



High quality nitrogen for the food industry

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



ENGINEERING YOUR SUCCESS.

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Filtration, purification and separation is our business

Parker is a world leader in the filtration, purification and separation of compressed air and gases.

Parker specialises in purification and separation technologies where compressed air and gas purity, product quality, technological excellence and global support are paramount. It designs and manufactures compressed air treatment products, gas generators and ancillary equipment for many key industries where ease of integration, low cost of ownership and energy savings can make a real difference.

Nitrogen gas

Nitrogen gas is used for a wide range of industrial applications, from modified atmosphere packaging for perishable food products, to preventing fire and explosions in chemical plants. However, while nitrogen surrounds us, accounting for up to 78% of the air we breathe, obtaining a ready supply of the gas can be problematic and expensive.

Parker offers an ideal solution to this requirement with a comprehensive range of cost effective nitrogen gas generation systems that enable users to produce their total demand for nitrogen gas on their premises, and under their complete control.



The increasing demand for fresh food produce

In today's global market place, consumers expect to receive maximum quality at minimum cost.

The food industry is no exception with demand for all types of produce to be supplied to every inhabited place on the globe. Regardless of season and location, everything from exotic tropical fruits to the staple diet of bread, rice and potatoes are expected to be available all year round and in "just produced" condition at competitive, affordable prices. Convenience and quick preparation of meals is also a high priority for the fast paced 21st century lifestyle.

Attractively presented fresh or prepared foods and combination meals, in durable hygienic packages that offer useful shelf life under normal refrigeration, have become very popular.

Faced with these consumer preferences and growing demand for an ever wider range of food products, retailers recognise the need for improvements in packaging technology. They need to address the spoilage problem and provide a huge diversity of new prepared foods.

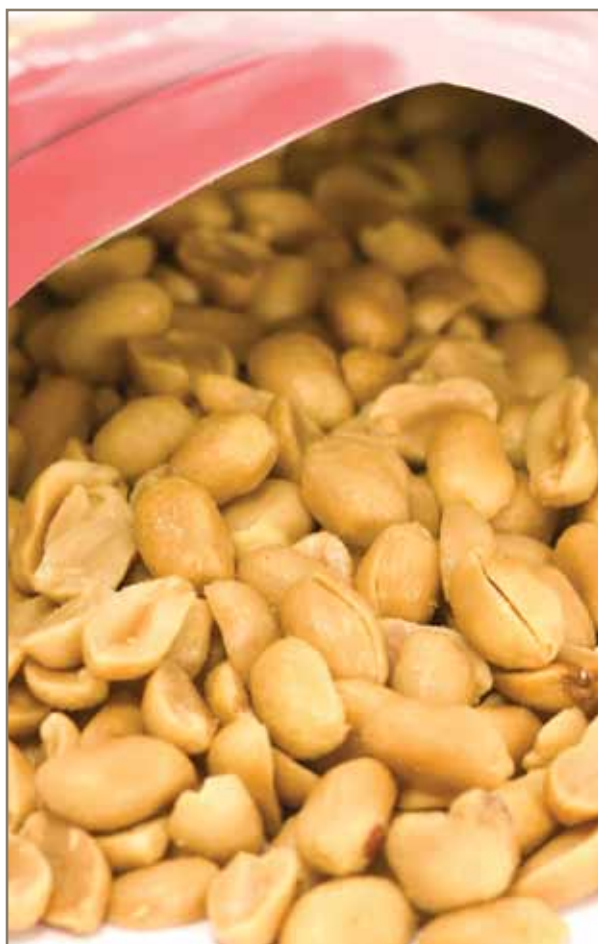
Health concerns continue to drive the insistence on reducing salt, chemicals and preservatives which also places additional pressure on suppliers and manufacturers. They are expected to provide food products that look and taste like they were freshly made or just picked, despite possibly having travelled half way around the world by sea freight.

Operating in a very competitive environment, from the independent retailer to global supermarket chains realise that minimising waste by increasing shelf life, whilst ensuring the product is of prime appearance and taste, is essential to maximising what is often very narrow profit margins. This can be difficult to achieve, but satisfied, loyal, returning customers are key, and both retail and commercial outlets are insisting more and more that their suppliers satisfy these demands with minimal financial impact.



