

SECTION 09 54 39
STRUCTURAL CEILING GRID

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fixed and Floating Perimeter structural ceiling grid and suspension system.

1.2 DEFINITIONS

- A. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- B. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- C. "Provide": Contractor, at his own expense, shall furnish and install work complete in place and ready for use, including furnishing of necessary labor, materials, tools, equipment and transportation. Definitions apply same to future, present and past tenses, except word "provided" may mean "contingent upon" where context is apparent.
- D. OFCI items: Refer to Section 01 11 00 Summary for Additional Information.
- E. Refer to Section 01 42 00 References for Additional Information.

1.3 ACTION SUBMITTALS

- A. Product Data: Technical data for structured ceiling grid and accessories, include procedures for cutting.
- B. Shop Drawings: Submit shop drawings detailing assembly layout, suspension member sizes and thickness, and type, including plans, elevations, sections, and details of steel components and connections. Show anchorage and accessory items.
 - 1. For installed products indicated to comply with design loads, include structural analysis data, for information only, signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples: When requested by Architect, submit for exposed finish indicated below:
 - 1. Suspension System Members: 6 inch (150 mm) long of each type.
- D. Delegated Design Submittal: Submit design data of structured ceiling grid assembly and attachment devices, indicating members sizes, fasteners, anchoring, and bracing to

structure. Provide drawings and calculations signed and sealed by the qualified professional engineer responsible for the preparation.

1. Structural Ceiling Grid: Support grid capable of withstanding imposed gravity loads and resisting seismic loads.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, indicating items are coordinated with each other, using input from installers of the items involved:
 1. Suspended ceiling components.
 2. Structural members to which structural framing system will be attached.
 3. Slotted Channel Framing System to which the structural ceiling grid will be suspended.
 4. Sprinkler system.
 5. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Cable trays and utility racks
 - f. Fire/smoke detector.
 - g. Access panels.
- B. Evaluation Reports: ICC-ES report for channel ceiling grid system, anchor, and fastener type.
- C. Field quality control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Installer having minimum 10 years documented experience, trained by the manufacturer, and is an authorized representative/installer.
- B. Sole Source Responsibility: Provide components of the structural grid assembly from a single manufacturer.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.
- D. Reports and Test Data: Submit mill certificates or testing data from a qualified independent testing agency or in house testing for calibrated test equipment indicating steel sheet complies with requirements, including base metal thickness, yield strength,

tensile strength, total elongation, chemical requirements, ductility, and metallic coating thickness.

1.7 COORDINATION

- A. Coordinate installation of structural grid assembly members that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are embedded in concrete or masonry. Coordinate delivery to site for installation.
- B. Coordinate the structural grid assembly with supporting Hot Dipped Galvanized slotted steel channel framing system specified in Section 05 45 00.
- C. Coordinate the design of the structural ceiling grid and all necessary accessories with the requirements of ASTM E-580 for fixed and floating grid applications, wall angle sizes and attachments and seismic bracing, struts and other necessary accessories based on the Seismic Design Category of the Project. The Qualified Structural Engineer shall verify all requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver structural grid assembly components and accessories to site in original, unopened packages and store in a fully enclosed, conditioned space, protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer to design seismic restraints and attachment devices including comprehensive analysis using performance requirements and design criteria indicated.
- B. Structural Framing Assembly: ASTM E 580 compliant Fixed and Floating Perimeter Grid assembly capable of withstanding structural loads complying with design criteria without exceeding the allowable design working stress of the materials involved, including but not limited to blank panels, HVAC supply and return registers, light fixtures, directly supported cable trays, utility racks, indicated equipment and accessories, anchors and connections, and without exhibiting excessive deflections in any of the components making up the framing system.
 - 1. The Qualified Structural Engineer shall verify compliance with ASTM-E580 has been met based upon the Seismic Design Category of the Project and that all supports, anchorages, bracing and other requirements have been met. Suspension of the grid, braces and accessories from MEP items is prohibited regardless of location, strength and composition of the system.

