## Conforming to Fire Service Act

Flexible metal hose Universal expansion joints Technical guidelines

Applicable laws and regulations prescribe that flexible metal hoses and universal expansion joints should be used in the connections of tanks for storage or handling of dangerous liquids with piping to prevent the connections being damaged by earthquake and ground subsidence. Our company supplies flexible hoses and bellows which conform to the performance rating standards specified by the applicable laws and regulations.

## Flexible metal hoses



Hoses can be provided with Teflon inner layer.



#### Performance table

Nominal		Max. Lateral displacement (mm)											
diam	diameter		100	150	200	250	300	350	400				
А	В	Overall length L											
40	1•1/2	500	600	700	800	900	1,000	1,100	1,200				
50	2	600	700 800		900	1,000	1,100	1,200	1,300				
65	2•1/2	600	800 900		1,000	1,100	1,200	1,300	1,400				
80	3	700	800	800 1,000		1,200	1,300	1,400	1,500				
100	4	700	900 1,100		1,200	1,300	1,400	1,500	1,600				
125	5	800 1,000		1,200	1,300	1,400	1,500	1,600	1,800				
150	6	800	1,100	1,300	1,500 1,600		1,700	1,800	1,900				
200	8	900	1,200	1,400	1,500	1,700	1,800	1,900	2,100				
250	10	1,000	1,400	1,500	1,700	2,000	2,100	2,200	2,300				
300	12	1,100	1,400	1,700	1,900	2,200	2,300	2,500	2,600				
350	14	1,200	1,500	1,800	2,000	2,200	2,400	2,600	2,800				
400	16	1,300	1,600	2,000	2,200	2,500	2,700	2,900	3,200				

Flexible metal hose

Universal expansion joints

# Universal bellows type expansion joints



#### Performance table

Nominal diameter		Max. Lateral displacement (mm)											
		50 100		150	200	250	300	350	400				
A	В	Overall length L											
80	3	700	1,000	1,400	1,700	2,100	2,400	2,700	3,100				
100	4	700	1,100	1,400	1,800	2,100	2,500	2,800	3,200				
125	5	800	1,200	1,600	2,000	2,300	2,700	3,100	3,500				
150	6	800	1,200 1,600		2,000	2,000 2,400		3,200	3,600				
200	8	900	1,300	1,700	2,100	2,500	2,900	3,300	3,700				
250	10	1,000	1,400	1,800	2,200	2,600	3,000	3,300	3,700				
300	12	1,000	1,400	1,800	2,200	2,600	3,000	3,300	3,700				
350	14	1,100	1,500	1,900	2,300	2,700	3,100	3,400	3,800				
400	16	1,200	1,600	2,100	2,400	2,800	3,200	3,600	4,000				
450	18	1,200	1,700	2,200	2,600	3,100	3,500	4,000	4,500				
500	20	1,300	1,800	2,300	2,800	3,300	3,800	4,300	4,800				
550	22	1,300	1,900	2,500	3,000	3,600	4,100	4,700	5,300				
600	24	1,400	1,900	2,500	3,000	3,600	4,100	4,700	5,300				
650	26	1,400	1,900	2,500	3,000	3,600	4,100	4,700	5,300				

**Technical guidelines** 

# **Technical guidelines**

### Engineering guidelines for expansion joints (extract)

#### Thickness of bellows of expansion joint (minimum value)

The thickness of formed bellows shall be larger than the following value depending on the nominal diameter of the relevant flexible hose.

For our products, materials thicker by 20 to 65% than the standard thickness are used in consideration of long-term use.

Nominal diameter (A)	40	50	65	80	100	125	150	200	250	300	350	400	450	500	550	600	650
Standard thickness value	<sup>ss</sup> 0.			0.	.8		1			1.2			1.	.5		2	2

 Length of expansion joint and maximum amount of lateral displacement

The length and maximum amount of lateral displacement of flexible metal hoses and universal expansion joints are shown in the tables in the previous two pages. The length of a expansion joint shall be larger than the value for the maximum amount of lateral displacement shown in the table.

#### Strength calculation

The value calculated by the specified strength calculation formula shall meet the specified value.

#### Material

The specified material or a material equivalent to or better than the specified one shall be used.

#### Static load test

When a expansion joint is filled with water and a weight (half of the weight of joint filled with water) is suspended for 1 min in the center of the joint horizontally placed with both ends fixed, the joint shall not leak water or shall not be damaged.

#### Displacement pressure test

When a hydraulic pressure higher than the maximum operating pressure is applied to a expansion joint displaced to the maximum lateral displacement for 5 min, its parts shall not be deformed.

#### Repeated displacement test

When a hydraulic pressure 1.5 times higher than the maximum operating pressure is applied to a joint for 5 minutes after the joint is displaced to the maximum lateral displacement repeatedly 1,000 times, the joint shall not leak water or shall not be damaged.

#### Durability test (only flexible metal hoses)

When the maximum operating pressure is applied to a hose repeatedly 2,000 times or more, the length after testing shall be 105% or less of the length before testing.

#### Stiffness test

When a hydraulic pressure 4 times higher than the maximum operating pressure is applied to a joint for 1 minute, the joint shall not leak water, and its length after testing shall be 115% or less of the length before testing in the case of a flexible joint or 102% or less in the case of a universal joint.

#### Anticorrosion coating

Apply an anticorrosion paint to the external surface of expansion joint. It is unnecessary to treat stainless steel parts.

#### Appearance

Expansion joint parts shall be free from defects, such as cracks and damages.

#### Marking

Expansion joints shall be marked with the maximum operating pressure, bellows material, manufacturing date and manufacturer's name by an indelible method.