

SECTION 09 51 00  
ACOUSTICAL CEILINGS

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM A 1008/A 1008M (2005a) Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability

ASTM A 641/A 641M (2003) Zinc-Coated (Galvanized) Carbon Steel Wire

ASTM A 653/A 653M (2004a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM B 633 (1998e1) Electrodeposited Coatings of Zinc on Iron and Steel

ASTM C 423 (2002a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

ASTM C 635 (2004) Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings

ASTM C 636 (2004) Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels

ASTM C 834 (2000e1; R 2005) Latex Sealants

ASTM E 1264 (1998; R 2005) Acoustical Ceiling Products

ASTM E 1414 (2000a) Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum

ASTM E 1477 (1998a; R 2003) Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers

ASTM E 580 (2002e1) Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Moderate Seismic Restraint

ASTM E 795 (2000) Mounting Test Specimens During

## Sound Absorption Tests

U.S. ARMY CORPS OF ENGINEERS (USACE)  
TI 809-04 (1998) Seismic Design for Buildings

UNDERWRITERS LABORATORIES (UL)  
UL Fire Resist Dir (2006) Fire Resistance Directory

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 23 SUBMITTAL PROCEDURES:

## SD-02 Shop Drawings

Approved Detail Drawings; G

Drawings showing suspension system, method of anchoring and fastening, details, and reflected ceiling plan.

## SD-03 Product Data

Acoustical Ceiling Systems; G

- a. Manufacturer's data indicating percentage of recycle material in acoustic ceiling tiles to verify affirmative procurement compliance.
- b. Total weight and volume quantities of acoustic ceiling tiles with recycle material.
- c. Manufacturer's catalog for the following items showing UL classification of fire-rated ceilings giving materials, construction details, types of floor and roof constructions to be protected, and UL design number and fire protection time rating for each required floor or roof construction and acoustic ceiling assembly.

## SD-04 Samples

Acoustical Units; G

Two samples of each type of acoustical unit and each type of suspension grid tee section showing texture, finish, and color.

## SD-06 Test Reports

Fire Resistive Ceilings

Ceiling Attenuation Class and Test

Reports by an independent testing laboratory attesting that acoustical ceiling systems meet specified fire endurance and sound transmission requirements. Data attesting to conformance of the proposed system to Underwriters Laboratories requirements for the fire endurance rating listed in UL Fire Resist Dir may be submitted in lieu of test reports.

## SD-07 Certificates

## Acoustical Units

Certificate attesting that the mineral based acoustical units furnished for the project contain recycled material and showing an estimated percent of such material.

## 1.3 GENERAL REQUIREMENTS

Acoustical treatment shall consist of sound controlling units mechanically mounted on a ceiling suspension system. The unit size, texture, finish, and color shall be as specified. The location and extent of acoustical treatment shall be as shown on the approved detail drawings. Reclamation of mineral fiber acoustical ceiling panels to be removed from the job site shall be in accordance with paragraph RECLAMATION PROCEDURES.

## 1.3.1 Ceiling Attenuation Class and Test

The ceiling attenuation class (CAC) of the ceiling system shall be minimum 35 for ACT-1, ACT-2, ACT-3 ACT-4, ACT-5 and ACT-6 when determined in accordance with

ASTM E 1414. Provide fixture attenuators over light fixtures and other ceiling penetrations, and provide acoustical blanket insulation adjacent to partitions, as required to achieve the specified CAC. Test ceiling shall be continuous at the partition and shall be assembled in the suspension system in the same manner that the ceiling will be installed on the project.

## 1.3.2 Ceiling Sound Absorption

Determine the NRC in accordance with ASTM C 423 Method of Test.

## 1.3.3 Light Reflectance

Determine light reflectance factor in accordance with ASTM E 1477 Test Method.

## 1.4 DELIVERY AND STORAGE

Materials shall be delivered to the site in the manufacturer's original unopened containers with brand name and type clearly marked. Materials shall be carefully handled and stored in dry, watertight enclosures. Immediately before installation, acoustical units shall be stored for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed in order to assure proper temperature and moisture acclimation.

## 1.5 ENVIRONMENTAL REQUIREMENTS

A uniform temperature of not less than 60 degrees F nor more than 85 degrees F and a relative humidity of not more than 70 percent shall be maintained for 24 hours before, during, and 24 hours after installation of acoustical units.

## 1.6 SCHEDULING

Mechanical, electrical, and other work above the ceiling line shall be completed and heating, ventilating, and air conditioning systems shall be installed and operating in order to maintain temperature and humidity requirements.

#### 1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided. Standard performance guarantee or warranty shall contain an agreement to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to, sagging and warping of panels; rusting and manufacturers defects of grid system.