2. Ceiling system with spacing as indicated on the Drawings, shall be capable of supporting a fully populated ceiling grid, including blank panels, HVAC supply and return registers, and light fixtures, plus directly supporting cable trays, utility racks, and other accessories.
3. Structural Capacity: Contractor shall confirm all loading requirements prior to engaging delegated design services.
 - a. Capable of supporting a uniform load up to 50 lbs. / sq. ft. minimum.
 - b. Ceiling system shall be capable of a maximum static point load of 380 lbs. with standard duty connector.
 - c. Ceiling system shall be capable of a maximum static point load of 800 lbs. with heavy duty connector in line with turnbuckle connection to building structure.
 - d. Turnbuckle connection shall be capable of a maximum point load connection to building structure of 800 lbs..
- C. Seismic Performance: Suspended grid system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- D. Surface Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Flame Spread Index: 25 or less.
 2. Smoke Developed Index: 450 or less.
- E. Metal Suspension System Standard: Direct hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.

2.2 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide the following:
 1. Basis of Design: Provide Tate Aluminum Structural Grid System for Data Centers all accessories as required for a complete installation meeting all Performance Requirements. Comparable products by one of the following are also acceptable:
 - a. Dynamax Structural Aluminum Data Center Grid System by Armstrong World Industries, Inc.
 - b. Gordon DG 3.0 Structural Grid System for Data Centers.

2.3 MATERIALS

- A. Structural Ceiling System: System composed of the following components:
 1. Main Runners, Structural Tees and Perimeter Angles shall be constructed of 6005-T5 extruded prefinished aluminum with finish as selected by the Architect.
 - a. Seismic Struts: Shall be provided where necessary and shall be designed to accommodate all seismic forces and ASTM E-580 compliance.
 - b. Center to center strut spacing: Center main runner system with center to center infill spacing as indicated on the Drawings.

- c. Strut Main Runners and Structural Tees: Predrilled to facilitate installation at required spacing.
 - d. Strut Connectors: Galvanized steel, Q235 or ASTM 283.
 2. Infill: ASTM B221 (ASTM B 221M) Alloy 6005-T5 extruded aluminum; coped back for vertical support through flange grid contact to adjacent pieces; notched for positive positioning of infill.
 - a. Provide connectors to align system with grid on center and prevent racking.
 3. Connectors: Field, Field XL, and Perimeter connectors shall be constructed of high strength cast aluminum with corrosion resistant finish. Provide threaded turnbuckle connections.
 - a. Connectors: High Strength Cast Aluminum with 3/8 - 16 threaded connections for strut connectors to turnbuckles.
 4. Tee Flanges: Pre-engineered and factory produced aluminum structural ceiling grid with continuously threaded slot.
 - a. Slot thread size: 3/8 – 16.
 5. Main runners with notches for precise location and connection of coped Structural Tees using simple four screw connectors.
 6. Fixed Perimeter Supports: Intended for fixed perimeter installation areas, configured with a continuous threaded 1/4-20 top slot, 2 inch height, 1.18 inch bottom flange and minimum 5/8 inch ledge 0.125 inches thick.
 7. Miscellaneous Accessories:
 - a. Brackets and Splice Brackets: Manufacturer's standard.
 - 1) Main Runner Splice Locations: 4 hole wrap around brackets and splice brackets.
 - 2) Strut Members: 4 hole brackets at turnbuckle connections.
 - b. Cross Tee Brackets: For turnbuckle connections at strut members.
 - c. Fasteners and Screws: Types recommended by system manufacturer
 - 1) 1/4 inch 20 button head stainless steel Philips head screws with lock washer.
 - 2) 1/2 inch 13 hex cap screws and channel nuts.
 - d. Gaskets: 1/8 inch thick x 3/8 inch (3.17mm x 9.52 mm) closed cell polyethylene gasket tape.
- B. Gaskets: 3/32 inch thick by 3/8 inch (2.4 mm by 9 mm) wide closed cell polyethylene gasket tape, factory applied, with precision cut ends, extended on grid members for an airtight seal at intersections.
- C. Hold Down Clips: Provide hold down clips spaced to secure all ceiling panels in place at each panel and achieve seal to grid gaskets.

