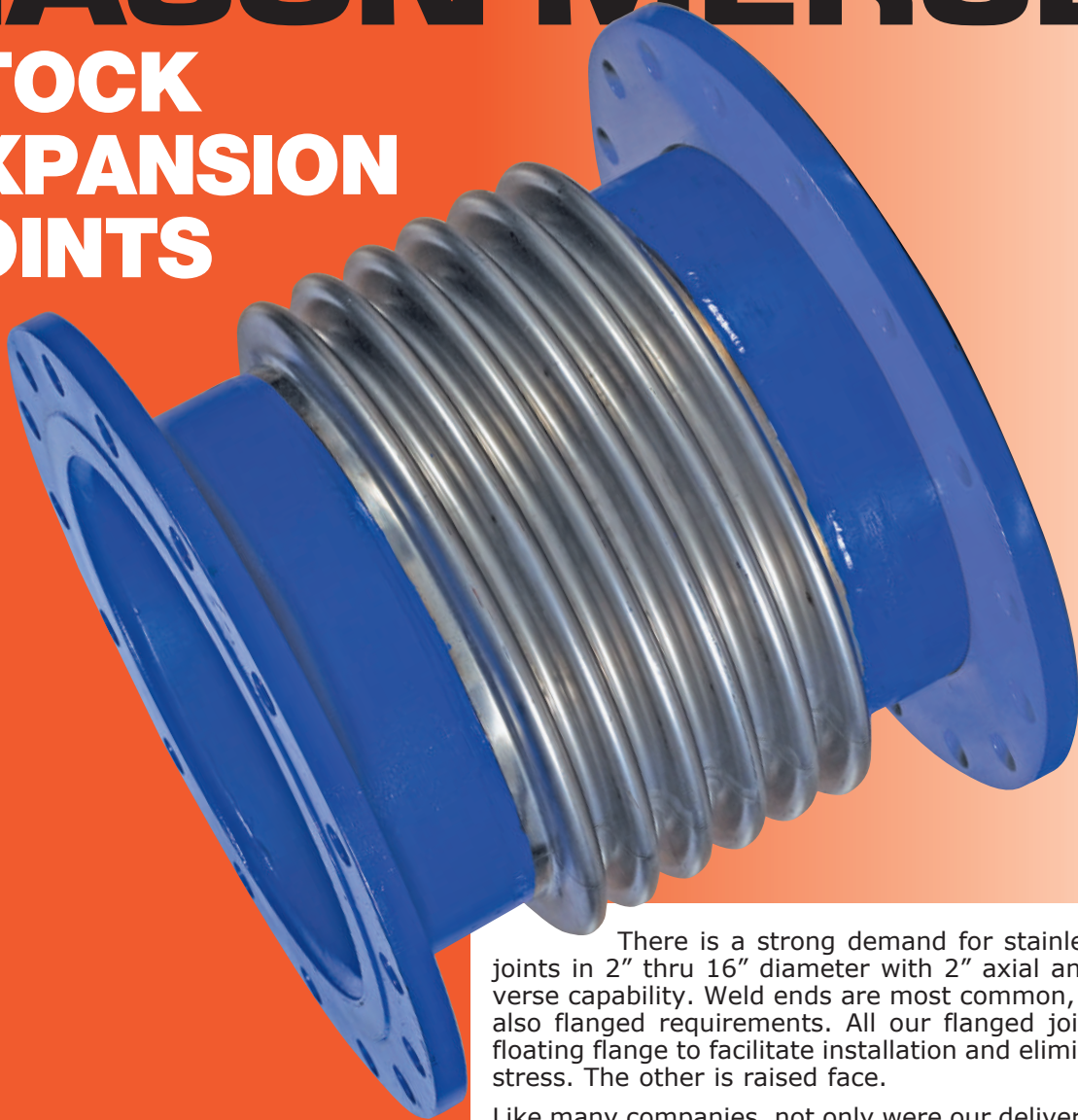


MASON-MERCER

STOCK EXPANSION JOINTS



There is a strong demand for stainless expansion joints in 2" thru 16" diameter with 2" axial and 1/4" transverse capability. Weld ends are most common, but there are also flanged requirements. All our flanged joints have one floating flange to facilitate installation and eliminate torsional stress. The other is raised face.