### PART 2 PRODUCTS

#### 2.1 ACOUSTICAL UNITS

Contractor shall comply with EPA requirements in accordance with Section 01 62 35 RECYCLED / RECOVERED MATERIALS. Acoustical units shall conform to ASTM E 1264, Class A, and the following requirements:

##### 2.1.1 Affirmative Procurement

Mineral wool, cellulose and laminated paperboard used in acoustic ceiling tiles are materials listed in the EPA's Comprehensive Procurement Guidelines (CPG) (<http://www.epa.gov/cpg/>). EPA's recommended Recovered Materials Content Levels for Mineral Wool, Cellulose, Structural Fiberboard and Laminated Paperboard are:

	Percent of Post Consumer Materials	Percent of Total Recovered Materials
Laminate	100	100
Paperboard	75	
Rock Wool	75	
Slag	75	
Cellulose	75	75

- a. The recommended recovered materials content levels are based on the weight (not volume) of materials in the insulating core only.
- b. For informational purposes, a list of known sources for acoustical ceiling tiles using recycled material is provided in the EPA/CPG Supplier database at <http://www.ergweb2.com/cpg4review/user/cpgsearch.cfm>.
- c. Note that the Contractor is not limited to these sources. A product meeting CPG recycle requirements from other sources may be submitted for the Government's approval.
- d. Submit recycled material content data for acoustic ceiling tiles indicating compliance with affirmative procurement.
- e. Submit total weight and volume quantities of acoustic ceiling tiles with recycle material.

##### 2.1.2 Units for Exposed-Grid System **ACT-1**

Type: III (non-asbestos mineral fiber with painted finish).

Minimum NRC: 0.70 in all areas indicated on Finish Schedule and areas when tested on mounting Type E-400 of ASTM E 795.

Pattern: EI (Smooth).

Nominal size: 24 by 24 by 3/4 inches.

Edge detail: Fineline reveal/tegular.

Finish: Factory-applied standard finish.

Minimum LR coefficient: LR-1, .80 or greater.

Minimum CAC: 35.

Flame Spread: Class A, 25 or less

#### 2.1.3 Units for Exposed-Grid System **ACT-2**

Type: III (non-asbestos mineral fiber with painted finish).

Minimum NRC: 0.70 in all areas indicated on Finish Schedule and areas when tested on mounting Type E-400 of ASTM E 795.

Pattern: EI (Smooth).

Nominal size: 24 by 24 by 3/4 inches.

Edge detail: Square.

Finish: Factory-applied standard finish.

Minimum LR coefficient: LR-1, .80 or greater.

Minimum CAC: 35.

Flame Spread: Class A, 25 or less

#### 2.1.4 Units for Exposed-Grid System **ACT-3**

Type: III (non-asbestos mineral fiber with painted finish).

Minimum NRC: 0.70 in all areas indicated on Finish Schedule and areas when tested on mounting Type E-400 of ASTM E 795.

Pattern: EI (Smooth).

Nominal size: 24 by 48 by 3/4 inches.

Edge detail: Square.

Finish: Factory-applied standard finish.

Minimum LR coefficient: LR-1, .80 or greater.

Minimum CAC: 35.

Flame Spread: Class A, 25 or less

2.1.5 Units for Exposed-Grid System **ACT-4: Moisture Resistant**

Type: III (non-asbestos mineral fiber with painted finish).

Minimum NRC: 0.70 in all areas indicated on Finish Schedule and areas when tested on mounting Type E-400 of ASTM E 795.

Pattern: EI (Smooth).

Nominal size: 24 by 24 by 3/4 inches.

Edge detail: Square.

Finish: Factory-applied standard finish.

Minimum LR coefficient: LR-1, .80 or greater.

Minimum CAC: 35.

Flame Spread: Class A, 25 or less

2.1.6 Units for Exposed-Grid System **ACT-5**

Type: III (non-asbestos mineral fiber with painted finish).

Minimum NRC: 0.95 in all areas indicated on Finish Schedule and areas when tested on mounting Type E-400 of ASTM E 795.

Pattern: EI (Smooth).

Nominal size: 24 by 24 by 1 inches.

Edge detail: 9/16 Square Tegular.

Finish: Factory-applied standard finish.

Minimum LR coefficient: LR-1, .95 or greater.

Minimum CAC: 35.

Flame Spread: Class A, 25 or less

2.1.7 Units for Exposed-Grid System **ACT-6**

Type: III (non-asbestos mineral fiber with painted finish).

Minimum NRC: 0.95 in all areas indicated on Finish Schedule and areas when tested on mounting Type E-400 of ASTM E 795.

Pattern: EI (Smooth).

Nominal size: 24 by 24 by 1 inches.

Edge detail: 9/16 Square Tegular.

Finish: Factory-applied standard finish.

Minimum LR coefficient: LR-1, .95 or greater.

Minimum CAC: 35.

