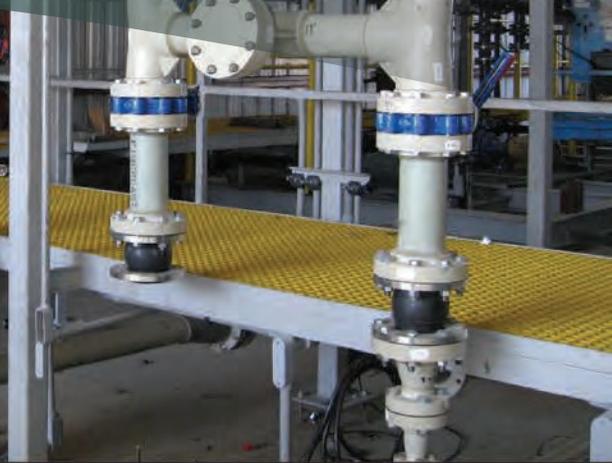


Chemical & Industrial Piping Systems



For over 60 years NOV Fiber Glass Systems has been the industry leader in the Chemical & Industrial market with composite piping systems designed to provide chemical and abrasion resistance. Our extensive line of products has grown to include the leading trade names in this market, creating an unequalled worldwide offering to battle corrosion and erosion.

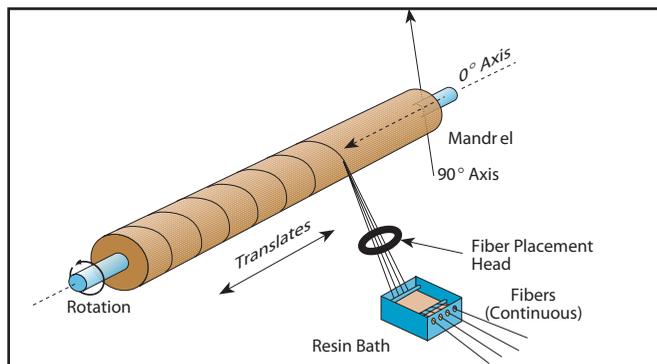
This globally manufactured group of products has become the world's most widely trusted product offering founded upon two essential elements: third party verified ASTM qualifications and decades of experience in tough services. The third party testing provides our customers with confidence that the physical properties we publish are based on test data, not theory. The wide scope of applications within such a diverse market provides our customers confidence that the products' reliability extends beyond rigorous testing into the real world of actual long-term performance in applications where upset conditions and thermal cycling are reality.

Typical applications range from potable water to brine and from harsh chemical feed, waste and vent applications to process lines in nearly every sector of industry imaginable: power generation, metals & minerals, food service, LNG, automotive, aerospace & defense, biotech and pharmaceutical, university and district heating and cooling, general, fine & specialty chemical process industry, petroleum refining, pulp & paper, municipal and industrial waste water treatment.

ASTM Test Methods and Specifications	
D1599	Standard Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing, and Fittings
D2105	Standard Test Method for Longitudinal Tensile Properties of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe and Tube
D695	Standard Test Method for Compressive Properties of Rigid Plastics
D2412	Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
D2925	Standard Test Method for Beam Deflection of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Pipe Under Full Bore Flow
D4024	Standard Specification for Machine Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting Resin) Flanges
D5685	Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe Fittings
D2996	Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe
D2997	Standard Specification for Centrifugally Cast "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe
D2992	Standard Practice for Obtaining Hydrostatic or Pressure Design Basis for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe and Fittings

Filament Wound Piping Systems

For more than 40 years, **Green Thread®**, **Red Thread®** and **Bondstrand®** products have been used in potable water, firewater mains, saltwater cooling, saltwater disposal, heating & cooling water systems and wastewater systems across the automotive, power generation, municipal, institutional and aerospace applications.

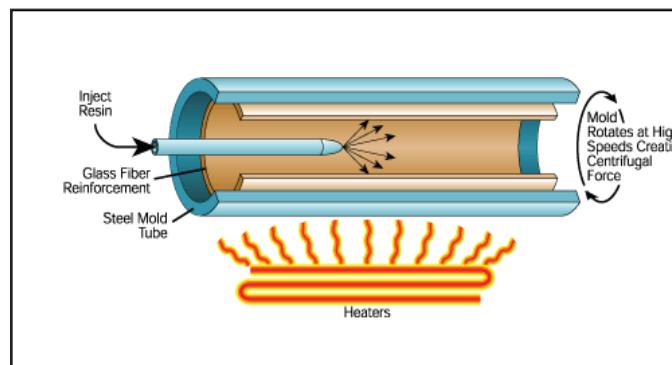


Filament Winding Process

Resin-impregnated glass fibers are wound onto a mandrel in a predetermined pattern under controlled tension. This process results in a pipe that is approximately 75% glass-reinforced for optimum internal pressure capability.

