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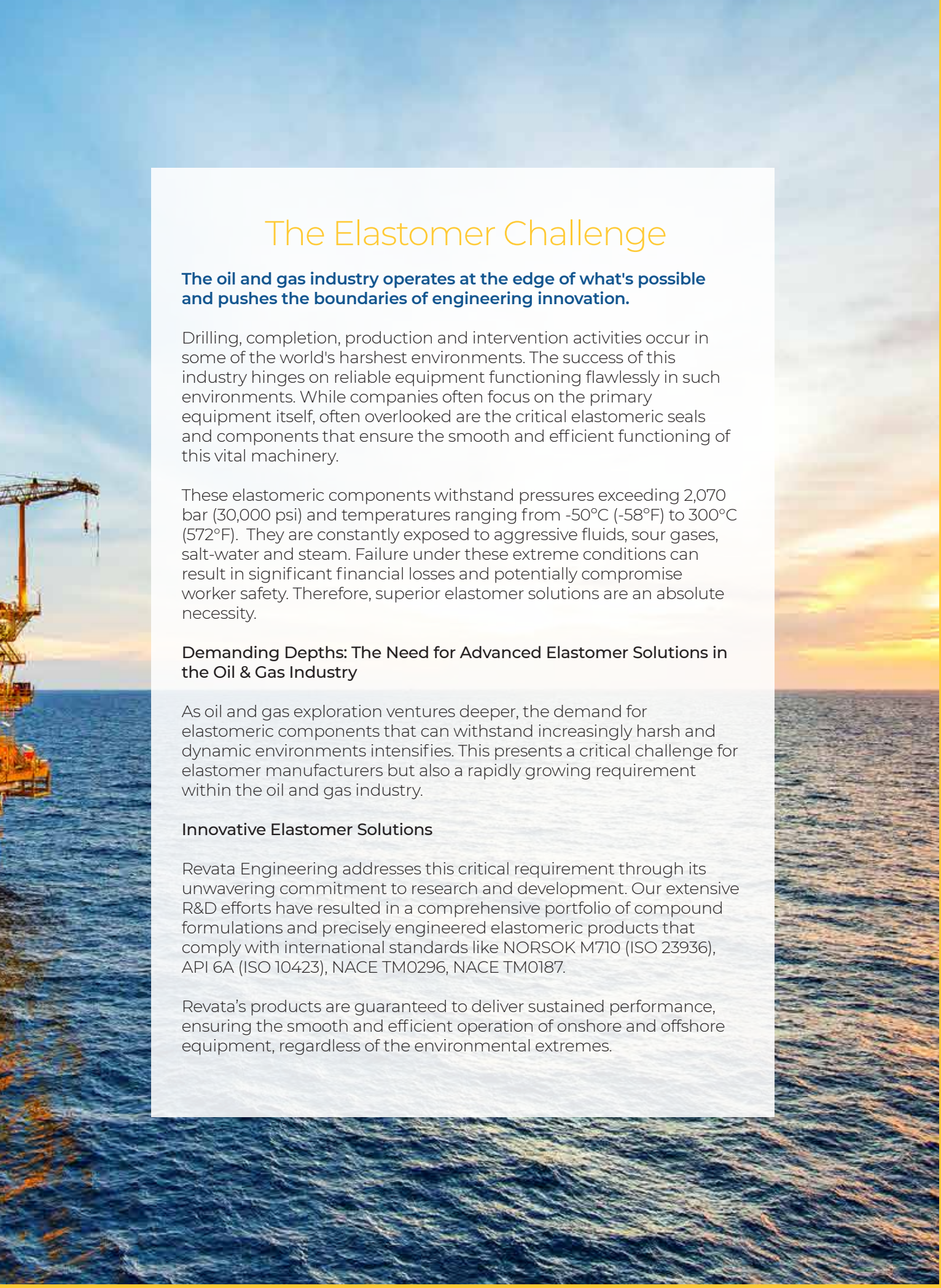
REVATA™
Engineering

Elastomer Solutions for the Oil & Gas Industry

Without elastomers, there is
no sealing,
no well control,
no safe extraction...

They are the backbone of
successful oil and gas operations.

Oil & Gas
Industry



The Elastomer Challenge

The oil and gas industry operates at the edge of what's possible and pushes the boundaries of engineering innovation.

Drilling, completion, production and intervention activities occur in some of the world's harshest environments. The success of this industry hinges on reliable equipment functioning flawlessly in such environments. While companies often focus on the primary equipment itself, often overlooked are the critical elastomeric seals and components that ensure the smooth and efficient functioning of this vital machinery.

These elastomeric components withstand pressures exceeding 2,070 bar (30,000 psi) and temperatures ranging from -50°C (-58°F) to 300°C (572°F). They are constantly exposed to aggressive fluids, sour gases, salt-water and steam. Failure under these extreme conditions can result in significant financial losses and potentially compromise worker safety. Therefore, superior elastomer solutions are an absolute necessity.

Demanding Depths: The Need for Advanced Elastomer Solutions in the Oil & Gas Industry

As oil and gas exploration ventures deeper, the demand for elastomeric components that can withstand increasingly harsh and dynamic environments intensifies. This presents a critical challenge for elastomer manufacturers but also a rapidly growing requirement within the oil and gas industry.

Innovative Elastomer Solutions

Revata Engineering addresses this critical requirement through its unwavering commitment to research and development. Our extensive R&D efforts have resulted in a comprehensive portfolio of compound formulations and precisely engineered elastomeric products that comply with international standards like NORSOK M710 (ISO 23936), API 6A (ISO 10423), NACE TM0296, NACE TM0187.

Revata's products are guaranteed to deliver sustained performance, ensuring the smooth and efficient operation of onshore and offshore equipment, regardless of the environmental extremes.

