SECTION 095113 - ACOUSTICAL PANEL CEILINGS

Light, intermediate, and heavy-duty exposed suspension systems with acoustical ceiling units. Use section 095123 for and concealed grid, attached acoustical ceilings and for adhesive applied tile on suspended gypsum board or plaster ceilings. Before editing, see information at end of section.

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. SUMMARY
				1. Section includes acoustical panels and exposed suspension systems for interior ceilings.
				2. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 095123 "Acoustical Tile Ceilings" for ceilings consisting of mineral-base acoustical tiles used with fully concealed suspension systems, stapling, or adhesive bonding.

Section 095133 "Acoustical Metal Pan Ceilings" for ceilings consisting of metal-pan units with exposed and concealed suspension systems.

Retain paragraph below if cast-in-place attachment devices are required for Project.

* + - * 1. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.
			1. REFERENCES
				1. ASTM C 635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
				2. ASTM C 636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
				3. ASTM E 1414 - Standard Test method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
				4. ASTM E 1264 - Standard Classification for Acoustical Ceiling Products.
				5. Ceilings and Interior Systems Contractors Association (CISCA) Acoustical Ceilings: Use and Practice.
				6. Ceilings and Interior Systems Contractors Association (CISCA) Acoustical Ceilings: Ceiling Systems Handbook.
				7. UL - Fire Resistance Directory and Building Material Directory.
			2. PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + - * 1. Preinstallation Conference: Conduct conference at Project site.

If needed, insert list of conference participants.

1. SUBMITTALS
	* + - 1. General: Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For each type of product including product testing data.
				5. Sustainable Design Submittals:

Retain "Samples" paragraph below for single-stage Samples, with a subordinate list if applicable. Retain "Samples for Initial Selection" and "Samples for Verification" paragraphs for two-stage Samples.

* + - * 1. Samples: For each exposed product and for each color and texture specified, 6 inches in size.
				2. Samples for Initial Selection: For components with factory-applied finishes.
				3. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

First option in "Acoustical Panels" subparagraph below may be impractical for large panels.

Acoustical Panels: Set of 6-inch- square Samples of each type, color, pattern, and texture.

Exposed Suspension-System Members, Moldings, and Trim: Set of [**6-inch-**] long Samples of each type, finish, and color.

Clips: Full-size [**hold-down**] [**impact**] [**and**] [**seismic**] clips.

Retain "Delegated-Design Submittal" paragraph below if design services have been delegated to Contractor.

* + - * 1. Delegated-Design Submittal: For seismic restraints for ceiling systems.

Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer, licensed in the State of New York, responsible for their preparation.

Retain "Coordination Drawings" paragraph below for situations where limited space could affect installation of different components or if coordination is required for installation of products and materials by separate installers. Coordinate paragraph with other Sections specifying products listed below. Preparation of coordination drawings requires the participation of each trade involved in installations within the limited space.

* + - * 1. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

Ceiling suspension-system members.

Structural members to which suspension systems will be attached.

Method of attaching hangers to building structure.

Retain first subparagraph below if cast-in-place attachment devices are required for Project.

Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.

Size and location of initial access modules for acoustical panels.

Items penetrating finished ceiling and ceiling-mounted items including the following:

Lighting fixtures.

Diffusers.

Grilles.

Speakers.

Sprinklers.

Access panels.

Perimeter moldings.

Show operation of hinged and sliding components covered by or adjacent to acoustical panels.

Minimum Drawing Scale: [**1/4 inch = 1 foot**] [**1/8 inch = 1 foot**] [**1:50**] [**1:100**].

* + - * 1. Qualification Data: For testing agency.
				2. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.
				3. Evaluation Reports: For each acoustical panel ceiling suspension system[**and anchor and fastener type**], from ICC-ES.

Retain "Field quality-control reports" paragraph below if Contractor is responsible for field quality-control testing and inspecting.

Retain the paragraph below only when fastening to concrete decks.

* + - * 1. Field quality-control reports.
			1. CLOSEOUT SUBMITTALS
				1. Maintenance Data: For finishes to include in maintenance manuals.
			2. MAINTENANCE MATERIAL SUBMITTALS
				1. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

Revise "Acoustical Ceiling Units," "Suspension-System Components," "Hold-Down Clips," and "Impact Clips" subparagraphs below to suit Project. If preferred, replace percentage with a specific number of panels and pieces of each suspension component and their lengths.

Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.

Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

Hold-Down Clips: Equal to 2 percent of quantity installed.

