

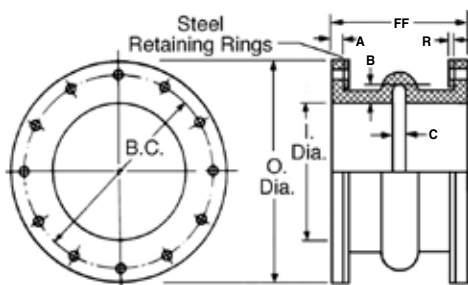
# Technical Data

## Sizes • Dimensions • Movements • Standard 150# Drilling

Joint Size (Inside Dia.) <sup>1</sup>	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14	16	18	20	22	24	26	28	30	34	36
Flange Outside Dia.	4 1/4	4 5/8	5	6	7	7 1/2	9	10	11	13 1/2	16	19	21	23 1/2	25	27 1/2	29 1/2	32	34 1/4	36 1/2	38 3/4	43 3/4	46
Bolt Circle Dia.	3 7/8	3 1/2	3 7/8	4 3/4	5 1/2	6	7 1/2	8 1/2	9 1/2	11 3/4	14 1/4	17	18 3/4	21 1/4	22 3/4	25	27 1/4	29 1/2	31 3/4	34	36	40 1/2	42 3/4
Number Bolt Holes	4	4	4	4	4	4	8	8	8	8	12	12	12	16	16	20	20	20	24	28	28	32	32
Diameter Bolt Holes	5/8	5/8	5/8	3/4	3/4	3/4	3/4	7/8	7/8	7/8	1	1	1 1/8	1 1/8	1 1/4	1 1/4	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 5/8	1 5/8
Single Arch    Recom. FF	6	6	6	6	6	6	6	6	6	6	8	8	8	8	8	8	10	10	10	10	10	10	10
204	Dimensions Flg. Thk. A	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	5/8	5/8	5/8	5/8	5/8
	Arch Ht. B	1	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	2	2	2	2	2	2	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4
	Arch Width C	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	3/4	3/4	3/4	3/4	3/4	3/4	7/8	7/8	7/8	1	1	1	1	1
	Single Arch Min. FF	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	7	7	7	7	7	7	9	9	9	9	9	9	9
	Double Arch Min. FF	9	9	9	9	9	9	9	9	9	10	10	10	11 3/4	11 3/4	11 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4
Triple Arch Min. FF	12	12	12	12	12	12	12	12	12	14	14	14	15 1/2	15 1/2	15 1/2	16 3/4	16 3/4	16 3/4	16 3/4	16 3/4	16 3/4	16 3/4	16 3/4
	R	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
204, 204HP, 200, 200HP																							
Max. Axial Compression	1/4	1/4	1/4	1/2	1/2	1/2	1/2	1/2	1/2	3/4	3/4	3/4	3/4	3/4	3/4	7/8	7/8	7/8	1	1	1	1	1
Max. Lateral Deflection	1/4	1/4	1/4	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Max. Axial Elongation	1/8	1/8	1/8	1/4	1/4	1/4	1/4	1/4	1/4	3/8	3/8	3/8	3/8	3/8	3/8	7/16	7/16	7/16	1/2	1/2	1/2	1/2	1/2
206 EZ-FLO®																							
Dimensions Flg. Thk. A	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	5/8	5/8	5/8	5/8	5/8
Wall Thk. B	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	9/16	9/16	5/8	5/8	5/8	5/8	5/8	5/8	5/8	5/8	13/16	13/16	13/16	13/16	13/16
206 EZ-FLO®, G306 EZ-FLO®																							
Max. Axial Compression	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1	1	1	1	1	1 1/8	1 1/8	1 1/8	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
Max. Lateral Deflection	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Max. Axial Elongation	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2

All specifications in inches unless otherwise noted.

### Styles 200, 200HP, 204, 204HP

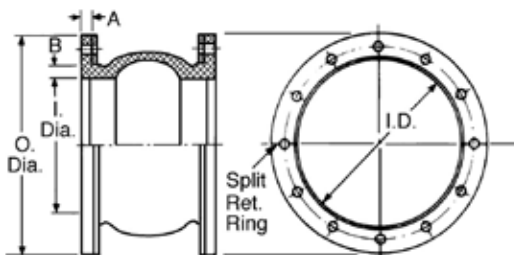


### 204 Single Arch Movements

Size (Inches)	Angular Movement (Degrees)	Torsional Movement (Degrees)
2	14.5	3
3	10	3
4	7.5	3
5	6	3
6-8	5	3
10-12	4	3
14-16	2.5	2
18-30	2	1
34-54	1.5	1
56-96	1	1

Note: The degree of angular movement is based on the max. extension shown.

