

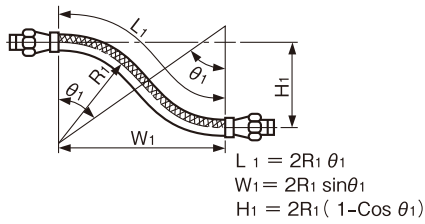
## Formula for calculating the length of flexible section of a flexible metal hose

When the deflection is generated in the direction perpendicular to the axis

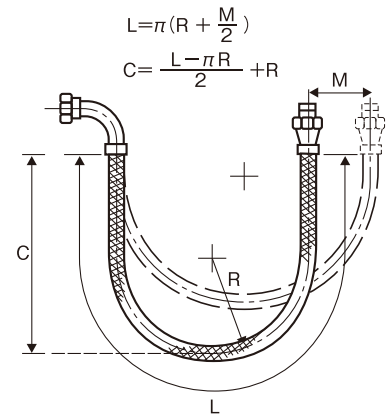
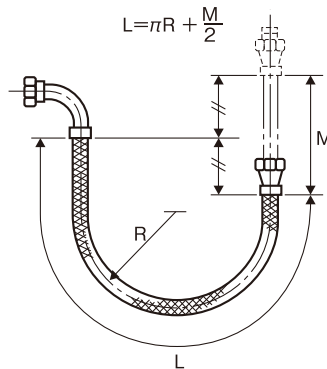
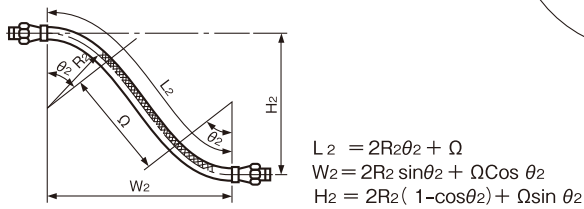
For vertical movement in U-shaped pipe line

For horizontal movement in U-shaped pipe line

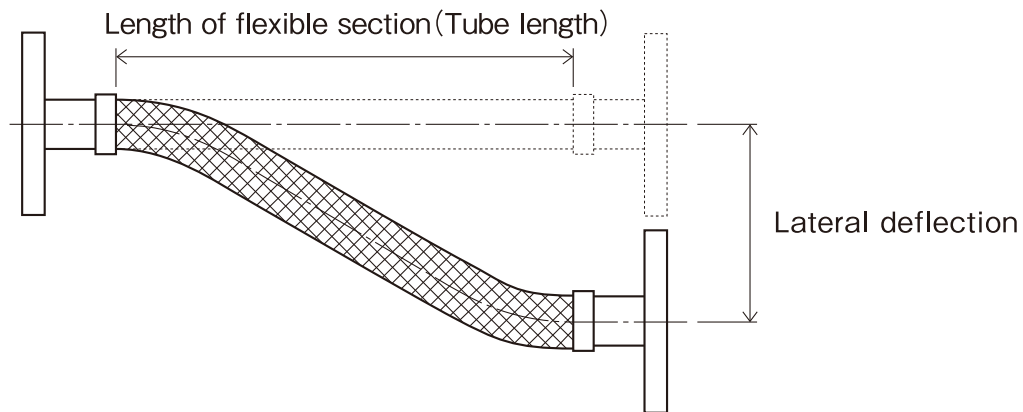
1. When the entire tube is bent in a uniform arc:



2. When both ends are arched and the middle is straight:



When repeated movement (lateral deflection) is generated, and face to face distance for installation is fixed.

