

## Conley Piping Specification

### 1.0 SCOPE

1.1 This specification covers requirements for machine made reinforced thermosetting resin pipe and fittings, 1" - 20", manufactured according to ASTM D 2996 or ASTM F 1173 or IMO A.753(18), the standard specification for filament wound pipe used in marine piping systems. These specifications shall cover Schedule 90C Conductive extra heavy duty pressure and process pipe and fittings for use with a broad base of marine applications in *hazardous areas* as well as corrosive chemical environments including acids, caustics, various waste solutions, brines and a wide range of solvents. The Epoxy systems meet the requirements for FDA.

**Both Pipe and Fittings (Tees, Elbows, Reducers, and Crosses) shall be manufactured with a minimum double Nexus® (synthetic veil) reinforced Conductive Epoxy internal corrosion barrier, an Epoxy filament wound fiberglass reinforced cage with a conductive filament, and a standard Nexus® reinforced external corrosion barrier. Pipe and fittings have a 25 year guarantee against ultraviolet (UV) degradation (fiber blooming).** Schedule 90 Series pipe and fittings are ABS Type Approved for shipboard piping without the fire protective coating. Conley Series 90 Piping Systems are also for Low Pressure Fiberglass Line Pipe, FW (Filament Wound), for use in conveying produced fluids including oil and non-potable water in the oil and gas producing industries. See the **Conley Product Data** for pressure/temperature ratings and span dimensions of each schedule.

### 2.0 MATERIAL

2.1 Raw materials will meet or exceed specifications for Epoxy resin systems and fiberglass materials.

2.2 The resin, reinforcement, pigments, fillers and other materials, when combined as a composite structure shall produce a pipe that shall meet or exceed the requirements of the classification system listed in ASTM D 2310.

### 3.0 PIPE CONSTRUCTION

3.1 The pipe shall consist of three specific layers; the minimum double **Nexus®** synthetic veil reinforced conductive **internal corrosion barrier**, the filament wound reinforcement or **cage** with conductive filament, and the synthetic veil reinforced **external corrosion** / UV barrier. This material shall then be post-cured to form an integral structure and provide optimum cross-linking density.

3.1a The 60 mil **internal corrosion barrier** (inner liner) shall consist of a minimum two layers of **Nexus®** synthetic veil saturated with aromatic amine cured Conductive Epoxy resin using both conductive graphite powder and filaments. This layer shall be a maximum of 90% resin and 10% reinforcement to increase impact, abrasion, and chemical resistance.

3.1b The glass reinforcement, or cage, shall be continuous glass roving with a conductive filament (such as nickel coated Epoxy) wound at an angle of 54 3/4 degrees to the longitudinal axis of the pipe, using aromatic amine cured premium Epoxy resin, and shall be not less than 65% glass for maximum strength and flexibility.

3.1c The external corrosion barrier will be **Nexus®** synthetic veil reinforced for corrosion resistance, impact, abrasion, and UV resistance. This is required to control the OD for straight socket design connections.

3.1d Standard exterior color is black. The exterior color may be any other color if specified prior to manufacture. The color can be pigmented (impregnated) into the outer cover resin without painting if so specified. Some colors and shades may not be achievable.

## 4.0 FITTINGS

4.1 All fittings such as elbows, laterals, tees and reducers shall be equal or superior in strength to the adjacent pipe section and shall have the same internal diameter as the pipe. ***Fittings shall be filament wound, and have the same three layer construction as the pipe, i.e., 60 mil Nexus® synthetic veil reinforced conductive internal corrosion resistant barrier, filament wound and glass reinforced structural cage with a conductive filament, and a Nexus® synthetic veil reinforced external corrosion barrier with standard 25 year guarantee against UV degradation (fiber blooming).***

4.2 Elbows - Manufactured in standard configurations with straight socket ends designed for the controlled OD of the pipe.

4.3 Reducers - Designed as concentric or eccentric gradual changes in diameter to minimally affect the fluid flow, and manufactured with straight socket ends.

## 5.0 CONNECTIONS

5.1 Prefabrication - When requested by the customer, the manufacturer shall prefabricate into shippable sub-assemblies to minimize the use of field-fabricated connections.