### Styles 206, 306 EZ-FLO®



#### WARNING:

Properties/applications shown throughout this brochure are typical. Your specific application should not be undertaken without independent study and evaluation for suitability. For specific application recommendations consult Garlock. Failure to select the proper sealing products could result in property damage and/or serious personal injury.

Performance data published in this brochure has been developed from field testing, customer field reports and/or in-house testing.

While the utmost care has been used in compiling this brochure, we assume no responsibility for errors. Specifications subject to change without notice. This edition cancels all previous issues. Subject to change without notice.

## Pressure Ratings

### Style 204 / GUARDIAN® 200

Pressure and vacuum service

Pipe Size I.D.		Pressure		Vacuum	
Inches	mm	psi	bar	In. Hg	mm Hg
1/2-4	13-100	165	11	29.9	750
5-12	125-300	140	10	29.9	750
14	350	85	6	29.9	750
16-24	400-600	65	4.5	29.9	750
26-66	650-1650	55	3.8	29.9	750
68-96	1700-2400	45	3	29.9	750
98-108	2450-2700	40	2.8	29.9	750
110-114	2750-3600	30	2	29.9	750

## Style 204HP / GUARDIAN® 200HP

High pressure and vacuum service

Pipe Size I.D.		Pressure		Vacuum	
Inches	mm	psi	bar	In. Hg	mm Hg
1/2-4	13-100	200	14	29.9	750
8-12	200-300	190	13	29.9	750
14	350	130	9	29.9	750
16-20	400-500	110	8	29.9	750
22-24	550-600	100	7	29.9	750
26-40	650-1000	90	6	29.9	750
42-66	1050-1650	80	5.5	29.9	750
68-96	1700-2400	70	5	29.9	750
98-108	2450-2700	60	4	29.9	750
110-144	2750-3600	50	3.5	29.9	750

## Style 206 EZ-FLO®

High pressure service

Pipe Size I.D.		Pressure		Vacuum	
Inches	mm	psi	bar	In. Hg	mm Hg
2-10	50-250	250	17	26	650
12	300	250	17	12	300
14	350	130	9	12	300
16-20	400-500	110	8	12	300
22-24	550-600	100	7	12	300
26-40	650-1000	90	6	12	300
42-66	1050-1650	80	5.5	12	300
68-84	1700-2100	70	5	12	300
86-120	2150-3000	60	4	12	300

### Notes:

- See pages B-6 and B-7 for temperature and pressure ratings of GUARDIAN® 306 EZ-FLO® expansion joint.
- Pressure and vacuum ratings at neutral FF dimension. Extended face-to-face dimensions result in reduced pressure and vacuum ratings for Style 206 EZ-FLO® expansion joints.

ID	40	42	48	50	54	60	66	72	78	84	90	96	108	120
OD	50 <sup>3</sup> / <sub>4</sub>	53	59 <sup>1</sup> / <sub>2</sub>	61 <sup>3</sup> / <sub>4</sub>	66 <sup>1</sup> / <sub>4</sub>	73	80	86 <sup>1</sup> / <sub>2</sub>	93	99 <sup>3</sup> / <sub>4</sub>	106 <sup>1</sup> / <sub>2</sub>	113 <sup>1</sup> / <sub>4</sub>	126 <sup>3</sup> / <sub>4</sub>	140 <sup>1</sup> / <sub>4</sub>
ØBC	47 <sup>1</sup> / <sub>4</sub>	49 <sup>1</sup> / <sub>2</sub>	56	58 <sup>3</sup> / <sub>4</sub>	62 <sup>3</sup> / <sub>4</sub>	69 <sup>1</sup> / <sub>4</sub>	76	82 <sup>1</sup> / <sub>2</sub>	88 <sup>3</sup> / <sub>4</sub>	95 <sup>1</sup> / <sub>2</sub>	102	108 <sup>1</sup> / <sub>2</sub>	120 <sup>3</sup> / <sub>4</sub>	132 <sup>3</sup> / <sub>4</sub>
#BH	36	36	44	44	44	52	52	60	60	64	68	68	72	76
ØBH	1 <sup>5</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>8</sub>	1 <sup>7</sup> / <sub>8</sub>	2	2	2	2	2 <sup>1</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>4</sub>	2 <sup>3</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>
FF	10	12	12	12	12	12	12	12	12	12	12	12	12	12
A	<sup>5</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>8</sub>
B	2 <sup>1</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>2</sub>
C	1	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>
FF	9	10	10	10	10	10	10	10	10	10	10	10	10	10
FF	14	14	14	14	14	14	14	15 <sup>1</sup> / <sub>2</sub>	15 <sup>1</sup> / <sub>2</sub>	15 <sup>1</sup> / <sub>2</sub>	15 <sup>1</sup> / <sub>2</sub>	15 <sup>1</sup> / <sub>2</sub>	15 <sup>1</sup> / <sub>2</sub>	15 <sup>1</sup> / <sub>2</sub>
FF	17 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>	17 <sup>1</sup> / <sub>2</sub>
R	<sup>3</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	1	<sup>3</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>
204														
C	1	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>
L	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>
E	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>
A	<sup>5</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>8</sub>
B	1 <sup>3</sup> / <sub>16</sub>	1	1	1	1	1	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>2</sub>
206														
C	1 <sup>1</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>8</sub>
L	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>
E	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>

