



FFKM / FKM / HNBR ELASTOMERS | ANTI EXPLOSIVE DECOMPRESSION & SOUR GAS RESISTANT MATERIALS

# Fluid sealing solutions for the **OIL & GAS INDUSTRY**



**BARNWELL**  
THE SEAL OF APPROVAL





# QUALITY AND SERVICE GUARANTEED

## Total Sealing Solutions

Founded in 1972, M Barnwell Services is a family business and prides itself on providing expert industry knowledge, technical expertise, products and services to over 5000 customers globally – quickly and reliably. Our range of fluid sealing products include O Rings, Oil Seals / Rotary Shaft Seals, Gaskets, Fasteners, Sealing Kits, Special Rubber Mouldings, Mechanical Seals, Hydraulic and Pneumatic Seals and many more.

We aim to work in partnership with you to reduce your supplier base, inventory and long-term costs. Applying our unique product knowledge to your specific needs, we will always offer the right sealing solution for your industry and application.

M Barnwell Services range of services include:

- ❖ Stocking/Supplying a vast and diverse product range – £3 million inventory
- ❖ An efficient logistical capability offering International coverage
- ❖ Industry leading bespoke Branding and Packaging technology
- ❖ Full documentation service and manufacturer guarantees
- ❖ Strategic partnerships with large Blue Chip customers and leading worldwide brands
- ❖ Seal Maker and Clean Room services that are tailor-made to the customer's needs
- ❖ A dedicated Export Department – providing sealing solutions to over 60 countries

## OIL & GAS

- ✦ Downhole Tools
- ✦ Valves
- ✦ Pumps
- ✦ Compressors
- ✦ Christmas Trees
- ✦ Wellhead Tools
- ✦ Completion Tools
- ✦ BOP's

- ✦ Pipeline Closures
- ✦ Valves
- ✦ Compressors
- ✦ Turbines

- ✦ Pumps
- ✦ Valves
- ✦ Compressors
- ✦ Mechanical Seals
- ✦ Filtration Equipment

## UPSTREAM

## MIDSTREAM

## DOWNSTREAM



# Reliability and Safety



Oil exploration and extraction presents some of the most challenging conditions for seals; a combination of extreme temperatures, aggressive chemicals and gases, abrasive media, high pressure and destructive forces, subject seals to the harshest environments. Combined with the importance of reliability and safety, there is no margin for error. M Barnwell Services specialises in critical sealing applications where failure is not an option, providing its customers with the confidence that their seals will deliver optimum performance.

## Exceeding Your Expectations

As the techniques used to exploit reserves become more complex, we continually seek the next generation of materials and products that not only keep pace with the current needs of the industry but look to future requirements. Regardless of the application, you can be sure that our seals will continue to meet and exceed your expectations. Below are some examples of the benefits M Barnwell Services have provided in various oil and gas applications:

- ✦ Increased reliability and safety with seals that resist rapid gas decompression and high temperatures in centrifugal compressors
- ✦ Extended service life and reduced repair costs with chemically inert sealing materials for pumps
- ✦ Extended service life and reductions in fugitive emissions in valves
- ✦ Improved seal integrity and environmental safety in pipeline closures
- ✦ Reduced risk of failure and loss of capital equipment with critical PTFE lip seals for remotely operated vehicles (ROVs)
- ✦ Increased operating periods between maintenance cycles in high pressure rotary and hydraulic sealing systems
- ✦ Fail safe seals for platform decommissioning that meet stringent safety requirements

## Material Qualifications

Rapid Gas Decompression (RGD) is a particular concern to users of oil and gas equipment. M Barnwell Services have access to laboratories that contain several high pressure test rigs for the development and testing of RGD resistant elastomers to industry standards such as **NACE TM-0297, NORSOK M710 Annex B, and ISO 23936-2**. For critical applications customer-specific testing is often carried out to much more challenging criteria, beyond the standard tests, to validate materials and provide confidence in a sealing solution that meets an application's specification or environmental conditions.

M Barnwell Services partnership suppliers carefully control material formulations and chemistry for consistency and reliability, so seals that are qualified from prototypes are the same materials that go into production.

For seals operating in sour gas conditions, our materials have undergone extensive testing to standards such as **NORSOK M710 Annex A**. Additional testing has also been carried out at H<sub>2</sub>S levels of 25%, much higher than the standard tests, which provides a thorough understanding of sealing performance in high concentration sour gas. ISO 10423 (API 6A) testing in FF/HH conditions to support the qualification of trees and wellhead equipment is also available.





## O Rings

Fully moulded O-rings can be manufactured in any size or quantity, allowing M Barnwell Services O-rings to be specified in all locations. Standard ISO (BS and DIN) sizes, international and non-standard sizes available.



