



Reliable Engineered Diaphragm Solutions





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About RPP

Engineered solutions and service are at the heart of our business

RPP works closely with our customer partners to develop solutions that set the bar for the industry



RPP is a world-class manufacturer of custom, fabric-reinforced elastomeric diaphragm seals and other highly-engineered, molded rubber products. RPP specializes in hard-to-make products, such as rolling “Top Hat,” convoluted, and double-acting diaphragms. With compression molding presses capable of exerting over 1,000 tons of pressure, RPP produces some of the largest diaphragms in the industry, with sizes up to 46 inches (1.168 meters) in diameter.

To ensure materials always meet customer requirements, RPP utilizes a variety of standard and custom elastomers, such as nitrile, silicone, EPDM, AFLAS®, Polyurethane, and Viton®, and various fabrics including Polyamide (Nylon®), Polyester (Dacron®), Vectran®, and Nomex®.

Supplying industrial users around the globe since 1963, RPP is committed to providing unique and cost-effective solutions for all application requirements. With 45,000 square feet of space, RPP has the capacity, equipment, and talent to take your project from engineering concept to production deliveries.

The RPP technical team has more than 200 years of combined industry experience and can offer solutions to your most challenging in-field demands. From design assistance to tooling fabrication, materials development, and inventory management, RPP is here to help you develop high-performing, robust products to tight tolerances and within short lead times.

Why settle for an off-the-shelf, catalog seal when a custom diaphragm seal from RPP can give you a competitive advantage? Contact us today to learn how RPP can help solve your current technical problems or work with you to develop next-generation products.



With customers in over 30 countries on six continents, RPP has the experience and know-how to provide technical support and quality products to all parts of the globe.

RPP Europe is RPP's distribution and technical support operation, serving customers located in Europe, the Middle East, and Africa.



Solutions

Supplying industrial users since 1963

RPP fabric-reinforced diaphragm seals are used in a wide range of industrial and scientific equipment

Our OEM customers provide products to any industry where the flow of liquids or gases must be controlled with zero friction and/or leakage. Our primary markets include Process Control, LP and Natural Gas Regulation, Water Management, and Medical/Industrial Systems.



Oil & Gas

RPP has years of experience in the design and manufacture of diaphragms for upstream, mid-stream and downstream Oil & Gas applications



Water Management

Our combination of design experience and materials development provides customers with unparalleled reliability in demanding Water Management applications



Industrial

If you have a need to convert pressure to force, RPP has a solution for you. With over 50 years of experience, there is rarely an application that we have not come across



Commercial / Residential Irrigation

Take irrigation seriously? RPP has specially formulated elastomers to meet your needs and experience in the field to make sure your lawn is ready for summer or the next golf classic



AODD Pumps

RPP manufactures diaphragms designed for high cycle applications, with bonded PTFE and component integration, our diaphragms will keep going when others quit



Pneumatic Brakes

We don't stop short on our diaphragm's capabilities. All our diaphragms are designed with a safety factor of 4x or greater, so you'll be sure that our solutions will go the extra mile



Medical

Our diaphragms are the trusted source for medical applications, with high reliability, sensitivity & responsiveness



Power

RPP is a leading provider of diaphragms for critical power applications, with some of the largest size diaphragms in the industry



Food & Beverage

RPP has several FDA compliant materials to choose from for your Food & Beverage processing needs



Automotive

Demanding applications require a reliable diaphragm seal

Services

Over 200 years of combined industry experience

Our technical team can offer solutions to your most challenging applications

From design assistance, to tooling fabrication, materials development, and inventory management, RPP can help customers develop high-performance, robust products to tight tolerances within short lead times.

Diaphragm & Hardware Design Assistance

RPP's technical team has decades of experience assisting customers with custom product designs focused on performance, quality, manufacturability, and cost. From customer requirements, to diaphragm design and design validation, RPP can help customers develop the best products while avoiding costly mistakes. RPP continually reviews mold design techniques and raw material availability to ensure we take advantage of technological advancements and new material capabilities.

Standard & Customized Elastomers & Fabrics

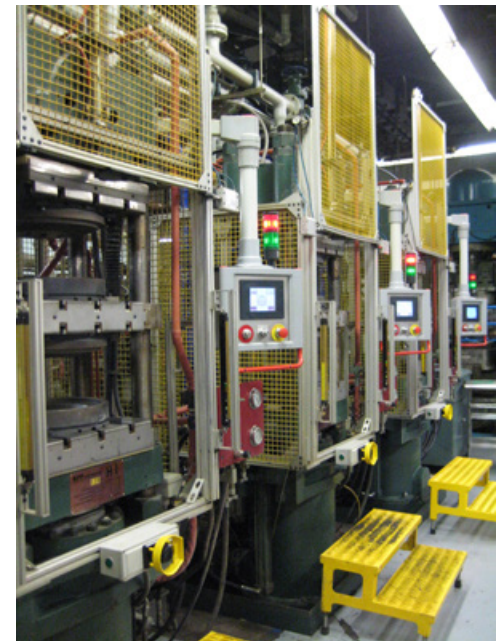
RPP uses a wide variety of standard and proprietary elastomers and fabrics. We regularly produce products utilizing

challenging compounds such as EPDM, Viton®, AFLAS®, FFKM, Saturated Nitrile (HNBR), and Silicone, and fabrics like Polyamide (Nylon®), Polyester (Dacron®), and high-temperature/high-strength fabrics, such as Nomex® and Vectran®. Our materials group has ongoing projects to improve compound and fabrics as well as identify alternative sources for high quality, cost-competitive raw materials. If an existing elastomer or fabric is not sufficient, RPP will work with you and our suppliers on developing a unique solution to meet your requirement.

Tool Design & Fabrication

RPP fabricates molds and tools in its fully-equipped machine shop. This enables RPP to provide short lead times for your critical applications. We control the process from design concept through mold fabrication, ensuring quick turnaround and quality design. This is just one of the valuable resources our creative technical team uses to provide customer solutions quickly and in a cost-effective manner.

RPP utilizes its broad range of molding presses to produce diaphragms from less than 1 inch (12mm) up to 46 inches (1168mm) in diameter. With 100 molding presses, RPP can handle annual quantity requirements that run anywhere from single digits to millions of parts per year.



Product Design to Delivery

Customer Requirements

Inquiries are reviewed by RPP engineering to determine each customer's specific requirements. With a thorough understanding of the key operating parameters, RPP will recommend an appropriate elastomer/fabric combination along with diaphragm dimensional specifications.

