DIA·COM CORPORATION

AN ISO/TS 16949:2002 CERTIFIED COMPANY

Company Profile

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DIA·COM CORPORATION

Providing Superior Diaphragms for
Consumer Products • Automotive • Aerospace
Medical • Industrial • Water Control/ Irrigation

Company Profile

Dia• Com is a leading international provider of innovative, cost-effective molded diaphragm solutions critical to the operation of essential systems and equipment in industrial, automotive, aerospace, medical instrumentation, and food and water processing applications. The company's reputation for excellence is based on superior quality in the design, manufacture and application of its high-performance, state-of-the-art, fabric-reinforced and homogeneous elastomeric diaphragm seals.

The company was founded in 1983 as a supplier of custom and standard diaphragm seals known for reliability and dependability. Today, Dia• Com, with worldwide corporate headquarters in Amherst, New Hampshire,USA focuses on forming strategic customer partnerships critical to the development of unique, technologically superior design solutions linked to its customer's success. As an extension of its customer's design teams, Dia• Com offers a broad range of custom diaphragm solutions that are " designed for manufacturing", and as a result, are more comprehensive, robust and cost-effective than competitive products.

Dia• Com's International Corporate Headquarters was specifically designed and constructed for state-of-the-art molded elastomeric diaphragm design and manufacturing. The 30,000 square foot facility, completed during the spring of 1994, had detailed planning and consideration given to material flow, HVAC and electrical systems, as well as future expansion.

Dia• Com Advantages

TS 16949 Quality Management System

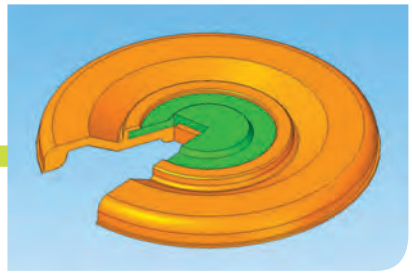
In House Tooling Design and Fabrication

Modern Facility with State of the Art Molding Presses

Engineering Expertise with Extensive Diaphragm Design, Materials and Applications Knowledge

Materials Lab with Elastomer and Fabric Development and Testing Capabilities

Dia• Com's Quality Systems are certified to the ISO/ TS16949:2002 Quality Management System, an International Standard developed to supercede the QS-9000 Quality system. ISO/TS16949:2002 uses a process approach when developing, implementing, and improving the effectiveness of a quality management system, to enhance customer satisfaction by meeting customer requirements. Dia• Com's " Diatrac" system enables 100% lot traceability. SPC, FMEA's, 8D analysis, Process Control Plans, and Process Capability Studies are routinely used in accordance with automotive and industrial requirements. Zero-Defect sampling and continual in-process quality audits insure dimensional and material integrity.



Computer Aided Drafting electronically enhances Dia• Com's abilities to provide accurate custom tooling designs on a timely basis. Dia• Com's application engineers routinely assist customers in the design of 3D drawings, standard or special diaphragms. Dia• Com uses only high strength steel for production and prototype molds. Dia• Com's internal tool shop has complete CNC machining capabilities that allows for quick turnaround on prototype and production tooling.

Microprocessor-Controlled Production Presses designed specifically for the production of fabric-reinforced and homogeneous elastomeric diaphragms. Our new production presses are built with high strength components. The microprocessors closely control the vulcanization process, thus assuring precise, repeatable control of the molding process. The result is high quality, low cost diaphragm production. Dia• Com utilizes unique compression and transfer molding processes to maximize efficiencies and insure the dimensional integrity of each part.

Dia• Com Design Engineers routinely work with our customer engineering personnel to transform application concepts first into fully functioning prototypes, and, ultimately, into production units. Our experience and background allow us to cost-effectively provide a diaphragm that meets or exceeds all customers' diaphragm expectations. Using AutoCad drafting software, we are able to communicate electronically with our customers to accelerate the design process. Existing diaphragm applications sometimes do not perform as well as intended. Our technical staff is available as an aid to our customers to analyze performance issues, offer hardware recommendations, and to assist in root cause analysis and the implementation of permanent corrective actions.

Constantly striving to improve existing applications, meet the demands of new programs, and troubleshoot application issues, Dia• Com has established a Rubber Materials Lab that gives us significant rubber-testing capabilities. Using ASTM standard procedures, we are able to obtain physical properties, such as, tensile strength, elongation, modulus, durometer, tear strength, compression set, and rheology data, such as, viscosity, cure times, scorch data, etc. We are also capable of running a variety of chemical compatibility testing, heat aging, volume swells, etc. using ASTM standard testing procedures, and we can run customer-specific tests. Dia• Com can custom formulate materials to meet virtually any application requirement. Combining this test capability with our technical expertise allows us to provide materials that meet customer specifications, ASTM material call-out and other certification bodies, such as, UL or NSF.

