

Combating Sour Gas, Salt Spray & Wellbore Fouling: Everflon™ High-Performance Fluoropolymer Coatings in Upstream, Midstream & Subsea Applications

Target Applications: Downhole Tools, Subsea Wellheads, Off-shore Fasteners, Valves, Chokes & Pipelines | **Division:** Everflon Energy & Oilfield Solutions | **Published:** September 2026

In extreme oil and gas exploration and production environments—spanning high-pressure, high-temperature (HPHT) deepwater wells, sour hydrocarbon reservoirs rich in H₂S and CO₂, and corrosive marine splash zones—equipment survival dictates operating profitability. Everflon™ fluoropolymer coating systems (PTFE, PFA, FEP, ETFE) establish an impenetrable, pinhole-free barrier across carbon steels, stainless alloys, and titanium. Engineered for chemical impermeability, galvanic insulation, ultra-low surface energy, and galling prevention, Everflon™ minimizes costly workovers, halts paraffin and asphaltene deposition, and provides thousands of hours of salt-spray endurance.

1. Harsh Oilfield Operating Environments: Corrosion, Permeation & Fouling Dynamics

Downhole drilling assemblies, subsea Christmas trees, chemical injection valves, and transmission pipelines operate under unforgiving conditions. Wet sour gas containing hydrogen sulfide (H₂S), carbon dioxide (CO₂), chlorides, and high-salinity formation water triggers rapid pitting, stress corrosion cracking (SCC), and hydrogen embrittlement in unprotected metals. In subsea installations, galvanic couples between dissimilar metals and relentless marine biofouling accelerate component degradation.

Simultaneously, heavy crude production suffers from paraffin wax precipitation, scale formation, and asphaltene deposition along casing walls and choke valves, severely restricting hydrocarbon throughput and requiring frequent solvent flushes or mechanical pigging. Everflon™ fluoropolymer barrier coatings replace sacrificial zinc or cadmium plating and fragile epoxies with an inert, thermally crosslinked fluorocarbon shield. The resulting surface eliminates galvanic continuity, rejects organic foulants, and repels aggressive sour well fluids across cryogenic to elevated reservoir temperatures.

Severe NACE MR0175 / ISO 15156 Sour Gas Resistance: Because Everflon™ PFA, PTFE, and ETFE coatings exhibit zero chemical reactivity with hydrogen sulfide, carbon dioxide, or volatile organic solvents, they provide complete isolation for low-alloy carbon steels in sour service. The coating functions as an impermeable permeation shield that stops acid gas migration to the metallic substrate, preventing catastrophic sulfide stress cracking (SSC).

2. Core Engineering Advantages of Everflon™ in Oil & Gas Infrastructure

Impermeable Corrosion & Acid Gas Barrier: Completely inert against high concentrations of H ₂ S, CO ₂ , hydrochloric/hydrofluoric well stimulation acids, and brine solutions.	High-Pressure High-Temperature (HPHT) Stability: Continuous operating performance up to 260 °C (500 °F) and resistance to rapid gas decompression (RGD) blistering.
Anti-Galling & Low Make-Up Torque: Ultra-low dynamic coefficient of friction (0.05–0.10) ensures smooth, repeatable make-up and breakout of threaded tubulars and studs.	Paraffin, Asphaltene & Scale Mitigation: Extremely low surface energy prevents crude oil paraffin waxes, scale crystals, and asphaltenes from adhering to flow paths.