Diaphragm Design

The design of a diaphragm is critical to its performance and life cycle. Customers often rely on RPP's assistance to come up with high-performance, cost-effective diaphragm designs.

Tooling Design

Compression molds and trim dies can be fabricated once the diaphragm design is finalized. In addition to the diaphragm shape, the elastomer and fabric properties impact the mold design. The fabrication of single or multiple cavity molds is dependent on annual quantity requirements.

Design Verification

Molds are checked for dimensional accuracy using a simulated elastomeric cold rubber test. This ensures the molded part can be produced as specified with an optimally designed mold.



Capabilities

Diaphragm Design and Consultation

Working with our customers and suppliers to develop technologically advanced, cost effective solutions to customer problems through our closed-loop design process.

Starting with customer requirements, we learn and understand our customer's most challenging needs so we can provide the optimum solutions and products to fit the bill. We translate these needs into the design of the diaphragm, from material selection to diaphragm geometry – we custom engineer each product to industry leading standards to ensure reliability and performance in application. Working together with our customers to validate designs in application ensures that all customer criteria are met and fully satisfied, closing the design loop.

Material Development

RPP material specialists work closely with our synthetic rubber compounders to develop custom materials to meet specific customer needs. The elastomer layer must be extremely thin (for maximum flexibility), very tough (to withstand repeated flexing over a long lifetime), able to handle anticipated operating temperatures, and resistant to media such as chemicals, fluids, or gases it may be contacting.

RPP has developed varieties of fabric designed to meet specific operating conditions. The fabric used in molded diaphragms employs a specially-developed weave pattern with a unique property. In one direction, it stretches easily, allowing for radial flexing of the diaphragm convolution. In the other (axial) direction, it provides high resistance to elongation and furnishes the tensile strength that enables the seal to withstand high differential pressures and transmit force to the piston head.

Large Diaphragms

RPP specializes in very large custom diaphragms. Utilizing some of the largest compression molding presses available in the industry, we can manufacture diaphragms up to 46 inches/1.168 meters in diameter and up to 15 inches/381mm tall (assuming a 1:1 bore to height ratio). Our raw material preparation equipment, large format compression molding presses, and knowledge of elastomers and fabrics give RPP the ability to manufacture large, high quality, fabric-reinforced, single- or double-coated diaphragms that very few companies have the capability to provide.



RPP can manufacture diaphragms up to 46 inches (1.168 meters) in diameter and up to 15 inches (381 mm) tall.

Material Procurement

RPP procures raw materials from a select number of approved suppliers. Elastomer suppliers mix compounds to specific recipes. Textile mills produce fabrics with predetermined weave, knit, and finishing characteristics. This stable procurement process results in a consistent raw material delivery to RPP and consistent end product performance to our customers.



Process Development and Design Validation

Experienced technicians are assigned the task of developing a robust and repeatable manufacturing process that includes elastomer volumes, cure times, and press tonnage and temperatures. The end result is a sample lot that the customer uses for mold and part approval, as well as cycle testing.



Diaphragms for the Nuclear Power Industry

RPP is a premier supplier of diaphragm seals for control valves for the power generation industry. RPP manufactures some of its largest diaphragms for the nuclear power industry in accordance with 10CFR50 Appendix B regulations. RPP employees are specially trained in the production, quality, and record-keeping requirements for nuclear products. RPP's 10 CFR 50 Appendix B Certified Material Option is a comprehensive program of testing and documented processes related to the tested physical characteristics of commercial grade material used in "safety related applications." An accredited testing lab verifies that raw materials meet specific critical characteristics. By choosing our Certified Material Option, customers can avoid the time associated with conducting outside testing of "safety related materials" and the cost of purchasing ASTM D412 slabs.

Reverse Engineering

Having trouble finding a replacement diaphragm for an obsolete actuator valve or pump? RPP can help. By reverse engineering your legacy diaphragm, we can provide a new diaphragm that, in most cases, will be better than the original at a fraction of the cost to replace an entire hardware assembly.

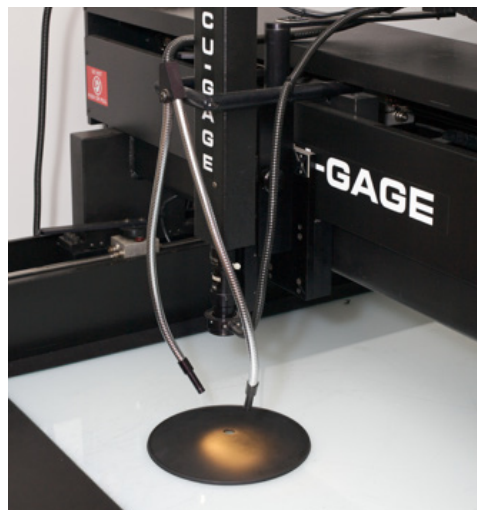
Superior Quality

RPP is committed to exceeding customer expectations for quality, delivery, and technical support. We build quality into the product at every step by following Design for Manufacturability concepts throughout the process. RPP has been ISO-certified since 1997. We were one of the first companies in the industry to embrace the ISO standard, and are currently certified to ISO 9001.



Production Verification

At the start of each production run, a first article verification is completed to ensure that the specific process will produce diaphragms that meet customer specifications. In-process inspections are conducted to verify the process remains in control. Final inspection is used as a last step to ensure customers only receive top quality products.



Product Delivery

RPP is committed to short lead times and on-time delivery. When annual quantity requirements justify the need, RPP will produce products according to customer forecasts and establish inventory stocking programs. This approach allows customers to maintain lower inventory levels while being able to respond to sales opportunities.