### Notes:

- Pipe sizes through 1<sup>1</sup>/<sub>2</sub>" are supplied with a filled arch (Style 204, 204HP), and movements have been reduced accordingly. Open-arch construction is available on special order.
- Pressure/vacuum ratings are for standard FF dimensions only. Consult Garlock for non-standards.
- For shorter "FF" dimensions, consult Garlock.
- Forces to compress, deflect and elongate elastomeric expansion joints are based on ambient temperature and zero pressure in the pipeline. These forces should be considered only as approximate and may vary with the elastomers and fabric used in construction. To convert force in pounds to kilograms, divide by 2.205.
- Movement of multiple-arch joints can be determined by multiplying the number of arches by the single-arch values in the table above.
- For filled-arch joints, reduce the axial compression, elongation and transverse deflection value by 50%.
- Rated movements are non-concurrent.
- Control units are recommended for most applications.

## Drilling Specifications

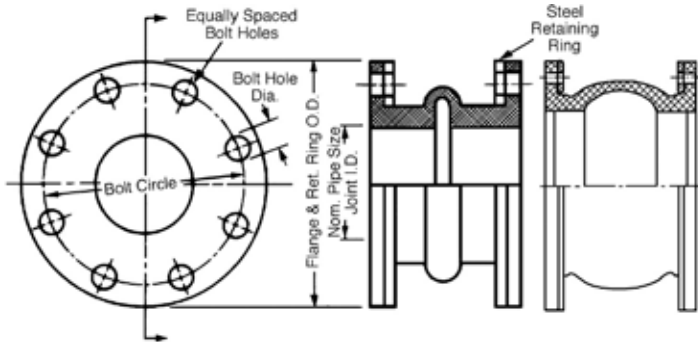
ANSI B16.1 ..... 1975 Class 125  
 ANSI B16.24 ..... 1971 Class 150  
 ANSI B16.5 ..... 1973 Class 150  
 MSS SP-51 ..... 1965 MSS 150 lb.  
 AWWA C201 ..... Class B

**Note:** Special drillings available.

# Types of Expansion Joints

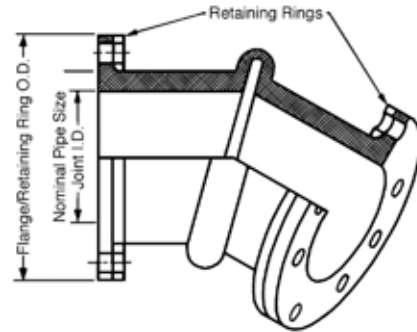
## Single Arch

- Fabric and rubber construction
- Reinforced with metal/wire rings
- Full-face flanges integral with joint body
- Flanges drilled to companion bolt pattern
- Gaskets not required



