

PROCO

The Expansion Joint and Check Valve People



FLANGED RUBBER PIPE CONNECTORS SERIES 3000

Proco Series 300 Flanged Rubber Pipe Connectors

PROCO Series 300 Rubber Pipe is designed for tough demanding industrial and commercial applications as found in: **Chemical-Petrochemical and Industrial Process Piping Systems, Power Generating Plants, Steel Mills, Marine Services, Pulp/Paper Systems, Water-Waste/Water-Sewage and Pollution Control Systems.** Specific equipment applications could include: **Pumps, Cooling Towers, Compressors, Blowers, Fans, Absorption Machines, etc.** Installed next to mechanical equipment or between the anchor points of a piping system, specify the PROCO Series 300 to: **(1) Isolate Mechanical Vibration, (2) Reduce System Noise, (3) Absorb Pipe Movement/Stress, (4) Compensate Alignment/Offset, (5) Eliminate Electrolysis, (6) Protect Against Start-Up/Surge Forces.** When you need an engineered rubber solution to a piping system problem, call PROCO.

Engineered For Your Application. Each PROCO Series 300 Rubber Pipe is constructed with a smooth interior tube specially compounded from an elastomer that satisfies the Chemical-Abrasion-Sound requirements of your application (See Table 2). Multiple plies of tough fabric and helical spring steel wire are embedded into the pipe wall during the manufacturing process to provide a product designed for your pressure and vacuum requirements. Available styles include:

Style 310-R: Precision molded to specific lengths as listed in Table 3. The built-in rubber flanges are drilled to ANSI - 125/150#.

Style 310: Manufactured by conventional methods which allow for fabrication to a specific length requirement, in addition to lengths as shown in Table 3. Standard with 125/150# drilling, the Style 310 can also be fabricated to meet other drilling patterns.

Style 320: Designed for high pressure applications (See Table 4); this connector manufactured similar to Style 310. Flanges are usually drilled to ANSI 250/300# with other drilling patterns furnished on request.

Absorbs Pipe-Wall and Fluid-Borne Noise. The PROCO quiet-operating Series 300 is a replacement for "sound transmitting" metallic connectors. Compare the Acoustical Impedance ratings of rubber and other materials, as shown in Table 1. Pipe-Wall sound is absorbed as the noise carried by the piping both enters and leaves the rubber section.

Connector length further influences absorption as sound loses energy traveling axially through the rubber. For optimum lengths, see Table 3. Fluid-borne noise is absorbed by the volumetric expansion (breathing) of the connector. This action cushions water hammer, and smoothes out pumping impulses.

Isolate Vibrations and Motion. Vibration originating from mechanical equipment is absorbed by the PROCO Series 300. Rubber pipe connectors should be installed right after and ahead of the equipment generating the vibration, thus isolating the equipment. As most machinery vibrates in a radial direction from the main shaft, for optimum performance the pipe connector should be installed horizontally and parallel to this shaft. While PROCO Series 300 Rubber Pipe will accept some axial motion, it is principally designed to accept transverse motion. When installed at right angles to the direction of the pipe motion (movement), PROCO rubber pipe connectors can absorb large amounts of expansion.

For major two-plane vibration/motion it is best to use two flexible rubber pipe connectors installed at right angles, one to absorb the horizontal vibration and one to absorb the vertical vibration. A tension anchor is usually advisable to stabilize the elbow between the connectors. Note: For maximum vibration transmission reduction, the piping section beyond the rubber connector must be anchored or sufficiently rigid.

Prevents Electrolysis and Electrolytic Action. In chemical applications when metallic connectors are used, they are generally of a metal dissimilar from the pipe-line. This could create an electrolytic galvanic action that could be destructive to the connector, equipment or piping system. The use of the PROCO Series 300 eliminates this potential hazard. Additionally, because the all-rubber connector eliminates metal-to-metal contact at the flange face, electrolysis is stopped.

Systems Misalignment Compensation. In a rigid piping system, the installation of the PROCO Series 300 Rubber Pipe adds a flexible component that is automatically selfcorrecting for misalignment created by structural movements caused by settling, expansion or ground shifts (See Table 3).

Chemical Or Abrasive Service Capability At Minimal Cost: Expensive, exotic metal connectors for chemical service can be replaced with the PROCO Series 300. Fabricated with low cost chemical resistant elastomer such as: Chlorobutyl, EPDM, Gum, CSM, Neoprene and Nitrile; insures a rubber connector compatible with the fluid being pumped or piped (See Table 1). Our Gum or Neoprene products should be specified when handling abrasive slurries. Use PROCO "Chemical to Elastomer Guide" to specify an elastomer for your requirements.