Introduction to Diaphragm Seals

Converting fluid or gas pressure into force or motion

Hydraulic and pneumatic systems that do this invariably use some form of dynamic seal

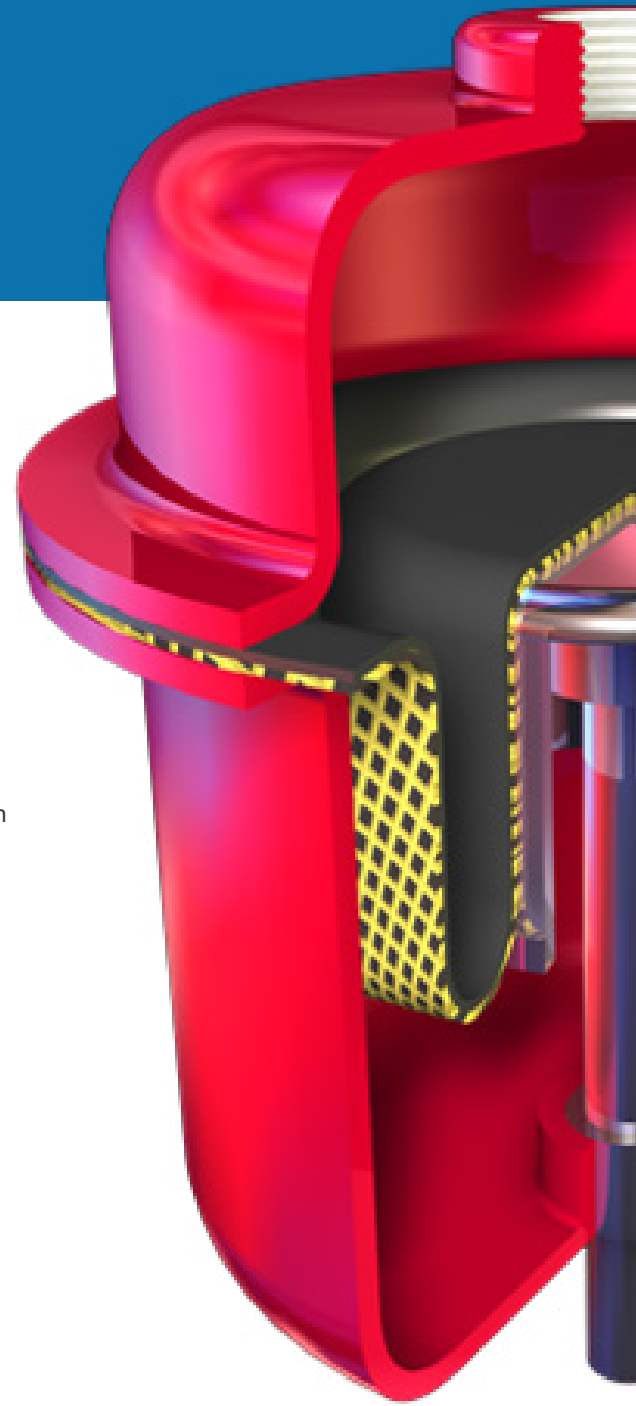
The energy conversion in such systems is usually accomplished by a cylinder—an enclosed, stationary barrel containing a movable piston. Liquid or gas introduced under pressure into the cylinder exerts force on the piston head, creating motion that can pull, push, position, open, close, or regulate a mechanical device or assembly.

To keep the pressurized fluid from leaking past the moving piston, a dynamic (motion-tolerant) seal of some kind is required. Several types of dynamic seals are commonly used, with the selection depending on the specific requirements of the application.

Fabric-reinforced molded diaphragms are flexible, circular seals, molded under high temperatures and pressures, with concentric 3D contours. The contours flex to permit axial motion of the central area with respect to the outer circumference.

Reinforced diaphragms are produced from tough, flexible elastomer (which serves as a fluid barrier), bonded to one or both sides of a high-tensile-strength fabric that supplies the mechanical reinforcement needed to withstand high pressures. They are widely used instead of interference seals and flat diaphragms wherever a relatively long piston stroke is needed, and where dynamic and breakaway friction would adversely affect the speed, accuracy, or repeatability of an operation, and/or where blow-by leakage cannot be tolerated.

Fabric-reinforced molded diaphragms often provide the best possible solution to a sealing problem—and frequently, they are the only solution. They are widely used whenever accurate, reliable response to hydraulic or pneumatic pressure changes is needed.



Pressure Regulators

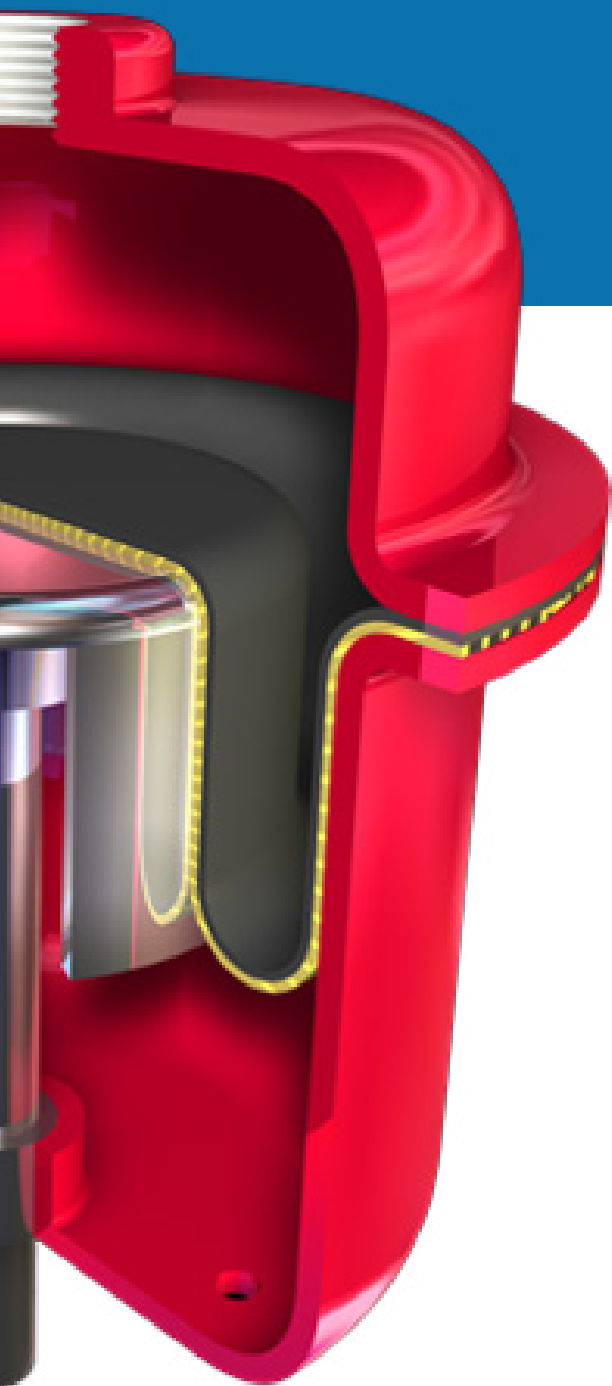
The diaphragm is part of a force/balance system and senses deviation from the desired set point, which in turn, allows pressure to build up or vent down until the set point is once again attained. RPP diaphragms are used in air, water, and propane regulators, natural gas house service regulators, back-flow prevention, medical respirators and relays.



