SECTION 095133 - ACOUSTICAL METAL PAN CEILINGS

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 metal pans and associated suspension system for interior ceilings.

* + - * 1. Related Requirements:

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

Section 095113 "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.

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

Section 095423 "Linear Metal Ceilings."

Section 095436 "Suspended Decorative Grids."

Section 095753 "Security Ceiling Assemblies" for downward-locking panel and plank ceilings for use in security or detention facilities.

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. 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. Include procedure for cutting metal pans.
				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 units with factory-applied finishes.
				3. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below:

Delete first option in "Metal Pans" subparagraph below if size of pans makes requirement impractical.

Metal Pans: Set of 6-inch- square Samples of each type, finish, color, pattern, and texture. Show pan edge profile.

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

Sound Absorber: Sample of each type matching size of Sample metal pan.

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

* + - * 1. Delegated-Design Submittal: For design of [**seismic restraints and**]attachment devices.

Retain "Coordination Drawings" paragraph below for situations where limited space necessitates maximum utilization for efficient 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:

Suspended ceiling components.

Structural members to which suspension systems will be attached.

Size and location of access modules for acoustical panels.

Items penetrating finished ceiling including the following:

Lighting fixtures.

Air outlets and inlets.

Speakers.

Sprinklers.

Access panels.

Perimeter moldings.

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

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 that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

Revise "Acoustical Metal Pans( with Sound Absorber)," "Suspension-System Components," and "Hold-Down Clips" subparagraphs below to suit Project. If preferred, replace percentage option in each subparagraph with a specific number of metal pans and pieces of each suspension component and their lengths.

Acoustical Metal Pans[**with Sound Absorber**]: Full-size units equal to 2 percent of quantity installed.

Suspension-System Components: Quantity of each grid, exposed molding, and trim equal to 2 percent of quantity installed.

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

* + - 1. QUALITY ASSURANCE

Retain "Testing Agency Qualifications" paragraph below if Contractor selects testing agency or if Contractor is required to provide services of a qualified testing agency in "Field Quality Control" Article.

* + - * 1. Testing Agency Qualifications: Qualified according to National Voluntary Laboratory Accreditation Program (NVLAP) for testing indicated.
				2. 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.

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

* + - 1. DELIVERY, STORAGE, AND HANDLING
				1. Deliver acoustical metal pans, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they are protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
				2. Handle acoustical metal pans, suspension-system components, and accessories carefully to avoid damaging units and finishes in any way.
			2. PROJECT CONDITIONS

Retain this article for interior installations in conditioned spaces; delete if only exterior installations are specified. Revise to suit Project.

* + - * 1. Environmental Limitations: Do not install interior ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
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. 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 and**]attachment devices.
				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 systems have a flame-spread index not exceeding 25 and a smoke-developed index not exceeding 50; Class B systems have a flame-spread index not exceeding 75 on face side; Class C systems have a flame-spread index not exceeding 200 on face side. Most products available in the United States are Class A.

Flame-Spread Index: Comply with ASTM E1264 for [**Class A**] [**Class B**] [**Class C**] materials.

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

Unlike mineral composition units, acoustical metal pan units and ceilings are not tested according to ASTM E119, are not listed in UL's "Fire Resistance Directory," and do not carry UL classification marking.

Retain one option in "Seismic Criteria" paragraph below or revise to suit Project. Verify requirements of authorities having jurisdiction.

* + - * 1. Seismic Criteria: Provide linear metal ceilings designed and installed to withstand the effects of earthquake motions in accordance with ASCE/SEI 7 and requirements of authorities having jurisdiction.
			1. ACOUSTICAL METAL PANS, GENERAL

Retain "Source Limitations" paragraph below if warranty requirements favor single-source ceiling systems or if ceiling units fit only same manufacturer's suspension system.

* + - * 1. Source Limitations: Obtain each type of acoustical metal ceiling pan and supporting suspension system from single source from single manufacturer.
				2. Acoustical Panel Standard: Provide manufacturer's standard pans of configuration indicated that comply with ASTM E1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.

"Mounting Method for Measuring NRC" subparagraph below represents standard mounting referenced in ASTM E1264. Revise if testing units with another mounting method is required for Project.

Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E795.

* + - * 1. Sheet Metal Characteristics: For metal components exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, roughness, stains, or discolorations.

Retain one or more of "Aluminum Sheet," "Steel Sheet," and "Stainless Steel Sheet" subparagraphs below for applicable sheet metal material(s).

Aluminum Sheet: Rolled aluminum sheet, complying with ASTM B209; alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

Steel Sheet: Commercial-quality, cold-rolled, carbon-steel sheet; stretcher leveled; with protective coating complying with ASTM C635.

Retain or revise "Painted Finishes" subparagraph below for painted finishes. Verify, with manufacturers, availability of protective coatings and finishes.

