

# Flexijoint®

PTFE Fluoropolymer



## Table of Contents

Introduction	Page 2	Flange & PTFE Dimensions	Page 11
Why Specify Flexijoint®	2	Spring Rate Data	12-13
Styles of Flexijoint	3	Axial Restraint	14
Antisquirm® Flexijoint	4	Installation Procedure	15
Approximate Weights	4	Additional Precautions	15
Safety Shield	5	Start-Up Check-List	15
Linersleeves	5	System Design Check-List	16-17
Warning	5	Expansion Joint Data Sheet	18
Face To Face Dimensions	6-7	How To Order	18
Axial, Parallel & Angular Movement	6-7	Recommended Procurement Specification	19
Pressure - Temperature Rating	8-9	Warranty	20
Vacuum Rating	10		

## Introduction

Ethylene Corp. Flexijoints® find use primarily in fluid conducting systems as resilient connectors and tremor barriers. They are designed to compensate for misalignment, to absorb expansion and contraction and to isolate vibration and shock. They are also frequently used to reduce stress on fragile mating flanges.

Flexijoints® are extensively used in the CPI for the following reasons:

1. **Long Flex Life:** PTFE exhibits a flex life far superior to metal or rubber when subjected to flexural stressing, either intermittently or continually.
2. **Chemical Resistance:** PTFE has near universal high temperature corrosion resistance.
3. **Spring Rate:** Flexijoints have low spring rates for axial, lateral and angular movement to protect stress sensitive equipment at elevated temperatures.
4. **Face to Face Dimension:** Flexijoints offer short face to face dimensions thus saving space and permitting a more compact design layout.
5. **Low Acoustical Impedance:** The Flexijoint is unexcelled in its ability to dampen vibration and noise.

**When expansion joints are used, they must not be viewed as a piping commodity. They must not be casually specified or arbitrarily dropped into a piping system. Their application requires careful engineering analysis. Expansion joints should never be used to compensate for misalignment unless such misalignment is a calculated basis of design. The safety and operability of an Ethylene Flexijoint, like that of any piece of critical process equipment, depends upon proper installation, good operating practice and regular inspection and maintenance.**

## Why Specify the Ethylene Flexijoint®

- A. High molecular weight** virgin PTFE (polytetrafluoroethylene) resin. Crystallinity is carefully controlled - resulting in long flex-life and high tensile strength. No pigments, lubricants or additives are used which can leach out and contaminate your process. Rigid inspection for impurities and inclusions is possible, since any contaminants or liner defect is readily discernible against the white PTFE.
- B. Patented design** T-Band support of convolution root *and* sidewall increases stability at higher working pressures. At the maximum compression limit of the Flexijoint, the T-Bands will "butt" to prevent over compression. Conventional support rings support only the convolution root and cannot limit over compression of the expansion joint.
- C. Limitlink™ prevents over-expansion** of the expansion joint even when mating flanges are not "two-holed". Conventional limit bolts are frequently removed to install an expansion joint when mating bolting patterns are not aligned, causing possible expansion joint over-extension and failure.
- D. Uniform PTFE wall thickness** for consistent joint performance. Conventional PTFE expansion joints show thinning of the PTFE at the convolution sidewall — introducing "stress-points" and limiting performance reproducibility.
- E. Custom application and design engineering** The Flexijoint is the only PTFE expansion joint capable of meeting all your unique requirements: diameters through 42", 2-12 convolutions, full vacuum capability (with Vacubands™) through 42" dia. at temperatures to 400°F, J-Bolt flanges for mating to glasslined steel, FRP flanges for exterior corrosion resistance, etc.

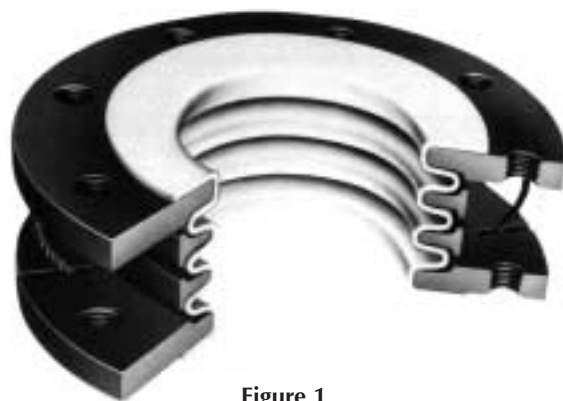


Figure 1

## Styles of Flexijoint®

Custom designed and fabricated Flexijoints® are available to meet a broad range of applications:



**Figure 2 Limitlink® Flexijoint®:** Offers maximum flexibility and permits installation where mating pipe is not “two-holed.”



**Figure 3 Limitbolt Flexijoint®:** Conventional limit bolt design.



**Figure 4 Antisquirm® Flexijoint®:** Increases working pressure for multi-convolution applications. (See page 4.)



**Figure 5 Ethylarmor® Flexijoint®:** PTFE lined metallic expansion joints combine the high temperature corrosion resistance of Teflon PTFE with the high pressure ratings of a supporting metal (stainless steel, Monel, Hastelloy, titanium, etc.) carcass.



**Figure 6 Universal Flexijoint®:** Two Flexijoints tied together by a flanged pipe spool in the middle. Gives maximum amount of angular and parallel movement. Substantially reduces the amount of force (spring rate) required to cause movement.



**Figure 7 Hinged & Gimballed Flexijoint®:** Limits movement in one or more planes.



**Figure 8 Anchorbase™ Flexijoint®:** Flexijoint with built-in anchor and pipe guide for simplified installation.



**Figure 9 Custom-Designed Flexijoint®:** Available to meet specific customer requirements.

**WARNING:** Safety shields must be used at all times in hazardous service to protect against serious personal injury in the event of expansion joint failure. Linersleeves must be used in abrasive service or where sharp-edged solids are or may be present (see page 5).

## Antisquirm Flexijoint®

The maximum working pressure of a Flexijoint decreases as the number of convolutions increase (see pages 8 & 9). This is due to “squirming and buckling” of the PTFE convolutions and resultant instability. The Antisquirm Flexijoint provides (3) lateral restraints for each T-Band to support the convolutions in balanced geometrical position.



Figure 10

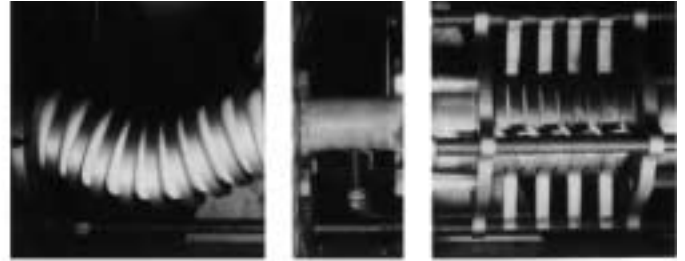


Figure 11

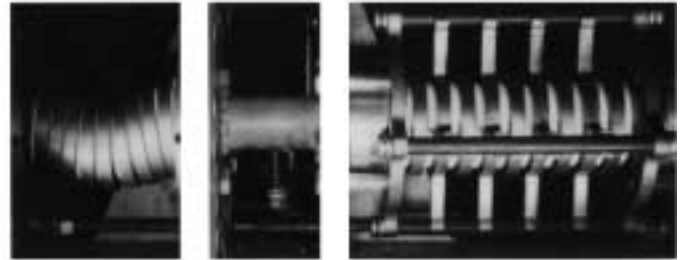


Figure 12

Two 2" dia. 10 convolution Flexijoints being cycled at 10 cycles/minute at 30 PSI. Note the “squirming” of the unrestrained (left) Flexijoint at maximum design expansion and compression limits (top and bottom respectively). The Antisquirm Flexijoint at the right shows stability under maximum design compression and expansion limits (top and bottom respectively).

## Approximate Weights

### Flexijoint® Weight (pounds without packaging) Table A

Size	Limitlink Flexijoint With Two Convolutions	Amount to Add for Each Convolution Over Two
1/2	2	0.1
3/4	2	0.2
1	3	0.2
1-1/2	4	0.3
2	6	0.4
2-1/2	9	0.6
3	10	0.8
4	14	1
5	17	1
6	21	2
8	32	3
10	44	4
12	68	5
14	88	7
16	117	9
18	132	12
20	161	14
24	230	21
28	350	27
30	400	29
32	510	34
36	650	42
42	910	64

**Example:** An 8" Diameter, 5 convolution Flexijoint weighs:  
32 + (5-2) (3) = 41 lbs.

**Note:** Weights can be substantially reduced for low pressure applications.

**WARNING:** Safety shields must be used at all times in hazardous service to protect against serious personal injury in the event of expansion joint failure. Linersleeves must be used in abrasive service or where sharp-edged solids are or may be present (see page 5).

## Safety Shields

Use a safety shield with all Ethylene Flexijoints® in hazardous service. Use of an industry accepted safety shield will help prevent a spray-out of conveyed liquid in the event of expansion joint failure. Ramco Co., Roselle Park, N.J., for instance, makes an economical safety shield that will quickly and easily install over a Flexijoint. The safety shield manufacturer must be consulted to pick the proper shield for your installation. The safety shield must be installed in full accordance with the manufacturer's recommendations. Please contact Ethylene for additional information.



