

SECTION 05 12 10.16 – STRUCTURAL STEEL-TO-CONCRETE INSULATED CONNECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Engineered, factory-fabricated, thermally broken structural assemblies for connecting exterior structural steel framing to interior structural steel framing.
- B. Related Sections:
 - 1. Section 051200 "Structural Steel Framing" for placing connection anchors, and welding and erection of adjacent steel framing.

1.3 REFERENCE STANDARDS

- A. ASTM: American Society for Testing Materials.
 - 1. ASTM A276: Standard Specification for Stainless Steel Bars and Shapes.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate work with installation of connections to supporting structural components.
 - 2. Furnish anchorage items to be embedded in, or attached to, other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.
 - 3. Coordinate selection of shop primers to structural steel assemblies with selection of topcoats or fire protective coatings to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Pre-installation Meeting: Conduct conference at Project site.
 - 1. Before fabricating assemblies, review special inspection and inspecting agency procedures for quality control, anchorage device installation tolerances, steel reinforcement installation, structural steel framing installation, minimum requirements for concrete mixes and compressive strengths and examine

procedures for ensuring quality of materials. Require representatives of each entity directly concerned with the work to attend, including the following:

- a. Contractor's superintendent.
- b. Independent testing agency responsible for quality control.
- c. Structural-steel framing subcontractor.
- d. Structural thermal break assembly manufacturer, to be available by teleconference.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design Submittals:
 1. Product Data: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
- C. Shop Drawings: Include assembly locations, plans, elevations, dimensions, shapes and sections, support conditions, and types of reinforcement, including special reinforcement. Detail fabrication and installation of structural thermal break assemblies.
 1. Indicate welded connections by AWS standard symbols. Show size, length, and type of each weld.
 2. Detail connections.
 3. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
 4. Indicate location of each thermal break assembly unit by same identification mark placed on assembly unit.
 5. Indicate relationship of assemblies to adjacent materials.
- D. Delegated Design Submittal: For structural thermal break assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer, installer, inspection agency and professional engineer.
- B. Material Certificates: For the following, from manufacturer:
 1. Structural-steel components.
 2. Anchors.

- C. Thermal Design: Provide thermal modeling analysis indicating compliance with performance requirements.
- D. Material Test Reports: For reinforcing steel and structural steel, certified copies of mill test report of materials analysis.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for the following, indicating compliance with performance requirements.
 - 1. Each type of structural thermal break assembly.
 - 2. Studs, nuts, and washers including mechanical properties and chemical analysis.
- F. Field quality control and special inspection reports.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Assumes responsibility for engineering structural thermal break assemblies to comply with the performance requirements.
 - 2. Assumes responsibility for preparation of Shop Drawings and comprehensive engineering analysis by a qualified engineer.
 - 3. Has minimum of 5 years' experience in the manufacture of structural thermal break products for concrete applications.
 - 4. Has experience with North American projects of a similar scope and scale.
- B. Installer Qualifications: Qualified installers must attend a preconstruction meeting with the manufacturer to review installation requirements for the thermal break assembly prior to installation. Preconstruction meetings may be held either in person or virtually.
- C. Inspection Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- D. Design Standards: Comply with the following specifications and documents, as applicable to types of structural thermal break assemblies indicated, unless modified by requirements in the Contract Documents.
 - 1. Concrete Construction:
 - a. CSA A23.3-14 – Design of Concrete Structures.
 - b. CRSI - Manual of Standard Practice.
 - c. RSIC - Reinforcing Steel Manual of Standard Practice
 - 2. Steel Construction:
 - a. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges.

- b. AISC 341 and AISC 341s1 - Seismic Provisions for Structural Steel Buildings Including Supplement No. 1.
 - c. AISC 360 - Specifications for Structural Steel Buildings.
 - d. Specification for Structural Joints Using ASTM A 325 or A 490 Bolts by Research Council on Structural Connections (RCSC).
- E. Mockups: Fabricate full-sized mockups of structural steel thermal break assemblies before production, to verify selections made under sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original containers and packaging, and place units with labels or other identifying marks clearly visible to allow for inspection.
- B. Store assemblies with adequate support and protect units to prevent contact with soil, to prevent staining, and to prevent displacement or physical damage.
 - 1. Place stored units so identification marks are clearly visible, and units can be inspected.
- C. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses that would cause displacement or physical damage. Protect exposed ends of reinforcement to prevent injury; provide continuous wood bar across ends, or suitably sized plastic caps.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide Isokorb products by:
 - 1. Schöck Bauteile GmbH, Schöckstraße 1, 76534 Baden-Baden (Germany); Tel. 001 49 7223 967 0; export@schoeck.com, www.schoeck.com
 - 2. Distributor: Schöck Canada Inc., 116 Albert Street, Suite 300, Ottawa, ON, K1P 5G3, Tel. 855 572 4625, info-na@schoeck.com www.schoeck.com
- B. Substitutions: **[Not permitted] [Comply with requirements in Division 01 Section for "Substitution Procedures"]**.

