

Untapped Potential of Polysulfide-Based Sealants in Deepwater Infrastructure and Subsea Engineering

Polysulfide sealants offer untapped potential in subsea engineering with superior durability, flexibility, and chemical resistance in harsh marine environments.

NEWARK, DE, UNITED STATES, June 1, 2025 /EINPresswire.com/ -- In a marketplace dominated by wellcharted industrial applications of chemical compounds, <u>polysulfides</u> are quietly carving out a niche in highperformance sealants. Most reports and discussions on the polysulfide



market revolve around traditional uses in construction joints, <u>insulating glass</u> units, and aerospace applications. However, one of the least explored but increasingly relevant uses lies deep beneath the ocean surface — in the challenging realm of subsea engineering and deepwater infrastructure.

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As offshore infrastructure expands, polysulfide-based sealants can redefine subsea engineering standards, offering a resilient, long-term solution amid rising deepwater challenges."

> Nikhil Kaitwade, Associate Vice President at Future Market Insights

The global polysulfide market has witnessed steady growth, driven by its widespread use in flexible polymer sealants and adhesives. Liquid polysulfide formulations, in particular, are known for their exceptional elasticity, chemical resistance, and impermeability. The aerospace industry relies on these attributes for fuel tank sealants, while the construction sector applies them in waterproofing systems.

According to Future Market Insights, the global polysulfide market is expected to register a compound annual growth rate (CAGR) of over 3.1% during the next decade. While construction and aerospace dominate revenue share, niche applications such as chemical containment linings and industrial coatings are showing a rising trajectory. Yet, the application of polysulfide sealants in subsea and deepwater engineering remains sparsely covered in commercial reports, despite holding vast potential.

The harsh environment of subsea operations presents challenges that few materials can withstand. High pressure, extreme temperature fluctuations, and corrosive saline conditions create a hostile setting for conventional sealants. Here, polysulfide-based sealants offer a unique advantage, thanks to their inherent flexibility, thermal stability, and exceptional chemical resistance.

In subsea cable insulation, pipe joint sealing, and the protection of sensors and instrumentation in underwater robots (ROVs), polysulfide sealants outperform many of their silicone or polyurethane counterparts. Their ability to maintain adhesion and flexibility in a constantly shifting underwater environment makes them ideal for structural sealing of offshore platforms and subsea manifolds.

Despite this, polysulfides are rarely the first choice for subsea infrastructure due to lack of awareness and limited field studies. Most industry players default to epoxy or polyurethanebased systems, overlooking the long-term performance benefits polysulfides can deliver under cyclical loading and saltwater immersion.

At a molecular level, polysulfide polymers are made of repeating units containing sulfur atoms in the main chain, which confer excellent chemical resistance — particularly to fuels, solvents, and acids. Their low glass transition temperature ensures continued flexibility at sub-zero temperatures, while their oxidative stability enables them to function in oxygen-poor environments like deep-sea beds.

Lab testing from naval materials research institutions has demonstrated that polysulfide-based sealants can retain over 90% of their tensile strength and elongation capacity even after prolonged immersion in seawater. Moreover, their impermeability to gas and moisture makes them ideal for use in sealing pressure housings for underwater electronics or power

transmission equipment.

One emerging area is in the growing market of floating wind farms, where subsea tethering points and electrical conduits require robust, long-life sealing compounds. In this context, polysulfide sealants could emerge as a game-changer, offering a cost-effective and low-maintenance alternative to frequently replaced sealing systems.

The limited adoption of polysulfide-based sealants in subsea applications is not due to performance limitations, but rather a combination of market inertia, cost perception, and regulatory lag. Most deepwater engineering firms continue to rely on legacy materials specified decades ago, with minimal motivation to switch unless presented with overwhelming evidence of superior performance.

Additionally, the specialized formulations required for underwater use demand higher R&D investment, which many manufacturers hesitate to undertake without a guaranteed market. Safety certifications and marine environmental compliance processes can also slow down innovation in this segment.

Cost is another factor. While the lifecycle cost of polysulfides may be lower due to durability, the upfront price can be higher than standard sealants — a consideration that tends to deter procurement departments focused on initial capital expenditure.

As global energy demand pushes exploration into deeper waters, and as subsea mining, offshore aquaculture, and renewable ocean technologies expand, the call for high-performance sealing solutions will intensify. Research institutions such as the Norwegian Geotechnical Institute and the University of Aberdeen are currently exploring next-generation polymeric materials, including hybrid polysulfide systems with improved curing kinetics and biostability.

Several chemical companies are also investigating the <u>integration of nanomaterials</u> into polysulfide matrices to enhance mechanical reinforcement and reduce water diffusion rates. If successful, these innovations could drive the commercial viability of polysulfides in underwater use cases, especially when coupled with sensor-based predictive maintenance systems that monitor sealant integrity over time.

The polysulfide market has long been defined by its utility in construction and aerospace, but its future may well lie underwater. With rising infrastructure demands below the ocean surface — from energy and data transmission to marine agriculture — the technical superiority of polysulfide sealants in hostile environments cannot be overlooked.

Bringing this application area into the mainstream will require collaborative efforts between manufacturers, marine engineers, and regulatory bodies to update standards, test new formulations, and quantify long-term value. By turning attention to this overlooked but vital segment, stakeholders can unlock a lucrative and high-impact opportunity that has been hiding in plain sight.

By Product Type:

- Thiokols - Solid Polysulfide Elastomers

By End Use:

- Automotive & Transportation
- Industrial Processing & Application
- Building & Construction
- Protective Coatings
- Specialty Chemicals
- Others

By Region:

- North America
- Latin America
- Europe
- East Asia
- South Asia & Pacific
- Middle East and Africa (MEA)

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Wind Power Coatings Market: <u>https://www.futuremarketinsights.com/reports/wind-power-coatings-market</u>

Emission Control Catalyst for Marine Market: https://www.futuremarketinsights.com/reports/emission-control-catalyst-for-marine-market Emission Control Catalyst for Motorcycle Market:

https://www.futuremarketinsights.com/reports/emission-control-catalyst-for-motorcyclemarket

Emission Control Catalyst for Small Engines Market: <u>https://www.futuremarketinsights.com/reports/emission-control-catalyst-for-small-engines-</u> <u>market</u>

n-Heptane Market: <u>https://www.futuremarketinsights.com/reports/n-heptane-market</u>

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