

# PROCO

The Expansion Joint and Check Valve People

## SERIES 231/ET

### PTFE Lined Rubber Expansion Joints



The PROCO Series 231/ET PTFE lined expansion joints are designed for tough demanding corrosive chemical applications, as found in: Chemical & Petrochemical Process Facilities and Highly Corrosive Industrial Piping & Pollution Control Systems. The greatest usage of the Series 231/ET is found in the Pulp and Paper Industry where the ability to resist corrosive attack at elevated temperature and pressure is unmatched by metallic, plastic or other competitive expansion joints. PROCO's Series 231 PTFE lined expansion joints can easily handle such pulp/paper applications as: White-Green-Black liquor, bleach plant chlorination and caustic extraction stages. Chemically resistant against the entire pH range, PROCO Series 231 PTFE expansion joints are designed to handle practically every chemical plant application. Installed next to mechanical equipment or between anchor points of a piping system, specify the PROCO 231/ET to: (1) Absorb Pipe Movements/ Stress, (2) Reduce System Noise, (3) Isolate Mechanical Vibrations, (4) Compensate Alignment/Offset, (5) Eliminate Electrolytic Action and Electrolysis, (6) Protect Against Start-Up/Surge Forces. Our history in the manufacture of expansion joints dates back to 1930. When you need an engineered rubber expansion joint solution to a piping problem, call PROCO.

**Series 231/ET.** The new and improved PROCO Series 231/ET will complement the existing PROCO Series 251/ET expansion joint. This new molded product has been completely re-engineered to provide improved strength, flexibility and movement capabilities. Manufactured utilizing tire cord industry technology, the Series 231/ET combines woven polyester tire cord into a fabric matrix and bonded with a EPDM elastomer that is reinforced with metal and bonded to a PTFE liner to create a product with greater operating performance. *Note: The PTFE liner extends to the bolt circle of the bottom of bolt holes.*

**Greater Movements with a Lower/Wider Arch Profile.** The movements for the PROCO Series 231/ET exceed the specification of the Fluid Sealing Association's, Rubber Expansion Joint Division Technical Handbook (7.3 Edition), Table VI. Due to a new and improved lower, wider profile arch, more axial compression and extension coupled with lateral and angular movements can be obtained without increasing the face-to-face requirements. For greater movements based on re-engineering and new product construction for highly corrosive piping installations, specify the PROCO Series 231/ET PTFE lined expansion joints.

**Chemical Service Capability at Minimal Cost.** Expensive, exotic metal expansion joint for low temperature service can be replaced with the PROCO Series 231/ET PTFE lined expansion joints. Engineered to operate up to 225 PSIG and 250°F, the PROCO Series 231/ET can be specified for a wide range of piping system requirements. Our standard stock is furnished with an exterior EPDM cover. Compared to metal, plastic or other rubber-backed competitive products, you will invest less and have access to in-stock availability with the high quality PROCO Series 231/ET.

**Specifications Met.** PROCO has assigned conservative pressure ratings to the Series 231/ET PTFE lined rubber expansion joints. The ratings, however, meet the requirements of the Fluid Sealing Association's, Rubber Expansion Joint Division Technical Handbook (7.3 Edition), Series C. The pressure ratings for the Series 231/ET PTFE lined rubber expansion joints have been fully tested and are based on a minimum 4 to 1 safety factor. For pressure protection with confidence, specify the PROCO Series 231/ET.

**Prevents Electrolysis and Electrolytic Action.** In Chemical applications when metallic expansion joints are used, they are generally of a metal dissimilar from the pipeline. This may create an electrolytic galvanic action that could be destructive to the connector equipment or piping system. The use of the rubber-backed PROCO 231/ET PTFE lined expansion joints prevents this potential hazard. Additionally, our 231/ET expansion joints are non-conductive and eliminate the metal-to-metal contact at the flange face thus stopping electrolysis.

**Absorbs Vibration • Noise • Shock.** The PROCO Series 231/ET PTFE lined rubber expansion joints are a replacement for "sound transmitting" metallic expansion joints. Sound loses energy traveling axially through an expansion joint. Water hammer, pumping impulses, water-borne noises and other forms of strain-stress-shock are cushioned and absorbed by the PTFE lined/rubber elastomer expansion joint, not related to piping. Install the Series 231/ET in a system to reduce vibration transmission when the piping section beyond the expansion joint is anchored or sufficiently rigid. For quiet, stress-free systems specify the PROCO Series 231/ET.

**Large Inventories Mean Same-Day Shipment.** We maintain the largest inventory of expansion joints in the world. Rubber, PTFE Lined, Plastic or Metal Hose — PROCO can ship the products you need when you need them! In fact, when it comes to expansion joints, if PROCO doesn't have them in stock ... nobody does!

**Information • Ordering • Pricing • Delivery.** Day or night, weekends and holidays ... the PROCO phones are monitored 24 hours around the clock. When you have a question, you can call us.