**Figure 13**  
Photograph shows PTFE fabric safety shield prior to installation over Flexijoint and mating flanges.



**Figure 14**  
Installed safety shield protects personnel and equipment from serious damage in the event of Flexijoint failure and/or rupture. Shields must be installed in full accordance with manufacturer's recommendations.

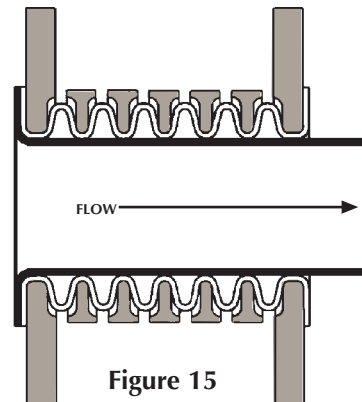
---

## Linersleeves®

Use a linersleeve in a Flexijoint as shown in figure #15 when:

1. Abrasives are present
2. Metallic or other sharp-edged particles are or may be present
3. Fluid velocity is high
4. Fluid holds solids that might settle out in convection

Linersleeves may be ordered in PTFE or a metal compatible with your process. They are flared on one end and clamped between the upstream Flexijoint flange and its mating flange. Ability of the Flexijoint to adjust to parallel misalignment is usually not seriously impaired with a PTFE Linersleeve. A metal liner may offer interference; the factory should be consulted for these applications.



**Figure 15**

**Note:** Failure to use a liner sleeve may result in expansion joint failure and serious personal injury.

---

# WARNING

Safety shield must be wrapped around expansion joint at all times to protect against serious personal injury.

Liner sleeve must be placed inside expansion joint if abrasives or sharp-edged solids present. Removal of liner sleeve can result in expansion joint failure and personal injury.

Do not exceed pressure/temperature ratings.

Follow sound installation procedures: see ANSI/ASME B 31.3 Code for Pressure Piping, Chemical Plant and Refinery Piping.

**FAILURE TO FOLLOW ABOVE RECOMMENDATIONS CAN CAUSE EXPANSION JOINT FAILURE AND PERSONAL INJURY OR DEATH.**

## Lengths (Contracted, Expanded, Normal)\*

Table B

SIZE	2 convolutions		3 convolutions		4 convolutions		5 convolutions		6 convolutions	
	NORMAL LENGTH	PLUS OR MINUS TRAVEL	NORMAL LENGTH	PLUS OR MINUS TRAVEL	NORMAL LENGTH	PLUS OR MINUS TRAVEL	NORMAL LENGTH	PLUS OR MINUS TRAVEL	NORMAL LENGTH	PLUS OR MINUS TRAVEL
1/2	1-5/8	5/16	2-5/32	15/32	2-11/16	5/8	3-7/32	25/32	3-25/32	15/16
3/4	1-5/8	5/16	2-3/16	15/32	2-23/32	5/8	3-9/32	25/32	3-13/16	15/16
1	1-3/4	11/32	2-5/16	1/2	2-29/32	21/32	3-1/2	27/32	4-1/16	1
1-1/4	1-25/32	11/32	2-3/8	1/2	2-31/32	11/16	3-9/16	27/32	4-5/32	1-1/32
1-1/2	1-13/16	11/32	2-13/32	17/32	3	11/16	3-5/8	7/8	4-7/32	1-1/32
2	1-7/8	11/32	2-1/2	17/32	3-1/8	23/32	3-3/4	7/8	4-3/8	1-1/16
2-1/2	2-1/8	13/32	2-13/16	19/32	3-17/32	13/16	4-1/4	1	4-15/16	1-7/32
3	2-3/16	13/32	2-29/32	5/8	3-5/8	27/32	4-3/8	1-1/32	5-3/32	1-1/4
4	2-9/32	7/16	3-1/16	21/32	3-13/16	7/8	4-9/16	1-3/32	5-11/32	1-5/16
5	2-13/32	15/32	3-7/32	11/16	4-1/32	29/32	4-27/32	1-5/32	5-5/8	1-3/8
6	2-17/32	15/32	3-3/8	23/32	4-3/16	31/32	5-1/32	1-3/16	5-7/8	1-7/16
8	2-3/4	17/32	3-21/32	25/32	4-19/32	1-1/16	5-1/2	1-5/16	6-13/32	1-9/16
10	2-31/32	9/16	3-15/16	27/32	4-15/16	1-1/8	5-15/16	1-13/32	6-29/32	1-11/16
12	3-3/16	19/32	4-1/4	31/32	5-5/16	1-7/32	6-3/8	1-17/32	7-7/16	1-13/16
14	3-3/8	5/8	4-15/32	31/32	5-19/32	1-9/32	6-23/32	1-19/32	7-27/32	1-29/32
16	3-11/16	11/16	4-29/32	1-1/16	6-1/8	1-13/32	7-11/32	1-3/4	8-9/16	2-3/32
18	4	3/4	5-11/32	1-5/32	6-11/16	1-17/32	8-1/32	1-29/32	9-11/32	2-9/32
20	4-5/32	25/32	5-17/32	1-3/16	6-15/16	1-19/32	8-5/16	1-31/32	9-11/16	2-3/8
24	4-21/32	7/8	6-7/32	1-11/32	7-25/32	1-25/32	9-5/16	2-7/32	10-7/8	2-21/32
28	5-1/8	1	6-7/8	1-1/2	8-9/16	2	10-5/16	2-7/16	12	2-15/16
30	5-5/8	1-1/16	7-17/32	1-5/8	9-13/32	2-5/32	11-5/16	2-11/16	13-3/16	3-7/32
32	6	1-1/8	8	1-3/4	10-1/16	2-5/16	12-1/16	2-7/8	14-1/16	3-7/16
36	6-5/16	1-1/4	8-7/16	1-27/32	10-17/32	2-13/32	12-5/8	2-27/32	14-3/4	3-5/8
42	7	1-3/8	9-3/8	2	11-11/16	2-11/16	14	3-3/8	16-3/8	4

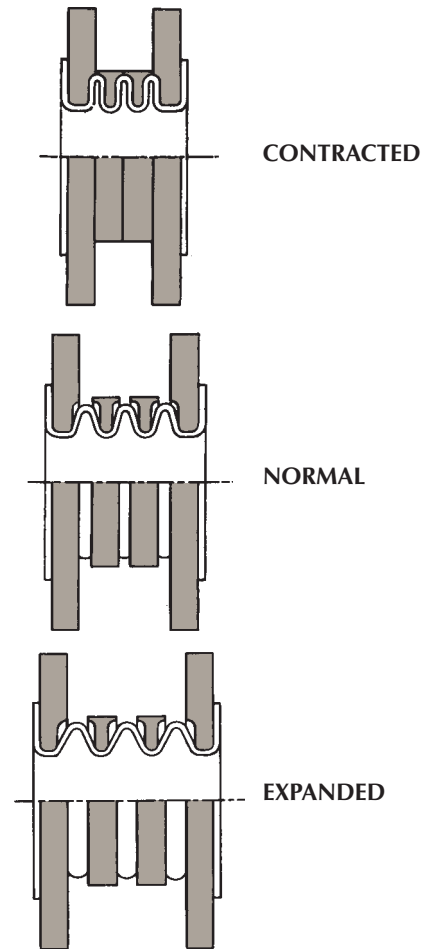
## Maximum Angular and Parallel Misalignment

SIZE	2 convolutions		3 convolutions		4 convolutions		5 convolutions		6 convolutions	
	ANGULAR	PARALLEL	ANGULAR	PARALLEL	ANGULAR	PARALLEL	ANGULAR	PARALLEL	ANGULAR	PARALLEL
1/2	19°	7/32	28°	11/32	37°	15/32	45°	9/16	53°	11/16
3/4	17°	7/32	25°	11/32	34°	15/32	41°	19/32	49°	11/16
1	16°	1/4	24°	3/8	31°	1/2	39°	5/8	45°	3/4
1-1/4	14°	1/4	21°	3/8	28°	1/2	34°	5/8	41°	3/4
1-1/2	13°	1/4	20°	3/8	26°	17/32	32°	21/32	40°	25/32
2	12°	9/32	17°	13/32	23°	17/32	29°	21/32	34°	13/16
2-1/2	11°	5/16	17°	15/32	22°	19/32	28°	3/4	33°	29/32
3	10°	5/16	15°	15/32	20°	5/8	25°	25/32	30°	15/16
4	9°	5/16	13°	1/2	17°	21/32	21°	13/16	26°	31/32
5	8°	11/32	11°	17/32	15°	11/16	19°	7/8	23°	1-1/32
6	7°	3/8	10°	17/32	14°	23/32	17°	29/32	20°	1-3/32
8	6°	13/32	9°	19/32	12°	25/32	15°	31/32	18°	1-3/16
10	5°	7/16	8°	5/8	11°	27/32	13°	1-1/6	16°	1-9/32
12	5°	15/32	7°	11/16	10°	29/32	12°	1-1/8	14°	1-3/8
14	5°	15/32	7°	23/32	9°	31/32	12°	1-3/16	14°	1-7/16
16	5°	17/32	7°	25/32	9°	1-1/16	11°	1-5/16	13°	1-9/16
18	4°	9/16	7°	7/8	9°	1-5/32	11°	1-7/16	13°	1-23/32
20	4°	19/32	6°	29/32	8°	1-3/16	10°	1-1/2	12°	1-25/32
24	4°	19/32	6°	1	8°	1-11/32	10°	1-21/32	12°	2
28	4°	3/4	6°	1-1/8	8°	1-7/16	10°	1-13/16	12°	2-3/16
30	4°	13/16	6°	1-3/16	8°	1-5/8	10°	2	12°	2-7/16
32	4°	7/8	6°	1-5/16	8°	1-11/16	10°	2-3/16	12°	2-9/16
36	4°	15/16	6°	1-3/8	8°	1-13/16	10°	2-1/4	12°	2-11/16
42	2°	1	5°	1-1/2	7°	2	8°	2-1/2	10°	3