Extending food shelf life

Many foodstuffs start to deteriorate the moment they are harvested or manufactured and prepared for packaging. The cause is attack from a multitude of spoilage mechanisms such as bacteria, yeast and mould spores, either airborne or naturally occurring within the product. Moisture loss or gain, depending on the food can also be undesirable.



If these spoilage mechanisms can be excluded, prevented or their progress retarded in some way, then the natural process of food decay can be delayed, allowing more time from production to consumer without affecting quality.

This benefits everyone in the supply chain from grower, manufacturer and packer through to logistics, retailer and ultimately, the consumer.

Over the past three decades, a safe, tried, tested and proven method of combating food spoilage mechanisms without the use of (or at least a substantial reduction in) undesirable preservatives, is the use of Modified Atmosphere Packaging. Sometimes referred to as “MAP” or “Gas Flushing”.

MAP is quite literally a process whereby produce is packed or stored in a “modified” form of the Earth’s naturally occurring air.

The normal ratio of gases is modified to significantly reduce or prevent the effects of spoilage mechanisms.

However it must be stressed that MAP is not a solution on its own. The shelf life of food produce is influenced by a number of factors including:

- **Storage temperature**
- **Quality of raw ingredients**
- **Product formulation**
- **Processing method**
- **Hygiene standards**
- **Packaging Material**

If any of these are lacking or substandard, the benefits of MAP can be reduced or even totally compromised.

Type and integrity of packaging

The selection of packaging materials is also of vital importance to ensure that MAP gases are internally retained at the desired level and that the transfer of outside contaminants through the pack are prevented.

There are many types of “barrier” packaging materials available and selection is very much dependent on the type of pack, product and gases to be used.

MAP Gases

The main gases used are nitrogen (N₂), oxygen (O₂) and carbon dioxide (CO₂). All three occur naturally in the air we breathe but by using them individually or combining them in the food packaging process, very beneficial results can be achieved.



Modified Atmosphere Packaging (MAP)

MAP is generally used to control four main types of micro-organisms.



Aerobic Microbes

These need air or oxygen to respire and grow.

Displacing the air in the packaging or storage process with nitrogen gas will cause a reduction in the oxygen level to a point where the bacteria are suppressed and the desired extended produce life is achieved. Some Bacillus, for example.

Anaerobic Microbes

These live without air or oxygen. Some species may even be destroyed or inhibited by very low levels of oxygen. Clostridium, for example.

Microaerophilic Microbes

These need low levels of oxygen to provide an optimum environment for growth. Some also require elevated levels of carbon dioxide, Campylobacter, for example.

Facultative Anaerobic Microbes

These can live and grow with or without air or oxygen. Salmonella species, for example.

For all of these spoilage mechanisms, a single MAP gas or mixture of two or all three will be required depending on the produce to be packaged.

Nitrogen is the most widely used gas. With the exception of raw red meat, raw offal, dark poultry cuts and hard cheese, nitrogen is used in some way for every other food that can benefit from MAP.

Benefits of using Parker nitrogen gas generators for MAP

- Preservation of product flavour, aroma, texture and nutritional value
- Increased sales through high product quality
- Fewer product returns
- Increased production efficiency with longer production runs
- Better product colour and texture at point of sale
- Extended shelf life
- Increased export opportunities to new geographic markets

Applications



Produce benefiting from MAP:

- Potato chips, corn chips and extruded snacks
- Nuts
- Fresh chilled meats, poultry and fish
- Cooked meats, poultry and fish
- Edible oils - refining of palm and coconut oils
- Coffee and tea
- Powdered milk
- Spices, pasta and other dried products
- Pita Breads, Naan Breads and Pizza bases
- Grated cheese and other dairy products
- Fruit juices and wine
- Salads
- Fruits
- Vegetables

Typical MAP shelf life extension

Product	Gas	Shelf Life In Air	Shelf Life In MAP
Liquid Food & Beverages	N ₂	3 – 7 days	1 – 3 weeks
Dried Food Products	N ₂	6 months	1 – 2 years
Grated & Soft Cheese	N ₂ / CO ₂	2 – 3 weeks	2 – 3 months
Fresh Fruit & Vegetables	N ₂	3 – 6 days	1 – 5 weeks
Fresh Pasta	N ₂ / CO ₂	1 – 2 weeks	3 – 4 weeks
Chilled & Ready Meals	N ₂ / CO ₂	1 – 4 days	1 – 2 weeks
Cooked & Chilled Meats	N ₂ / CO ₂	1 – 2 weeks	1 – 2 months

