

ITEM 662.18130425 - TZB FURNISH AND INSTALL FIBER REINFORCED EPOXY (F.R.E.) CONDUIT

1. DESCRIPTION:

- 1.01 This work shall consist of furnishing and installing F.R.E. conduits, fittings, support angles and hardware, sleeves and hanger assemblies as shown in the Contract Documents and in accordance with the applicable specifications and standards of the utility companies referenced in the contract documents. All provisions of the 2008 New York State Standard Specifications and all addendums shall apply.
- 1.02 All materials and equipment necessary for complete conduit installation will be furnished by the Contractor.
- 1.03 ~~The Contractor may contact the Utility Company listed in the Contract Documents.~~

2. MATERIALS:

- 2.01 **General.** All materials shall conform to the latest requirements of the New York Standard Specifications 2008 and any updates, the [REDACTED]
[REDACTED] Difference in standards or code shall be resolved as determined by the Engineer. Material requirements are specified in the following subsections of the New York State Standard Specifications:

[REDACTED]

- 2.02 Material requirements for this specification require [REDACTED]
[REDACTED]

- 2.03 Conduit and fittings shall consist of continuous [REDACTED]
[REDACTED]

- 2.04 Epoxy resin system shall be [REDACTED]
[REDACTED]

- 2.05 ~~Size & Wall Thickness Conduit and fittings shall be manufactured with a [REDACTED]~~
~~[REDACTED]~~
Size & Wall Thickness Conduit and fittings shall be manufactured with a [REDACTED]
[REDACTED]

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2. MATERIALS: (cont'd)

2.06 All conduit shall be Dielectric.

2.07 All conduit sections shall be supplied in 20 foot long sections. All conduits shall be marked at least once with a suitable identifying mark printed on the outside of the conduit or fittings. The markings shall contain manufacturer name, trade size, XW a part number date of manufacturer. All fittings shall have the degree of radii.

All expansion fittings shall be O-ring expansion/deflection type joints.

2.08 Properties:

Physical properties



Test results



Test Protocol



Electrical Properties



Test Results



Test Protocol



Surface Finish



Thermal Properties



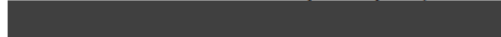
Test results



Test Protocol



2.09 Adhesive shall be a two part epoxy cement



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3. CONSTRUCTION DETAILS:

- 3.01 The Contractor shall study the plans and details and use them as a guide in determining the location of the conduit, bracket, hangers and enclosures. Any discrepancies in the contract documents shall be resolved with the Engineer before any materials are ordered.
- 3.02 All installation shall conform to the latest EEI, NEMA, ANSI and ASTM standards. In addition workmanship shall conform to the latest requirements of the Code; the rules of the New York State Public Service Commission; and any local ordinances which may apply. Differences in standards or code requirements shall be resolved as determined by the Engineer.
- 3.03 **Shop Drawings.** The Contractor shall submit six copies of the Manufacturer's Shop drawings for approval. These drawings shall cover the following items and be submitted at least ten working days prior to the date the Contractor orders the conduit, hanger assemblies, bracket(s) and the layout of proposed conduit run(s) including bracket and enclosure locations. These items shall not be shipped to the job site until the shop drawings and Prototype(s)/Mockup(s) are approved. The shop drawings shall be neatly drawn and clearly legible. Catalog cuts may be submitted instead of shop drawings.
- 3.04 **Conduit:**
- A. All conduit shall be F.R.E. as indicated on the contract plans and shall be carefully installed as shown in the plans or in a manner approved by the Engineer. Conduit bracket / hanger assemblies spacing shall not exceed 10 feet. All bends in the conduit shall be made with factory bends only, no reduction of the internal diameter of the conduit is allowed. No sweeps shall be greater than 45 degrees. A minimum bend radius shall be 36" and or maximum 5% ovalization. $Quality = (MAX.O.D. - MIN I.D.) \text{ divided by average O.D. times } 100$. No conduit or fittings will be accepted that shows any evidence of destruction of the protective coating.
- B. Where conduit terminates at pull boxes or enclosures, the contractor shall break into the pull box or enclosures in a manner acceptable to the Engineer. Threaded couplers shall be utilized to join F.R.E. to the enclosure(s). Sealed bonding bushings shall be provided at each conduit outlet in the pull box or enclosure. Bushing caps, to prevent entry of dirt and refuse shall be provided prior to pulling cables, shall be placed at ends. [REDACTED]
[REDACTED] Intermediate enclosures shall be [REDACTED]
- C. All conduit installed shall be tested for clear bore and correct installation by the Contractor using a ball mandrel, brush and snake before installation will be accepted. The ball shall be 85 percent of the internal diameter of the conduit / raceway to be tested. Two short wire brushes shall be included in the mandrel assembly. Snaking of the conduits shall be done by the Contractor in the presence of the Engineer and Utility owner. All conduits which reject the mandrel shall be cleared and the Contractor shall bear all costs to replace defective conduit.