Pumps

Diaphragms are used in double-acting pumps to move slurries and other difficult materials without abrasion or leakage. Diaphragms are commonly used in bilge (marine) pumps and as a mechanical seal for pump controls.





RPP diaphragms are routinely used in diverse applications, such as process control equipment, water management, gas regulation, precision medical equipment and in industrial systems such as pumps, tensioning devices, vibration apparatus, and metering devices. Since they can be custom designed quickly and inexpensively to meet a wide variety of conditions and requirements, RPP diaphragms frequently represent invaluable solutions to equipment design problems.

Molded diaphragms are composed of tough, flexible, carefully-engineered laminates. In general, the laminates are made out of elastomer and fabric. Metal or plastic inserts are sometimes molded in to serve as a piston or rigid backing for a valve seat. A layer of PTFE may also be molded on to improve resistance to harsh chemicals and abrasives.

The elastomer is one or two pressure-tight layers of tough elastomeric material, or synthetic rubber, selected or specially compounded for long life under a specific set of operating conditions, including fluid type and temperature. Depending on the application, the elastomer is bonded to one or both sides of a fabric base. The fabric is a high-tensile-strength base layer of highly-engineered, woven fabric, designed to withstand the stresses induced by high pressures. Medium-tensile-strength base fabrics are also available that have been specially designed for ultimate sensitivity and low hysteresis.



Air Brakes

Diaphragms allow the use of inexpensive hardware design, yet provide high reliability in the process of converting air pressure to braking force. RPP manufactures diaphragms for large vehicle and train braking systems, as well as force transducers.



Dispensing and Metering

The accurate, repeatable mechanical motion of a diaphragm is frequently used in dispensing very precise volumes of various liquids.



Diaphragm Seal Selection

Specifying the right molded diaphragm

Selecting the diaphragm that will perform best in a particular application can be a complex task

A surprising number of parameters and physical considerations are involved when specifying a diaphragm, and a successful design often depends on a complex multi-variable optimization relying on the experience and understanding of the designer rather than a straightforward, step-by-step engineering method. As a result, it is usually preferable and more cost effective to custom-design the seal to fit the job rather than to attempt to use a standard, off-the-shelf product. Nevertheless, certain guidelines can be used in selecting the general type, configuration, and, in some cases, the materials best suited to a proposed diaphragm seal.

The typical molded diaphragm will fall into one of four categories:

- Rolling “Top Hat”
- Convoluted
- Offset-Convoluted
- Double-Acting

Rolling diaphragms are used when a constant effective area is needed in an application with a high stroke or diameter ratio. Convoluted diaphragms offer maximum cycle life and are pre-molded into the installed shape for ease of installation. An offset-convoluted diaphragm is the choice for longer stroke lengths and ease of installation. Actuating pressure can be applied from both directions in double-acting diaphragms, which are usually double-coated to withstand harsh media.

Design Considerations

Selection of the overall form of the diaphragm is generally determined by the need to conform to existing or planned hardware and/or special considerations imposed by the mechanical operation to be performed. Such considerations include:

1. Operating Temperature:

The temperature extremes anticipated in an application play a major role in the selection of both the elastomer and fabric.

2. Operating Media

The chemical and physical nature of the fluid/s and gases, which will be contacting the diaphragm naturally, plays a key role in the anticipated service life of the diaphragm. Care in the selection of the elastomer is needed to provide maximum resistance to corrosive or harsh media.

Pressure Switches

The diaphragm is used to effect the mechanical opening and closing of an electrical contact in response to an input pressure signal. Typical applications include instrumentation and HVAC systems.



Flow Meters

Requiring very little energy to move, and with a constant displacement, diaphragms are used to measure gas flow in terms of volume.



3. Power Stroke Direction:

Unidirectional or bi-directional, i.e. Is actuating pressure applied from one side or alternately from both sides of the piston? Double-coated, double-acting diaphragms are used in bi-directional applications, while single-coated, single-acting diaphragms are used in applications where pressure is applied on only one side.

4. Stroke Requirement:

The diaphragm height relates to the overall height and diameter of the piston and the convolution height and width. The piston travel on each side of the clamping flange determines the height of the diaphragm. If the projected piston motion is relatively long, a rolling diaphragm is generally required. For shorter stroke lengths, offset or planar types can be used.

5. Operating Pressure:

It is the base layer of fabric that enables the diaphragm to withstand the stresses imposed by the actuating pressure. The anticipated maximum differential pressure, therefore, will



determine the type and strength of the fabric to be used. In addition, if back pressure is developed at the bottom of the piston stroke (i.e., if the cylinder is not vented), this will affect the type of coating specified.

6. Flange Type:

Beaded flanges allow for quick, easy installation, while flat flanges provide higher pressure capabilities and require less expensive hardware.

7. Effective Area:

The effective area or diameter is the center line between the cylinder bore and the piston diameter. It represents the pressurized area of the diaphragm. If an application requires a constant actuating pressure across the total piston stroke, a rolling diaphragm is required since it is the only configuration providing a constant effective area throughout the stroke cycle.

Pneumatic Positioning

With their constant effective area and quick, accurate response to slight pressure changes, diaphragms are frequently used to position devices precisely in response to minute changes in signal pressure. A typical use for these diaphragms is in air cylinders.



Valves and Valve Actuators

As a valve seat, the diaphragm controls the flow of liquids in water management, irrigation, blowout prevention and slurry systems. In an actuator application, the diaphragm reacts to small changes in system control pressure to open or close a process control valve used for maintaining temperature or pressure.



Diaphragm Materials

Elastomer

The elastomer layer must be extremely thin to maintain maximum flexibility, very tough to withstand repetitive flexing over a long lifetime, able to handle anticipated operating temperatures, and chemically resistant to the media present.

With a variety of standard elastomers available, RPP typically has a material ready to meet the application requirements. However, if the application has unique requirements, RPP's materials engineering team is able to develop a specialized

elastomer to meet the application requirements by working closely with our suppliers and the customer to engineer the best possible solution.

