

Purpose

This document describes the basic and reference knowledge of jacket piping modeling for thermal stress calculation.

Jacket Piping

Jacketed pipe would be used where external heating or cooling is required to maintain the primary product being transported in a desired state (i.e., keep it liquid). When the primary product is sensitive to contamination or corrosion, the carrier pipe (inner pipe) will often be of a different material (such as stainless steel) than the jacket (which is usually carbon steel).

Basics of Modeling

The modeling approach is to define two pipe segments lying over each other (1mm offset). The first segment represents the carrier pipe (inner pipe) and the second segment the jacket (outer pipe). Next, the two pipes are assembled into a single component with jacket end or flange at either end. Typically, the jacket end or flanges are considered to be fully connected (i.e. they have the same displacements and rotations). The connection between the jacket (outer pipe) and carrier pipe (inner pipe) is achieved by using a rigid beam element. Pipe spacers are used at various increments along the length of the pipe assembly in order to maintain a uniform spacing between the carrier (inner pipe) and the jacket (outer pipe). Spacers are modeled as rigid connections using a two-point guide support.

Jacket Sizes

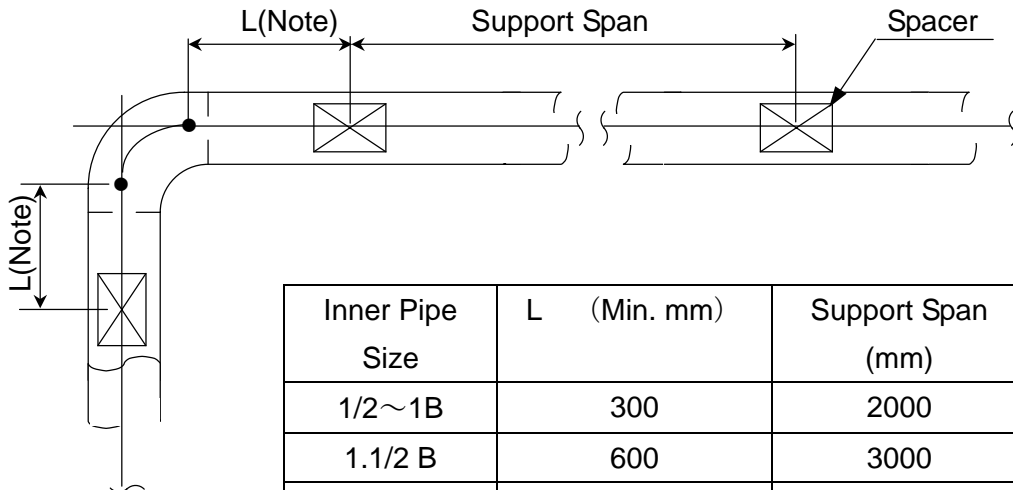
Unless otherwise noted in Piping and Instrument Diagrams, jacket relative sizes may be as follows:

<u>Inner Pipe</u> (Process Side)	<u>Outer Pipe</u> (Steam Side)
NPS 1/2, 3/4	NPS 1-1/2
1	2
1-1/2	3
2	3
2-1/2	4
3	4 or 5
4	6
5	8
6	8
8	10 or 12
10	14
12	16

Spacer

Spacer may be installed as follows to maintain the clearance between inner pipe and outer pipe.

(1) Spacer Installation Pitch



Inner Pipe Size	L (Min. mm)	Support Span (mm)
1/2~1B	300	2000
1.1/2 B	600	3000
2 B	800	4000
3B	1000	5000
4B	1100	5000