Flame Spread: Class A, 25 or less

Color : Black with black grid

## 2.2 SUSPENSION SYSTEM

Suspension system shall be standard exposed-grid, standard width flange narrow width slotted flange as indicated on the drawings, and shall conform to ASTM C 635 for intermediate-duty systems. Surfaces exposed to view shall be aluminum or steel with a factory-applied white baked-enamel finish. Wall molding shall have a flange of not less than 15/16 inch. Inside and outside corner caps Mitered corners shall be provided. Suspended ceiling framing system shall have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown. The suspension system shall have a maximum deflection of 1/360 of span length. Seismic details shall conform to the guidance in TI 809-04 and ASTM E 580.

## 2.3 HANGERS

Hangers and attachment shall support a minimum 300 pound ultimate vertical load without failure of supporting material or attachment.

### 2.3.1 Wires

Wires shall conform to ASTM A 641/A 641M, Class 1, 0.106 inches in diameter.

### 2.3.2 Straps

Straps shall be 1 by 3/16 inch galvanized steel conforming to ASTM A 653/A 653M, with a light commercial zinc coating or ASTM A 1008/A 1008M with an electrodeposited zinc coating conforming to ASTM B 633, Type RS.

### 2.3.3 Rods

Rods shall be 3/16 inch diameter threaded steel rods, zinc or cadmium coated.

## 2.4 FINISHES

Acoustical units and suspension system members shall have manufacturer's standard textures, patterns and finishes as specified. Ceiling suspension system components shall be treated to inhibit corrosion.

## 2.5 COLORS AND PATTERNS

Colors and patterns for acoustical units and suspension system components shall be as indicated on drawings.

## 2.6 ACOUSTICAL SEALANT

Acoustical sealant shall conform to ASTM C 834, nonstaining.

## PART 3 EXECUTION

### 3.1 INSTALLATION

Examine surfaces to receive directly attached acoustical units for unevenness, irregularities, and dampness that would affect quality and execution of the work. Areas where acoustical units will be cemented shall be free of oils, form residue, or other materials that reduce bonding capabilities of the adhesive. Interior finish work such as plastering, concrete, and terrazzo work shall be completed and dry before installation. Mechanical, electrical, and other work above the ceiling line shall be completed and approved prior to the start of acoustical ceiling installation. Acoustical work shall be provided complete with necessary fastenings, clips, and other accessories required for a complete installation. Mechanical fastenings shall not be exposed in the finished work. Hangers shall be laid out for each individual room or space. Hangers shall be placed to support framing around beams, ducts, columns, grilles, and other penetrations through ceilings. Main runners and carrying channels shall be kept clear of abutting walls and partitions. At least two main runners shall be provided for each ceiling span. Wherever required to bypass an object with the hanger wires, a subsuspension system shall be installed, so that all hanger wires will be plumb.

#### 3.1.1 Suspension System

Suspension system shall be installed in accordance with ASTM C 636 and as specified herein. There shall be no hanger wires or other loads suspended from underside of steel decking.

##### 3.1.1.1 Plumb Hangers

Hangers shall be plumb and shall not press against insulation covering ducts and pipes. Where lighting fixtures are supported from the suspended ceiling system, hangers shall be provided at a minimum of four hangers per fixture and located not more than 6 inches from each corner of each fixture. See Section 26 51 00 INTERIOR LIGHTING for additional lighting installation requirements.

##### 3.1.1.2 Splayed Hangers

Where hangers must be splayed (sloped or slanted) around obstructions, the resulting horizontal force shall be offset by bracing, countersplaying, or other acceptable means.

#### 3.1.2 Wall Molding

Wall molding shall be provided where ceilings abut vertical surfaces. Miter corners where wall moldings intersect or install corner caps. Wall molding shall be secured not more than 3 inches from ends of each length and not more than 16 inches on centers between end fastenings. Wall molding springs shall be provided at each acoustical unit in semi-exposed



or concealed systems.

### 3.1.3 Acoustical Units

Acoustical units shall be installed in accordance with the approved installation instructions of the manufacturer. Edges of acoustical units shall be in close contact with metal supports, with each other, and in true alignment. Acoustical units shall be arranged so that units less than one-half width are minimized. Units in exposed-grid system shall be held in place with manufacturer's standard hold-down clips, if units weigh less than 1 psf or if required for fire resistive rating.

### 3.1.4 Caulking

Seal all joints around pipes, ducts or electrical outlets penetrating the ceiling. Apply a continuous ribbon of acoustical sealant on vertical web of wall or edge moldings. See Section 07 92 00 JOINT SEALANTS.

### 3.2 CLEANING

Following installation, dirty or discolored surfaces of acoustical units shall be cleaned and left free from defects. Units that are damaged or improperly installed shall be removed and new units provided as directed.

### 3.3 RECLAMATION PROCEDURES

Ceiling tile, designated for recycling by the Contracting Officer, shall be neatly stacked on 4 by 4 foot pallets not higher than 4 foot. Panels shall be completely dry. Pallets shall then be shrink wrapped and symmetrically stacked on top of each other without falling over. Disposal shall be in accordance with Section 01 74 19 CONSTRUCTION WASTE MANAGEMENT.

-- End of Section --