Painted Finishes: Electrolytic zinc-coated steel complying with ASTM A879, 13Z coating, surface treatment as recommended by finish manufacturer for type of use and finish indicated.

Retain or revise "Chemical/Mechanical Finishes" subparagraph below for chemical/mechanical finishes. Verify, with manufacturers, availability of finishes.

Chemical/Mechanical Finishes: Uncoated steel sheet complying with ASTM A1008 with luster or bright finish as required by finisher for applying electroplating or other metallic-finishing processes.

Stainless steel is available from most manufacturers as a custom, rather than a standard, product. Some manufacturers offer only Type 430, which is a general-purpose ferritic stainless steel with less corrosion resistance than the 300-Series austenitic alloys. See the Evaluations.

Stainless Steel Sheet: Complying with ASTM A240 or ASTM A666, [**Type 304**] [**Type 430**].

Retain "Sound-Absorbent Fabric Layer" paragraph below for sound-absorbent fabric. Verify availability of sound-absorbent fabric with manufacturer and coordinate with acoustical performance requirements if any.

* + - * 1. Sound-Absorbent Fabric Layer: Provide fabric layer, sized to fit concealed surface of pan, and consisting of black, nonwoven, nonflammable, sound-absorbent material with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing according to ASTM E84.

Bond fabric layer to panels in the factory with manufacturer's standard nonflammable adhesive.

Retain "Sound-Absorbent Pads" paragraph below for sound-absorbent pads that can reduce noise within a closed space. Verify availability, material, thickness, density, and color of wrap and pad with manufacturer and coordinate with acoustical performance requirements if any.

* + - * 1. Sound-Absorbent Pads: Provide width and length to completely fill concealed surface of pan, with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing according to ASTM E84, and to comply with the following requirements:

Plastic Sheet-Wrapped, Mineral-Fiber Insulation: Pads consisting of nonrigid, PVC plastic sheet encapsulating unfaced mineral-fiber insulation complying with ASTM C553, Type I, Type II, or Type III, and as follows:

Revise "Mineral-Fiber Type and Thickness" subparagraph below if mineral-wool fiber rather than glass fiber is required.

Mineral-Fiber Type and Thickness: Glass fiber; [**1 inch**] [**1-1/2 inches**] [**3 inches**].

Coordinate thickness and density retained in "Mineral-Fiber Density" subparagraph below with acoustical performance requirements if any. Options below correspond with Types I, II, and III, respectively.

Mineral-Fiber Density: [**3/4 lb/cu. ft.**] [**1 lb/cu. ft.**] [**1-1/2 lb/cu. ft.**].

Revise "Plastic Sheet Thickness and Color" subparagraph below if applicable. In a standard-height ceiling, clear or white plastic sheet is usually recommended for pans with perforations of 1/8 inch (3 mm) or less in diameter; black plastic sheet is usually recommended for pans with perforations exceeding 1/8 inch in diameter. Verify pattern selected with pan manufacturer.

Plastic Sheet Thickness and Color: Not less than 0.003 inch; [**clear**] [**flat black**] [**white**].

Verify, with manufacturer, availability of unwrapped pad material and verify suitability for indoor air and environmental quality of Project.

Unwrapped, Glass-Fiber Insulation: Black coated, unfaced, complying with ASTM C553, Type I, Type II, or Type III; treated to be nondusting; [**1 inch**] [**1-1/2 inches**] thick.

Spacer Grids: Provide manufacturer's standard [**aluminum**] [**galvanized-steel**] grid units that provide an air cushion between metal pans and insulation pads and that act to improve sound absorption.

Retain "Sound Attenuation Panels" paragraph below for improved acoustical privacy, such as where partitions are not extended to structure above.

* + - * 1. Sound Attenuation Panels: Provide manufacturer's standard [**aluminum**] [**galvanized-steel**] unperforated metal backing unit that acts as a sound attenuation pan to reduce sound travel through ceiling plenum into adjoining rooms.

Retain or revise "Sound-Absorbent Pads" subparagraph below if secondary pad is different from primary pad; delete if not needed for Project.

Sound-Absorbent Pads: Provide secondary sound-absorbent pads, [**same as specified for primary sound-absorbent pads**], for placement over sound attenuation pan to reduce plenum sound.

* + - * 1. Adhesive: Manufacturer's standard nonflammable adhesive for sound-absorbent [**fabric**] [**and**] [**pads**].
			1. ALUMINUM PANS FOR ACOUSTICAL METAL PAN CEILING <**Insert drawing designation**>

If applicable, copy this article and re-edit for each product.

Insert drawing designation. Use same designation for both acoustical pans in this article and the suspension system that together make up the ceiling. Use these designations on Drawings to identify each product.

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=354) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[American Decorative Ceilings (ADC)](http://www.specagent.com/Lookup?uid=123457138963).