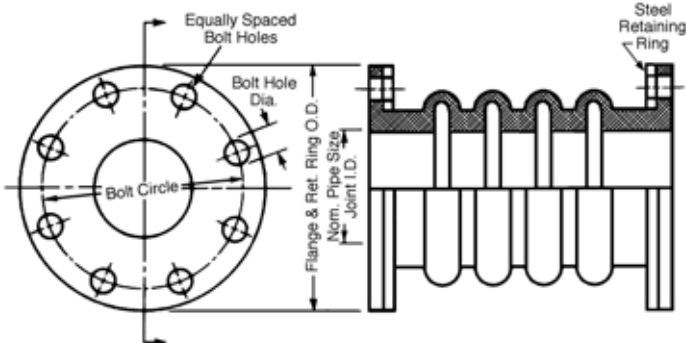
## Offset

- Compensates for initial misalignment and non-parallelism of piping axis
- Custom-built to your specifications
- Complete drawings and specifications recommended with inquiries/orders



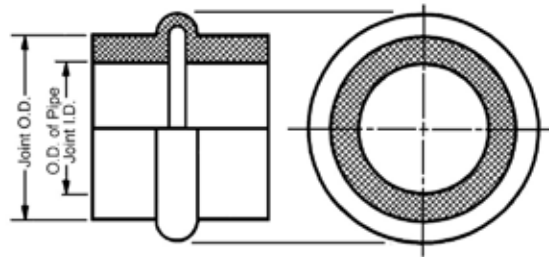
## Multiple Arch

- Accommodates greater movement than single arch
- Minimum joint length depends on number of arches
- Maximum of four arches recommended to maintain lateral stability



## Sleeve

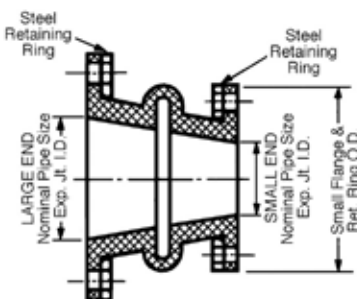
- Same as single arch type, except sleeve end I.D. equals pipe O.D.
- Slips over straight ends of open pipe
- Ends secured by suitable clamps
- Recommended for low pressure service only



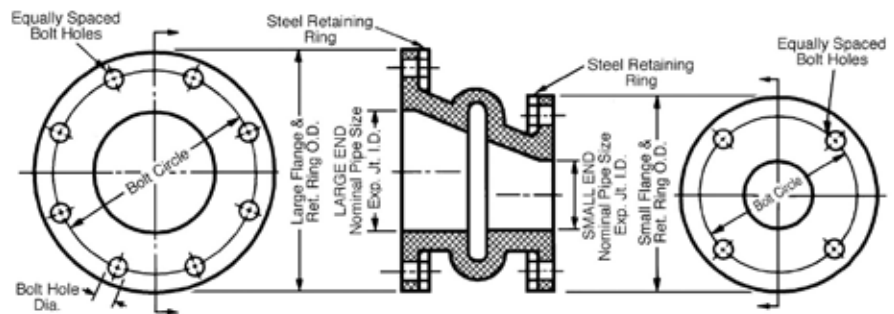
## Taper or Reducer

- Connects piping of different diameters
- Concentric tapered joints: same axis for both ends
- Eccentric: axis of one end offset from other end

- Tapers in excess of 15° are not recommended
- Pressure ratings are based on larger I.D.
- Available with or without arches



Concentric Taper



Eccentric Taper

# Expansion Joint Components

## Tube

- Synthetic or natural rubber forms seamless, leak-proof lining
- Extends fully through bore to outer flange edge
- Common materials include chlorobutyl, neoprene, natural rubber, EPDM, Viton\* and Hypalon\*

## Body or Carcass

- When wrapped or plied, reinforcements provide support and flexibility between tube and cover
- Fabric reinforcement: polyester or other suitable fabrics impregnated with specified elastomers
- Metal reinforcement: bonded rectangular steel rings exclusive to Garlock, or continuous strands of wire and round steel body rings
- Metal reinforcement rings provide longer service life, extra safety protection, and extra rigidity, allowing higher pressure ratings

## Cover

- Homogeneous layer of synthetic or natural rubber
- Chlorobutyl is standard; other elastomers available to meet your specific applications
- Rubber or other weather-resistant coating protects carcass from corrosion or damage

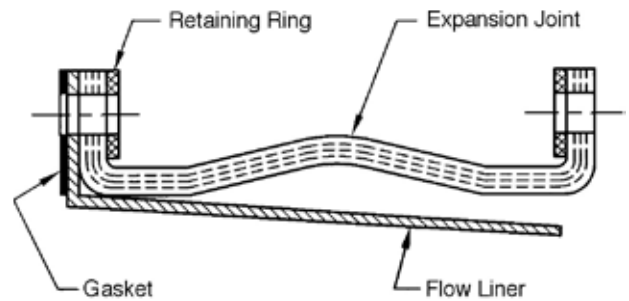
## Metal Retaining Rings

- Must be used in all applications; provides metal surface to distribute bolting pressure equally, preventing flange damage during bolt tightening
- Install behind and against inner face of each flange
- Standard material: mild steel with corrosion-resistant coating; galvanized or stainless steel also available