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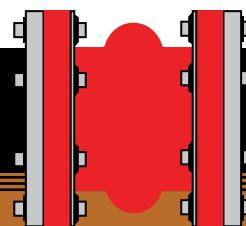
Website ..... www.procoproducts.com

Weekday office hours are 5:30 a.m. to 5:15 p.m. Pacific Time.

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#### Table 1: Available Styles • Design Descriptions • I.D. Sizes

#231/ET — Standard Single-Arch, Spool-Type Joint (See Table 2)	1"–36"
#251/ET — Standard Single-Arch, Spool-Type Joint	1"–48"



### Protecting Piping and Equipment Systems from Stress/Motion



# PTFE Lined Rubber Expansion Joints

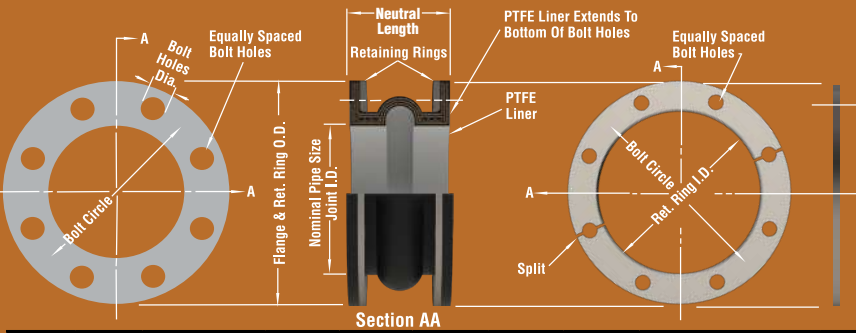


Figure 1: Detail of Style 231/ET

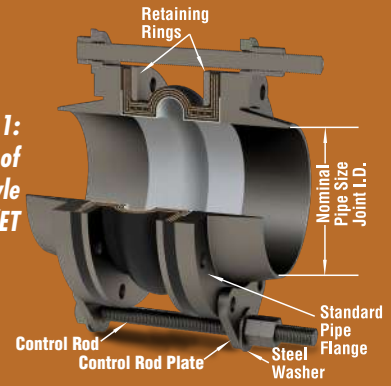
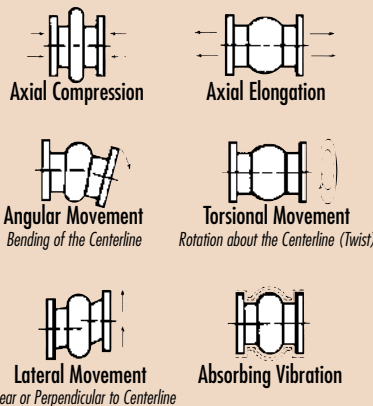


