BOA® Group

Expansion Joints Guide Module 3c
- Angular Expansion Joints (EFB)
Technical Data

Expansion Joints Guide

Summary Module 3c

TECHNICAL DATA BOA STANDARD ANGULAR EXPANSION JOINTS (EFB) **3**

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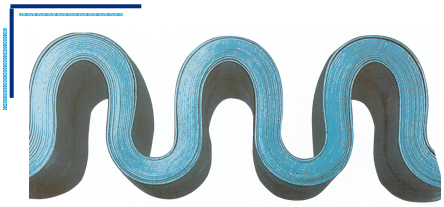


Elastomer Formed Bellows (EFB):

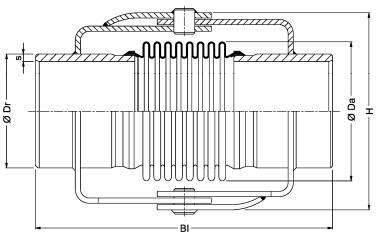
- several to multi-ply (2 to 16 layers)
- high flexibility
- short construction length
- low displacement forces
- big movement capacity
- small corrugation height
- vibration absorbing

Technical Data BOA Standard Angular Expansion Joints (EFB)

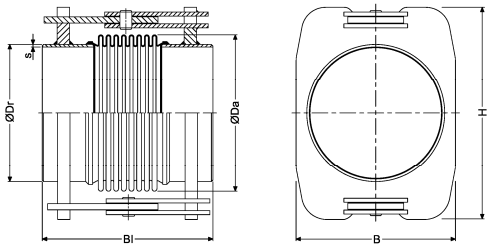
1 Type AW (Angular expansion joint with weld ends)

- As a standard, expansion joints of type AW are manufactured in nominal diameters from DN 40 to DN 1000 mm and in pressure ranges of PN 16, 25 and 40. For PN 6 and 10, standard designs from DN 350 to DN 1000 are available.
- In type designation, PN is extended by the figure 1, 2, 3 and 4, depending on the construction dimension.
- AW 6-1 means e.g.: shortest expansion joint for pressure range PN 6; AW 25-4 means: the longest expansion joint for pressure range PN 25.
- As a standard, weld ends and tie rods are made of carbon steel and are primer coated.
- As special designs, also angular expansion joints type AFS (with fixed flanges) and of type AFB (with flared flanges) are manufactured.
- The design type I or II is indicated in the last column of the standard tables (see fig.).

Design I
Available only without inner sleeve



Design II
Optionally available with or without inner sleeve



[1] Nominal expansion capacity: these indications are meant for 1000 full load cycles at 20°C
Type designation: L = with inner sleeve; B = without inner sleeve; * = optionally with/without inner sleeve

		Type			Flange/ hinge			Weld end		Bellows				
DN	PN	AW	Nominal angular expansion capacity[1]	Overall length	Height / largest outside dimension	Width / largest outside dimension	Weght (without inner sleeve)	Outside Ø	Thickness	Outside Ø	Spring rate ± 30%	Additional moment from rotation and pressure	Specific hinge friction	Design
			$\pm\Delta\alpha$	Bl.	H	B	m	Ø Dr	s	Ø Da	C_α	C_z	C_r	
-	-	-	°	mm	mm	mm	kg	mm	mm	mm	Nm/°	Nm/(bar°)	Nm/bar	-
40	6	AW16-1B	±29	285	150	90	5	48.3	2.9	68.2	0.9	0.0558	1	I
40	10	AW16-1B	±29	285	150	90	5	48.3	2.9	68.2	0.9	0.0558	1	I
40	16	AW16-1B	±29	285	150	90	5	48.3	2.9	68.2	0.9	0.0558	1	I
40	25	AW25-1B	±27	285	150	90	5.4	48.3	2.9	69.8	1.5	0.0558	1	I
40	40	AW40-1B	±20	285	150	90	5.4	48.3	2.9	69.8	3.1	0.0558	1	I
50	6	AW16-1B	±26	285	164	100	5.5	60.3	3.2	81.2	1.1	0.0805	1.4	I
50	10	AW16-1B	±26	285	164	100	5.5	60.3	3.2	81.2	1.1	0.0805	1.4	I
50	16	AW16-1B	±26	285	164	100	5.5	60.3	3.2	81.2	1.1	0.0805	1.4	I
50	25	AW25-1B	±24	285	164	100	5.9	60.3	3.2	82.8	2.4	0.0805	1.4	I
50	40	AW40-1B	±20	285	164	100	5.9	60.3	3.2	83.8	4.1	0.0805	1.4	I
65	6	AW16-1B	±23	285	189	120	7	76.1	3.2	104.8	1.7	0.1363	2.4	I
65	10	AW16-1B	±23	285	189	120	7	76.1	3.2	104.8	1.7	0.1363	2.4	I
65	16	AW16-1B	±23	285	189	120	7	76.1	3.2	104.8	1.7	0.1363	2.4	I
65	25	AW25-1B	±20	285	189	120	7.8	76.1	3.2	105	4.2	0.1363	2.4	I
65	40	AW40-1B	±18	285	189	120	8	76.1	3.2	107	6.6	0.1363	2.4	I
80	6	AW16-1B	±22	285	203	140	8.7	88.9	3.6	118.5	2.4	0.1735	3.1	I
80	10	AW16-1B	±22	285	203	140	8.7	88.9	3.6	118.5	2.4	0.1735	3.1	I
80	16	AW16-1B	±22	285	203	140	8.7	88.9	3.6	118.5	2.4	0.1735	3.1	I
80	25	AW25-1B	±20	285	203	140	9.2	88.9	3.6	118	3.6	0.1735	3.1	I
80	40	AW40-1B	±18	285	203	140	9.5	88.9	3.6	120	8.3	0.1735	3.1	I