## Metal Flow Liners

- Extends service life by providing protection from abrasive materials or solids, especially in high velocity applications
- Flanged at one end, installed at the head of the flow, tapered to a 5° angle, allows lateral deflection
- Liner flange thickness: 10 gauge  
Liner body thickness: 12 gauge

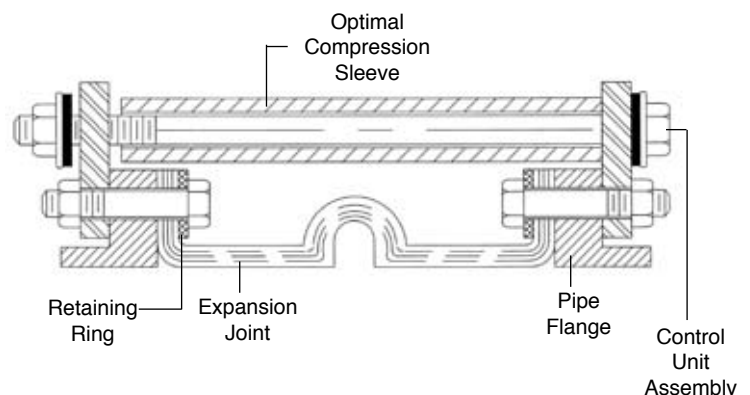
- Available in 304/316 stainless steel; also: titanium, Hastelloy C\*\*
- Special metal liner configurations also available for reducing or multiple arch design. Contact Garlock.



*Metal Flow Liner Installation*

## Control Units

- Recommended on most applications to prevent damage due to excessive pipe movement
- Consists of two or more tie rods connected between flanges
- Triangular end plate has two holes for bolting plate securely to flange, and one hole to accommodate plate connecting tie rod
- Rubber washer between plate and rod substantially reduces both noise and vibration
- Installing pipe sleeves over tie rods provides additional protection against overcompression damage
- NOT designed to replace pipeline anchoring

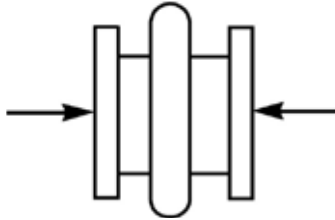


*Control Unit Installation*

# Types of Pipe Movements

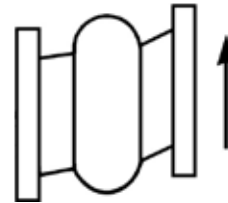
## Axial Compression

- Longitudinal movement shortens face-to-face dimension along axis of expansion joint or flexible coupling
- Pipe flanges remain perpendicular to axis



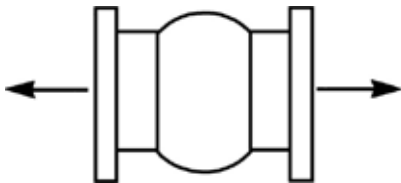
## Lateral/Transverse Movement

- Offset movement of one or both pipe flanges
- Both flanges remain parallel to each other while forming angle to axis of joint



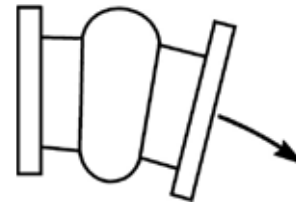
## Axial Elongation

- Longitudinal movement lengthens face-to-face dimension along axis of expansion joint or flexible coupling
- Pipe flanges remain perpendicular to axis



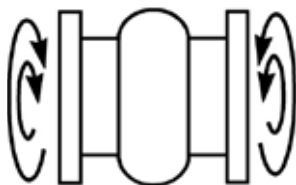
## Angular Movement

- Deflection or rotation of one or both flanges
- Forms angle with axis of expansion joint or flexible coupling



## Torsional Movement

- Rotation of one flange with stationary counterpart
- Simultaneous rotation of both flanges in opposing motion



## Vibration

- Oscillating movement around axis of expansion joint or flexible coupling
- Pipe flanges remain parallel with each other
- Flanges remain perpendicular to axis
- Mechanical vibration in steel piping system reduced with installation of pipe connectors or expansion joints