Product Portfolio

Since its founding in 1983, Dia• Com has been committed to a single goal – the design and production of the finest molded diaphragm seals available for industrial applications.

Today we produce, and distribute worldwide, one of the industry's broadest lines of standard and custom diaphragms. Built and tested to exacting standards, these quality products are widely used in the automotive, industrial, aerospace, food and water processing, medical instrument and other industries where high-performance, fabric-reinforced and homogeneous elastomeric seals are critical to the operation of essential systems and equipment.

The utilization of lean manufacturing principles, statistical process control, microprocessor-based production monitoring and control systems, and other advanced manufacturing, testing and QA techniques ensures Dia• Com's position at the leading edge of the technology.

Dia• Com is proud of its reputation for delivering the finest, state-of-the-art products, on time and at reasonable cost. Our rapidly expanding worldwide customer base testifies to the success of our efforts.

Principal Diaphragm Types

Homogeneous Diaphragms

For very low-pressure applications, Dia• Com offers diaphragms made with a homogeneous, or all-rubber, construction. These diaphragms offer the same functional advantages seen in fabric reinforced diaphragms but they have the added economy of using the homogeneous construction.

Fabric Reinforced Diaphragms

Fabric-reinforced diaphragms utilize a layer of an engineered fabric material as part of the diaphragm construction. This layer of fabric gives tremendous design flexibility. A very thin-walled diaphragm can withstand high pressures while remaining very flexible and responsive to minor pressure variations. Fabrics made of polyester, nylon are commonly used for most applications, with Nomex fabric used for those applications exposed to high-temperature. For those applications that require extremely high-strength, Dia• Com offers our unique Dia• Tuff fabric.

Insert Bonded Diaphragms

Dia• Com has capabilities to bond metal or plastics to diaphragms during the molding process. Mechanical bonding is generally the least expensive and simplest method to achieve. This process is accomplished by designing the insert with projections or holes. During the molding process the insert becomes totally or partially encapsulated by the elastomer creating a strong mechanical interlock. Chemical or adhesive bonding utilizes a commercial adhesive applied to the non-elastomeric component. The component is then attached to the elastomer during or after vulcanization depending on the type of bond required and geometry of the diaphragm. By bonding inserts to diaphragms, costly assembly operations can be reduced or eliminated. Additionally, rivet, screw or other fastening methods which might create leak paths through the diaphragm would be eliminated with a bonded insert.

Teflon Bonded Diaphragms

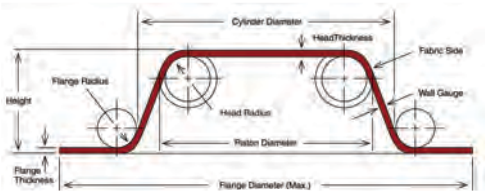
Dia• Com has capabilities to design and manufacture composite diaphragms made from TEFLON/Elastomeric materials. Dia• Com's process bonds TEFLON to rubber using Teflon as thin as 0.002" (0.0508 mm) thick. Dia• Com's unique process and construction produce a diaphragm that is compatible with harsh environments without limiting the life and responsiveness of the diaphragm. For additional strength, fabric may be added to the Teflon/Elastomer composite.

Fab Air Diaphragms

Dia• Com has introduced a new line of specialty industrial diaphragms composed of our new Fab• Air materials. Fab• Air is a composite elastomer material with a proprietary fiber dispersed throughout the elastomer. FabAir is typically used in low pressure applications to eliminate ballooning replacing all rubber diaphragms. It also can be used in conjunction with fabric reinforced diaphragms in extremely high pressure applications to give the diaphragm added strength and reduce the possibility of blow through.

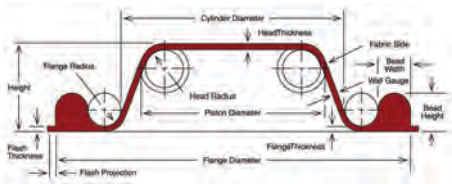
Standard Configurations

Top Hat



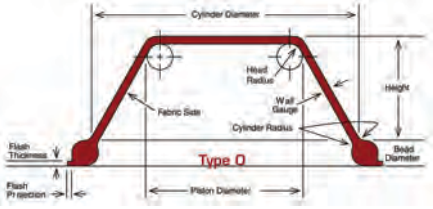
Type F Diaphragms

It exhibits all of the benefits that are associated with rolling diaphragms. These diaphragms have the longest stroke-to-bore ratio, zero spring rate, no breakaway friction, constant effective pressure area, and long life. The flange of the diaphragm is designed to seal like a gasket between the two flat surfaces of the cylinder and bonnet. The outside edge and bolt holes can be cut into any configuration desired.