Like many companies, not only were our deliveries extended, but whenever an inquiry came in, we would redesign and re-cost needlessly. We decided the thing to do was stock all sizes 2" through 16", as shown in our dimension tables.

There seems to be some confusion as to what 2" travel means, so let's go over it. Every expansion joint has its neutral length. From this neutral position, the joint can be used for a full 2" compression or 2" expansion, but never a combination of the two. They are perfectly suitable for 1" compression and 1" extension or as a further example, 1 1/2" compression and 1/2" extension. In other words, in its working life, total movement should never exceed combined 2".

There is a common misconception that you can take a 2" movement expansion joint, extend it 1", and then use it for a compression of 3". No matter where this information came from, it is wrong.

What determines the life of an expansion joint is the stress cycle, the total bending from one extreme to the other over its lifetime. Let's think of a flat strip of sheet metal. Place it in a vise and bend it to one side 2" and then bring it back to the vertical. After a given number of cycles, this strip will crack at the bending point, based on the bending stress cycle for having moved the 2" and back to neutral.

Now let's assume we would like to use that same strip for 3" travel. So we bend it to one side 1", go to neutral and then continue 2", as in the previous example. With this simple picture in mind, I think we can all agree that the strip having moved through this 3" travel will crack or break much earlier than if we had only moved it the simple 2".

The same is true of expansion joints. Do not be deceived when someone tells you how easy it is to pre-extend the expansion joint and increase the allowable travel. Hopefully, that information is a misunderstanding, but sometimes it is just another way to get an order.

All of our designs are based on a working life of approximately 2,000 cycles. If the 2" movement is exceeded, it will reduce the theoretical life. If movements are smaller, the joint will last longer.

Our tables include the "Spring Rate" for every joint. The spring rate is the number of pounds required to compress the joint 1". Our multi-ply construction lowers the number. However, when designing

anchors the spring rate multiplied by the travel should be added to the pressure thrust.

We stock 50 psi and 250 psi capabilities.

Expansion Joints are sometimes furnished with control rods to prevent overextension or pipe sleeves over the rods to prevent overcompression. Unless the joint is flexed laterally only or anchors are under-designed, they serve no purpose as expansion joints will not open or close unless forced to by properly located anchors. Guides prevent buckling. Note guide and anchor spacing on the bottom of pages 3 and 4.

We can furnish specially designed expansion joints to virtually any requirement, but we certainly hope that these shelf items and their quick delivery will help keep your jobs moving and minimize downtime.

Ron Mason



Anchorage Calculations

Total Force on Anchors is the sum of the Pressure Thrust plus the force needed to flex the expansion joint. We have published the pressure thrusts at the maximum ratings of 50 and 250 psi and the spring rate (force needed to compress the joint 1").

However, to determine the specific anchoring, reduce the pressure thrust by the system pressure divided by 50 or 250 psi, depending on which series you are using.

Typical Anchor Calculations

EFL-50

6" Diameter 50 psi 2" Movement

Pressure Thrust— 1900 lbs.

Spring Force— 890/inch x 2 = 1780 lbs.

Minimum Anchorage Requirement 3680 lbs.

Anchor Resistance Calculation

$$\frac{\text{System Pressure}}{\text{Max. Allowable Pressure}} \times \text{Max. Published Thrust} = \text{Pressure Anchor Force}$$

$$\frac{\text{Expansion Joint Travel}}{\text{Max. Allowable Travel}} \times \text{Spring Rate} = \text{Resistive Spring Force}$$

Minimum Total Anchorage Requirement

EFL-250

6" Diameter 200 psi 1 1/2" Movement

Pressure Thrust— 200/250 x 9620 = 7696 lbs.

Spring Force— 1960/inch x 1.5 = 2940 lbs.