Table 2: Sizes • Movements • Pressures • Weights • Drilling

EXPANSION JOINT SIZE Nom. I.D. x Inch / (mm) <sup>1</sup>	NEUTRAL LENGTH Inch / (mm)	231/ET Movement Capability: From Neutral Position					Operating Conditions <sup>5</sup>			Weights in lbs / (kgs) <sup>6</sup>			Flange Dimensions and Drilling <sup>8</sup>						
		Axial Compression Inch / (mm)	Axial Extension Inch / (mm)	Lateral Deflection Inch / (mm)	Angular Deflection <sup>2</sup> Degrees	Torsional Rotation <sup>3</sup> Degrees	Thrust Factor <sup>4</sup> In <sup>2</sup> / (cm <sup>2</sup> )	Positive PSIG / (Bar)	Vacuum Inches of Hg / (mm of Hg)	Joint Assembly	Retaining Ring Set	Control Unit <sup>7</sup> Assembly	O.D. of Exp. Joint / Ring Inch / (mm)	Bolt Circle Inch / (mm)	Number of Holes	Size of Holes Inch / (mm)			
1.5 (40)	6 (150)	1.25 (32)	0.625 (16)	0.625 (16)	28.0°	1°	7.03 (45)	225 (15.5)	30 (762)	1.5 (0.7)	2.5 (1.1)	2.3 (1.0)	5.0 (127.0)	3.88 (98.6)	4	0.625 (15.88)			
2 (50)					25.0°		12.56 (81)	225 (15.5)	30 (762)	2.0 (0.9)	4.0 (1.8)	2.8 (1.3)	6.0 (152.4)	4.75 (120.65)	4	0.750 (19.05)			
2.5 (65)					20.2°		15.82 (102)	225 (15.5)	30 (762)	2.5 (1.2)	4.5 (2.0)	2.8 (1.3)	7.0 (177.8)	5.50 (139.7)	4	0.750 (19.05)			
3 (80)					18.0°		19.63 (127)	225 (15.5)	30 (762)	3.0 (1.4)	5.5 (2.5)	2.8 (1.3)	7.5 (190.5)	6.00 (152.4)	4	0.750 (19.05)			
4 (100)					14.2°		28.27 (182)	225 (15.5)	30 (762)	4.0 (1.8)	8.0 (3.6)	2.8 (1.3)	9.0 (228.6)	7.50 (190.5)	8	0.750 (19.05)			
5 (125)					13.0°		39.26 (253)	225 (15.5)	30 (762)	5.0 (2.3)	8.5 (3.9)	4.0 (1.8)	10.0 (254.0)	8.50 (215.9)	8	0.875 (22.23)			
6 (150)					12.2°		50.27 (324)	225 (15.5)	30 (762)	7.0 (3.2)	9.5 (4.3)	4.0 (1.8)	11.0 (279.4)	9.50 (241.3)	8	0.875 (22.23)			
8 (200)					12.0°		78.54 (507)	210 (14.5)	30 (762)	11.0 (5.0)	14.5 (6.6)	8.0 (3.6)	13.5 (342.9)	11.75 (298.4)	8	0.875 (22.23)			
10 (250)	8 (200)	2.0 (50)	1.0 (25)	1.0 (25)	11.9°	113.1 (730)	210 (14.5)	30 (762)	19.0 (8.6)	17.0 (7.7)	10.0 (4.5)	16.0 (406.4)	14.25 (362.0)	12	1.000 (25.40)				
12 (300)					11.3°	153.94 (993)	210 (14.5)	30 (762)	29.0 (13.2)	24.5 (11.0)	10.0 (4.5)	19.0 (482.6)	17.00 (431.8)	12	1.000 (25.40)				
14 (350)					11.5°	201.06 (1297)	150 (10.0)	30 (762)	38.0 (17.2)	27.0 (12.3)	12.0 (5.4)	21.0 (533.4)	18.75 (476.3)	12	1.125 (28.58)				
16 (400)					10.1°	254.47 (1642)	150 (10.0)	30 (762)	44.0 (20.0)	33.5 (15.2)	15.0 (6.8)	23.5 (596.9)	21.25 (539.8)	16	1.125 (28.58)				
18 (450)					8.9°	314.16 (2027)	150 (10.0)	30 (762)	49.0 (22.2)	34.0 (15.5)	16.5 (7.2)	25.0 (635.0)	22.75 (577.9)	16	1.250 (31.75)				
20 (500)					8.1°	380.13 (2452)	150 (10.0)	30 (762)	54.0 (24.5)	38.0 (17.3)	16.5 (7.2)	27.5 (698.5)	25.00 (635.0)	20	1.250 (31.75)				
24 (600)					10 (250)	3.0 (75)	1.5 (38)	1.5 (38)	9.0°	530.93 (3425)	110 (7.5)	28 (711)	60.0 (27.2)	48.0 (21.8)	20.0 (9.0)	32.0 (812.8)	29.50 (749.3)	20	1.375 (34.93)
30 (750)									7.5°	838.65 (5410)	100 (7.0)	28 (711)	88.0 (44.0)	63.0 (28.6)	29.5 (13.3)	38.8 (984.3)	36.00 (914.4)	28	1.375 (34.93)
36 (900)	6.7°	1169.16 (7543)	100 (7.0)	28 (711)					112.0 (50.8)	76.0 (34.5)	43.0 (19.5)	46.0 (1168.4)	42.75 (1085.9)	32	1.625 (41.28)				

- Notes:
1. PTFE liner extends to bottom of bolt holes.
  2. The degree of angular movement is based on the maximum rated extension.
  3. Torsional movement is expressed when the expansion joint is a neutral length.
  4. To determine "end thrust", multiply thrust factor by operating pressure of system.
  5. Pressure rating is based on 194°F operating temperature. At higher temperature the pressure rating is slightly reduced.
  6. Weights are approximate.
  7. Control unit weight consists of one rod, four washers, three nuts and two control rod plates. Multiply number of control units needed for application (as specified in the Fluid Sealing Association Technical Handbook) to determine correct weights.
  8. Dimensions shown are in accordance with 125/150# standards of ANSI B-16.1, B-16.24, B-16.5; AWWA C-207 Table 1 and 2 Class D.

Proco™ Series 231/ET products are designed to absorb different movements concurrently.



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NATIONWIDE AND CANADA  
INTERNATIONAL

Warning: Expansion joints may operate in pipelines or equipment carrying fluids and/or gases at elevated temperatures and pressures. Normal precautions should be taken to make sure these parts are installed correctly and inspected regularly. Precautions should be taken to protect personnel in the event of leakage or splash. Note: Piping must be properly aligned and anchored to prevent damage to an expansion joint. Movement must not exceed specified ratings and control units are always recommended to prevent damage in the event other anchoring in the system fails. Properties applications shown throughout this data sheet are typical. This information does not constitute a warranty or representation and we assume no legal responsibility or obligation with respect thereto and the use to which such information may be put. Your specific application should not be undertaken without independent study and evaluation for suitability.