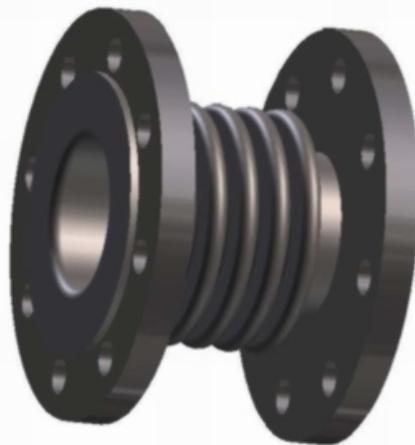


# Expansion joint

Type: AF-G, steel

Data sheet



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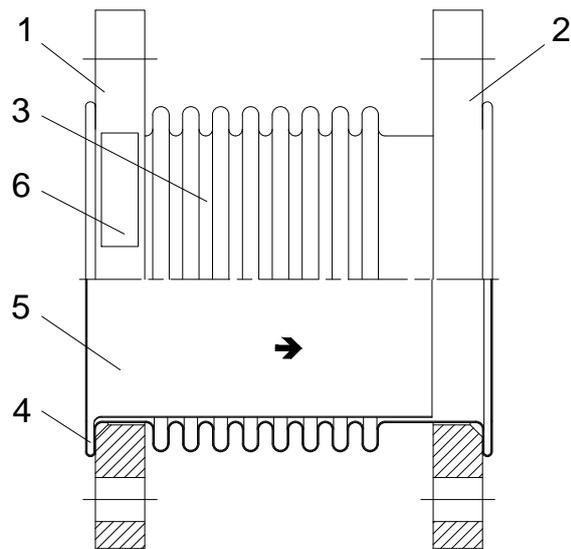
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## 1 Axial expansion joint

### 1.1 Design and operation

The axial expansion joint compensates thermal changes in length as well as slight axis and angle misalignments at pipe connections.

Due to the elastic connection the pipe system is decoupled from the aggregate. The structure-borne noise transmission to the connected pipe systems is reduced.



*Fig. 1: Design*

- 1 Loose flange - inlet
- 2 Loose flange - outlet
- 3 Metal bellow
- 4 Raised edge
- 5 Internal conduit tube
- 6 Name plate
- ➔ Flow direction conveyed medium

The flange expansion joint consists of a metal bellow (3), which is made from steel plate with rolled-in circumferential bellows. Each end features a raised edge (4) to accommodate the loose flanges (1 and 2). The internal conduit tube (5) is mounted to the raised edge on the inlet side.

# Axial expansion joint

Design

## 1.2 Type key

Example:

**AF-G100-PA-160**

Designation	Sign	Explanation
type	AF	with loose flange and internal conduit tube
design	G	for gases acc. to fluid group 1
nominal size	100	
flange connection	P A	flange connection drilled acc. to DIN EN 1092-1 (DN) ASME B16.5 Class 150 (NPS) 1. position: inlet flange 2. position: outlet flange
construction length	160	

## 1.3 Design

### Pressure equipment directive

The expansion joint is classified according to the European Pressure Equipment Directive 2014/68/EU, designed in conformity with the AD 2000 Directive and manufactured and tested according to Pressure Equipment Directive.

### Design data

fluid group		1, hazardous	
max. temperature	<b>TS</b>	-10 to +150	°C
max. pressure	<b>PS</b>	6,0	barg
test pressure	<b>PT</b>	9,6	barg

<b>TS*</b> [°C]	-10	0	20	100	<b>150</b>	200	250	280
<b>PS*</b> [barg]	7	7	7	6,1	<b>6</b>	5,5	5,2	5

\* Design as per nominal pressure (PN7).

The nominal pressure as a code number (7) corresponds to the pressure permitted at room temperature (20 °C). At higher temperatures, strength values of the used material drop accordingly and only a lower pressure rating may be permitted as nominal pressure – the allowed pressure must be “decreased”.

## Classification

Nominal size DN	Category	Module
25	production according to Good Engineering Practice, article 4 paragraph 3	
32	I	A
40		
50		
65		
80		
100	II	H
125		
150		
200		
250		
300	III	H
350		
400		
500		

## 1.4 Tests

The expansion joint shall be subjected to the following tests:

- Leakage test
- Pressure test at **PT**
- Dimensional and visual inspection

According to category and module further examinations will take place.

## 1.5 Documentation

Documentation consists of:

- Declaration of conformity acc. to Pressure Equipment Directive (from and including category I)

# Axial expansion joint

Technical data

## 1.6 Further specifications

For an extra charge the expansion joint can also be designed, manufactured and tested according to further customer specifications or special directives at the installation site.