Typical Elastomer Offerings

General Elastomers	Available Durometers	Typical Operating Temperature Range
Nitrile (NBR)	40 to 80	-40°F (-40°C) to 210°F (100°C)
Ethylene Propylene (EPDM)	45 to 75	-40°F (-40°C) to 300°F (150°C)
Fluorocarbon (FKM) (Viton®)	60 to 65	10°F (-12°C) to 530°F (275°C)
Silicone (SI)	45 to 55	-65°F (-55°C) to 550°F (300°C)
Fluorosilicone (FSI)	60	-40°F (-40°C) to 450°F (230°C)
Polychloroprene (CR) (Neoprene®)	40 to 70	-50°F (-45°C) to 275°F (135°C)

Specialty Elastomers	Available Durometers	Typical Operating Temperature Range	Special Characteristics
AFLAS	65	-10°F (-23°C) to 400°F (205°C)	Improved chemical resistance
Nitrile (NBR)	40 to 60	-40°F (-40°C) to 300°F (150°C)* -40°F (-40°C) to 210°F (100°C)	EN 549 compliant and FDA and low-temperature* grades available
Ethylene Propylene (EPDM)	65 to 75	-40°F (-40°C) to 300°F (150°C)	NSF, ASSE, and FDA grades available
Hydrogenated Nitrile (HNBR/HSN)	70	-40°F (-40°C) to 320°F (160°C)	Improved oil & gas temperature resistance



Fabric

The fabric used in molded diaphragms is a highly-engineered, industrial textile with a unique property. When formed in the diaphragm, it stretches easily in the radial direction, allowing for flexing of the diaphragm convolution in the axial direction.

It provides high resistance to elongation and furnishes the tensile strength that enables the seal to withstand high differential pressures and transmit force to the piston head. A variety of diaphragm fabrics, woven specially for RPP, are available.

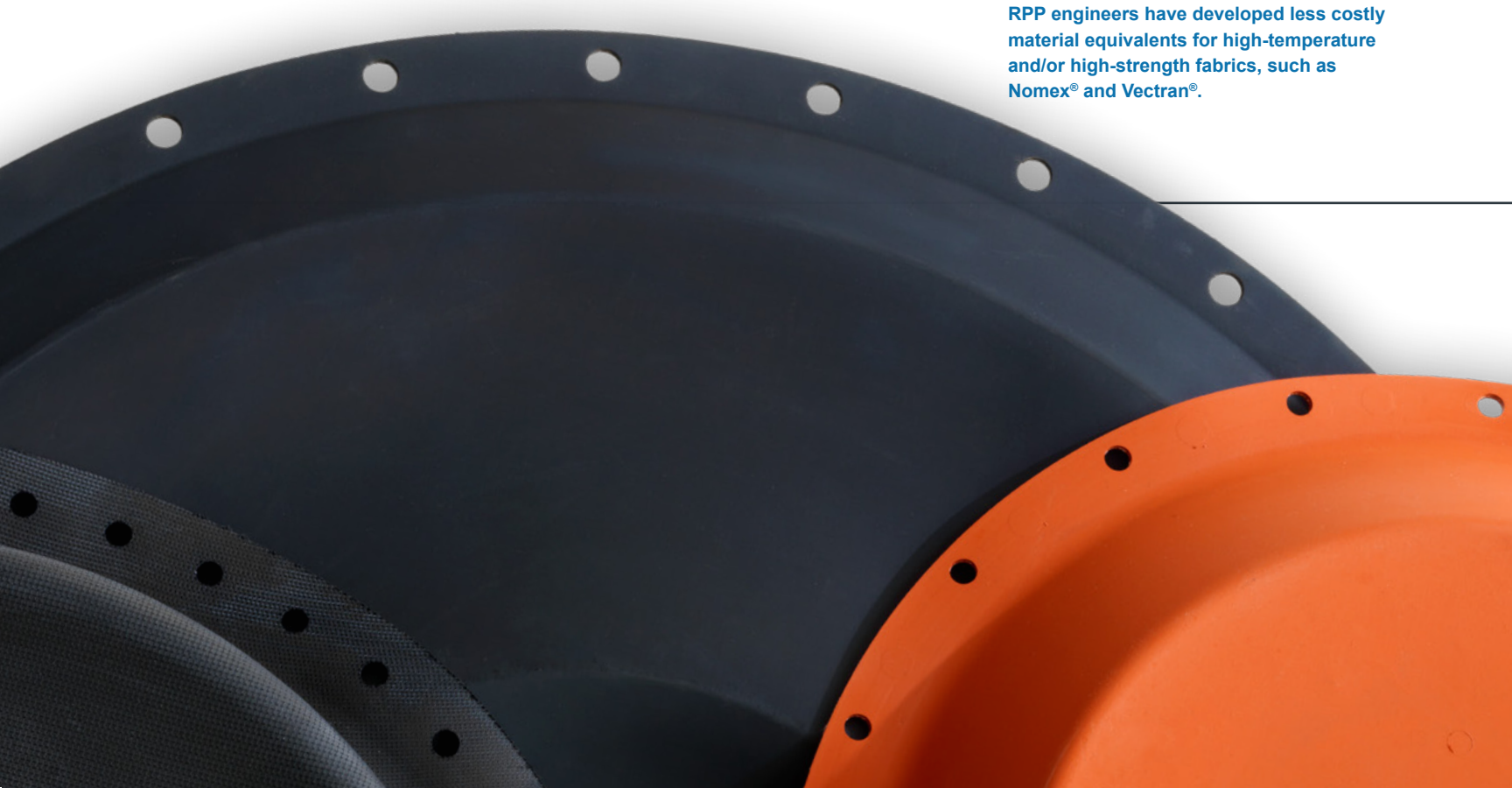
RPP has developed over 20 unique varieties of fabric designed to meet specific operating conditions. Special, low-cost, knit versions are also available for more sensitive applications with high volume and low hysteresis.