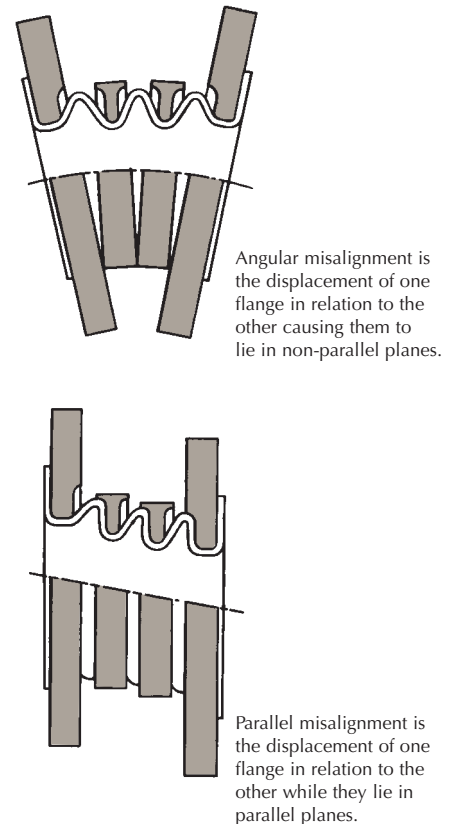
All dimensions are approximate, from PTFE face to PTFE face.

**WARNING:** Safety shields must be used at all times in hazardous service to protect against serious personal injury in the event of expansion joint failure. Linersleeves must be used in abrasive service or where sharp-edged solids are or may be present (see page 5).

7 convolutions		8 convolutions		9 convolutions		10 convolutions	
NORMAL LENGTH	PLUS OR MINUS TRAVEL	NORMAL LENGTH	PLUS OR MINUS TRAVEL	NORMAL LENGTH	PLUS OR MINUS TRAVEL	NORMAL LENGTH	PLUS OR MINUS TRAVEL
4- 5/16	1-1/16	4-27/32	1-7/32	5-3/8	1-3/8	5-15/16	1-17/32
4-3/8	1-3/32	4-29/32	1-1/4	5-15/32	1-13/32	6	1-9/16
4-21/32	1-5/32	5-7/32	1-5/16	5-13/16	1-1/2	6-13/32	1-21/32
4-3/4	1-3/16	5-11/32	1-3/8	5-15/16	1-17/32	6-17/32	1-11/16
4-13/16	1-7/32	5-13/32	1-3/8	6-1/32	1-9/16	6-5/8	1-23/32
4-31/32	1-1/4	5/19-32	1-7/16	6-7/32	1-19/32	6-27/32	1-25/32
5-21/32	1-13/32	6-3/8	1-5/8	7-1/16	1-13/16	7-25/32	2-1/32
5-13/16	1-15/32	6-9/16	1-21/32	7-9/32	1-7/8	8	2-3/32
6-3/32	1-17/32	6-7/8	1-3/4	7-5/8	1-31/32	8-13/32	2-3/16
6-7/16	1-5/8	7-1/4	1-27/32	8-1/16	2-1/16	8-27/32	2-5/16
6-23/32	1-11/16	7-9/16	1-29/32	8-13/32	2-5/32	9-1/4	2-13/32
7-11/32	1-27/32	8-1/4	2-3/32	9-5/32	2-11/32	10-3/32	2-5/8
7-29/32	1-31/32	8-7/8	2-1/4	9-7/8	2-17/32	10-27/32	2-13/16
8-1/2	2-1/8	9-9/16	2-7/16	10-5/8	2-3/4	11-23/32	3-1/32
8-31/32	2-1/4	10-3/32	2-9/16	11-3/16	2-7/8	12-5/16	3-3/16
9-13/16	2-7/16	11-1/32	2-13/16	12-1/4	3-5/32	13-15/32	3-1/2
10-11/16	2-11/16	12-1/32	3-1/16	13-3/8	3-7/16	14-23/32	3-13/16
11-3/32	2-25/32	12-15/32	3-5/32	13-7/8	3-9/16	15-1/4	3-31/32
12-7/32	3-3/32	14	3-9/16	15-17/32	4	17-3/32	4-7/16
13-3/4	3-7/16	5-7/16	3-15/16	17-3/16	4-7/16	18-7/8	4-7/8
15-1/16	3-3/4	16-15/16	4-9/32	18-27/32	4-13/16	20-3/4	5-11/32
16-1/16	4	18-1/16	4-5/8	20-1/8	5-3/16	22-1/8	5-3/4
16-7/8	4-1/4	18-15/16	4-13/16	21-1/16	5-7/16	23-1/8	6-3/16
18-11/16	4-11/16	21-1/16	5-3/8	23-3/8	6	25-11/16	6-11/16



7 convolutions		8 convolutions		9 convolutions		10 convolutions	
ANGULAR	PARALLEL	ANGULAR	PARALLEL	ANGULAR	PARALLEL	ANGULAR	PARALLEL
60°	13/16	67°	15/16	74°	1-1/32	79°	1-5/32
56°	13/16	62°	15/16	68°	1-1/16	74°	1-5/32
52°	7/8	58°	1	64°	1-1/8	70°	1/14
47°	29/32	53°	1-1/32	58°	1-5/32	64°	1-9/32
44°	29/32	49°	1-1/32	55°	1-5/32	60°	1-9/32
39°	15/16	44°	1-1/16	49°	1-3/16	54°	1-11/32
38°	1-1/16	43°	1-7/32	48°	1-3/8	53°	1-1/2
34°	1-3/32	39°	1-1/4	43°	1-13/32	47°	1-9/16
30°	1-15/32	34°	1-5/16	38°	1-15/32	41°	1-5/8
26°	1-7/32	30°	1-3/8	33°	1-9/16	37°	1-23/32
24°	1-1/4	27°	1-7/16	30°	1-5/8	33°	1-13/16
21°	1-3/8	24°	1-9/16	27°	1-25/32	29°	1-31/32
18°	1-5/32	21°	1-11/16	23°	1-29/32	26°	2-1/8
17°	1-19/32	19°	1-13/16	22°	2-1/16	24°	2-9/32
16°	1-11/16	19°	1-29/32	21°	2-5/32	23°	2-13/32
16°	1-27/32	18°	2-3/32	20°	2-3/8	22°	2-5/8
15°	2	17°	2-9/32	20°	2-17/32	22°	2-7/8
15°	2-3/32	16°	2-3/8	18°	2-11/16	20°	2-31/32
14°	2-11/32	15°	2-21/32	17°	3	19°	3-11/32
14°	2-9/16	15°	2-15/16	17°	3-3/8	19°	3-11/16
14°	2-13/16	15°	3-3/16	17°	3-11/16	19°	4-1/16
14°	3	15°	3-7/16	17°	3-15/16	19°	4-5/16
14°	3-3/16	15	3-9/16	17°	4-1/16	19°	4-1/2



**Note: Applications involving combined axial, parallel and angular movement:**

$$\frac{\text{Design Axial Movement}}{\text{Max. Allowable Axial Movement}} + \frac{\text{Design Parallel Movement}}{\text{Max. Allowable Parallel Movement}} + \frac{\text{Design Angular Movement}}{\text{Max. Allowable Angular Movement}} \leq 1$$

## Pressure-Temperature Ratings (Non-Shock)

Since PTFE is a thermoplastic its physical properties are sensitive to changes in temperature. Hence, the bursting pressure of a Flexijoint is a function of temperature. In addition, bursting pressure is related to a number of other variables, such as:

1. Diameter
2. Number of convolutions
3. Rate of pressure application
4. Extent of contraction from normal length
5. Extent of expansion from normal length
6. Degree of angular misalignment
7. Amount of parallel misalignment
8. Magnitude, frequency, and duration of cycle vibration

Graph 1 is a curve relating operating temperature to a "Pressure Factor" ( $F_p$ ). The shape of this curve is similar to that relating the drop in tensile strength of PTFE with increasing temperature. The "Pressure Factor" must then be modified by a second factor, " $F_s$ " derived from Table C.  $F_s$  is a function of pipe size, number of convolutions and style.)

The recommended non-shock maximum operating pressure can then be determined by equation (1).

$$\text{Equation (1) } P_{\max} = (F_p) \times (F_s)$$

*Example 1:*

Determine the maximum non-shock operating pressure at 250°F of a 4 inch, 4 convolution Flexijoint.