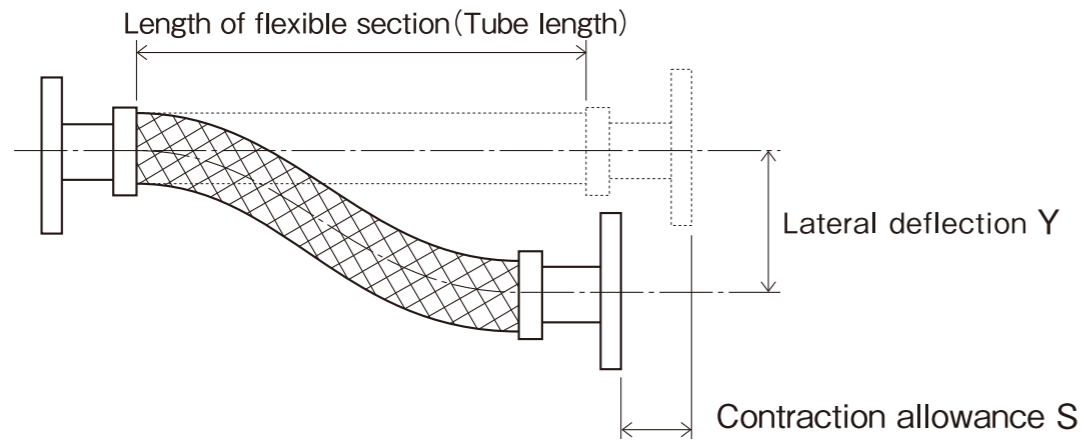


Aim of lateral deflection for a flexible section (tube length)

Unit: mm

N B	min. bending radius	Length of flexible section (Tube length)													
		200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
8A	120	27	41	55	70	84	98	112	126	140	169	197	226	254	282
10A	150	27	41	55	69	84	98	112	126	140	169	197	225	254	282
15A	155	27	41	55	69	84	98	112	126	140	169	197	225	254	282
20A	215	26	41	55	69	83	97	111	126	140	168	197	225	253	282
25A	220	26	40	55	69	83	97	111	126	140	168	197	225	253	282
32A	240	26	40	55	69	83	97	111	125	140	168	196	225	253	281
40A	335	25	40	54	68	82	96	111	125	139	167	196	224	252	281
50A	450	22	38	53	67	81	96	110	124	138	167	195	223	252	280
65A	460	21	38	53	67	81	95	110	124	138	166	195	223	251	280
80A	355	28	39	54	68	82	96	110	125	139	167	196	224	252	281
100A	425	23	39	53	67	82	96	110	124	138	167	195	223	252	280
125A	570	17	37	52	66	80	95	109	123	137	166	194	222	251	279
150A	660	15	34	51	65	80	94	108	122	137	165	193	222	250	279
200A	850	11	26	47	63	78	92	107	121	135	164	192	220	249	277
250A	1000	10	22	40	61	76	91	105	120	134	162	191	219	248	276
300A	1350	7	16	29	46	66	87	102	116	131	159	188	217	245	273

When repeated movement (lateral deflection) is generated, and face to face distance for installation is not fixed:

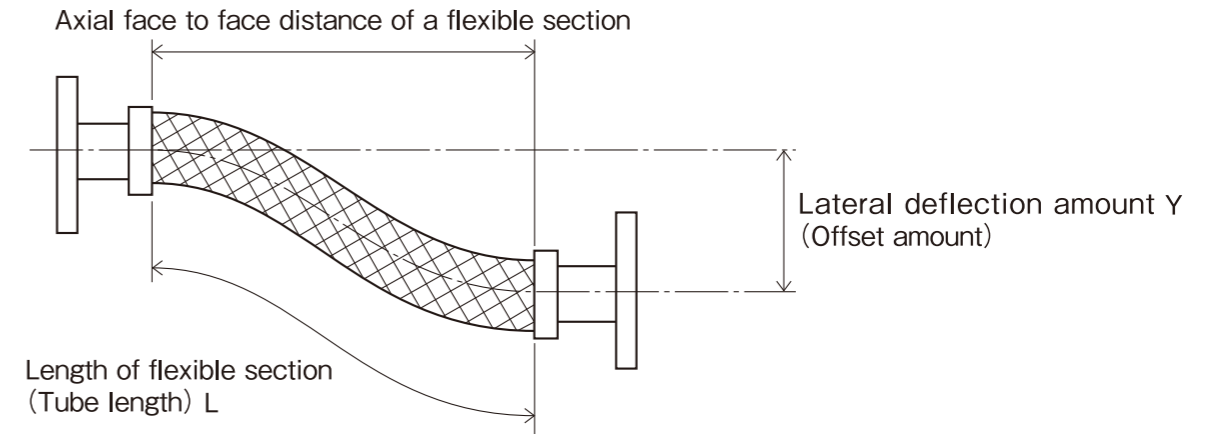


Aim of lateral deflection for a flexible section (tube length)