## 1.7 Technical data

### Material

Designation	Material*	Remark
loose flange - inlet	1.0037, S235JR	hot-dip galvanized
loose flange - outlet	ASTM A 36	
metal bellow	1.4541, X6CrNiTi18-10	multi-layer
raised edge		AISI 321
internal conduit tube		-
name plate	stainless steel	-

\* - or equivalent/superior material

### Movement absorption

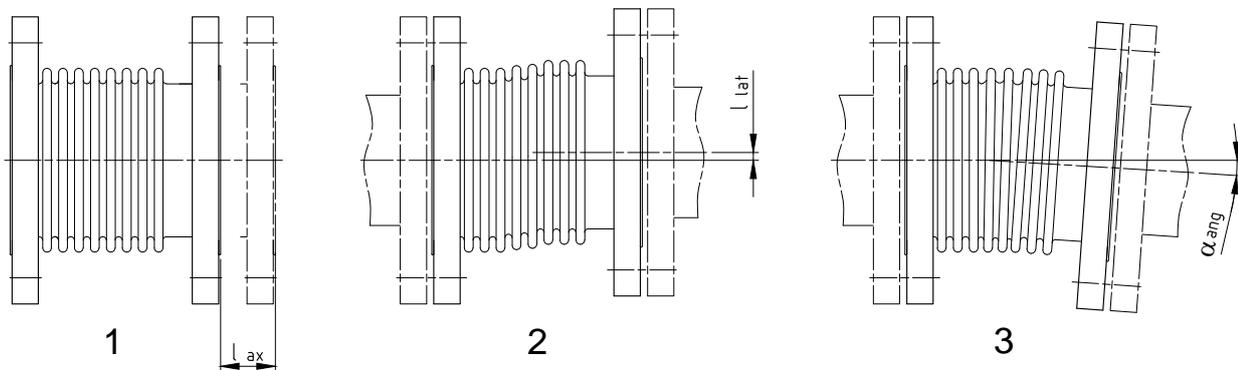


Fig. 2: Movement absorption

- 1 axial  
2 lateral  
3 angular

Nominal size		Length $L^*$ [mm]	Movement absorption			Spring rate			Effective area $F$ [cm <sup>2</sup> ]
DN	NPS		axial $l_{ax}$	lateral $l_{lat}$	angular $\alpha_{ang}$	axial $R_{ax}$	lateral $R_{lat}$	angular $R_{ang}$	
			[±mm]		[±°]	[N/mm]		[Nm/°]	
25	1"	140	8	4	18	107	109	0,42	9,5
32	1¼"	140	10	4	12	100	104	1	14

Nominal size		Length L*	Movement absorption			Spring rate			Effective area F
DN	NPS		axial I <sub>ax</sub>	lateral I <sub>lat</sub>	angular α <sub>ang</sub>	axial R <sub>ax</sub>	lateral R <sub>lat</sub>	angular R <sub>ang</sub>	
		[mm]	[±mm]		[±°]	[N/mm]		[Nm/°]	[cm <sup>2</sup> ]
40	1½"	140	14	5	4	60	97	1	28
50	2"	140	10	2	7	85	465	1	42
65	2½"	145	12	3	4	59	260	1	66
80	3"	160	14	4	8	135	322	4	82
100	4"	160	22	5	5	96	253	4	125
125	5"	160	22	6	6	136	541	9	188
150	6"	160	22	4	5	145	900	13	269
200	8"	180	22	4	3	136	1084	20	443
250	10"	180	22	2	3	156	2929	34	669
300	12"	200	22	2	6	303	5541	91	935
350	14"	200	22	3	4	233	4484	85	1133
400	16"	170	16	2	2	151	5037	70	1456
		220	22	2	2	120	2579	56	1456
500	20"	240	35	3	3	269	6310	195	2269