2.2 PERFORMANCE REQUIREMENTS

- A. Sustainable Requirements:
 - 1. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than **[25]<Insert number>** percent.

- B. Delegated Design: Design structural thermal break assemblies, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Structural Performance: Provide structural thermal break assemblies and connections capable of withstanding the following design loads:
 - 1. Provide assembly connections capable of withstanding dead loads, snow loads, and design loads in conformance with applicable codes and the following:
 - a. Design Moment: **[As indicated on Drawings]<Insert KN-m>**.
 - b. Shear Force: **[As indicated on Drawings]<Insert KN>**.
 - c. Axial Load: **[As indicated on Drawings]<Insert KN>**.
 - 2. Design assemblies and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, accommodate live-load deflection, shrinkage and creep of primary building structure and other building movements. Maintain structural concrete deflections within limits of CSA A23.3-14.
 - a. Thermal Movements: Allow for in-plane thermal movements resulting from annual ambient temperature changes of minus **[40]<Insert temperature>** to plus **[40] <Insert temperature>** deg F.
 - 3. Shear forces must be addressed by reinforcement bars to insure proper anchoring within the concrete slab.
- D. Thermal Performance: Increase interior floor temperature by **19 degrees C** compared to a continuous slab.

2.3 STRUCTURAL THERMAL BREAK ASSEMBLIES

- A. Steel-to-Concrete Connection: Provide thermal break assemblies, engineered, tested and sized to suit structure as indicated.
- B. Accessories:
 - 1. Threaded Rods, Nuts, and Anchors: Stainless Steel, engineered to meet performance requirements.
 - 2. Lubricate threaded parts of with an anti-seize thread lubricant during assembly.

2.4 FABRICATION

- A. Welding: Comply with applicable CSA W59 & W47.1 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
 - 1. Weld studs according to CSA W59 & W47.1, "Structural Welding Code."
 - 2. Remove, re-weld, or repair incomplete and defective welds.
- B. Reinforce structural thermal break assemblies to resist handling, transportation, and erection stresses.

- C. Protect strand ends and anchorages with manufacturer recommended removable protective coatings or coverings to avoid corrosion.
- D. Discard and replace structural thermal break assembly units that do not comply with requirements, including structural, manufacturing tolerance.
- E. Size assemblies to accommodate required thicknesses of integrated thermal barrier materials.
- F. Fabrication Tolerances: Fabricate structural break assemblies straight and true to size and shape and to applicable requirements of CSA A23.1/CSA A23.2.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean connection plates of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond connection efficacy.

3.3 INSTALLATION

- A. Install structural thermal break assemblies according to manufacturer's written instructions and approved shop drawings.
- B. Install structural thermal break assemblies level, plumb, and square within specified allowable tolerances. Provide temporary structural supports, and bracing as required to maintain position, stability, and alignment of units until permanent connection or support.
- C. Accurately position, support, and secure reinforcement against displacement, and in accordance with Manual of Standard Practice by CRSI. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
- D. Field cutting of components is not permitted without approval of the Architect.
- E. Field welding of components is not permitted.
- F. At bolted connections, use lock washers, or other approved means to prevent loosening of nuts after final adjustment.

1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot. For friction connections, apply specified bolt torque and check 25 percent of bolts at random by calibrated torque wrench.

G. Installation Tolerances:

1. Maximum Variation from Plumb and Level of Structural Thermal Break Assemblies: 3 mm.

3.4 FIELD QUALITY CONTROL

A. Inspections: [Owner][Contractor] will engage an inspecting engineer to perform field inspections and prepare reports determining compliance with the structural plans.

1. Provide inspector access to installed assemblies to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.
2. Inspections:
 - a. Steel members and welds.
 - b. Studs.
3. Inspector will report findings promptly and in writing to Contractor and Architect.
4. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
5. Prepare inspection reports.

END OF SECTION 05 12 10.16