

## **SECTION 260710 - SEISMIC EQUIPMENT SUPPORT SYSTEM**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Seismic Requirements for single rod hanger supports for conduit, pipe and other similar systems.
- B. Seismic Requirements for trapeze type supports for cable tray, conduit, pipe and other similar systems.

#### **1.2 REFERENCES**

- A. Building Officials and Code Administrators National Building Code (BOCA)
- B. New York State Building Code
- C. Uniform Building Code (UBC)
- D. International Building Code (IBC)
- E. Standard Building Code (SBC)
- F. Cooper B-Line SRS-02 – Seismic Restraints: Multi-Directional Bracing for Electrical Conduit, Cable Tray, and Equipment Support Systems.
- G. ANSI/NFPA 70– National Fire Protection Association (National Electrical Code)
- H. NFPA 13 – Installation of Sprinkler Systems
- I. NFPA 14 – Standpipe and Hose Systems

#### **1.3 QUALITY ASSURANCE**

- A. General:
  - 1. The contractor shall provide pre-engineered seismic restraint systems to meet total design lateral force requirements for support and restraint of transformers, conduit, cable trays and other similar systems and equipment where required by the applicable building code.
- B. Manufacturer:
  - 1. System Supports/Restraints: Firms regularly engaged in the manufacture of products of the types specified in this section, whose products have been in satisfactory use in similar service for not less than 5 years.

2. Bolted framing channels and fittings shall have the manufacturer's name, part number, and material heat code identification number stamped in the part itself for identification. Material certification sheets and test reports must be made available by the manufacturer upon request.

#### 1.4 SUBMITTALS

- A. Submit pre-approved restraint selections and installation details from manufacturer. Restraint selection and installation details shall be pre-approved by a professionally licensed engineer experienced in seismic restraint design.
- B. Submit manufacturer's product data on strut channels including, but not limited to, types, materials, finishes, gauge thickness, and hole patterns. For each different strut cross-section, submit cross sectional properties including Section Modulus ( $S_x$ ) and Moment of Inertia ( $I_x$ ).

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver strut systems, pipe hangers and components carefully to avoid breakage, denting, and scoring finishes. Do not install damaged equipment.
- B. Store strut systems, pipe hangers and components in original cartons and in clean dry space; protect from weather and construction traffic.

### PART 2 PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: Subject to compliance with these specifications, strut systems, pipe hangers, and accessories to be installed shall be as manufactured by Cooper B-Line, Inc. Mason Industries, Toloco, or approved equal.

#### 2.2 SEISMIC BRACING COMPONENTS

- A. Steel strut shall be 1-5/8 wide in varying heights and mig-welded combinations as required to meet load capacities and designs indicated. A material heat code, part number, and manufacturer's name shall be stamped on all strut and fittings to maintain traceability to material test reports.
  1. Material for epoxy painted strut: ASTM A1011, SS, Grade 33
  2. Material for pre-galvanized strut: ASTM A653, SS, Gr. 33
  3. Material for Hot-Dip Galvanized strut: ASTM A1011, SS, Grade 33 and hot-dip galvanized after fabrication in accordance with ASTM A123.
  4. Material for fittings and accessories: ASTM A907 Gr. 33, Structural Quality or ASTM A1011, SS, Gr.33.

5. Fittings and accessories: Products shall be of the same manufacturer as strut and designed for use with that product.

## 2.3 CODE INFORMATION

- A. This project is subject to the seismic bracing requirements of the NYS Building Code. The following criteria are applicable to this project.
  1. Component Importance Factor ( $I_p$ ) (Section 1621.1.6):1.0 8)): 1.5 for all electrical Life safety contract work, 1.0 for rest of electrical installation
    - a. *Life Safety Components and Components needed for continued for continued operation of the facility or whose failure could impair the continued operation of the facility, NYS 2020 Building Code Section 1621.1.6*
  2. Building Occupancy Category: IV
  3. Soil Site Class Category: C
  4. Design Spectral Response Acceleration (SDS, SD1): 0.138g, 0.048g
  5. Mapped Spectral Acceleration ( $S_s$ ,  $S_1$ ): 0.159g,  $S_1 = 0.048g$
  6. Seismic Design Category (Table 1616.3(1)): A
  7. Design Coefficient Table for basic seismic force resisting systems

*The total height of the structure (h) and the height of the system to be restrained within the structure (z) shall be determined by the Contractor.*
- B. Forces shall be calculated for individual supports using the above information and requirements of Section 1621.
- C. The following exemptions to seismic support systems may be utilized:
  1. Where  $I_p > 1.0$ , electrical conduit and piping less than 2" diameter, where supported by hangers 12" or less in length
  2. Where  $I_p = 1.0$ , all electrical and mechanical components.
  3. Where  $I_p = 1.0$ , transformers and stationary floor mounted mechanical components weighing less than 400lbs, located 4 feet or less above the floor, and provided with flexible connectors.
  4. Where  $I_p = 1.0$  rectangular air-handling duct work less than 6 sq.ft. cross-sectional area where hangers are 12" or less in length.