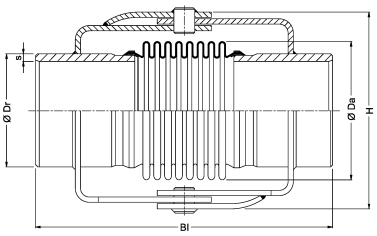
		Type			Flange/ hinge			Weld end		Bellows				
DN	PN	AW	Nominal angular expansion capacity[1]	Overall length	Height / largest outside dimension	Width / largest outside dimension	Weght (without inner sleeve)	Outside Ø	Thickness	Outside Ø	Spring rate ± 30%	Additional moment from rotation and pressure	Specific hinge friction	Design
			$\pm\Delta\alpha$	Bl.	H	B	m	Ø Dr	s	Ø Da	C_α	C_z	C_r	
-	-	-	°	mm	mm	mm	kg	mm	mm	mm	Nm/°	Nm/(bar°)	Nm/bar	-
100	6	AW16-1*	±19	340	241	210	18.7	114.3	4.0	142	3.7	0.2364	0.51	II
100	10	AW16-1*	±19	340	241	210	18.7	114.3	4.0	142	3.7	0.2364	0.51	II
100	16	AW16-1*	±19	340	241	210	18.7	114.3	4.0	142	3.7	0.2364	0.51	II
100	16	AW16-2*	±28	388	241	210	20.2	114.3	4.0	143	4.4	0.4138	0.51	II
100	25	AW25-1*	±17	340	241	210	19.2	114.3	4.0	144	8	0.2512	0.51	II
100	25	AW25-2*	±24	388	241	210	20.7	114.3	4.0	146	8	0.4138	0.51	II
100	40	AW40-1*	±15	344	241	210	19.8	114.3	4.0	146	11.9	0.2512	0.51	II
100	40	AW40-2*	±20	388	241	210	20.8	114.3	4.0	147	10.6	0.4138	0.51	II
125	6	AW16-1*	±16	340	265	234	23.4	139.7	4.0	170.8	6.8	0.3425	0.74	II
125	10	AW16-1*	±16	340	265	234	23.4	139.7	4.0	170.8	6.8	0.3425	0.74	II
125	16	AW16-1*	±16	340	265	234	23.4	139.7	4.0	170.8	6.8	0.3425	0.74	II
125	16	AW16-2*	±23	388	265	234	24.2	139.7	4.0	170	6.6	0.5566	0.74	II
125	25	AW25-1*	±15	340	265	234	24	139.7	4.0	172	15	0.3639	0.74	II
125	25	AW25-2*	±22.5	384	265	234	25.1	139.7	4.0	173	10	0.578	0.74	II
125	40	AW40-1*	±14	344	265	234	24.8	139.7	4.0	174	18.7	0.3639	0.74	II
125	40	AW40-2*	±20	388	265	234	27.3	139.7	4.0	176	15.2	0.578	0.74	II
150	6	AW16-1*	±11	340	295	264	24	68.1	54.3	200.8	16.9	0.4268	1.1	II
150	10	AW16-1*	±11	340	295	264	24	68.1	54.3	200.8	16.9	0.4268	1.1	II
150	16	AW16-1*	±11	340	295	264	24	68.1	54.3	200.8	16.9	0.4268	1.1	II
150	16	AW16-2*	±20	384	295	264	25	68.1	54.3	200.8	8.4	0.7621	1.1	II
150	25	AW25-1*	±11	354	301	270	34.9	168.3	4.5	203	16.9	0.4268	1.6	II
150	25	AW25-2*	±19	390	301	270	36.5	168.3	4.5	204	17	0.8079	1.6	II
150	40	AW40-1*	±10	364	301	270	36.3	168.3	4.5	206	45	0.6097	1.6	II
150	40	AW40-2*	±17	400	301	270	38.8	168.3	4.5	207	26	0.8841	1.6	II
175	6	AW16-2*	±20	426	343	312	45	193.7	5.6	230	34.4	1.173	1.6	II
175	10	AW16-2*	±20	426	343	312	45	193.7	5.6	230	34.4	1.173	1.6	II
175	16	AW16-2*	±20	426	343	312	45	193.7	5.6	230	34.4	1.173	1.6	II
175	25	AW25-2*	±20	444	345	312	62.5	193.7	5.6	232.5	20	1.309	2.3	II
175	40	AW40-2*	±15.5	444	345	312	65	193.7	5.6	235	68	1.247	2.3	II
200	6	AW16-1*	±10	356	369	338	43.2	219.1	4.5	256	36.1	0.909	1.8	II
200	10	AW16-1*	±10	356	369	338	43.2	219.1	4.5	256	36.1	0.909	1.8	II
200	16	AW16-1*	±10	356	369	338	43.2	219.1	4.5	256	36.1	0.909	1.8	II
200	16	AW16-2*	±18	400	369	338	44.9	219.1	4.5	256	20.6	1.4644	1.8	II
200	25	AW25-2*	±15	450	371	338	67.5	219.1	6.3	259	36.1	1.3888	2.6	II
200	25	AW25-3*	±22	500	371	338	70	219.1	6.3	259	26.1	2.02	2.6	II
200	40	AW40-2*	±12	460	371	338	68.2	219.1	6.3	260	68	1.515	2.6	II
200	40	AW40-3*	±17.5	500	371	338	72.2	219.1	6.3	260	55	2.02	2.6	II
250	6	AW16-2*	±15.5	450	439	406	70	273	5.0	311	30.3	2.1118	4	II
250	10	AW16-2*	±15.5	450	439	406	70	273	5.0	311	30.3	2.1118	4	II
250	16	AW16-2*	±15.5	450	439	406	70	273	5.0	311	30.3	2.1118	4	II
250	16	AW16-3*	±22	505	439	406	72.5	273	5.0	312.6	22.7	3.1677	4	II
250	25	AW25-2*	±14	490	439	406	103	273	6.3	316.5	65	2.3038	4	II
250	25	AW25-3*	±18	530	439	406	107	273	6.3	316.5	51	3.0717	4	II
250	40	AW40-2*	±11	490	439	406	104	273	6.3	317	128	2.3038	4	II
250	40	AW40-3*	±15.5	545	439	406	108.2	273	6.3	317	96	3.3597	4	II
300	6	AW16-2*	±13	490	483	450	94	323.9	5.6	365.4	64	3.1799	5.5	II

