JS Type Sleeve Expansion Joint

for Building・Air Conditioning Equipments, Factory Equipments, etc.

Flanged

Solutions for Pipe Expansion/Contraction, Ground Sinkage

Sleeve expansion joint absorbing expansion/contraetion of pipe in axial direction due to change of temperature.
Suitable for main pipeline in high buildings, area conditioning, plants, factories and hospitals. Also serve as countermeasure for ground sinkage and earthquake.

FEATURES

- Supper packing for high sealing performance.
- Safe structure.
- Large expansion/contraction.
- No need for lubrication.
- All stainless steel products are also suitable for water supply.

SPECIFICATIONS

Model name	JS-5HF	JS-6HF	JS-7HF	JS-8HF
Code name	**JS5HF-N**	**JS6HF-N**	**JS7HF-N**	**JS8HF-N**
Applicable fluid	Steam, air, gases, cold or hot water & oils			
Fluid temperature	Max. 220℃			
Applicable pressure	Max. 1.0MPa		Max. 2.0MPa	
End connection	Flanged JIS 10KFF		Flanged JIS 20KRF	
Materials	Sleeve(Stainless steel), External sleeve(Carbon steel), Packing(Graphite compound)			
	Flange(Mild steel)		Flange(Carbon steel)	
Pressure test	Hydraulic 1.5MPa		Hydraulic 3.0MPa	
Expansion amount	100mm	200mm	100mm	200mm
Expansion	20mm	40mm	20mm	40mm
Contraction	80mm	160mm	80mm	160mm

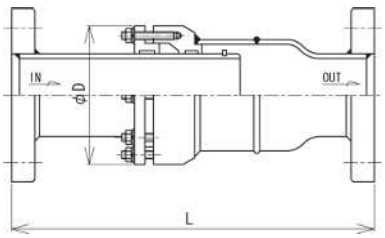
＊All stainless steel material is also available upon request.

DIMENSIONS

DIMENSIONS / Model Name / Size	L(mm) JS-5HF,7HF (Max. exp. 100mm)	L(mm) JS-6HF,8HF (Max. exp. 200mm)	D(mm)	Pressure receiving area of sleeve Ae(mm²)	Friction resistance of sleeve μ(N)	Load on main fixing point (N) JS-5HF,6HF (at 1.0MPa)	Load on main fixing point (N) JS-7HF,8HF (at 2.0MPa)
20(¾″)	380	560	83	530	1300	1900	2400
25(1″)	380	560	90	860	1600	2500	3400
32(1¼″)	380	560	100	1320	2000	3400	4700
40(1½″)	380	560	105	1730	2300	4100	5800
50(2″)	380	560	120	2460	2700	5200	7700
65(2½″)	430	600	135	4300	3600	8000	13000
80(3″)	430	600	145	5810	4200	11000	16000
100(4″)	430	640	185	9850	5400	16000	26000
125(5″)	500	640	210	14700	6600	22000	37000
150(6″)	500	690	235	20600	7800	29000	49000
200(8″)	500	690	300	35600	10300	46000	82000
250(10″)	580	740	350	54700	12700	68000	123000
300(12″)	580	740	415	77900	15200	94000	172000

Flange code JIS 10KFF, JIS 20KRF

CONSTRUCTION



Depending on size, the structure may vary.

MASS

(kg)

Model Name / Size	JS-5HF	JS-6HF	JS-7HF	JS-8HF
20(¾″)	4.5	5.5	5	6
25(1″)	6.5	7	7	7.5
32(1 ¼″)	7.5	9.5	8	10
40(1 ½″)	8.5	10	9	10.5
50(2″)	10.5	12.5	11	13
65(2 ½″)	14.5	18.5	15	19
80(3″)	15.5	25.5	16.5	26.5
100(4″)	20	29.5	21	30.5
125(5″)	30	34	32	36
150(6″)	40	47	42	49
200(8″)	60	71	64	75
250(10″)	88	107	93	112
300(12″)	122	141	132	151

Flange code JIS 10KFF,JIS 20KRF

DATA/JB Type Bellows Expansion Joint

■ ABOUT BELLOWS MATERIAL SUS316L (Stainless steel)

The JIS B 2352 Bellows Type Expansion Joint recommends SUS304, SUS304L, SUS316, SUS 316L, and others for making bellows. To ensure durability and corrosion resistance, which are extremely important parameters for high grade bellows, we selected SUS316L for making bellows and all parts that contact with fluid. With higher performance than SUS304, SUS316L is considered having the same or even higher characteristics than SUS304L. See the following table for characteristics of SUS316L and SUS304L.