Impact Clips: Equal to 2 percent of quantity installed.

* + - 1. QUALITY ASSURANCE
				1. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

Indicate portion of ceiling represented by mockup on Drawings or draw mockup as separate element.

Build mockup of typical ceiling area as shown on Drawings.

Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Director’s Representative specifically approves such deviations in writing.

Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

* + - * 1. Installers Qualifications: The persons installing the suspended acoustical ceiling system and their supervisor shall be personally experienced in suspended acoustical ceiling installation and shall have been regularly employed by a company installing systems for a minimum of 2 years.
			1. DELIVERY, STORAGE, AND HANDLING
				1. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
				2. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
			2. FIELD CONDITIONS

Limitations in "Environmental Limitations" paragraph below may be necessary for best results in many locations. If construction scheduling or other conditions conflict with requirements below, consider products that can be installed under less-than-ideal conditions according to manufacturer's written instructions. Revise below if humidity-resistant products do not need stringent environmental limitations. See the Evaluations and consult manufacturers for recommendations.

* + - * 1. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

"Pressurized Plenums" subparagraph below is according to CISCA's recommendations for cleaning duct system and protecting ceiling units in pressurized plenums from damage and soiling caused by blowing dirt and dust that may be present when duct system is first operated.

Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

* + - * 1. Environmental Requirements: Comply with acoustical units manufacturer’s printed temperature and ventilation requirements before, during, and after installation.
1. PRODUCTS

Manufacturers and products listed in SpecAgent and Masterworks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. GENERAL
				1. System Description: Suspended Ceiling System consisting of main runners and cross runner tees snapped together to form modules or grids for the installation of lay-in acoustical tiles or panels, air diffusers, and light fixtures.
				2. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.
			2. PERFORMANCE REQUIREMENTS

Retain "Delegated Design" paragraph below if Contractor is required to assume responsibility for design.

* + - * 1. Delegated Design: Engage a qualified professional engineer, licensed in the State of New York to design seismic restraints for ceiling systems.

Retain "Seismic Performance" paragraph below for projects requiring seismic design. Delete paragraph if performance requirements are indicated on Drawings. Model building codes and ASCE/SEI 7 establish criteria for buildings subject to earthquake motions. Coordinate requirements with Project's structural engineer.

* + - * 1. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
				2. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

Retain one option in "Flame-Spread Index" subparagraph below. Class A products have a flame-spread index not exceeding 25 and a smoke-developed index not exceeding 50; Class B products have a flame-spread index not exceeding 75 on face side; and Class C products have a flame-spread index not exceeding 200 on face side. Most products available in the United States are Class A.

Flame-Spread Index: Class [**A**] [**B**] [**C**] according to ASTM E1264.

Retain first option in "Smoke-Developed Index" subparagraph for Class A products, which is according to ASTM E1264. Retain second option below for Class B and Class C products, which is according to the IBC for all products.

Smoke-Developed Index: [**50**] [**450**] or less.

Retain "Fire-Resistance Ratings" paragraph below only if products specified are part of a fire-resistance-rated assembly. Indicate rating, testing agency, and testing agency's design designation on Drawings.

* + - * 1. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

Indicate design designations from UL or from the listings of another qualified testing agency.

Delete types that are not used. If more than one type is required, make sure “types” are indicated on the drawings.

* + - * 1. Structural Performance and Suspension System Types:

Use light duty for residential work and structures where ceiling loads other than tile or panels are not anticipated.

Type LD/EG: Light duty, direct hung, exposed grid. (Minimum load carrying capability of main runners: 5 lb/lin ft).

Type LD/CG: Light duty, direct hung, concealed grid. (Minimum load carrying capability of main runners: 5 lb/lin ft).

Use intermediate duty for ceilings bearing moderate load of lights and air diffusers. This type commonly used for institutional projects.

Type ID/EG: Intermediate duty, direct hung, exposed grid. (Minimum load carrying capability of main runner: 12 lb/lin ft).

Type ID/CG: Intermediate duty, direct hung, concealed grid. (Minimum load carrying capability of main runners: 12 lb/lin ft).

Use heavy duty for heavy load of lights, air diffusers, etc.

Type HD/EG: Heavy duty, direct hung, exposed grid. (Minimum load carrying capability of main runners: 16 lb/lin ft).

Type HD/CG: Heavy duty, direct hung, concealed grid. (Minimum load carrying capability of main runners: 16 lb/lin ft).

* + - 1. ACOUSTICAL PANELS <**Insert drawing designation**>

Copy this article and re-edit for each product.

