SECTION 09 51 00

ACOUSTICAL CEILINGS
08/20

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 E119	(2020) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E580/E580M	(2020) Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions
ASTM E84	(2023) Standard Test Method for Surface Burning Characteristics of Building Materials

JAPANESE STANDARDS ASSOCIATION (JSA)

JIS A 5758	(2022) Sealants for Sealing and Glazing in Buildings
JIS A 1409	(1998) Method for Measurement of Sound Absorption Coefficients in a Reverberation Room
JIS A 1445	(2007) Testing Methods of Materials for Ceiling Suspension System
JIS A 6301	(2007) Sound Absorbing Materials
JIS A 6517	(2020) Steel Furrings for Wall and Ceiling in Buildings
JIS B 1168	(1994) Eyebolts
JIS G 3537	(2011)Zinc-coated steel wire strands
JIS G 4309	(2013) Stainless Steel Wires
JIS G 5111	(1991) High Tensile Strength Carbon Steel castings and low alloy steel castings for structural purposes
JIS H 8610	(1999) Electroplated-Coatings of Zinc on Iron or Steel

ARCHITECTURAL INSTITUTE OF JAPAN (AIJ)

JASS 26 (2006) Interior Work

MINISTRY OF LAND, INFRASTRUCTURE, TRANSPORT AND TOURISM (MLIT)

MLIT Notification No. 771 (2013) Establishment of specified ceilings and a construction method that is effective for structural resistance of specified ceilings

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-310-04 (2013; with Change 1, 2016) Seismic Design of Buildings

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.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings; G[, [_____]]

[1.3 ADHESIVES AND SEALANTS

Provide products certified to meet indoor air quality requirements by providing the certification or validation by other third-party program that products meet the requirements of this Section. Provide current product certification documentation from certification body. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

]1.4 DELIVERY, STORAGE. AND HANDLING

Deliver materials to the site in the manufacturer's original unopened containers with brand name and type clearly marked. Carefully handle and store materials in dry, watertight enclosures. Immediately before installation, store acoustical units 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

Maintain a uniform temperature of not less than 16 degrees C nor more than 29 degrees C and a relative humidity of not more than 70 percent for 24 hours before, during, and 24 hours after installation of acoustical units.

1.6 SCHEDULING

Complete and dry interior finish work such as plastering, concrete and

terrazzo work before ceiling installation. Complete mechanical, electrical, and other work above the ceiling line; install and start operating heating, ventilating, and air conditioning systems in order to maintain temperature and humidity requirements.

1.7 WARRANTY

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

1.8 EXTRA MATERIALS

Furnish spare tiles, from the same lot as those installed, of each color at the rate of 5 tiles for each 1000 tiles installed.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide sound controlling units mechanically mounted on a ceiling suspension system for acoustical treatment. The unit size, texture, finish, and color must be as specified. Coordinate the whole ceiling system with other details, like the location of access panels and ceiling penetrations, etc., shown on the drawings. The Contractor is responsible for all associated labor and materials and for the final assembly and performance of the specified work and products are used. The location and extent of acoustical treatment must be as shown on the approved detail drawings. Submit drawings showing suspension system, method of anchoring and fastening, details, and reflected ceiling plan. Coordinate with paragraph RECLAMATION PROCEDURES for reclamation of mineral fiber acoustical ceiling panels to be removed from the job site.

2.1.1 Fire Resistive Ceilings

Rate acoustical ceiling systems, indicated as fire resistant, for fire endurance as specified when tested in accordance with ASTM E119. Test suspended ceiling with a specimen [roof][floor] assembly representative of the indicated construction, including mechanical and electrical work within ceiling space openings for light fixtures, and air outlets, and access panels. Provide ceiling assembly rating for [[1][1-1/2][2][3][4] hour [concealed grid system][exposed grid system]][as shown on drawings]. Provide acoustical units with a flame spread of 25 or less and smoke development of 50 or less when tested in accordance with ASTM E84.