■ COMPARISON BETWEEN SUS316L AND SUS304L

TABLE1. CHEMICAL COMPOSITION (%)

Type	Carbon C	Silicon Si	Manganese Mn	Phosphor P	Sulfur S	Nickel Ni	Chrome Cr	Molybdenum Mo
SUS316L	0.030 or less	1.00 or less	2.00 or less	0.045 or less	0.030 or less	12.00~15.00	16.00~18.00	2.00~3.00
SUS304L	0.030 or less	1.00 or less	2.00 or less	0.045 or less	0.030 or less	9.00~13.00	18.00~20.00	—

TABLE2. MECHANICAL PROPERTY

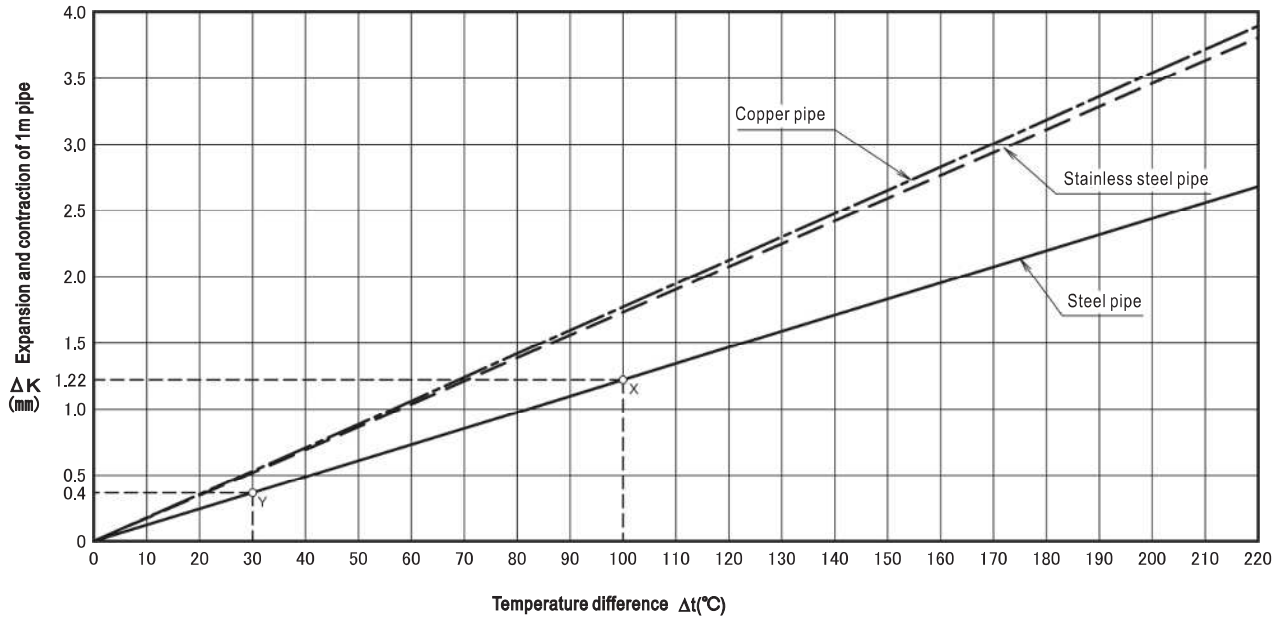
Type	Tensile test			Hardness test		
	Yield Strength N/mm²	Tensile N/mm²	Elongation %	HB	HRB	HV
SUS316L	175 or more	480 or more	40 or more	187 or less	90 or less	200 or less
SUS304L	175 or more	480 or more	40 or more	187 or less	90 or less	200 or less

TABLE3. ANTICORROSION

Type	All surface corrosion	Intercrystalline corrosion	Stress corrosion crack	Porous corrosion	Gap corrosion
SUS316L	○	○	◎	◎	◎
SUS304L	○	○	○	○	○

＊○:Superior ◎:Much superior

■ FIG.1 EXPANSION AND CONTRACTION OF 1m PIPE



■ SELECTING EXPANSION JOINT

Determine the type and number of expansion joints based on the material of pipe and change of temperature, which are factors affecting expansion/ contraction of pipe.

● Calculation $n = \frac{\Delta \ell}{\delta}$

$$\Delta \ell = \beta \times \Delta t \times \ell$$

n : number of joints
δ :max. expansion/contraction of joint (mm)
Δℓ : expansion/contraction of pipe (mm)
β : linear expansion coefficient of pipe (mm/m/℃)
Steel pipe (12.2×10^{-3})
Copper pipe (17.7×10^{-3})
Stainless steel pipe (17.3×10^{-3})

Δt : temperature difference (℃)
ℓ : length of pipe (m)

● Example

Under the following conditions:
Length of pipe (ℓ): 35m
Max. working temperature (t_1): 120℃
Min. ambient temperature (t_2): −10℃
Ambient temperature at the time of installation (t_3): 20℃
Determine the type and number of expansion joints.
The pipe is steel pipe and the joint is to be determined based on standard face-to-face dimensions.