Revata
Engineering

Revata - An Elastomer Solutions Company

Our Experience

Leveraging over 15 years of experience, Revata Engineering has established itself as a leading provider of innovative elastomer solutions for the global oil and gas industry. Our deep understanding of industry-specific challenges and our continuous investment in R&D has resulted in the development of a comprehensive portfolio of elastomeric components specifically designed for the most demanding applications.

This together with our proven track record in successfully tackling complex issues like bonding failures in harsh operating fluids or elastomer extrusion in high steam geothermal wells exemplifies our dedication to delivering effective solutions.

Our Facility

In our state-of-the-art 25,000 sq. ft. facility located in Pune, India, we have in-house capabilities to control every stage of elastomer development and production.
Our polymer testing laboratory is equipped to conduct a comprehensive suite of tests that are critical in ensuring real-world performance of our solutions. Utilizing a diverse range of advanced manufacturing techniques, we achieve exceptional product quality.
Furthermore, rigorous quality control measures throughout the entire process guarantees the consistent production of fully traceable components, each manufactured for optimal performance in your demanding applications.

If you are looking for a solution to a specific challenge, we have all it takes to bring your requirement to reality.

Quality Assurance

At Revata Engineering, a commitment to quality is paramount. As an ISO 9001:2015 certified manufacturer, we adhere to the most rigorous quality management standards in the industry. Our comprehensive quality assurance system encompass every stage of the development, testing and production process. Detailed documentation, well-defined production procedures and inspection plans further safeguard consistent quality and ensure traceability throughout every project. Our unwavering commitment to excellence enables us to deliver best-in-class elastomer solutions that consistently meet the critical performance demands of the oil and gas industry.

Quality, Health, Safety, Security, Environment (QHSSE)

Revata Engineering prioritizes QHSSE, recognizing that our people are the foundation of our success. We are committed to fostering a healthy, safe and secure work environment, while minimizing our environmental impact.

This dedication extends beyond our employees. Revata embraces the 'Let's grow together' philosophy, actively contributing to the betterment of the communities we serve and work towards a sustainable future for all.

IADC MEMBER

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CERTIFIED
EN ISO 9001
Certificate No. 20100163000537
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Our Development & Testing Capabilities

Design & Validation Testing

At Revata Engineering, customer collaboration begins with our design validation and testing team. This team serves as the cornerstone of our R&D efforts, continuously developing innovative sealing solutions and proprietary material formulations. Our engineers engage in a meticulous process to understand your design, intent and application down to the finest detail. Leveraging cutting-edge tools like 3D CAD, finite element analysis (FEA) and mould flow simulation, they craft the most optimal design and formulation that seamlessly integrates your requirements into the proposed solution. FEA plays a crucial role in predicting critical parameters such as deflection, stress, reaction force and contact pressure, ensuring design soundness while minimizing development timelines and costs.

Design

3D modelling software
(handling formats such as .IGES, .STEP, .DXF, .DWG etc.)

Analysis

- Advanced FEA software for both plastic and elastomers
- Engineering library and white papers related to seals, elastomers and other materials, testing & manufacturing technology

Experimental & Validation

- Physical Properties Testing
- Ultra Low and High Temperature Testing
- Rheology
- Chemical Compatibility Testing (Pressurized / Non-Pressurized-Liquids and Gases)
- Polymer Identification Testing (FTIR)
- Compound Development
- Wear Testing (Dry, Lubricated with Temperature Control)
- Corrosion Testing
- Cyclic Temperature Curing
- Thermal Analysis (DSC, TMA, TGA)
- High Pressure / High Temperature (HPHT) Testing

Polymer Testing Laboratory: Assuring Quality And Performance

Our state-of-the-art elastomer testing laboratory drives innovation and ensures the highest quality standards in our customized sealing solutions. We meticulously test both elastomer compounds and finished products to guarantee they meet the demanding requirements of your unique applications.

List Of Laboratory Equipment

Universal Testing Machine – DAK Systems Inc, India
Environmental Chamber -70°C (-94°F) to +300°C (572°F) – DAK Systems Inc, India
Video Extensometer – DAK Systems Inc, India
Programmable Curing Ovens with Data Logger – Memmert, Germany
Low Temperature Test Chamber – National Cooling, India
Oscillating Disc Rheometers – Microvision, India
Hardness Testers (Shore A and D) – Mitutoyo, Japan & Rex Gauge, USA
Hardness Tester (Rockwell cum Brinell) – Meta-Test Instruments, India
Vernier Callipers – Mitutoyo, Japan
Micrometres – Mitutoyo, Japan
Abrasion Tester
Muffle Furnace
Lab Mixing Mill
Laboratory Press

Equipment At Our Associate Laboratory

Universal Testing Machine (up to 25kN) - Tinius Olsen, UK
Thermo Gravimetric Analyser (TGA) - Shimatzu, Japan
Ozone Chamber - In USA Inc, India
Impact Tester - Ceast, Spa, Italy
Accelerated Weathering Tester - Q Lab, USA
Heat Deflection Temperature (HDT) & VICAT Softening Temp. Tester - Ceast, Spa, Italy
Melt Flow Indexer - Tinius Olsen, UK
Multi Head Micro Hardness Tester – Gibitre, Italy

In-House Rubber Compounding And Moulding

Rubber Compounding

Bringing Formulation To Form

Rubber compounding is a precise, intricate process that transforms raw materials into custom-designed elastomer compounds with optimal properties. Our skilled compounders combine meticulous science with a craftsman's touch to control ingredient ratios and ensure uniform dispersion. Getting this right is very essential to prevent flaws like cracks, lumps or an uneven texture ensuring the consistency and reliable performance of your final products.

Precisely formulated compounds are essential for delivering tailored performance characteristics in elastomer products. By carefully selecting and combining reinforcing fillers, curatives, accelerators and specialty additives, we achieve a vast range of properties to meet the specific demands of your application.

Our in-house compounding expertise guarantees batch-to-batch consistency, giving you complete confidence in the quality and performance of your rubber components.

