

**SECTION 09 51 00  
ACOUSTICAL CEILINGS**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. Metal ceiling suspension system for acoustical ceilings.
- B. Acoustical units.
- C. Metal perimeter trim channel.

**1.02 RELATED WORK**

- A. Color, pattern, and location of each type of acoustical unit: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Section 09 54 26 LINEAR WOOD CEILINGS.

**1.03 SUBMITTAL**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
  - 1. Acoustical units, each type, with label indicating conformance to specification requirements.
  - 2. Ceiling suspension system, each type, 300 mm (12 inch) long.
  - 3. Perimeter Trim, each type, 300 mm (12 inch) long.
  - 4. Colored markers for units providing access.
- C. Manufacturer's Literature and Data:
  - 1. Ceiling suspension system, each type, showing complete details of installation including suspension system.
  - 2. Acoustical units, each type.
  - 3. Perimeter Trim, each type.
  - 4. Transitions.
- D. Manufacturer's Certificates: Acoustical units, each type, in accordance with specification requirements.

**1.04 DEFINITIONS**

- A. Standard definitions as defined in ASTM C634.
- B. Terminology as defined in ASTM E1264.

**1.05 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.
- B. American Society for Testing and Materials (ASTM):  
A641/A641M-09a ..... Zinc-coated (Galvanized) Carbon Steel Wire

- A653/A653M-13 ..... Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process
- C423-09a ..... Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
- C634-13 ..... Standard Terminology Relating to Environmental Acoustics
- C635/C635M-13a ..... Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
- C636/C636M-13 ..... Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
- E84-14 ..... Surface Burning Characteristics of Building Materials
- E119-14 ..... Fire Tests of Building Construction and Materials
- E413-10 ..... Classification for Rating Sound Insulation.
- E580/E580M-14 ..... Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions
- E1264-08e1 ..... Classification for Acoustical Ceiling Products

- C. Ceiling and Interior Systems Construction Association (CISCA):  
Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies –  
Seismic Zones 3&4

## **PART 2 - PRODUCTS**

### **2.01 METAL SUSPENSION SYSTEM**

- A. Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized steel as per ASTM A653. Main beams and cross tees are double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
  - 1. Structural Classification: ASTM C635 Heavy Duty.
  - 2. Use same construction for cross runners as main runners. Use of lighter-duty sections for cross runners is not acceptable.
  - 3. Exposed grid width not less than 14 mm (9/16 inch) with not less than 6 mm (1/4 inch) panel bearing surface.
  - 4. Color: Color to match adjacent acoustical units unless specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.

### **2.02 PERIMETER SEAL**

- A. Vinyl, polyethylene or polyurethane open cell sponge material having density of 1.3 plus or minus 10 percent, compression set less than 10 percent with pressure sensitive adhesive coating on one side.
- B. Thickness as required to fill voids between back of wall molding and finish wall.
- C. Not less than 9 mm (3/8 inch) wide strip.

### **2.03 WIRE**

- A. ASTM A641.
- B. For wire hangers: Minimum diameter 2.68 mm (0.1055 inch).
- C. For bracing wires: Minimum diameter 3.43 mm (0.1350 inch).

**2.04 ANCHORS AND INSERTS**

- A. Use anchors or inserts to support five times the loads imposed by hangers attached thereto.
- B. Hanger Inserts:
  - 1. Fabricate inserts from steel, zinc-coated (galvanized after fabrication).
- C. Clips:
  - 1. Galvanized steel.
  - 2. 12-gauge steel of size and shapes shown.
- D. Tile Splines: ASTM C635.

**2.05 CARRYING CHANNELS FOR SECONDARY FRAMING**

- A. Fabricate from cold-rolled or hot-rolled steel, black asphaltic paint finish, free of rust.
- B. Weighing not less than the following, per 300 m (per thousand linear feet):

Size mm	Size Inches	Cold-rolled		Hot-rolled	
		Kg	Pound	Kg	Pound
38	1 1/2	215.4	475	508	1120
50	2	267.6	590	571.5	1260

**2.06 ADHESIVE**

- A. ASTM D1779, having flame spread index of 25 or less when tested in accordance with ASTM E84.
- B. Developing minimum strength of 7 kg/m<sup>2</sup> (one psi) of contact surface 48 hours after installation in temperature of 21 °C (70 °F).

