



*THE
GLOBAL LEADER
IN PIPING CORROSION
SOLUTIONS*

NOV Fiber Glass Systems



The GLOBAL LEADER in PIPING CORROSION PREVENTION and CONTROL

National Oilwell Varco (NOV) Fiber Glass Systems delivers piping solutions across industries and continents. With manufacturing facilities spanning 4 continents, and a sales and distribution network covering 40 countries, we provide worldwide service to the oil and gas, chemical and industrial, marine, offshore, and fuel handling industries.

Engineered to Endure

NOV Fiber Glass Systems manufactures composite pipe and fittings engineered for efficiency and performance. The lightweight corrosion-resistant design is easy to install and maintenance free, lowering installation and operation costs. And with a proven history of longevity – original installation can successfully operate for more than 5 decades – our economic advantage endures time. Offering value and innovation, NOV Fiber Glass Systems solves the inherent problems associated with using traditional piping materials for tough applications and harsh environments.

We Deliver More Than Pipe

NOV Fiber Glass Systems can provide complete turnkey solutions for owners, engineers and contractors, and we assist at every stage of a project — from conception through operation. We have extensive experience designing, engineering, manufacturing, fabricating and installing piping systems for aggressive chemicals, abrasive slurries, temperature extremes and high pressure, as well as milder applications.

Our engineers and fabricators design and manufacture pipe and fittings incorporating a variety of mechanical and bonded systems to ensure precise installation, optimum performance and unmatched ease of assembly.

We select the best suited manufacturing process for the product application, including:

- Reciprocal Filament Winding
- Centrifugal Casting
- Dual-Angle Continuous Filament Winding
- Chopped-Hoop Continuous Winding
- Filament Wound and Compression Molded Fittings

**Oil and Gas
Chemical and Industrial
Marine
Offshore
Fuel Handling**



**Performance you trust...
from products you know.**

STAR™, Centron™, Fiberspar™, Centricast™, Ceram Core™, Green Thread™, Bondstrand™, Dualoy™, Red Thread™, Z-Core™, F-Chem™, Silver Streak™

A Range of Products For Every Application

NOV Fiber Glass Systems products range from 1½" to 36" diameter (40 mm to 900 mm) for oil and gas applications and 1" to 100" diameter (25 mm to 2500 mm) for chemical and industrial applications. Temperature ratings range from 225°F (107°C) for the oil and gas industry to 275°F (135°C) for the chemical and industrial sector. Marine and offshore products range from 1" to 72" diameter (25 mm to 1828 mm) with Type Approval through 362 psi (25 bar), with fire endurance capabilities, including resistance to jet fire. Fuel handling products range from 2" to 6" (50 mm to 152 mm), in size-over-size or coaxial configurations for compatibility with all types of fuel.

The Forerunner in Setting Standards

An expert in composite pipe with over 65 years of industry experience, NOV Fiber Glass Systems is the:

- **FIRST** composite pipe manufacturer in the world
- **FIRST** North American pipe manufacturer to earn ISO 9001 certification
- **FIRST** U.S. pipe manufacturer to achieve API Q1 status
- **FIRST** listed non-metallic fuel handling pipe
- **FIRST** in product versatility, supplying the broadest, most comprehensive product selection available
- **FIRST** in spoolable line pipe

Certifications and Approvals:

American Bureau of Shipping (ABS), Alberta Boilers Safety Assoc. (ABSA), American National Standards Institute (ANSI), American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), American Water Works Assoc. (AWWA), ASTM International, DET Norske Veritas (DNV), Factory Mutual (FM), International Maritime Organization (IMO), International Organization for Standards (ISO), NSF International, Technical Standards & Safety Authority (TSSA), Underwriters Laboratories (UL/ULC), United States Coast Guard (USCG), United States Department of Defense (Military Specifications), United States Food & Drug Administration (FDA) are just a few examples of our commitment to regulatory compliance.



OIL and GAS

NOV Fiber Glass Systems leads the oil and gas industry with a full line of durable glass reinforced epoxy piping systems with a proven track record. For decades, long-standing brands such as STAR™, Red Thread™, Centron™, Fiberspar™ and Bondstrand™ have supported successful oil and gas operations around the world. The efficient design and performance of our systems offer key installation, operation and economic advantages.