Packaging equipment often utilising MAP



Image courtesy of HayssenSandiacre Europe

- Vertical Form Fill & Seal, (VFFS)
- Vacuum Chambers
- Thermo Form Fill & Seal
- Snorkel Type



Image courtesy of MULTIVAC

- Horizontal Form Fill & Seal, (HFFS)
- Coffee Podders
- Inerting tunnels
- Tin Can Fillers

Food grade gases

As well as the quality, taste and appearance of food produce, the quality of packaging or blanketing gas is also of paramount importance.

Requirements do vary from country to country concerning the specification for MAP gases.

For example, within Europe, the European Industrial Gases Association (EIGA), has developed a specification detailing the maximum contaminant levels acceptable for a gas to be considered food grade.

Nitrogen is classed as a food additive when it is in direct contact with the foodstuff and is designated an “E” number. The nomenclature for nitrogen is “E941”

Compliance with the specified contaminant levels is mandatory under EU law.

PSA technology MAXIGAS nitrogen gas generators from Parker have been independently tested by an accredited UKAS scientific analysis laboratory to confirm that they fully comply, producing nitrogen gas, with residual levels well below EIGA’s specified maximums.

In addition, the MAXIGAS materials of construction have been tested by the same UKAS laboratory to confirm full compliance with the United States FDA code of federal regulations title 21.

Parker MAXIGAS – Food Industry Compliant



Materials of construction, independently verified to comply with FDA code of federal regulations title 21 ‘Food & Dairy’.



Meets European Industrial Gas Association contaminant specification pertaining to gas approved for use at the highest level - as a food additive E941.

	<p>INTERNATIONAL APPROVALS</p>	
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Problems with typical nitrogen supply methods

Obtaining a ready supply of nitrogen gas can be problematic and expensive. Typical gas supply methods include high pressure cylinders, liquid mini tanks or bulk storage vessels. However, each of these options introduces a range of problems that needs to be solved.

When considering nitrogen supplies, a reliable vendor must be outsourced and valuable space in or outside the company premises needs to be assigned for gas storage. Procedures have to be established to monitor and manage the gas supply and arranging deliveries and payment for the gas must also be considered.

Additionally, safety and handling concerns need to be taken into account. The cost of addressing these logistical issues can be high and difficult to budget for, while the price of gas and supplier rates change continually. The environmental impact of truck based deliveries is another important consideration for carbon footprint reduction.

The ideal solution lies in a range of gas generation systems from Parker, which enable users to produce their total demand for food grade nitrogen gas on their premises, under their complete control. As a result, companies can generate as much or as little nitrogen as needed, at a fraction of the cost of having the gas delivered by an external supplier.

Why gas generation is best

Being able to take control of nitrogen supplies as opposed to having to rely on a third party, can reduce operational costs significantly.

These integrated nitrogen generation systems from Parker Industrial Division use pre-treated air from a standard industrial compressor which is essentially “sieved” so that oxygen and other trace gases are removed while nitrogen is allowed to pass through to the application as the product gas. Air separation is not a new idea, but the radical Pressure Swing Adsorption (PSA) design and control systems employed on the Parker nitrogen generator ranges have maximised gas output and reduced compressed air consumption to achieve even higher levels of efficiency than before.

A nitrogen generation system can reduce costs by up to 90% when compared to traditional methods of supply. If a company using liquid nitrogen was to convert to gas generation technology, the new system could be expected to pay for itself in typically less than two years. For a company using cylinders, the payback period could be even earlier, less than 12 months in many cases.

The new systems can also make the workplace considerably safer for employees, eliminating the safety risks of storage, handling and changing heavy, high pressure cylinders.

Parker nitrogen generators have many advantages over traditional nitrogen supplies:

- **Enhanced safety without the need to store or handle high pressure cylinders**
- **Reduced downtime owing to an on-demand supply**
- **Cost savings following payback of up to 90%**
- **Food grade nitrogen at consistent flow, pressure and purity**
- **Compact space saving design**
- **Flexible modular design**
- **Very low cost of ownership**
- **No need for expensive civil works prior to installation**
- **Proven reliability**
- **Operates from a standard factory compressor for even greater energy savings**



SWP 10 bar
MAX P 12bar

SWP 10 bar

NITROGEN
COMPRESSED
NITROGEN
COMPRESSIE

NITROGEN
COMPRESSIE

Technological excellence

Using the latest technology, Parker designs and manufactures both hollow fibre membranes and Pressure Swing Adsorption (PSA) nitrogen gas generators to provide a solution for every food application that requires nitrogen gas with residual oxygen levels from 16% down to 10ppm.