Insert drawing designation for each product required. Use the same designation for the acoustical panels in this article and for the related suspension system in "Metal Suspension System" Article; together, they make up the ceiling assembly. Use these designations on Drawings to identify each ceiling assembly.

Other surface types, compositions, and special purpose units (besides those specified) are available. Many are proprietary. If such units are required (high stc rated or glass fiber, for example) edit section and insert brand name(s) and description.

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=344) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Armstrong Ceiling & Wall Solutions](http://www.specagent.com/Lookup?uid=123457177788).

[CertainTeed Corporation; Saint-Gobain North America](http://www.specagent.com/Lookup?uid=123457020640).

[USG Corporation](http://www.specagent.com/Lookup?uid=123457020638).

Approved equivalent.

* + - * 1. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

Before retaining paragraphs below, verify availability with manufacturers. Do not assume that every combination of fire-resistance rating, classification, pattern, color, light reflectance, acoustical rating, edge detail, thickness, and size listed under each product description is available.

Retain option in "Classification" paragraph below along with permitted fire-resistance-rated suspension system if fire-rated assembly is required for Project. Indicate rating, testing agency, and testing agency's design designation on Drawings. Consider deleting paragraph if a basis-of-design product is indicated.

* + - * 1. Classification: Provide[**fire-resistance-rated**] panels as follows:

Retain one of six "Type and Form" subparagraphs below. Classifications are examples of commonly specified products and are not all-inclusive. First three examples are mineral-based panels.

Select mineral base acoustical unit(s) below to meet project or design requirements. (Type III) and (Form 2) are common type panel products available from the industry. Painted finish (Type III) is the only finish available for tiles. Many patterns with painted finish also available with scrubbable finish. See manufacturer’s literature.

Type and Form: Type III, mineral base with painted finish; [**Form 1, nodular**] [**Form 2, water felted**] [**Form 4, cast or molded**].

Type and Form: Type IV, mineral base with membrane-faced overlay; Form 1, nodular; with [**glass-fiber cloth**] [**washable vinyl-film**] overlay.

Mineral base with membrane-faced overlay is suited for areas where abuse to ceiling surfaces is a possibility. Also stain resistant. Examples are Armstrong’s “Armashield” and USG interior’s “Clean Room”.

Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted; with [**vinyl overlay on face**] [**vinyl overlay on face and back**] [**vinyl overlay on face, back, and sealed edges**] [**fiberglass-fabric overlay on face**].

First "Type and Form" subparagraph below is an example of a glass-fiber-based panel.

Type and Form: Type XII, glass-fiber base with membrane-faced overlay; [**Form 1, plastic**] [**Form 2, cloth**] [**Form 3, other**]. Binder shall not contain urea formaldehyde.

First "Type and Form" subparagraph below is an example of a panel with scrubbable finish.

Mineral base acoustical unit (type x) below is highly resistant to dirt, grease, and other severe conditions. Recommended for use in clean rooms, kitchens, corridors, etc. Examples are Armstrong’s “Fire Guard ML” and USG interior’s “Auratone metal face”.

Type and Form: Type XX, high-density, ceramic- and mineral-base panels with scrubbable finish, resistant to heat, moisture, and corrosive fumes.

Type and Form: <**Insert type and form**>.

Retain or insert one or more pattern designations in "Pattern" subparagraph below; use more than one for combination patterns. For panels with a "K" (surface scored) in their designation, insert a detailed description or indicate on Drawings the type of scoring required. For panels with a "Z" in their designation, insert both the designation and a detailed description.

Pattern: [**C (perforated, small holes)**] [**CD (perforated, small holes and fissured)**] [**CE (perforated, small holes and lightly textured)**] [**D (fissured)**] [**E (lightly textured)**] [**F (heavily textured)**] [**G (smooth)**] [**GH (smooth and printed)**] [**I (embossed)**] [**J (embossed-in-register)**] [**K (surface scored)**] [**Z (other patterns as described)**] [**and**] [**as indicated by manufacturer's designation**].

* + - * 1. Color: [**White**] [**As selected from manufacturer's full range**] [**Match Director’s Representative's sample**] [**As indicated by manufacturer's designation**] [**As indicated on Drawings**] [**As indicated in a schedule**].

LR below applies to most tile and panel finishes. Lower values listed by manufacturers for special surface finish or texture. Check manufacturer’s literature.

* + - * 1. Light Reflectance (LR): Not less than0.75 or greater.