2.1.2 Ceiling Attenuation Class and Test

Provide a ceiling system with an attenuation class (CAC) of [36] for [_____] [and _____ for _____]. 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. Provide test ceiling continuous at the partition and assembled in the suspension system in the same manner that the ceiling will be installed on the project.

2.1.3 Ceiling Sound Absorption

Determine the sound reduction rate in accordance with JIS A 1409.

2.1.4 Light Reflectance

Light reflectance to be 0.75 or above.

2.2 ACOUSTICAL UNITS

Submit two samples of each type of acoustical unit and each type of suspension grid tee section showing texture, finish, and color. Conform acoustical units to JIS A 6301 and the following requirements:

2.2.1 Units for Exposed-Grid System [A] [_____]

2.2.1.1 Type

[III (non-asbestos mineral fiber with painted finish). Provide Type III Acoustical Ceiling Tiles containing a minimum of 30 percent recycled content.]

[IV (non-asbestos mineral fiber with membrane-faced overlay). Provide Type IV Acoustical Ceiling Tiles containing a minimum of 60 percent recycled content.]

[IX (mineral fiber with scrubbable finish). [Provide Type IX Acoustical Ceiling Tiles containing a minimum [50] [_____] percent recycled content.]]

[X (mineral composition with plastic membrane).]

[XI (mineral fiber with fabric faced overlay).]

[XII (fiberglass base with membrane-faced overlay). [Provide Type XII Acoustical Ceiling Tiles containing a minimum of [25] [_____] percent recycled content.]]

2.2.1.2 Flame Spread

Class A, 25 or less

2.2.1.3 Pattern

[A] [B] [C] [D] [E] [F] [G] [I] [J] [K] [_____]

2.2.1.4 Minimum NRC

[0.75] [_____] in open office areas; [0.60] [_____] in conference rooms, executive offices, teleconferencing rooms, and other rooms as designated; [0.50] [_____] in all other rooms and areas.

2.2.1.5 Minimum Light Reflectance Coefficient
[LR-1, 0.75 or greater] [_____]

2.2.1.6 Nominal Size

[600 by 1200] [_____] mm

2.2.1.7 Edge Detail

[Square] [Reveal] [Trimmed and butt] [_____]

2.2.1.8 Finish

Factory-applied [standard finish] [color finish].

2.2.1.9 Minimum CAC

[40] [36]

2.2.2 Units for Concealed-Grid System [A] [_____]

2.2.2.1 Type

[III (non-asbestos mineral fiber with painted finish). Provide Type III Acoustical Ceiling Tiles containing a minimum of 30 percent recycled content.]

[IV (non-asbestos mineral fiber with membrane-faced overlay). Provide Type IV Acoustical Ceiling Tiles containing a minimum of 60 percent recycled content.]

[IX (mineral fiber with scrubbable finish). [Provide Type IX Acoustical Ceiling Tiles containing a minimum of [50][_____] percent recycled content.]]

[X (mineral composition with plastic membrane).]

[XI (mineral fiber with fabric faced overlay).]

[XII (fiberglass base with membrane-faced overlay). [Provide Type XII Acoustical Ceiling Tiles containing a minimum of [25][_____] percent recycled content.]]

2.2.2.2 Flame Spread

Class A, 25 or less

2.2.2.3 Pattern

[A] [B] [C] [D] [E] [F] [G] [I] [J] [K] [_____]

2.2.2.4 Minimum NRC

[0.50] [_____]

2.2.2.5 Minimum Light Reflectance Coefficient

[LR-1, 0.75 or greater] [_____]

2.2.2.6 Nominal Size

[300 by 300] [_____] mm

2.2.2.7 Edge Detail

[Beveled] [Square]

2.2.2.8 Joint Detail

[kerfed and rabbeted] [tongue and grooved]

2.2.2.9 Finish

Factory-applied [standard finish] [color finish]

2.2.2.10 Minimum CAC

[40] [_____]

2.2.3 Metal Pans [A] [_____]

2.2.3.1 Type

[V, steel.]