The Parker range of generators include:



MIDIGAS PSA nitrogen gas generators



MAXIGAS PSA nitrogen gas generators

Please consult with your local Parker representative to ensure selection of the correct solution tailored exactly to your requirements.



NitroFlow basic membrane nitrogen gas generators



NitroFlow membrane nitrogen gas generators



NitroSource HiFluxx membrane nitrogen gas generators

Ancillary products available to complete a total food grade nitrogen solution:

- Gas mixing systems for CO₂ and or O₂ mixing capability
- Sterile Gas Filtration
- Compressed air filtration and drying equipment to provide food grade compressed air
- Gaseous CO₂ purifiers



Parker nitrogen gas generators- food applications other than MAP



Image courtesy of ICA

Controlled Atmosphere (CA) storage

Large gas tight temperature and oxygen controlled bulk stores are typically used for fruit, vegetables and salads.

Purging with nitrogen gas removes oxygen and CO₂ which will slow product deterioration from weeks to many months.

In addition to land based CA stores, marine units provide the same level of benefit on-board specially modified cargo holds within ships, allowing the most economical transportation of perishable foods from all areas of the world.



Sparging

Nitrogen gas is passed through liquids such as cooking oils to help reduce dissolved oxygen. Diffusers are used within the oil storage vessels to ensure small bubbles of nitrogen gas are produced to achieve the best results.



Pressure transfer

Nitrogen gas is used as an inert, non oxidizing motive force to convey powders and liquids where it is undesirable or not possible to employ traditional pumping methods.

Using nitrogen gas gives the additional benefit of fire and explosion suppression, often associated with powders, dust and flammable liquids.



Silo and bulk storage blanketing

Providing an inert nitrogen gas “blanket” at minimal overpressure, above food produce contained in bulk storage silos or vessels will help prevent oxidisation and contamination from possible external atmospheric sources.



Insect and larvae reduction

Storage of produce such as cereals and grains can be purged and blanketed with nitrogen gas to eradicate insects or the development of their larvae. While the vast majority of these pests are totally harmless to consumers, minimisation of their presence is often desirable.



Nitrogen injection

Nitrogen gas is often used to create micro bubbles in products such as cream and certain desserts to increase bulk and improve texture. Nitrogen is used in preference to air as it is less likely to be absorbed into the product, therefore maintaining the bulk for longer, and as it is inert, it is less likely to oxidise the product and affect the taste.



Aerosol propellant

Nitrogen gas is used as an inert propellant in aerosol dispensed products such as “squirty” creams, oils and cheeses.

Total partnership and support

Parker works closely with its partners to create individual OEM solutions and its nitrogen gas generation systems can be fully integrated into a company's own system designs.

Parker is an ideal partner for developing customised solutions. Parker professionals, with the right knowledge, skills, expertise and experience, can work closely with company design teams to help significantly add value and deliver optimum results.

As a partner, Parker offers:

- **Intimate in depth knowledge of gas generation technology**
- **Best MAP gas solution and integration**
- **Expertise in system design, installation, commissioning and total aftermarket support**
- **Experience in developing customised solutions**
- **Support for integrating the system into business' processes**

Committed to environmental responsibility

Parker is a very environmentally aware company and is certified to ISO14001 standards. This means that it is making investments for the future, with the aim of minimising its environmental impact by the way it conducts business and with the solutions it provides.

Nitrogen gas generation offers a real low carbon alternative to traditional methods of supply and one that environmentally aware customers will appreciate and want to be a part of.

A significant amount of energy is wasted through process inefficiencies when considering traditional supplies, such as turning air into liquid at very low temperatures, or compressing gas to high pressures, and of course, the CO₂ emitted from delivery trucks.

However, producing just the right amount of gas at low pressure and ambient temperature, at the site of the application with nitrogen gas generators from Parker is the most convenient and energy efficient option.



After sales service

Businesses need much more than just a supply of high quality products in order to maintain their competitive edge.