NRC and CAC ranges are minimum requirements. Upgrade, if required, to match the specific materials desired.

* + - * 1. Ceiling Attenuation Class (CAC): Not less than 30-34.

Retain "Noise Reduction Coefficient (NRC)" or "Articulation Class (AC)" paragraph below if required. Consider revising first paragraph to specify a range of values, above and below the target performance value, to suit Project's acoustical design. Retain second paragraph only for ceilings designed for open-plan offices. See the Evaluations.

* + - * 1. Noise Reduction Coefficient (NRC): Not less than 0.50-0.75.

In "Edge/Joint Detail" paragraph below, insert a manufacturer's special or proprietary edge detail if required. Select edge type to suit project.

* + - * 1. Edge/Joint Detail: [**Square**] [**Reveal sized to fit flange of exposed suspension-system members**] [**Flush reveal sized to fit flange of exposed suspension-system members**] [**Beveled, kerfed, and rabbeted long edges and square, butt-on short edges**] [**As indicated by manufacturer's designation**].

Retain "Thickness" paragraph below for glass-fiber-based panels. Select thickness below to suit project.

* + - * 1. Thickness: [**1/8 inch**] [**7/16 inch**] [**9/16 inch**] [**5/8 inch**] [**3/4 inch**] [**7/8 inch**] [**1 inch**] [**1-1/2 inches**] [**2 inches**] [**3 inches**] [**As indicated on Drawings**] [**As indicated in a schedule**].

Select size below to suit project.

* + - * 1. Modular Size: [**24 by 24 inches**] [**24 by 48 inches**] [**24 by 72 inches**] [**24 by 96 inches**] [**48 by 48 inches**] [**As indicated on Drawings**] [**As indicated in a schedule**].
				2. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.
			1. METAL SUSPENSION SYSTEM <**Insert drawing designation**>

Copy this article and re-edit for each product.

Insert drawing designation for each product required. Use the same designation for the suspension system in this article and for the related acoustical panels in "Acoustical Panels" Article; together, they make up the ceiling assembly. Use these designations on Drawings to identify each ceiling assembly.

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=345) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Armstrong Ceiling & Wall Solutions](http://www.specagent.com/Lookup?uid=123457177789).

[CertainTeed Corporation; Saint-Gobain North America](http://www.specagent.com/Lookup?uid=123457020648).

[USG Corporation](http://www.specagent.com/Lookup?uid=123457020647).

Approved equivalent.

Revise "Metal Suspension-System Standard" paragraph below if indirect-hung system is required. For an indirect-hung system, also insert specification requirements and prepare Drawing details for the carrying channels, their support, and the clips that attach the main runners to the carrying channels, unless these items have been delegated to Contractor. Carrying channels may be inserted in this Section or in Section 055000 "Metal Fabrications."

* + - * 1. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635 and designated by type, structural classification, and finish indicated.

Retain "High-Humidity Finish" subparagraph below if required. Indicate on Drawings where high-humidity finish is required.

High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C635.

Retain one of nine suspension-system paragraphs below. paragraphs are examples of suspension systems for acoustical panel ceilings; revise to suit Project.

Before retaining options in remaining subparagraphs, verify availability with manufacturers. Coordinate edge and joint details of acoustical panels with main- and cross-runner configurations of suspension systems under consideration, to ensure compatibility between panels and system members.

Retain option in "Wide-Face, Capped, Double-Web,( Fire-Rated,) Steel Suspension System" paragraph below along with permitted fire-resistance-rated acoustical panel if fire-rated assembly is required; revise to suit Project.

* + - * 1. Wide-Face, Capped, Double-Web,[**Fire-Rated,**] Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges.

Structural Classification: As indicated in PERFORMANCE article above.

End Condition of Cross Runners: [**Override (stepped)**] [**or**] [**butt-edge**] type.

Face Design: Flat, flush.

Cap Material: [**Cold-rolled steel**] [**or**] [**aluminum**].

Coordinate finish in "Cap Finish" subparagraph below with cap material selected.

Cap Finish: [**Painted white**] [**Painted in color as selected from manufacturer's full range**] [**Painted to match color indicated by manufacturer's designation**] [**Painted to match color of acoustical unit**] [**Plated with metallic finish as selected from manufacturer's full range**] [**Plated with metallic finish indicated by manufacturer's designation**] [**Natural finish for aluminum**].

* + - * 1. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 9/16-inch- wide metal caps on flanges.

Structural Classification: As indicated in PERFORMANCE article above..