From Graph 1  $F_p$  is 42 at 250°F. In Table C,  $F_s$  is found to be 1.58 for this style and size. Therefore, from Equation (1):

$$P_{\max} = (42) \times (1.58) = 66.4 \text{ psi}$$

For an Antisquirm design:

$$P_{\max} = (42) \times (1.82) = 76.4 \text{ psi}$$

If the operating pressure of the system is known and the maximum safe temperature at this pressure is to be determined, Equation 1 is still applied, using the data from Graph 1 and Table C.

*Example 2:*

A 6 inch, 5 convolution Flexijoint is needed for a pipe operating at a maximum pressure of 50 psi. What is the maximum safe operating temperature for this Flexijoint?

From Equation 1:

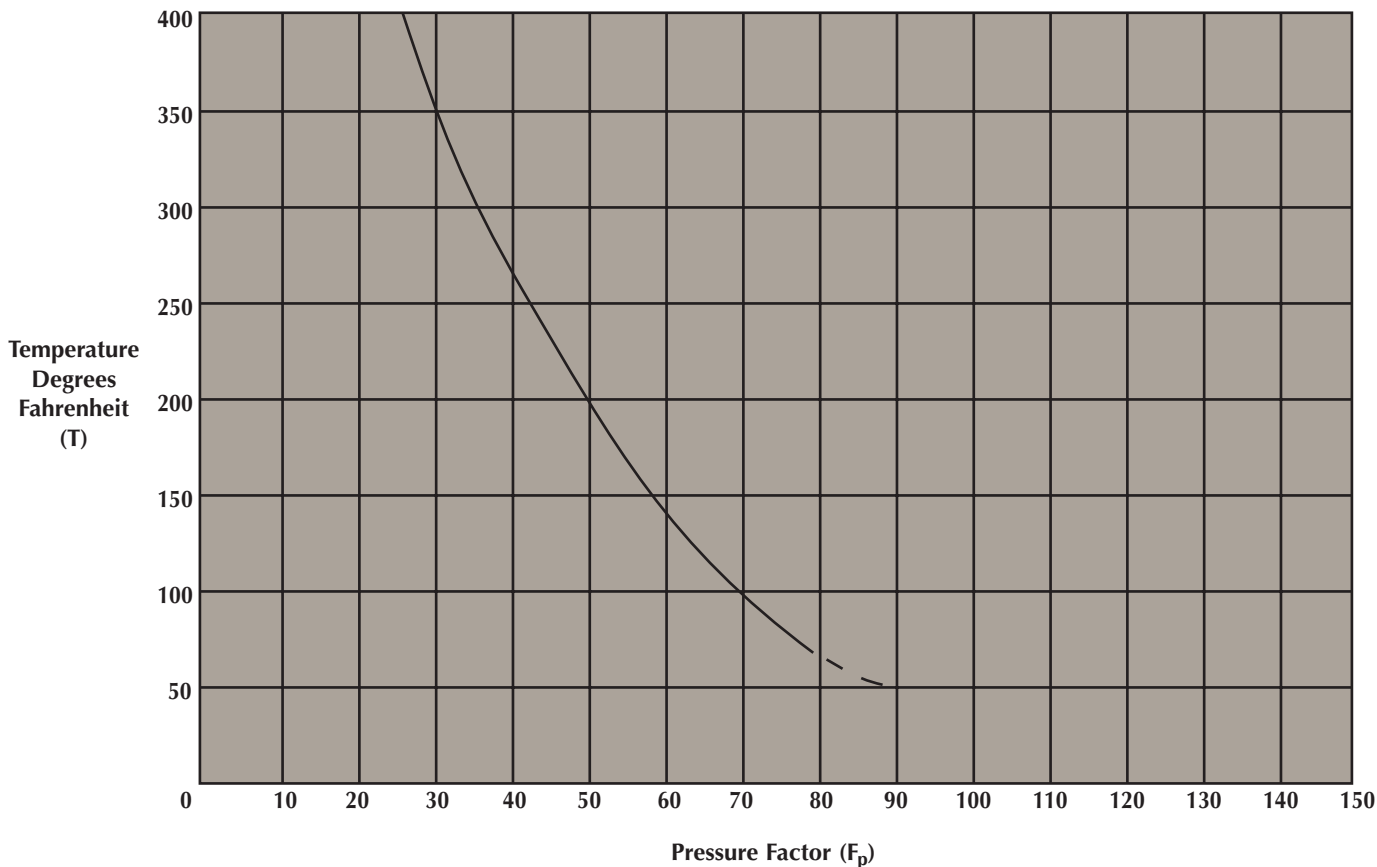
$$50 = (1.30) \times F_p$$

$$F_p = 38.5$$

From the curve in Graph 1, the operating temperature at  $F_p = 38.5$  is 275°F.

### Relationship Between Pressure Factor ( $F_p$ ) and Operating Temperature

Graph 1



**Note:** Operation of a Flexijoint at pressures and/or temperatures in excess of recommended limits may result in serious personal injury or death.

**WARNING:** Safety shields must be used at all times in hazardous service to protect against serious personal injury in the event of expansion joint failure. Linersleeves must be used in abrasive service or where sharp-edged solids are or may be present (see page 5).

## "SIZE" AND "STYLE" FUNCTION (F<sub>s</sub>)

Table C

Pipe Size	Style	Number of Convolutions										
		2	3	4	5	6	7	8	9	10	11	12
1/2	Antisquirm	2.25	1.93	1.87	1.82	1.80	1.69	1.59	1.50	1.41	1.32	1.24
	Other	2.25	1.93	1.60	1.25	1.07	.89	.68	.61	.51	.40	.31
3/4	Antisquirm	2.25	1.93	1.87	1.82	1.80	1.70	1.61	1.52	1.44	1.36	1.28
	Other	2.25	1.93	1.62	1.27	1.10	.91	.70	.64	.54	.44	.36
1	Antisquirm	2.25	1.93	1.87	1.82	1.80	1.71	1.62	1.54	1.47	1.39	1.32
	Other	2.25	1.93	1.63	1.29	1.13	.94	.73	.67	.57	.47	.39
1-1/4	Antisquirm	2.25	1.93	1.87	1.82	1.80	1.71	1.62	1.54	1.47	1.39	1.32
	Other	2.25	1.93	1.65	1.31	1.15	.97	.77	.71	.61	.52	.44
1-1/2	Antisquirm	2.25	1.93	1.87	1.82	1.80	1.71	1.62	1.54	1.47	1.39	1.32
	Other	2.25	1.93	1.66	1.38	1.19	1.02	.87	.75	.64	.55	.47
2	Antisquirm	2.25	1.93	1.87	1.82	1.80	1.74	1.70	1.73	1.77	1.68	1.59
	Other	2.25	1.93	1.67	1.39	1.20	1.03	.88	.76	.65	.56	.48
2-1/2	Antisquirm	2.25	1.93	1.87	1.82	1.80	1.71	1.68	1.64	1.61	1.53	1.48
	Other	2.25	1.93	1.67	1.39	1.20	1.02	.87	.73	.63	.54	.46
3	Antisquirm	2.25	1.93	1.87	1.82	1.81	1.77	1.74	1.70	1.67	1.64	1.60
	Other	2.25	1.93	1.67	1.42	1.18	1.00	.85	.72	.62	.53	.45
4	Antisquirm	2.25	1.86	1.82	1.78	1.75	1.74	1.70	1.67	1.63	1.60	1.57
	Other	2.25	1.86	1.58	1.34	1.14	.97	.83	.70	.60	.51	.43
5	Antisquirm	2.20	1.84	1.81	1.77	1.74	1.70	1.67	1.63	1.60	1.57	1.54
	Other	2.20	1.84	1.56	1.33	1.13	.96	.82	.69	.59	.50	.43
6	Antisquirm	2.10	1.80	1.77	1.74	1.71	1.67	1.64	1.61	1.58	1.55	1.52
	Other	2.10	1.80	1.53	1.30	1.11	.94	.78	.68	.58	.49	.42
8	Antisquirm	2.04	1.75	1.72	1.69	1.66	1.63	1.60	1.58	1.55	1.52	1.50
	Other	2.04	1.75	1.50	1.28	1.10	.94	.80	.69	.59	.50	.43
10	Antisquirm	1.95	1.72	1.69	1.64	1.64	1.61	1.58	1.56	1.53	1.51	1.48
	Other	1.95	1.72	1.45	1.22	1.07	.91	.78	.67	.58	.49	.42
12	Antisquirm	1.85	1.65	1.61	1.60	1.57	1.54	1.52	1.50	1.48	1.45	1.43
	Other	1.85	1.65	1.37	1.19	1.04	.89	.77	.66	.56	.48	.42
14	Antisquirm	1.78	1.58	1.55	1.53	1.51	1.49	1.47	1.45	1.43	1.41	1.39
	Other	1.78	1.58	1.31	1.10	.94	.80	.69	.59	.50	.43	.37
16	Antisquirm	1.70	1.53	1.52	1.50	1.48	1.45	1.43	1.42	1.40	1.38	1.36
	Other	1.70	1.53	1.20	.98	.84	.72	.61	.53	.45	.39	.33
18	Antisquirm	1.62	1.51	1.49	1.47	1.45	1.44	1.43	1.42	1.40	1.38	1.36
	Other	1.62	1.51	1.18	.96	.83	.71	.61	.52	.45	.38	.32
20	Antisquirm	1.54	1.41	1.39	1.38	1.36	1.35	1.34	1.32	1.31	1.30	1.29
	Other	1.54	1.41	1.16	.93	.80	.69	.59	.51	.43	.37	.32
24	Antisquirm	1.47	1.34	1.33	1.31	1.30	1.29	1.28	1.26	1.25	1.24	1.23
	Other	1.47	1.34	1.15	.92	.79	.68	.58	.50	.43	.37	.31
30	Antisquirm	1.38	1.28	1.27	1.26	1.24	1.23	1.22	1.21	1.20	1.19	1.18
	Other	1.38	1.28	1.11	.87	.75	.63	.54	.46	.39	.33	.28
36	Antisquirm	1.25	1.20	1.13	1.07	1.05	1.01	.98	.96	.93	.91	.87
	Other	1.25	1.15	1.08	.84	.72	.66	.52	.44	.38	.31	.27

The basic flex-life of Flexijoints can be many millions of cycles. A service life approaching such a figure requires installation with minimum misalignment. Please see pages 15 through 17 for extremely important installation information.