[VI, stainless steel.]

[VII, aluminum perforated pans with acoustical, non-asbestos, insulation backing.]

2.2.3.2 Flame Spread

Class: A, 25 or less

2.2.3.3 Pattern

[A] [C] [I] [_____]

2.2.3.4 Minimum NRC

[0.75] [_____] in open office areas; [0.60] [_____] in conference rooms, executive offices, teleconferencing rooms, and other rooms as designated; [0.50] [_____] in all other rooms.

2.2.3.5 Minimum Light Reflectance Coefficient

[LR-1, 0.75 or greater] [_____]

2.2.3.6 Nominal Size

[600 by 600] [_____] mm

2.2.3.7 Edge Detail

Manufacturer's standard.

2.2.3.8 Joint Detail

[Beveled] [_____]

2.2.3.9 Finish

Factory-applied standard finish

2.2.3.10 Pads

[Completely enclosed, of material and thickness required for acoustical and fire test ratings] [_____].

2.2.4 Impact/Abrasion Resistant Units

2.2.4.1 Type

Non-asbestos mineral composition with a hardened mineral surface and factory applied white paint finish. Provide a surface resistant to impact and abrasion.

2.2.4.2 Flame Spread

Class A, 25 or less

2.2.4.3 Pattern

[_____]

2.2.4.4 Minimum NRC

[0.50] [_____].

2.2.4.5 Minimum Light Reflectance Coefficient

LR-1, 0.75 or greater

2.2.4.6 Nominal Size

[300 by 300] [600 by 600] [600 by 1200] mm

2.2.4.7 Edge Detail

[Square] [Beveled]

2.2.4.8 Joint Detail

[Trimmed and butted] [Kerfed and rabbeted]

2.2.5 Humidity Resistant Composition Units

2.2.5.1 Type

Non-asbestos mineral or glass fibers bonded with ceramic, moisture resistant thermo-setting resin, or other moisture resistant material and having a factory applied white paint finish. Provide panels that do not sag or warp under conditions of heat, high humidity or chemical fumes.

2.2.5.2 Flame Spread

Class: A, 25 or less

2.2.5.3 Pattern

[_____]

2.2.5.4 Minimum NRC

Minimum [0.50] [_____].

2.2.5.5 Minimum Light Reflectance Coefficient

LR-1, 0.75 or greater

2.2.5.6 Nominal Size

[600 by 1200] [_____] mm

2.2.5.7 Edge Detail

Square

2.2.6 Metal Faced Composition Units

2.2.6.1 Type

[Type V (Steel facings with non-asbestos mineral composition absorbent backing).]

[Type VI (Stainless steel facings with non-asbestos mineral composition absorbent backing)]

[Type VII (Aluminum facings with non-asbestos mineral composition absorbent backing) with [anodized] [baked enamel] [acrylic] finish color [white] [_____].]

2.2.6.2 Flame Spread

Class: A, flame spread 25 or less

2.2.6.3 Pattern

[_____]

2.2.6.4 Minimum (NRC)

[0.75] [_____] in open office areas. [0.60] [_____] in conference rooms, executive offices, teleconferencing rooms, and other rooms as designated. [0.50] [_____] in all other rooms and areas.

2.2.6.5 Minimum Light Reflectance Coefficient

LR-1, 0.75 or greater

2.2.6.6 Nominal Size

600 by [600] [1200] mm

2.2.6.7 Edge Detail

Square

2.2.6.8 Joint Detail

Trimmed and butted

2.2.7 Unit Acoustical Absorbers

Absorbers must be individually mounted sound absorbing plaques composed of glass fibers or non-asbestos mineral fibers and having a NRC range of not less than 0.60 - 0.70 when tested in accordance with JIS A 1409 and reported as a 4 frequency average.