End Condition of Cross Runners: [**Override (stepped)**] [**or**] [**butt-edge**] type.

Face Design: [**Flat, flush**] [**Flanges formed with an integral center reveal**].

Cap Material: [**Cold-rolled steel**] [**or**] [**aluminum**].

Coordinate finish in "Cap Finish" subparagraph below with cap material selected.

Cap Finish: [**Painted white**] [**Painted in color as selected from manufacturer's full range**] [**Painted to match color indicated by manufacturer's designation**] [**Painted to match color of acoustical unit**] [**Plated with metallic finish as selected from manufacturer's full range**] [**Plated with metallic finish indicated by manufacturer's designation**] [**Natural finish for aluminum**].

Retain "Narrow-Face, Steel-Capped, Double-Web, Fire-Rated Steel Suspension System" paragraph below along with permitted fire-resistance-rated acoustical panel if fire-rated assembly is required for Project.

* + - * 1. Narrow-Face, Steel-Capped, Double-Web, Fire-Rated Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished, cold-rolled, 9/16-inch- wide metal caps on flanges.

Structural Classification: Intermediate-duty system.

Face Design: Flat, flush.

Cap Finish: [**Painted white**] [**Painted in color as selected from manufacturer's full range**] [**Painted to match color indicated by manufacturer's designation**] [**Painted to match color of acoustical unit**] [**Plated with metallic finish as selected from manufacturer's full range**] [**Plated with metallic finish indicated by manufacturer's designation**].

* + - * 1. Narrow-Face, Uncapped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; to produce structural members with 9/16-inch- wide faces.

Structural Classification: As indicated in PERFORMANCE article above..

Face Design: [**With 1/8-inch- wide, slotted, box-shaped flange**] [**With 1/4-inch- wide, slotted, box-shaped flange**] [**Flanges formed in stepped design with a center protrusion projecting 19/64 inch below flange surfaces supporting panel faces and forming 3/16-inch- wide reveals between edges of protrusion and those of panels**].

Face Finish: Painted [**white**] [**in color as selected from manufacturer's full range**] [**to match color indicated by manufacturer's designation**] [**to match color of acoustical unit**].

Reveal Finish: Painted [**to match flange color**] [**white**] [**black**] [**in color other than flange color as selected from manufacturer's full range of contrasting reveal colors**].

* + - * 1. Wide-Face, Aluminum-Capped, Double-Web,[**Fire-Rated,**] Hot-Dip Galvanized, G60, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; hot-dip galvanized, G60 coating designation; with prefinished, 15/16-inch- wide aluminum caps on flanges.

Structural Classification: As indicated in PERFORMANCE article above.-duty system.

Face Design: Flat, flush.

Cap Finish: [**Painted white**] [**Painted to match color indicated by manufacturer's designation**] [**Painted to match color of acoustical unit**] [**Natural finish**].

* + - * 1. Wide-Face, Single-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet electrolytically zinc coated, with prefinished flanges of width indicated.

Structural Classification: Heavy-duty system.

Face Finish: Painted [**white**] [**black**].

* + - * 1. Wide-Face, Capped, Double-Web, Stainless-Steel Suspension System: Main and cross runners roll formed from Type 304 or 316 stainless-steel sheet, with prefinished 15/16-inch- wide, stainless-steel caps on flanges.

Structural Classification: Intermediate-duty system.

Face Design: Flat, flush.

* + - * 1. Narrow-Face, Single-Web, Extruded-Aluminum Suspension System: Main and cross runners formed from extruded aluminum to produce structural members with 9/16-inch- wide faces.

Structural Classification: As indicated in PERFORMANCE article above.-duty system.

Face Design: Screw-slot profile.

Face Finish: [**Painted white**] [**Satin anodized according to AAMA 611, AA-M12C22A31**].

Reveal Finish: [**Match face finish**] [**Painted white**] [**Painted black**].

* + - * 1. Extra-Wide-Face, [**Double**] [**Single**]-Web, Metal Suspension System: Main and cross runners formed from [**extruded aluminum**] [**aluminum-capped steel**] [**steel-capped steel**] to produce structural members with [**1-1/2-inch-**] [**2-inch-**] wide flanges.

Structural Classification: As indicated in PERFORMANCE article above.-duty system.

Face Design: Flat, flush.

Face Finish: [**Painted white**] [**Satin anodized according to AAMA 611, AA-M12C22A31**].

Gasket System: Clean-room type.