Unit:mm

N B	min. bending radius	Lateral deflection Y (Contraction allowance S)	Length of flexible section (Tube length)															
			200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
8A	120	Y	78	143	190	238	286	334	381	429	477	522	668	763	859	954		
		(S)	(22)	(51)	(69)	(86)	(103)	(121)	(138)	(155)	(173)	(207)	(242)	(276)	(311)	(346)		
10A	150	Y	64	137	190	238	286	334	381	429	477	522	668	763	859	954		
		(S)	(14)	(47)	(69)	(86)	(103)	(121)	(138)	(155)	(173)	(207)	(242)	(276)	(311)	(346)		
15A	155	Y	62	134	190	238	286	334	381	429	477	522	668	763	859	954		
		(S)	(13)	(44)	(69)	(86)	(103)	(121)	(138)	(155)	(173)	(207)	(242)	(276)	(311)	(346)		
20A	215	Y	45	100	173	238	286	334	381	429	477	522	668	763	859	954		
		(S)	(7)	(23)	(55)	(86)	(103)	(121)	(138)	(155)	(173)	(207)	(242)	(276)	(311)	(346)		
25A	220	Y	44	98	169	238	286	334	381	429	477	522	668	763	859	954		
		(S)	(6)	(22)	(52)	(86)	(103)	(121)	(138)	(155)	(173)	(207)	(242)	(276)	(311)	(346)		
32A	240	Y	41	90	157	237	286	334	381	429	477	522	668	763	859	954		
		(S)	(5)	(19)	(44)	(85)	(103)	(121)	(138)	(155)	(173)	(207)	(242)	(276)	(311)	(346)		
40A	335	Y	29	66	115	178	251	333	381	429	477	522	668	763	859	954		
		(S)	(2)	(9)	(23)	(45)	(77)	(120)	(138)	(155)	(173)	(207)	(242)	(276)	(311)	(346)		
50A	450	Y	22	49	87	135	192	258	332	413	477	522	668	763	859	954		
		(S)	(1)	(5)	(13)	(25)	(43)	(68)	(101)	(142)	(173)	(207)	(242)	(276)	(311)	(346)		
65A	460	Y	21	48	85	132	188	253	326	406	477	522	668	763	859	954		
		(S)	(1)	(5)	(12)	(24)	(41)	(65)	(97)	(136)	(173)	(207)	(242)	(276)	(311)	(346)		
80A	355	Y	27	62	109	168	238	318	381	429	477	522	668	763	859	954		
		(S)	(2)	(8)	(20)	(40)	(68)	(108)	(138)	(155)	(173)	(207)	(242)	(276)	(311)	(346)		
100A	425	Y	23	52	92	142	203	272	349	429	477	522	668	763	859	954		
		(S)	(1)	(6)	(14)	(28)	(48)	(76)	(112)	(155)	(173)	(207)	(242)	(276)	(311)	(346)		
125A	570	Y	17	39	69	107	154	208	269	337	411	522	668	763	859	954		
		(S)	(1)	(3)	(8)	(15)	(27)	(43)	(64)	(90)	(123)	(207)	(242)	(276)	(311)	(346)		
150A	660	Y	15	33	60	93	134	181	235	295	361	508	668	763	859	954		
		(S)	(0)	(2)	(6)	(11)	(20)	(32)	(48)	(68)	(92)	(158)	(242)	(276)	(311)	(346)		
200A	850	Y	11	26	46	73	104	142	184	232	285	406	544	698	859	954		
		(S)	(0)	(1)	(3)	(7)	(12)	(19)	(29)	(41)	(56)	(97)	(152)	(225)	(311)	(346)		
250A	1000	Y	9	22	39	62	89	121	157	199	244	349	470	606	756	919		
		(S)	(0)	(1)	(2)	(5)	(8)	(14)	(21)	(30)	(41)	(70)	(111)	(165)	(233)	(317)		
300A	1350	Y	7	16	29	46	66	90	117	148	183	262	354	460	578	707		
		(S)	(0)	(0)	(1)	(2)	(4)	(7)	(11)	(16)	(22)	(39)	(61)	(92)	(130)	(177)		

The amount of offset against the length of a flexible section of an offset pipe (pipe without repeated movement)