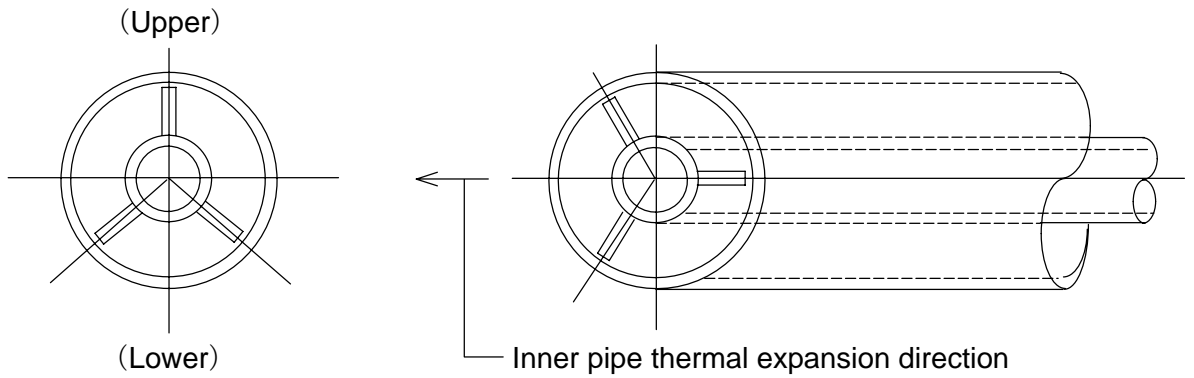
Note

- L shows minimum length.
- Thermal expansion shall be considered.
- This concept should be applied at tee.

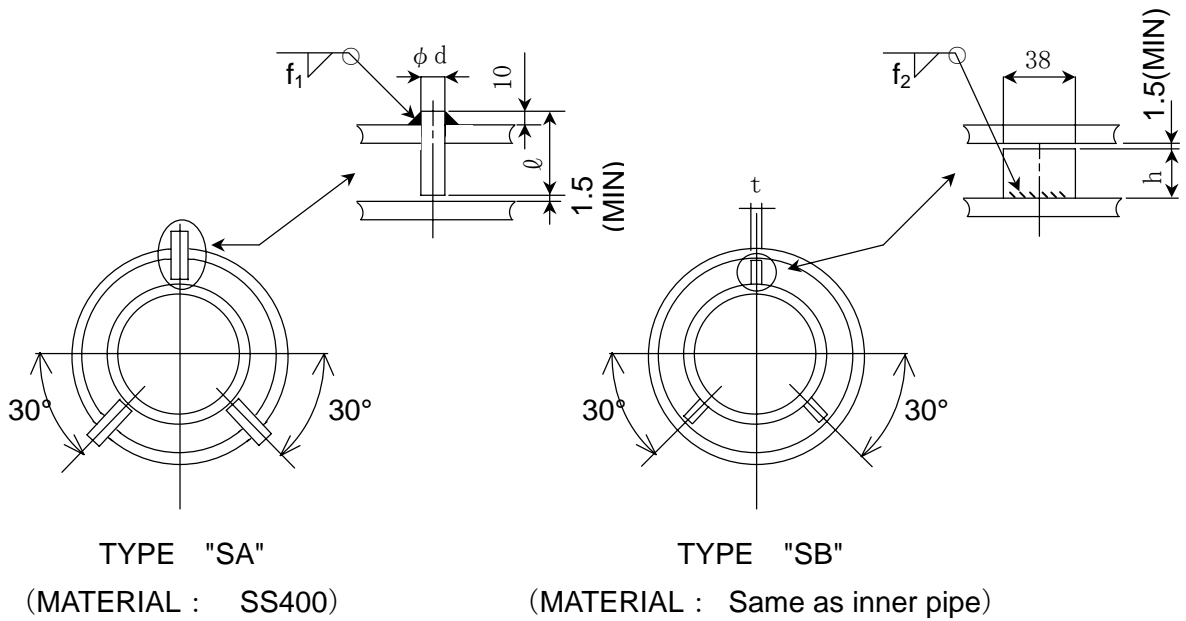
(2) Installation Direction of Spacer

(a) Horizontal Piping

(b) Vertical Piping



(2) Detail of Spacer



TYPE "SA" : In case special material is used as inner pipe.