# Properties of Elastomers

Material Designation		Rating Scale Code	Elastomer Physical and Chemical Properties Comparison									
ANSI / ASTM D1418-77	ASTM D-2000 D1418-77	7 - Outstanding    3 - Fair to Good 6 - Excellent        2 - Fair 5 - Very Good       1 - Poor to Fair 4 - Good             0 - Poor X - Contact Manufacturer	Water Chemical Animal & Vegetable Oil Alkali, Condensed	Alkali, Dilute Oil & Gasoline Lacquers Oxygenated Hydrocarbons	Aromatic Hydrocarbons Aliphatic Hydrocarbons Acid, Concentrated Acid, Dilute	Swelling in Oil Radiation Water Absorption Electrical Insulation	Dielectric Strength Tensile Strength Compression Set Rebound, Cold	Rebound, Hot Dynamic Impermeability Abrasion	Tear Flame Cold Heat	Oxidation Sunlight Weather Ozone		
		COMMON NAME Chemical Group Name										
<b>CR</b>	BC BE	<b>NEOPRENE</b> chloroprene	4 3 4 0	4 4 0 1	2 3 4 6	4 5 4 3	5 4 2 4	5 2 4 5	4 4 4 4	5 5 6 5		
<b>NR</b>	AA	<b>GUM RUBBER</b> polyisoprene, synthetic	5 3 X X	X 0 0 4	0 0 3 3	0 6 5 5	6 6 4 6	6 6 2 7	5 0 5 2	4 0 2 0		
<b>IR</b>	AA	<b>NATURAL RUBBER</b> polyisoprene, synthetic	5 3 X X	X 0 0 4	0 0 3 3	0 6 5 5	6 6 4 6	6 2 2 6	5 0 5 2	4 0 2 0		
<b>IIR</b>	AA	<b>BUTYL</b> isobutene-isoprene	5 6 5 4	4 0 3 4	0 0 4 6	0 4 5 5	5 4 3 0	5 2 6 4	4 0 4 5	6 5 5 6		
<b>CIIR</b>	AA BA	<b>CHLOROBUTYL</b> chloro-isobutene-isoprene	5 6 5 4	4 0 3 4	0 0 4 6	0 4 5 5	5 4 3 0	5 2 6 4	4 0 4 5	6 5 5 6		
<b>NBR</b>	BE BK CH	<b>BUNA-N / NITRILE</b> nitrile-butadiene	4 3 5 0	4 5 2 0	4 6 4 4	5 5 4 1	0 5 5 4	4 5 4 4	3 0 3 4	4 0 2 2		
<b>SBR</b>	AA	<b>SBR / GRS / BUNA-S</b> styrene-butadiene	5 3 X 2	4 0 0 4	0 0 3 3	0 6 5 5	4 5 4 4	4 4 2 5	3 0 5 3	2 0 2 0		
<b>CSM</b>	CE	<b>HYPALON*</b> chloro-sulfonyl-polyethylene	5 6 4 4	4 4 3 1	2 3 4 6	4 5 4 3	5 2 2 2	4 2 4 4	3 4 4 4	6 7 6 7		
<b>FKM</b>	HK	<b>VITON* / FLUOREL**</b> fluorocarbon elastomer	5 6 6 0	4 6 1 0	6 6 6 5	6 5 5 3	5 5 6 2	4 5 5 5	2 6 2 7	7 7 7 7		
<b>EPR</b>	BA CA DA	<b>EPDM</b> ethylene-propylene- diene-terpolymer	5 6 5 6	6 0 3 6	0 0 4 6	0 7 6 6	7 5 4 6	6 5 4 5	4 0 5 6	6 7 6 7		
<b>AFMU</b>		<b>TEFLON† / TFE / FEP</b> fluoro-ethylene-polymers	7 7 7 7	7 7 7 7	7 7 7 7	7 3 7 X	X X X X	X X X 4	X X X 7	7 7 7 7		
<b>S</b>	GE	<b>SILICONE</b>	5 5 5 0	2 X 0 2	0 0 2 6	2 5 6 6	4 0 3 6	6 0 2 0	2 3 6 7	6 6 6 6		

