

Special Specification 6390

Intelligent Transportation System (ITS) Fiberglass Conduit



1. DESCRIPTION

Furnish and place Fiberglass Conduit of the type and size specified, and the installation method specified as shown on the plans and as directed. Provide conduits suitable for installation in an outdoor environment including constant emersion in water or hung from a bridge without any degradation in the conduit.

2. MATERIALS

Provide new materials that conform to the details shown on the plans, the requirements of this Item, and to the pertinent requirements of the following:

- UL-listed
- NEMA requirements
- NEC requirements

Provide aerial Fiberglass Conduit that conforms to the pertinent requirements of the following:

- ASTM-D2996
- ASTM-D2310
- ASTM-D2517

Unless otherwise shown on the plans, fabricate expansion joints and conduit from the same material as the connecting conduit.

Furnish, install, and test the conduit. Provide required sweeps, bends, repair couplings, ground box/manhole termination kits, alternative outer ducts, adapters, pre-assembled split repair kits, lubrication access fittings, tug-plugs, slit-innerduct plugs, conduit hangers (bridge), brackets, expansion joints, and accessories to complete the fiberglass conduit installation. Provide materials for installation and testing.

Provide expansion joints and conduit that matches the connecting conduit.

Furnish components of the fiberglass conduit that are produced by the same manufacturer.

Provide a single protective end cap for each end of 20 ft. conduit sections, factory bends, and fittings to minimize the risk of damage to the conduit system during shipping and handling. Leave the end cap in place on the conduit until delivery to the project site.

Provide fiberglass conduit that conforms to the following requirements:

- a percentovality of less than 5%,
- an underground system that performs in an ambient temperature range of 30°F to 130°F without degradation of material properties,
- an aerial system that performs in an ambient temperature range of 104°F to 200°F without degradation of material properties,
- resistant to most harsh chemicals,
- protected against degradation due to oxidation or general corrosion,

- capable of being direct buried by trenching or boring with no special consideration to using selective backfill,
- has a low coefficient of thermal expansion, such that expansion and contraction is minimal,
- free of visible cracks, holes or other physical defects that would degrade its performance,
- uniform as practical in respect to overall dimensions, color, density, thickness, etc., and
- contains a UV light stabilizer which will protect it for a minimum of 12 mo., in direct sunlight

Provide fiberglass conduit that is bullet resistant, heavy walled, pure, high grade, and filament wound fiberglass reinforced epoxy conduit. Provide conduit, elbows, and fittings that are manufactured from the same resin/hardener/glass systems manufactured by the same filament wound system.

Provide fiberglass conduit suitable for concrete encasement.

3. CONSTRUCTION

Place conduit in accordance with the lines, grades, details, and dimensions shown on the plans or as directed. Install underground fiberglass conduit at a minimum depth of 18 in., unless otherwise shown on the plans. Install conduit in accordance with the requirements of the NEC.

Ream conduit ends to remove burrs and sharp edges. Fasten conduit placed on structures with fiberglass conduit brackets or hangers as shown on the plans or as directed. Fit the conduit terminations with bushings or bell ends.

Prior to installation of cables or final acceptance, draw a spherical template having a diameter of not less than 75% of the inside diameter of the conduit to ensure that the conduit is free from obstruction. Fit the ends of all empty conduit with caps.

For underground installation, trench, excavate and backfill as shown on the plans and in accordance with Item 400, "Excavation and Backfill for Structures", except for measurement and payment.

Before backfilling conduit trenches, place a detectable underground metalized Mylar marking tape above the conduit and concrete encasement. Extend the tape continuously into the adjacent ground boxes on each conduit run. Imprint the marking tape with "TXDOT CONDUIT AND FIBEROPTIC CABLE SYSTEM CALL (713) 802-5909 or (713) 802-5286 BEFORE PROCEEDING" every 18 in. The supplying and installation of the marking tapes is not paid for directly but is considered subsidiary to the various bid items. Where removing existing surfacing for placing conduit, repair by backfilling with material equal in composition and density to the surrounding areas and by replacing any removed surfacing, such as asphalt pavement or concrete riprap, with like material to equivalent condition. Provide a bare copper No. 6 AWG in conduit runs, in accordance with Electrical Detail requirements.

3.1. Testing.

- 3.1.1. **General.** Perform tests of materials and equipment not previously tested and approved. If technical data is not considered adequate for approval, samples may be requested for test. The contract period will not be extended for time lost or delays caused by testing before final approval of any items.

Compare the results of each test with the requirements of this Item. Failure to conform to the requirements of any test must be identified as a defect and the materials will be subject to rejection by the Engineer. Offer rejected materials again for retest provided the non-compliances have been corrected and retested by the Contractor with evidence submitted to the Engineer.

- 3.1.2. **Examination of Product.** Carefully examine each conduit system component before installing to verify that the materials, design, construction, markings, and workmanship comply with the requirements of this Item.

- 3.2. **Documentation Requirements.** Submit documentation of the conduit system consisting of the following:
- manufacturer specifications or cut sheets for the components of the conduit duct system,
 - laboratory certified material test reports documenting conformance with pertinent standards identified under Article 2, "Materials,"
 - GPS coordinates,
 - pre-installation test procedures,
 - post-installation test procedures, and
 - as-built plans of installed conduit system.
- 3.2.1. **References.** The Fiberglass Conduit Supplier must submit three references, preferably from State Departments of Transportation, where this supplier's conduit system has functioned successfully for a minimum period of 1 yr. Include current name and address of organization, and the current name and telephone number of an individual from the organization who can be contacted to verify system installation. Provide this information before submitting documentation. Failure to furnish the above references will be sufficient reason for rejection of the supplier's equipment.

4. MEASUREMENT

This Item will be measured by the foot of the conduit furnished, installed, and tested.

5. PAYMENT

The work performed, and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Fiberglass Conduit" of the type and size specified and the installation method specified as applicable. This price is full compensation for furnishing and installing conduit; hanging, strapping, jacking, boring, tunneling, excavating, and furnishing and placing backfill; replacing pavement structure, sod, riprap, curbs, or other surface; marking location of conduit (when required); furnishing and installing fittings, junction boxes, and expansion joints; and equipment, labor, tools, and incidentals.

Flexible conduit will not be paid for directly but will be subsidiary to pertinent Items. Unless otherwise shown on the plans, no payment will be allowed under this Item for conduit used on electrical services or in foundations.