Unit:mm

N B	min. bending radius (fixed)	Offset amount Y (Length of flexible section L)	Axial face to face distance of a flexible section															
			200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
8A	20	Y	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
		(L)	(314)	(471)	(628)	(785)	(942)	(1100)	(1257)	(1414)	(1571)	(1885)	(2199)	(2513)	(2827)	(3142)		
10A	25	Y	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
		(L)	(314)	(471)	(628)	(785)	(942)	(1100)	(1257)	(1414)	(1571)	(1885)	(2199)	(2513)	(2827)	(3142)		
15A	30	Y	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
		(L)	(314)	(471)	(628)	(785)	(942)	(1100)	(1257)	(1414)	(1571)	(1885)	(2199)	(2513)	(2827)	(3142)		
20A	35	Y	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
		(L)	(314)	(471)	(628)	(785)	(942)	(1100)	(1257)	(1414)	(1571)	(1885)	(2199)	(2513)	(2827)	(3142)		
25A	40	Y	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
		(L)	(314)	(471)	(628)	(785)	(942)	(1100)	(1257)	(1414)	(1571)	(1885)	(2199)	(2513)	(2827)	(3142)		
32A	60	Y	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
		(L)	(314)	(471)	(628)	(785)	(942)	(1100)	(1257)	(1414)	(1571)	(1885)	(2199)	(2513)	(2827)	(3142)		
40A	70	Y	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
		(L)	(314)	(471)	(628)	(785)	(942)	(1100)	(1257)	(1414)	(1571)	(1885)	(2199)	(2513)	(2827)	(3142)		
50A	75	Y	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
		(L)	(314)	(471)	(628)	(785)	(942)	(1100)	(1257)	(1414)	(1571)	(1885)	(2199)	(2513)	(2827)	(3142)		
65A	105	Y	145	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
		(L)	(265)	(471)	(628)	(785)	(942)	(1100)	(1257)	(1414)	(1571)	(1885)	(2199)	(2513)	(2827)	(3142)		
80A	200	Y	53	315	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
		(L)	(209)	(339)	(628)	(785)	(942)	(1100)	(1257)	(1414)	(1571)	(1885)	(2199)	(2513)	(2827)	(3142)		
100A	250	Y	41	100	200	500	600	700	800	900	1000	1200	1400	1600	1800	2000		
		(L)	(206)	(332)	(464)	(785)	(942)	(1100)	(1257)	(1414)	(1571)	(1885)	(2199)	(2513)	(2827)	(3142)		
125A	320	Y	32	74	140	240	417	700	800	900	1000	1200	1400	1600	1800	2000		
		(L)	(203)	(312)	(432)	(574)	(778)	(1100)	(1257)	(1414)	(1571)	(1885)	(2199)	(2513)	(2827)	(3142)		
150A	370	Y	27	63	117	194	306	500	800	900	1000	1200	1400	1600	1800	2000		
		(L)	(203)	(309)	(423)	(549)	(700)	(918)	(1257)	(1414)	(1571)	(1885)	(2199)	(2513)	(2827)	(3142)		
200A	520	Y	19	44	80	128	190	270	375	518	754	1200	1400	1600	1800	2000		
		(L)	(201)	(304)	(411)	(522)	(640)	(768)	(913)	(1088)	(1344)	(1885)	(2199)	(2513)	(2827)	(3142)		
250A	700	Y	14	32	58	92	135	187	251	327	420	678	1400	1600	1800	2000		
		(L)	(201)	(302)	(406)	(511)	(620)	(733)	(852)	(978)	(1114)	(1442)	(2199)	(2513)	(2827)	(3142)		
300A	900	Y	11	25	45	70	102	141	187	241	303	458	668	975	1800	2000		
		(L)	(200)	(301)	(403)	(507)	(612)	(719)	(829)	(942)	(1060)	(1314)	(1604)	(1971)	(2827)	(3142)		

# Manual of Flexible Metal Hose

**1** This document is described general attention matters about conveyance, installation and maintenance of "FLEXIBLE METAL HOSE".

Picture marks and the meanings

	<b>Warning</b> The meaning of this mark is the contents supposing man dying or becoming serious injury.
	<b>Attention</b> The meaning of this mark is the contents supposing material damage, or man is injured. But it may be connected with a serious result depending on a situation.
	The meaning of this mark is "Prohibition".
	The meaning of this mark is "Compulsion".

**2** The main portion of FLEXIBLE METAL HOSE consist of thin stainless steel tube and stainless steel braid. If tube and braid are damaged or corroded, the capacity to resist pressure of FLEXIBLE METAL HOSE will be declined. Therefore, it is necessary to pay sufficient attention for prevention of the following matters with a possibility of reducing the quality of the FLEXIBLE METAL HOSE.