## Temperature Ratings

### Body Material

### Max. Temp.

Chlorobutyl/polyester.....	+250°F (+120°C)
Chlorobutyl/nylon tire cord.....	+250°F (+120°C)
Chlorobutyl/fiberglass/Kevlar†	
with EPDM tube and cover.....	+300°F (+150°C)
Fluoroelastomer/fiberglass/Kevlar.....	+400°F (+205°C)

### Liner and/or Cover Material

### Max. Temp.

EPDM.....	+300°F (+150°C)
FEP fluorocarbon.....	+400°F (+205°C)
Fluoroelastomer.....	+400°F (+205°C)
HNBR (hydrogenated nitrile).....	+300°F (+150°C)
Hypalon.....	+250°F (+120°C)
Natural/gum.....	+180°F (+80°C)
Neoprene.....	+250°F (+120°C)
Nitrile.....	+250°F (+120°C)
PTFE.....	+450°F (+230°C)

\* Hypalon and Viton are registered trademarks of DuPont Dow Elastomers.

\*\* Fluorel is a registered trademark of 3M Companies.

† Teflon and Kevlar are registered trademarks of DuPont.

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# Expansion Joint Installation

## Preparation

### Check service range

- Double check performance limits against anticipated operating conditions
- Check temperature, pressure, vacuum recommendations
- Check total joint deflection—alter as needed to reduce deflection to correct range
- Anchor lines

### Check location

- Proper location is usually close to main anchoring point
- Install pipe guide(s) for proper alignment
- Joint should absorb pipeline expansion / contraction between fixed anchor points

### Check cover

- Check outside joint cover for damage
- Cover will keep harmful materials from penetrating joint carcass

### Check alignment

- Alignment should be 0.125" (3.2 mm) or less
- If 0.125" (3.2mm) must be exceeded, use a special offset joint

### Check support

- Weight must not be carried by joint
- Support with hangers or anchors

### Check flanges

- Clean all mating flanges
- Do not gouge or mutilate surfaces during cleaning
- Carefully examine used parts for smoothness

## Installation

### Apply lubricant

- On elastomeric joints only, not required with all PTFE- or FEP-lined joints
- Coat rubber faces with graphite in water, or glycerine, to prevent joint adherence to pipe flanges

### Insert bolts from arch side

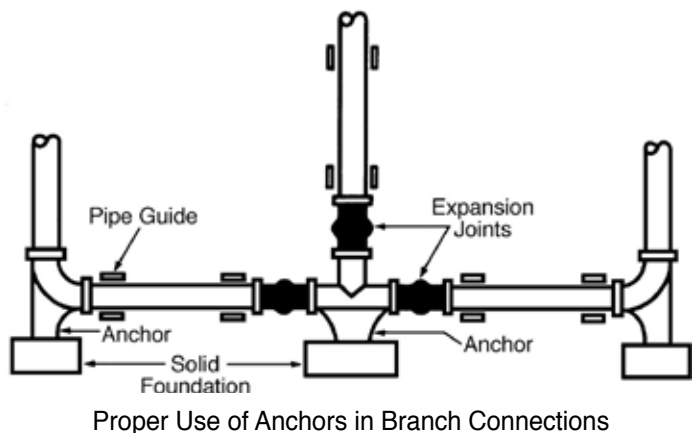
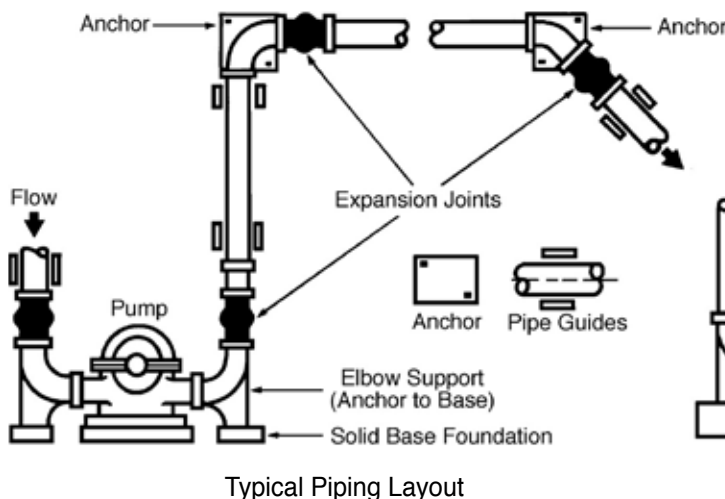
- On elastomeric joints only, not necessary with PTFE joints/couplings with threaded holes
- Set bolt heads adjacent to arch

### Tighten bolts

- Elastomeric joints only, tighten gradually and equally, alternating around flange
- Edges of joint must bulge slightly at flange O.D.

