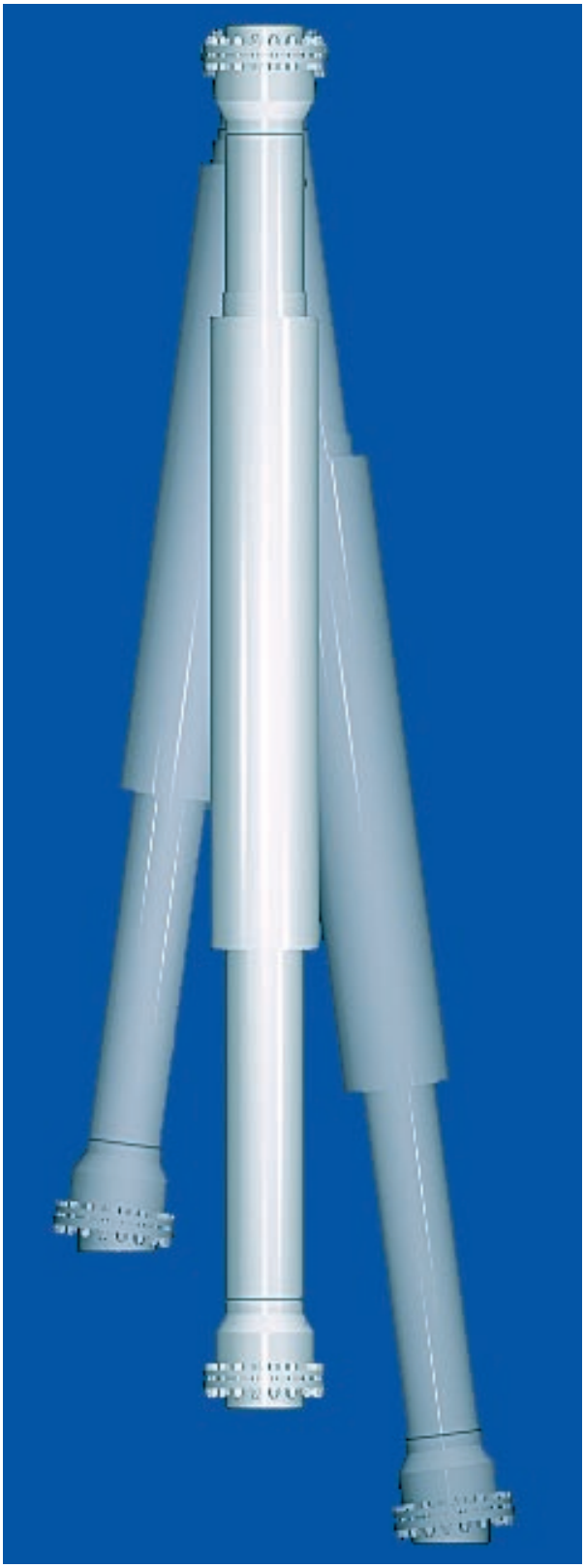
Hyspan®

IN-LINE SEISMIC EXPANSION JOINT

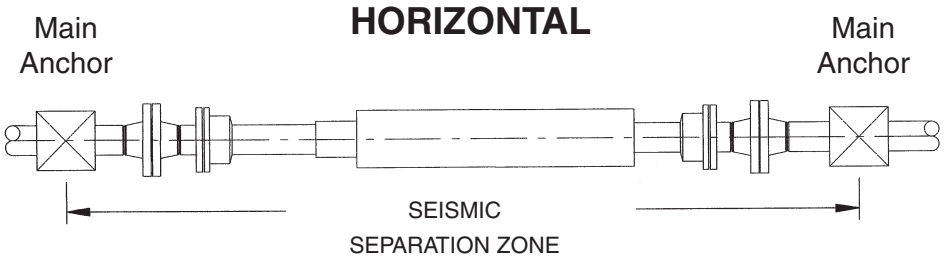


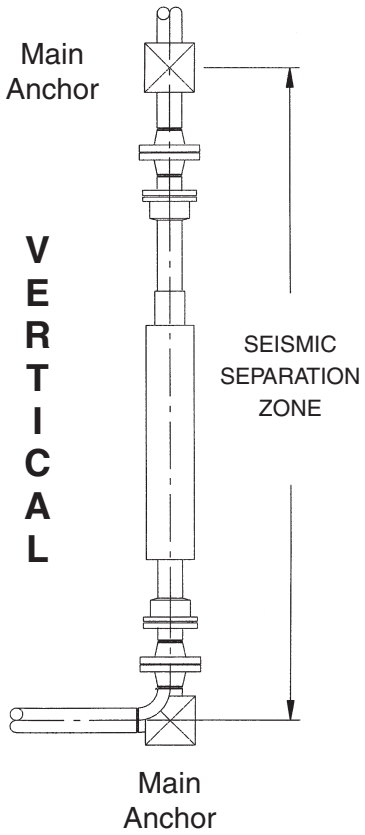
- ±6", ±12", ±18" or ±24" AXIAL AND LATERAL MOTIONS
- FLANGED, GROOVED, OR WELD ENDS
- PIPE CONSTRUCTION
- NO CHANGE IN DIRECTION REQUIRED
- HORIZONTAL OR VERTICAL INSTALLATION
- RETROFIT EXISTING BUILDINGS
- MINIMAL OUTSIDE DIAMETER FOR CONFINED SPACES
- NO EXPOSED BELLOWS ELEMENT
- MAINTENANCE FREE

Series 3500 IS In-Line Seismic Expansion Joint

The rugged in-line construction of the Series 3500 IS seismic expansion joint provides a reliable heavy-duty solution to absorb large multi-plane seismic motions. Designed specifically to connect the piping of two structures that move independently in a seismic event. The design does not require a change in piping direction and therefore does not add elbows and other components that increase pressure drop and heat loss. The envelope is minimum to facilitate installations in tight fitting areas and retrofitting of existing piping installations.

