ASME B31J-2017, Table 1-1 Flexibility and Stress Intensification Factors
(Including Proposal Errata 11-9-2017)

Supplier:	Description:	Appr.	Date	Rev.
				0
				1
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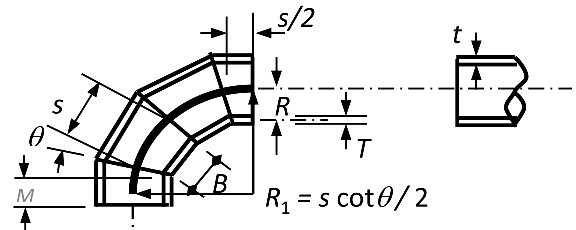
Sketch 1.2 Closely Spaced Miter Bend, s < R (1 + tan θ)
[Notes (1), (2), (4)]
Flexibility factors and SIF's shall not be less than 1.0
$B \geq 6T$ (for good welds)
$\theta \leq 22.5$ deg.



See ASME B31.3, para. 304.2.3

Units of measure: U.S. Customary

Miter Pipe: NPS 8 (DN 200) -- 10S, thk = 0.148 in.(3.76 mm) — D_{nps} = 8 (DN 200)

Outside diameter of miter pipe — D_o = 8.625 in.

Nominal wall thickness of miter pipe: — T = 0.148 in.

Matching pipe: User defined O.D. & Thk. — d_n = - -- - -- - --- -

Outside diameter of matching pipe — d_o = 8.625 in.

Nominal wall thickness of matching pipe: — t = 0.144 in.

Mean diameter of matching pipe = $d_o - T$ — d = 8.481 in.

General Note (b): d / t = 58.9 OK. d/t is less or equal 100.

Number of miter cuts in a 90-deg. bend: — n = 5

Design pressure: — P = 100.0 psig

Modulus of Elasticity: — E = 2.7.E+07 psi

Bend radius of elbow: — R_1 = 12.00 in.

Mean radius of matching pipe = $(D_o - T) / 2$ — R = 4.239 in.

One-half angle between adjacent miter axes = $(90/n) / 2$ — θ = 9.00 deg.

Is θ <= 22.5 degrees? Angle is <=22.5 degrees. That's OK.

Miter spacing at center line $s = 2R_1 / \cot\theta$ — s = 3.801 in.

One-half of miter spacing at centerline = $s / 2$: — $s / 2$ = 1.901 in.

Is $s < R(1 + \tan\theta)$? i.e., is $s <$ 4.91 mm ? Yes. Contiinue. This bend is closely spaced.

Length of miter segment at crotch $B = 2(R_1 - D_o / 2) / \cot\theta$) — B = 2.534 in.

Is B sufficient space for making adjacent miter welds (is $B \geq 6T$?) Yes, OK — $6T$ = 0.888 in.

Flexibility characteristic, $h = s\,T \cot\theta / (2R^2)$ — h = 0.099

Number of flanges or rigid components attached to bend, Note (2): — N_c = 0

Factor for flanges or rigid items attached to bend, (Note (2) and Figure 1-5),
$c = h^{1/6}$ if $N_c = 1$ end rigid; or $c = h^{1/3}$ if $N_c = 2$ ends rigid; or $c = 1$ if $N_c = 0$: — c = 1.00

Flexibility Factors:

In-Plane, $k_i = (1.52 / h^{5/6})\,c$ — k_i = **10.46** 10.46

Out-of-Plane, $k_o = (1.52 / h^{5/6})\,c$ — k_o = **10.46** 10.46

Stress Intensification Factors (SIF's):

In-Plane, $i_i = (0.9 / h^{2/3})\,c$ — i_i = **4.21** 4.21

Out-of-Plane, $i_o = (0.9 / h^{2/3})\,c$ — i_o = **4.21** 4.21

Torsional, $i_t = 1$ — i_t = **1.0**

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Flexibility Factors with Pressure Effect for Large-Dia Thin-Wall Elbows [Note (4)]:

In-Plane, $k_{ip} = k_i \,/\, [1+6(P/E)(R/T)^{7/3}(R_1/R)^{1/3}]$	k_{ip} =	**9.69**	9.69
Out-of-Plane, $k_{op} = k_o \,/\, [1+6(P/E)(R/T)^{7/3}(R_1/R)^{1/3}]$	k_{op} =	**9.69**	9.69

SIF's with Pressure Effect for Large-Dia Thin-Wall Elbows [Note (4)]:

In-Plane, $i_{ip} = i_i \,/\, [1+3.25(P/E)(R/T)^{5/2}(R_1/R)^{2/3}]$	i_{ip} =	**3.81**	3.81
Out-of-Plane, $i_{op} = i_o \,/\, [1+3.25(P/E)(R/T)^{5/2}(R_1/R)^{2/3}]$	i_{op} =	**3.81**	3.81
Torsional, $i_{tp} = 1.0$	i_{tp} =	**1.0**	

General Note *(d)* : Where sustained stress or moment factors are required by the applicable Code (e.g., ASME B31.1, ASME B31.3), and in lieu of more applicable data, for components of Sketches 1.1 through 1.3, and Sketches 3.1 through 5.1, the directional sustained stress or moment multiplier can be taken as the component SIF.

Note (1): The SIF and flexibility factors apply over the effective arc length (shown by heavy centerlines) for curved and miter bends and may be read from Figure 1-4.