Modern production technologies are becoming increasingly demanding with the provision of high quality and reliable solutions.

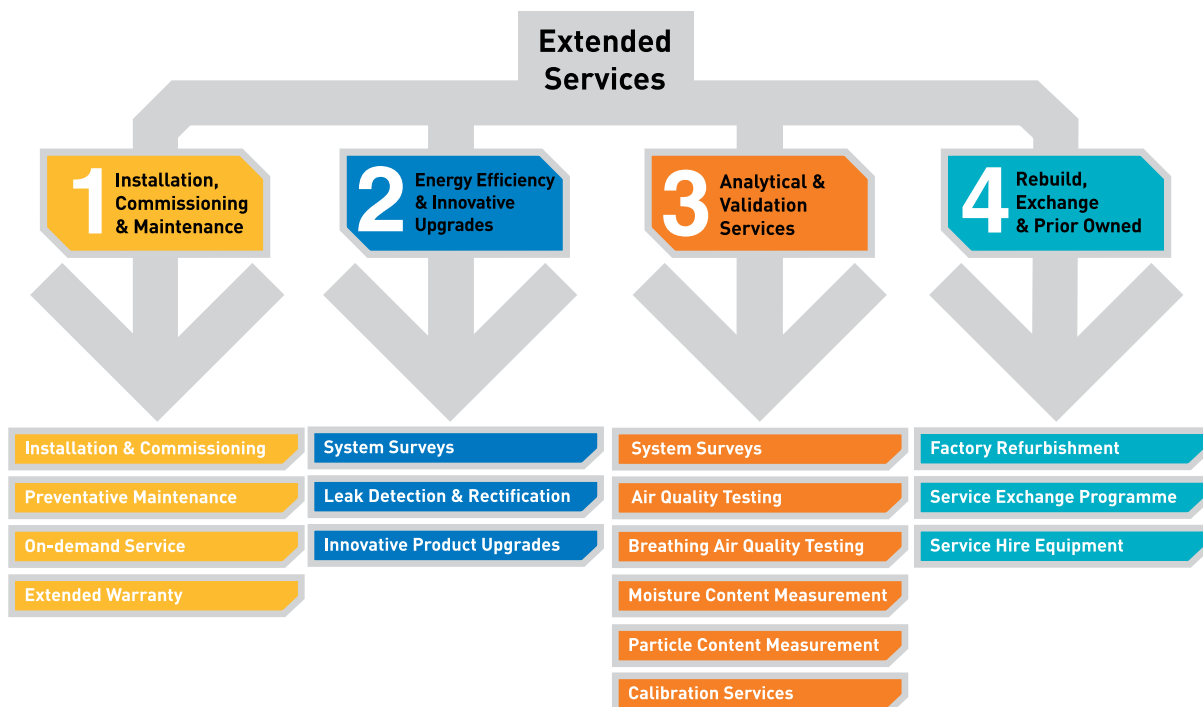
Products that are manufactured by Parker are designed to meet and often exceed international standards.

As well as the requirement for quality and reliability, there are additional factors to consider when choosing the right service provider for purification and separation systems. For example, knowledge of the many regulations regarding the management of industrial waste, energy efficiency improvement programmes and environmental considerations.

It is anticipated that future legislations will demand further in-depth technical and knowledge based support from service providers.

Parker's commitment to industry does not stop with the supply of high quality products. It is also committed to ensuring that its equipment provides a trouble-free service from a bespoke maintenance and verification package – all tailored to specific requirements.

The company offers a wide range of valuable services that will impact positively on business production efficiencies and product quality, with reduced production rejections and operational costs. From initial selection to installation, commissioning, preventative maintenance and extended services, Parker is redefining customer service.



Parker's Motion & Control Technologies

At Parker, we're guided by a relentless drive to help our customers become more productive and achieve higher levels of profitability by engineering the best systems for their requirements. It means looking at customer applications from many angles to find new ways to create value. Whatever the motion and control technology need, Parker has the experience, breadth of product and global reach to consistently deliver. No company knows more about motion and control technology than Parker. For further info call 00800 27 27 5374.



