



SOLVAY

asking more from chemistry®

**Reliable Performance in
O&G Extreme Environments**

**SPECIALTY
POLYMERS**

Flexible Pipes

Risers, Flowlines, Reinforced Thermoplastic Pipes (RTP) and Umbilicals

Solvay specialty polymers used in flexible pipes offer safe and reliable performance in service conditions, with temperatures of up to 180 °C and internal pressures that reach 1,000 bar. They are highly-resistant to oilfield fluids, H₂S and CO₂ and they allow for easy reeling due to the optimal balance of mechanical strength with flexibility.

Solef® PVDF has been used for the pressure sheath in flexible pipes for almost 20 years and is fully-qualified to API17J specification to up to 150 °C. While highly flexible non-plasticized PVDF grades are available for outer sheathing. **Solef® PVDF**, **AvaSpire® PAEK** and **KetaSpire® PEEK** can all be used for anti-wear, anti-creep and insulation tapes.

For RTP, **Ryton® PPS** and **Solef® PVDF** flexible grades present an excellent choice due to both their high chemical and permeation resistance as well as their spoolability.

Thermoplastic Composites

A fully vertically-integrated company which combines specialty polymers with expertise in composite processing, Solvay can offer a range of high performance thermoplastic polymer tapes and parts, with **Solef® PVDF**, **Ryton® PPS** and **KetaSpire® PEEK** all comprising the key matrix resins for oilfield service.

Steel Pipeline Protection

Liners & Tubing

Polymeric liners represent a highly cost-effective alternative to both Corrosion-Resistant Alloys (CRA) and specialty coatings used to prolong the service life of new and existing pipe assets. They help to significantly reduce the need for inspection, maintenance, downtime and the use of chemical corrosion inhibitors and other chemicals.

Such high-performance polymers as **Solef® PVDF** are engineered to withstand typical onshore and offshore scenarios, and also in the rehabilitation of existing onshore and subsea lines. **Solef® PVDF** boasts an excellent 20-year track record in offshore as a low-risk, high performance solution to up to 150 °C. For downhole Oil Country Tubular Goods (OCTG) applications in liners reaching 170 °C, **Ryton® PPS** can be applied, while **KetaSpire® PEEK** can be the ideal choice for temperatures exceeding 200 °C. All have excellent resistance to typical multiphase oilfield mixtures and can offer notable CAPEX reduction as well as significant OPEX savings owing to better flow-assurance. Compared with carbon steel or CRA, specialty polymers offer an extremely smooth surface with non-stick properties, allowing for lower pressure drop and greater fluid productivity. Thanks to excellent permeation properties and high mechanical performance, all these materials offer high resistance to wall collapse.

Protective Coatings

Solvay has developed a series of high performance, anti-corrosion coatings which offer lifetime extension for Outer Diameter (OD) mainline onshore pipe and high temperature Inner Diameter (ID) protective coatings. Coatings are typically applied by electrostatic powder coating techniques. Used internally, these help to reduce scaling and enhance flow, thanks to their exceptional surface smoothness and low surface energy.

For OD, the new 3-layer **Solef® PVDF** solution provides unsurpassed UV protection, resistance to permeation of water and oxygen, as well as protection from harsh soils. For high temperature gas lines, **Halar® ECTFE** is an effective, smooth corrosion barrier for pipe internals and other assets. Both of these polymers are well-established in the field of anti-corrosion, offering cost effectiveness and extended assets lifetime.

Hyflon® PFA fluorinated polymers can provide excellent corrosion protection for pipe assets, as well as an extremely low friction surface for greater productivity.



Courtesy of NOV



Courtesy of IFL

For elevated temperatures above 180 °C, **Ryton® PPS** and **KetaSpire® PEEK** coatings can be an excellent choice, combining outstanding friction and wear resistance along with advanced chemical resistance and low permeation to oilfield conditions. Also, they can extend the service life of metal components in highly abrasive environments reaching up to 220 °C.

Depending on the material, our products are available either as aqueous or solvent spray coating dispersions, or through conventional electrostatic powder coating techniques.