DATA/JS Type Sleeve Expansion Joint

■ ABOUT SUPER PACKING

Super packing is packing material made of flexible graphite and a certain type of inorganic substance in specific proportion. It has a high sealing performance and reliable service life.

In addition, it can resist −200~450℃ temperature and shows great corrosion resistance against acid, alkaline and organic solvents.

■ EXAMPLE OF APPLICATION

Fig.1 Absorption of thermal expansion

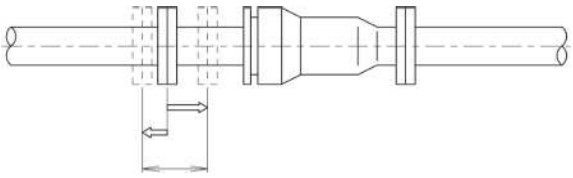


Fig.2 Ground sinkage prevention

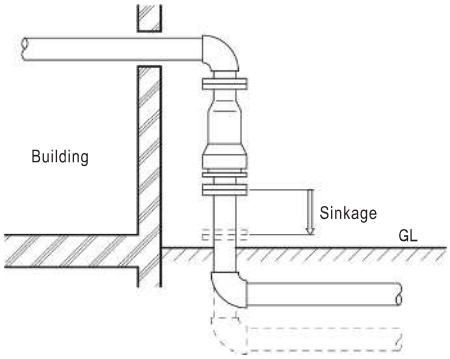
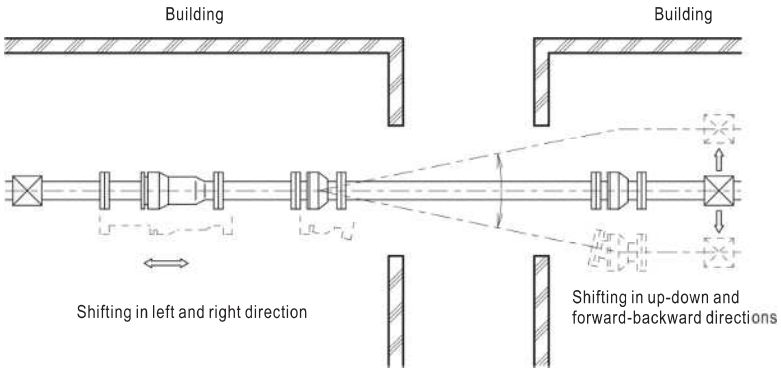


Fig.3 Earthquake-proof building and ground sinkage prevention



■ CALCULATING EXPANSION/CONTRACTION OF PIPE

$\Delta \ell = \beta \times \Delta t \times \ell$

$\Delta \ell$: Expansion/contraction of pipe		(mm)
β: Linear expansion coefficient of pipe		
12.2×10^{-3}mm/m/℃		(steel pipe)
Δt: Temperature difference		(℃)
ℓ: Length of pipe		(m)

Note: The extension/compression of 1m pipe can also be calculated using Fig.1 in Page 179.

■ FIXING POINT INSTALLATION

Fixing point with sufficient strength are necessary for installing expansion joint. The position of fixing point is the following.

① Main fixing point

- The end of straight pipe closed by a flange or valve.
- Bending pipe where the direction of flow changes;
- Between two expansion joints, where reducer is used to change the diameter of pipe;
- Pipe between two expansion joints, where valve is installed;
- The inlet of main pipe of branch pipe with free expansion joint.

② Intermediate fixing point

In the middle of two expansion joints between main fixing point.

■ LOAD ON FIXING POINT

Load on main fixing point of straight pipe Fm (N)

$Fm = Ae \times P + \mu$

Load on intermediate fixing point Fi (N)

$Fi = \mu$

Ae: Pressure receiving area of sleeve	(mm^2)
P: Pressure of fluid	(MPa)
μ: Friction resistance of sleeve	(N)

DATA/JS Type Sleeve Expansion Joint

■ GUIDE AND PIPE SUPPORT

① Guide

To ensure correct expansion and contraction of expansion joint, the axes of expansion joint and pipe must match with each other. In addition, it is necessary to use guides to transmit the force for the movement in axial direction to fixing point. The guides need to be installed according to the following intervals.