**WARNING:** Safety shields must be used at all times in hazardous service to protect against serious personal injury in the event of expansion joint failure. Linersleeves must be used in abrasive service or where sharp-edged solids are or may be present (see page 5).

## Vacuum Rating

The vacuum rating of a Flexijoint decreases with increasing temperature, diameter, and number of convolutions. Figure 16 shows typical vacuum failure of a Flexijoint. The convolutions are distorted, but the Flexijoint maintains its structural integrity to the point that the PTFE wall does not tear open.

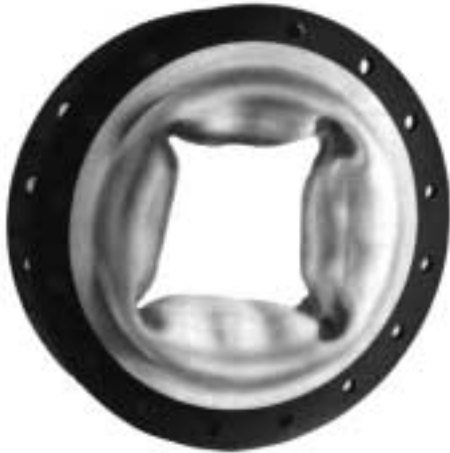


Figure 16  
Flexijoint without Vacubands subjected to excess vacuum.

Vacubands™ now enable Flexijoints through 42" diameter to be rated for full vacuum at temperatures to 400°F. The Vacuband is a metal hoop, inserted into the root of the convolution. Metal selection is based on the customer's specification. Tantalum, Hastelloy, Monel, stainless steel, Nickel, and Zirconium Vacubands have been used to date.



Figure 17  
Flexijoint with Vacubands in place.

Maximum Temperature (°F) for Full Vacuum Service (Without Vacubands)  
Table D

Dia.	# of Convolutions								
	2	3	4	5	6	7	8	9	10
1	320	320	320	320	320	320	320	320	320
1 1/2	320	320	320	320	320	320	320	320	320
2	320	320	320	320	320	320	320	300	300
2 1/2	320	320	320	320	320	320	320	280	280
3	320	320	320	320	320	280	280	240	240
4	320	280	280	280	240	200	200	160	160
5	320	280	280	240	200	160	160	120	120
6	280	240	216	200	160	120	80		
8	240	200	160	120	80				
10	200	160	120	80					
12	120	120	80						
14	80								

Consult the factory for vacuum ratings on Flexijoints above 14" diameter.

■ Use Vacuband™ for Full Vacuum Service

**Note:** 1) When Vacubands are used with any Flexijoints 6" diameter and larger, a full vacuum rating to 400° F is obtained.  
2) Please consult the factory for data on partial vacuum applications.

**WARNING:** Safety shields must be used at all times in hazardous service to protect against serious personal injury in the event of expansion joint failure. Linersleeves must be used in abrasive service or where sharp-edged solids are or may be present (see page 5).

## Flange and PTFE Dimensions

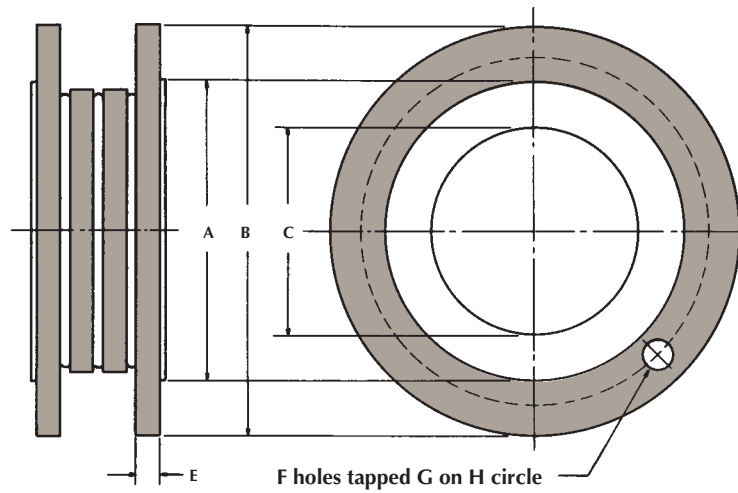


Figure 18

Table E

Flexijoint Size	A	B	C	PTFE Wall (in.)	Max. Bellows Area (sq. in.)	E	F	G	H
	Flare Face (in.)	Flange Outside Diameter (in.)	PTFE Inside Diameter (in.)			Flange Thickness (in.)	Number of Holes	Thread	Bolt Circle (in.)
1/2	1-3/8	3-1/2	9/16	.07	1.5	3/8	4	1/2 x 13	2-3/8
3/4	1-11/16	3-7/8	13/16	.07	2.0	3/8	4	1/2 x 13	2-3/4
1	2	4-1/4	1	.08	2.8	13/32	4	1/2 x 13	3-1/8
1-1/4	2-1/2	4-5/8	1-3/8	.09	3.9	13/32	4	1/2 x 13	3-1/2
1-1/2	2-7/8	5	1-5/8	.09	4.8	7/16	4	1/2 x 13	3-7/8
2	3-5/8	6	2-1/16	.09	6.9	7/16	4	5/8 x 11	4-3/4
2-1/2	4-1/8	7	2-7/16	.10	9.5	1/2	4	5/8 x 11	5-1/2
3	5	7-1/2	3-1/16	.10	13.3	17/32	4	5/8 x 11	6
4	6-3/16	9	4	.11	20.6	9/16	8	5/8 x 11	7-1/2
5	7-5/16	10	5-1/16	.12	30.0	9/16	8	3/4 x 10	8-1/2
6	8-1/2	11	6-1/16	.12	41.5	19/32	8	3/4 x 10	9-1/2
8	10-5/8	13-1/2	8	.13	67.9	11/16	8	3/4 x 10	11-3/4
10	12-3/4	16	10	.14	102.6	11/16	12	7/8 x 9	14-1/4
12	15	19	11-15/16	.15	142.3	3/4	12	7/8 x 9	17
14	16-1/4	21	13-1/8	.16	170.4	13/16	12	1 x 8	18-3/4
16	18-1/2	23-1/2	15	.17	220.5	7/8	16	1 x 8	21-1/4
18	21	25	16-7/8	.19	277.3	15/16	16	1-1/8 x 7	22-3/4
20	23	27-1/2	18-13/16	.20	339.6	1	20	1-1/8 x 7	25
24	27-1/4	32	22-5/8	.22	485.0	1-1/8	20	1-1/4 x 7	29-1/2
28	31-1/4	36-1/2	26-7/16	.24	655.0	1-1/4	32	1-1/4 x 7	34
30	33-3/4	38-3/4	28-1/4	.27	751.0	1-3/8	28	1-1/4 x 7	36
36	40-1/4	46	34	.31	1,074.0	1-1/2	32	1-1/2 x 6	42-3/4
42	47	53	41	.33	1,741.0	1-11/16	36	1-1/2 x 6	49-1/2

### Special Drilling

ANSI 150 lb. is standard drilling for Flexijoint flanges. Ethylene can readily supply any flange drilling (Corning, DIN, 300 lb., clearance holes, etc.). Flexijoints are carried in stock with ANSI 150 lb. drilling, and a combination of ANSI 150 lb. drilling with Corning drilling. Please consult the factory for any non-standard drilling you may require.

**WARNING:** Safety shields must be used at all times in hazardous service to protect against serious personal injury in the event of expansion joint failure. Linersleeves must be used in abrasive service or where sharp-edged solids are or may be present (see page 5).

## Spring Rate

The spring rate of a Flexijoint is the force required to cause given amount of movement. It is usually given in lbs./1" for axial and parallel movement and in inch•lbs/degree for angular misalignment. The low spring rate of the Ethylene Flexijoint is critical when mating to stress-sensitive process equipment (glass-lined steel, glass, FRP, Haveg™, graphite, etc.).

### I. AXIAL MOVEMENT

Graph 2 shows the instantaneous spring rate for Flexijoints at 70°F.