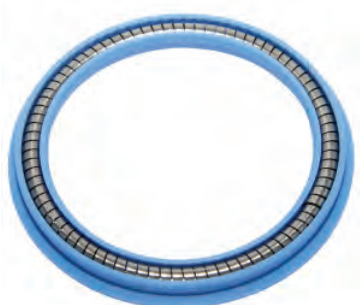
## Bespoke PTFE Seals

Typically used for sealing rotary shafts in dry operating conditions and high operating temperatures, PTFE seals are designed for durability and offer exceptional chemical resistance to aggressive media. Spring energised PTFE seals offer efficient sealing of reciprocating, rotary or swiveling equipment. Other PTFE products include piston rings, packings and composite seals.



## Rotary Seals & Mechanical Seals

High performance rotary components for pumps, compressors and other oilfield equipment provide easy fitting, extended service life, leak tightness, reliability and low friction in arduous applications.



## Spring Energised Seals

Moulded from a high modulus elastomer with two integrated anti-extrusion springs; spring seals provide a versatile sealing system for bi-directional, high pressure applications in static conditions. Specifically designed for downhole, wellhead, surface equipment and high pressure pipelines, and riser systems.



## Custom Moulded Seals

Seals can be designed and manufactured to customer-specific requirements, moulded in almost infinite shapes, sizes and profiles. Customized rubber-to-metal or plastic parts for specialized oil tools, subsea production equipment and valves can be provided where engineered solutions are required.



## Bushings and Bearings

Various types of sliding element bearing products are available to suit extreme applications; including custom materials for applications where there is a lack of lubrication, elevated temperatures or aggressive chemicals. Self-lubricating components can withstand temperatures up to 400°C (752°F) and provide extended performance in dynamic sealing applications.

X-rings, T-seals, lip seals, wipers, packings and back-up rings also available.



# FFKM Perfluoroelastomers



The ultimate perfluoroelastomers for sealing applications where chemical resistance and high temperature / pressure performance are critical.



## What is FFKM?

The range of perfluoroelastomers (FFKM) has been developed to seal in the most aggressive fluid environments and temperatures. Each FFKM material grade is designed to overcome specific sealing challenges found in the oil and gas, chemical processing and flow management industries.

The FFKM range includes perfluoroelastomers that not only withstand high temperatures but can resist steam, amines, polar solvents, aromatic hydrocarbons, oil, fuels and thousands of other chemicals. Within the product family there are materials designed to **resist rapid gas decompression (RGD)** for valves and oil equipment, endure extreme high temperatures for chemical processing applications, and operate in a variety of chemicals for use in rotating equipment and mechanical seals.

## Why M Barnwell Services FFKM?

FFKM perfluoroelastomers push the boundaries of polymer technology for critical elastomer sealing in extreme temperature and pressures. Our design capability, coupled with industry-leading material compounding ensures the optimum sealing solution, reinforced by various industry qualifications.

- ✦ Design advice to optimize the seal for the intended operating conditions
- ✦ Shortest manufacturing lead-times
- ✦ Global sales, manufacturing and support coverage
- ✦ Expert technical support both before and after the sale

Other FFKM's are also available including Kalrez®, Chemraz®, Simriz™, etc...  
For more information contact us today



## Why use FFKM?

### High temperature performance

- ✦ High temperature capability to 325°C (617°F)
- ✦ Low temperature capability to -46°C (-51°F)
- ✦ Engineering support to design non-standard and custom seals that operate over the full temperature range
- ✦ Third party certifications to NORSOK M710, NACE, ISO23936 & ISO10423 (API 6A)

### Chemical resistance

- ✦ Broad chemical resistance including solvents, steam and amines
- ✦ FFKMs are fully fluorinated and provide almost universal chemical resistance
- ✦ H<sub>2</sub>S resistance - FFKMs are resistant to sour gas. (High concentration H<sub>2</sub>S and high temperature test data is available)



## FFKM Products

FFKM elastomers can be moulded into a wide range of shapes, profiles and sizes to suit any sealing application. Typically FFKM elastomers are available as O-rings, X-rings, T-Seals, L-Seals, wipers, spring energised seals and many more profiles, including custom designed components and metal bonded parts.

FFKM O Rings are also used in the Oil & Gas, Chemical, Aerospace, High Vacuum Technology and Semiconductor industries.