Centrifugally Cast Piping Systems

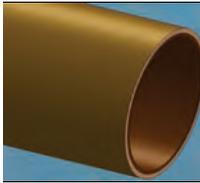
With a 100% resin corrosion barrier, **Centricast®** piping systems provide the most chemically resistant pipe in the market. These products have 60 years of successful history in the steel pickling, chloro-alkali, pharmaceutical, power generation and chemical processing industries.



Centrifugal Casting Process

Woven glass fiber (or fabric) in a motor-driven steel tube is saturated with resin while the tube rotates at high speed. Fiber reinforcement in both the hoop and axial directions affords excellent thermal expansion and beam-bending properties.

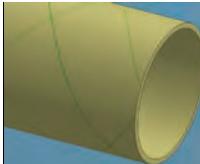
Epoxy Piping Systems



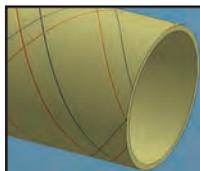
RB-2530 pipe is available in 1"-14" diameters, with pressure ratings from 125-300 psig and temperatures up to 250°F (121°C), and is recommended for most caustics, salts, solvents, many acids and chemical process solutions, including steel pickling. It also handles abrasive slurries.



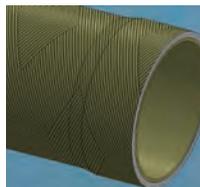
RB-1520 pipe is available in 1½"-14" diameters, with pressure ratings from 125-300 psig and temperatures up to 250°F (121°C), and is recommended for chemical process solutions, solvents, acids, caustics and salt solutions.



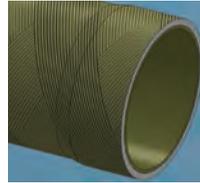
Green Thread HP pipe is available in 1"-42" diameters with pressure ratings up to 725 psig and temperatures up to 230°F (110°C), and is recommended for dilute acids and caustics, produced/hot water, industrial waste and condensate return. (Primary Market-North America)



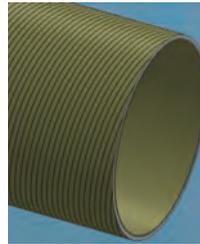
Red Thread HP pipe is available in 2"-42" diameters with pressure ratings up to 362 psig and temperatures up to 210°F (99°C). Pipe sizes 2"-6" have special profile threads for quick and reliable assembly. The product is recommended for general industrial service. (Primary Market-North America)



Bondstrand 2000 pipe is available in 1"-16" diameters with pressure ratings up to 450 psig and temperatures up to 250°F (121°C). This product is recommended for dilute acids and caustics, produced/hot water, industrial waste and condensate returns.



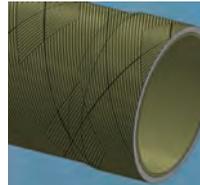
Bondstrand 2400 pipe is available in 2"-40" diameters with pressure ratings up to 725 psig and temperatures up to 250°F (121°C). Recommended for salt waters, brackish water, fire protection, potable/waste water and sewage, oil field reinjection, crude oil transmission and mild chemicals.



Bondstrand 3000, 3200, and 3300 series piping are manufactured using aromatic amine or anhydride epoxy. They are recommended for general industrial service up to 210°F (99°C). The 3000 series pipe is available in 2"-16" diameters with pressure ratings up to 450 psig. The 3200 and 3300 series pipe are available in 8"-16" diameters with pressure ratings of 200 and 300 psig, respectively.



Bondstrand 4000 pipe is available in 1"-16" diameters with pressure ratings from 150 to 300 psi and temperatures up to 250°F (121°C) and is recommended for acid drains, chemical processes, slurries, food processing, non-oxidizing chemicals and acids.



Bondstrand 7000 pipe is available in 2"-16" with a pressure rating of 150 psig and temperatures up to 210°F (99°C). Pipe is recommended for general industrial and jet fuel services where static electrical charge build-up is possible.