### II. PARALLEL MISALIGNMENT

Graph 3 shows the instantaneous spring rate for Flexijoints at 70°F.

### III. ANGULAR MISALIGNMENT

Table G shows the instantaneous torque for Flexijoints at 70°F.

Two factors will lower the spring rate (increase the flexibility) of a Flexijoint for axial, parallel and angular misalignment.

- A. TEMPERATURE EFFECT: Because PTFE is a thermoplastic, its modulus will drop with increasing temperature. This necessitates a change in the spring rate for the Flexijoint's operating temperature. This is done by multiplying the instantaneous rate by a factor selected from Table F.
- B. TIME EFFECT (CREEP): The "creep" associated with thermoplastics also tends to lower the spring rate at any stress. Over a 24 hour period the instantaneous spring rate would drop by 50%. Continued loading will contribute to a further reduction in the spring rate, but at a slower rate.

## Temperature Multiplying Factors

Table F

Temperature °F	Temperature °C	Multiplying Factor
70	21	1.00
100	38	0.65
212	100	0.48
250	121	0.39
300	149	0.32
342	172	0.25
400	204	0.19

## Instantaneous Torque for Angular Misalignment (inch•lbs/degree)

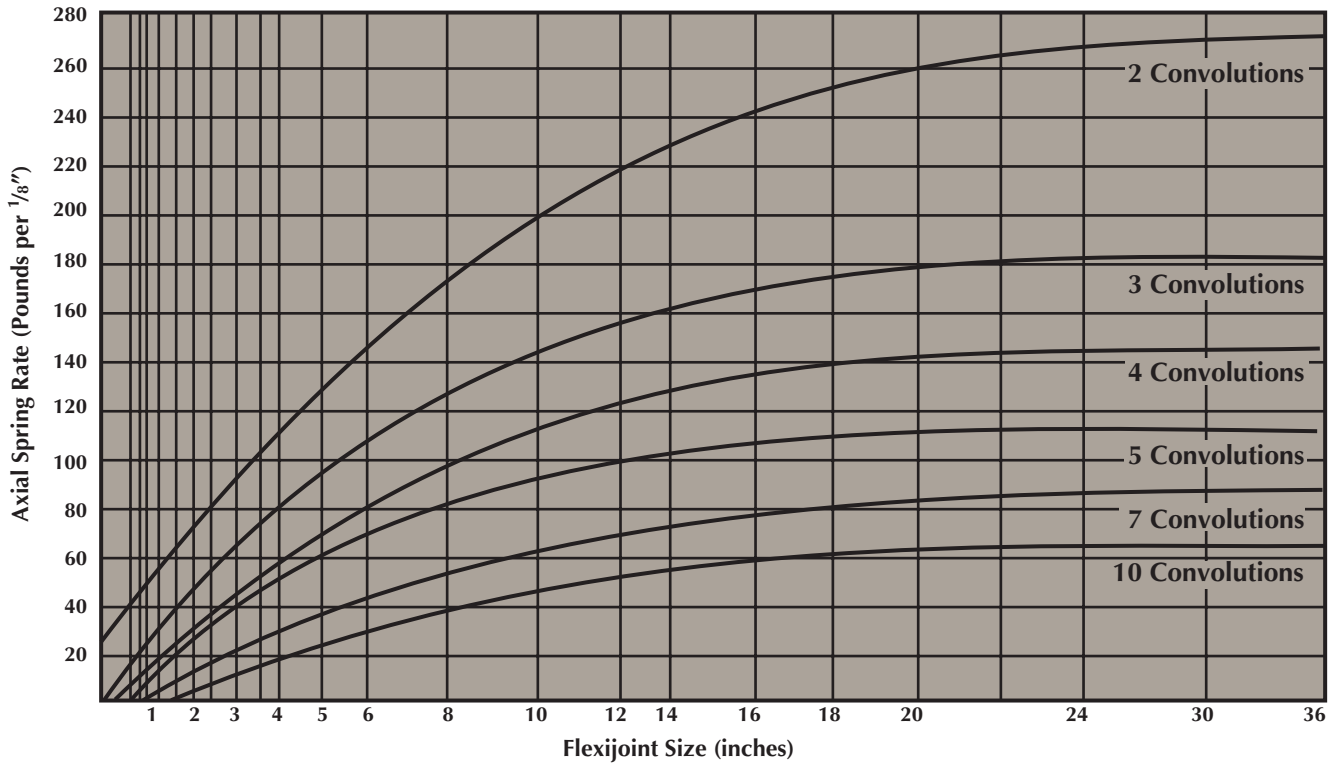
Table G

Flexijoint Size	# of Convolutions								
	2	3	4	5	6	7	8	9	10
1	0.7	0.4	0.3	0.1	—	—	—	—	—
1-1/2	3	2	1	—	—	—	—	—	—
2	4	3	2	1	—	—	—	—	—
3	11	8	6	5	3	3	2	2	1
4	26	18	14	11	9	7	6	6	4
6	77	56	45	37	31	22	21	18	16
8	166	116	95	74	59	53	47	40	38
10	290	209	168	133	110	93	81	64	58
12	462	281	261	211	170	140	130	120	110
14	654	462	376	287	239	207	183	175	159
16	857	643	500	428	333	285	262	238	214
18	1,187	848	678	576	441	373	356	339	271
20	1,535	1,070	837	651	558	502	465	418	372
24	2,251	1,527	1,206	964	884	723	691	643	562
30	3,612	2,355	1,884	1,570	1,256	1,130	1,099	1,005	943
36	5,156	3,528	2,713	2,171	2,008	1,791	1,601	1,438	1,302

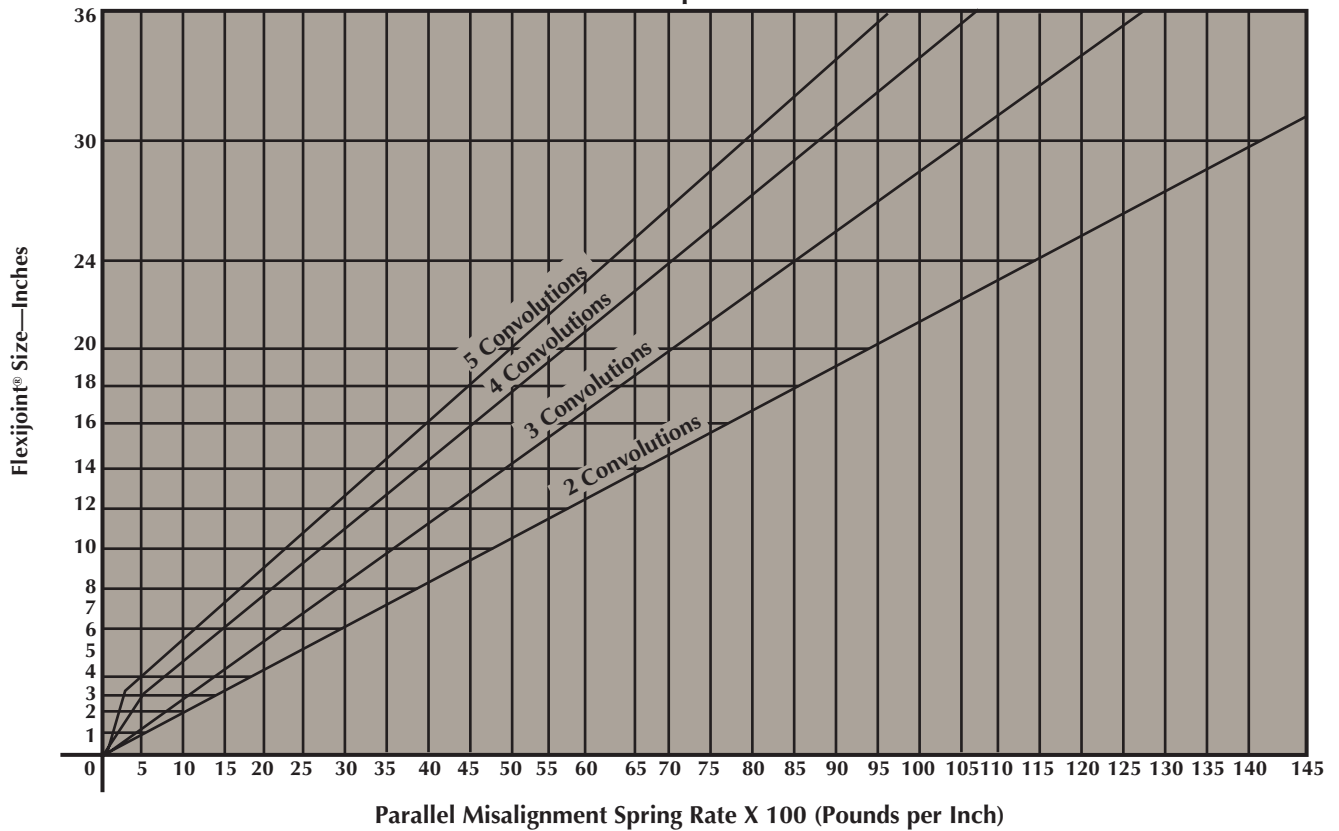
**Note:** Please consult the factory if you require a Flexijoint with a spring rate lower than the published data. A universal expansion joint, for instance, will substantially lower the angular and parallel spring rate.

