SECTION 330509.33 - THRUST RESTRAINT FOR UTILITY PIPING

This section specifies tied joint restraint systems used to anchor and resist forces developed in underground closed pipeline systems. Consider using this section to restrain underground pressure pipe using mechanical system instead of, or in combination with, concrete thrust blocks.

1. GENERAL
   * + 1. SUMMARY
          1. Section Includes:

Tied joint restraint system.

* + - * 1. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section as well as Sections required to describe complete system or assembly requirements.

Section 310000 - Earthwork: Trenching and backfilling requirements for Site utilities.

Section 331413 - Public Water Utility Distribution Piping: Requirements for piping Work as required by this Section.

Section 331416 - Site Water Utility Distribution Piping: Requirements for piping Work as required by this Section.

Section 333100 - Sanitary Sewerage Piping: Requirements for piping Work as required by this Section.

* + - 1. REFERENCE STANDARDS

List reference standards included within text of this section, with designations, numbers, and complete document titles.

* + - * 1. American Water Works Association:

AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

* + - * 1. ASME International:

ASME B1.1 - Unified Inch Screw Threads, UN and UNR Thread Form.

* + - * 1. ASTM International:

ASTM A36 - Standard Specification for Carbon Structural Steel.

ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.

ASTM A588 - Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi Minimum Yield Point, with Atmospheric Corrosion Resistance.

ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.

ASTM F436 - Standard Specification for Hardened Steel Washers.

* + - 1. COORDINATION
         1. Coordinate Work of this Section with installation of fittings and joints that require restraint.
      2. SUBMITTALS

Only request submittals needed to verify compliance with project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
        2. Manufacturer’s installation instructions shall be provided along with product data.
        3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
        4. Product Data: Submit manufacturer catalog information for restrained joint details and installation instructions.
        5. Shop Drawings:

Indicate restrained joint details and materials being used.

Submit layout drawings showing piece numbers and locations.

Indicate restrained joint locations.

Include following paragraph for submission of physical samples for selection of finish, color, texture, and other properties.

* + - * 1. Samples: Submit [**two**] samples of joint restraint parts.
        2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

Include separate paragraphs for additional certifications.

* + - * 1. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
        2. Qualifications Statement:

Coordinate following subparagraph with requirements specified in qualifications article.

Submit qualifications for manufacturer, fabricator, and licensed professional.

Remove paragraph if not LEED project.

* + - 1. SUSTAINABLE DESIGN SUBMITTALS
         1. Section 018113 - LEED Documentation Requirements: Requirements for sustainable design submittals.
         2. Manufacturer's Certificate:

Certify that products meet or exceed specified sustainable design requirements.

Insert material certifications list below to suit products specified in this Section and Project sustainable design requirements. Specific certificate submittal and supporting data requirements are specified in Section 018113.

Materials Resources Certificates:

Certify source and origin for [**salvaged**] [**and**] [**reused**] products.

Certify recycled material content for recycled content products.

Certify source for regional materials and distance from Project Site.

* + - * 1. Product Cost Data:

Submit cost of products to verify compliance with Project sustainable design requirements.

Exclude cost of labor and equipment to install products.

Provide cost data for following products:

Edit list of material cost data below to suit products specified in this Section and Project sustainable design requirements. Specific cost data requirements are specified in Section 018113.

Salvaged, refurbished, and reused products.

Products with recycled material content.

Regional products.

<**\_\_\_\_\_\_\_\_**>.

* + - 1. CLOSEOUT SUBMITTALS
         1. Project Record Documents: Record actual locations of joint restraints.
      2. QUALITY ASSURANCE
         1. Maintain [**copy**] [<\_\_\_> **copies**] of each standard affecting Work of this Section on Site.
      3. QUALIFICATIONS

Coordinate following paragraphs with requirements specified in submittals article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] years' [**documented**] experience.
        2. Fabricator: Company specializing in fabricating products specified in this Section with minimum [**three**] years' [**documented**] experience [**and approved by manufacturer**].
        3. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in the State of New York.
      1. DELIVERY, STORAGE, AND HANDLING
         1. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
         2. Store materials according to manufacturer instructions.
         3. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Provide additional protection according to manufacturer instructions.

* + - 1. EXISTING CONDITIONS
         1. Field Measurements:

Verify field measurements prior to fabrication.

Indicate field measurements on Shop Drawings.

1. PRODUCTS
   * + 1. PERFORMANCE AND DESIGN CRITERIA
          1. Provide pressure pipeline with restrained joints at each bend, tee, and change in direction.
       2. TIED JOINT RESTRAINT SYSTEMS
          1. Manufacturers:

Baker Hughes Company, 1 (800) 229-7447, Houston, TX.

Bulldog Restraint System; S&B Technical Products, (817) 996-7267, 1300 East Berry Street, Ft. Worth TX 76119

Approved equivalent.

Insert descriptive specifications below to identify project requirements and to eliminate conflicts with products specified above.

* + - * 1. Tie Bolts:

Mechanical Joints on 2- and 3-Inch Pipe:

Size: [**5/8**] inch.

Comply with ASTM A588, Grade B.