Key Advantages

- **No Maintenance:** Impervious to corrosion and resistant to chemical attack caused by CO₂, H₂S and saltwater, eliminating the need for protective coating, wraps or cathodic protection
- **Low Installation Costs:** Lightweight construction enables easy installation, reducing personnel and equipment needs
- **Improved Flow Capacity:** Smooth interior pipe surface resists scale and paraffin build-up
- **Long Service Life:** Calculated design life of 20 years, with an actual service life of over 30 years

NOV Fiber Glass Systems piping systems are available in sizes up to 36-inch with pressure capabilities, depending on size, up to 3500 psi (24,1 MPa), and they withstand continuous service temperatures up to 225°F (107° C). An assortment of fittings include elbows, tees, swages, nipples and flanges, and joining and sealing systems include threaded, threaded with gasket seal and adhesive bonded.

Common Applications

- | | |
|---|---|
| • Oil Production Lines | • Water Management in Unconventional Production |
| • Multi-Phase Flow Lines | • Transfer Lines |
| • Brine Lines | • Plant Piping |
| • Water Injection, Disposal, & Supply Lines | • Tank Battery Hook-ups |
| • CO ₂ & Natural Gas Gathering Lines | • Injection & Production Tubing |
| • CO ₂ Injection-LP & Super Critical | • Downhole Tubing & Casing |

Line Pipe and Fittings

STAR™ and Centron™ pipe dominate the high pressure market for primary oil and gas production and enhanced oil recovery techniques. These high pressure piping systems handle pressures from 500 psi (3,44 MPa) to 3500 psi (24,1 MPa) with a full range of temperature resistance up to 210°F (99°C) and sizes from 1½" through 12" (38,1-304,8mm) diameters.

For low pressure applications, STAR™, Centron™, Red Thread™ and Bondstrand™ piping systems carry ratings up to 800 psi (5,5 MPa), sizes ranging from 2" to 36" (50-900mm) and temperatures up to 225°F (107°C).

Our piping systems are inherently resistant to chemical attack from all oilfield fluids and eliminate all types of corrosion problems. NOV Fiber Glass Systems line pipe products are licensed to be monogrammed by the American Petroleum Institute (API) under Standards 15LR and 15HR.

Spoolable Line Pipe

Fiberspar™ spoolable line pipe is ideal for gas, oil, or multi-phase gathering applications and high pressure water or CO₂ injection. Suitable for a wide range of media and temperature requirements, Fiberspar™ is available in 2½" to 6½" nominal sizes, pressure ratings up to 2,500 psi and temperature ratings up to 180°F (82°C) for continuous operations. Fiberspar™ is the only true glass reinforced epoxy spoolable pipeline system. No other spoolable pipeline supplier offers the range of products, diameters, pressure rating, temperature tolerances and terrain-specific installation methods — open ditch, plowing or remediation — than Fiberspar™.

Tubing and Casing

Our tubing and casing products are manufactured using a filament winding process with a specialized orientation of the glass fibers to give superior tensile strength and performance in downhole oilfield applications. These tubing and casing products are designed for pressures up to 3500 psi (24,1 MPa) and temperatures up to 210°F (99°C).

Sizes available: Tubing 1½" - 4½" and Casing 5½" - 9 5⁄8".

Corrosion Resistant
for primary oil and gas
production and enhanced
oil recovery techniques





NOV Fiber Glass Systems leads the world in supplying piping systems to a multitude of applications and service conditions within the chemical and industrial marketplace. Whether centrifugally cast or filament wound, epoxy or vinyl ester, we have the product and process to provide a fit-for-purpose system for every need. NOV Fiber Glass Systems has also taken on the technical leadership role in developing industry specifications and regulations (A.S.T.M., A.N.S.I., A.S.M.E., etc.) to assure performance standards are established and maintained. All NOV Fiber Glass Systems manufacturing facilities have registered Quality Systems according to ISO 9001 requirements.

NOV Fiber Glass Systems pipes and fittings address a broad range of service demands, from transferring water to handling concentrated chemical solutions and abrasive materials. When conditions involve elevated temperatures or pressures, our pipes manufactured with thermosetting resins meet the challenge. Unequalled global positioning and capacity ensure the right product is delivered on time with support services available.



Centrifugally Cast Piping Systems

With a 100% resin corrosion barrier, Centricast™ piping systems are the most chemically resistant available. Pioneers in the market, we have a successful track record in the steel pickling, chloro alkali, mining, pharmaceutical, power generation and chemical processing industries. Z-Core™ is another proprietary product with outstanding properties.

Filament Wound Piping Systems

For more than 60 years, F-Chem™, Green Thread™, Red Thread™, and Bondstrand™ products have been used in potable water, firewater mains, saltwater cooling and disposal, heating and cooling water systems, and wastewater systems across the mining, automotive, power generation, municipal, institutional and aerospace applications.

Abrasion Resistant Piping Systems

Ceram Core™ piping has been installed for more than 30 years in the most aggressive corrosive and abrasive services such as bottom ash at coal-fired power plants. The Silver Streak™ product has over 15 years of successful service in flue gas desulfurization applications such as limestone and gypsum slurries. Many of our other products have also been successfully used in corrosive and abrasive environments.