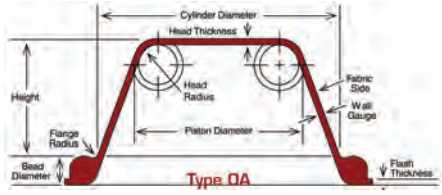
Type D Diaphragms

This style diaphragm is the same as the Type F in all respects except flange mounting. The parts are molded with what equates to half of an O-ring on the flange rather than a large flat surface. This O-Ring half fits into a groove machined into the cylinder half of the hardware. Sealing is achieved by squeezing the bead into a properly sized groove.



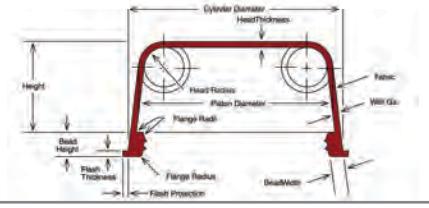
Type O Diaphragms

This type of diaphragm has no flange. An O-ring is molded to the bottom of the sidewall. Unlike the other types of diaphragms, the Type O is put into convolution by folding the sidewall back onto itself. The bead is then squeezed into a groove machined into the bonnet half of the hardware. This type enables the greatest reduction in hardware diameter, while keeping a full stroke potential.



Type OA Diaphragms

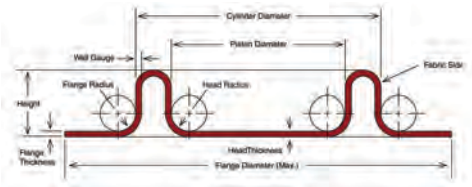
This diaphragm type is second generation to the Type O. It fits into identical hardware. It differs from the Type O in that its sidewall attaches to the inside diameter of the O-ring and the fabric is on the outside, requiring the head corner radius to be inverted for installation. The Type OA tends to be easier to install.



Type OB Diaphragms

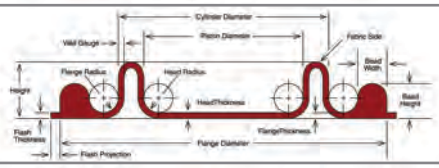
This type of diaphragm has a rectangular bead molded inside the cylinder wall. This design requires the smallest hardware diameter of any diaphragm type. Since clamping and sealing in this style is against the inside wall of the cylinder, the stroke capability is restricted to the lower half of the diaphragm.

Pre-Convoluted



Type FC Diaphragms

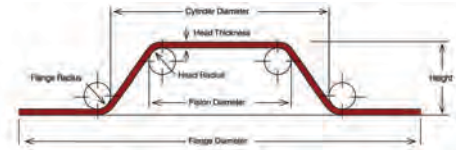
In this style, the piston and the flange are molded on the same plane. The benefit of this style is that the handwork of forming the convolution is eliminated, which greatly reduces the assembly time, especially in high volume applications. The drawbacks to this type of diaphragm are: a built-in spring rate, due to the molded-in convolution, which must be considered during the design stage, and a limited stroke-to-bore ratio. To improve this ratio, an offset preconvoluted diaphragm can be designed



Type DC Diaphragms

This style diaphragm is similar in function to the Type FC diaphragm, while the sealing and hardware designs are the same as the Type D.

Dish Shape



Type P Diaphragms

This diaphragm type, commonly referred to as dish-shaped, has a sidewall that slopes gradually from the cylinder to the piston. This diaphragm is designed to be flexed in both directions to its full height. It may be double-coated to take pressure in both directions.

Applications

The molded elastomeric diaphragm is a tough, versatile, dynamic seal that eliminates virtually all of the problems and limitations associated with other sealing methods such as U-Cups, O-Rings, metal bellows and flat, die-cut diaphragms. Unlike alternative techniques, molded diaphragms do not leak, offer no friction, have exceptional sensitivity, and display a hysteresis that is, in most cases, negligible. They can withstand pressures up to 6000 PSI over a temperature range of -65°F to 600°F (-50°C to 315°C), require no maintenance or lubrication, and are extremely cost-effective in most applications. Dia• Com molded diaphragms are available in two forms: contoured, annular disks that provide high sensitivity and freedom of motion in short-stroke applications, and rolling diaphragms for frictionless, leak-proof sealing in cylinders and other applications requiring a long piston stroke.