		Type			Flange/ hinge			Weld end		Bellows				
DN	PN	AW	Nominal angular expansion capacity[1]	Overall length	Height / largest outside dimension	Width / largest outside dimension	Weght (without inner sleeve)	Outside Ø	Thickness	Outside Ø	Spring rate ± 30%	Additional moment from rotation and pressure	Specific hinge friction	Design
			$\pm\Delta\alpha$	Bl.	H	B	m	Ø Dr	s	Ø Da	C_α	C_z	C_r	
-	-	-	°	mm	mm	mm	kg	mm	mm	mm	Nm/°	Nm/(bar°)	Nm/bar	-
300	10	AW16-2*	±13	490	483	450	94	323.9	5.6	365.4	64	3.1799	5.5	II
300	16	AW16-2*	±13	490	483	450	94	323.9	5.6	365.4	64	3.1799	5.5	II
300	16	AW16-3*	±17	525	483	450	97.3	323.9	5.6	365.4	48	4.1074	5.5	II
300	25	AW25-2*	±11	505	509	468	146	323.9	7.1	369	106	3.1799	5.5	II
300	25	AW25-3*	±17	560	509	468	150.5	323.9	7.1	369	96	4.5049	5.5	II
300	40	AW40-2*	±8.5	510	509	468	146	323.9	7.1	369	232	3.1799	5.5	II
300	40	AW40-3*	±11	548	509	468	150.5	323.9	7.1	369	174	4.1869	5.5	II
350	6	AW6-2*	±12	360	555.0	412.0	60	355.6	5.6	397.0	31	3.2	19	II
350	6	AW6-3*	±18	430	555.0	412.0	65	355.6	5.6	397.0	23	4.7	19	II
350	10	AW10-2*	±8	360	555	412	65	355.6	5.6	398	89	2.7	19	II
350	10	AW10-3*	±16	430	555	412	70	355.6	5.6	398	42	5.1	19	II
350	16	AW16-1*	±6	360	550	416	80	355.6	5.6	401	166	2.2	19	II
350	16	AW16-2*	±13	430	550	416	90	355.6	5.6	401	82	4.1	19	II
350	25	AW25-1*	±6	380	570	426	110	355.6	5.6	403	239	2.3	25	II
350	25	AW25-2*	±10	410	570	426	120	355.6	5.6	403	147	3.6	25	II
350	40	AW40-1*	±5	400	605	442	160	355.6	8.8	403	440	2.3	28	II
350	40	AW40-2*	±8	440	605	442	170	355.6	8.8	403	309	3.9	28	II
400	6	AW6-2*	±12	360	605.0	462.0	80	406.4	6.3	450.0	50	4.5	25	II
400	6	AW6-3*	±16	430	605.0	462.0	85	406.4	6.3	450.0	38	6.2	25	II
400	10	AW10-2*	±9	360	605	462	95	406.4	6.3	450	95	4.3	25	II
400	10	AW10-3*	±16	450	605	462	55	406.4	6.3	450	55	6.6	25	II
400	16	AW16-1*	±6	380	625	470	115	406.4	6.3	455	237	2.9	32	II
400	16	AW16-3*	±10	410	625	470	125	406.4	6.3	455	89	5	32	II
400	25	AW25-1*	±5	380	640	476	155	406.4	6.3	456	335	2.9	32	II
400	25	AW25-2*	±10	490	640	476	160	406.4	6.3	456	198	5.4	32	II
400	40	AW40-2*	±5	430	695	492	215	406.4	10	456	668	3.8	36	II
400	40	AW40-3*	±10	530	695	492	240	406.4	10	456	334	7.5	36	II
450	6	AW6-2*	±9	360	665.0	518.0	105	457.2	10.0	505.0	80	5.2	32	II
450	6	AW6-3*	±15	450	665.0	518.0	110	457.2	10.0	505.0	50	8.4	32	II
450	10	AW10-2*	±9	430	665	518	110	457.2	10.0	507	114	5.8	32	II
450	10	AW10-3*	±15	450	665	518	115	457.2	10.0	507	71	8.9	32	II
450	16	AW16-1*	±6	380	680	528	155	457.2	10.0	509	308	3.8	41	II
450	16	AW16-2*	±10	410	680	528	155	457.2	10.0	509	182	6.3	41	II
450	25	AW25-1*	±5	400	725	538	210	457.2	10.0	511	461	4.1	46	II
450	25	AW25-3*	±10	500	725	538	225	457.2	10.0	511	251	8.6	46	II
450	40	AW40-1*	±4	450	755	538	290	457.2	12.5	512	1055	3.8	55	II
450	40	AW40-3*	±7	530	755	538	315	457.2	12.5	512	503	8.5	55	II
500	6	AW6-2*	±9	430	715.0	574.0	115	508	6.3	557.0	117	7	39	II
500	6	AW6-3*	±14	450	715.0	574.0	115	508	6.3	557.0	73	10.9	39	II
500	10	AW10-2*	±9	430	715	574	120	508	6.3	559	160	7.1	39	II
500	10	AW10-3*	±12	450	715	574	120	508	6.3	559	114	10.3	39	II
500	16	AW16-1*	±6	380	745	584	165	508	6.3	561	413	4.9	50	II
500	16	AW16-2*	±10	490	745	584	180	508	6.3	561	245	8.4	50	II
500	25	AW25-1*	±4.5	430	790	598	250	508	11.0	561	715	4.6	56	II
500	25	AW25-3*	±9	530	790	598	275	508	11.0	561	310	10.3	56	II
500	40	AW40-2*	±4	470	835	598	360	508	12.5	563	951	7.1	67	II