- 1) Shock, drop
- 2) Over displacement
- 3) Welding and cutting work near the FLEXIBLE METAL HOSE
- 4) Invasion of salt, sand and iron powder

**3 Conveyance** Keep the following matters at conveyance.

- 1) Convey horizontally as much as possible.
- 2) Avoid the drag, drop and crash.
- 3) When hanging up the hose, use the cloth belts so that the wire does not to contact the hose directly.

**4 Storage** Storage of the hose should be in the following state.

- 1) On the shelf or flat board at airy place.
- 2) If a hose is taken out from the packing unavoidably, wrap up the whole hose in polyethylene sheet.
- 3) Do not operate welding, gouging and gas cutting near the hose.
- 4) The place which does not touch the copper products or copper alloy products.

**5 Installation** At installation, take care for the following matters.

- 1) Check the installation place by the machinery number or size, which are indicated in name plate or tag plate.
- 2) Compare the fitting form and dimensions with drawing.
- 3) Don't install the hose with displacement beyond the design value and don't twist.

**6 After installation** Carry out the followings to prevent the installed hose from damage and deterioration.

- 1) Cover the hose with waterproof clothes and prevent to stick the iron powder, sand, dust and water.
- 2) Attach the plate indicated to prohibit following matters.
  - A. Welding or weld cutting near and upper the hose.
  - B. Put the heavy things on the hose.
  - C. Work to give a shock.
- 3) At welding or weld cutting upper the hose, be sure to cover the hose with nonflammable clothes.

**7** Inspection of pressure proof test of piping line.

- Check the following matters during and immediately after system pressure test.
  - 1) Abnormal transformation (ex. creases of braid)
  - 2) Leakage of fluid
  - 3) Other abnormal condition

**8** Inspection of the hose at test operation of piping line.

Judge the following items at test operation.

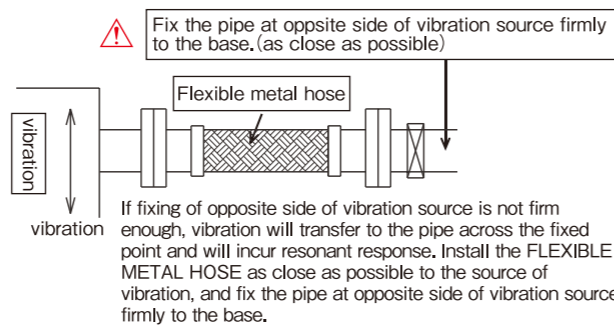
- 1) Vibration
- 2) Displacement
- 3) Rust
- 4) Abnormal transformation

**9** Regular inspection throughout its life.

Frequency of inspection should be determined depending on external environment and kind of inner fluid. And, clean and replace old hose to new one, if needed, to prevent damage and accident.

- Check the followings for regular inspection.
- 1) Rust or corrosive condition on outer surface.
  - 2) Corrosive condition of inner surface of tube.
    - ※ Remove the hose from piping system and check.
  - 3) External injury and abnormal transformation
  - 4) Traces of leakage

**10** FLEXIBLE METAL HOSE for vibration absorber



**11** FLEXIBLE METAL HOSE for water tank

At open and shut of valve, we recommend to install check-valve to prevent breakage due to water-hammer or vibration.

**12** FLEXIBLE METAL HOSE for main valve piping

If FLEXIBLE METAL HOSE installed at upper stream side of main valve, it is possible to break according to alteration of water supply pressure. Install the hose at lower stream side of main valve.

# Explanatory Sketch

<p>Install the hose as straight as possible.</p>	
<p>Don't twist the hose. (Hose can be bent on only one plane.)</p>	
<p>Don't bend the hose by small radius.</p>	<p>Stress of hose concentrates into root of fittings. (Using guides is effective for durability of hose.)</p>
<p>Don't stretch the hose. (If hose is stretched, pressure proof capacity of hose declines.)</p>	<p>Consider decision of the hose length and method of installation.</p>
<p>Remove the corrosive matters from hose.</p>	<p>Stainless steel is superior to corrosive proof but take care not to attach the chloride because it is possible to corrode stainless steel by chloride existence.</p>