Comply with ASTM A325, Type 3, except increase tensile strength of full-body threaded section to 40,000 lb. minimum for 5/8 inch and 60,000 lb. minimum for 3/4 inch by heat-treating (quenching and tempering) to manufacturer's reheat and hardness specifications.

Mechanical and Flanged Joints on 4- to 12-Inch Pipe:

Size: [**3/4**] inch.

Comply with ASTM A588, Grade B.

Comply with ASTM A325, Type 3, except increase tensile strength of full-body threaded section to 40,000 lb. minimum for 5/8 inch and 60,000 lb. minimum for 3/4 inch by heat-treating (quenching and tempering) to manufacturer's reheat and hardness specifications.

Mechanical Joints on 14- to 24-Inch Pipe:

Size: [**3/4**] inch.

Comply with ASTM A588/A588M, Grade B and ASTM A325, Type 3.

Mechanical and Flanged Joints on 30-Inch and Larger Pipe:

Size: 1 inch.

Comply with ASTM A588, Grade B.

Comply with ASTM A325, Type 3, except increase tensile strength of full-body threaded section to 100,000 lb. minimum by heat-treating (quenching and tempering) to manufacturer's reheat and hardness specifications.

* + - * 1. Tie Nut:

Description: Hex nut for each tie bolt and tie rods.

Comply with ASTM A563, Grade C3.

Finish: [**Plain**] [**, zinc plated**] [**, or**] [**galvanized**].

* + - * 1. Tiepin:

Bends and Hydrants: [**3/4**] -inch round bar stock.

Size and Shape: [**6**] -inch hairpin.

Comply with ASME B1.1 and ASTM A588.

Finish: [**Plain**] [**, zinc plated**] [**, or**] [**galvanized**].

* + - * 1. Tie Coupling:

Description: Extension of continuous-threaded rods.

Provide with center stop to aid installation.

Comply with ASTM A588.

Finish: [**Plain**] [**, zinc plated**] [**, or**] [**galvanized**].

* + - * 1. Tie Clamp:

Description: Retainer clamp for ductile iron, asbestos-cement, and PVC push-on pipe.

Location: In front of bell.

Comply with ASTM A36, ASTM A307, Grade A, and ASTM A563, Grade A.

Finish: [**Plain**] [**, zinc plated**] [**, or**] [**galvanized**].

* + - * 1. Tie Rod:

Description: Continuous-threaded rod for cutting to desired lengths.

Comply with ASTM A588, Grade B, ASTM A325, Type 3, and ASME B1.1.

Finish: [**Plain**] [**, zinc plated**] [**, or**] [**galvanized**].

* + - * 1. Tie Bar:

Description: Steel bar used to restrain push-in plugs.

Comply with ASTM A36.

Finish: [**Plain**] [**, zinc plated**] [**, or**] [**galvanized**].

* + - * 1. Tie Washer:

Description: Round flat washers.

ASTM A588, ASTM F436, Type 1.

Finish: [**Plain**] [**, zinc plated**] [**, or**] [**galvanized**].

Delete below if not a LEED project.

* + - * 1. SUSTAINABILITY CHARACTERISTICS

Insert sustainable design characteristics in this Article to suit content of this Section and Project sustainable design requirements as specified in Section 018113.

Section 018113 – LEED Documentation Requirements: Requirements for sustainable design compliance.

Material and Resource Characteristics: <\_\_\_\_\_\_>.

Recycled Content Materials: Furnish materials with maximum available recycled content [**including:**] [**.**]

Insert list of materials specified in this Section required to have recycled content.

<\_\_\_\_\_\_\_\_>.

Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project Site [**including:**] [**.**]

Insert list of materials specified in this Section required to be regional materials.

<\_\_\_\_\_\_\_\_>.

* + - 1. MATERIALS
         1. Steel:

High-Strength Low-Alloy Steel: Comply with ASTM A588, heat treated.

High-Strength Low-Alloy Steel: Comply with ASTM A588.

Carbon Steel: Comply with ASTM A36.

* + - 1. FINISHES
         1. Zinc Plating:

Factory applied.

Comply with ASTM B633.

* + - * 1. Galvanizing:

Factory applied.

Comply with ASTM A153.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

ASTM A123 includes minimum coating thickness grade, based on type of material and steel thickness of component.

* + - * 1. Galvanizing:

Comply with ASTM A123.

Hot dip galvanize after fabrication.

1. EXECUTION
   * + 1. EXAMINATION
          1. Verify that pipe and fittings are ready to receive Work.
          2. Field measure and verify conditions for installation of Work.
       2. PREPARATION
          1. Clean surfaces of pipe and fittings that are to receive tied joint restraint systems.
       3. INSTALLATION
          1. According to AWWA C600.
          2. Install joint restraint system such that joints are mechanically locked together to prevent joint separation.
       4. TOLERANCES
          1. Torque 5/8-inch nuts on mating threaded fasteners from 45 to 60 ft.-lbf.
          2. Torque 3/4-inch nuts on mating threaded fasteners from 75 to 90 ft.-lbf.
          3. Torque 1-inch nuts from 100 to 120 ft.-lbf.

END OF SECTION 330509.33