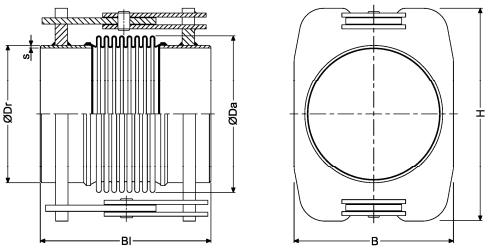
		Type			Flange/ hinge			Weld end		Bellows				
DN	PN	AW	Nominal angular expansion capacity[1]	Overall length	Height / largest outside dimension	Width / largest outside dimension	Weght (without inner sleeve)	Outside Ø	Thickness	Outside Ø	Spring rate ± 30%	Additional moment from rotation and pressure	Specific hinge friction	Design
			$\pm\Delta\alpha$	Bl.	H	B	m	Ø Dr	s	Ø Da	C_α	C_z	C_r	
-	-	-	°	mm	mm	mm	kg	mm	mm	mm	Nm/°	Nm/(bar°)	Nm/bar	-
500	40	AW40-3*	±7	580	835	598	390	508	12.5	563	679	10.6	67	II
600	6	AW6-2*	±8	430	815.0	610.0	120	610	6.3	663.0	197	10.8	55	II
600	6	AW6-3*	±12	450	815.0	610.0	125	610	6.3	663.0	141	14.6	55	II
600	10	AW10-2*	±7	410	850	630	170	610	6.3	663	300	10	71	II
600	10	AW10-3*	±12	490	850	630	190	610	6.3	663	183	15.5	71	II
600	16	AW16-1*	±5.5	430	880	677	255	610	6.3	665	635	7.5	79	II
600	16	AW16-2*	±10	480	880	677	265	610	6.3	665	350	12.8	79	II
600	25	AW25-1*	±4.5	490	925	695	385	610	10.0	666	1193	7.3	95	II
600	25	AW25-3*	±9	560	925	695	410	610	10.0	666	546	15.6	95	II
600	40	AW40-2*	±4	570	1000	691	630	610	15	666	1678	9.2	127	II
600	40	AW40-3*	±7	620	1000	691	650	610	15	666	959	16.5	127	II
700	6	AW6-2*	±8	410	945.0	711.0	180	711	7.1	764.0	228	13.5	95	II
700	6	AW6-3*	±11	490	945.0	711.0	190	711	7.1	764.0	163	20.2	95	II
700	10	AW10-2*	±6	440	970	735	250	711	7.1	764	446	13.5	106	II
700	10	AW10-3*	±10	500	970	735	270	711	7.1	764	278	19.7	106	II
700	16	AW16-2*	±6	530	1020	790	390	711	7.1	771	700	14.9	128	II
700	16	AW16-3*	±10	560	1020	790	400	711	7.1	771	467	21.8	128	II
700	25	AW25-2*	±5	570	1045	781	570	711	11.0	770	1425	14.6	171	II
700	25	AW25-3*	±8	610	1045	781	585	711	11.0	770	944	20.3	171	II
700	40	AW40-3*	±6	690	1100	788	900	711	18	773	1555	20.4	214	II
800	6	AW6-2*	±6	410	1050.0	813.0	240	813	8.0	871.0	433	16	124	II
800	6	AW6-3*	±10	490	1050.0	813.0	250	813	8.0	871.0	286	25	124	II
800	10	AW10-2*	±6	480	1090	840	350	813	8	871	628	18	138	II
800	10	AW10-3*	±10	530	1090	840	360	813	8	871	417	26.9	138	II
800	16	AW16-2*	±6	520	1155	889	545	813	8.0	875	979	20.6	167	II
800	16	AW16-3*	±9	580	1155	889	570	813	8.0	875	653	29	167	II
800	25	AW25-2*	±4	570	1215	908	840	813	12.5	877	2006	19.4	223	II
800	25	AW25-3*	±7	630	1215	908	865	813	12.5	877	1338	28.4	223	II
800	40	AW40-4*	±6	790	1260	900	1330	813	20	881	1687	37.3	280	II
900	6	AW6-2*	±6	440	1180.0	914.0	330	914	8.0	974.0	546	21	174	II
900	6	AW6-3*	±9	500	1180.0	914.0	345	914	8.0	974.0	364	32.3	174	II
900	10	AW10-2*	±4.5	530	1220	955	465	914	8	975	1105	20.1	208	II
900	10	AW10-3*	±9	560	1220	955	480	914	8	975	557	34.7	208	II
900	16	AW16-2*	±5	570	1270	1005	760	914	10	979	1614	22.6	279	II
900	16	AW16-3*	±7.5	610	1270	1005	775	914	10	979	1076	34.5	279	II
900	25	AW25-3*	±7	690	1335	1007	1165	914	14.2	980	1823	36.5	350	II
1000	6	AW6-2*	±5	480	1295.0	1016.0	450	1016	10.0	1078.0	780	27.8	214	II
1000	6	AW6-3*	±8	530	1295.0	1016.0	465	1016	10.0	1078.0	520	41.2	214	II
1000	10	AW10-2*	±5	520	1335	1060	610	1016	10	1080	1200	30.8	257	II
1000	10	AW10-3*	±8	580	1335	1060	635	1016	10	1080	800	44.8	257	II
1000	16	AW16-2*	±5	570	1420	1105	945	1016	10.0	1084	1860	31	344	II
1000	16	AW16-3*	±7	630	1420	1105	980	1016	10.0	1084	1489	42.4	344	II
1000	25	AW25-3*	±6.5	790	1465	1112	1520	1016	18	1084	2260	45.9	430	II

[1] Nominal expansion capacity: these indications are meant for 1000 full load cycles at 20°C
Type designation: L = with inner sleeve; B = without inner sleeve; * = optionally with/without inner sleeve

Type AW Design I
Available only without inner sleeve



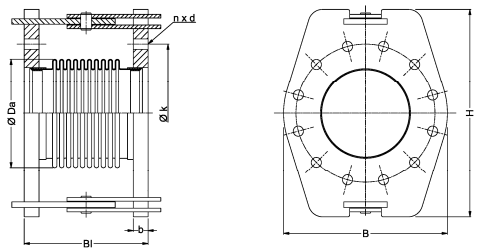
Type AW Design II
Optionally available with or without inner sleeve



Subject to changes; latest specifications on www.boagroup.com

2 Type AFS (Angular expansion joint with fixed flanges)

- AFS are angular expansion joints with a raised face. The bellows and flanges are welded tightly together. The nominal expansion capacity is either ±15 or 10°.
- As a standard, expansion joints of type AFS are manufactured in nominal diameters from DN 40 to DN 600 mm and in pressure ranges of PN 16 and 25.
- In type designation, PN 16 or 25 is extended by the figure 1, 2, 3 and 4, depending on the construction dimension.
  AFS 16-1 e.g. means: shortest expansion joint for pressure range PN 16, AFS 25-3: longer expansion joint for pressure range PN 25.



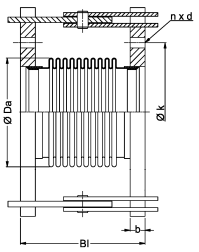
[1] Nominal expansion capacity: these indications are meant for 1000 full load cycles at 20°C
Type designation: L = with inner sleeve; B = without inner sleeve; * = optionally with/without inner sleeve