**Protecting Piping & Equipment
Systems From Stress/Motion**



Series 300 Performance Data

Table 1: Comparison of Material Acoustical Impedances

Material	Sound Velocity In. / Sec.	Density Lbs./In. ³	Acoustical Impedance Lbs. / In. ² Sec.	Relative Impedance
Steel	206,500	.283	58,440	551.3
Copper	140,400	.320	44,930	423.9
Cast Iron	148,800	.260	38,690	365.0
Lead	49,800	.411	20,470	193.1
Glass	216,000	.094	20,300	191.5
Concrete	198,000	.072	14,260	134.5
Water	56,400	.036	2,030	19.2
Pine	132,000	.0145	1,910	18.0
Cork	19,200	.0086	165	1.6
Rubber	2,400	.0442	106	1.0

NOTES: Acoustical impedance is defined as the product of material density times velocity of sound in that material. In acoustical systems low impedance corresponds to low sound transmission.
Relative impedance is based on Rubber = 1.0

Table 2: Available Styles and Materials

For Specific Elastomer Recommendations, See: **PROCO™ "Chemical To Elastomer Guide"**

310	310-R	320	PROCO Material Code	Cover Elastomer	Tube Elastomer	Maxi- mum Operating Temp °F	F.S.A. Material Class
*	*	*	BB	Chlorobutyl	Chlorobutyl	250°	Special II
*	*	*	BT	Chlorobutyl	Teflon®	250°	Special II
*	*	*	EE	EPDM	EPDM	250°	Special II
*	*	*	NR	Neoprene	Natural	180°	Std. I
*	*	*	NH	Neoprene	CSM	212°	Std. II
*	*	*	NN	Neoprene	Neoprene	225°	Std. II
*	*	*	NP	Neoprene	Nitrile	212°	Std. II

Product "cover" can be CSM coated on special order.
Style 310/NN meets ASTM, Class A. Type III and conforms to all USCG requirements.

NOTES: 1. Teflon is a registered trademark of the DuPont Company.
2. Products with Teflon® "tubes" are not recommended with vacuum service.

Reduce System Stress And Strain. Rigid attachment of piping to critical or mechanical equipment can produce excessive loading. Thermal or mechanically created strain-stress-shock are cushioned and absorbed with the installation of a flexible PROCO Series 300 Rubber Pipe.

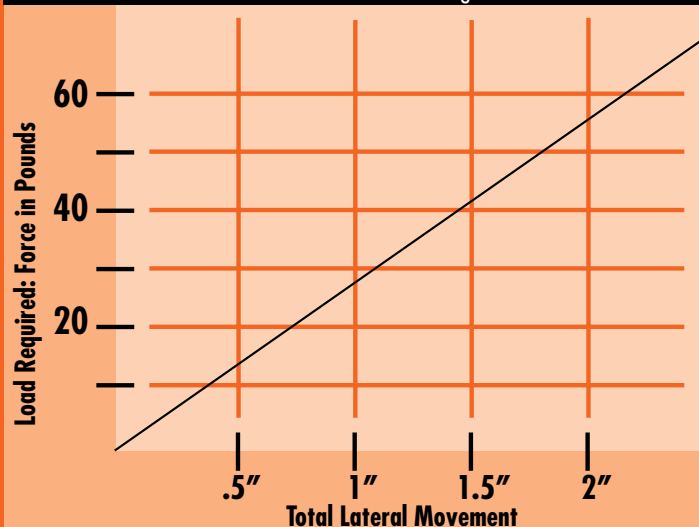
Full Flow With Less Turbulence Or Material Entrapment. The smooth bore of the PROCO Series 300 Rubber Pipe Connector allows full flow without turbulence. Metallic connectors depend upon bellows or convolutions to absorb motion. These bellows/ convolutions could create flow turbulence and also create an area for material entrapment or bacteria growth.

Leak Free Without Gaskets Or Packing. The full-face rubber flange of the PROCO Series 300 Rubber Pipe Connector is self gasketing. Additionally, the Style 310-R features a molded in place "O-Ring" on each flange-face for faster sealing with less torque at installation and less long-term maintenance. Unlike interlocked metallic connectors, the Series 300 features a onepiece seamless tube that does not require packing. Our rubber connector is suitable for all air, gas, and fluids, including "searching" thin fluids.

