12.0	1,081	20.5	1,263	20.5	1,514
350	10.4	1,333	10.4	1,333	17.7	1,534	17.7	1,810
400	9.1	1,750	9.1	1,750	15.6	1,979	15.6	2,290
450	6.0	1,801	8.1	2,132	14.0	2,384	14.0	2,725
500	7.3	2,570	7.3	2,570	12.6	2,846	12.6	3,217
600	6.1	3,515	6.1	3,515	10.6	3,837	10.6	4,266
700	8.0	4,019	8.0	4,019	9.1	5,064	9.1	5,555
800	8.0	5,436	4.6	5,986	8.0	6,404	8.0	6,955
900	4.1	7,390	4.1	7,390	5.0	6,706	7.1	8,462
1000	3.7	8,992	3.7	8,992	5.0	8,231	6.4	10,171
1100	3.3	10,751	3.3	10,751	5.8	11,310	5.8	12,037
1200	3.1	12,668	3.1	12,668	5.3	13,273	5.3	14,061

  Recommended sizes  
  Additional possible sizes

Reduction of movement for expansion joints with PTFE lining; angular movement: -66 %.

**Individual fabrication possible**



# D111F

▶ with internal vacuum support ring



Installation length (L <sub>E</sub> ) at design pressure								
	up to 10 bar L <sub>E</sub> = 130 mm		up to 10 bar L <sub>E</sub> = 150 mm		up to 10 bar L <sub>E</sub> = 175 mm		up to 10 bar L <sub>E</sub> = 200 mm	
higher pressures on request								
NB	Movement	A	Movement	A	Movement	A	Movement	A
	±°	cm <sup>2</sup>	±°	cm <sup>2</sup>	±°	cm <sup>2</sup>	±°	cm <sup>2</sup>
20	30.0	17						
25	30.0	17						
32	30.0	17						
40	35.0	18						
50	30.0	32						
65	30.0	53						
80	30.0	85						
100	20.0	128	30.0	85				
125	20.0	187	20.0	128				
150	20.0	259	20.0	187				
200	12.0	410			12.0	409	13.2	564
250	12.0	596			12.0	599	10.6	799
300	12.0	822			6.5	903	12.0	822
350					5.5	1,134	8.0	907
400					4.9	1,521	8.0	1,018
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900					2.2	6,910	3.0	7,359
1000					1.9	8,462	2.7	8,958
1100					1.8	10,171	2.4	10,715
1200					1.6	12,037	2.2	12,628









Installation length (L <sub>E</sub> ) at design pressure								
	up to 10 bar L <sub>E</sub> = 250 mm		up to 10 bar L <sub>E</sub> = 275 mm		up to 10 bar L <sub>E</sub> = 300 mm		up to 10 bar L <sub>E</sub> = 350 mm	
higher pressures on request								
NB	Movement	A	Movement	A	Movement	A	Movement	A
	±°	cm <sup>2</sup>	±°	cm <sup>2</sup>	±°	cm <sup>2</sup>	±°	cm <sup>2</sup>
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



Recommended sizes  
 Additional possible sizes

Reduction of movement for expansion joints with PTFE lining: angular movement: -0 %.

**Individual fabrication possible**



Installation length (L <sub>E</sub> ) at design pressure								
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40								
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300					4.4	903	6.3	1,069
350					3.8	1,134	5.4	1,320
400					3.3	1,521	4.7	1,735
450					2.9	1,878	4.2	2,116
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1200	1.7	12,668	1.7	12,668	2.9	13,273	2.9	14,061

Recommended sizes  
Additional possible sizes

Reduction of movement for expansion joints with PTFE lining: angular movement: -0 %.

**Individual fabrication possible**