Features

• Minimum hysteresis – accurate, repeatable positioning • No spring rate (rolling diaphragms) • Long stroke length capabilities • No lubrication • No break-away or sliding friction • Long cycle life• Effective in harsh environments • Constant effective pressure area • Low assembly and associated hardware costs

Consumer Products

• Small Engine Carburetors • Gas Grill Regulators • Camping Stoves and Lanterns • Vacuum Cleaners • Pneumatic Nail Guns Firing Systems

Aerospace

• Fuel Regulator • Expansion Chambers • Oxygen Regulators • Actuators • Engine Governor

Automotive

• EGR Valve • Turbo Charge Wastegate Actuators • Fuel Pressure Regulators • Automatic Tire Inflation Valves • Transmission Pressure Switches • Brake Pressure Switches

Medical

• Oxygen Regulator • IV Pump • Air Pump • Oxygen Conserver • Hospital Beds

Water Controls/Irrigation

• Water Pressure Regulators • Irrigation Valves • Pop up Sprinkler Heads • Backflow Preventers • Flow Control Valves

Industrial

• Valve Actuators • Pneumatic Air Cylinders • Diaphragm Pumps • Weir Valves • Chemical Pumps • Pressure Switches • Industrial Printers

Pneumatic Controls

• Precision Air Regulators • I/P Transducers • Pneumatic Relays • Valve Positioners • Volume Boosters • FRL Systems

Natural Gas / Propane

• Residential NG/LPG Regulators • Commercial Service NG/LPG Regulators • Industrial Service NG Regulators • Tank Blanketing Valves • Pilot Valves • Shut Off Valves

Food/Dairy Processing

• Positive Displacement Pump • Shutoff Valve • Flow Control Valve
• Protective boot

Diaphragm Materials

Elastomers

Dia• Com has developed an extensive inventory of rubber compound formulations to meet the demands of a wide range of diaphragm applications, and maintains a full-time Rubber Chemist on-staff, constantly working to develop rubber formulations to meet the demands of an ever-changing industry.

Dia•Com works with all types of rubber materials, such as, Nitrile, EPDM, Neoprene, Fluorosilicone, Silicone, SBR, Fluoroelastomers (Viton®), Hydrin and Vamac®.

Rubber has a variety of physical properties, such as, tensile strength, elongation, modulus, compression set, and tear resistance, as well as chemical compatibility. All of these properties must be considered when selecting a rubber to be used in a diaphragm. Contact a Dia• Com representative for proper rubber selection.

Speciality Elastomers

Dia• Com has developed a range of Specialty Elastomers that provide Elastomeric solutions to difficult applications & environments. These materials provide properties that are not found in other materials and can be used in the harshest of uses.

Specialty compounds have been developed that include FDA grade, chloramine resistant compounds NSF 61 approved, UL-157 and EN-549 approved for use in propane, Bio-Diesel resistant compound, Chemically resistant compounds for use in acids, alkalis & organic materials, Ionic Hybrid Elastomers and USP Class VI Compounds.

Fabrics

A key component of diaphragms is the fabric reinforcement selected to ensure the diaphragm will withstand the application pressure and cycle life expectations. Dia• Com has developed a comprehensive selection of standard fabric styles, each with specific physical characteristics, that are selected based on weave patterns, tensile strength, formability and chemical and heat resistance capabilities, as well as other variables. **The fabrics most commonly used are Polyster, Nylon, Nomex & Dia•Tuff.** Dia• Com technical personnel are available to assist in selecting the proper fabric for a specific application.

Coated Fabrics

Many diaphragm applications require that the diaphragms be coated with rubber on both sides, commonly referred to as "double-coat" diaphragms. This type of diaphragm is typically required when the application sees pressure on both sides.

Dia•Com has two processes to produce double-coat diaphragms; coated fabrics and proprietary double-coat process. By utilizing our proprietary double-coat molding process, we are able to provide double-coat diaphragms directly from rubber and fabric. The selection of the proper double-coat process and materials requires an understanding of both the rubber and fabric used in its fabrication, as well as the overall geometry of the diaphragm. Dia• Com also develope and maintain an inventory of standard "coated-fabrics" that is, fabric that is coated on both sides by a sub-contractor using a variety of materials. Dia• Com technical personnel are available to assist in the proper selection of coated fabric.

Fluorinated Films

For use in applications with aggressive media & process conditions, diaphragms bonded with fluorinated films are used. Most common types are PTEE, TEM, FEP & PFA.

Dia•Com has recently introduced diaphragms using a new high strength PTEE material. This new Dia•Com material is specially designed to not thin in formed areas as associated with the standard PTFE material and will outlast a standard PTFE Diaphragm in a side by side cycle test by as much as ten times!

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MOLDED DIAPHRAGMS – IDEAL SOLUTIONS TO TOUGH SEALING PROBLEMS

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