Typical Diaphragm Fabrics

General Fabrics	Available Strengths	Maximum Operating Temperature
Polyester (Dacron®) Knit	~ 90 psi	325°F (163°C)
Polyester (Dacron®) Woven	150-800 psi	325°F (163°C)
Polyamide (Nylon®)	100-700 psi	300°F (149°C)

Specialty Fabrics	Available Strengths	Maximum Operating Temperature	Special Characteristics
Nomex®	150-1000 psi	450°F (232°C)	High temperature resistance; high strength
Vectran®	3000 psi	Extra High Temperature	Ultra high temperature
Polyamide (Nylon®) (Ballistic)	1200 psi	300°F (149°C)	High strength
Polyamide (Nylon®) (Wick Resistance)	700 psi	300°F (149°C)	Wick resistance

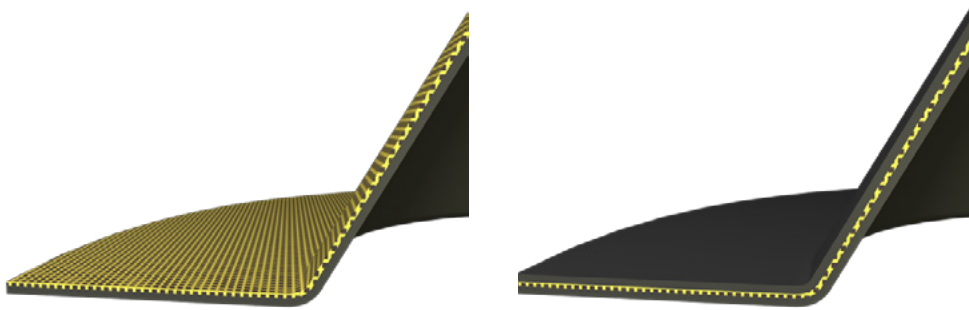
RPP engineers have developed less costly material equivalents for high-temperature and/or high-strength fabrics, such as Nomex® and Vectran®.



Design Considerations

Elastomer/Fabric Laminate

Factors to consider include pressure, temperature, media, cycle life, and sensitivity

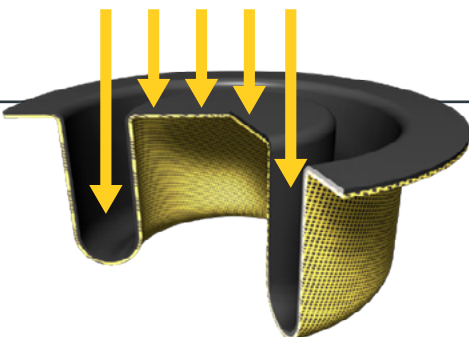


Single-Coat Construction

For use in single-acting cylinders where pressure is applied in one direction. A single layer of elastomer is bonded to one side of the base fabric. This construction is generally employed in long-stroke diaphragms.

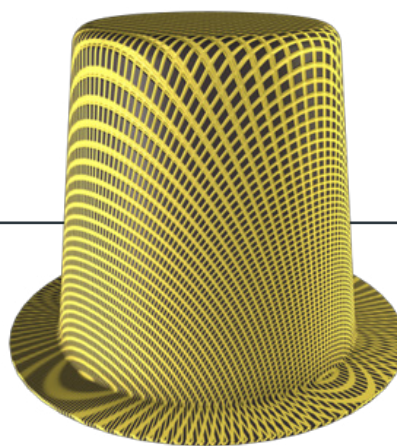
Double-Coat Construction

Used for double-acting cylinders where pressure is applied alternately in each direction, or where extra durability is required for longer life or abrasive media and the stroke/diameter ratio is not excessively large. The elastomer is bonded to both sides of the base fabric.



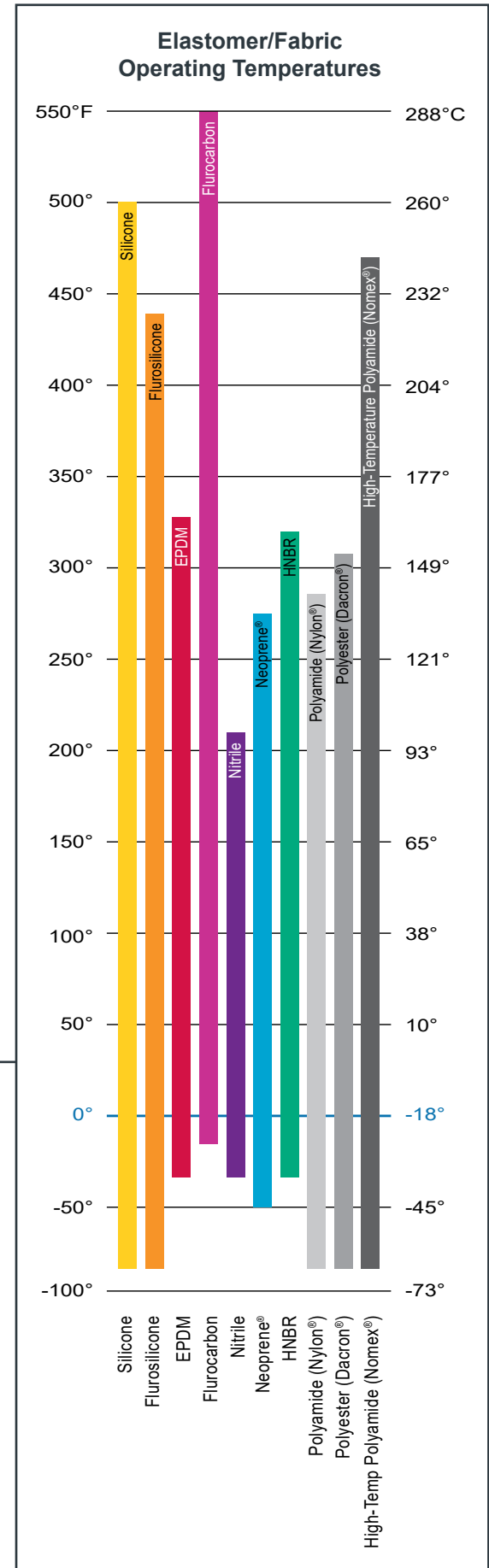
Operating pressure requirements drive fabric choice.

Fabric acts as the “muscle” in the diaphragm. High-pressure, demanding applications require a fabric that can withstand the forces being applied.



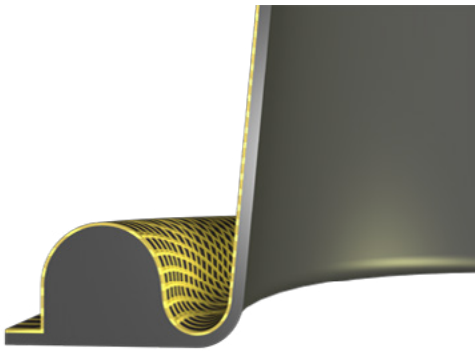
In the axial direction, fabric provides high resistance to elongation and furnishes the tensile strength that enables the seal to withstand high differential pressures.

In the radial direction, fabric stretches to allow a diaphragm to roll with a constant effective area.