2.3 SUSPENSION SYSTEM

Provide [[standard] [fire-resistive] [snap-in metal pan]] [[exposed-grid] [indirect hung concealed H and T or Zee] [direct hung, concealed, downward access] [direct hung, concealed, upward access]] [[standard width flange] [narrow width flange] [narrow width slotted flange]] [as shown on drawings] suspension system conforming to JIS A 1445 [for intermediate-duty systems] [for heavy-duty systems]. Provide surfaces exposed to view of [aluminum or [galvanized]steel with a factory-applied [white] [black] [color] baked-enamel finish] [aluminum with a clear anodized finish] [aluminum with colored factory-applied vinyl paint finish]. Provide wall molding having a flange of not less than [23 mm] [_____]. Provide [inside and outside corner caps] [[standard] [overlapped] [mitered] corners]. Suspended ceiling framing system must have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown. Provide a suspension system with a maximum deflection of 1/360 of the span length. Conform seismic details to the [guidance in UFC 3-310-04 and ASTM E580/E580M or JIS A 1445] [contract drawings], and in accordance with "Practical Guide on the Technical Standards concerning Measures to Prevent the Fall of Buildings" based on MLIT Notification No. 771 of the Ministry of Land, Infrastructure, Transport and Tourism.

For gypsum board ceilings greater than 5994mm AFF, with an area greater than 200 SM, and weight of 2 kg/SM, refer to the detail in the Ministry of Land, Infrastructure, Transport and Tourism, MLIT Notification No. 771, and JIS A 1445 and JIS A 6517 for testing method. For gypsum board ceilings less than or equal to 5994mm AFF, refer to detail in JASS 26 Section 4, and JIS A 6517 for testing method. For lay-in acoustical ceilings refer to detail in JASS 26, Section 4.4 and JIS A 1445 for testing method.

Provide Suspension System containing a minimum of 15 percent recycled content.

2.4 HANGERS

Provide hangers and attachment capable of supporting a minimum 1330 N ultimate vertical load without failure of supporting material or attachment.

2.4.1 Wires

Conform wires to JIS G 3537, [JIS G 4309 condition annealed stainless steel, [2.0] [_____] mm in diameter.]

2.4.2 Straps

Provide straps of 25 by 5 mm galvanized steel with a light commercial zinc coating or JIS G 5111 with an electrodeposited zinc coating conforming to JIS H 8610.

2.4.3 Rods

Provide 5 mm diameter threaded steel rods, zinc or cadmium coated.

2.4.4 Eyebolts

Provide eyebolts of weldless, forged-carbon-steel, with a straight-shank in accordance with JIS B 1168. Eyebolt size must be a minimum [_____] [7] mm, [zinc coated][cadmium plated].

2.4.5 Anchorage Devices

Comply with JIS A 1445 for anchorage devices for [eyebolts] [machine screws] [wood screws]. Where aluminum is in contact with concrete, coat aluminum with bituminous paint or where exposed, with a chromatic primer and 2-coats of enamel paint.

2.5 ACCESS PANELS

Provide access panels that match adjacent acoustical units, designed and equipped with suitable framing and fastenings for removal and replacement without damage. Size panel to be not less than 300 by 300 mm or more than 300 by 600 mm.

a. Attach an identification plate of 0.8 mm thick aluminum, 19 mm in diameter, stamped with the letters "AP" and finished the same as the unit, near one corner on the face of each access panel.

b. Identify ceiling access panel by a number utilizing white identification plates or plastic buttons with contrasting numerals. Provide plates or buttons of minimum 25 mm diameter and securely attached to one corner of each access unit. Provide a typewritten card framed under glass listing the code identification numbers and corresponding system descriptions listed above. Mount the framed card where directed and furnish a duplicate card to the Contracting Officer. Code identification system is as follows:

1 Fire detection/alarm system

2 Air conditioning controls

3 Plumbing system

4 Heating and steam systems

5 Air conditioning duct system

6 Sprinkler system

7 Intercommunication system

8 Nurse's call system

9 Pneumatic tube system

10 Medical piping system

11 Program entertainment

12 Telephone junction boxes

13 Detector X-ray

14 [_____]

2.6 ADHESIVE

Use adhesive as recommended by tile manufacturer. Meet emissions requirements of F 4-STar and JAIA 4VOC.