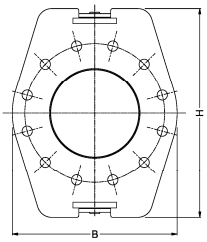
		Type				Flange						Bellows				
DN	PN	AFS	Nominal expansion capacity [1]	Overall length	Weight (without inner sleeve)	Height	Width	Thickness	Bolt circle Ø	Number of holes	Hole Ø	Outside Ø	Male face Ø	Spring rate ± 30%	Additional moment from rotation and pressure	Specific hinge fricton
			$\pm\Delta\alpha$	Bl.	m	H	B	b	k	n	d	Ø Da	g	C_α	C_z	C_r
-	-	-	°	mm	kg	mm	mm	mm	mm	-	mm	mm	mm	Nm/°	Nm/(bar°)	Nm/bar
40	16	AFS16-1*	±15	154	-	214	150	18	110	4	18	68.0	88.0	1.0	-	0.4
40	25	AFS25-1*	±15	154	-	214	150	18	110	4	18	69.0	88.0	1.0	-	0.4
50	16	AFS16-1*	±15	154	-	214	165	18	125	4	18	81.0	102.0	1.0	-	0.6
50	25	AFS25-1*	±15	158	-	220	165	20	125	4	18	83.0	102.0	2.0	-	0.6
65	16	AFS16-1*	±15	154	-	254	185	18	145	8	18	105.0	122.0	2.0	-	1.0
65	25	AFS25-1*	±15	162	-	254	185	22	145	8	18	105.0	122.0	4.0	-	1.0
80	16	AFS16-1*	±15	162	-	254	200	20	160	8	18	119.0	138.0	2.0	-	1.6
80	25	AFS25-1*	±15	170	-	254	200	24	160	8	18	118.0	138.0	3.0	-	1.6
100	16	AFS16-1*	±15	178	-	288	220	20	180	8	18	142.0	158.0	4.0	-	2.4
100	25	AFS25-1*	±15	196	-	304	234	24	190	8	22	143.0	162.0	8.0	-	1.9
125	16	AFS16-2*	±15	196	-	340	250	22	210	8	18	172.0	188.0	6.0	-	3.5
125	25	AFS25-3*	±15	234	-	352	270	26	220	8	26	172.0	188.0	14.0	-	3.4
150	16	AFS16-3*	±15	276	-	360	285	22	240	8	22	196.0	212.0	10.0	-	4.9
150	25	AFS25-3*	±15	280	-	400	300	28	250	8	26	202.6	218.0	15.0	-	5.8
200	16	AFS16-3*	±15	276	-	450	340	26	295	12	22	256.0	268.0	16.0	-	9.6
200	25	AFS25-3*	±15	300	-	466	360	30	310	12	26	258.0	278.0	34.0	-	14.5
250	16	AFS16-2*	±10	280	-	532	405	33	355	12	26	311.0	320.0	47.0	-	22.0
250	25	AFS25-3*	±10	358	-	540	425	38	370	12	30	315.0	335.0	47.0	-	22.0
300	16	AFS16-3*	±10	348	-	586	460	33	410	12	26	356.0	378.0	47.0	-	30.4
300	25	AFS25-2*	±10	348	-	620	485	39	430	16	30	368.0	395.0	112.0	-	33.8
350	16	AFS16-2*	±10	308	-	650	520	33	470	16	26	400.0	438.0	80.0	-	40.8
350	25	AFS25-3*	±10	318	-	730	550	38	490	16	33	402.0	450.0	139.0	-	30.5
400	16	AFS16-2*	±10	294	-	730	580	38	525	16	30	453.0	490.0	137.0	-	52.7

		Type				Flange						Bellows				
DN	PN	AFS	Nominal expansion capacity [1]	Overall length	Weight (without inner sleeve)	Height	Width	Thickness	Bolt circle Ø	Number of holes	Hole Ø	Outside Ø	Male face Ø	Spring rate ± 30%	Additional moment from rotation and pressure	Specific hinge fricton
			$\pm\Delta\alpha$	Bl.	m	H	B	b	k	n	d	Ø Da	g	C_α	C_z	C_r
-	-	-	°	mm	kg	mm	mm	mm	mm	-	mm	mm	mm	Nm/°	Nm/(bar°)	Nm/bar
400	25	AFS25-2*	±10	358	-	800	620	48	550	16	36	455.0	505.0	120.0	-	52.7
450	16	AFS16-2*	±10	308	-	830	640	42	585	20	30	507.0	550.0	178.0	-	67.0
450	25	AFS25-3*	±10	418	-	890	670	53	600	20	36	510.0	555.0	192.0	-	67.0
500	16	AFS16-3*	±10	418	-	930	715	48	650	20	33	559.0	610.0	171.0	-	106.6
500	25	AFS25-3*	±10	418	-	950	730	58	660	20	36	560.0	615.0	336.0	-	98.4
600	16	AFS16-3*	±10	380	-	1050	840	58	770	20	36	664.0	725.0	265.0	-	163.7
600	25	AFS25-3*	±10	510	-	1140	845	77	770	20	39	666.0	720.0	580.0	-	163.7

[1] Nominal expansion capacity: these indications are meant for 1000 full load cycles at 20°C
Type designation: L = with inner sleeve; B = without inner sleeve; * = optionally with/without inner sleeve

Type AFS

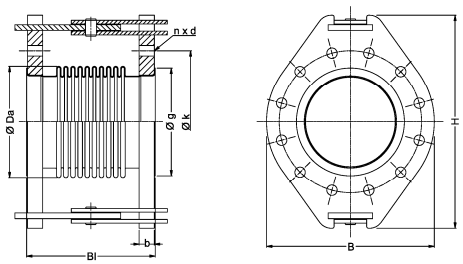




Subject to changes; latest specifications on www.boagroup.com

3 Type AFB (Angular expansion joint with flared flanges)

- AFB are angular expansion joints with a flared flange. The nominal expansion capacity is ±15° or less for larger DN types.
- As a standard, AFB expansion joints are manufactured in nominal diameters from DN 40 to DN 300 mm and in pressure ranges of PN 6 and 10.
- In type designation, PN 6 or 10 is not extended by a figure indicating the construction dimension.



[1] Nominal expansion capacity: these indications are meant for 1000 full load cycles at 20°C

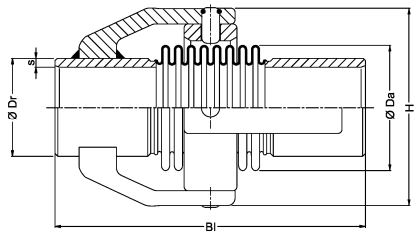
		Type				Flange						Bellows				
DN	PN	AFB	Nominal expansion capacity[1]	Overall length	Weight (without inner sleeve)	Height	Width	Thickness	Bolt circle Ø	Number of holes	Hole Ø	Outside Ø	Male face Ø	Spring rate ± 30%	Additional moment from rotation and pressure	Specific hinge friction
			$\pm\Delta\alpha$	Bl.	m	H	B	b	k	n	d	Ø Da	g	C_α	C_z	C_r
-	-	-	°	mm	kg	mm	mm	mm	mm	-	mm	mm	mm	Nm/°	Nm/(bar°)	Nm/bar
40	6	AFB6	±15	130	-	211	130	13	100	4	14	59.0	58.0	0.8	0.1	0.2
40	10	AFB10	±15	130	7.0	231	150	16	110	4	18	59.0	58.0	1.1	0.1	0.2
50	6	AFB6	±15	130	-	221	140	13	110	4	14	75.0	70.0	1.6	0.1	0.4
50	10	AFB10	±15	130	8.5	246	165	18	125	4	18	73.0	70.0	2.0	0.1	0.4
65	6	AFB6	±15	130	-	241	160	13	130	4	14	94.0	92.0	1.8	0.1	0.6
65	10	AFB10	±15	130	9.5	266	185	18	145	4	18	105.0	92.0	2.4	0.1	0.6
80	6	AFB6	±15	130	-	271	190	15	150	4	18	105.0	106.0	2.3	0.2	0.8
80	10	AFB10	±15	130	11.0	281	200	20	160	8	18	119.0	106.0	2.9	0.2	0.8
100	6	AFB6	±15	130	-	291	210	15	170	4	M16	136.0	134.0	3.5	0.3	1.3
100	10	AFB10	±15	130	14.5	347	220	20	180	8	18	143.0	134.0	4.3	0.2	1.3
125	6	AFB6	±15	130	-	323	240	17	200	8	18	158.0	162.0	6.5	0.4	1.9
125	10	AFB10	±15	130	18.0	377	250	22	210	8	18	157.0	162.0	8.0	0.4	1.8
150	6	AFB6	±15	130	-	390	265	19	225	8	18	186.0	190.0	8.7	0.5	2.7
150	10	AFB10	±15	130	-	370	285	22	240	8	22	202.0	190.0	11.0	0.6	2.9
200	6	AFB6	±15	130	-	425	330	22	280	8	18	250.0	256.0	13.0	0.8	4.4
200	10	AFB10	±10	130	24.5	440	340	23	295	12	22	253.0	256.0	20.0	0.9	5.0
250	6	AFB6	±6	130	-	470	400	25	335	12	18	304.0	308.0	22.0	18.8	0.9
250	10	AFB10	±6	130	-	515	405	28	350	12	22	308.0	308.0	34.0	18.9	1.1
300	6	AFB6	±5	130	-	560	440	24	395	12	22	356.0	361.0	43.0	22.2	1.3
300	10	AFB10	±5	130	-	593	485	28	400	12	22	366.0	361.0	74.0	22.2	1.3

