

**SECTION 09 51 00**  
**ACOUSTICAL CEILINGS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Acoustical units.
2. Metal ceiling suspension system for acoustical ceilings.
3. Deleted

**1.2 RELATED REQUIREMENTS**

- A. Deleted.
- B. Deleted
- C. Deleted
- D. Deleted
- E. Ceiling Suspension System: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- F. Deleted

**1.3 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
  1. A641/A641M-09a(2014) - Zinc-coated (Galvanized) Carbon Steel Wire.
  2. A653/A653M-15e1 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process.
  3. C423-09a - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
  4. C634-13 - Terminology Relating to Environmental Acoustics.
  5. C635/C635M-13a - Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
  6. C636/C636M-13 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
  7. D1779-98(2011) - Adhesive for Acoustical Materials.
  8. E84-15b - Surface Burning Characteristics of Building Materials.
  9. E119-16 - Fire Tests of Building Construction and Materials.
  10. E413-16 - Classification for Rating Sound Insulation.
  11. E580/E580M-14 - Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.

12. E1264-14 - Classification for Acoustical Ceiling Products.

C. International Organization for Standardization (ISO):

1. ISO 14644-1 - Classification of Air Cleanliness.

#### **1.4 NOT USED**

#### **1.5 SUBMITTALS**

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:

1. Show size, configuration, and fabrication and installation details.

C. Manufacturer's Literature and Data:

1. Description of each product.

2. Ceiling suspension system indicating manufacturer recommendation for each application.

3. Installation instructions.

4. Warranty.

D. Samples:

1. Acoustical units, 150 mm (6 inches) in size, each type,

a. Submit quantity required to show full color and texture range.

2. Suspension system, trim and molding, 300 mm (12 inches) long.

3. Colored markers for access service.

4. Approved samples may be incorporated into work.

E. Sustainable Construction Submittals:

1. Recycled Content: Identify post-consumer and pre-consumer recycled content percentage by weight.

2. Biobased Content:

a. Show type and quantity for each product.

b. Show volatile organic compound types and quantities.

F. Certificates: Certify products comply with specifications.

1. Acoustical units, each type.

G. Qualifications: Substantiate qualifications comply with specifications.

1. Manufacturer with project experience list .

H. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

#### **1.6 QUALITY ASSURANCE**

A. Manufacturer Qualifications:

1. Regularly manufactures specified products.

2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.

a. Project Experience List: Provide contact names and addresses for completed projects.

#### **1.7 DELIVERY**

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

#### **1.8 STORAGE AND HANDLING**

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.

#### **1.9 FIELD CONDITIONS**

- A. Environment:
  - 1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.
  - 2. Work Area Ambient Conditions: HVAC systems are complete, operational, and maintaining facility design operating conditions continuously, beginning 48 hours before installation until Government occupancy.
  - 3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

#### **1.10 WARRANTY**

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

### **PART 2 - PRODUCTS**

#### **2.1 SYSTEM DESCRIPTION**

- A. Ceiling System: Acoustical ceilings units on exposed grid suspension systems.

#### **2.2 SYSTEM PERFORMANCE**

- A. Design product complying with specified performance:
  - 1. Maximum Deflection: 1/360 of span, maximum.

- B. Deleted
- C. Surface Burning Characteristics: When tested according to ASTM E84.
  - 1. Flame Spread Rating: 25 maximum.
  - 2. Smoke Developed Rating: 450 maximum.

## **2.3 PRODUCTS - GENERAL**

- A. Deleted
- B. Provide acoustical units from one manufacturer.
  - 1. Provide each product exposed to view from one production run.
- C. Provide suspension system from same manufacturer.
- D. Deleted

## **2.4 ACOUSTICAL UNITS**

- A. General:
  - 1. Ceiling Panel and Tile: ASTM E1264, bio-based content according to USDA Bio-Preferred Product requirements.
    - a. Mineral Fiber: 3.6 kg/sq. m (3/4 psf) weight, minimum.
    - b. Deleted
  - 2. Deleted
  - 3. Lay-in panels: Anti-microbial coated surfaces, sizes as indicated on Drawings, with square edges.
    - a. Sizes:
      - 1) Deleted
      - 2) Deleted
      - 3) Edge and Joint Detail: Square edges and joints as required to suit suspension and access system.
  - 4. Deleted
  - 5. Deleted
- B. Deleted

## **2.5 METAL SUSPENSION SYSTEM**

- A. General: ASTM C635, heavy-duty system, except as otherwise specified.
  - 1. Suspension System: Provide the following:
    - a. Deleted
    - b. Extruded aluminum.
    - c. Deleted
  - 2. Main and Cross Runner: Use same construction Do not use lighter-duty sections for cross runners.
- B. Exposed Grid Suspension System: Support of lay-in panels.

1. Grid Width: 22 mm (7/8 inch) minimum with 8 mm (5/16 inch) minimum panel bearing surface.
2. Molding: Fabricate from the same material with same exposed width and finish.
3. Finish: Baked-on enamel flat texture finish.
  - a. Color: To match adjacent acoustical units unless specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.