Precision Moulding

Guaranteed Consistency & Quality

Once the optimal compound is formulated, it seamlessly transitions to our moulding facility. We understand that no two projects are alike. That's why Revata has a diverse range of moulding machines, such as compression, transfer and injection, allowing us to select the most suitable technique, to precisely mould the compound into the desired product.

Compression Moulding

Compression moulding is a classic and versatile rubber moulding technique, ideal for large parts, complex shapes requiring inserts, or when surface finish needs to be free of gates/sprues. Its lower tooling costs make it a preferred choice for smaller production runs or unique, customized parts.

Transfer Moulding

Transfer moulding excels at intricate shapes and higher production volumes by precisely controlling the amount of compound entering the mould. This process ensures high-quality parts, minimizing post-production trimming needs. Transfer moulding also offers lower tooling costs and faster setup times for greater efficiency.

Injection Moulding

Injection moulding is the most advanced and precise rubber moulding method. Its high degree of automation supports faster, cost-effective production of large volumes of parts with complex geometries and tight tolerances. While tooling costs are higher, injection moulding guarantees superior consistency and repeatability.

By combining its extensive experience in custom elastomer compounding, with a fully integrated in-house moulding facility, Revata Engineering is able to offer its customers a comprehensive suite of customized solutions.

Our Purity Commitment

Revata Engineering is committed to ensure purity of its compounds.
We understand that diluting specialized materials with low-cost fillers or adding excessive process aids compromises the performance of the final elastomer product. Through stringent process controls, we are committed to ensure every part is made from pure, unadulterated compounds, ensuring reliability and consistency.

Polyurethane Casting

Revata uses Polyurethane to manufacture a wide range of products in the oil and gas industry including Pipe Wipers, Cementing Plugs, Pigs, Stabbing Guides and Thread Protectors.

Polyurethane casting involves creating a mould (made from steel or 3D-printed materials), pouring liquid urethane at high temperature and curing it in an oven to achieve the desired shape.
This process allows for, the inclusion of threaded or other metal components during casting, resulting in near-finished, highly detailed parts. PU casting is ideal for complex parts requiring tight tolerances. It offers cost-effective tooling for both small and large production volumes, with minimal post-production finishing needed.

Polyurethane is a remarkably versatile material. It can be formulated for a wide range of hardnesses, from rubber-like softness to the rigidity of Nylon 6/66. Polyurethane offers diverse customization options, including pigments for custom colours, lubricating additives for reduced friction and UV stabilizers for outdoor applications. It's ease of machinability further expands its application potential.

Its excellent wear resistance, high-temperature stability, high load capacity in tension and compression, resilience and shock-absorbing properties make polyurethane ideal for demanding applications. It withstands high flex fatigue, remains stable in water, oil and grease, offers electrical insulation and bonds readily to various materials. This combination of properties, along with its resistance to extreme temperatures and chemicals, makes polyurethane exceptionally durable in harsh environments.

Advanced Manufacturing And Materials

Our team of experienced design and manufacturing engineers leverages a comprehensive portfolio of advanced materials and a diverse array of production processes to translate your requirements into high performance final products.

Precision Metal & Polymer Machining

- CNC (Lathes and Mills, Including 5-axis & 7-axis)
- Manual (Lathes and Mills)

Metal Only
- Laser Cutting
- CNC Wirecut
- CNC EDM
- Surface Grinder
- Sheet Metal Pressing
- Drilling

Moulding & Casting

- Compression (Rubber, PTFE)
- Transfer Moulding
- Injection (Rubber And Plastic)
- Polyurethane Casting

In Process / Post Process Treatments

Surface Treatments
- Shot Blasting

Surface Modifications
- Sodium Etching

Coating
- Anodizing
- PTFE
- Manganese Phospating
- Zinc Phospating
- Zinc (Hot & Cold Galvanzing)
- Electroplating (Copper, Chrome, Nickel)
- Molybdenum Disulphide (MoS2)
- Epoxy

Prototyping

- 3D Printing
(PLA, ABS, PC, Nylon, HIPS, PETG, ULEM)

Filler & Reinforcement Materials

- Aramid Fiber & Fabric
- Fabric (Cotton, Nylon, Aramid etc.)
- Woven Wire mesh
- Garter Springs
- Engineering Plastics (PTFE, PEEK etc.)
- Carbon Nanotubes (SWCNTs & MWCNTs)
- Molybdenum Disulphide (MoS2)
- Glass Fiber
- Graphite
- Bronze
- Carbon

Bonding Capabilities

- Metal to Rubber
- Metal to Plastic
- Metal to Polyurethane
- Rubber to Rubber
- Rubber to Wire Mesh
- Rubber to Garter Spring
- Rubber to Plastic
- Rubber to Fabric

Custom Moulds Manufacturing

- Compression Moulding
- Transfer Moulding
- Injection Moulding
- Sheet Metal Stamping

Manufacturing Capacity

Material	Moulding Capability	Machining Capability
Thermoplastics Injection	Moulding to 30" (3.5 kgs)	Machining to 40”
Elastomers Compression	Moulding to 40”	Machining to 40”
PTFE Compression	Moulding to 35”	Machining to 35”
Cast Polymers	Cast to 50”	Machining to 50”

An Overview Of Elastomers

The broadest classification of polymers is between elastomers and plastics.

Elastomers

Elastomers are polymers that exhibit rubber-like elasticity and flexibility. They can undergo large deformations and recover their original shape after the deformation force is removed. The large family of elastomers makes them a preferred choice for sealing applications in diverse operating conditions. Rubber and Urethane (Thermoset and Thermoplastics) are two main categories of Elastomers. EPDM, HNBR, FKM, FEPM, FFKM are well known elastomers used in the oil and gas industry.

Plastics

Generally speaking, they are more rigid than elastomers, but their behaviour can range from very ductile to brittle and their chemical resistance varies greatly. Plastics are further classified to Thermoset and Thermoplastics. PTFE, PEEK, UHMWPE are commonly used plastics in the oil and gas industry.