Control Rod Assembly Usage. PROCO Style 491 Control Units are designed to protect the Series 300 Pipe Connector from excessive elongation. Control rods must be used: (1) when the piping containing the rubber pipe connector is not anchored and, (2) when the rubber pipe connector is attached to resiliently supported pipe or equipment.

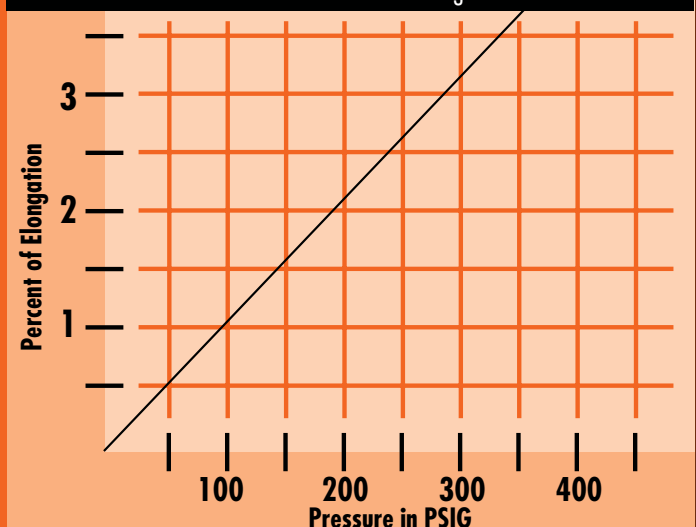
Force Required for Lateral Displacement

Based on: 2.5" I.D. x 18" Length Product



Pressure-Elongation Curve

Based on: 2.5" I.D. x 18" Length Product



Series 300 Performance Data continued

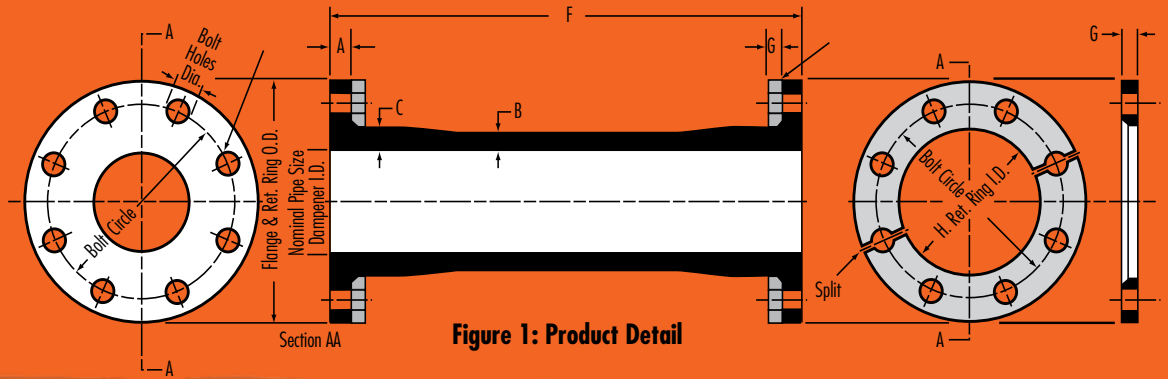


Figure 1: Product Detail

Table 3: Sizes • Movements • Flange Dimensions • Weights • Pressures

Nominal Pipe Size: Pipe I.D.	Neutral Length	Movement Capability From Neutral				125/150# Flange Dimensions				Rubber Pipe Dimensions		Approx. Weight (lbs)		Operating Pressures ³				
		In. of Axial Compression	In. of Axial Extension	± In. of Lateral Deflection	± In. of Angular Deflection	Flange O.D.	Bolt Circle	# of Holes	Size of Holes	"A" Flange Thickness	"B" Body Thickness	Style 310-R	Retaining Rings (set)	Style 310-R	Style 310	Style 320		
.75	12*	.158	.158	1.97	21.8°	3.875	2.750	4	0.625	0.591	0.472	2.4	1.5					
	18	.236	.236	2.96	31.0°												3.2	1.5
1	12*	.158	.158	1.77	17.7°	4.250	3.120	4	0.625	0.591	0.551	3.3	1.9					
	18	.236	.236	2.66	25.6°												4.2	1.9
1.25	12*	.158	.158	1.58	14.0°	4.625	3.500	4	0.625	0.591	0.551	4.0	2.4	300		300		
	18	.236	.236	2.36	20.6°												5.0	2.4
	24	.315	.315	3.15	26.6°												6.0	2.4
1.5	12*	.158	.158	1.39	11.3°	5.000	3.880	4	0.625	0.591	0.551	4.3	2.6					
	18	.236	.236	2.09	16.7°												5.4	2.6
	24	.315	.315	2.78	21.8°												6.5	2.6
2	12*	.158	.158	1.18	9.1°	6.000	4.750	4	0.750	0.591	0.551	5.6	2.6		250			
	18	.236	.236	1.77	13.5°												6.8	2.6
	24	.315	.315	2.36	17.7°												8.0	2.6
	30	.354	.354	2.96	19.8°												9.2	2.6
2.5	12*	.158	.158	.98	7.0°	7.000	5.500	4	0.750	0.591	0.551	6.9	5.3		200			
	18	.236	.236	1.48	10.5°												8.2	5.3
	24	.315	.315	1.97	13.8°												9.5	5.3
	30	.354	.354	2.46	15.5°												10.0	5.3
3	12*	.158	.158	.79	5.7°	7.500	6.000	4	0.750	0.591	0.551	8.6	5.6		150			
	18	.236	.236	1.18	8.5°												10.6	5.6
	24	.315	.315	1.58	11.3°												11.7	5.6
	30	.354	.354	1.97	12.7°												14.6	5.6
3.5	12	.158	.158	.59	5.1°	8.500	7.000	8	0.750	0.591	0.669	9.7	6.5					
	18*	.236	.236	.89	7.6°												12.2	6.5
	24	.315	.315	1.18	10.1°												14.7	6.5
	30	.354	.354	1.48	11.3°												17.2	6.5
4	12	.158	.158	.59	4.6°	9.000	7.500	8	0.750	0.591	0.669	10.9	7.3		175			
	18*	.236	.236	.89	6.8°												14.5	7.3
	24	.315	.315	1.18	9.1°												17.4	7.3
	30	.354	.354	1.48	10.2°												19.7	7.3
	36	.433	.433	1.77	12.4°												21.9	7.3