[Armstrong World Industries, Inc](http://www.specagent.com/Lookup?uid=123457138964).

[Steel Ceilings Inc](http://www.specagent.com/Lookup?uid=123457138970).

[USG Corporation](http://www.specagent.com/Lookup?uid=123457138971).

Approved equivalent.

* + - * 1. Classification: Units complying with ASTM E1264 for [**Type VII, perforated aluminum facing (pan) with mineral- or glass-fiber-base backing**] [**Type XX, other types described as perforated aluminum facing (pan) units with sound-absorbent fabric backing**] [**Type XX, other types described as unperforated aluminum facing (pan) units**].

Retain one of three "Pattern" subparagraphs below for perforated pans. Coordinate pattern with acoustical performance and sound-absorbent assembly specified.

Pattern: Pattern A (perforated, regularly spaced large holes), arranged in [**diagonal**] [**parallel**] alignment to pan edge with uniform perforations of dimension, holes per square foot or inch, and percent open area as [**indicated by product designation**] [**selected from manufacturer's full range**].

Pattern: Pattern C (perforated, small holes) regularly spaced, with uniform perforations of dimension, holes per square foot or inch, and percent open area as [**specified by product designation**] [**selected from manufacturer's full range**].

Pattern: <**Insert pattern designation for perforated pans and any requirements for perforation alignment, hole shape and size, holes per square foot or inch, percent open area, and border requirements**>.

* + - * 1. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.

Retain one of four pan-type subparagraphs below to suit Project, or insert description. Coordinate pans with suspension system for a complete acoustical metal pan ceiling.

Lay-in Pans: Formed to set in exposed suspension grid.

Clip-in Pans: Designed to clip in and be securely retained in exposed suspension grid by formed edges or accessory clips provided by manufacturer.

Snap-in Pans: Designed with dimples or continuous beads on flanges for snap-in, secure engagement with concealed suspension system.

Torsion-Spring-Hinged Pans: Designed to be securely retained in preslotted, exposed suspension grid by torsion springs provided by manufacturer.

* + - * 1. Pan Thickness: Not less than [**0.019 inch**] [**0.025 inch**] [**0.032 inch**] [**0.040 inch**].
				2. Pan Edge Detail: [**Square**] [**Beveled**] [**Reveal**] [**Manufacturer's standard edge detail**].

Retain "Pan Joint Detail" paragraph below if joint detail is not obvious for metal pan and suspension system selected.

* + - * 1. Pan Joint Detail: [**Butt**] [**Wide reveal, not less than 15/16 inch wide**] [**Narrow reveal, not greater than 9/16 inch wide**] [**Flush narrow reveal, not greater than 9/16 inch wide**].
				2. Pan Size: [**12 by 12 inches**] [**12 by 24 inches**] [**12 by 36 inches**] [**24 by 24 inches**] [**24 by 48 inches**] [**24 by 60 inches**] [**30 by 30 inches**] [**30 by 60 inches**] [**As indicated on Drawings**].

Retain "Scoring" paragraph below if applicable. Verify availability with manufacturers.

* + - * 1. Scoring: Score pans at intervals to appear as [**12-by-12-inch**] ceiling units.
				2. Pan Face Finish: [**Mill**] [**Lacquered mill**] [**Clear anodized**] [**Clear mirror anodized**] [**Painted white**] [**Painted to match color indicated by product designation**] [**Painted to match Director’s Representative's sample**] [**Painted in color selected from manufacturer's full range**] [**Bright-reflective metallic finish selected by Director’s Representative from manufacturer's full range**].

Retain "Light Reflectance Coefficient" paragraph below if applicable. Values are examples of units with baked white finish.

* + - * 1. Light Reflectance Coefficient: Not less than 0.70.

Retain "NRC" paragraph below if unperforated pans are not specified. Coordinate option retained with perforation pattern, sound absorber, and accessories selected.

* + - * 1. NRC: Not less than [**0.60**] [**0.65**] [**0.70**] [**0.75**] [**0.80**] [**0.85**] [**0.90**] [**0.95**].

Retain "Ceiling Attenuation Class" paragraph below if applicable for acoustical ceiling. Revise if STC is required. Coordinate option retained with perforation pattern, sound absorber, and accessories selected.

* + - * 1. Ceiling Attenuation Class: Not less than [**35**] [**40**] [**45**].
			1. STEEL PANS FOR ACOUSTICAL METAL PAN CEILING <**Insert drawing designation**>

If applicable, copy this article and re-edit for each product.

Insert drawing designation. Use same designation for both acoustical pans in this article and the suspension system that together make up the ceiling. Use these designations on Drawings to identify each product.

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=355) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[American Decorative Ceilings (ADC)](http://www.specagent.com/Lookup?uid=123457138973).

[Armstrong World Industries, Inc](http://www.specagent.com/Lookup?uid=123457138974).