Engineering Design Support

Our “Success by Design” engineering software sets the industry standard for design assistance. With material selection to flow calculations and comparisons; anchor, guide and support calculations; and thermal expansion solutions, this design package assists engineers and owners in designing a successful system.

Installation and Fabrication

With fabrication facilities globally, NOV Fiber Glass Systems can rapidly fabricate your project for minimum field installation. All of our shops are staffed with ASME B31.3 certified bonders. Certification of field installation crews to the same ASME standard is available.

Application

With over 60 years experience in all types of chemical service, our applications engineers can assist you in selecting the proper piping system for your specific application.

NOV Fiber Glass Systems
has the products to
provide a **fit-for-purpose**
system for every need



NOV Fiber Glass Systems designs and builds high performance pipe and fittings systems to the specific requirements pertaining to shipboard piping. Compliance with and participation in the development of industry standards by IMO, ABS, USCG, LR and others have positioned NOV Fiber Glass Systems as the leading supplier of marine-grade fiberglass pipe. Design variations include elevated external pressure resistance for in-tank piping; electrical conductivity for hazardous areas; low smoke and toxicity for confined spaces and passageways; and fire endurance for fire suppression systems. Full engineering support is available for system design, stress analysis, material take-off and spool pre-fabrication.



NOV Fiber Glass Systems products meet the demanding requirements and regulations associated with the offshore market, whether on fixed, floating, ship-shaped or custom designed facilities. Exposure to the corrosive sea environment and various grades of water conveyed inside the pipe makes NOV Fiber Glass Systems the product supplier of choice for a variety of systems from fire protection to deck drains.

NOV Fiber Glass Systems works closely with project engineers, owners and yards to offer the products and services needed for success. Product variations are available when specific demands require properties such as vacuum or external pressure resistance, electrical conductivity or fire endurance, even to the level of resisting exposure to jet fire. IMO and specific 3rd party approvals guarantee that system performance is never compromised. The ability to meet these high standards is backed by ongoing in-house testing. Commitment to engineering and design capabilities ensures compliance and performance of Bondstrand™ 2000M, 7000M and 2400 series piping, making these systems the products of choice.

Conductivity

All pipe grades can be supplied with conductive carbon fibers as an integral part of the pipe wall in order to provide a uniformly conductive piping system for use in hazardous areas. Specially formulated conductive adhesives ensure conductivity across the joints. Fittings are manufactured with a 0.020" (0.5 mm) conductive synthetic reinforced liner so there is no compromise in performance when choosing the conductive option.

Fire Resistance

All Bondstrand™ marine-grade systems are fully qualified for IMO Level-3 fire resistance without any passive fire protection required in 2"-40" sizes. In applications such as dry deluge fire protection piping, where a higher degree of fire resistance is necessary, Bondstrand™ 2000M-FP and 7000M-FP are supplied with a unique reinforced Fire Jacket that has been fully qualified for modified Level-3 (L-WD) fire resistance in accordance with U.S. Coast Guard PFM 1-98. Bondstrand™ 2000M-FP and 7000M-FP are also qualified and has Type Approval under the guidelines of HSE-OTI 95 634 and per ASTM F1173. Pipe protected by the Fire Jacket exhibits zero heat release when tested in accordance with IMO A.653(16). Low flammability makes it exempt from smoke and toxicity test requirements.

Engineering, Design & Installation

NOV Fiber Glass Systems collaborate with the owner, engineer, shipbuilder and platform constructor. Our application engineers provide layout and system design assistance in the pre-FEED, FEED, and detail design stages, and they conduct complete pipe stress analysis on approved-for-construction isometrics using Caesar II®. We can provide detailed pressure surge analysis using the latest version of PIPENET™. Our fittings library is available to designers in Aveva™ PDMS and Tribon format. Prefabrication is done in our facility under controlled environments. Complete installation services are provided with our factory trained and ASME B31.3 qualified fabricators and installers. Our field technicians are onshore and offshore certified. The team is then mobilized to the location to facilitate all aspects of installation, including final certified hydrostatic test.

Caesar II® is a registered trademark of Coade. PIPENET™ is a trademark of Sunrise Systems, Inc. USA. PDMS/Tribon are trademarks of Aveva™.

**“...IMO and specific
3rd party approvals
guarantee that systems
performance is never
compromised...”**





NOV Fiber Glass Systems is the leader for time-tested piping systems for underground fueling systems. We have proven our leadership with more than 40 years of continuous supply of 2 brands of UL Listed products for underground fuels. With a combined 85 years of experience, Red Thread™ IIA, Dualoy™ 3000/L and LCX have never been removed due to fuel incompatibility. With the ongoing search for renewable fuels, this long-term capability is key to choosing our products for use in future fuel applications.