Minimum Anchorage Requirement 10,636 lbs

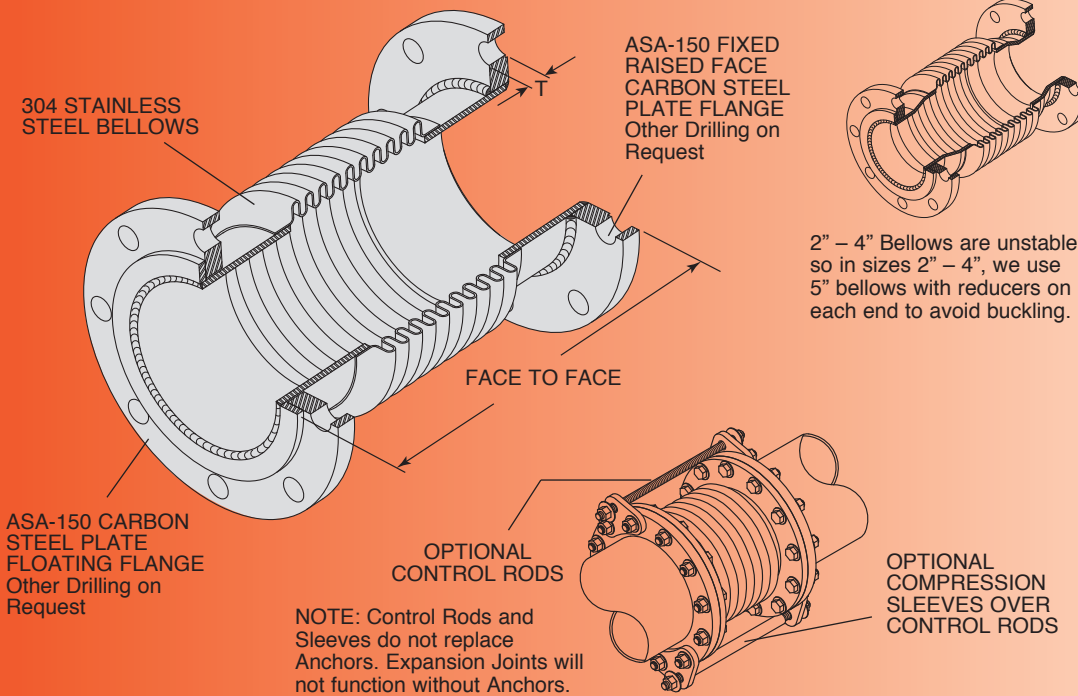
2 NOTE: There is support and sometimes guide friction too. An addition of 10-20% to total is more conservative.

EFL50 Max. Pressure 50 psi Full Vacuum

EFL250 Max. Pressure 250 psi Full Vacuum



**BELLOWS EXPANSION
JOINT with FIXED
and FLOATING FLANGES**



FLANGE BOLT and NUT REQUIREMENT

EFL Size	Quantity per End	Size & Length
2 & 2 1/2	4	5/8 x 3
3	4	5/8 x 3 1/4
4	8	5/8 x 3 1/4
5 & 6	8	3/4 x 3 1/2
8	8	3/4 x 4
10 & 12	12	7/8 x 4 1/4
14 & 16	12	1 x 4 1/2

CARBON STEEL PLATE FLANGES

Pipe Size (in)	Flange Thickness T (in)
2 thru 4	5/8
5 thru 6	3/4
8 thru 16	1

EFL50

DIMENSIONS AND PRESSURE RATINGS

2" AXIAL MOVEMENT, 1/4" LATERAL DEFLECTION

Pipe Size (in)	Face to Face (in)	Axial Spring Rate (lbs/in)	Lateral Spring Rate (lbs/in)	Max. Thrust [†] @ 50 psi (lbs)	Rated Pressure @ 70°F (psi)	Ship Wt. (lbs)
4	21	640	850	1400	50	12
5	141/4	640	850	1400	50	15
6	151/4	890	1400	1900	50	19
8	151/2	1130	3700	3200	50	35
10	153/4	1070	6400	4800	50	45
12	173/4	1360	7790	6600	50	63
14	181/2	1410	9450	8800	50	81
16	19	1810	18160	11300	50	104