[Steel Ceilings Inc](http://www.specagent.com/Lookup?uid=123457138978).

[USG Corporation](http://www.specagent.com/Lookup?uid=123457138979).

Approved equivalent.

* + - * 1. Classification: Units complying with ASTM E1264 for [**Type V, perforated steel facing (pan) with mineral- or glass-fiber-base backing**] [**Type XX, other types described as perforated steel facing (pan) units with sound-absorbent fabric backing**] [**Type XX, other types described as unperforated steel facing (pan) units**].

Retain one of three "Pattern" subparagraphs below for perforated pans. Coordinate pattern with acoustical performance and sound-absorbent assembly specified.

Pattern: Pattern A (perforated, regularly spaced large holes), arranged in [**diagonal**] [**parallel**] alignment to pan edge with uniform perforations of dimension, holes per square foot or inch, and percent open area as [**indicated by product designation**] [**selected from manufacturer's full range**].

Pattern: Pattern C (perforated, small holes) regularly spaced, with uniform perforations of dimension, holes per square foot or inch, and percent open area as [**specified by product designation**] [**selected from manufacturer's full range**].

Pattern: <**Insert pattern designation for perforated pans and any requirements for perforation alignment, hole shape and size, holes per square foot or inch, and percent open area**>.

* + - * 1. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.

Retain one of four pan-type subparagraphs below to suit Project, or insert description. Coordinate pans with suspension system for a complete acoustical metal pan ceiling.

Lay-in Pans: Formed to set in exposed suspension grid.

Clip-in Pans: Designed to clip in and be securely retained in exposed suspension grid by formed edges or accessory clips provided by manufacturer.

Snap-in Pans: Designed with dimples or continuous beads on flanges for snap-in, secure engagement with concealed suspension system.

Torsion-Spring-Hinged Pans: Designed to be securely retained in preslotted, exposed suspension grid by torsion springs provided by manufacturer.

* + - * 1. Pan Thickness: Not less than [**0.010 inch (32 ga)** ] [**0.019 inch (26 ga)** ] [**0.025 inch (24 ga)** ] [**0.030 inch (22 ga)** ] [**0.036 inch (20 ga)** ].
				2. Pan Edge Detail: [**Square**] [**Beveled**] [**Reveal**] [**Manufacturer's standard edge detail**].

Retain "Pan Joint Detail" paragraph below if joint detail is not obvious for metal pan and suspension system selected.

* + - * 1. Pan Joint Detail: [**Butt**] [**Wide reveal, not less than 15/16 inch wide**] [**Narrow reveal, not greater than 9/16 inch wide**] [**Flush narrow reveal, not greater than 9/16 inch wide**].
				2. Pan Size: [**12 by 12 inches**] [**12 by 24 inches**] [**12 by 36 inches**] [**24 by 24 inches**] [**24 by 48 inches**] [**24 by 60 inches**] [**30 by 30 inches**] [**30 by 60 inches**] [**As indicated on Drawings**].

Retain "Scoring" paragraph below if applicable. Verify availability with manufacturers.

* + - * 1. Scoring: Score pans at intervals to appear as [**12-by-12-inch**] ceiling units.
				2. Pan Face Finish: [**Painted white**] [**Painted to match color indicated by product designation**] [**Painted to match Director’s Representative's sample**] [**Painted in color selected from manufacturer's full range**] [**Plated with metallic finish, as selected from manufacturer's full range**] [**Bright-reflective metallic finish selected by Director’s Representative from manufacturer's full range**].

Retain "Light Reflectance Coefficient" paragraph below if applicable. Values are examples of units with baked white finish.

* + - * 1. Light Reflectance Coefficient: Not less than 0.70.

Retain "NRC" paragraph below if unperforated pans are not specified. Coordinate option retained with perforation pattern, sound absorber, and accessories selected.

* + - * 1. NRC: Not less than [**0.60**] [**0.65**] [**0.70**] [**0.75**] [**0.80**] [**0.85**] [**0.90**] [**0.95**].

Retain "Ceiling Attenuation Class" paragraph below if applicable for acoustical ceiling. Revise if STC is required. Coordinate option retained with perforation pattern, sound absorber, and accessories selected.

* + - * 1. Ceiling Attenuation Class: Not less than [**35**] [**40**] [**45**].
			1. STAINLESS STEEL PANS FOR ACOUSTICAL METAL PAN CEILING <**Insert drawing designation**>

If applicable, copy this article and re-edit for each product.

Insert drawing designation. Use same designation for both acoustical pans in this article and the suspension system that together make up the ceiling. Use these designations on Drawings to identify each product.

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=356) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Ceilings Plus](http://www.specagent.com/Lookup?uid=123457138987).

[Hunter Douglas Architectural Products, Inc](http://www.specagent.com/Lookup?uid=123457138984).