C. Deleted

D. Deleted

E. Carrying Channels Secondary Framing: Cold-rolled or hot-rolled steel, black asphaltic paint finish, rust free.

1. Weight per 300 m (per thousand linear feet), minimum:

Size		Cold-rolled		Hot-rolled	
mm	inches	kg	pound	kg	pound
38	1-1/2	215.4	475	508	1120
50	2	267.6	590	571.5	1260

F. Anchors and Inserts: Provide anchors or inserts to support twice the loads imposed by hangers.

1. Hanger Inserts: Steel, zinc-coated (galvanized after fabrication).
  - a. Nailing type option for wood forms:
    - 1) Upper portion designed for anchorage in concrete and positioning lower portion below surface of concrete approximately 25 mm (one inch).
    - 2) Lower portion provided with minimum 8 mm (5/16 inch) hole to permit attachment of hangers.
  - b. Flush ceiling insert type:
    - 1) Designed to provide a shell covered opening over a wire loop to permit attachment of hangers and keep concrete out of insert recess.
    - 2) Insert opening inside shell approximately 16 mm (5/8 inch) wide by 9 mm (3/8 inch) high over top of wire.
    - 3) Wire 5 mm (3/16 inch) diameter with length to provide positive hooked anchorage in concrete.

G. Clips: Galvanized steel, designed to secure framing member in place.

H. Tile Splines: ASTM C635.

I. Wire: ASTM A641.

1. Size:
  - a. Wire Hangers: Minimum diameter 2.68 mm (0.1055 inch).
  - b. Bracing Wires: Minimum diameter 3.43 mm (0.1350 inch).

## 2.6 ACCESSORIES

- A. Deleted
- B. Perimeter Seal: Vinyl, polyethylene or polyurethane open cell sponge material, density of 1.3 plus or minus 10 percent, compression set less than 10 percent with pressure sensitive adhesive coating on one side.
  1. Thickness: As required to fill voids between back of wall molding and finish wall.
  2. Size: Minimum 9 mm (3/8 inch) wide strip.
- C. Access Identification Markers: Colored markers with pressure sensitive adhesive on one side, paper or plastic, 6 to 9 mm (1/4 to 3/8 inch) diameter.
  1. Color Code: Provide the following color markers for service identification:

Color	Service
White	Maintenance Access
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

### 3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Deleted

### 3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
  1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

### 3.3 ACOUSTICAL UNIT INSTALLATION

#### A. Applications:

1. Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding.

#### B. Layout acoustical unit symmetrically, with minimum number of joints.

#### C. Installation:

1. Install acoustic tiles after wet finishes have been installed and solvents have cured.
2. Install lay-in acoustic panels in exposed grid with minimum 6 mm (1/4 inch) bearing at edges on supports.
  - a. Install tile to lay level and in full contact with exposed grid.
  - b. Replace cracked, broken, stained, dirty, or tile.
3. Tile in concealed grid upward access suspension system:
  - a. Install acoustical tile with joints close, straight and true to line, and with exposed surfaces level and flush at joints.
  - b. Make corners and arises full, and without worn or broken places.
  - c. Locate acoustical units providing access to service systems.
4. Deleted
5. Markers:
  - a. Install color coded markers to identify the various concealed piping, mechanical, and plumbing systems.
  - b. Attach colored markers to exposed grid on opposite sides of the units providing access.
  - c. Attach marker on exposed ceiling surface of upward access acoustical unit.

#### D. Touch up damaged factory finishes.

1. Repair painted surfaces with touch up primer.

### 3.4 CEILING SUSPENSION SYSTEM INSTALLATION

#### A. General: Install according to ASTM C636.

1. Use direct or indirect hung suspension system or combination of both.
2. Support a maximum area of 1.48 sq. m (16 sq. ft.) of ceiling per hanger.
3. Prevent deflection in excess of 1/360 of span of cross runner and main runner.
4. Provide additional hangers located at each corner of support components.

5. Provide minimum 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.
  6. Provide main runners minimum 1200 mm (48 inches) in length.
  7. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.
- B. Direct Hung Suspension System: ASTM C635.
1. Support main runners by hanger wires attached directly to the structure overhead.
  2. 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.
- C. Anchorage to Structure:
1. Concrete:
    - a. Install hanger inserts and wire loops required for support of hanger and bracing wire. Install hanger wires with looped ends through steel deck when steel deck does not have attachment device.
    - b. Deleted
  2. Steel:
    - a. Install carrying channels for attachment of hanger wires.
      - 1) Size and space carrying channels to support load within performance limit.
      - 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 fireproofing is installed. Weld or use steel clips for beam attachment.
    - 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.
- D. Indirect Hung Suspension System: ASTM C635.



1. Space carrying channels for indirect hung suspension system maximum 1200 mm (4 feet) on center. Space hangers for carrying channels maximum 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.
2. Support main runners by specially designed clips attached to carrying channels.

E. Seismic Ceiling Bracing System:

1. Install according to ASTM E580.
2. Connect bracing wires to structure above as specified for anchorage to structure and to main runner or carrying channels of suspended ceiling at bottom.

**3.5 CEILING TREATMENT**

- A. Deleted
- B. 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.
- C. Deleted
- D. Deleted

**3.6 CLEANING**

- A. Remove excess adhesive before adhesive sets.
- B. Clean exposed surfaces. Remove contaminants and stains.

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