5.2 Straight Cement Socket Joints - Shall be used with both pipe to fitting connections as well as pipe to pipe connections using a coupling. Tapering or machining of the pipe shall not be allowed.

5.3 Flange connections - Shall be used to join the fiberglass pipe and fittings to other equipment. Flanges shall be designed for the operating pressure per the line requirements as a minimum. Flange dimensions shall conform to ANSI/ASME B16.5 150 lb drilling. Where flanges connect to raised face surfaces (valves, etc.), a spacer ring shall be added to achieve a flat mating surface.

5.4 Gasket material - For flanged connections this shall be an elastomer which is compatible with the service. Teflon and Teflon envelope gaskets are not recommended. See 9.5.

5.5 Conductive Epoxy adhesive (United States Patent #6482333) shall be used to fabricate all piping, fitting and flanged connections according to Conley fabrication procedures. The conductive Epoxy adhesive includes both conductive graphite powder and filaments. The conductive adhesive is also used to bond any grounding stud/clamp to the pipe. ***See the Conley Installation and Fabrication Manual, Conductive Piping section.***

## 6.0 STRAIGHT SOCKET CEMENT JOINTS

6.1 This type of joint shall be the only means of joining pipe to pipe and fittings. Tapering or machining of the pipe shall not be allowed, nor shall butt wrap joints. Pipe to pipe connections shall be made with straight socket cement couplings. The only exception to this specification shall be flanged connections as described in 5.3.

## 7.0 Flanges

7.1 Flange Attachment - Flanges shall be attached to a pipe section only with straight socket cement joints.

7.2 Flange Face - Flanges through 12" diameter shall be grooved to allow use of a full face gasket, flanges larger than 12" shall be non-grooved. Full face gaskets are required.

## 8.0 PRESSURE AND VACUUM SERVICE

8.1 Series 90 pipe and fittings are available in 150, 225, or 250 psi internal pressure rating. The piping systems have a minimum Full Vacuum rating for installation in ballast systems. Other internal pressure and external pressure (vacuum) ratings are available.

## 9.0 RECOMMENDED INSTALLATION PRACTICE

9.1 Pipe hangers and spacing - Hangers shall be band type hangers contacting a minimum of 120 degrees of the pipe surface, and with a minimum width of 1" or pipe diameter divided by 6, whichever is greater.

9.2 Underground Installation - The pipe shall be designed for burial of 3 feet to 20 feet under standard soil and bedding conditions. Manufacturer shall design pipe

for required burial conditions.

9.3 Expansion - The manufacturer shall specify thermal loads, expansion and contraction, and shall convey this design information to the end user or customer for consideration in the proper design of the piping system.

9.4 Bolts, Nuts, and Washers - Bolts, nuts, and washers shall be furnished by the customer. Metal SAE washers shall be used under all nut and bolt heads. All nuts, bolts and washers shall be of materials suitable for use in the exterior environment.

9.5 Gaskets - Gaskets shall be furnished by the customer. Recommended gasket materials shall be a minimum of 1/8 inch in thickness with a suitable chemical resistance to the service environment. Gaskets shall have a Shore A hardness of 50 to 70. **See the Conley Installation and Fabrication Manual for bolt torque requirements.**

9.6 Fabrication - Fabrication procedures or "bonders" shall be in accordance with the qualified bonding procedure document: **"Conley Installation and Fabrication Manual"**.

## 10.0 QUALITY ASSURANCE AND INSPECTION

10.1 Conley's Quality Assurance program is in compliance with ISO 9001. Pipe and fittings shall be inspected and measured at each stage of manufacture, i.e. liner, reinforcement and external corrosion barrier. For optimum strength and corrosion resistance, all pipe and fittings shall be post cured.

This specification and recommendations it contains are based on data reasonably believed to be reliable. It is intended that this data be used by competent personnel having acceptable training in accordance with current industry practice and operating conditions. Variation in environment, application or installation, changes in operating procedures, or extrapolation of data may cause unsatisfactory results. Conley Composites makes no representation or warranty, express or implied, including warranties of merchantability or fitness for purpose, as to accuracy, adequacy or completeness of the recommendations or information contained herein. Conley Composites assumes no liability whatsoever in connection with this literature or the information or recommendations it contains.

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