2.7 FINISHES

Use manufacturer's standard textures, patterns and finishes as specified for acoustical units and suspension system members. Treat ceiling suspension system components to inhibit corrosion.

2.8 COLORS AND PATTERNS

Use colors and patterns for acoustical units and suspension system components as indicated.

2.9 ACOUSTICAL SEALANT

Conform acoustical sealant to JIS A 5758, nonstaining.

PART 3 EXECUTION

3.1 INSTALLATION

Do not install building construction materials that show visual evidence of biological growth.

Examine surfaces to receive directly attached acoustical units for unevenness, irregularities, and dampness that would affect quality and execution of the work. Rid areas, where acoustical units will be cemented, of oils, form residue, or other materials that reduce bonding capabilities of the adhesive. Complete and dry interior finish work such as plastering, concrete, and terrazzo work before installation. Complete and approve mechanical, electrical, and other work above the ceiling line prior to the start of acoustical ceiling installation. Provide acoustical work complete with necessary fastenings, clips, and other accessories required for a complete installation. Do not expose mechanical fastenings in the finished work. Lay out hangers for each individual room or space. Provide hangers to support framing around beams, ducts, columns, grilles, and other penetrations through ceilings. Keep main runners and carrying channels clear of abutting walls and partitions. Provide at least two main runners for each ceiling span. Wherever required to bypass an object with the hanger wires, install a subsuspension system so that all hanger wires will be plumb.

3.1.1 Suspension System

Install suspension system in accordance with JIS A 1445 and in accordance with "Practical Guide on the Technical Standards concerning Measures to Prevent the Fall of Buildings" based on MLIT Notification No. 771 of the Ministry of Land, Infrastructure, Transport and Tourism and as specified herein. The suspension system shall conform to allowable stress

performance per the static pressurization test designed by the Japan Ministry of Construction. Do not suspend hanger wires or other loads from underside of steel decking.

3.1.1.1 Plumb Hangers

Install hangers plumb and not pressing against insulation covering ducts and pipes. Where lighting fixtures are supported from the suspended ceiling system, provide hangers at a minimum of four hangers per fixture and located not more than 150 mm from each corner of each fixture.

3.1.1.2 Splayed Hangers

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

3.1.2 Wall Molding

Provide wall molding where ceilings abut vertical surfaces. Miter corners where wall moldings intersect or install corner caps. Secure wall molding not more than 75 mm from ends of each length and not more than 400 mm on centers between end fastenings. Provide wall molding springs at each acoustical unit in semi-exposed or concealed systems.

3.1.3 Acoustical Units

Install acoustical units in accordance with the approved installation instructions of the manufacturer. Ensure that edges of acoustical units are in close contact with metal supports, with each other, and in true alignment. Arrange acoustical units so that units less than one-half width are minimized. Hold units in exposed-grid system in place with manufacturer's standard hold-down clips, if units weigh less than 5 kg/square meter or if required for fire resistance 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.

3.1.5 Adhesive Application

Wipe back of tile to remove accumulated dust. Daub acoustical units on back side with four equal daubs of adhesive. Apply daubs near corners of tiles. Ensure that contact area of each daub is at least 50 mm diameter in final position. Press units into place, aligning joints and abutting units tight and uniform without differences in joint widths.

3.2 CEILING ACCESS PANELS

Locate ceiling access panels directly under the items which require access.

3.3 CLEANING

Following installation, clean dirty or discolored surfaces of acoustical units and leave them free from defects. Remove units that are damaged or improperly installed and provide new units as directed.

3.4 RECLAMATION PROCEDURES

Neatly stack ceiling tile, designated for recycling by the Contracting Officer, on 1220 by 1220 mm pallets not higher than 1220 mm. Panels must be completely dry. Shrink wrap and symmetrically stack pallets on top of each other without falling over.

-- End of Section --