Thermoset & Thermoplastics

Thermoplastics are able to be re-melted after polymerization, so they are moulded with a melt processing operation such as injection moulding of extrusion. Thermosets react or crosslink during moulding, so they are usually compression moulded or extruded.

How well and how long a seal performs in the harsh environments of the oil and gas industry greatly depends on the choice of sealing material. The physical properties if any polymer used is substantially influenced by the operating condition and medium of usage, making selection of the right grade very challenging as well as important.

Temperature Range & Trade Names of Common Polymer Materials

	Temp. Low °C (°F)	Temp. High °C (°F)	Common Trade Names
Rubber			
NBR (LT)	–30 (–22)	100 (212)	Chemigum®, Nipol®
XNBR	–20 (–4)	135 (275)	Chemigum®, Nipol®, Krynac®
HNBR (LT)	–25 (–13)	150 (302)	Therban®, Zetpol®
EPDM	–50 (–58)	150 (302)	Nordel®, Buna EP®, Keltan®
FKM (LT)	–20 (–4)	200 (392)	Viton®, Technoflon®, Dai-El®
FEPM (TFE/P)	–10 (–14)	200 (392)	Aflas®, Fluoraz®
FKM Extreme	–10 (–14)	200 (392)	Viton Extreme®
FFKM	–15 (–5)	290 (554)	Kalrez®, Chemraz®, Simriz®
Thermoplastic elastomers			
Standard TPU	–30 (–22)	110 (230)	Vibrathane®, Urepan®
Premium TPU	–20 (–4)	110 (230)	Vibrathane®, Urepan®
PTFE / FEP / PFA			
PTFE / FEP / PFA	–200 (–328)	260 (500)	Teflon®, Dyneon®
Filled PTFE / FEP / PFA	–200 (–328)	260 (500)	Teflon®, Dyneon®
Plastics			
Acetal	–50 (–58)	100 (212)	Delrin®, Pomalux®
PPS	–250 (–418)	220 (428)	Ryton®, Fortron®
PEEK	–60 (–76)	260 (500)	Victrex®, Arlon®, Arolux®
UHMWPE	–200 (–328)	90 (194)	Lennite®

LT = Low Temperature Compound Available

	NBR	Low temp NBR	XNBR	HNBR	EPDM	Fluoro-silicone	FKM	TFE/P	FKM Extreme	FFKM	Standard TPU	Premium TPU	PTFE	PTFE w/ C	PTFE w/ Moly Glass	Acetal	PPS	PEEK	UHMWPE
Acids																			
Inorganic diluted	0	0	0	0	+	+	+	+	+	+	-	+	+	+	+	0	+	+	+
Inorganic concentrated	-	-	-	-	+	+	+	+	+	+	-	-	+	-	0	-	-	-	-
Organic diluted	+	+	+	+	+	+	+	+	+	+	0	+	+	+	+	0	+	+	+
Organic concentrated	-	-	-	-	+	0	-	0			-	0	+	+	+	0	+	+	+
Alkalis General	0	0	0	0	+	+	0	+	+	+	-	0	+	0	0	0	+	+	+
Alcohols General	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	0	0	+
Biocides																			
Diluted	+	+	+	+	+	+	+	+	+	+	0	+	+	+	+	+	+	+	+
Concentrated	-	-	-	-	+	-	-	0	-	+	-	-	+	+	+	0	+	+	+
Brines General	0	0	0	0	+	+	+	+	+	+	0	+	+	+	+	+	+	+	+
Carbon dioxide	+	+	+	+	+	+	+	0	+	+	0	+	+	+	+	+	+	+	+
Corrosion inhibitors																			
Amine based	-	-	-	0	+	0	-	+	+	+	0	0	+	+	+	+	+	+	+
Potassium based	-	-	-	0	+	0	-	+	0	+	+	+	+	+	+	+	+	+	+
Crude Oil																			
Sweet	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Sour – up to 5% H2S	-	-	0	+	-	0	+	+	+	+	+	+	+	+	+	+	+	+	+
Sour – above 5% H2S	-	-	-	-	-	-	-	0	0	+	+	0	+	0	0	+	+	+	+
Drilling mud																			
Diesel based	0	0	+	+	-	+	0	0	+	+	+	+	+	+	+	+	+	+	+
Ester based	-	-	-	-	-	0	0	0	+	+	0	0	+	+	+	+	+	+	+
Mineral Oil based	+	+	+	+	-	0	0	0	+	+	+	+	+	+	+	+	+	+	+
Silicate based	0	0	0	+	0	+	+	+	0	+	+	+	+	+	+	+	+	+	+
Glycols General	+	+	+	+	+	+	+	+	0	+	0	0	+	+	+	+	+	+	+
Hydraulic fluids																			
Mineral Oil based	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+
HFA (water-oil emulsion)	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+
HFB (oil-water emulsion)	0	0	-	+	-	0	+	+	+	+	+	+	+	+	+	+	+	+	+
HFC (water-glycol)	+	+	+	+	+	0	+	+	+	+	0	0	+	+	+	+	+	+	+
HFD-R	-	-	-	-	+	+	0	+	+	+	-	-	+	+	+	+	+	+	+
HFD-S	-	-	-	-	-	+	+	0	+	+	-	-	+	+	+	+	+	+	+
HFD-U	0	0	0	0	-	-	+	0	+	+	+	+	+	+	+	+	+	+	+
Hydrocarbons																			
Aliphatic	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Aromatic	0	0	0	0	-	+	+	0	+	+	0	0	+	+	+	+	+	+	+
Hydrogen Sulphide	-	-	0	+	+	-	0	+	+	+	+	+	+	+	0	+	+	+	+
Methanol																			
Diluted	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Concentrated	0	0	0	+	0	+	-	+	+	+	-	-	+	+	+	+	0	0	0
Natural gas	+	+	+	+	-	0	+	+	+	+	+	+	+	+	+	+	+	+	-
Sea water	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Solvents																			
Toluene	-	-	-	-	-	0	+	0	+	+	-	-	+	+	0	+	-	-	0
Acetone	-	-	-	-	+	-	-	-	-	+	-	-	+	+	+	+	+	+	0
MEK	-	-	-	-	+	-	-	-	-	+	-	-	+	+	+	0	0	0	+
Steam	-	-	-	-	+	-	-	+	0	+	-	-	+	+	+	-	+	+	0
Water																			
General	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Produced	0	0	+	+	0	0	0	+	0	+	+	+	+	+	+	+	+	+	+
Treated	0	0	+	+	+	0	-	+	0	+	0	0	+	+	+	0	+	+	+