[Steel Ceilings Inc](http://www.specagent.com/Lookup?uid=123457138986).

Approved equivalent.

* + - * 1. Classification: Units complying with ASTM E1264 for [**Type VI, perforated stainless steel facing (pan) with mineral- or glass-fiber-base backing**] [**Type XX, other types described as perforated stainless steel facing (pan) units with sound-absorbent fabric backing**] [**Type XX, other types described as unperforated stainless steel facing (pan) units**].

Retain one of two "Pattern" subparagraphs below for perforated pans. Perforated pattern listed in first subparagraph is the only pattern offered by Steel Ceilings for a 0.019-inch-thick pan. Coordinate pattern with acoustical performance and sound-absorbent assembly specified.

Pattern: Pattern A (perforated, regularly spaced large holes), arranged in parallel alignment to pan edge with uniform perforations of 0.109-inch diameter, 1800 holes/sq. ft. or inch, and 11.8 percent open area.

Pattern: <**Insert pattern designation for perforated pans and any requirements for perforation alignment, hole shape and size, holes per square foot or inch, and percent open area**>.

* + - * 1. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.

Retain one of four pan-type subparagraphs below to suit Project, or insert description. Coordinate pans with suspension system for a complete acoustical metal pan ceiling.

Lay-in Pans: Formed to set in exposed suspension grid.

Clip-in Pans: Designed to clip in and be securely retained in exposed suspension grid by formed edges or accessory clips provided by manufacturer.

Snap-in Pans: Designed with dimples or continuous beads on flanges for snap-in, secure engagement with concealed suspension system.

Torsion-Spring-Hinged Pans: Designed to be securely retained in preslotted, exposed suspension grid by torsion springs provided by manufacturer.

* + - * 1. Pan Thickness: Not less than [**0.019 inch**] [**0.025 inch**] [**0.030 inch**].
				2. Pan Edge Detail: [**Square**] [**Beveled**] [**Reveal**] [**Manufacturer's standard edge detail**].

Retain "Pan Joint Detail" paragraph below if joint detail is not obvious for metal pan and suspension system selected.

* + - * 1. Pan Joint Detail: [**Butt**] [**Wide reveal, not less than 15/16 inch wide**] [**Narrow reveal, not greater than 9/16 inch wide**] [**Flush narrow reveal, not greater than 9/16 inch wide**].
				2. Pan Size: [**12 by 12 inches**] [**12 by 24 inches**] [**12 by 36 inches**] [**24 by 24 inches**] [**24 by 48 inches**] [**30 by 30 inches**] [**As indicated on Drawings**].

Retain "Scoring" paragraph below if applicable. Verify availability with manufacturers.

* + - * 1. Scoring: Score pans at intervals to appear as [**12-by-12-inch**] ceiling units.
				2. Pan Face Finish: [**Directional Satin Finish: ASTM A480 No. 4**] [**Dull Satin Finish: ASTM A480 No. 6**] [**Mirrorlike Reflective, Nondirectional Polish: ASTM A480 No. 8**].

Retain "NRC" paragraph below if unperforated pans are not specified. Coordinate option retained with perforation pattern, sound absorber, and accessories selected.

* + - * 1. NRC: Not less than [**0.60**] [**0.65**] [**0.70**] [**0.75**] [**0.80**] [**0.85**] [**0.90**] [**0.95**].

Retain "Ceiling Attenuation Class" paragraph below if applicable for acoustical ceiling. Revise if STC is required. Coordinate option retained with perforation pattern, sound absorber, and accessories selected.

* + - * 1. Ceiling Attenuation Class: Not less than [**35**] [**40**] [**45**].
			1. METAL SUSPENSION SYSTEMS, GENERAL
				1. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C635 requirements.

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. Suspension Systems: Provide systems complete with carriers, runners, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, and other suspension components required to support ceiling units and other ceiling-supported construction.
				2. Attachment Devices: Size for 5 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. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

Retain "Zinc-Coated, Carbon-Steel Wire"; "Stainless Steel Wire"; or "Nickel-Copper-Alloy Wire" subparagraph below unless more than one wire type is required. If more than one type is required, indicate location of each on Drawings. See the Evaluations for discussion on corrosion resistance of hangers and fasteners. Revise hangers to strap type if required by authorities having jurisdiction or by local union regulations.

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 for UNS No. N04400 alloy.

Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C635, Table 1, Direct Hung, is less than yield stress of wire, but provide not less than 0.106-inch (12 ga) - diameter wire.

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

* + - * 1. [**Hanger Rods**] [**Flat Hangers**]: Mild steel, zinc coated or protected with rust-inhibitive paint.

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 (20 ga) - thick, galvanized-steel sheet complying with ASTM A653, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

Retain "Seismic Stabilizer Bars" paragraph below if required. Revise if stabilizer bars are needed to improve stability of suspension system and panel 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 "Seismic Clips" paragraph below if required. Coordinate with manufacturer's requirements and authorities having jurisdiction.