Flange Design

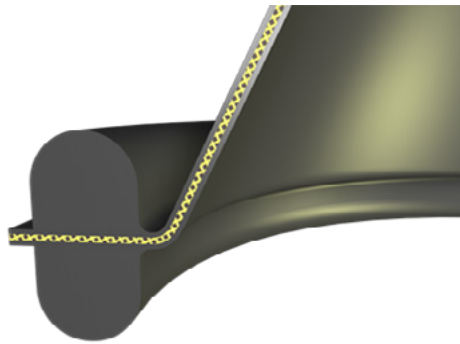
Flange retention design is a function of cost and application requirements



Beaded Flange

The bead simplifies assembly of the diaphragm to the hardware. The seal is enhanced by the bead, which spreads under pressure in a properly sized hardware groove.

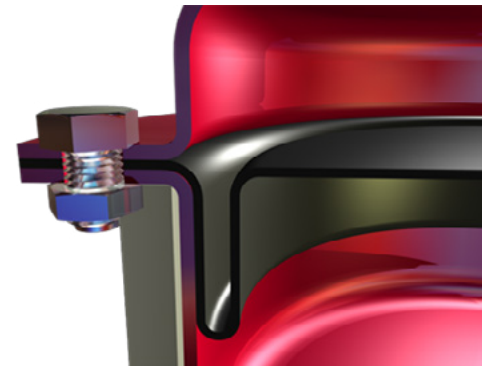
NOTE: Not recommended for applications over 150 psi.



Opposing Beaded Flange

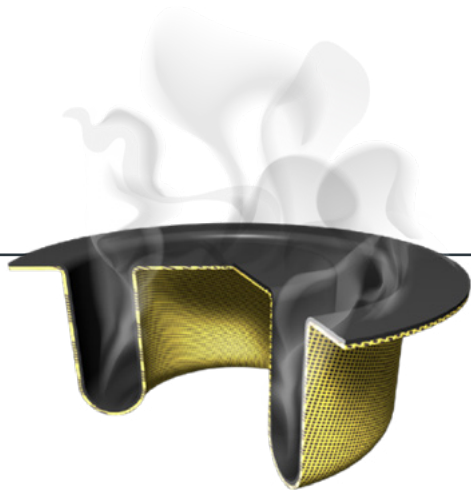
With double-coated applications, RPP can produce diaphragms with opposing beads and even offset-opposing beads where the top bead is not in alignment with the lower bead.

NOTE: Not recommended for applications over 150 psi.



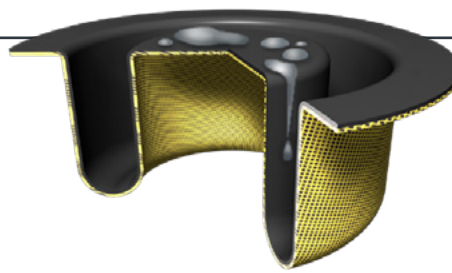
Flat Flange

Used for larger diaphragms and all high-pressure applications. Flat flange allows for less expensive hardware.



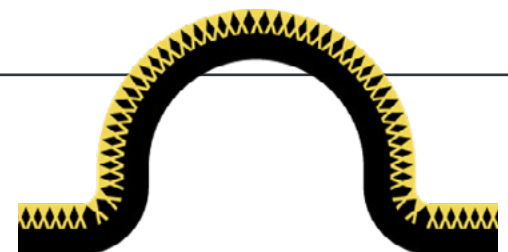
Operating temperature is a primary factor in fabric and elastomer selection.

Both the elastomer and fabric must be able to withstand the temperature requirements in application.



The elastomer and operating media must be compatible.

The elastomer creates a barrier for the seal, while the fabric acts as the "muscle". Choosing the right elastomer ensures that the seal will perform and contain the media in application.



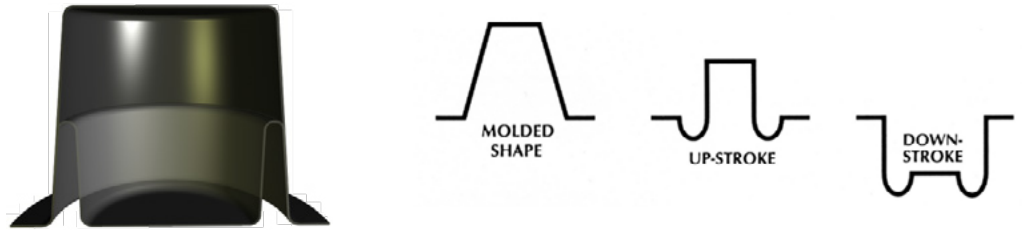
Fabric-to-elastomer adhesion is a key to long cycle life.

Whether it is a mechanical bond or chemical bond, the longevity of the diaphragm is dependent on a strong bond between the two materials.

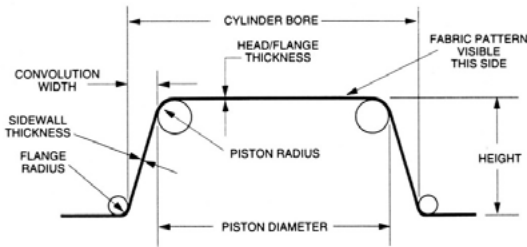
Typical Diaphragm Specifications

Rolling “Top Hat”

- Maximum stroke to approximately 1.8 x cylinder bore diameter
- Differential pressure capability up to 150 psi
- Pressure applied from one direction only
- Must be formed into convoluted shape