+ = Recommended | 0 = Moderate Attack or Temperature Dependent | - = Not Recommended

Compounds for Extreme Oil & Gas Applications

Low Temperature Compounds

Determining an elastomer's low-temperature performance is complex and application specific. Factors like pressure, seal design, storage, assembly and media all influence how the elastomer reacts. When exposed to low temperatures, elastomers lose flexibility and responsiveness, making specialized formulation essential for longevity and optimal performance.

Generic low-temperature claims based on non-standard or undisclosed testing are unreliable. The only accurate way to assess an elastomer's suitability is through application-specific tests that mirror the real-world conditions it will encounter. Revata Engineering prioritizes this rigorous approach to ensure the reliability of our elastomer solutions in demanding low-temperature environments.

To accurately assess the suitability of our elastomer compounds for low-temperature environments, Revata Engineering employs a range of test methods including real time measurement of the physical properties of the test specimens in a sub-zero environment chamber. Beyond laboratory testing, Revata Engineering goes further by working with its customers to conduct actual product evaluations to replicate real-world conditions, allowing us to validate the designs under actual application conditions.

Revata Engineering has successfully developed elastomer grades in HNBR and FKM that are validated for use in Wireline BOP Seals at temperatures as low as -45°C (-49°F)

RGD

Rapid Gas Decompression (RGD): A Critical Challenge In Oil & Gas Sealing

Rapid Gas Decompression (RGD), also known as Explosive Decompression (ED), poses a severe threat to elastomer seals within high-pressure oil and gas environments. Gases or gasses dissolved within liquid medium rapidly expand upon sudden pressure drops, potentially causing blistering, cracking and catastrophic seal failures. This phenomenon is purely physical and distinct from chemical attack, though both must be considered for optimal material selection.

Factors Influencing RGD Risk

Several factors contribute to the severity of RGD damage. These include the type of gas, elastomer choice, temperature, pressure, seal design (cross-section, groove fill), decompression rate and the frequency of decompression events.

Revata Engineering: Your RGD Solution Partner

Revata Engineering specializes in RGD resistant elastomer compounds, offering tailored solutions in HNBR, FKM and FFKM. We understand that RGD resistance requires more than simple hardness adjustments. Our precise compound formulation, processing and rigorous testing procedures ensure reliable performance in demanding applications. From O-rings to Hammer Union Seals and BOP Seals to Packer Elements, Revata Engineering ensures its compounds are RGD resistant.

Sour Gas Compounds

The Challenge Of Sour Gas

Sour gas, characterized by the presence of hydrogen sulphide (H2S), poses a significant challenge within the oil and gas industry. This corrosive gas can severely degrade standard elastomeric materials used in seals, gaskets and other critical components. H2S attacks elastomers through various mechanisms, including chemical degradation, swelling and embrittlement, leading to premature seal failures, leaks and potential safety hazards.

To combat the detrimental effects of sour gas, specialized elastomer formulations in HNBR, FKM, FEPM and FFKM have been developed. These materials are formulated to resist the harsh conditions of sour and sour gas environments, ensuring reliable performance in applications where regular elastomers would fail. Key characteristics of sour gas resistant elastomers include resistance to chemical attack, resistance to rapid gas decompression (RGD) and compatibility with high temperatures and pressures typically encountered in oil and gas operations.

Applications In Oil And Gas Sealing

Sour gas resistant elastomers find widespread use in critical sealing applications throughout the oil and gas industry. From downhole drilling tools and wellhead components to production pipelines and processing equipment, these elastomers ensure leak-free operation and safeguard the integrity of assets, protecting personnel and the environment. Examples of common sour gas sealing components include O-rings, Packer Elements, Seals, Gaskets etc.

Selecting The Right Material

Choosing the appropriate sour gas resistant elastomer depends on various factors like H2S concentration, temperature, pressure, expected operational life and compatibility with various process fluids. Industry standards like NORSOK M-710 and ISO 23936-2 provide guidelines and testing protocols for evaluating elastomer suitability in sour gas environments.

Revata Engineering has developed a range of sour gas resistant compound formulations in HNBR, FKM, FEPM and FFKM for the oil, gas and petrochemical processing industries. Special custom formulations can be made depending on specific operating conditions.

PFAS - The Road Ahead

PFAS (per-and polyfluoroalkyl substances) comprise a large group of synthetic chemicals with widespread industrial use since the 1950s. While some PFAS, such as PFOA and PFOS, present significant risks to human health and the environment, others including fluoropolymers (PTFE, FKM, FFKM), are essential for critical applications and demonstrate significantly lower potential harm.

Due to lack of clear understanding regarding the different risk profiles within the PFAS category, the entire group faces increasing regulatory scrutiny. Agencies like the European Union's ECHA and the United States' EPA propose broad restrictions that may impact even low-risk PFAS compounds, potentially disrupting industries like oil and gas where fluoropolymers are key raw materials in O-rings, BOP seals and other critical parts.

Revata Engineering remains committed to responsible supply chain management, actively restricting non-compliant PFAS use wherever feasible. We are committed to collaborating with customers, navigating the complex regulatory landscape and developing PFAS-free elastomer solutions where feasible or mandated.

Wireline BOP Inner & Outer Seals

The wireline valve (BOP) is designed to provide a positive seal around slickline or cable.