* + - * 1. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical metal pans in place.

Retain "Hold-Down Clips" paragraph below if required by manufacturer for system specified. Hold-down clips are typically required to secure cut edges of metal pans to channel moldings at ceiling perimeters. They may also be required throughout ceiling to enhance security or if pans are subject to potential uplift, positive pressure, vibration, impact, tampering, or abuse.

* + - * 1. Hold-Down Clips: Manufacturer's standard hold-down clips spaced to secure acoustical metal pans in place [**to molding and trim at perimeter**] [**at each pan**].
				2. Exposed Metal Edge Moldings and Trim: Provide exposed members as indicated or as required to comply with seismic requirements of authorities having jurisdiction, to conceal edges of and penetrations through ceiling, to conceal edges of pans and runners, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching acoustical metal pan ceiling units unless otherwise indicated.

Revise "For Circular Penetrations of Ceiling" subparagraph below to suit Project and products selected; indicate profiles on Drawings.

For Circular Penetrations of Ceiling: Fabricate edge moldings to diameter required to fit penetration exactly.

* + - * 1. Miscellaneous Fasteners: Bolts, screws, and other fasteners recommended by suspension system manufacturer and necessary to install the Work.
			1. DIRECT-HUNG, STANDARD-GRID, METAL SUSPENSION SYSTEM FOR ACOUSTICAL METAL PAN CEILING <**Insert drawing designation**>

Delete this article if only snap-in metal pan ceilings are required. If applicable, retain this article along with "Metal Suspension Systems, General" Article.

Copy this article and re-edit for each product.

Insert drawing designation. Use same designation for both the suspension system in this article and the acoustical metal pans that together make up the ceiling. Use these designations on Drawings to identify each product.

* + - * 1. [Manufacturers:](http://www.specagent.com/Lookup?ulid=357) 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=123457138989).

[CertainTeed Corporation; Saint-Gobain North America](http://www.specagent.com/Lookup?uid=123457138993).

[USG Corporation](http://www.specagent.com/Lookup?uid=123457138992).

Approved equivalent.

* + - * 1. Suspension System: For [**clip-in**] [**lay-in**] [**torsion-spring-hinged**] pans.

Retain one of first five paragraphs below. They are examples of suspension systems for acoustical metal pan ceilings; retain or revise to suit Project and verify compatibility with manufacturers.

Note that gap resulting from override (stepped) end condition of cross runners may be especially noticeable when combined with metal pans and may compromise a flat, monolithic ceiling appearance.

Revise paragraphs below if fire-rated suspension system is preferred for Project and available from manufacturers. Although acoustical metal pan ceiling systems are not fire-rated assemblies according to ASTM E119, fire-rated suspension systems may be preferable for other reasons such as rigidity or seismic stability. See Section 095113 "Acoustical Panel Ceilings."

* + - * 1. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytic zinc-coated or hot-dip galvanized according to ASTM A653, G30 coating designation, with prefinished, cold-rolled, 15/16-inch- wide, sheet 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: [**Steel**] [**or**] [**aluminum**] cold-rolled sheet.

In "Cap Finish" subparagraph below, coordinate finish with metal 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 metal pan**] [**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, electrolytic zinc-coated or hot-dip galvanized according to ASTM A653, G30 coating designation, with prefinished, cold-rolled, 9/16-inch- wide, sheet 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: [**Steel**] [**or**] [**aluminum**] cold-rolled sheet.

In "Cap Finish" subparagraph below, coordinate finish with metal 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 metal pan**] [**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, Uncapped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytic zinc-coated or hot-dip galvanized, to produce structural members with 9/16-inch- wide faces.

Structural Classification: As indicated in PERFORMANCE article above..

Face Design: With [**1/8-inch-**] [**1/4-inch-**] wide, slotted, box-shaped flange.

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 metal pan**].

* + - * 1. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A653, G60 coating designation, with prefinished, cold-rolled, 15/16-inch- wide, aluminum caps on flanges.

Structural Classification: As indicated in PERFORMANCE article above..

Face Design: Flat, flush.

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

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

Structural Classification: Intermediate-duty system.

Face Design: Flat, flush.

Finish: [**Directional Satin Finish: ASTM A480 No. 4**] [**Dull Satin Finish: ASTM A480 No. 6**] [**Mirrorlike Reflective, Nondirectional Polish: ASTM A480 No. 8**].

Retain "Suspension System for Torsion-Spring-Hinged Metal Pans" paragraph below only for torsion-spring-hinged metal pan ceilings.