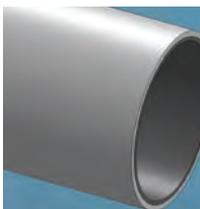
Note:

HP pressure classes are 16, 20, 25, 32, 40 and 50 bar.

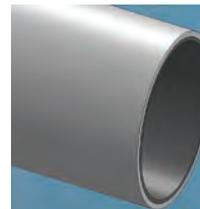
Bondstrand 2400 pressure classes are 10, 12, 14, 16, 20, 25, 32, 40 and 50 bar.

The above pressure classes are not available in all sizes.

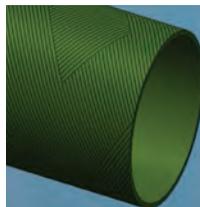
Vinyl Ester Piping Systems



CL2030 pipe is available in 1"-14" diameters with pressure ratings up to 150 psig and is recommended for most chlorinated and acidic mixtures up to 175°F (80°C) and other chemicals up to 200°F (93°C). This pipe is manufactured with a 100 mil liner.



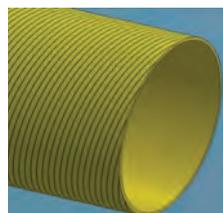
CL1520 pipe is available in 1"-14" diameters with pressure ratings up to 150 psig and is recommended for most chlorinated and acidic mixtures up to 175°F (80°C) and other chemicals up to 200°F (93.3°C). This pipe is manufactured with a 50 mil liner.



F-Chem pipe is a special order product available in 14"-72" with a pressure rating of 50-150 psig. The temperature rating is up to 225°F (121°C).

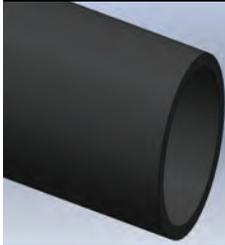


Bondstrand 5000 is available in 1"-16" diameters with temperature range up to 200°F (93°C). This is a custom vinyl ester pipe available in Asia, Europe and South America and is recommended for most chlorinated and acidic mixtures. This pipe is manufactured with a 50 mil liner.

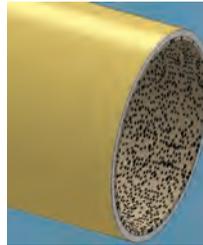


Polyplaster pipe is hand lay up pipe in diameters 1"-8" and is wound on a C.A.M. machine up to 100 inch. A variety of vinyl ester/polyester resin systems and liner thicknesses can be specified. Joint is butt and wrap.

Advanced Performance Specialty Products



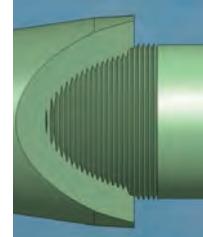
Z-Core products are a propriety thermosetting resin capable of enduring severe environments such as concentrated sulfuric acid, hydrochloric acid, hot caustic and mixtures of acids, solvents and bases. Z-Core is an excellent alternative to fluoropolymer lined pipe and expensive alloys. Temperature ratings up to 275°F and diameters from 1" to 8".



Ceram Core products are made from high-alumina ceramic with an epoxy exterior making it an ideal material for extreme abrasive and corrosive environments. Applications include bottom ash, ore slurries, mine tailings, salt slurries, dredge lines, wood pulp, concrete slurries and Diatomaceous Earth. Diameters are available from 6" to 16".



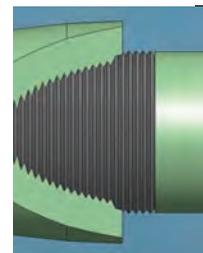
Silver Streak products are made for tough abrasive applications such as Flue Gas Desulfurization. This product is available from 1" through 48" diameters with a pressure rating up to 225 psig and a temperature rating up to 225°F (107°C).



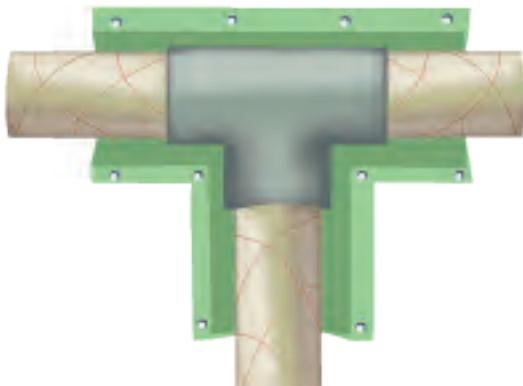
Down Hole Tubing & Casing products are capable of pressures up to 3500 psi and temperatures of 210° F for corrosive applications like CO₂, saltwater/brine and other such services for methane gas, chemical disposal or simply brackish water wells. Diameters are available from 1 1/2" through 9" for pressures up to 3500 psi and diameters up to 24" for lower pressure brackish/RO water wells.