Within a wireline BOP, inner and outer seals together play a vital role in containing wellbore pressure and preventing uncontrolled fluid releases. These seals are rated to work at 1,035 bar (15,000 psi) and in temperatures as low as -40°C (-40°F).

Specially formulated compounds ensures that the elastomer and the metal plates stay bonded together even under the most severe operating conditions.

A proprietary dual hardness design ensures the rubber does not extrude from the wireline area.

Available to suit Wireline Valves with bore sizes 3" to 9" and for Slickline, Electric Line and Coil Tubing Service

Materials: HNBR, FKM, FEPM

Packer Elements

A Packer is a key piece of downhole equipment in many completions and is used to seal the annular space between the wellbore and tubing string.

A key component of the Packer is the Packing Element which is an elastomeric seal that creates the seal between its exterior and the inner wall of the casing.

Elements produced in our specially formulated compounds resist high temperatures, high pressures, rapid gas decompression, abrasive completion fluids, corrosive environments, high circulation and more.

Revata manufactures Packer Elements for use in Liner hangers, Cement Retainers, Hydraulic Retrievable Packers, Bridge plugs, Mechanical Set Packers, Tension Packers, Seal Bore Packers etc.

If required, metallic and non-metallic back-up materials can be incorporated.

Materials: NBR, HNBR, FKM, FEPM

S / FS Seal

S Seals and FS Seals are crucial components in wellhead equipment, ensuring reliable and safe operation in oil and gas production. Suited for sealing wellheads, connectors, downhole tools, high pressure valves and other demanding oil and gas applications.

The S Seal design enables it to withstand large extrusion gaps and high pressures when energized.

FS Seals offer excellent sealability in areas where a high degree of seal deflection is necessary.

These are manufactured to Standard AS568B housing sizes with option for custom size manufacturing.

The commonly used Elastomer materials include HNBR, FKM, FEPM.
The spring materials include SS316, Nickel based Alloy, Bronze or Peek.

Wire Mesh Bonded Elements for Thermal Application

Metal Wire Mesh reinforced sealing elements are used in downhole Packers to seal an annular space between the pipe and liners having large extrusion gap.

The wire mesh reinforcement is compressed to the desired density and shape and can be impregnated with a range of elastomer compounds depending on the application.

These seals have very high anti-extrusion properties as the mesh bonds to the elastomer during moulding process. This prevents migration of the seal material through the porosity of the mesh into the extrusion gaps during use in HPHT applications.

Wire mesh reinforced EPDM & FEPM elements are often used for high pressure applications with exposure to steam.

Wiper Plugs / Elements

A range of down-hole oilfield wiper plugs are used for well completion in the oil and gas industry. These include Liner Wiper Plugs, Cementing Plugs and Flex Plugs. Revata manufactures Wiper Plugs for use in subsea, surface, liner and multistage cementing applications.

These plugs are built from NBR, XNBR, HNBR, FKM or Polyurethane.

The material selection depends on the application and well conditions.

The elastomers we formulate are compatible for use with a wide range of wellbore fluids and provide superior abrasion resistance and wiping performance thus reducing well construction costs.

Some wiper plug models use metal inserts or cores which are made from Phenolic Resins, Drillable Aluminum or custom materials.

A strong bonding between the core or insert and the elastomer ensures the wiper does not fail on the job.

Depending on type of wiper, the sizes vary from 2-3.8" to 24".

Spring Packer Sleeve (Dual Hydraulic Pack-off Head)

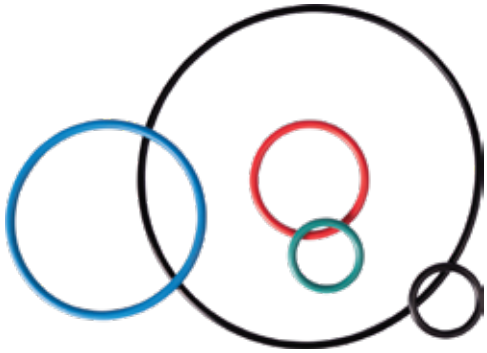
The Rubber Spring Sleeve is a critical component in a Hydraulic Pack-Off Head assembly.

These spring sleeve elements are moulded while the spring is in an energized state.

Post moulding the spring remains bonded to the rubber in an energized state.

Perfect bonding and tight tolerance are critical to the optimum functioning of the Spring sleeves.

O-Rings



O-rings are exceptionally versatile sealing devices that play a critical role in preventing leaks throughout oil and gas equipment, from pipelines and valves to drilling rigs.

They are available in a range of elastomer compounds that are compatible with virtually all media commonly used in oil and gas applications and work in temperatures as low as -65°C (-85°F) to as high as +325°C (617°F).

In addition, special coloured and PTFE coated O-Rings are available for easy identification and installation.

Revata manufactures O-rings in standardized sizing systems like AS-568 and ISO 3601 and in compounds tested to standards like NORSOK M-710, API 6A etc.

Vee Packings (Chevron Seals)

In the oil and gas industry, Vee Packings also called Chevron Packings, are reliable workhorses.

They are used in a very vast range of equipment from Mud Pumps to Downhole Wireline Tools.

Their self-adjusting, multi-lip design allows them to conform to slight imperfections in sealing surfaces, making them suitable for a wider range of equipment.

Manufactured by moulding or machining, their unique design makes them capable of sealing at extremely high pressures.

Given their extensive use across various operating conditions, Revata manufactures them in a wide range of materials such as NBR, HNBR, FKM, FFKM, PU, PTFE as well as blends such as FKM-Kevlar, FFKM-Kevlar, Moly glass filled PTFE, Graphite filled PTFE etc. and with reinforcement material such as fabric.

Hammer Union Seals

Hammer Unions are high-pressure connections used in the oil and gas industry, to seal two pieces of pipe or hose together. Critical to the safety in such high-pressure connections are the Hammer Union Seals.

They are available in a full elastomer version or with a metal anti-extrusion ring for enhanced strength and extrusion resistance at high pressures.