* + - * 1. Suspension System for Torsion-Spring-Hinged Metal Pans: Provide runners with factory-cut slots fabricated to accept torsion-spring-hinged attachment.
			1. METAL SUSPENSION SYSTEM FOR ACOUSTICAL SNAP-IN METAL PAN CEILING <**Insert drawing designation**>

Retain this article only for snap-in metal pan ceilings. If applicable, retain this article along with "Metal Suspension Systems, General" Article.

Copy this article and re-edit for each product.

Insert drawing designation. Use same designation for both the suspension system in this article and the acoustical metal pans that together make up the ceiling. Use these designations on Drawings to identify each product.

* + - * 1. Manufacturers: Subject to compliance with requirements, provide products by snap-in metal pan ceiling manufacturer.

Usually retain "Indirect-Hung, Snap-(Tee) (Bar) System" paragraph below. Indirect-hung suspension systems are commonly available and used for most installations.

* + - * 1. Indirect-Hung, Snap-[**Tee**] [**Bar**] System: Designed to support metal pans that snap into main runners, consisting of main runners connected to carrying channels that are attached by hangers to building structure, and complying with the following requirements:

Main Runners: Formed from the following metal:

Retain at least one of first five subparagraphs below for main runners. Verify manufacturer's recommendations for potentially corrosive environments.

Aluminum Sheet: Alloy and temper recommended by aluminum producer and finisher for type of use indicated and manufacturer's standard finish, complying with ASTM B209.

Electrolytic Zinc-Coated Steel Sheet: ASTM A879, with not less than 08Z zinc coating.

Hot-Dip Galvanized Steel: ASTM A653, with not less than G60 zinc coating.

Stainless Steel Sheet: ASTM A240 or ASTM A666, Type 302 or Type 304, stretcher leveled, with cold-rolled mill finish.

Metal Sheet: Metal as standard with ceiling system manufacturer, with factory-applied protective finish complying with ASTM C635.

Retain one of two "Carrying Channels" subparagraphs below.

Carrying Channels: Same member and metal as indicated for main runners.

Carrying Channels: Cold-rolled steel, not less than 0.060-inch (16 ga) nominal thickness of base (uncoated) metal and 7/16-inch- wide flanges, [**protected with rust-inhibitive paint**] [**hot-dip galvanized according to ASTM A653, G60 coating designation**], and as follows:

Depth and Weight: [**1-1/2 inches and 475 lb/1000 feet**] [**2 inches and 590 lb/1000 feet**].

Retain "Direct-Hung, Snap-(Tee) (Bar) System" paragraph below if required. These systems are not typically offered by manufacturers as a standard. Verify, with manufacturers, that they can provide custom-designed, direct-hung systems.

* + - * 1. Direct-Hung, Snap-[**Tee**] [**Bar**] System: Designed to support metal pans that snap into main runners, consisting of main runners supported by hangers attached directly to building structure, and complying with the following requirements:

Hangers: Angles or channels, as standard with ceiling system manufacturer, formed from same metal as main runners.

Main Runners: Rolled aluminum sheet; alloy and temper recommended by aluminum producer and finisher for type of use indicated and manufacturer's standard finish, complying with ASTM B209.

* + - * 1. Access Panels: For access at locations indicated, provide acoustical snap-in metal pan ceiling units, accessible by [**key or tool**] [**two access knobs; place one access knob at each end of panel near corners**].

Retain "Access Key or Tool" subparagraph below if required. Indicate location of access panels on Drawings or insert requirements here.

Access Key or Tool: Provide manufacturer's standard key or tool for opening access panels; two.

* + - 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. GENERAL FINISH REQUIREMENTS
				1. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
				2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

Retain "High-Humidity Finish" paragraph below if required. Finish is generally applicable to hot-dip galvanized steel with G60 or greater coating designation and aluminum systems with anodized finish. On Drawings, indicate where high-humidity finishes are required.

* + - * 1. High-Humidity Finish: Comply with ASTM C635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
			1. ALUMINUM FINISHES

If retaining more than one finish in paragraphs below, indicate location of each on Drawings or by inserts. Revise mechanical finish if custom anodized finish is required and availability is verified.

* + - * 1. Mill Finish: AA-M10C10 (Mechanical Finish: as fabricated, unspecified; Chemical Finish: chemically cleaned).
				2. Lacquered Mill Finish: AA-M10C10R1x (Mechanical Finish: as fabricated, unspecified; Chemical Finish: chemically cleaned; Organic Coating: as specified below).

Organic Coating: Manufacturer's standard clear organic coating.

* + - * 1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
				2. Clear Mirror Anodic Finish: AA-M21C12A212, 0.005 mm or thicker.
				3. Color-Coated Finish: Manufacturer's standard[**powder-coat**] baked paint complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.
				4. Bright-Reflective Finish: Manufacturer's standard chemical/mechanical bright-reflective metallic finish complying with finish manufacturer's written instructions for surface preparation, pretreatment, process, protective coating, and minimum thickness to produce a finish uniform in appearance and free of blisters, pits, roughness, nodules, burning, cracks, unfinished areas, and other visible defects.
			1. METALLIC-COATED STEEL SHEET FINISHES
				1. Color-Coated Finish: Manufacturer's standard powder-coat baked paint complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.