5	12	.158	.158	.45	3.7°	10.000	8.500	8	0.875	0.591	0.669	13.5	7.9					
	18*	.236	.236	.67	5.5°												16.6	7.9
	24	.315	.315	.89	7.3°												20.1	7.9
	30	.354	.354	1.12	8.2°												23.1	7.9
	36	.433	.433	1.34	10.0°	26.1	7.9											

Series 300 Performance Data continued

Table 3: Sizes • Movements • Flange Dimensions • Weights • Pressures

Nominal Pipe Size: Pipe I.D.	Neutral Length	Movement Capability From Neutral				125/150# Flange Dimensions				Rubber Pipe Dimensions		Approx. Weight (lbs)		Operating Pressures ³		
		In. of Axial Compression	In. of Axial Extension	± In. of Lateral Deflection	± In. of Angular Deflection	Flange O.D.	Bolt Circle	# of Holes	Size of Holes	"A" Flange Thickness	"B" Body Thickness	Style 310-R	Retaining Rings (set)	Style 310-R	Style 310	Style 320
6	12	.158	.158	.45	3.1°	11.000	9.500	8	0.875	0.591	0.709	18.9	9.1			
	18	.236	.236	.67	4.6°							19.9	9.1			
	24*	.315	.315	.89	6.1°							24.1	9.1			
	30	.354	.354	1.12	6.8°							27.2	9.1			
	36	.433	.433	1.34	8.3°							31.5	9.1			
	48	.472	.472	1.55	9.9°							39.0	9.1			
8	12	.118	.118	.35	1.7°	13.500	11.750	8	0.875	0.591	0.787	23.4	14.0	150	150	250
	18	.158	.158	.53	2.3°							29.4	14.0			
	24*	.236	.236	.71	3.4°							35.7	14.0			
	30	.276	.276	.89	4.0°							40.2	14.0			
	36	.354	.354	1.06	5.1°							47.4	14.0			
	48	.472	.472	1.42	6.8°							59.4	14.0			
10	12	.118	.118	.32	1.4°	16.000	14.250	12	1.000	0.787	0.866	26.0	17.0			
	18	.158	.158	.47	1.8°							37.0	17.0			
	24*	.236	.236	.63	2.7°							48.7	17.0			
	30	.276	.276	.79	3.2°							59.0	17.0			
	36	.354	.354	.95	4.1°							70.0	17.0			
	48	.472	.472	1.26	5.5°							92.0	17.0			
12	12	.118	.118	.24	1.1°	19.000	17.000	12	1.000	0.787	0.984	36.0	24.1			
	18	.158	.158	.36	1.5°							51.0	24.1			
	24*	.236	.236	.47	2.3°							66.5	24.1			
	30	.276	.276	.59	2.7°							81.0	24.1			
	36	.354	.354	.71	3.4°							96.0	24.1			
	48	.472	.472	.95	4.2°							126.0	24.1			
14	12	.118	.118	.24	1.0°	21.000	18.750	12	1.125	0.787	0.984	58.0	26.8	125*	125	200
	18	.158	.158	.36	1.3°							83.0	26.8			
	24*	.236	.236	.47	2.0°							108.0	26.8			
	30	.276	.276	.59	2.3°							133.0	26.8			
	36	.354	.354	.71	2.9°							157.0	26.8			
	48	.472	.472	.95	3.9°							208.0	26.8			
16	12	.118	.118	.24	0.7°	23.500	21.250	16	1.125	0.787	0.984	83.0	32.1			
	18	.158	.158	.36	1.3°							118.0	32.1			
	24*	.236	.236	.47	1.7°							153.0	32.1			
	36	.354	.354	.71	2.6°							233.0	32.1			
	48	.472	.472	.95	3.4°							294.0	32.1			
	18	12	.112	.112	.18							0.9°	25.000			
18		.118	.118	.24	1.2°	157.5	34.6									
24*		.236	.236	.24	1.5°	205.0	34.6									
36		.354	.354	.36	2.3°	300.0	34.6									
48		.472	.472	.48	3.1°	394.0	34.6									
20		24*	.236	.236	.24	1.4°	27.500	25.000	20	1.250	1.000	1.000		270.0	35.9	
	36	.354	.354	.36	2.1°	394.0							35.9			
	48	.472	.472	.48	2.7°	519.0							35.9			