3. Everflon™ Fluoropolymer Selection Matrix for Oilfield Applications

Fluoropolymer Grade	Max Continuous Temp	Permeation Resistance	Primary Engineering Mechanism	Target Oil & Gas Equipment
Everflon™ PTFE	260 °C (500 °F)	Good	Lowest friction coefficient, dry film lubrication, anti-galling, thermal resistance	B7/L7 stud bolts, marine fasteners, ball valve seats, actuator pistons, casing centralizers
Everflon™ PFA	260 °C (500 °F)	Exceptional	Melt-processable pinhole-free barrier, severe acid/sour gas impermeability, crack resistance	Subsea Christmas tree valves, downhole safety valves (DHSV), chemical injection lines
Everflon™ FEP	205 °C (401 °F)	Superior	Smooth non-porous fused film, exceptional release of sticky paraffin and crude deposits	Flowlines, choke bodies, sampling cylinders, downhole gauge housings, tubular liners
Everflon™ ETFE	155 °C (311 °F)	Superior	High mechanical impact toughness, cut-through resistance, abrasive slurry wear resistance	Drill pipe OD protection, mud motor housings, slurry pump impellers, subsea riser clamps

4. Critical Oil & Gas Subsystems & Industrial Applications

- **Subsea & Offshore Threaded Fasteners (ASTM A193 B7/B7M Studs & Nuts):** Galvanic corrosion and marine salt fog cause seizure and catastrophic stud snapping. Everflon™ PTFE fastener coatings withstand over 3,000 hours of ASTM B117 salt spray, provide uniform torque-tension relationships, and ensure breakout with standard hand tools without cutting torches.
- **Downhole Drilling & Completion Tools (MWD/LWD, DHSVs & Packers):** Severe bottom-hole temperatures and abrasive drilling muds erode unshielded tool strings. Everflon™ ETFE and PFA coatings protect delicate sensor housings, prevent mud packing, and provide slick, non-stick performance on downhole completion tools.
- **Valves, Chokes & Actuators (Ball, Gate, Plug & Butterfly Valves):** Corrosive wet gas and sand-bearing crude erode valve trim and gall metal-to-metal seating surfaces. Everflon™ PFA and PTFE linings on balls, gates, and plugs eliminate operating torque spikes, seal bubble-tight, and prevent acid gas etching on underlying alloys.
- **Production Flowlines & Manifolds (Paraffin, Asphaltene & Hydrate Control):** Temperature drops across subsea flowlines cause heavy wax deposition and gas hydrate crystallization that choke well production. The hydrophobic and oleophobic nature of Everflon™ FEP/PFA internal linings prevents wax crystallization on pipe walls, maintaining maximum flow velocity.
- **Offshore Rig Structural Hardware & Riser Clamps:** Marine splash zones subject riser guide clamps, structural bolts, and crane pins to continuous seawater wetting and atmospheric UV oxidation. Everflon™ multi-layer coating systems provide cathodic and chemical isolation, preventing rust bleeding and stress corrosion cracking.
- **Chemical Injection & Hydraulic Control Lines:** Methanol, glycol, scale inhibitors, and biocides injected at high pressure aggressively attack standard polymer lines. Everflon™ PFA and ETFE continuous linings offer unmatched resistance to universal oilfield chemicals, preventing swelling and permeation failures.

5. Quality Control, Salt Spray Standards & Technical FAQ

Everflon™ oilfield coatings undergo rigorous quality testing including spark testing for pinhole detection (ASTM G62), salt fog corrosion resistance (ASTM B117), cross-hatch adhesion (ASTM D3359), and autoclave immersion testing under simulated sour gas environments.

Q: How do Everflon™ coatings compare with conventional zinc or cadmium plating on offshore fasteners?

A: Metallic platings provide sacrificial protection that rapidly depletes in harsh marine environments, leading to red rust and thread galling within months. Everflon™ fluoropolymer coatings provide barrier protection with over 3,000 hours of salt spray resistance, zero galvanic transfer, and consistent breakout torque after years of subsea exposure.

Q: Can Everflon™ coatings withstand rapid gas decompression (RGD) in high-pressure gas wells?

A: Yes. Melt-processable grades such as Everflon™ PFA and ETFE, when properly applied over high-bond primers, feature high

molecular density and exceptional elongation, preventing the blistering, micro-cracking, and explosive decompression common in standard elastomers and epoxies.

Everflon™ Advanced Materials — Oil & Gas Surface Engineering Center

NACE MR0175 Compliance Consultation, Fastener Salt-Spray Qualification & Custom Valve Lining Trials

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