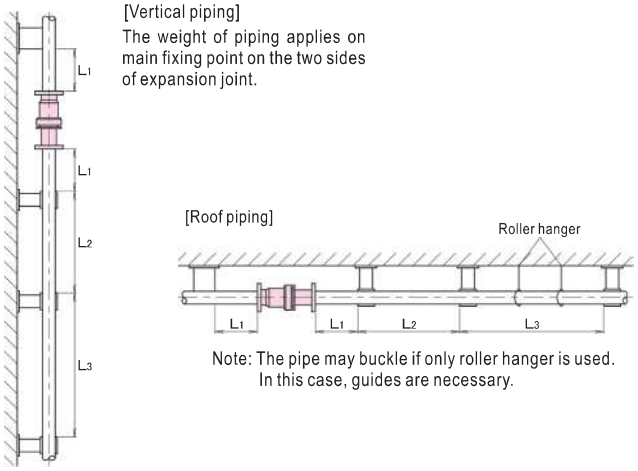
The deviation of pipe axes is ±2mm for size 125mm or smaller pipes, and ±3mm for size 150mm or larger pipes. The deviation of degree of parallelization of pipe should be ±0.5°.

L_1: The interval between expansion joint and No.1 guide.

L_2: The interval between No.1 guide and No.2 guide.

L_3: The interval between No.2 guide and middle guide.

Fig. 4-2 Vertical piping and roof piping



The max. interval of guides can be calculated using the following formula. The max. interval of intermediate guide (L_3) can be determined using Fig.5. (For STPG Sch40 carbon steel)

$L_1 \leqq 4D$

$L_2 \leqq 14D$

$$L_3 \leqq \sqrt{\frac{\pi^2 EI}{fFm}} \qquad I=\frac{\pi}{64}(D^4-d^4)$$

L_1, L_2, L_3: Interval between guides (max.)	(mm)
D: External diameter of pipe	(mm)
d: Internal diameter of pipe	(mm)
E: Young's modulus at the designed temperature of pipe material	(N/mm²)
Steel pipe 200℃:	191×10^3N/mm²
Stainless steel pipe 200℃:	183×10^3N/mm²
I: Secondary moment of the cross section of pipe	(mm⁴)
f: Safety factor	(3 or larger)
Fm: Load on main fixing point	(N)

② Pipe supporting

Install roller support or roller hanger guide to prevent pipe from bending due the weight of pipe or fluid.

Fig.5 Max. interval between intermediate guides

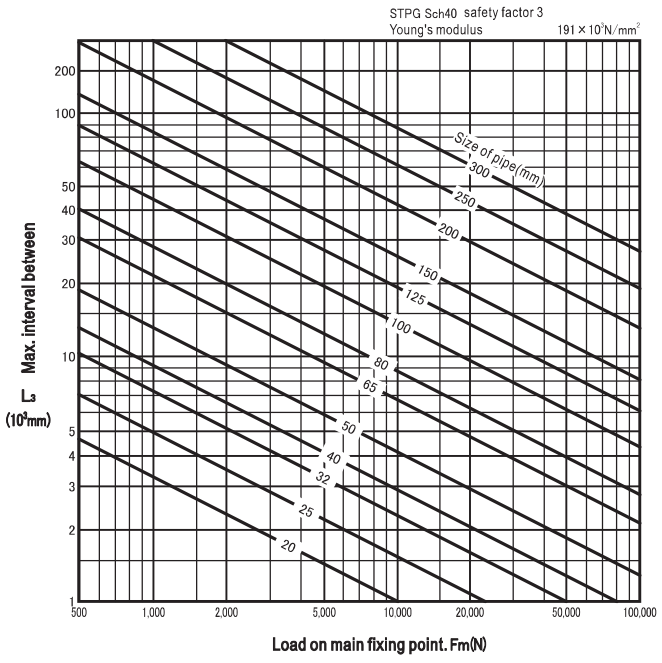


Fig.4-1 Interval between guides

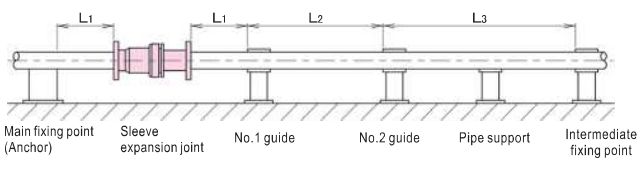
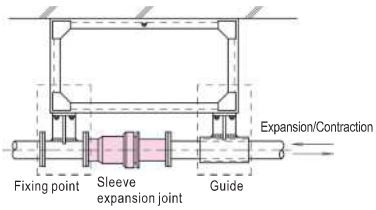


Fig.6 Fixing point and guide (example)



Other guide (example)