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3. CONSTRUCTION DETAILS: (cont'd)

3.04 Conduit: (cont'd)

- D. Numbers or Letters shall be assigned to various conduit runs, and as they test clear, they shall be identified by a tag (water proof adhesive label) no less than 2" square. As the conduit runs test clear , a record shall be kept under the heading "Empty Conduit tested, Left Clear, Tagged and Capped" showing the conduit designation, diameter, location, date tested, and by whom. When completed the record shall be signed by the Engineer and submitted in triplicate for final approval by the Authority. When completed a record drawing shall be submitted by the Contractor for approval by the Authority.
- E. All empty conduit(s) ends shall be temporarily capped or plugged by the Contractor each day. After the conduit is properly installed the Contractor shall furnish and install in each conduit run a flat, woven polyester style muletape with a tensile strength of at least [REDACTED] leaving at least 3 feet of extra line in each pull box and enclosure or other terminus.
- F. Prior to installation of the adhesive the ends of the conduit shall be inspected for damage or burrs. If determined by the ENGINEER the ends are damaged the conduit shall not be used. All burrs shall be removed to the satisfaction of the Engineer.
- G. All joints shall be made with bell and spigots. All bell(s) shall face in the same direction. To allow free travel through intermediate hangers bell and spigots ends shall be located a minimum of six (6) inches away from hangers.
- H. Conduit length shall be twenty (20) feet in length.
- I. All joints shall be inserted a minimum of four (4) inches. All joints shall be made with two part adhesive.
- J. All conduit cuts shall be mitered square with a miter saw. All cuts shall be de-burred.
- K. All enclosure(s) shall be located so as to remain in line to the conduit. Conduit runs shall be parallel to each other and located no closer than four (4) inches between them or ten (10) inches maximum.
- L. Conduits passing through the enclosure shall be located within 1/4" vertical or horizontal of each other.

3.05 Field Drilling Holes in Structural Steel:

- A. The requirements of the New York State Standard Specifications 586-3.03A shall apply
- B. The required hole diameter will be indicated on the plans.
- C. No Welding, Flame Cutting, Punching or Flame Drilling of the existing steel will be permitted.
- D. All damage to existing steel, as determined by the Engineer, shall be repaired by the Contractor, at no cost to the Authority. The proposed repair procedure and materials must be submitted to the Engineer for approval. All repair shall be done in a manner satisfactory to the Engineer.

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4. METHOD OF MEASUREMENT:

- 4.01 **Conduit:** The quantity to be measured for payment will be in linear feet of furnished conduit, of the type and size specified and installed as shown in the contract documents and/or as directed by the Engineer. Measurement shall include all couplings, adapters, and bends.

5. BASIS OF PAYMENT:

- 5.01 **General:** The Contractor shall pay all fees for testing, licenses and any other cost he may incur in furnishing and installing the conduit system. The cost of all minor miscellaneous components shall be included in the price bid for the conduit.
- 5.02 The unit price bid per liner foot of conduit shall include the conduit and all labor, equipment and other materials necessary to complete the work, including couplings, conduit, adaptors or bends, hanger assemblies, brackets, expansion/deflection fittings, including paint removal, incidental painting when required, and field drilling of holes. No adjustment will be paid for holes drilled through different thicknesses, or different numbers of plates.
- 5.03 The Contractor shall be responsible for meeting any intermediate and final completion dates defined in the proposal. The contractor is therefore advised to take all necessary measurements and to submit all documents for review and approval as soon as the Contract is awarded. Liquidated damages, as defined in the contract proposal and the New York State Standard Specifications, will be assessed for any delay in the contract schedule.
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