

Bridge Drain Specifications

I. References

When a standard or other referenced document referred to in this specification is superseded by an approved revision, the revision shall apply.

II. Manufacturing

The Bridge Drain Pipe, also known as Reinforced Thermosetting Resin Piping (RTRP), shall be manufactured **using the single-circuit filament winding process** (up through 12") meeting the requirements of ASTM D 2996 RTRP-12EA12122, with at least 30,000 psi short time rupture strength in the hoop tensile stress. The single-circuit wound conduit shall have a winding angle as close as possible to 54.75°. Multi-circuit winding may be incorporated on 14" and larger sizes of bridge drain straight lengths. Winding mandrels shall be straight and true so as to produce a non-tapered bridge drain pipe. Tapering is allowed at the belled end.

The bridge drain straight lengths resin system shall be epoxy based, with no fillers, using an anhydride curing agent. The fiberglass shall consist of continuous **E-glass Grade "A" roving**. All additives for increasing flame spread and lowering smoke density shall be halogen free, i.e. not contain chlorine or bromine.

Carbon black shall be used as ultraviolet inhibitor to protect the bridge drain and fittings during storage and exposure to the outdoors. Bridge drain, elbows and fabricated fittings shall be concrete-grey in color. UV-resistant exterior coating may be applied (upon customer request) to the finished products to further inhibit UV degradation on pipe exposed to extreme sunlight UV. Upon customer request, bridge drain and fittings shall incorporate an exterior surfacing veil to provide a resin rich surface that fights corrosion and inhibits UV degradation.

Curing shall be done using an oven and shall take place in two steps. The first curing zone shall bring the bridge drain slowly to the gel temperature. The second zone shall post-cure the bridge drain at no less than 350°F. The bridge drain has to be properly cured so that when measuring the glass transition temperature with a differential calorimeter the difference between the first measurement and the second shall not exceed 5°F.

The internal bridge drain and elbow walls shall be smooth, and all fibers embedded within the epoxy.

All fiberglass bridge drain, fittings and elbows shall be pigmented throughout the wall. Color to be standard concrete-grey unless otherwise specified. Paint or any other exterior coating shall be specified by the customer.

All bridge drain, fittings and elbows shall be durably and legibly marked with the appropriate part number. In addition, the following information shall be included:

- Manufacturer Name
- Date of Manufacturing of Bridge Drain and Fittings
- Special customer markings (per request)

All bridge drain, elbows and fittings shall be **manufactured in the U.S.A. (Spring, TX) and marked as such.**

III. Dimensions

Bridge drain shall be manufactured having non-tapered sections (except for integral belled ends) and shall be manufactured with following nominal dimensions:

| CONDUIT SIZE | OUTSIDE DIAMETER (IN) | INSIDE DIAMETER (IN) | WALL THICKNESS (IN) |
|--------------|-----------------------|----------------------|---------------------|
| 4" | 4.57" | 4.32" | .125" |
| 6" | 6.68" | 6.43" | .125" |
| 8" | 8.48" | 8.23" | .125" |
| 10" | 10.48" | 10.23" | .125" |
| 12" | 12.48" | 12.23" | .125" |
| 14" | 14.48" | 14.23" | .125" |
| 16" | 16.48" | 16.23" | .125" |
| 18" | 18.48" | 18.23" | .125" |
| 20" | 20.56" | 20.23" | .165" |
| 24" | 24.56" | 24.23" | .165" |

Tolerances are +.034"/-.028

IV. Mechanical Characteristics

The bridge drain shall have following mechanical strength when tested in accordance with referenced test method:

| Hoop Tensile Strength (based on reinforced thickness @ 75°F) | | ANSI/ASTM D1599 |
|---|---------------------------------------|-----------------|
| 4" through 12" | 30,000 psi | |
| 12" through 24" | 30,000 psi | |
| Tensile Strength, Axial | 11,000 psi | ASTM D2105 |
| Ultimate Elongation | 2% psi | ASTM D2105 |
| Modulus of Elasticity (4" conduit) | 1.4 x 10 ⁺⁶ psi | ASTM D2105 |
| Thermal Conductivity | 2.0 BTU/(ft ²)(hr)(°F/in) | ASTM D5930-1 |
| Specific Gravity | 1.9 | ASTM D792 |
| Glass Content | 65–75% | API 15LR |
| Water Absorption | 1% max | ASTM D570 |
| Barcol Hardness | 52–56 | ASTM D2583 |
| Coefficient of Thermal Expansion | 1.2 x 10 ⁻⁵ in/in/°F | ASTM D696 |
| Compressive Strength (end loads): | | ASTM D2444 |
| Size 4" | 23.3 lbs/°F | |
| 6" | 36 lbs/°F | |
| 8" | 46 lbs/°F | |
| 10" | 84 lbs/°F | |
| 12" | 99 lbs/°F | |
| 14" | 105 lbs/°F | |
| 16" | 110 lbs/°F | |
| 18" | 123 lbs/°F | |
| 20" | 137 lbs/°F | |
| 24" | 142 lbs/°F | |