**2.07 ACOUSTICAL UNITS**

- A. General:
  - 1. Ceiling Tile shall meet minimum 37 percent bio-based content in accordance with USDA Bio-Preferred Product requirements.
  - 2. ASTM E1264, weighing 3.6 kg/m<sup>2</sup> (3/4 psf) minimum for mineral fiber panels or tile.
  - 3. Class A Flame Spread: ASTM 84
  - 4. Minimum NRC (Noise Reduction Coefficient): 0.55 unless specified otherwise: ASTM C423.
  - 5. Minimum CAC (Ceiling Attenuation Class): 40-44 range unless specified otherwise: ASTM E413.
  - 6. Manufacturers standard finish, minimum Light Reflectance (LR) coefficient of 0.75 on the exposed surfaces, except as specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Acoustical Panel (ACT-1):
  - 1. Surface Texture: Fine
  - 2. Composition: Fiberglass

3. Color: White
4. Size: 24-inch x 24-inch x 1-inch
5. Edge Profile: Square Tegular

## 2.08 PERIMETER TRIM CHANNEL

- A. Perimeter Trim Channel: Extruded aluminum alloy 6063, 3/4-inch horizontal legs, straight sections with special bosses formed for attachment to the tee-bar connection clip or hanging clip, commercial quality, factory-finished baked enamel, color to match acoustical ceiling grid runner and tee color.
1. Size: Height as shown on Drawings.
  2. Provide splice plates, corner posts, connection clips and accessories as necessary to complete the Work per manufacturer's recommendations.

## 2.09 ACCESS IDENTIFICATION

- A. Markers:
1. Use colored markers with pressure sensitive adhesive on one side.
  2. Make colored markers of paper or plastic, 6 to 9 mm (1/4 to 3/8 inch) in diameter.
- B. Use markers of the same diameter throughout building.
- C. Color Code: Use following color markers for service identification:
- |              |  |
|--------------|--|
| Color.....   | Service                                  |
| Red.....     | Sprinkler System: Valves and Controls    |
| Green .....  | Domestic Water: Valves and Controls      |
| Yellow.....  | Chilled Water and Heating Water          |
| Orange ..... | Ductwork: Fire Dampers                   |
| Blue .....   | Ductwork: Dampers and Controls           |
| Black .....  | Gas: Laboratory, Medical, Air and Vacuum |

## PART 3 - EXECUTION

### 3.01 CEILING TREATMENT

- A. Treatment of ceilings shall include sides and soffits of ceiling beams, furred work 600 mm (24 inches) wide and over, and vertical surfaces at changes in ceiling heights unless otherwise shown. Install acoustic tiles after wet finishes have been installed and solvents have cured.
- B. Lay out acoustical units symmetrically about center lines of each room or space unless shown otherwise on reflected ceiling plan.
- C. Moldings:
1. Install metal wall molding at perimeter of room, column, or edge at vertical surfaces.
  2. Install special shaped molding at changes in ceiling heights and at other breaks in ceiling construction to support acoustical units and to conceal their edges.
- D. Perimeter Seal:
1. Install perimeter seal between vertical leg of wall molding and finish wall, partition, and other vertical surfaces.
  2. Install perimeter seal to finish flush with exposed faces of horizontal legs of wall molding.

- E. Existing ceiling:
  - 1. Where extension of existing ceilings occur, match existing.
  - 2. Where acoustical units are salvaged and reinstalled or joined, use salvaged units within a space. Do not mix new and salvaged units within a space which results in contrast between old and new acoustic units.
  - 3. Comply with specifications for new acoustical units for new units required to match appearance of existing units.