\* - L = Construction length of expansion joint **without** prestress

## Dimensions

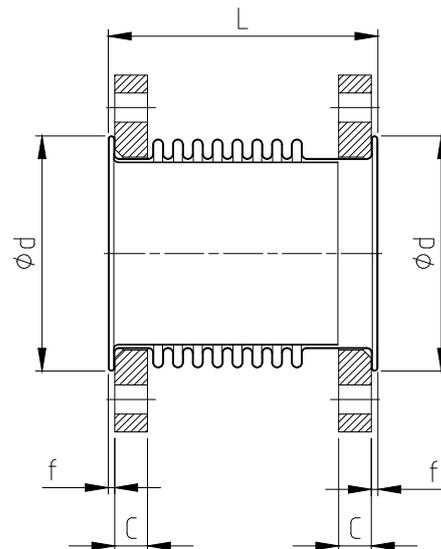


Fig. 3: Dimensions

## Axial expansion joint

Technical data

Nominal size		Con- struction length L*	Diameter of nubbin ød	Flange thick- ness C	Weight
DN	NPS	[mm]			[~kg]
25	1"	140	68	16	3,5
32	1¼"	140	78	18	4,0
40	1½"	140	88	18	4,7
50	2"	140	102	20	6,0
65	2½"	145	122	20	6,5
80	3"	160	138	20	9,5
100	4"	160	144	22	12,0
125	5"	160	174	22	17,0
150	6"	160	206	24	22,0
200	8"	180	264	24	30,0
250	10"	180	320	26	41,0
300	12"	200	374	26	45,0
350	14"	200	408	30	61,0
400	16"	170	464	32	70,0
		220			80,0
500	20"	240	575	38	97,0

\* - L = Construction length of expansion joint **without** prestress

nubbin f :

- for flange DN 25 to DN 350 max. 2 mm
- for flange DN 400 and DN 500 max. 3 mm

## Flange connecting dimensions according to EN 1092-1 - PN10

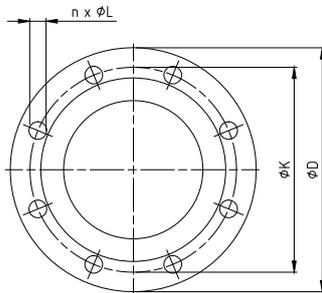


Fig. 4: Flange connection

Tab. 1: EN 1092-1 - PN10

Nominal size DN	Outer diameter D	Diameter of bolt circle K	Quantity n	Hole diameter L
	[mm]			[mm]
25	115	85	4	14
32	140	100	4	18
40	150	110	4	18
50	165	125	4	18
65	185	145	8	18
80	200	160	8	18
100	220	180	8	18
125	250	210	8	18
150	285	240	8	22
200	340	295	8	22
250	395	350	12	22
300	445	400	12	22
350	505	460	16	22
400	565	515	16	26
500	670	620	20	26

## Flange connection dimensions as per EN 1092-1 - PN25

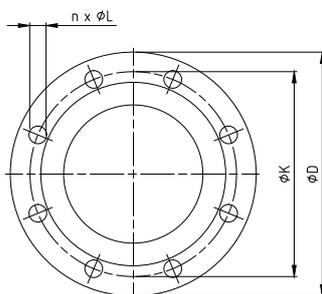


Fig. 5: Flange connection

Tab. 2: EN 1092-1 - PN25

Nom-inal width DN	Outer diam-eter D	Pitch circle diameter K	Quan-tity n	Hole diam-eter L
	[mm]			[mm]
25	115	85	4	14
32	140	100	4	18
40	150	110	4	18
50	165	125	4	18
65	185	145	8	18
80	200	160	8	18

## Axial expansion joint

Technical data

Nom- inal width	Outer diam- eter	Pitch circle diameter	Quan- tity	Hole diam- eter
DN	D	K	n	L
	[mm]			[mm]
100	235	190	8	22
125	270	220	8	26
150	300	250	8	26
200	360	310	12	26
250	425	370	12	30
300	485	430	16	30
350	555	490	16	33
400	620	550	16	36
500	730	660	20	36

## Flange connecting dimensions according to ASME B16.5 Class 150

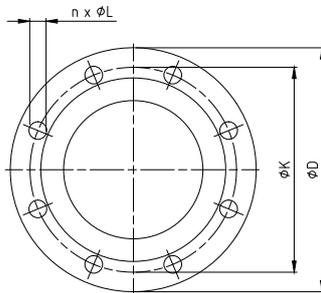


Fig. 6: Flange connection

Nominal size	Outer diameter	Diameter of bolt circle	Quantity	Hole diameter
NPS	D	K	n	L
	[mm]			[mm]
1"	108	79,2	4	15,7
1¼"	117,3	88,9	4	15,7
1½"	127,0	98,6	4	15,7
2"	152,4	120,7	4	19,1
2½"	177,8	139,7	4	19,1
3"	190,5	152,4	4	19,1
4"	228,6	190,5	8	19,1
5"	254,0	215,9	8	22,4
6"	279,4	241,3	8	22,4
8"	342,9	298,5	8	22,4
10"	406,4	362,0	12	25,4
12"	482,6	431,8	12	25,4
14"	533,4	476,3	12	28,4
16"	596,9	539,8	16	28,4
20"	698,5	635,0	20	31,8