NOTES:*1. For optimum noise and vibration absorption, use this or longer length

2. The degree of angular movement is based on the maximum rated extension.

3. Pressure rating is based on 170°F. operating temperature. Vacuum rating is 26" Hg in all cases except where * appears.

Larger I.D. or length sizes are available upon special request. Contact PROCO

Rubber Expansion Joint Specification Form

Company Name: _____

Mailing Address: _____

City: _____

State: _____

Zip/Postal Code: _____

Contact Person: _____

E-Mail Address: _____

Telephone: _____

SIZE

Pipe Size of Application (Inches)

Nominal pipe size (I.D.)

Installed Length (Inches)

Dimension between mating flanges.

Also known as: Flange-to-flange, OAL or Takeout.

FLOWING MEDIUM

Flowing Medium

Indicate fluid being piped. Refer to our "Chemical/Rubber Guide" for elastomer compatibility.

Type of Medium

Indicate if liquid, gas, slurry, solids, etc.

Temperature of Flowing Medium (F)

Indicate both operating and maximum temperatures at the expansion joint

Op. _____

Max. _____

Note: See Table: "Comparative Properties of Typical Proco Products, Inc. Elastomers"

PRESSURES

Operating Pressure of the System

Actual pressure in which system works in normal conditions (use PSIG and Hg)

+

-

Design Pressure of the System

Highest/most severe pressure expected during operation (use PSIG and Hg)

+

-

Surge Pressure of the System

Increased pressure due to pump starts, valve closings, etc. (use PSIG and Hg)

+

-

Test Pressure of the System

Hydrostatic test used to demonstrate system capability (use PSIG and Hg)

+

-

Type of Pressure

Constant, intermittent, shock, pulsating, etc.

MOVEMENTS

Axial Compression

In inches as a result of pipe extension-expansion

Actual Extension

In inches as a result of pipe contraction

Lateral Deflection at Joint

In inches

Angular Movement at Joint

In degrees

Torsional Movement at Joint

In degrees

MISCELLANEOUS

Pipe Flange Drilling

Indicate specific standard such as: ANSI, DIN, JIS, B5, Navy.

If special, provide: Flange O.D., Bolt Circle, Number & Size of Holes

Mating Pipe Flange Thickness

In inches

Location of Joint Installation

Indoors or outdoors

Retaining Rings

Are required on all installations. Reusable, they need not be ordered with replacement or spare expansion points

Yes

No

Control Unit Assemblies

Are recommended for use in all expansion joint applications.

Control units must be used when piping support or anchoring is insufficient

Yes

No

Hydrostatic Test of Joint Required by

Manufacturer of Product

Yes

No

Quantity Required

REPRESENTED BY:



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