* + - 1. ACCESSORIES
				1. Attachment Devices: Size for five times the design load indicated in ASTM C635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

"Anchors in Concrete" subparagraph below does not apply to power-actuated fasteners. Retain if anchorage to concrete is required and if power-actuated fasteners are unacceptable. Verify safety factor with Project's structural engineer. Revise testing methods below if required by authorities having jurisdiction.

Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E488 or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency.

Retain one option in "Type" subparagraph below; verify suitability with Project's structural engineer.

Type: [**Cast-in-place**] [**Postinstalled expansion**] [**Postinstalled bonded**] anchors.

Retain one of three "Corrosion Protection" subparagraphs below or, if more than one is required, indicate locations for each type on Drawings. Zinc plating of mild class indicated protects against corrosion from an indoor atmosphere with rare condensation and subject to minimum wear or abrasion; revise thickness to suit more corrosive conditions or use stainless steel or nickel-copper alloy, depending on site conditions. See the Evaluations for discussion of humidity considerations in corrosive environments. If postinstalled expansion anchors are used to attach nickel-copper-alloy wire hangers and braces, consider retaining nickel-copper anchors after verifying availability with manufacturers.

Corrosion Protection: Carbon-steel components zinc plated according to ASTM B633, Class SC 1 (mild) service condition.

Corrosion Protection: Stainless-steel components complying with ASTM F593 and ASTM F594, Group 1 Alloy 304 or 316.

Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B164 for UNS No. N04400 alloy.

Retain "Power-Actuated Fasteners in Concrete" subparagraph below if power-actuated fasteners are allowed. Verify suitability and safety factor with Project's structural engineer.

Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E1190, conducted by a qualified testing and inspecting agency.

* + - * 1. Hanger Clips: Galvanized steel clips or clamps specifically designed for attachment to structural steel. Drive-on clips or clamps which depend on friction to hold the device are not acceptable.
				2. Welded Studs: Low carbon steel copper flashed studs, 1/4 - 20 UNC, automatic short-cycle welded to a transformer-rectifier power source. When surface on which studs are to receive fireproofing, furnish studs of length to extend one inch below fireproofing.
				3. Wire Hangers, Braces, and Ties: Provide wires as follows:

Retain "Zinc-Coated, Carbon-Steel Wire," "Stainless-Steel Wire," or "Nickel-Copper-Alloy Wire" subparagraph below. If more than one type of wire is required, indicate locations for each type on Drawings. See the Evaluations for discussion of humidity considerations in corrosive environments. Revise hangers to strap type if required by authorities having jurisdiction.

Zinc-Coated, Carbon-Steel Wire: ASTM A641, Class 1 zinc coating, soft temper.

Stainless-Steel Wire: ASTM A580, Type 304, nonmagnetic.

Nickel-Copper-Alloy Wire: ASTM B164, nickel-copper-alloy UNS No. N04400.

Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch (12 ga) - diameter wire.

If retaining "Hanger Rods" or "Flat Hangers" paragraph below, insert sizes or indicate on Drawings.

* + - * 1. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
				2. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
				3. Hanger Tees: Galvanized steel, 16 gage T-hangers for attachment to precast concrete decks.

If retaining "Angle Hangers" paragraph below, insert sizes or indicate on Drawings.

* + - * 1. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized-steel sheet complying with ASTM A653, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

Retain "Hold-Down Clips" paragraph below if required. Fire-resistance-rated panels generally weigh more than 1 lb/sq. ft., and hold-down clips are not required to comply with UL design requirements. Verify weight of panels selected for UL fire-resistant designs, and revise below to require hold-down clips for fire-resistance-rated ceilings with panels weighing less than 1 lb/sq. ft.

* + - * 1. Hold-Down Clips: Manufacturer's standard hold-down.

Retain "Impact Clips" paragraph below if required.

* + - * 1. Impact Clips: Manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.

Retain "Seismic Clips" paragraph below if required. Coordinate with manufacturer's requirements and authorities having jurisdiction.

* + - * 1. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.

Retain "Seismic Stabilizer Bars" paragraph below if required. Revise if stabilizer bars are needed to improve stability of the suspension system and unit alignment in nonseismic installations.

* + - * 1. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

Retain "Seismic Struts" paragraph below if required. Coordinate with manufacturer's requirements and authorities having jurisdiction.

* + - * 1. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

Retain "Clean-Room Gasket System" paragraph below if required. Verify, with manufacturers, product availability and compatibility of gasket type with panels and suspension system specified. Indicate location on Drawings or by inserts.