**WARNING:** Safety shields must be used at all times in hazardous service to protect against serious personal injury in the event of expansion joint failure. Linersleeves must be used in abrasive service or where sharp-edged solids are or may be present (see page 5).

Instantaneous Spring Rate for Axial Movement (70°F)  
Graph 2



Instantaneous Spring Rate for Parallel Misalignment (70°F)  
Graph 3



## Axial Restraint

**Compression** — The T-Band™ metal reinforcement on the outside of the convolution contributes to the pressure rating of the Flexijoint and also prevents the joint from over-compressing.

**Expansion** — The maximum axial expansion of the Flexijoint is controlled by the use of Limitlinks or 3 Limitbolts. The number of Limitlinks used is selected by Ethylene to control expansion forces when the Flexijoint is operating at maximum recommended operating pressure at 70°F.

**UNDER NO CIRCUMSTANCES ARE THE LIMITLINKS OR LIMITBOLTS ON AN ETHYLENE FLEXIJOINT TO BE CONSIDERED AS SUBSTITUTES FOR PIPE ANCHORS. THEY ARE SAFETY DEVICES ONLY.**

**Limitbolts** — Axial expansion is limited by (3) bolts in limitbolt and Antisquirm Flexijoints, any Flexijoint 30" diameter and above, and where customer specified.

In most applications Limitlinks are recommended. Limitbolts may "hang-up" on the expansion joint flanges in parallel misalignment, and prevent the Flexijoint from absorbing its designed movement.

## Limitlinks

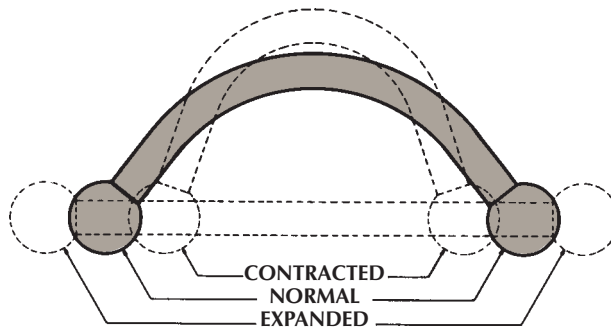
Limitlinks consist of stainless steel cables conforming to MIL-C-5424, Government Specification for Aircraft Cable, at the ends of which stainless steel ball-shaped terminals are swaged. The opposite ends of each Limitlink are firmly anchored in the Flexijoint flanges in a manner which leaves the terminals free to swivel as the flanges change position relative to each other during their adjustment to angular misalignment, parallel misalignment, purely axial motion (shown below), or combinations of the three.

Although the cable in standard Limitlinks is stainless steel Monel cable can be supplied for unusual conditions such as corrosive atmospheres which might attack even Type 316 Stainless Steel. The strength of Monel cable is between 55 and 60 percent of the stainless steel cable specified in MIL C-5424. (See Table H below.)

**Allowable Load Per Limitlink (4 to 1 Safety Factor)**  
**Table H**

IPS	Allowable Limitlink Load (lbs.)	Cable Diameter	IPS	Allowable Limitlink Load (lbs.)	Cable Diameter
1/2	72	1/16	8	750	7/32
3/4	150	3/32	10	750	7/32
1	150	3/32	12	960	1/4
1-1/4	150	3/32	14	960	1/4
1-1/2	150	3/32	16	1170	9/32
2	264	1/8	18	1350	5/16
2-1/2	264	1/8	20	1350	5/16
3	360	5/32	24*	1350	5/16
4	360	5/32			
5	555	3/16			
6	555	3/16			

\*Limit Bolts are supplied for Flexijoints above 24" diameter.



**Figure 19**

**WARNING:** Safety shields must be used at all times in hazardous service to protect against serious personal injury in the event of expansion joint failure. Linersleeves must be used in abrasive service or where sharp-edged solids are or may be present (see page 5).

## Installation Procedure

Flexijoints are precision products made to rigid standards. For maximum life and your safety please follow these instructions.

1. The safety and operability of an Ethylene Flexijoint, like that of any piece of critical process equipment depends upon proper installation, good operating practice and regular inspection and maintenance.
2. Follow sound installation procedures: see ANSI/ASME B 31.3 Code for Pressure Piping, Chemical Plant & Refinery Piping. (See your Engineering Department.)
3. After inspection return the unit to its carton until time for installation.
4. During installation protect the TFE faces from cutting, abrasion, paint, welding splatter, etc.
5. Prevent overtightening by limiting torque to:

Torque		Torque		Torque		Torque	
IPS	Ft.-Lbs.	IPS	Ft.-Lbs.	IPS	Ft.-Lbs.	IPS	Ft.-Lbs.
1/2	5	2-1/2	30	10	50	24	90
3/4	5	3	40	12	60	28	90
1	10	4	30	14	70	30	100
1-1/4	10	5	40	16	65	32	120
1-1/2	15	6	45	18	90	36	120
2	25	8	60	20	80	42	100

6. To perform its function properly a Flexijoint must not be rigid. When rigidity is required it should be provided by other means, usually by attaching the pipe or fittings to nonyielding structural members before and after each flexible joint. In straight runs Flexijoints may be alternated with these anchor points, the spacing depending on expected motion and allowable Flexijoint expansion and contraction as shown on pages 6 and 7. Generally, the system should be anchored wherever it changes direction or branches, such as at elbows, tees, or crosses. No more than one Flexijoint should be placed between any two anchors.
7. Provide vertical support for piping at any point where weight might cause misalignment.
8. The life of any flexible coupling, expansion joint, or bellows depends largely on freedom from both angular and parallel misalignment; life increases as misalignment decreases. For maximum Flexijoint life keep misalignment minimum, and certainly within the limits shown in Data on pages 6 and 7.
9. If expansion beyond the recommended limits occurs, the unit may be damaged. For this reason Flexijoints are usually supplied with Limitlinks, flexible wire cables fastened between the flanges. When a Limitlink is stretched taut the Flexijoint has reached its maximum extended length. Limitlinks guard against damage but must not be depended upon to compensate for faulty piping. Corrective steps must be taken.
10. Mating bolts should be retorqued after 24 hours, the first full temperature cycle, and then again in 72 hours.
11. The Flexijoint must not be subjected to any torsional loads.

## Additional Precautions

1. Use an expansion joint safety shield in hazardous service.
2. Use a linersleeve when abrasives or sharp-edged "solids" may be present.
3. When a Flexijoint is installed in a piping system, it must not be subjected to pressure surges.
4. Protect Flexijoints from weld "splatter" and sharp-edged objects.
5. Do not drill out tapped holes in the field. Consult Ethylene Corporation.
6. When performing electric welding on a piping system containing Flexijoints, it is important that current not be permitted to flow through the Limitlinks. This can be prevented by proper "grounding" of the piping system between the welding point and the Flexijoint.

## Start-Up Check List

The final control any designer has is to **visit the field, prior to startup, to ensure that the piping system, including all its restraints, was installed properly.** It is important to insure that:

1. All restraints are positioned and will function exactly as the designer intended.
2. The piping was aligned properly and that the Flexijoint was not made to fit a poorly fabricated pipe arrangement.
3. The pipe guides are in place and correctly positioned.
4. All Flexijoints are covered with a shield wherever possible.
5. The Flexijoints are not misaligned beyond recommended limits. If limit bolts are used, the bolts should not be hung-up or or cocked in the holes of the flanges thru which the limit bolts pass.
6. The Flexijoints are installed within their neutral or normal length. If the joint is fully expanded or compressed prior to start-up (or even after start-up) the piping assembly is faulty.
7. No weld splatter or metal chips or other types of foreign material are present.
8. Provisions have been made to prevent pressure or temperature surges.

**WARNING:** Safety shields must be used at all times in hazardous service to protect against serious personal injury in the event of expansion joint failure. Linersleeves must be used in abrasive service or where sharp-edged solids are or may be present (see page 5).