AEROSPACE

Key Markets

- Aircraft engines
- Business & general aviation
- Commercial transports
- Land-based weapons systems
- Military aircraft
- Missiles & launch vehicles
- Regional transports
- Unmanned aerial vehicles

Key Products

- Flight control systems & components
- Fluid conveyance systems
- Fluid metering delivery & atomization devices
- Fuel systems & components
- Hydraulic systems & components
- Inert nitrogen generating systems
- Pneumatic systems & components
- Wheels & brakes



CLIMATE CONTROL

Key Markets

- Agriculture
- Air conditioning
- Food, beverage & dairy
- Life sciences & medical
- Precision cooling
- Processing
- Transportation

Key Products

- CO² controls
- Electronic controllers
- Filter driers
- Hand shut-off valves
- Hose & fittings
- Pressure regulating valves
- Refrigerant distributors
- Safety relief valves
- Solenoid valves
- Thermostatic expansion valves



ELECTROMECHANICAL

Key Markets

- Aerospace
- Factory automation
- Food & beverage
- Life science & medical
- Machine tools
- Packaging machinery
- Paper machinery
- Plastics machinery & converting
- Primary metals
- Semiconductor & electronics
- Textile
- Wire & cable

Key Products

- AC/DC drives & systems
- Electric actuators
- Controllers
- Gantry robots
- Gearheads
- Human machine interfaces
- Industrial PCs
- Inverters
- Linear motors, slides and stages
- Precision stages
- Stepper motors
- Servo motors, drives & controls
- Structural extrusions



FILTRATION

Key Markets

- Food & beverage
- Industrial machinery
- Life sciences
- Marine
- Mobile equipment
- Oil & gas
- Power generation
- Process
- Transportation

Key Products

- Analytical gas generators
- Compressed air & gas filters
- Condition monitoring
- Engine air, fuel & oil filtration & systems
- Hydraulic, lubrication & coolant filters
- Process, chemical, water & microfiltration filters
- Nitrogen, hydrogen & zero air generators



FLUID & GAS HANDLING

Key Markets

- Aerospace
- Agriculture
- Bulk chemical handling
- Construction machinery
- Food & beverage
- Fuel & gas delivery
- Industrial machinery
- Mobile
- Oil & gas
- Transportation
- Welding

Key Products

- Brass fittings & valves
- Diagnostic equipment
- Fluid conveyance systems
- Industrial hose
- PTFE & PFA hose, tubing & plastic fittings
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects



HYDRAULICS

Key Markets

- Aerospace
- Aerial lift
- Agriculture
- Construction machinery
- Forestry
- Industrial machinery
- Mining
- Oil & gas
- Power generation & energy
- Truck hydraulics

Key Products

- Diagnostic equipment
- Hydraulic cylinders & accumulators
- Hydraulic motors & pumps
- Hydraulic systems
- Hydraulic valves & controls
- Power take-offs
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters
- Quick disconnects



PNEUMATICS

Key Markets

- Aerospace
- Conveyor & material handling
- Factory automation
- Food & beverage
- Life science & medical
- Machine tools
- Packaging machinery
- Transportation & automotive

Key Products

- Air preparation
- Compact cylinders
- Field bus valve systems
- Grippers
- Guided cylinders
- Manifolds
- Miniature fluidics
- Pneumatic accessories
- Pneumatic actuators & grippers
- Pneumatic valves and controls
- Rodless cylinders
- Rotary actuators
- Tie rod cylinders
- Vacuum generators, cups & sensors



PROCESS CONTROL

Key Markets

- Chemical & refining
- Food, beverage & dairy
- Medical & dental
- Microelectronics
- Oil & gas
- Power generation

Key Products

- Analytical sample conditioning products & systems
- Fluoropolymer chemical delivery fittings, valves & pumps
- High purity gas delivery fittings, valves & regulators
- Instrumentation fittings, valves & regulators
- Medium pressure fittings & valves
- Process control manifolds



SEALING & SHIELDING

Key Markets

- Aerospace
- Chemical processing
- Consumer
- Energy, oil & gas
- Fluid power
- General industrial
- Information technology
- Life sciences
- Military
- Semiconductor
- Telecommunications
- Transportation

Key Products

- Dynamic seals
- Elastomeric o-rings
- EMI shielding
- Extruded & precision-cut, fabricated elastomeric seals
- Homogeneous & inserted elastomeric shapes
- High temperature metal seals
- Metal & plastic retained composite seals
- Thermal management



ENGINEERING YOUR SUCCESS.

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