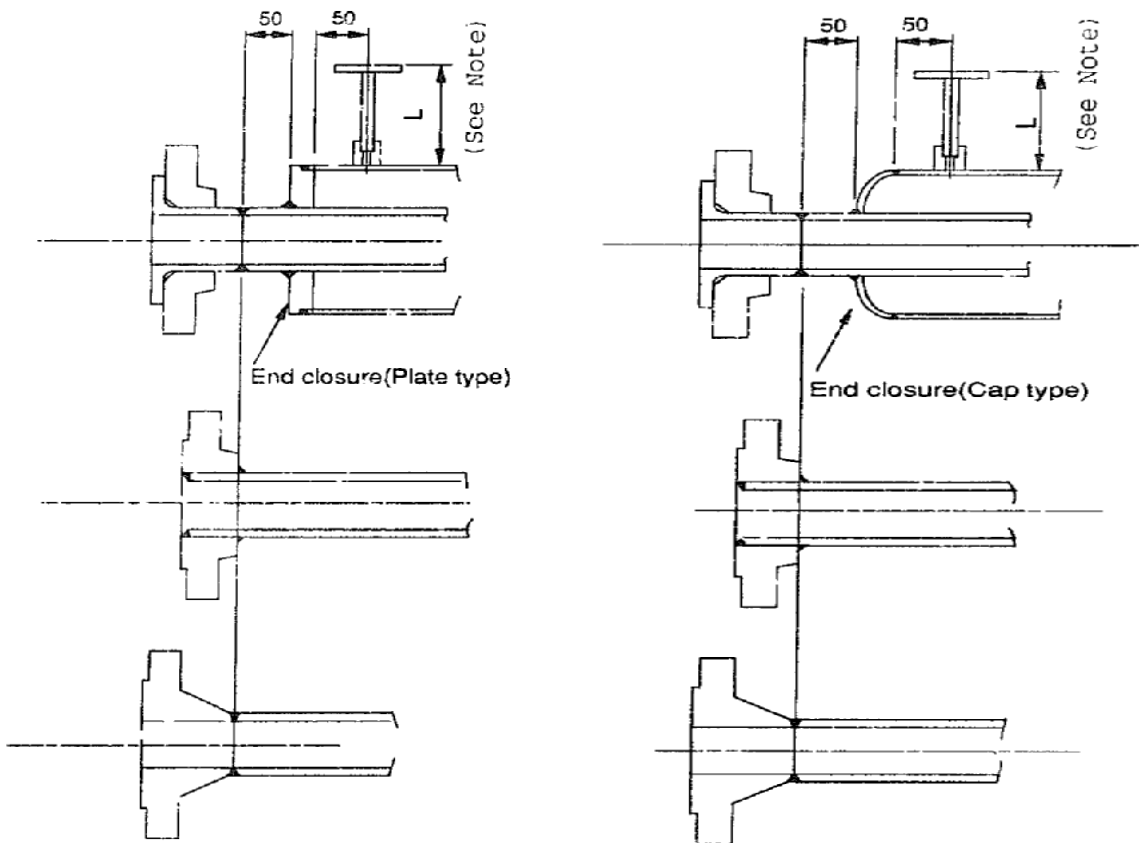
TYPE "SB" : In case inner pipe is except for TYPE "SA".

UNIT : mm

Inner Pipe Size (B)	Outer Pipe Size (B)	SPACER TYPE "SA"			SPACER TYPE "SB"			
		d	l	f ₁	h		t	f ₂
					1S, CCW	BR		
1/2	1.1/2	6	22	4	8	7	3	3
3/4	1.1/2	6	19	4	5	4	3	3
1	2	6	22	4	8	8	3	3

1. 1/2	3	6	28	4	14	13	3	3
2	3	6	22	4	8	7	3	3
3	5	9	33	6	19	17	3	3
4	6	9	35	6	19	19	3	3
5	8	9	47	6	31	31	4	4
6	8	9	35	6	18	18	4	4
8	10	9	35	6	17	17	4	4
10	14	9	33	6				
12	16	9	24	6				

JACKET END



Jacket Construction - Typical Assemblies