Proven Joining System

Lightweight Red Thread™ IIA pipe is joined with a threaded and bonded joint that promotes fast, positive make-up and prevents back-out problems during cure time. These features assist the installer and assure economical installation. Dualoy™ products and Red Thread™ IIA fittings are joined with matching taper bonded connections that lock in place to assure a reliable joint throughout the life of the system.

Leak Prevention

Fiberglass sump entry fittings provide a positive seal at the sump wall to prevent fuel leakage from the sump if there is a dispenser or other equipment malfunction. This fitting also helps provide Class I leak- prevention protection that complies with California's requirement of continuous interstitial monitoring of the piping system's secondary containment. This same performance assures that no ingress of ground water to the sump will occur, a major problem with flexible entry fittings and systems.

Superior Flow Capabilities

Red Thread™ IIA pipe has the largest inside diameter in the fuel handling industry, which enables you to pump fuel at twice the rate of any other 1½" flexible product on the market. Dualoy™ products have a slightly smaller inside diameter to accommodate a neat resin liner layer. Both products demonstrate superior flow.

Lowest Total Cost of Ownership

Red Thread™ IIA and Dualoy™ pipe systems are made with thermosetting, aromatic amine cured epoxy resin, ensuring no maintenance or replacement costs due to fuel incompatibility.

Reliability

NOV Fiber Glass Systems fuel handling piping is designed and manufactured to meet the requirements for public safety and environment regulations, including those issued by Federal and State EPA in the U.S.



StationWare 3000™

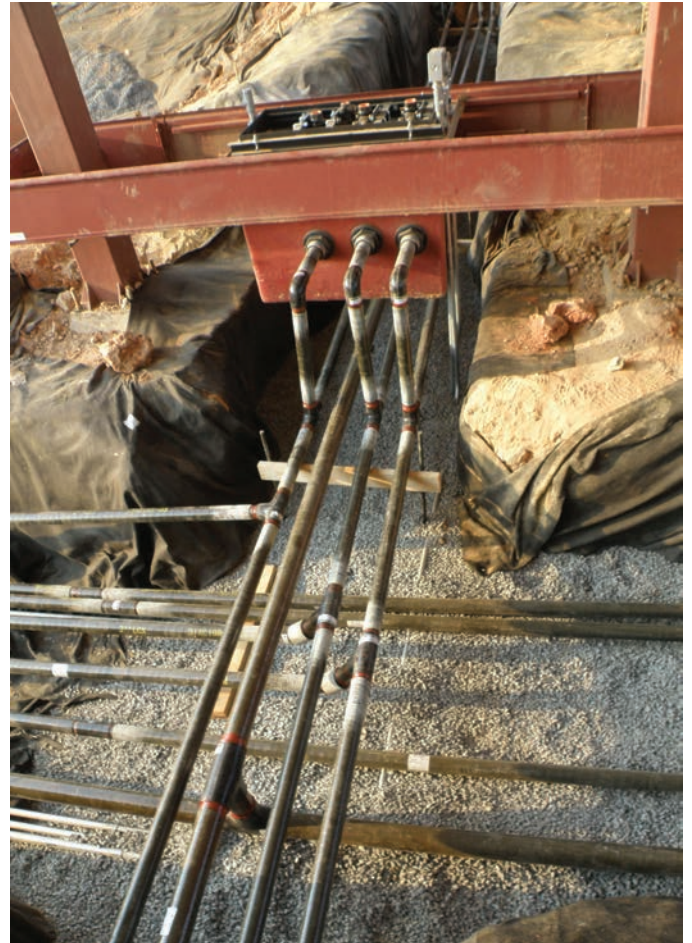
StationWare 3000™ is a self-contained CAD program that makes service station layout and bill of materials quick and easy, and provides professional-looking documents for presentations. For technical support, consult the operating instructions contained in the software or contact your local NOV Fiber Glass Systems representative.

Training

NOV Fiber Glass Systems offers in-depth training seminars covering primary product and secondary containment piping installation procedures. The training includes hands-on participation, and each attendee receives a complete fuel handling catalog with the installation manuals used during the seminar. Each installer completing the training receives documentary proof of attendance.

Warranty

NOV Fiber Glass Systems offers a 30-year warranty on Red Thread™ IIA pipe, fittings and adhesives. This ensures against material and workmanship defects, and internal and external corrosion when used for underground transportation of fuel.



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Downhole Solutions

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