Bonding between the metal and elastomer is critical to the success of these seals. Failure of the metal ring to bond to the elastomer can result in connection failure.

Our Hammer Union Seals are design validated for use at 1,035 bar (15,000 psi) and for a temperature range of -30°C (-22°F) to 260°C (500°F). Special elastomer compounds are available for RGD and sour gas resistance.

Sizes available: 1" to 6"
Available Grades: NBR, HNBR, FKM, FEPM
Reinforcement materials: Stainless Steel, Brass.

Pack-off Wiper Element

The main function of the Pack-Off Element is to restrict wellbore fluids and gases beneath it by providing sealing effect around static cable.

The Liner wiper seal also strips wellbore fluids from the braided wireline traveling through it to containment system in grease injection head.

These elements are available in two halves and can be replaced with cable through the Pack-off assembly.

Available Grades: NBR, HNBR, FKM or FEPM to suit different well conditions.

Line sizes: 1/8", 3/16", 7/32", 1/4", 9/32", 5/16", 3/8", 7/16", 15/32", 1/2".

Greaseless Wireline Pack Off Rubber

The Greaseless Wireline Pack-off rubbers are used primarily to restrict wellbore fluids and gases beneath it by providing sealing effect around a greaseless wireline.

They are manufactured with special top and bottom fabric reinforcements to prevent extrusion.

Available in various elastomer grades with additives to suit service conditions.

Manufactured in a separate colour for each wire size, they are easy to identify and reduce errors from usage of incorrect sizes.

Available in ID sizes 0.370, 0.355, 0.345, 0.325, 0.360 and 0.340

Cone Packings

Stuffing Box Cone Packing is a material used to seal the stem of a valve and is inserted into an annular space called the stuffing box.

Our Stuffing Box Cones are designed to create a solid inner seal for polished rods to efficiently ride through.

We offer a broad range of sizes, materials and designs to best fit your stuffing box configuration.

They are available in different hardness of elastomers such as NBR, SBR, HNBR, EPDM and with filler materials such as Brass, PTFE, Graphite and Kevlar to meet all types of service conditions.

They are available in sizes 1-1/8", 1-1/4", 1-5/16", 1-1/2" & 1-3/4"

Stuffing Box Packing Seal

Stuffing Boxes are used to provide a tight seal around solid wireline, whether stationary or moving.

Revata manufactures Stuffing Box Packings in various materials such as Polyurethane and Nitrile, various types such as solid or fabric impregnated and various hardness such as 70 or 90 Duro.

The material selection depends on the temperature in which they will operate.

Blow Out Plug

Sitting at the bottom of the Stuffing Box, the Blow Out Plugs are designed such that when the well bore pressure blows past the top of the stuffing box, these plugs will seal on the wire.

Available Grades: NBR, HNBR, FKM to suit different well conditions. The metal casing is made in stainless steel.

U Stem Packings

Stem Packings, also known as U-packing, are used between the Stem and Bonnet of Type F and FC Gate Valves.

These seals are made up of a Virgin PTFE shell bonded to an energizer rubber material such as NBR, HNBR or FKM.

PTFE has an extremely low coefficient of friction making it a very difficult material to bond with any elastomer.

A special chemical surface treatment is carried out to defluorination the surface of PTFE and improve its bondability.

If the PTFE does not bond well to the elastomer it can result in valve leakages.

Snubbing Stripper

Revata's Snubbing Strippers are made up of a non-sparking Brass or Steel support ring onto which a polymeric sealing element is moulded.

The metallic support ring increases resistance to pressure.

They are made from specially formulated Polyurethane compound that has higher tensile strength and enhanced friction and abrasion resistance.

Excellent resistance to a range of chemicals commonly present in oil and gas workover operations including Synthetic or Oil based muds.

They are designed for use in pressures 70 to 550 bar (1,000 to 8,000 psi) and temperatures -10°C to +110°C (14°F to 230°F)

They are compatible with all existing stripper heads and available in any size bore for the 4 1/16", 7 1/16" strippers.

Coil Tubing Stripper Rubber

The Coiled Tubing Stripper rubber is a sealing element used in the Coil tubing.

They play an important role in ensuring safe and clean working environments when running or pulling coiled tubing string.

As the tubing goes in or out of the hole it is wiped by the Stripper Rubber

Revata has developed Polyurethane compounds with special friction reducing additives, enhanced chemical degradation resistance and higher abrasion resistance. They are not affected by synthetic based drilling muds.

They are designed for use in pressures 70 to 550 bar (1,000 to 8,000 psi) and temperatures -10°C to +110°C (14°F to 230°F)

They are compatible with all existing stripper heads and available in any size bore for the 4 1/16", 7 1/16" strippers.

Pneumatic / Clamp-on Casing Protectors

Pneumatic or Clamp-on Casing Protectors eliminate damage to the tubular threads during transportation and guarantee total threaded ends protection against physical damage that may occur during handling.

Clamp-on Casing Protectors have a strong steel cage moulded into the body to provide high clamping force that is necessary to secure the protector onto the tubular threads.

Pneumatic Air Operated Protectors are easy to uninstall by simply pressing on the air release valve.

They are made from high grade UV stabilized polyurethane that has excellent abrasion, impact & wear resistance properties.

Use Of Elastomers In The Oil And Gas Industry

WELL DRILLING

Oil well drilling is the process of using drilling rigs to bore deep holes in the earth (onshore & offshore) to extract oil and gas to the surface. Ensuring safety and performance of these drill rigs are the elastomers used in various critical equipment of the rig. As these rigs drill deeper into the earth the equipment and seals used are exposed to extremely high pressures and temperatures.
Abrasive drilling muds and mechanically hostile operating conditions demand the use of resilient elastomer compounds specifically developed to ensure long service life of seals in such conditions.