Subject to changes; latest specifications on www.boagroup.com

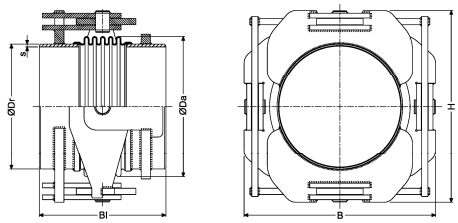
4 Type KAW (Gimbal expansion joint with weld ends)

- As a standard, KAW expansion joints are manufactured in nominal diameters from DN 40 to DN 1000 mm and in pressure ranges of PN 6, 10, 16, 25 and 40.
- As a standard, weld ends and tie rods are made of carbon steel and are primer coated.
- As special designs, also gimbal expansion joints with fixed flanges or with flared flanges may be manufactured.

Design I
Available only without inner sleeve



Design II
Optionally available with or without inner sleeve



[1)] Nominal expansion capacity: these indications are meant for 1000 full load cycles at 20°C
Type designation: L = with inner sleeve; B = without inner sleeve; * = optionally with/without inner sleeve

DN	PN	Type	Nominal expansion capacity[1)]		Flange/ hinge			Weld end		Bellows				
		KAW		Overall length	Height / largest outside dimension	Width / largest outside dimension	Weight (without inner sleeve)	Outside Ø	Thickness	Outside Ø	Spring rate ± 30%	Additional moment from rotation and pressure	Specific hinge friction	Design
			$\pm\Delta\alpha$	Bl.	H	B	m	Ø Dr	s	Ø Da	C_α	C_z	C_r	
-	-	-	°	mm	mm	mm	kg	mm	mm	mm	Nm/°	Nm/(bar°)	Nm/bar	-
40	6	KAW6-2*	±20	268	155	155	7.7	48.3	2.6	58	0.7	0.05	0.2	I
40	10	KAW10-2*	±20	268	155	155	7.7	48.3	2.6	58	0.7	0.05	0.2	I
40	16	KAW16-1B	±20	246	155	155	7.7	48.3	2.6	58	0.9	0.04	0.2	I
40	25	KAW25-1B	±20	260	155	155	7.7	48.3	2.6	57	1.3	0.04	0.2	I
40	40	KAW40-1B	±20	244	155	155	7.7	48.3	2.6	57	1.6	0.03	0.2	I
50	6	KAW6-2*	±20	260	168	168	8.2	60.3	2.9	74	1.2	0.09	0.2	I
50	10	KAW10-2*	±20	260	168	168	8.2	60.3	2.9	74	1.2	0.09	0.2	I
50	16	KAW16-1B	±20	256	168	168	8.3	60.3	2.9	74	1.6	0.07	0.2	I
50	25	KAW25-1B	±20	260	168	168	8.4	60.3	2.9	74	2.7	0.09	0.2	I
50	40	KAW40-1B	±20	256	168	168	8.5	60.3	2.9	74	3.3	0.07	0.2	I
65	6	KAW6-2*	±20	290	186	186	9.6	76.1	2.9	94	1.7	0.2	0.4	I
65	10	KAW10-2*	±20	306	186	186	9.9	76.1	2.9	94	2.5	0.19	0.4	I
65	16	KAW16-1B	±20	306	186	186	9.9	76.1	2.9	94	2.5	0.19	0.4	I
65	25	KAW25-1B	±20	308	186	186	10.1	76.1	2.9	94	5.9	0.19	0.4	I
65	40	KAW40-1B	±19	310	186	186	10.5	76.1	2.9	93	7.1	0.16	0.4	I
80	6	KAW6-2*	±20	300	200	200	10.5	88.9	3.2	105	2	0.26	0.5	I
80	10	KAW10-2*	±20	298	200	200	10.6	88.9	3.2	105	3.5	0.25	0.5	I
80	16	KAW16-1B	±20	298	200	200	10.6	88.9	3.2	105	3.5	0.25	0.5	I
80	25	KAW25-1B	±20	320	200	200	11.6	88.9	3.2	104	7	0.28	0.5	I
80	40	KAW40-1B	±17	330	194	194	14.5	88.9	3.2	104	9.7	0.21	0.5	II
100	6	KAW6-2*	±20	330	250	250	19.8	114.3	3.6	136	8.7	0.6	1.6	II
100	10	KAW10-2*	±20	330	250	250	19.8	114.3	3.6	136	8.7	0.6	1.6	II
100	16	KAW16-1*	±18.5	332	250	250	20.2	114.3	3.6	136	17	0.6	1.6	II
100	25	KAW25-1*	±18.5	332	250	250	20.2	114.3	3.6	136	17	0.6	1.6	II
100	40	KAW40-1*	±16.5	368	250	250	28.4	114.3	3.6	135	19	0.4	1.8	II
125	6	KAW6-2*	±20	360	274	274	23.1	139.7	4	158	5.6	0.8	2.2	II