## Typical Applications

Materials are typically used in a wide range of critical sealing applications within the oil and gas and chemical processing industries including:

- ✦ Subsea and surface equipment
- ✦ Mechanical seals
- ✦ Completion tools
- ✦ Production tools
- ✦ Compressors
- ✦ Pumps
- ✦ Valves

## Design Service and Material Testing

With many years of experience in the oil and gas industry, M Barnwell Services has the technical knowledge and expertise to provide sealing solutions for the most critical and challenging applications. Our team of application engineers work closely with customers, from initial concept through design, testing, commissioning, and operation. M Barnwell Services has access to laboratories in the UK, including RGD resistance, fluid compatibility, material and seal failure analysis.



The chemical and heat resistance of Perfluoroelastomer are similar to those of PTFE and combine the positive properties of a PTFE O Ring with the elasticity of FKM / Viton® O Ring



## Case study: MBMS0493 High Pressure & Ultra Low Temperature FFKM spring energised seals

A subsea application required a spring energised seal that would operate in demanding high pressure field conditions and provide a life expectancy of 40 years plus.

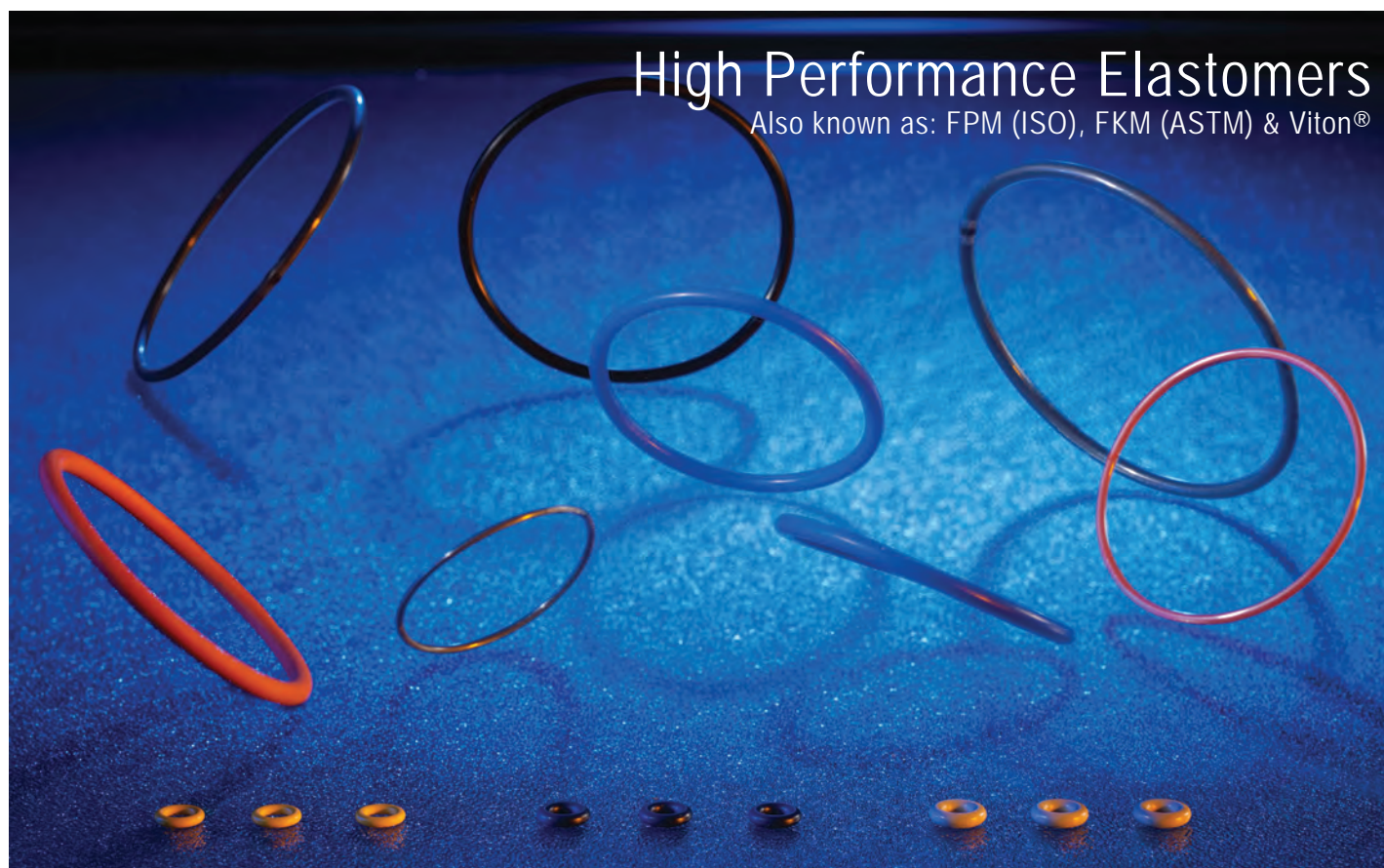
Field conditions included a combination of aggressive control fluid, potential 20% CO<sub>2</sub>, 10,000psi pressure and an operating temperature range of +155°C (+311°F) down to -40°C (-40°F) due to system blow down and the risk of the adiabatic effect taking place.