EFL250

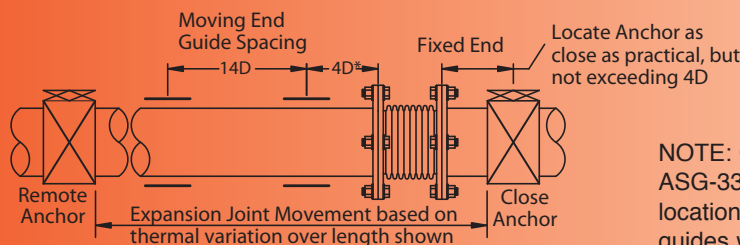
DIMENSIONS AND PRESSURE RATINGS

2" AXIAL MOVEMENT, 1/4" LATERAL DEFLECTION

Pipe Size (in)	Face to Face (in)	Axial Spring Rate (lbs/in)	Lateral Spring Rate (lbs/in)	Max. Thrust [†] @ 250 psi (lbs)	Rated Pressure @ 70°F (psi)	Ship Wt. (lbs)
2	21	1500	2040	7070	250	15
2 1/2	21	1500	2040	7070	250	15
3	21	1500	2040	7070	250	15
4	21	1500	2040	7070	250	15
5	141/4	1500	2040	7070	250	16
6	161/2	1960	2450	9620	250	22
8	171/4	2040	3980	15910	250	38
10	18	2500	7790	23760	250	52
12	19	3530	14300	33190	250	70
14	20	3700	17600	44180	250	92
16	201/2	4660	30650	56750	250	112

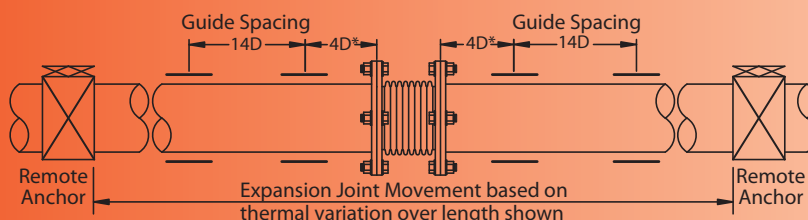
GUIDE SPACING – Referencing Pipe Diameter "D"

Guides and Anchors for Joint located near Anchor



NOTE: Consult Bulletin ASG-33, page 4 for location of intermediate guides when needed to prevent buckling.

Guides and Anchors for Joint located between Remote Anchors



*Plus an additional 5" for Sizes 2 & 2 1/2

**EFL50 RATED PRESSURES
@ ELEVATED TEMPERATURES**

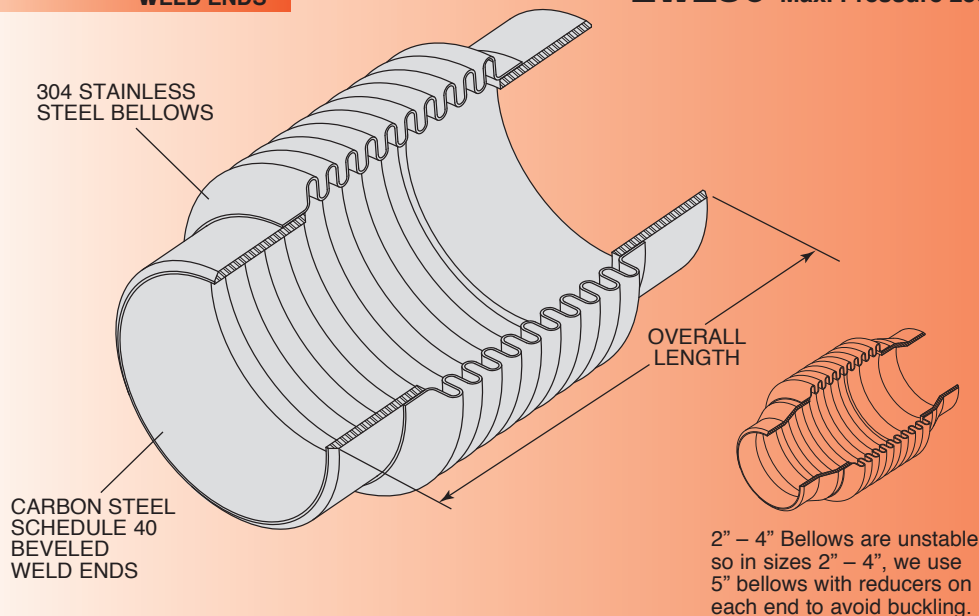
Temperature (°F)	Rated Pressure (psi)
200	46
300	43
400	39
500	38
800	37
1000	30
1500	13