# Expansion Joint Data Sheet

## 1.0 SAFETY

1.1 Material of Construction of Safety Shields \_\_\_\_\_

1.2 Shield Manufacturer \_\_\_\_\_

## 2.0 FLUID PROPERTIES:

2.1 Medium \_\_\_\_\_

2.2 Velocity \_\_\_\_\_ ft./sec.

## 3.0 MATERIALS OF CONSTRUCTION:

3.1 Bellows \_\_\_\_\_

3.2 Flanges \_\_\_\_\_

3.3 Piping \_\_\_\_\_

3.4 Liner \_\_\_\_\_

## 4.0 SPECIFICATIONS:

4.1 Flanges \_\_\_\_\_

4.2 Piping \_\_\_\_\_

## 5.0 SPRING RATES:

5.1 Axial \_\_\_\_\_ lbs.

5.2 Lateral \_\_\_\_\_ lbs./in.

5.3 Angular \_\_\_\_\_ in•lbs./deg.

## 6.0 JOINT FEATURES:

6.1 Size \_\_\_\_\_ in. normal dia.

6.2 Type \_\_\_\_\_

6.3 Internal Sleeve Yes  No

6.4 External Cover Yes  No

6.5 Installation Position  
Horizontal  Flow Up   
Vertical  Down

6.6 Installed Length \_\_\_\_\_ in.

6.7 Pressure Thrust Area \_\_\_\_\_ sq. in.

## 7.0 STAMPING: "CONDITIONS NOT BE EXCEEDED"

7.1 Pressure Test \_\_\_\_\_ psig.

7.2 Pressure \_\_\_\_\_ psig @ \_\_\_\_\_ °F

7.3 Axial Movement \_\_\_\_\_ in.

7.4 Lateral Movement \_\_\_\_\_ in.

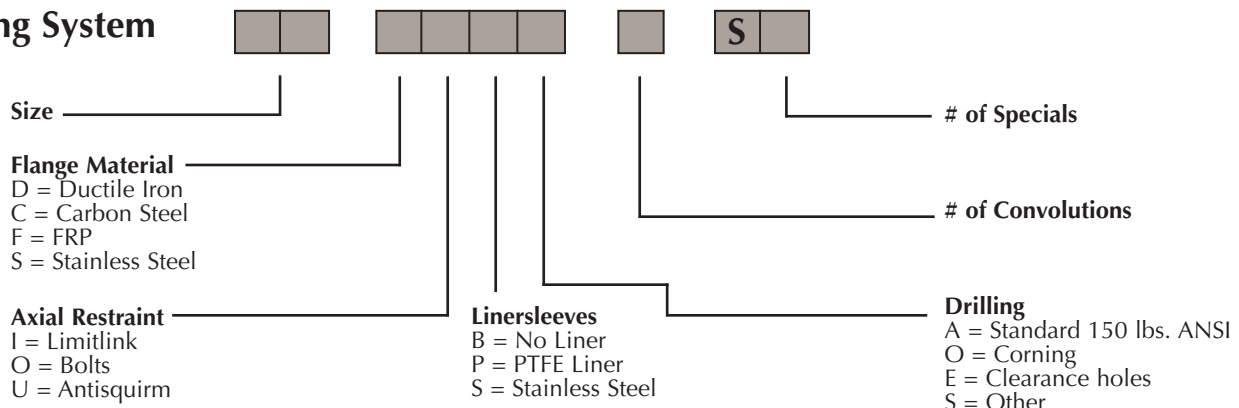
7.5 Angular Movement \_\_\_\_\_ deg.

## 8.0 DESIGN PARAMETERS

Condition	Vacuum In., Hg.	Pressure Psig	Temp Deg. F	Axial-In.	Movements (1)		Cycles
					Lateral-In.	Angular-Deg.	
Testing				—	—	—	—
Installation Tolerance	—	—					—
Normal Operation							
Cold Weather Shutdown	—	—					1000
Design							

(1) Axial movement causing joint to compress is designated as Positive (+), Axial Extension as Negative (—).

## How to Order Coding System



- EXAMPLES:**
- 1) 8" diameter, 4 convolution Flexijoint, 150 lb. ANSI, drilling with limitlinks and PTFE liner  
The ordering code would be: 8 DIPA-4.
  - 2) 20" diameter, 5 convolution Flexijoint, one flange 150 lb. ANSI — one flange clearance holes with limitbolts, carbon steel flanges and Titanium Vacubands.  
The ordering code would be: 20 COBA-4 S2
    - 1) Titanium Vacubands
    - 2) One flange 150 lb. ANSI — one flange clearance holes

**WARNING:** Safety shields must be used at all times in hazardous service to protect against serious personal injury in the event of expansion joint failure. Linersleeves must be used in abrasive service or where sharp-edged solids are or may be present (see page 5).

# Recommended Procurement Specifications

## 1. SCOPE

1.1 This specification provides information for the procurement of expansion joints, flexible couplings, and bellows made of PTFE-Fluorocarbon resin by molding without subsequent machining.

1.2 The subjects covered are materials, construction, tests, and packaging.

## 2. MATERIALS

2.1 The convoluted component shall be pure white virgin PTFE-Fluorocarbon resin conforming to ASTM D 1457 without pigments, lubricants, or additives of any kind.

2.2 Unless otherwise specified the metal in all flanges and reinforcing rings shall conform to ASTM 60-45-12.

2.3 Unless otherwise specified, all Flanges and T-Bands shall be coated with an electrostatically applied epoxy.

2.4 Unless otherwise specified all materials subject to atmospheric corrosion shall be zinc phosphate treated.

## 3. CONSTRUCTION

3.1 The flanges shall be one piece with no welding.

3.2 Unless otherwise specified the number of bolt holes, the bolt circle, and the flange diameter shall conform to ANSI B16.5. The bolt holes shall be tapped to accommodate the bolts specified in ANSI B16.5.

3.3 When external band reinforcement is required each reinforcing element shall be one piece with no welding, and shall reinforce the full length of the convolution sidewall as well as the convolution root.

3.4 The surfaces of all cast components which touch the PTFE shall be bored, turned, milled, ground, polished, or otherwise machined to remove all pits, burrs, flash, pimples or other cavities or projections.

3.5 The PTFE wall thickness shall be no less than .077". It shall be uniform within 5% of the nominal wall thickness measured at any point on the convolution sidewall, crest, or root.

3.6 The radius of the neutral layer of the PTFE wall measured at the convolution root or crest in the fully retracted position shall be no less than the nominal wall thickness. (See Fig. 20).

3.7 When mechanical limiting to a maximum extended length or to a minimum retracted length is required the means by which such limiting is accomplished shall not interfere with freedom to adjust to angular, parallel, or rotary misalignment.

## 4. TESTS

4.1 No leakage shall occur after 100,000 cycles (200,000 strokes) of the maximum rated axial travel, 10 cycles per minute, at room temperature, and at the pressure shown below. For more than five convolutions the pressure shall be as agreed upon between supplier and user.

Number of Convolutions	Pressure
2	150
3	135
4	120
5	105

4.2 100% of all components used to limit longitudinal travel shall be tested before installation at the allowable load specified by the manufacturer.

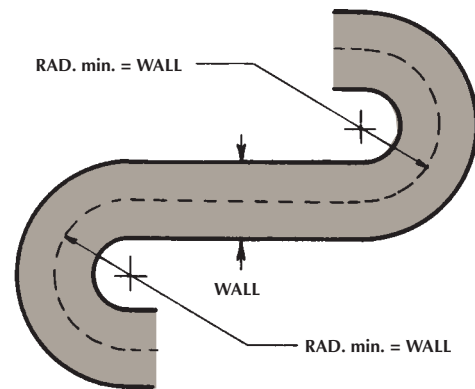


Figure 20

4.3 Each Flexijoint shall be subjected to a minimum pressure test of 100 psi.

4.4 The PTFE component shall have a minimum ultimate tensile strength of 4000 psi. by ASTM D 1708, and a minimum ultimate elongation of 300% by ASTM D 1708, and a minimum specific gravity of 2.14 by ASTM D 792.

4.5 The PTFE component shall be free of scratches, tool marks, dents, pits, tears, inclusions or any other defects which occupy or penetrate 20% or more of the PTFE wall thickness.

4.6 All units will be subjected to a high intensity light to test for imperfections and inclusions.

4.7 The entire surface of each finished unit shall withstand a 10,000-volt spark test without arcing through.

## 5. PACKAGING

5.1 Each unit shall be packed in a separate container, clearly marked externally to show the pipe size, the number of convolutions, and the manufacturer.

5.2 All containers shall be readily reclosable without retaping.

5.3 Each unit shall be shipped with one or more covers internal to the container to exclude foreign particles from interstices between the PTFE and other components during storage and before installation.

5.4 Each unit shall bear a nameplate or other marking to show the pipe size and the manufacturer.

5.5 An instruction sheet showing recommended installation procedure, bolt tightening torque, maximum extended length, neutral length, and minimum retracted length shall be enclosed in each container.

## 6. HAZARDOUS SERVICE WARNING LABEL

6.1 Each unit shall be shipped with a minimum of one warning label stressing the absolute urgency of using a suitable safety shield in hazardous service and using a liner in abrasive service or where sharp-edged solids are or may be present.

# Engineered Fluoropolymer Products

Ethylene Corporation manufactures a broad range of custom-engineered fluoropolymer process equipment. Ours is an expertise that is able to respond quickly to your needs, drawing on proven experience to design and fabricate process components that solve your problems.



P.O. Box 918  
Murray Hill, N.J. 07974

Phone: 908-464-2600  
Fax: 908-464-0627

## Warranty

Ethylene Corporation warrants its products to be free of any defects in material or workmanship for a period of 12 months from date of installation or 18 months from shipment, whichever comes first. However, Ethylene shall have no liability whatsoever for units which fail due to mechanical damage, misuse or abuse. Except for this warranty, Ethylene makes no warranty, express or implied, and expressly excludes any warranty of merchantability or fitness for a particular service. Ethylene's maximum liability hereunder shall be limited to the repair or replacement of any defective product, if appropriate. Ethylene shall, under no circumstances, be liable for any incidental, consequential, or other damages, including, but not limited to, loss of business or profits, based on any alleged negligence, breach of warranty, strict liability or other theory, arising out of the use or handling of these products.

©Copyright 2/01  
Specifications Subject to change

Teflon® is a registered trademark of  
the E.I. DuPont Co.