### Check tightness

- Within one week after application, then periodically
- In hot or cold water systems during cyclical changes



# Troubleshooting

## General Precautions

### Elastomeric Joints Only

- Use proper care breaking seal
- Drive flanges apart gently with wooden wedges
- Bring insulation only to pipe flange—do not insulate over or around joint
  - Covering joints may make leak detection difficult
  - Insulation could restrict joint movement or cause overheating
- Store in cool, dry, dark area
- Do not rest on flange edges
- Carefully protect joints near welding operations
- Never install spool-type joints next to flangeless check valves or butterfly valves
- Install only against full-face metal flanges or damage/leakage could result; restrictions also apply to raised face or any non-full face flange

## Flange leakage

- Check bolt tightness
- Check mating flange surface area for:
  - Grooves
  - Scratches
  - Distorted areas
- Over-extension may indicate need for control units

## Liquid weeping from bolt holes

- Check tube portion of joint for leaks; replace if necessary

## Cracking at base of arch or flange

- Check installed face-to-face dimensions for over-extension or over-compression
- Check for proper pipe alignment: must not exceed 0.125" (3.2mm)

## Excessive ballooning of arch

- Indicates distortion/deterioration of joint strengthening members, or excessive system pressure
- Re-evaluate service conditions
- Install new joint



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# Expansion Joint Weights\*

## For Rubber Spool-Type Joints, and Styles 200 and 204

Joint Size (Inches)	Approx Lbs per Joint				Approx. Lbs / Set	
	Face to-Face Dimension				Retaining Rings	Control Units
6 Inches	8 Inches	10 Inches	12 Inches			
2	3.5	4.0	—	—	3.5	6.5
2-1/2	4.0	5.0	—	—	5.0	7.5
3	4.5	5.5	—	—	5.5	8.0
3-1/2	5.5	6.6	—	—	6.5	8.0
4	6.5	7.8	—	—	6.8	8.0
5	7.5	9.5	—	—	7.5	8.0
6	8.8	11.5	13.8	15.5	8.8	10.0
8	12.5	15.0	20.0	22.0	12.5	13.0
10	16.0	23.5	25.0	28.0	15.8	19.0
12	—	28.8	35.0	41.5	23.5	20.0
14	—	38.0	45.0	53.0	25.5	27.0
16	—	48.0	52.0	60.0	31.0	27.0
18	—	50.0	55.0	68.0	29.5	29.5
20	—	55.0	67.0	78.0	36.0	38.5
24	—	—	77.0	91.0	46.0	45.0
26	—	—	92.0	110.0	50.0	45.0
28	—	—	110.0	120.0	60.0	56.0
30	—	—	118.0	130.0	63.0	58.0
34	—	—	128.0	140.0	82.0	103.0
36	—	—	140.0	152.0	85.0	130.0
42	—	—	—	222.0	113.0	163.0
48	—	—	—	252.0	138.0	150.0
54	—	—	—	275.0	157.0	226.0
60	—	—	—	337.0	180.0	262.0
72	—	—	—	365.0	250.0	321.0
78	—	—	—	405.0	295.0	368.0
84	—	—	—	430.0	350.0	438.0



\* For total approximate weights, add the weight of the expansion joint at the required face-to-face dimension to the weight of retaining rings and/or control units.

**Example (Metrics):**

A 100 mm joint (200 mm face-to-face) with retaining rings equals 3.5 Kg. + 3.1 Kg., or 6.6 Kg. A 350 joint (250 mm face-to-face) with retaining rings and control units equals 20.4 Kg. + 11.6 Kg. + 12.2 Kg., or 44.2 Kg.

To convert pounds to kilograms, divide by 2.205.

**Note:** For calculating weight of Style 206 EZ-FLO® expansion joint = Style 204 x 0.66.

## For PTFE Couplings, with Flanges and Restricting Bolts

	Pipe Size (Inches)								
	1	1-1/2	2	2-1/2	3	4	5	6	8
Style 214	2 lbs.	4 lbs.	7 lbs.	10 lbs.	12 lbs.	18 lbs.	24 lbs.	29 lbs.	47 lbs.
Style 215	2 lbs.	4 lbs.	8 lbs.	11 lbs.	13 lbs.	19 lbs.	25 lbs.	30 lbs.	47 lbs.

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