**EFL250 RATED PRESSURES
@ ELEVATED TEMPERATURES**

Temperature (°F)	Rated Pressure (psi)
200	227
250	220
300	212
400	195
500	192
600	190
700	185
800	Not Recommended

EW50 Max. Pressure 50 psi Full Vacuum

EW250 Max. Pressure 250 psi Full Vacuum



**EW50 RATED PRESSURES
@ ELEVATED TEMPERATURES**

Temperature (°F)	Rated Pressure (psi)
200	46
300	43
400	39
500	38
800	37
1000	30
1500	13

**EW250 RATED PRESSURES
@ ELEVATED TEMPERATURES**

Temperature (°F)	Rated Pressure (psi)
200	227
250	220
300	212
400	195
500	192
600	190
700	185
800	Not Recommended

EW50

DIMENSIONS AND PRESSURE RATINGS
2" AXIAL MOVEMENT, 1/4" LATERAL DEFLECTION

Pipe Size (in)	Overall Length (in)	Axial Spring Rate (lbs/in)	Lateral Spring Rate (lbs/in)	Thrust* @ 50 psi (lbs)	Rated Pressure @ 70°F (psi)	Ship Wt. (lbs)
4	173/4	640	850	1400	50	4
5	141/4	640	850	1400	50	5
6	151/4	890	1400	1900	50	7
8	151/2	1130	3700	3200	50	12
10	153/4	1070	6400	4800	50	16
12	173/4	1360	7790	6600	50	20
14	181/2	1410	9450	8800	50	28
16	19	1810	18160	11300	50	37

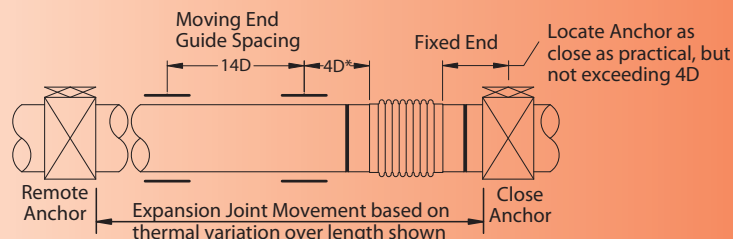
EW250

DIMENSIONS AND PRESSURE RATINGS
2" AXIAL MOVEMENT, 1/4" LATERAL DEFLECTION

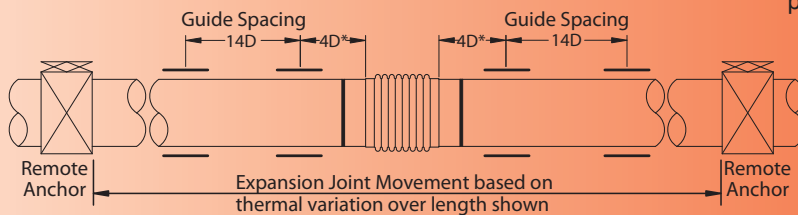
Pipe Size (in)	Overall Length (in)	Axial Spring Rate (lbs/in)	Lateral Spring Rate (lbs/in)	Thrust* @ 250 psi (lbs)	Rated Pressure @ 70°F (psi)	Ship Wt. (lbs)
2	21	1500	2040	7070	250	6
2 1/2	21	1500	2040	7070	250	6
3	21	1500	2040	7070	250	6
4	18	1500	2040	7070	250	6
5	141/4	1500	2040	7070	250	6
6	161/2	1960	2450	9620	250	9
8	171/4	2040	3980	15910	250	14
10	18	2500	7790	23760	250	23
12	19	3530	14300	33190	250	27
14	20	3700	17600	44180	250	36
16	201/2	4660	30650	56750	250	48

GUIDE SPACING – Referencing Pipe Diameter “D”

Guides and Anchors for Joint located near Anchor



Guides and Anchors for Joint located between Remote Anchors



*Plus an additional 5" for Sizes 2 & 2 1/2

NOTE: Consult Bulletin ASG-33, page 4 for location of intermediate guides when needed to prevent buckling.



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