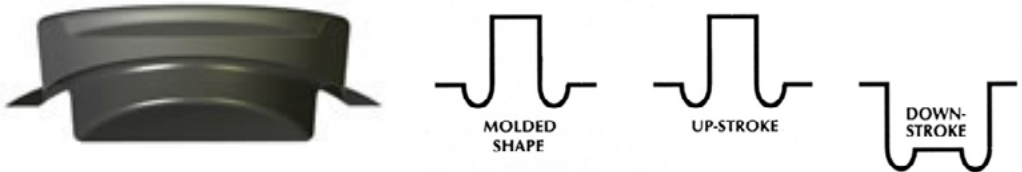
Single-Coated, Beaded, and Flat Flange



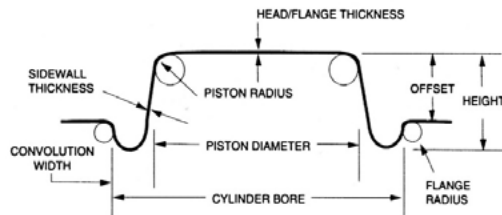
Cylinder Bore Range	0.25-0.99	1.00-2.50	2.51-4.00	4.01-8.00	Over 8.00
Sidewall Thickness	0.013/0.017	0.014/0.020	0.020/0.028	0.030/0.040	0.038/0.052
	Double-Coated Flat Flange Only:				0.035/0.055
Head/Flange Thickness	0.015/0.025	0.015/0.025	0.025/0.035	0.030/0.040	0.035/0.055
Piston Radius	0.094	0.125	0.156	0.250	0.250
	Double-Coated Flat Flange Only:				0.310
Flange Radius	0.031	0.062	0.094	0.125	0.125
	Double-Coated Flat Flange Only:				0.250
Convolution Width	0.085	0.094	0.156	0.250	0.250
Bead Width	0.090/0.096	0.122/0.128	0.184/0.190	0.247/0.253	0.247/0.253
Bead Height	0.091/0.097	0.131/0.139	0.195/0.205	0.263/0.277	0.263/0.277

Offset Convoluted

- Moderate stroke to approximately 0.5 x cylinder bore diameter
- Pre-molded shape for easy installation
- Double coating limits diaphragm height while increasing durability when in contact with rough surfaces



Single-Coated



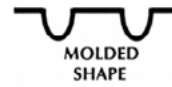
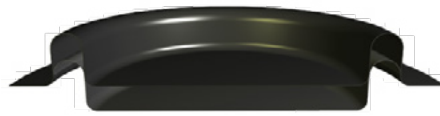
Cylinder Bore Range	1.00-2.50	2.51-4.00	4.01-8.00	Over 8.00
Sidewall Thickness	0.015/0.025	0.020/0.030	0.030/0.040	0.038/0.052
Head/Flange Thickness	0.015/0.025	0.020/0.030	0.030/0.040	0.035/0.055
Piston Radius	0.125	0.156	0.250	0.310
Flange Radius	0.062	0.094	0.125	0.188
Convolution Width	0.125	0.156	0.250	0.375

Double-Coated

Cylinder Bore Range	1.00-2.50	2.51-4.00	4.01-8.00	Over 8.00
Sidewall Thickness	0.015/0.025	0.020/0.030	0.032/0.048	0.070/0.090
Head/Flange Thickness	0.015/0.025	0.020/0.030	0.032/0.048	0.070/0.090
Piston Radius	0.125	0.156	0.250	0.370
Flange Radius	0.094	0.125	0.250	0.250
Convolution Width	0.125	0.156	0.250	0.375

Convolutd

- Limited stroke to approximately 0.25 x cylinder bore diameter
- Pre-molded shape for easy installation
- Differential pressure capability to 150 psi
- Pressure applied from one direction only
- Double coating increases durability when in contact with rough surfaces

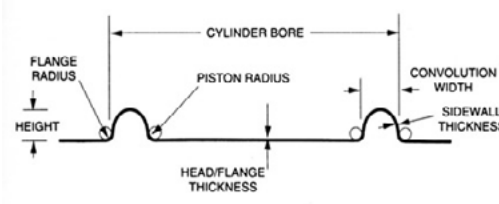
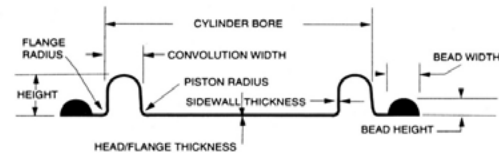


Single-Coated; Beaded Flange

Cylinder Bore Range	1.00-2.50	2.51-4.00	4.01-8.00	Over 8.00
Sidewall Thickness	0.014/0.020	0.020/0.030	0.030/0.040	0.038/0.052
Head/Flange Thickness	0.015/0.025	0.025/0.035	0.030/0.040	0.035/0.055
Piston Radius	0.062	0.094	0.125	0.188
Flange Radius	0.062	0.094	0.125	0.125
Convolution Width	0.125	0.156	0.250	0.250
Bead Width	0.122/0.128	0.184/0.190	0.247/0.253	0.247/0.253
Bead Height	0.131/0.139	0.195/0.205	0.263/0.277	0.263/0.277

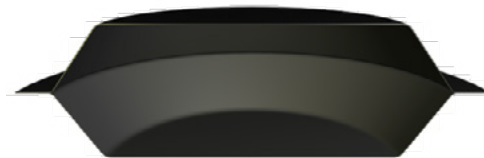
Single- and Double-Coated; Flat Flange

Cylinder Bore Range	0.25-0.99	1.00-2.50	2.51-4.00	4.01-8.00	Over 8.00
Sidewall Thickness	0.013/0.017	0.014/0.020	0.020/0.030	0.030/0.040	0.038/0.055
Head/Flange Thickness	0.017/0.023	0.015/0.025	0.025/0.035	0.030/0.040	0.035/0.055
Piston Radius	0.031	0.062	0.094	0.125	0.125
(Double-Coated)	0.062	0.094	0.125	0.187	0.250
Flange Radius	0.031	0.062	0.094	0.125	0.125
(Double-Coated)	0.062	0.094	0.125	0.187	0.250
Width	0.085	0.094	0.250	0.250	0.250



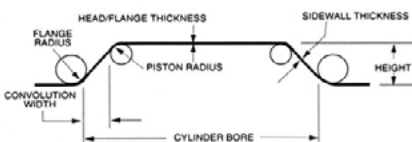
Double-Acting Dished

- Moderate stroke to approximately 0.5 x cylinder bore diameter
- Pressure can be applied from both directions
- Double coating increases durability when in contact with rough surfaces



Double-Coated, Flat Flange

Cylinder Bore Range	1.00-2.50	2.51-4.00	4.01-8.00	Over 8.00
Sidewall Thickness	0.020/0.030	0.030/0.040	0.045/0.055	0.070/0.090
Head/Flange Thickness	0.020/0.030	0.030/0.040	0.045/0.055	0.070/0.090
Piston Radius	0.094	0.125	0.188	0.250
Flange Radius	0.094	0.125	0.188	0.250
Convolution Width	0.085	0.062	0.870	1.120



The RPP Difference

Selecting and specifying the diaphragm seal that will provide maximum performance and the longest possible service life calls for a degree of expertise gained only through years of experience in diaphragm seal design and application. Our technical team has years of experience in the science of fabric-reinforced diaphragm seals and is often viewed as an extension of our customers' engineering teams, providing design and material engineering services from our breadth of knowledge and experience.

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