APPLICATION

- Drilling Tools, Bits & Accessories
- Blow-out Preventers
- Drilling Mud Systems
- Well Logging
- Casing & Pipe Connections
- Sub-sea Riser Systems
- Control Valves
- Compressors & Pumps
- Drilling Rig Floor Tools

KEY CHALLENGES

- High Pressure
- High Temperature
- Abrasive Drilling Fluids
- Swelling Resistance
- Elastomer Extrusion
- Bonding Failure
- Chemical Resistance
- Abrasion Resistance
- Drilling Fluid Resistance

PRODUCTS

- O-rings
- Back-up Rings
- Pipe Wipers
- Hammer Union Seals
- Casing Protectors
- Packer Cups
- S Seals
- T Seals
- BOP Seals
- Bonded Seals

MATERIALS

- EPDM
- NBR
- XNBR
- HNBR
- FKM
- FEPM
- FFKM

WELL COMPLETION

Well completion is a series of tasks required to make a well ready for production (or injection), the most important one being cementing. Seals and other elastomer components used in the completion equipment play an important role in ensuring the integrity and functionality of equipment and the well. From temperatures as low as - 50°C (58°F) in regions like Norway to extreme high temperatures of over 300°C (572°F) in steam injection wells, these elastomer components have no option but to sustain it all. Seals in well completion systems are used either for short-term applications after which they are changed or maintained, or long-term applications in which they are expected to perform without change or maintenance for over 20 years.

APPLICATION

- Wellhead Completion Assemblies
- Christmas Trees
- Cementing Equipment
- Tubing Hangers
- Production Packers
- Bridge Plugs
- Safety Valves

KEY CHALLENGES

- Extreme High or Low Temperatures
- High Pressures
- Chemical & Gas Compatibility
  Steam Resistance
- Extrusion Resistance
- RGD Resistance
- Low Friction

PRODUCTS

- O-rings
- Back-up Rings
- Cementing Plugs
- Wiper Elements
- Packer Elements
- Bonded Elastomer Components
- Custom Moulded & Machined Seals

MATERIALS

- NBR
- XNBR
- HNBR
- FKM
- FEPM
- FFKM

WELL PRODUCTION

Well production is one of the most critical stages in the life of an oil well as it transforms a drilled and completed hole into a flowing well. Once the well is completed and the chosen lift method is in place, this phase focuses on extracting oil efficiently and maintaining the well's functionality throughout its lifespan. Elastomer components in well production and service applications are exposed to a wide range of aggressive chemicals such as acids, brines, service fluids and sour gases like H2S etc. Different formulations are designed to excel in specific environments. Some handle high temperatures, while others resist specific chemicals commonly encountered in wells.

APPLICATION

- Packers
- Gas Lift Valves
- Artificial Lift Systems
- Christmas Trees
- Injection Systems
- Well Service Tools
- Production Blow out Preventers
- Submersible Pumps
- Pump Jacks
- Compressors

KEY CHALLENGES

- Extreme High or Low Temperatures
- High Pressures
- Chemical & Gas Compatibility
- Steam Resistance
- Extrusion Resistance
- Corrosion Resistance
- RGD Resistance
- Compliance with Industry Standards such as API & NORSOK

PRODUCTS

- O-rings
- Packer Elements
- Back-up Rings
- Cementing Plugs
- Hammer Union Seals
- Wiper Elements
- S Seals
- FS Seals
- Packer Elements
- Bonded Elastomer
- Components
- Custom Moulded &
- Machined Seals

MATERIALS

- NBR
- XNBR
- HNBR
- FKM
- FEPM
- FFKM

WELL INTERVENTION

Well intervention, the process of maintaining and optimizing oil and gas wells, is a complex operation fraught with several challenges. Every well is unique and downhole conditions can be unpredictable. Deepwater and high-pressure / high-temperature (HPHT) wells pose specific challenges. Deploying equipment and ensuring its functionality under extreme pressure and depth is difficult, further complicating intervention procedures.
The right selection of elastomers that can sustain such extreme conditions has a direct impact on the efficiency, safety and ultimately, the profitability of the well.

APPLICATION

- Coiled Tubing Equipment
- Slickline Equipment
- Wireline BOP Valves
- Wireline Systems
- Logging Tools
- Actuators
- Christmas Trees

KEY CHALLENGES

- Extreme High or Low Temperatures
- High Pressures
- Chemical & Gas Compatibility
- Extrusion Resistance
- RGD Resistance
- Compliance with Industry Standards such as API & NORSOK

PRODUCTS

- Wireline BOP Seals
- Hammer Union Seals
- Packer Elements
- Wiper Elements
- Packoff Elements
- Bonded Elastomer Components
- Custom Moulded & Machined Seals

MATERIALS

- NBR
- XNBR
- HNBR
- FKM
- FEPM
- FFKM

Developing Solutions for **Geothermal** *Applications*

Harnessing Geothermal Energy

Interest in geothermal energy as a sustainable power source is growing. Steam and hot water reservoirs below the earth's surface can power turbines for electricity generation.

Sealing Challenges in Geothermal Environments

Elastomeric seals, known for maintaining integrity despite movement in sealing surfaces, have proven effective in oil well applications with temperatures up to 121°C (250°F).
However, geothermal applications present extreme challenges with temperatures reaching 315°C (600°F), where most elastomers harden or lose elasticity, compromising their sealing function. Additionally, aggressive geothermal environments containing hydrogen sulphide, steam, hydrocarbons and ammonia can degrade certain polymers.

Sealing Solutions

Revata Engineering has developed EPDM and FEPM compounds with high-temperature and steam resistance for geothermal applications. Our R&D team is continually innovating, developing application-specific sealing solutions like FEPM Packer Elements with integrated Wire Mesh for anti-extrusion reinforcement.

We are also researching on elastomer formulations incorporating carbon nanotubes to enhance mechanical and chemical resistance for the demanding conditions of geothermal wells.

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Innovation Perfected

REVATA ENGINEERING PVT LTD
W-20, S Block, M.I.D.C. Bhosari, Pune - 411026 India
+91 20 2729 3506 | info@revataengineering.com

www.revata.in

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