Sealing & Wear Resistance

Seals, O-Rings and Gaskets

Solvay's **Tecnoflon® FKM** and **FFKM** fluoro- and perfluoroelastomers provide best-in-class thermal and chemical resistance. They are ideally suited for extreme low and high temperature operating environments – enduring explosive decompression and demonstrating excellent compression/stress relaxation properties while easily withstanding highly sour environments.

Downhole Components

Amodel® PPA, **Ryton® PPS**, **KetaSpire® PEEK** and **Torlon® PAI** all display excellent fatigue and wear resistance, together with thermal and chemical resistance. Parts are typically machined from stock shapes into a variety of such high-strength components as compressor plates, poppets, seals, back-up rings, bushings, bearings and electrical connectors.

Drilling & Completion

Rod Guides for Sucker Rods

Amodel® PPA and **Ryton® PPS** are typically used for rod guides in artificial lift pump rod operations, thanks to their resistance to oil temperatures up to 200 °C. They exhibit high mechanical and impact strength along with abrasion and wear resistance in hot, sweet and sour, sandy, high-water or high-brine environments.

The ability of these materials to resist damage from impact and shock loadings makes **Amodel® PPA** and **Ryton® PPS** excellent candidates for sucker rod-couplings and production tubings.

Packer Elements

Tecnoflon® FKM and **FFKM** are suitable for manufacturing downhole packers with an end-use temperature of up to 300 °C. They can also withstand very harsh oilfield chemicals, including CO₂ and H₂S.

Tecnoflon® FFKM has a proven ability to withstand exposure to such multiphase completion fluids as oil-based mud, brine, bromides, high pH completion fluids, and amine-based inhibitors as well as exposure to such solvents as xylene, toluene and methanol.

Lubricants

Fomblin® PFPE fluorinated fluids are fully inert and immiscible with hydrocarbons and water. They make excellent lubricants for use from up to 100 to 290 °C in subsea as well as in other harsh environments, such as Electrical Submersible Pumps (ESP).

Shale Reservoirs

Frac Balls

Torlon® PAI, used in shale gas production, provides excellent sealing in multi-stage fracturing applications thanks to its high heat resistance, dimensional stability under high pressure and very low gas permeation.

Gel Breaker Encapsulation

Diofan® PVDC is an excellent choice for the encapsulation of such gel breakers as ammonium, potassium and sodium persulphate – all used in fracturing fluids. The polymer acts as a barrier to water and allows the breaker to activate along the fractured seam at the correct point.

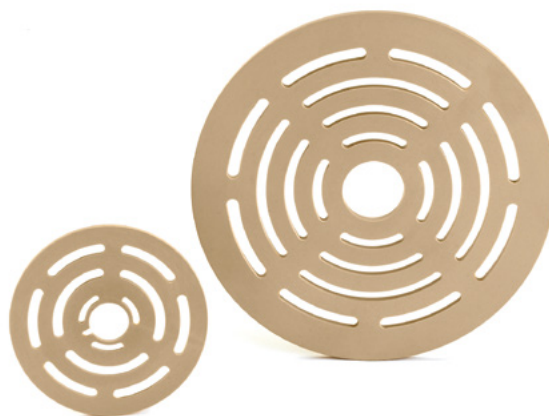
Encapsulated breaking agents are an important component of hydraulic fracturing gelled fluids, since the dispersed proppants can open the fracture while the breaker reduces the viscosity of the gel, so allowing the gas and oil to flow.

Cables

Heating and Downhole Cables

Solvay's broad range of fluoropolymers provide excellent electrical insulation and dielectric properties, intrinsic fire resistance and thermal stability up to 250 °C, making them suitable for both cable insulation and jacketing.

Halar® ECTFE, **Hyflon® PFA**, **Algoflon® PTFE** are all exceptional, chemically-inert insulators with advanced permeation and a broad thermal performance range, and **Hyflon® MFA** performs best-in-class flex life. Our Hyflon® P1xx series can be recommended for ultra high temperature cabling applications. They are also used to encapsulate thermo-mechanical cables due to both their outstanding abrasion and their crush resistance.





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