V. Bridge Drain Support Spans

Many codes require pipe hanger supports to be spaced every 10 ft. regardless of size. Check local codes.

| DRAIN PIPE SIZE | SUPPORT SPAN (FT) |
|-----------------|-------------------|
| 4" | 16' |
| 6" | 18' |
| 8" | 19' |
| 10" | 21' |
| 12" | 22' |
| 14" | 23' |
| 16" | 24' |
| 18" | 24' |
| 20" | 25' |
| 24" | 26' |

Runs of bridge drain shall be supported at spacing no greater than those on the engineer approved drawings. Steel and fiberglass sling, clamp and clevis hangers designed for hanging and supporting pipes may be used as long as they meet the designated load ratings. Fiberglass bridge/grid hanger-type supports are recommended. If support contains less than 120° of contact, a split fiberglass pipe protective sleeve or fiberglass wear pad shall be installed and bonded to the pipe. Split sleeve length shall equal pipe diameter. This does not apply to bridge/grid-type support hangers.

VI. Hangers

Pipe strap/clevis hanger width shall be 1-1/2 in. for nominal fiberglass pipe size 6 in. to 10 in. Strap width shall be 2 in. for nominal fiberglass pipe size 12 in. to 14 in. Hanger's thickness shall be 3/16 in. This does not apply to bridge/grid-type hangers.

| PIPE STRAP/HANGER WIDTH | |
|-------------------------|--------------------|
| PIPE SIZE (IN) | MINIMUM WIDTH (IN) |
| 4" | 1-1/4" |
| 6" | 1-1/2" |
| 8" | 1-1/2" |
| 10" | 1-1/2" |
| 12" | 2" |
| 14" | 2" |
| 16" | 2-1/2" |
| 18" | 2-1/2" |
| 20" | 3" |
| 24" | 3" |

VII. Bridge Drain Connections

All connections between piping systems and roadway drain scuppers shall not be rigid. The deck outlet connection shall be made with a free-floating collector assembly sized 4 in. larger than the outlet pipe. Assemblies shall include an oversized fiberglass splash guard at each collector unit. End run connections should feature a female threaded outlet. Where specifically shown as a clean out, removal pieces shall be made of a threaded PVC plug. The standard plug shall come white in color. Butt or wrap straight section joint connections shall not be allowed. Belled end connections shall be used to connect factory straight lengths. Straight socket slip couplings are acceptable when factory belled ends have been field cut.

VIII. Adhesive

UV-resistant epoxy adhesive will be used to bond pipe/fitting connections with straight slip couplings for all joints. All fiberglass pipe, fittings and bonding adhesives shall be provided from the same manufacturer.

IX. Quality Assurance Program

Manufacturer shall have a current Certificate, issued by an independent and accredited company, of compliance with an **ISO 9001:2015 Quality Management System**.

X. Joining System

The bridge drain shall be supplied with an integral wound bell on one end and a machined spigot on the other end. A two-part adhesive, epoxy resin system, designed to permanently bond fittings and joints of bridge drain shall be properly mixed and applied to the spigot end before joining the bridge drain lengths together. The adhesive shall be available for use in three different ambient temperatures, 70°F, 40°F and 20°F. The adhesive shall be supplied from the same manufacturer of bridge drain, fittings and elbows in order not to void the manufacturer’s warranty.

XI. Toxicity

The bridge drain shall not contain any compounds that can release halogens, i.e. chlorine, bromine, fluorine and iodine in more than trace amounts when burning. Following shall be the maximum values when tested in accordance to ASTM E-800:

| GASES | VALUES (MAX PPM) |
|--------------------|------------------|
| Hydrogen Chloride | 0 |
| Hydrogen Bromide | 0 |
| Hydrogen Cyanide | <1 |
| Hydrogen Sulfide | 0 |
| Ammonia | 0 |
| Aldehydes as HCHO | <10 |
| Oxides of Nitrogen | <50 |

XII. Fittings and Accessories

Fiberglass bridge drain, fittings, elbows and accessories shall be manufactured using one of two manufacturing procedures. The first method shall use the same process (filament winding) as is used to manufacture the fiberglass bridge drain straight lengths. The second method shall use a vacuum infusion or resin transfer (RTM) molding process. All elbows shall be manufactured by vacuum infusion or RTM and shall be smooth radius. 90- and 45-degree elbows shall not be mitered. Filament-wound pipe may be used to fabricate mitered tees, laterals, Y’s and crosses.

XIII. Environmental

Manufacturer shall have a current Certificate, issued by an independent and accredited company, of compliance with an **ISO 14001:2015 Environmental Management Systems and Performance**.

XIV. Installation

All fiberglass bridge drain, fittings and elbows shall be handled and installed according to the manufacturer's recommended guidelines and procedures outlined in the catalog.