2.4 FINISH REQUIREMENTS

- A. Grid Finish: As selected by Architect from manufacturer's standard range.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 LAY-IN CEILING PANELS

- A. Lay-in Ceiling Panels: All panels shall be factory cut to fit the Structural Ceiling Grid dimensions without field modification to grid or panels. Contractor shall coordinate to ensure properly sized, precut panels are provided.
 - 1. Panels shall be as indicated on the Drawings.
- B. Provide hold down clips and grid members with continuous gasket seals.

2.6 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which ceiling system attaches or abuts for compliance with requirements affecting ceiling installation and anchorage and for compliance with requirements for installation tolerances and conditions affecting performance of the work.
- B. Proceed with installation after correcting unsatisfactory conditions.

2.7 PREPARATION

- A. Establish layout of grid system to coordinate with access floor grid prior to proceeding with installation.
- B. Confirm the grid and installation intend is in compliance with ASTM E-580 for the Siesmic Design Category of the Project.

2.8 INSTALLATION

- A. Grid System Installation: Install structural ceiling grid on grid supported with spacing recommended by grid system manufacturer for existing conditions connected to overhead structure:
 - 1. Position 1/2 inch (13 mm) turnbuckle connections offset from one another starting from one corner of the interior structural grid assembly and spaced evenly throughout. Provide additional supports as necessary along perimeter and at critical areas.
 - 2. Install strut main runners on centers and at main runners parallel to one another. Install strut structural tees perpendicular to main tunners.
 - a. Install light structural infill in open area between strut members.
 - 3. Coordinate installation with electrical, mechanical, and fire protection.
- B. Perimeter Installation: Install structural ceiling grid in accordance with manufacturer's recommendations, written instructions and in compliance with ASTM E-580. Fixed and floating perimeters shall be configured based on ASTM E-580 compliance and notations on the Drawings.

1. Fixed Perimeter Installation: Mount perimeter angles at level height to interior ceiling grid within 0.10 inch (2.5 mm) overall and 0.06 inch (1.52 mm) over any 10 ft (3048 mm) distance. Fasten perimeter angles to perimeter wall with appropriate wall type fasteners.
 - a. Fit joints with no more than 0.08 inch (2.03 mm) gaps.
 2. Floating Perimeter Installation: Support perimeter angles from structure at level height to interior ceiling grid within 0.10 inch (2.5 mm) overall and 0.06 inch (1.52 mm) over any 10 ft (3048 mm) distance. Suspend perimeter angles shall be suspended from structure above.
 - a. Fit joints fit with no more than .125" (3.17mm) gaps.
- C. Panel Installation: Install factory cut ceiling panels as identified on the Drawings. Field cut panels are not permitted; all panels shall be factory pre-cut to fit the specific structural grid approved for the Work.
1. All panels shall be fully seated in the continuous gasket seals of the structural grid.
 2. Install hold down clips for each panel minimum of one per side.
- D. ATTACHMENT DEVICES FOR RELATED ITEMS
1. Attachment Devices for related systems, components and devices: Install manufacturer recommended manufactured connectors for related components and systems directly attached to the Structural Ceiling Grid, including but not limited to lighting, electrical and communications devices and hold and cold air containment enclosures (HAC). Direct anchors unintended by the manufacturer's published installation instructions are not permitted.

2.9 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 1. Seismic design compliance.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Structural ceiling grid anchors will be considered defective if they do not pass tests and inspections.
- D. Prepare tests and inspection reports.

2.10 CLEANING

- A. Clean exposed surfaces. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling grid components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage

END OF SECTION