Fiberspar LinePipe products are continuous spoolable piping systems with HDPE liners over wrapped with a glass fiber epoxy thermoset matrix for corrosive and abrasive applications up to 2500 psi and up to 180°F. Diameters are available in 2 1/2" through 6 1/2" and continuous lengths up to 2 miles. A down hole version is also available.



High Pressure products are available in sizes ranging from 1 1/2" through 36" for pressures of 150 psi up to 4000 psi at temperatures up to 210°F. Typical applications include water, hydraulic fluid, and other difficult industrial applications in a variety of industries including severe elevation changes.



Secondary Containment

Two-piece secondary containment fittings are available in 3"-16" diameters for primary pipe sizes up to 14". The systems are designed for maximum field flexibility, ease of installation and the ability to use one size larger containment. When higher pressure, larger diameter or severe temperature changes are required, special fittings can be provided to handle the added requirements.

Other Considerations

In many instances NOV Fiber Glass Systems' products can be hydro-blasted, steam cleaned and heat-traced; please contact FGS for details.

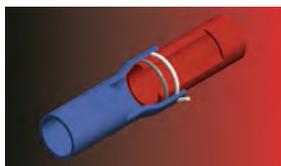
FGS has Factory Mutual Listing for Red Thread FM and Bondstrand 3200/6000 piping. Bondstrand 3200 has UL and ULC listing for buried fire protection systems.



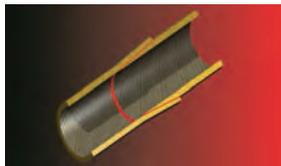
The following FGS pipe systems have UL and NSF 61 Listing for drinking water: Red Thread HP, Green Thread HP, Bondstrand 2000, 2400 series and 7000 pipe.



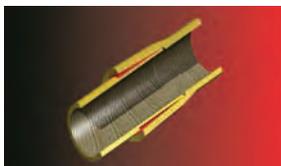
Joining Systems



Key Lock® - Self-restrained mechanical joint provides quick assembly by means of locking keys inserted between bell and spigot. Used to install Bondstrand 2400 series pipe in sizes 2" through 40" (50 - 1000 mm).



Taper x Taper - Matched taper joint secured with epoxy adhesive. Self-locking feature resists movement, facilitating joining on RT/GT HP 16/20/25 bar piping without awaiting adhesive cure.



Quick® Lock - Straight spigot/tapered socket adhesive bonded joint for precise make-up to facilitate close tolerance piping. Used for 1"-16" (25-400 mm) Bondstrand 2000/4000/5000/6000/7000 piping.



T.A.B.™ - Threaded and bonded joining system. Double-lead threads provide quick and secure adhesive connections. Available for 2" through 6" **Red Thread** pipe sizes.



Flanged - Available for all piping systems and diameters; factory assembled or shipped loose for assembly in the field.

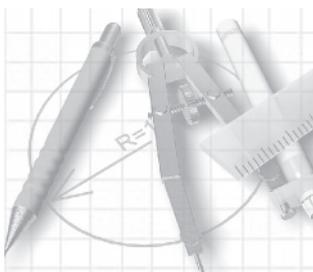


Butt & Wrap - Plain end pipe or pipe and fittings butted together and wrapped with multiple layers of resin-saturated mat or woven roving. Use with all piping systems.



Socket Joint - Adhesive bonded straight socket joint with positive stops. This is the standard for Centricast piping systems.

Engineering Design



The NOV Fiber Glass Systems' "Success by Design" engineering software sets the industry standard for design assistance. From material selection to flow calculations and comparisons; anchor, guide and support calculations; and

thermal expansion solutions, this design package assists the engineer and owner in designing a highly successful system. Our applications engineers can assist you in the selection of the proper piping system for your application.



Installation and Fabrication

With eight regional fabrication locations in North America and others around the world, 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.



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Engineering and Project Management Solutions

Lifting and Handling Solutions

Production Solutions

Supply Chain Solutions

Tubular and Corrosion Control Solutions

Well Service and Completion Solutions

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