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- 1 General
- 1.1 **SECTION INCLUDES**
- .1 Design, labour, Products, equipment and services necessary for acoustical ceiling work in accordance with the Contract Documents.
- 1.2 **REFERENCES**
- .1 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
- .2 ASTM C635, Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
- .3 ASTM C636, Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
- .4 ASTM C645, Specification for Non-Load Bearing (Axial) Steel Studs, Runners (Tracks), and Rigid Furring Channels for Screw Application of Gypsum Board.
- .5 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .6 ASTM E1264, Classification for Acoustical Ceiling Products.
- 1.3 **DESIGN REQUIREMENTS**
- .1 Design ceiling suspension systems in accordance with ASTM C636 and manufacturer's printed directions.
- .2 Design tile ceiling system for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority. Acoustic panel system is not designed to carry the weight of electrical equipment.
- .3 Design hanger anchor and entire suspension system static loading not to exceed 25% of their ultimate capacity including lighting fixture dead loads.
- .4 Design tile suspension system to support weight of mechanical and electrical items such as air handling boots and lighting fixtures, and with adequate support to allow rotation/relocation of light fixtures. Acoustic panel system is not designed to carry the weight of mechanical and electrical equipment.
- .5 Design subframing as necessary to accommodate, to avoid conflicts and interferences where ducts or equipment prevent regular spacing of hangers.

1.4 **SUBMITTALS**

- .1 Shop drawings:
 - .1 Submit shop drawings in accordance with Section 01 10 10 indicating:
 - .1 Suspension system layout including hangers and supports for acoustic tile system.
 - .2 Acoustic panel system including suspension system, hangers, supports and panel sizes and locations.
 - .3 Conditions at abutting, intersecting, and penetrating construction.
 - .4 Dimensioned locations of lighting fixtures, diffusers, sprinkler heads and other items that pierce the ceiling plane.
 - .2 Samples:
 - .1 Submit following samples in accordance with Section 01 10 10:
 - .1 One full-size sample of each type of tile panels to be used.
 - .2 One of each type of suspension system members.
 - .3 Certificates: Submit written certification stating that suspended ceiling system is designed for adequate support of electrical fixtures as required by the current bulletin of the Electrical Safety Authority.

1.5 **QUALITY ASSURANCE**

- .1 Source limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.
- .2 Mock-up:
 - .1 Construct one 3 m² mock-up for each type of ceiling system incorporating typical light fixture and other typical mechanical and electrical fixtures.
 - .2 Test the adequacy of the suspension system to support the fixtures without deflection of ceiling or failure of hanging wire anchorage. Supply copy of Test Results to Consultant.
 - .3 Change materials and installation methods if tests indicate proposed system is inadequate and re-test as necessary until system approved.
 - .4 Give early notice to Consultant and Mechanical and Electrical Trades and cooperate with them in selecting suitable location for sample ceiling and timing of installation and test.
 - .5 Do not commence general installation work until sample ceiling approved, then install ceiling to conform with approved samples.
 - .6 Mock-up may form part of final Work, if acceptable to Consultant. Remove and dispose of mock-ups which do not form part of Work.

1.6 **SITE CONDITIONS**

- .1 Do not install the work of this Section until:
 - .1 Mechanical and electrical work above the ceiling is complete.
 - .2 Relative humidity is below 80 %.
 - .3 Ventilation is adequate to remove excess moisture.