M Barnwell Services MBMS0493 FFKM in the form of a spring energised seal was the recommended solution. The material was tested to API 6A (PR2) by the customer and also RGD tested at +155°C (+311°F) with 20% CO<sub>2</sub> (third party witnessed).

The customer benefit of the FFKM spring energised seals is that they will provide long term elastomeric properties for the life of the field, thereby eliminating expensive servicing of the equipment and seal replacement.







## High Performance Elastomers

Also known as: FPM (ISO), FKM (ASTM) & Viton®

### Fluorocarbon has excellent resistance to high temperatures and chemicals

Trade name e.g Viton® (Du Pont-Dow Elastomers). FKM materials are noted for their very high resistance to temperatures and chemicals. Other key benefits are its excellent resistance to ageing and ozone, very low gas permeability (excellent for vacuum application) and the fact that it is self-extinguishing.

The standard FKM material for O-rings has excellent resistance to mineral oils and greases, aliphatic, aromatic and chlorinated hydrocarbons, fuels, non-inflammable hydraulic pressure fluids HFD and many organic solvents and chemicals.

In addition to the standard FKM materials, a number of special compounds with different compositions of polymer chains and varying fluoro contents (65% to 71%) are developed for special applications.

FKM is generally not resistant to hot water, steam\*, polar solvents, glycolbased brake fluids and low-molecular organic acids.

### Why Fluorocarbon?

- ✦ Standard FKM/FPM Barnwell compounds
- ✦ ASTM D-2000 (SAE J200) Classification HK
- ✦ Manufactured size standards include BS1806 (BS ISO 3601-1), BS4518, SAE AS568 (Aerospace), Euro Standard Metric DIN 3771 (ISO 3601), JIS (Japanese) and we can also offer increased inspection levels to BS6442 Grade S (ISO3601-3)
- ✦ (MBMS0115 - MBMS0119) meet a range of WATER & GAS Accreditations including WRc (WRAS), DVGW (W270), DVGW (W534), ACS, NSF61, KTW & EN549.
- ✦ FDA Black FKM material is also available
- ✦ Compound approvals to Military Standard MIL-R-83248 TYP1 CLASS1, Defence Standard 02-337
- ✦ Standard operating temperature is between -20°C and +200°C
- ✦ Barnwell compounds MBMS0297 and MBMS0269 are NORSOK M-710 tested and Explosive Decompression Resistant
- ✦ Special LOW TEMPERATURE -35°C (GLT) compound available: MBMS0297
- ✦ Special HIGH TEMPERATURE +250°C compound available MBMS0056
- ✦ \*A Steam Resistant FKM is available - MBMS0254



FLUID SEALING SPECIALISTS FOR OVER 40 YEARS

| £3 MILLION INVENTORY

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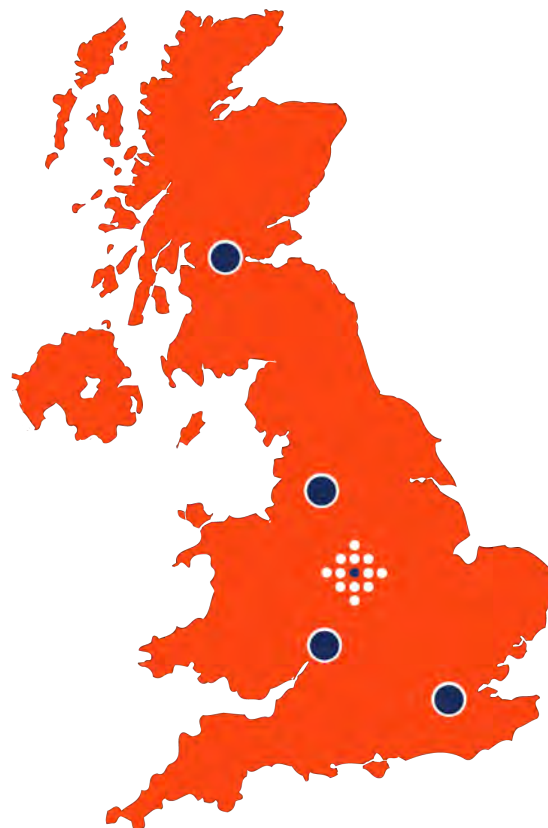
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