* + - * 1. Clean-Room Gasket System: Where indicated, provide manufacturer's standard system, including [**manufacturer's standard**] [**closed-cell PVC**] [**neoprene**] [**antimicrobial**] gasket and related adhesives, tapes, seals, and retention clips, designed to seal out foreign material from and maintain positive pressure in clean room.
				2. Miscellaneous Fasteners: Bolts, screws, and other fasteners recommended by suspension system manufacturer and necessary to install the Work.
			1. METAL EDGE MOLDINGS AND TRIM <**Insert drawing designation**>

Copy this article and re-edit for each product.

Insert drawing designation. Use these designations on Drawings to identify each product.

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=346) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Armstrong World Industries, Inc](http://www.specagent.com/Lookup?uid=123457020653).

[CertainTeed Corporation; Saint-Gobain North America](http://www.specagent.com/Lookup?uid=123457020654).

[USG Corporation](http://www.specagent.com/Lookup?uid=123457020652).

Approved equivalent.

Retain "Roll-Formed, Sheet-Metal Edge Moldings and Trim" or "Extruded-Aluminum Edge Moldings and Trim" paragraph below; revise to suit Project and insert additional types of trim if required.

* + - * 1. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

Revise subparagraphs below to suit Project and products retained; indicate profiles on Drawings.

Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.

For lay-in panels with reveal edge details, provide [**stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member**].

Delete subparagraph below for seismic designs.

For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

* + - * 1. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.

Retain "Clear Anodic Finish" or "Baked-Enamel or Powder-Coat Finish" subparagraph below; revise to suit Project Indicate profiles on Drawings.

Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils. Comply with ASTM C635 and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

* + - 1. ACOUSTICAL SEALANT
				1. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.

Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.

Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant.

1. EXECUTION
	* + 1. EXAMINATION
				1. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
				2. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
				3. Proceed with installation only after unsatisfactory conditions have been corrected.
			2. PREPARATION
				1. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
				2. Layout openings for penetrations centered on the penetrating items.
			3. INSTALLATION OF SUSPENSION GRID
				1. Install acoustical panel ceilings according to ASTM C636[**, seismic design requirements,**] in accordance with manufacturer's written instructions, and CISCA “Ceiling System Handbook”.

Retain "Fire-Rated Assembly" subparagraph below if applicable.

Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

* + - * 1. Lay-out grid system as indicated, or if not indicated, lay out to a balanced design with edge units no less than 50 percent of acoustical unit size.
				2. Suspend ceiling hangers from building's structural members and as follows:

Unless otherwise shown, secure the hangers to the construction as follows:

Attachment to Existing Cast-in-Place Concrete: Attach hangers to clip angles, fastened to the concrete with expansion bolts or drive pins.

Attachment to Structural Steel Framing: Clinch hanger around top of flange of steel member approximately 135 degrees. If framing member supports roof planks or precast slabs, bolt hanger to center of web or weld to bottom flange. Where applicable, hanger wires may be directly double wound around steel members with wires twisted together.

Attachment to Steel Joists: Secure hanger with special clip or clamp designed for such use. Where applicable, hanger wires may be directly double wound around steel members with wires twisted together.

Attachment to Precast Tees, Slabs, and Planks: Insert “T” hangers through joints between the units. Where concrete fill is required, lay out and install hangers prior to placing fill.

Attachment to Steel Decks: Secure hangers with welded studs. Locate studs as close to the deck supports as possible. Install studs in accordance with manufacturer’s printed instructions. After installation, clean stud welds and repair the affected areas of deck and studs with cold galvanizing compound. Attach hangers to studs with double nuts.

Attachment to Wood Framing (Except Trusses): Secure hangers with threaded fasteners.

Attachment to Wood Trusses: Double wind hanger wire around bottom chord member and twist wire together securely.

Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.

Retain option in first subparagraph below only for fire-rated assembly.

Splay hangers only where required[**and, if permitted with fire-resistance-rated ceilings,**] to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.

Retain first subparagraph below if applicable and indicate hanger locations on Drawings or by inserts.

Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

Retain first subparagraph below if applicable and indicate hanger locations on Drawings or by inserts.

Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.

Retain one or more of six subparagraphs below that refer to applicable construction types.

Revise first subparagraph if power-actuated fasteners are not allowed. Also, revise if attaching to permanent metal forms or the floor deck is permitted by the structural engineer and authorities having jurisdiction.

Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.

When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.

Do not attach hangers to steel deck tabs.