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- .4 Areas are closed and protected against weather, and maintained at no less than 10°C.
 - .2 Install temporary protection and facilities to maintain Product manufacturer's, and above specification, environmental requirements 24 h before, during, and after installation.
- 1.7 **MAINTENANCE**
- .1 Submit extra acoustic ceilings amounting to 1% of gross ceiling area, allowing proportionately for each pattern and type specified to nearest full carton. Submit Products which are part of same production run as installed Products. Store maintenance Products as directed by Consultant.
- 1.8 **DELIVERY, STORAGE AND HANDLING**
- .1 Transport, handle and store material in manner to prevent warp, twist, damage to panel edges and surfaces in accordance with Manufacturer's recommendations.
 - .2 Any warped and/or damaged panels and trim shall be rejected and be replaced by new, straight, undamaged and acceptable material at no cost to Owner.
 - .3 Bent, twisted or otherwise damaged Tee grid suspension components shall not be used under any circumstances. Replace such damaged items with new undamaged material at no additional cost to Owner.
 - .4 Store material in warm, dry place away from water and the elements. Protect against undue loading stresses and shock.
 - .5 All packaged material shall be delivered in original manufacturers wrappers and containers with labels and seals intact. All cartons shall bear U.L. label.
- 2 Products
- 2.1 **MATERIALS**
- .1 Galvanized steel sheet: ASTM A653/A653-M, Z275; cold rolled, galvanized steel sheet.
 - .2 Main carrying channels: ASTM C645; Channels formed from galvanized steel sheet, 38 x 19 mm cold rolled.
 - .3 Subframing: ASTM C645; Channels formed from galvanized steel sheet, dimensions and spans as required.
 - .4 Hangers: 2.6 mm minimum diameter, galvanized steel wire.
 - .5 Tie wire: 1.6 mm minimum diameter, soft annealed galvanized steel wire.

3 Execution

3.1 **EXAMINATION**

- .1 Verify condition and dimensions of previously installed work upon which this Section depends. Report defects to Consultant. Commencement of work of this Section means acceptance of existing conditions.

3.2 **SUSPENSION SYSTEM**

- .1 Coordinate locations and openings of mechanical and electrical services support, and penetration through the acoustical ceilings. Coordinate field conditions, clearances, measurements, and mechanical and electrical services testing and commissioning, above the acoustical ceilings.
- .2 Install hanger wires plumb and securely anchored to the building structural framing, independent of walls, pipes, ducts, and metal deck; install additional framing and hangers to bridge interference items.
- .3 Install acoustical ceiling systems in accordance with manufacturer's written instructions, reviewed shop drawings, and ASTM C636, listed in order of precedence.
- .4 Install hanger wires at 1200 mm maximum centres along carrying channels, not less than 25 mm, and not more than 150 mm from channel ends.
- .5 Install additional hangers at lighting fixture and air distribution ductwork locations. Do not attach hanger wires to mechanical or electrical equipment. Do not support mechanical and electrical fixtures and fitting on ceiling without the ceiling manufacturer's written acceptance.
- .6 Install acoustical ceiling suspension system to a tolerance of 1:1200 of span and 0.4 mm maximum between adjacent metal members. Tolerances are not cumulative. Refer to Electrical Contract Drawings for fixture layout.
- .7 Do not bend or twist hangers as a means of levelling. Form double loops tightly and lock to prevent vertical movement or rotation within the loop.
- .8 Install edge moulding at intersection of ceiling and vertical surfaces.
- .9 Centre acoustical ceiling suspension systems on room axis; install equal border pieces. Install hangers onto the ends of main tee runners at not more than 150 mm from ends of runners, adjacent and perpendicular to walls.
- .10 Support the suspension system independently of walls, columns, ducts, pipes and conduits.

- .11 Install main runners in maximum available lengths. Layout joints in suspension members to avoid the perimeters of recessed fixtures. Lock grid members to form a rigid assembly. Install additional tee, suspension system framing around recessed fixtures, diffusers, grilles and other items for a complete assembly.

3.3 **ACOUSTIC LAY-IN TILES**

- .1 Install acoustic tile in grid system openings supported by bottom flanges of members. Provide special shapes and sizes to provide a complete installation by cutting tile to fit into openings. Fit tile moderately tight between upright legs of members.
- .2 Carefully cut and trim acoustic tiles to accommodate items piercing the finished ceiling plane.
- .3 Remove and replace acoustic tiles with broken edges, or damaged, marked, discoloured, soiled, or stained faces.

3.4 **ACOUSTIC INSULATION**

- .1 Provide acoustic insulation above full area of ceiling spaces in intended rooms.
- .2 Ensure that sound blankets are installed in accordance with manufacturers written instructions to assure complete monolithic coverage to insulated spaces.

3.5 **ADJUSTMENTS AND CLEANING**

- .1 Clean soiled or discoloured surfaces of exposed work on completion of work.
- .2 Replace components which are visibly damaged, marred or uncleanable.

END OF SECTION