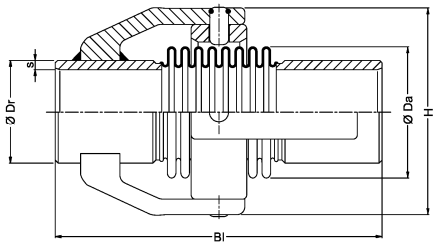
DN	PN	Type	Nominal expansion capacity[1)]		Flange/ hinge			Weld end		Bellows				
		KAW		Overall length	Height / largest outside dimension	Width / largest outside dimension	Weight (without inner sleeve)	Outside Ø	Thickness	Outside Ø	Spring rate ± 30%	Additional moment from rotation and pressure	Specific hinge friction	Design
			$\pm\Delta\alpha$	Bl.	H	B	m	Ø Dr	s	Ø Da	C_α	C_z	C_r	
-	-	-	°	mm	mm	mm	kg	mm	mm	mm	Nm/°	Nm/(bar°)	Nm/bar	-
125	10	KAW10-2*	±19.5	360	274	274	23.6	139.7	4	158	13	0.8	2.2	II
125	16	KAW16-1*	±19.5	360	274	274	23.6	139.7	4	158	13	0.8	2.2	II
125	25	KAW25-1*	±16.5	362	280	280	36	139.7	4	158	26	0.8	2.5	II
125	40	KAW40-1*	±15	368	280	280	37.2	139.7	4	157	27	0.6	2.4	II
150	6	KAW6-2*	±20	360	308	308	37	168.3	4.5	187	9	1.1	3.7	II
150	10	KAW10-2*	±17	360	308	308	37.6	168.3	4.5	186	21	1.1	3.6	II
150	16	KAW16-1*	±17	360	308	308	37.6	168.3	4.5	186	21	1.1	3.6	II
150	25	KAW25-1*	±14	362	308	308	38.3	168.3	4.5	186	42	1.1	3.6	II
150	40	KAW40-1*	±13	498	308	308	65	168.3	4.5	185	43	0.9	4.4	II
200	6	KAW6-2*	±13	495	382	382	94	219.1	6.3	259	64	2.6	9	II
200	10	KAW10-2*	±13	495	382	382	94	219.1	6.3	259	64	2.6	9	II
200	16	KAW16-1*	±13	495	382	382	94	219.1	6.3	259	64	2.6	9	II
200	25	KAW25-2*	±11	495	382	382	95	219.1	6.3	259	113	2.6	9	II
200	40	KAW40-2*	±8.5	555	398	398	137	219.1	6.3	258	257	2.6	12	II
250	6	KAW6-2*	±11.5	495	440	440	109	273	6.3	313	107	4	13	II
250	10	KAW10-2*	±11.5	495	440	440	109	273	6.3	313	107	4	13	II
250	16	KAW16-1*	±11.5	495	440	440	109	273	6.3	313	107	4	13	II
250	25	KAW25-2*	±9.5	555	448	448	154	273	6.3	313	188	4	19	II
250	40	KAW40-2*	±9	520	480	480	136	273	6.3	312	378	4.3	14	II
300	6	KAW6-2*	±10	495	500	500	98	323.9	8	364	174	5.5	18	II
300	10	KAW10-2*	±10	555	500	500	171	323.9	8	364	174	5.5	18	II
300	16	KAW16-2*	±10	555	500	500	171	323.9	8	364	174	5.5	18	II
300	25	KAW25-2*	±8	515	525	525	136	323.9	8	364	304	5.5	20	II
300	40	KAW40-2*	±7.5	540	525	525	165	323.9	8	362	613	6	19	II
350	6	KAW6-2*	±12	360	555.0	555.0	70	355.6	5.6	397	31	3.2	19	II
350	6	KAW6-3*	±18	430	555.0	555.0	75	355.6	5.6	397	23	4.7	19	II
350	10	KAW10-2*	±8	360	555	555	75	355.6	5.6	398	89	2.7	19	II
350	10	KAW10-3*	±16	430	555	555	80	355.6	5.6	398	42	5.1	19	II
350	16	KAW16-1*	±6	360	550	550	105	355.6	5.6	401	166	2.2	19	II
350	16	KAW16-2*	±13	430	550	550	110	355.6	5.6	401	82	4.1	19	II
350	25	KAW25-1*	±6	380	570	570	140	355.6	5.6	403	239	2.3	25	II
350	25	KAW25-2*	±10	410	570	570	145	355.6	5.6	403	147	3.6	25	II
350	40	KAW40-1*	±5	400	605	605	205	355.6	8.8	403	440	2.3	28	II
350	40	KAW40-2*	±8	440	605	605	215	355.6	8.8	403	309	3.9	28	II
400	6	KAW6-2*	±12	360	605.0	605.0	95	406.4	6.3	450	50	4.5	25	II
400	6	KAW6-3*	±16	430	605.0	605.0	100	406.4	6.3	450	38	6.2	25	II
400	10	KAW10-2*	±9	360	605	605	105	406.4	6.3	450	95	4.3	25	II
400	10	KAW10-3*	±16	450	605	605	110	406.4	6.3	450	55	6.6	25	II
400	16	KAW16-1*	±6	380	625	625	145	406.4	6.3	455	237	2.9	32	II
400	16	KAW16-3*	±10	410	625	625	155	406.4	6.3	455	89	5	32	II
400	25	KAW25-1*	±5	380	640	640	205	406.4	6.3	456	335	2.9	32	II
400	25	KAW25-2*	±10	490	640	640	205	406.4	6.3	456	198	5.4	32	II
400	40	KAW40-2*	±5	430	695	695	295	406.4	10	456	668	3.8	36	II
400	40	KAW40-3*	±10	530	695	695	310	406.4	10	456	334	7.5	36	II
450	6	KAW6-2*	±9	360	665.0	665.0	125	457.2	10.0	505	80	5.2	32	II
450	6	KAW6-3*	±15	450	665.0	665.0	130	457.2	10.0	505	50	8.4	32	II
450	10	KAW10-2*	±9	430	665	665	140	457.2	10.0	507	114	5.8	32	II

