
Part 1 General**1.1 RELATED SECTIONS**

- .1 Section 26 05 00 - Common Work Results for Electrical.

1.2 REFERENCES

- .1 CSA G40.20-04/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

1.3 DEFINITIONS

- .1 Operational Functional Components (OFCs) are non-structural building components, including architectural finishes, building service components (mechanical, plumbing, electrical and telecommunications) and building contents.
- .2 Importance Categories for Buildings: buildings (and their respective OFCs) are defined by the National Building Code of Canada 2010.
 - .1 For seismic design, the importance categories for buildings are defined as normal, high and post disaster.
 - .2 For seismic design of OFCs, the importance categories are defined as normal , high and post-disaster with OFCs being nominally impacted after a design seismic event and repairable within two to three days and post-disaster with OFCs being fully functional after a design seismic event.
- .3 SRS: acronym for Seismic Restraint System.

1.4 GENERAL DESCRIPTION

- .1 This section covers design, supply and installation of complete SRS for all systems, equipment specified for installation on this project. This includes electrical light fixtures, transformers, battery, diesel generators, fire protection, conduit, communications, electrical equipment and systems, both vibration isolated and statically supported.
- .2 SRS to be fully integrated into, compatible with:
 - .1 Noise and vibration controls specified elsewhere in this project specification.
 - .2 Structural, mechanical, electrical design of project.
- .3 During seismic event, SRS to prevent systems and equipment from causing personal injury and from moving from normal position.
- .4 Design to be by Professional Engineer specializing in design of SRS and registered in Province of Ontario. Include all costs associated with this work as it relates to the electrical installations. Submit design sketches c/w professional stamp prior to start of installations, c/w installation requirements.

1.5 DESIGN CRITERIA

- .1 Seismic restraint design for OFCs to meet National Building Code of Canada 2010, National Fire Code 2010 and National Plumbing Code 2010.
- .2 Building is defined as a 'post disaster building' with an importance factor $I_c=1.5$. Foundation class is $F_a=.5$ for a Class 'A' soil. Spectral response factor is for Ottawa with a $S_a(.2)=.66$ and a peak ground acceleration of .42.

1.6 SUBMITTALS

- .1 Submit shop drawings and product data in accordance with Section 01 00 10 – General Instructions.
- .2 Submittals to include:
 - .1 Full details of design criteria.
- .3 Submit additional copy of shop drawings and product data to Structural Engineer for review of connection points to building structure.

1.7 MAINTENANCE DATA

- .1 Provide maintenance data including monitoring requirements for incorporation into manuals specified in Section 26 05 00 - Common Work Results for Electrical.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 00 10 – General Instructions.
- .2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.
- .3 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products**2.1 SRS MANUFACTURER**

- .1 SRS to be from one manufacturer regularly engaged in production of same.

2.2 GENERAL

- .1 SRS to provide gentle and steady cushioning action and avoid high impact loads.
- .2 SRS to restrain seismic forces in all directions.
- .3 Fasteners and attachment points to resist same load as seismic restraints.

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- .4 SRS of conduit systems to be compatible with:
 - .1 Expansion, anchoring and guiding requirements.
 - .2 Equipment vibration isolation and equipment SRS.
 - .5 SRS utilizing cast iron, threaded pipe, other brittle materials not permitted.
 - .6 Attachments to reinforced concrete structure:
 - .1 Use high strength mechanical expansion anchors.
 - .2 Drilled or power driven anchors not permitted.
 - .7 Seismic control measures not to interfere with integrity of firestopping.

2.3 SRS FOR STATIC EQUIPMENT, SYSTEMS

- .1 Floor-mounted equipment, systems:
 - .1 Anchor equipment to equipment supports.
 - .2 Anchor equipment supports to structure.
 - .3 Use size of bolts scheduled in approved shop drawings.
- .2 Suspended equipment, systems:
 - .1 Use one or combination of following methods:
 - .1 Install tight to structure.
 - .2 Cross-brace in all directions.
 - .3 Brace back to structure.
 - .4 Slack cable restraint system.
 - .2 SRS to prevent sway in horizontal plane, "rocking" in vertical plane, sliding and buckling in axial direction.
 - .3 Hanger rods to withstand compressive loading and buckling.

2.4 SRS FOR VIBRATION ISOLATED EQUIPMENT, SYSTEMS

- .1 Floor mounted equipment, systems:
 - .1 Use one or combination of following methods:
 - .1 Vibration isolators with built-in snubbers.
 - .2 Vibration isolators and separate snubbers.
 - .3 Built-up snubber system approved by Departmental Representative, consisting of structural elements and elastomeric layer.
 - .2 SRS to resist complete isolator unloading.
 - .3 SRS not to jeopardize noise and vibration isolation systems. Provide 4-8 mm clearance between seismic restraint snubbers and equipment during normal operation of equipment and systems.
 - .4 Cushioning action to be gentle and steady by utilizing elastomeric material or other means in order to avoid high impact loads.

- .2 Suspended equipment, systems:
 - .1 Use one or combination of following methods:
 - .1 Slack cable restraint system.
 - .2 Brace back to structure via vibration isolators and snubbers

Part 3 Execution

3.1 INSTALLATION

- .1 Attachment points and fasteners:
 - .1 To withstand same maximum load that seismic restraint is to resist and in all directions.
- .2 Install SRS at least 25 mm from all other equipment, systems, and services.
- .3 Miscellaneous equipment not vibration-isolated:
 - .1 Bolt through house-keeping pad to structure.
- .4 Co-ordinate connections with all disciplines.

3.2 INSPECTION AND CERTIFICATION

- .1 SRS to be inspected and certified by Manufacturer upon completion of installation.
- .2 Provide written report stamped by professional Engineer licensed in Ontario to Departmental Representative with signed certificate of compliance with the SRS design requirements

3.3 COMMISSIONING DOCUMENTATION

- .1 Upon completion and acceptance of certification, hand over to Departmental Representative complete set of construction documents, revised to show "as-built" conditions.

END OF SECTION