### 3.02 CEILING SUSPENSION SYSTEM INSTALLATION

- A. General:
  - 1. Install metal suspension system for acoustical tile and lay-in panels in accordance with ASTM C636, except as specified otherwise.
  - 2. Use direct or indirect hung suspension system or combination thereof as defined in ASTM C635.
  - 3. Support a maximum area of 1.48 m<sup>2</sup> (16 sf) of ceiling per hanger.
  - 4. Prevent deflection in excess of 1/360 of span of cross runner and main runner.
  - 5. Provide extra hangers, minimum of one hanger at each corner of each item of mechanical, electrical and miscellaneous equipment supported by ceiling suspension system not having separate support or hangers.
  - 6. Provide not less than 100 mm (4 inch) clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams or joists; and steel beam or bar joist unless furred system is shown,
  - 7. Use main runners not less than 1200 mm (48 inches) in length.
  - 8. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.
- B. Anchorage to Structure:
  - 1. Concrete:
    - a. Attach wires to structures per details as shown on drawings.
    - b. Use clips in existing or already placed concrete structures to support hanger and bracing wire. Install in sides of concrete beams or joists at mid height.
  - 2. Steel:
    - a. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels for attachment of hanger wires.
      - 1. Size and space carrying channels to insure that the maximum deflection specified will not be exceeded.
      - 2. Attach hangers to steel carrying channels, spaced four feet on center, unless area supported or deflection exceeds the amount specified.
    - b. Attach carrying channels to the bottom flange of steel beams spaced not 1200 mm (4 feet) on center before fire proofing is installed. Weld or use steel clips to attach to beam to develop full strength of carrying channel.
    - c. Attach hangers to bottom chord of bar joists or to carrying channels installed between the bar joists when hanger spacing prevents anchorage to joist. Rest carrying channels on top of the bottom chord of the bar joists, and securely wire tie or clip to joist.
- C. Direct Hung Suspension System:
  - 1. As illustrated in ASTM C635.
  - 2. Support main runners by hanger wires attached directly to the structure

- overhead.
- 3. Maximum spacing of hangers, 1200 mm (4 feet) on centers unless interference occurs by mechanical systems. Use indirect hung suspension system where not possible to maintain hanger spacing.
- D. Indirect Hung Suspension System:
  - 1. As illustrated in ASTM C635.
  - 2. Space carrying channels for indirect hung suspension system not more than 1200 mm (4 feet) on center. Space hangers for carrying channels not more than 2400 mm (8 feet) on center or for carrying channels less than 1200 mm (4 feet) on center so as to insure that specified requirements are not exceeded.
  - 3. Support main runners by specially designed clips attached to carrying channels.
- E. Seismic Ceiling Bracing System:
  - 4. Construct system in accordance with ASTM E580.
  - 5. Connect bracing wires to structure above as specified for anchorage to structure and to main runner or carrying channels of suspended ceiling at bottom.

### 3.03 ACOUSTICAL UNIT INSTALLATION

- A. Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding.
- B. Install lay-in acoustic panels in exposed grid with not less than 6 mm (1/4 inch) bearing at edges on supports.
  - 1. Install tile to lay level and in full contact with exposed grid.
  - 2. Replace cracked, broken, stained, dirty, or tile not cut for minimum bearing.
- C. Markers:
  - 1. Install markers of color code specified to identify the various concealed piping, mechanical, and plumbing systems.
  - 2. Attach colored markers to exposed grid on opposite sides of the units providing access.
  - 3. Attach marker on exposed ceiling surface of upward access acoustical unit.

### 3.04 PERIMETER TRIM CHANNEL INSTALLATION

- A. Lay out and install suspension system according to the reflected ceiling plan.
- B. Attach T-Bar Connector Clips:
  - 1. Align clip as shown in the Drawings.
  - 2. Insert one framing screw near the center of the slot.
- C. Install Trim Channels:
  - 1. Hang the sections of trim onto the grid system by engaging the top ear of the connection clips under the boss of channel trim. Slide the back plate downward to engage the lower boss on the trim and secure by tightening the locking screw.
  - 2. Complete the installation of all channel trim sections. Install and secure the splices.
  - 3. Make adjustments as necessary to properly align the complete installation. Insert a second framing screw in each of the connection clips.

### 3.05 CLEAN-UP AND COMPLETION

- A. Replace damaged, discolored, dirty, cracked and broken acoustical units.

- B. Leave finished work free from defects.

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