Series 3500 IS expansion joints combine the design techniques of two well established Hyspan products; Hyspan Barco Ball Joints provide lateral offset and rotation, and Hyspan Series 3500 externally pressurized expansion joints provide axial extension or compression. The bellows is enclosed and all component parts are made from standard pipe or equivalent. The installation can be horizontal or vertical as illustrated.





Applications

Series 3500 IS seismic expansion joints must be installed between two anchor points that are designed to react to the pressure thrust and bellows spring force of the axial expansion joint, and the lateral force resulting from the flex torque of the ball joints.

The maximum lateral force on the anchor is equal to the break away force which is tabulated in Column 5 of Table 1 for the standard designs. After break away, the force is reduced, and it is not a function of pressure.

The maximum axial force is a combination of the pressure thrust force which is tabulated in Table 2, Pressure and Force Data, and the Axial Spring Rate that is tabulated in Column 4 of Table 1 multiplied by the axial deflection.

$$\text{Anchor Force (Lbs.)} = \text{Pressure Force Table 2 (lbs)} + \left\{ \frac{\text{Spring Rate (lb./in.)}}{\text{Column 4, Table 1}} \right\} \times \left\{ \text{Axial Travel (inches)} \right\}$$

Table 1 Design Pressure: 150 psig Test Pressure: 225 psig Design Temperature: 400° F