DN	PN	Type			Flange/ hinge			Weld end		Bellows				
		KAW	Nominal expansion capacity[1)]	Overall length	Height / largest outside dimension	Width / largest outside dimension	Weight (without inner sleeve)	Outside Ø	Thickness	Outside Ø	Spring rate ± 30%	Additional moment from rotation and pressure	Specific hinge friction	Design
			$\pm\Delta\alpha$	Bl.	H	B	m	Ø Dr	s	Ø Da	C_α	C_z	C_r	
-	-	-	°	mm	mm	mm	kg	mm	mm	mm	Nm/°	Nm/(bar°)	Nm/bar	-
450	10	KAW10-3*	±15	450	665	665	145	457.2	10.0	507	71	8.9	32	II
450	16	KAW16-1*	±6	380	680	680	195	457.2	10.0	509	308	3.8	41	II
450	16	KAW16-2*	±10	410	680	680	200	457.2	10.0	509	182	6.3	41	II
450	25	KAW25-1*	±5	400	725	725	280	457.2	10.0	511	461	4.1	46	II
450	25	KAW25-3*	±10	500	725	725	290	457.2	10.0	511	251	8.6	46	II
450	40	KAW40-1*	±4	450	755	755	405	457.2	12.5	512	1055	3.8	55	II
450	40	KAW40-3*	±7	530	755	755	425	457.2	12.5	512	503	8.5	55	II
500	6	KAW6-2*	±9	430	715.0	715.0	140	508	6.3	557	117	7	39	II
500	6	KAW6-3*	±14	450	715.0	715.0	140	508	6.3	557	73	10.9	39	II
500	10	KAW10-2*	±9	430	715	715	155	508	6.3	559	160	7.1	39	II
500	10	KAW10-3*	±12	450	715	715	160	508	6.3	559	114	10.3	39	II
500	16	KAW16-1*	±6	380	745	745	225	508	6.3	561	413	4.9	50	II
500	16	KAW16-2*	±10	490	745	745	240	508	6.3	561	245	8.4	50	II
500	25	KAW25-1*	±4.5	430	790	790	345	508	11.0	561	715	4.6	56	II
500	25	KAW25-3*	±9	530	790	790	365	508	11.0	561	310	10.3	56	II
500	40	KAW40-2*	±4	470	835	835	510	508	12.5	563	951	7.1	67	II
500	40	KAW40-3*	±7	580	835	835	530	508	12.5	563	679	10.6	67	II
600	6	KAW6-2*	±8	430	815.0	815.0	160	610	6.3	663	197	10.8	55	II
600	6	KAW6-3*	±12	450	815.0	815.0	165	610	6.3	663	141	14.6	55	II
600	10	KAW10-2*	±7	410	850	850	235	610	6.3	663	300	10	71	II
600	10	KAW10-3*	±12	490	850	850	250	610	6.3	663	183	15.5	71	II
600	16	KAW16-1*	±5.5	430	880	880	360	610	6.3	665	635	7.5	79	II
600	16	KAW16-2*	±10	480	880	880	370	610	6.3	665	350	12.8	79	II
600	25	KAW25-1*	±4.5	490	925	925	550	610	10.0	666	1193	7.3	95	II
600	25	KAW25-3*	±9	560	925	925	570	610	10.0	666	546	15.6	95	II
600	40	KAW40-2*	±4	570	1000	1000	880	610	15	666	1678	9.2	127	II
600	40	KAW40-3*	±7	620	1000	1000	895	610	15	666	959	16.5	127	II
700	6	KAW6-2*	±8	410	945.0	945.0	245	711	7.1	764	228	13.5	95	II
700	6	KAW6-3*	±11	490	945.0	945.0	255	711	7.1	764	163	20.2	95	II
700	10	KAW10-2*	±6	440	970	970	350	711	7.1	764	446	13.5	106	II
700	10	KAW10-3*	±10	500	970	970	370	711	7.1	764	278	19.7	106	II
700	16	KAW16-2*	±6	530	1020	1020	555	711	7.1	771	700	14.9	128	II
700	16	KAW16-3*	±10	560	1020	1020	565	711	7.1	771	467	21.8	128	II
700	25	KAW25-2*	±5	570	1045	1045	815	711	11.0	770	1425	14.6	171	II
700	25	KAW25-3*	±8	610	1045	1045	825	711	11.0	770	944	20.3	171	II
700	40	KAW40-3*	±6	700	1100	1100	1270	711	18	773	1555	20.4	214	II
800	6	KAW6-3*	±10	490	1050.0	1050.0	350	813	8.0	871	286	25	124	II
800	10	KAW10-2*	±6	480	1090	1090	505	813	8	871	628	18	138	II
800	10	KAW10-3*	±10	530	1090	1090	510	813	8	871	417	26.9	138	II
800	16	KAW16-3*	±9	580	1155	1155	805	813	8.0	875	653	29	167	II
800	25	KAW25-3*	±7	650	1215	1215	1225	813	12.5	877	1338	28.4	223	II
800	40	KAW40-4*	±6	790	1260	1260	1870	813	20	881	1687	37.3	280	II
900	6	KAW6-2*	±6	440	1180.0	1180.0	470	914	8.0	974	546	21	174	II
900	6	KAW6-3*	±9	500	1180.0	1180.0	485	914	8.0	974	364	32.3	174	II
900	10	KAW10-3*	±9	560	1230	1230	700	914	8	975	557	34.7	208	II
900	16	KAW16-3*	±7.5	690	1270	1270	1120	914	10	979	1076	34.5	279	II

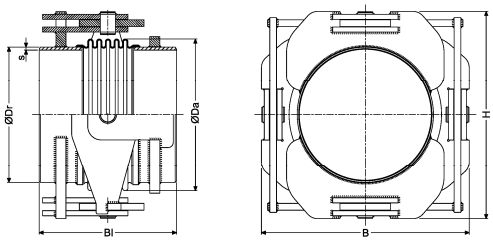
DN	PN	Type	Nominal expansion capacity[1)]		Flange/ hinge			Weld end		Bellows				
		KAW		Overall length	Height / largest outside dimension	Width / largest outside dimension	Weight (without inner sleeve)	Outside Ø	Thickness	Outside Ø	Spring rate ± 30%	Additional moment from rotation and pressure	Specific hinge friction	Design
			$\pm\Delta\alpha$	Bl.	H	B	m	Ø Dr	s	Ø Da	C_α	C_z	C_r	
-	-	-	°	mm	mm	mm	kg	mm	mm	mm	Nm/°	Nm/(bar°)	Nm/bar	-
900	25	KAW25-3*	±7	700	1335	1335	1685	914	14.2	980	1823	36.5	350	II
1000	6	KAW6-2*	±5	480	1295.0	1295.0	645	1016	10.0	1078	780	27.8	214	II
1000	6	KAW6-3*	±8	530	1295.0	1295.0	655	1016	10.0	1078	520	41.2	214	II
1000	10	KAW10-3*	±8	580	1335	1335	935	1016	10	1080	800	44.8	257	II
1000	16	KAW16-3*	±7	680	1420	1420	1450	1016	10.0	1084	1489	42.4	344	II
1000	25	KAW25-3*	±6.5	850	1465	1465	2215	1016	18	1084	2260	45.9	430	II

[1)] Nominal expansion capacity: these indications are meant for 1000 full load cycles at 20°C
Type designation: L = with inner sleeve; B = without inner sleeve; * = optionally with/without inner sleeve

Type KAW Design I
Available only without inner sleeve



Type KAW Design II
Optionally available with or without inner sleeve



Subject to changes; latest specifications on www.boagroup.com