## 1.8 Spare parts

DN - DN

Type	Inlet DN*1	Outlet DN*1	Article number
AF-G25-PP-140	25	25	024-20004844
AF-G32-PP-140	32	32	024-20004845
AF-G40-PP-140	40	40	024-20004846
AF-G50-PP-140	50	50	024-20004155
AF-G65-PP-145	65	65	024-20004156
AF-G80-PP-160	80	80	024-20004157
AF-G80-PP-160	80	80-PN25	024-20027481
AF-G100-PP-160	100	100	024-20004158

## Axial expansion joint

Spare parts

Type	Inlet DN*1	Outlet DN*1	Article number
AF-G100-PP-160	100- PN25	100	024-20027480
AF-G100-PP-160	100	100-PN25	024-20027482
AF-G125-PP-160	125	125	024-20004159
AF-G150-PP-160	150	150	024-20004160
AF-G200-PP-180	200	200	024-20004161
AF-G250-PP-180	250	250	024-20004162
AF-G300-PP-200	300	300	024-20004163
AF-G350-PP-200	350	350	024-20004164
AF-G400-PP-170 *2	400	400	024-20006611
AF-G400-PP-220	400	400	024-20004165
AF-G500-PP-240	500	500	024-20004166

\*1 - Dimensions for PN10, unless otherwise stated

\*2 - Special length

### DN - NPS

Type	Inlet DN*1	Outlet NPS*1	Article number
AF-G25-PA-140	25	1"	024-20009533
AF-G32-PA-140	32	1¼"	024-20009534
AF-G40-PA-140	40	1½"	024-20009535
AF-G50-PA-140	50	2"	024-20009536
AF-G65-PA-145	65	2½"	024-20009537
AF-G80-PA-160	80	3"	024-20009538
AF-G100-PA-160	100	4"	024-20009539
AF-G125-PA-160	125	5"	024-20009540
AF-G150-PA-160	150	6"	024-20009541
AF-G200-PA-180	200	8"	024-20009489
AF-G250-PA-180	250	10"	024-20009542
AF-G300-PA-200	300	12"	024-20006614
AF-G350-PA-200	350	14"	024-20009543
AF-G400-PA-220	400	16"	024-20006609
AF-G500-PA-240	500	20"	024-20009544

\*1 - Dimensions for PN10 / Class 150, unless otherwise stated

### NPS - DN

Type	Inlet NPS*1	Outlet DN*1	Article number
AF-G25-AP-140	1"	25	024-20009545
AF-G32-AP-140	1¼"	32	024-20009546
AF-G40-AP-140	1½"	40	024-20009547
AF-G50-AP-140	2"	50	024-20009548
AF-G65-AP-145	2½"	65	024-20009549
AF-G80-AP-160	3"	80	024-20009550
AF-G100-AP-160	4"	100	024-20009551
AF-G125-AP-160	5"	125	024-20009552
AF-G150-AP-160	6"	150	024-20009553
AF-G200-AP-180	8"	200	024-20009554
AF-G250-AP-180	10"	250	024-20009555
AF-G300-AP-200	12"	300	024-20009491
AF-G350-AP-200	14"	350	024-20009556
AF-G400-AP-220	16"	400	024-20006676
AF-G500-AP-240	20"	500	024-20009557

\*1 - Dimensions for Class 150 / PN10, unless otherwise stated

### NPS - NPS

Type	Inlet NPS*1	Outlet NPS*1	Article number
AF-G25-AA-140	1"	25	
AF-G32-AA-140	1¼"	32	
AF-G40-AA-140	1½"	40	
AF-G50-AA-140	2"	50	
AF-G65-AA-145	2½"	65	
AF-G80-AA-160	3"	80	
AF-G100-AA-160	4"	100	
AF-G125-AA-160	5"	125	
AF-G150-AA-160	6"	150	
AF-G200-AA-180	8"	200	

## Axial expansion joint

Spare parts

Type	Inlet NPS*1	Outlet NPS*1	Article number
AF-G250-AA-180	10"	250	024-20026857
AF-G300-AA-200	12"	300	
AF-G350-AA-200	14"	350	
AF-G400-AA-220	16"	400	
AF-G500-AA-240	20"	500	

\*1 - Dimensions for Class 150, unless otherwise stated

### Gaskets

During assembly of the expansion joint new pipeline gaskets have to be used.

See data sheet *Gaskets*.