Nominal Size (NPS)	Part No.(1) 3501 IS 3502 IS 3507 IS	Maximum Outside Diameter (inches)	Axial Spring Rate (lb./in.)	Break Away Force(2) (lb.)	3501 IS Flanged		3502 IS Weld End		3507 IS Grooved End	
					Overall Length (inches)	Weight (lbs)	Overall Length (inches)	Weight (lbs)	Overall Length (inches)	Weight (lbs)
2 1/2	-135-6	6.19	46	88	62.0	112	56.5	96	56.0	96
	-135-12		22	24	104.5	164	99.0	148	98.5	148
	-135-18		15	16	150.5	216	145.0	200	144.5	200
	-135-24		13	12	196.5	274	191.0	258	190.5	258
3	-140-6	7.19	36	175	63.5	157	58.0	137	57.5	137
	-140-12		19	47	106.0	224	100.5	204	100.0	204
	-140-18		12	32	152.0	296	146.5	276	146.0	276
	-140-24		11	24	198.0	367	192.5	347	192.0	347
4	-148-6	9.75	65	323	70.5	310	64.5	280	63.88	280
	-148-12		33	94	109.0	405	103.0	375	102.38	375
	-148-18		21	63	155.0	514	149.0	484	148.38	484
	-148-24		22	47	201.0	610	195.0	580	194.38	580
5	-155-6	11.28	166	480	73.0	400	66.0	362	65.25	362
	-155-12		85	141	111.0	502	104.0	464	103.25	464
	-155-18		53	94	157.0	635	150.0	597	149.25	597
	-155-24		43	71	203.0	738	196.0	700	195.25	700
6	-160-6	12.38	181	601	76.5	521	69.5	473	68.75	473
	-160-12		94	180	113.38	669	106.38	621	105.63	621
	-160-18		58	120	159.38	840	152.38	792	151.63	792
	-160-24		48	90	205.38	988	198.38	940	197.63	940
8	-167-6	14.75	200	509	83.5	794	75.5	716	74.5	716
	-167-12		92	165	116.0	991	108.0	913	107.0	913
	-167-18		66	110	162.0	1,225	154.0	1,147	153.0	1,147
	-167-24		60	83	208.0	1,411	200.0	1,333	199.0	1,333
10	-174-6	17.12	232	969	84.0	1,081	76.0	977	75.0	977
	-174-12		113	314	116.5	1,324	108.5	1,220	107.5	1,220
	-174-18		77	209	162.5	1,657	154.5	1,553	153.5	1,553
	-174-24		68	157	208.5	1,902	200.5	1,798	199.5	1,798
12	-180-6	19.75	529	1,496	87.0	1,475	78.0	1,315	77.0	1,315
	-180-12		130	468	123.38	1,797	114.38	1,637	113.38	1,637
	-180-18		176	329	164.38	2,294	155.38	2,084	154.38	2,084
	-180-24		137	247	210.38	2,678	201.38	2,518	200.38	2,518
1	2	3	4	5	6	7	8	9	10	11

Note:

(1) The part number designates the design axial and lateral (all planes) motions. Dash 6 (-6) indicates combined motions of 6" axial and lateral, -12, -18, -24 are 12",18" and 24" respectively.

(2) The break away force is the lateral force required to deflect the expansion joint. The values given are for liquid service at 150 psig. Values for steam are 67% higher.

(3) Flanges 150 lb. A105 raised face weld neck, Weld Ends ASME/ANSI B16.5, Grooved Ends per ANSI/AWWA C606-87.

Table 2 Pressure and Force Data

Nominal Size (NPS)	Effective Area ($in.^2$)	Tabulated Force (lbs.)		
		50 psig	150 psig	225 psig
2 1/2	10.6	533	1,599	2,385
3	13.7	685	2,054	3,082
4	22.7	1,135	3,404	5,108
5	35.3	1,763	5,288	7,943
6	50.3	2,513	7,540	11,318
8	80.5	4,026	12,077	18,112
10	115	5,773	17,320	25,875
12	164	8,228	24,684	36,900

Recommended Specification

The seismic expansion joint shall be fully enclosed in-line construction. Designs requiring elbows or a change in direction are not acceptable. The pressure/temperature rating shall be 150 psig at 400°F. Rated axial and lateral (all planes) motions shall be plus or minus 6", 12", 18" or 24" as required. The assembly shall consist of a Hyspan Barco Ball Joint at each end for lateral offset, and a Hyspan Series 3500 three ply externally pressurized expansion joint for axial motion. Bellows design shall be in accordance with the Standards of the Expansion Joint Manufacturers Association, Inc. using ASME Section II, Part D allowable stresses. Minimum fatigue life shall be 100 cycles. Internal vented guiding shall be included. All pipe including the expansion joint housing shall be ASTM A53 Gr. B standard weight. The expansion joint shall be Hyspan Series 3500 IS.

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