5. Where  $I_p = 1.0$  round air-handling duct work less than 28" diameter where hangers are 12" or less in length.

## 2.4 SEISMIC SUPPORT SYSTEMS COMPONENTS

- A. The following seismic support system components shall used as called for in this section:
  1. Transverse and longitudinal bracing supports. Design Make: B-Line Bxx Channel Series.
  2. "Clevis" type conduit hanger supports. Design Make: B-Line B3100 Series.
  3. "J" type conduit hanger supports. Design Make: B-Line B3690 Series.
  4. Adjustable hinges for connecting anchors or support members to longitudinal and transverse bracing. Design Make: B-Line B335-2 Series.
  5. Horizontal bumper restraints. Design Make: Mason Industries Z-1011 Series
  6. Threaded Rod in the following sizes. Design Make: B-Line ATR Series.
    - a) 3/8" diameter – capable of 610 lb. Load
    - b) 1/2" diameter – capable of 1130 lb. Load
    - c) 5/8" diameter – capable of 1810 lb. Load
    - d) 3/4" diameter – capable of 2710 lb. Load
    - e) 7/8" diameter – capable of 3770 lb. Load
  7. Uni-Strut steel support channel. Design Make: B-Line Bxx Channel Series.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Seismic Restraint of Electrical Services
  1. All seismic restraint systems shall be installed in strict accordance with the manufacturer's seismic restraint guidelines manual and all certified submittal data.
  2. Installation of seismic restraints shall not cause any change in position of equipment or piping, resulting in stresses or misalignment.
  3. Provide over-sized washers (fender washers) when attaching all supports and equipment through sheet metal housings to structural components and walls. This is not required if the equipment includes built-in stiffeners or is not capable of transferring load to the structure.

4. No rigid connections between equipment and the building structure shall be made that degrade the noise and vibration-isolation system specified.
5. Do not install any equipment, piping, duct, or conduit that makes rigid connections with the building unless isolation is not specified.
6. Provide flexible conduit connection from elevator disconnects to controller.
7. Provide flexible type "mc cable" whips to all lighting in drop ceilings allowing a 12" horizontal and vertical movement.
8. Provide transverse and longitudinal bracing supports to all cable tray, conduit, bus ducts, and wireways supported by threaded rod. The transverse and longitudinal supports shall be sized to meet the calculated seismic force for the individual component. Refer to the typical installation details on the drawings. Threaded rod shall be anchored to the supporting structure using a manufacture approved beam clamp or masonry anchor suitable for seismic installations.
9. Bracing may occur from flanges of structural beams, upper truss cords of bar joists, cast in place inserts, or wedge-type concrete anchors. Consult structural engineer of record.
10. Overstressing of the building structure shall not occur from overhead support of equipment. Bracing attached to structural members may present additional stresses. The contractor shall submit loads to the structural engineer of record for approval in this event.
11. Brace support rods when necessary to accept compressive loads. Welding of compressive braces to the vertical support rods is not acceptable.
12. Do not use non-expanding insets, shot-pins, or cast-iron embedments for masonry concrete attachments. Masonry anchors shall expansion type where the penetration depth is 8x the bolt diameter.
  - a) 3/8" diameter, 3" length
  - b) 1/2" diameter, 4" length
  - c) 5/8" diameter, 5" length
  - d) 3/4" diameter, 6" length
13. Provide bumper restraints in each horizontal direction for all components mounted on vibration isolation systems. A rubber pad shall be installed between the equipment and each horizontal restraint to limit impacts.
14. Seismic restraints shall be mechanically attached to the system. Looping restraints around the system is not acceptable.

15. Do not brace a system to two independent structures such as a ceiling and wall.
16. Provide appropriately sized openings in walls, floors, and ceilings for anticipated seismic movement. Provide fire seal systems in fire-rated walls.

**END OF SECTION 260710**