Do not hang grid system from walls, columns, ducts, pipes, and conduit.

Retain first subparagraph below unless attaching to the roof deck is permitted by the structural engineer and authorities having jurisdiction. Revise if structural members are spaced too far apart for hangers and another method is required. For alternatives that may need to be indicated on Drawings, consult Project's structural engineer.

Do not attach hangers to steel roof deck. Attach hangers to structural members.

Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.

Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

Retain first paragraph below if required. It is based on requirements issued by the Division of the State Architect in California, for ceilings in hospitals and schools. ASTM C636 requires three full turns within a 3-inch length. Revise or delete if not required.

* + - * 1. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
				2. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

Retain subparagraphs below to eliminate air movement and light and sound leaks at edges of ceiling.

Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.

Revise or delete subparagraph below if exposed fasteners are allowed.

Do not use exposed fasteners, including pop rivets, on moldings and trim.

* + - * 1. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
			1. INSTALLATION OF ACOUSTICAL UNITS
				1. Install acoustical units in accordance with the manufacturer’s printed instructions, unless otherwise shown or specified.

Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

Scribe and cut acoustical units to fit accurately at borders and at penetrations.

* + - * 1. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.

Retain first subparagraph below if directionally patterned panels are specified.

Arrange directionally patterned acoustical panels as follows:

Retain one of first three subparagraphs below.

As indicated on reflected ceiling plans.

Install panels with pattern running in one direction parallel to [**long**] [**short**] axis of space.

Install panels in a basket-weave pattern.

Retain one or more of seven subparagraphs below that coordinate with panel edge details and suspension-system types required.

For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.

For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.

For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.

Retain first subparagraph below unless all edges are concealed by suspension-system flanges.

Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

Retain first subparagraph below if required; revise to suit Project. Coordinate with manufacturer's requirements and authorities having jurisdiction.

Install [**hold-down**] [**impact**] [**and**] [**seismic**] clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.

Hold-Down Clips: Space [**24 inches**] o.c. on all cross runners.

Retain first subparagraph below for clean-room installations.

Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.

Retain subparagraph below for fire-resistance-rated assemblies.

Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

Insert requirements for semiexposed system (splined joints, and so forth) if any.

* + - 1. ERECTION TOLERANCES

Retain this article for installation tolerances more restrictive than required by ASTM C636, which requires 1/4 inch in 10 feet for the main runners only. Consult manufacturers before inserting tighter tolerances.

* + - * 1. Form right angles at intersections of main and cross runners.
				2. Suspended Ceilings: Install main and cross runners level to a tolerance of [**1/8 inch in 12 feet**], non-cumulative.
				3. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of [**1/8 inch in 12 feet**], non-cumulative.
				4. Align vertical distance of exposed surfaces between intersecting runners to within 0.015 inch.
				5. Limit horizontal gaps in exposed surfaces of intersecting or abutting members to within 0.020 inch.
			1. FIELD QUALITY CONTROL

Retain this article if applicable. ASCE/SEI 7 requires special inspections for suspended ceiling systems in seismic design Categories D, E, and F; verify requirements of authorities having jurisdiction.

Retain first option in "Special Inspections" paragraph below if Director’s Representative engages special inspector. Consider retaining second option if authorities having jurisdiction allow Contractor to engage special inspector. If retaining second option, retain "Field quality-control reports" paragraph in "Informational Submittals" Article.

* + - * 1. Special Inspections: Director’s Representative will engage a qualified special inspector to perform the following special inspections:

Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.

Retain the remaining four paragraphs only when fastening to concrete decks.

Retain "Testing Agency" paragraph below, with or without "Special Inspections" paragraph above, to identify who shall perform tests and inspections. If retaining second option in "Testing Agency" paragraph, retain "Field quality-control reports" paragraph in "Informational Submittals" Article.

* + - * 1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

Retain "Perform the following tests and inspections" paragraph below to require Contractor to perform tests and inspections. Testing requirements are examples only and apply only to ceilings with hangers attached to concrete by power-actuated fasteners and postinstalled anchors. Consult Project's structural engineer and revise requirements to suit Project.

* + - * 1. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.

Verify loadings in two subparagraphs below with Project's structural engineer based on ceiling loadings and Project's seismic zone where Project is located.

Within each test area, testing agency will select one of every 10 power-actuated fasteners and post-installed anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.

When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

* + - * 1. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
				2. Prepare test and inspection reports.

Insert other field quality-control procedures required for Project.

* + - 1. CLEANING
				1. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
				2. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113