For exact finish, insert names of coating manufacturers and products.

* + - 1. STEEL SHEET FINISHES
				1. Electroplated Finish: Electroplating process complying with finish manufacturer's written instructions for surface preparation, pretreatment, process, and minimum thickness to produce a coating uniform in appearance and free of blisters, pits, roughness, nodules, burning, cracks, unplated areas, and other visible defects.
				2. Bright-Reflective Finish: Manufacturer's standard chemical/mechanical bright-reflective metallic finish complying with finish manufacturer's written instructions for surface preparation, pretreatment, process, protective coating, and minimum thickness to produce a finish uniform in appearance and free of blisters, pits, roughness, nodules, burning, cracks, unfinished areas, and other visible defects.

For exact finish, insert names of coating manufacturers and products.

* + - 1. STAINLESS STEEL FINISHES
				1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
				2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

Retain first subparagraph below for directional finishes.

Run grain of directional finishes with long dimension of each piece.

When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

1. EXECUTION
	* + 1. EXAMINATION
				1. Examine substrates, areas, and conditions, including structural framing to which acoustical metal pan 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 metal pan ceilings.
				2. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
				3. Proceed with installation only after unsatisfactory conditions have been corrected.
			2. PREPARATION
				1. Measure each ceiling area and establish layout of acoustical metal pans to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width pans at borders, and comply with layout shown on reflected ceiling plans and coordination drawings.
			3. INSTALLATION
				1. General: Install acoustical metal pan ceiling assemblies to comply with ASTM C636[**, seismic design requirements,**] and manufacturer's written instructions.
				2. Suspend ceiling hangers from building's structural members and as follows:

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.

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 by inserting below or indicating on Drawings.

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

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

Secure flat, angle, channel, and rod hangers to ceiling suspension members or carrying channels and to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that does 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 below 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.

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 detailed 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 and publications.

* + - * 1. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical metal pans.

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, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.

Delete subparagraph below or revise 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.

Revise first paragraph below and insert requirements in Part 2 if penetrations for light fixtures, sprinklers, and similar fixtures are factory cut. Verify availability with manufacturers.

* + - * 1. Cut acoustical metal pan units for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet. Cut and treat edges to comply with manufacturer's written instructions.
				2. Install acoustical metal pans in coordination with suspension system and exposed moldings and trim. Comply with manufacturer's installation tolerances.

Retain applicable subparagraphs below that coordinate with metal-pan type, pan edge and joint details, and suspension-system types, or revise to suit Project.

Retain one of first three subparagraphs below for lay-in pans, or insert another.

For lay-in, square-edge pans, install pans with edges fully hidden from view by flanges of suspension-system runners and moldings.

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

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

For [**clip-in**] [**torsion-spring-hinged**] pans, position pans according to manufacturer's written instructions.

For snap-in pans, fit adjoining units to form flush, tight joints.

Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.

Fit adjoining units to form flush, tight joints.

Retain first subparagraph below if applicable. Indicate locations of directionally patterned or textured pans on Drawings, or insert locations here.

Install directionally patterned or textured metal pans in directions indicated.

Usually delete both subparagraphs below if only unperforated patterns are specified. Delete first subparagraph if acoustical fabric is bonded to pan in factory.

Install sound-absorbent fabric layers in, and bond to, perforated metal pans.

Install sound-absorbent pads in perforated metal pans[**over metal spacer grids**].

* + - * 1. Install sound attenuation panels in areas indicated by reflected ceiling plans or room finish schedules. Lay panels directly on ceiling system and close major openings to form complete coverage in required areas. Lay second sound-absorbent pads on sound attenuation panels.
				2. Install hold-down clips where indicated.
			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 applicable building code.

Retain first option in "Special Inspections" paragraph below if the State 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: The State will engage a qualified special inspector to perform the following special inspections:

Seismic design compliance.

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 test 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.

* + - * 1. Perform the following tests and inspections of completed installations of acoustical metal panel ceiling hangers, anchors, and fasteners in successive stages. Do not proceed with installations of acoustical metal panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.

Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed.

Verify loadings in two subparagraphs below with structural engineer based on ceiling loadings and seismic zone where Project is located. CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies - Seismic Zones 3 & 4" requires hanger wire attachment devices to be "capable of supporting 100 lbf."

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

When tested fasteners and anchors do not comply with requirements, testing agency tests those fasteners and anchors not previously tested until 20 pass consecutively and then resumes initial testing frequency.

* + - * 1. Acoustical metal 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 metal pan ceilings, including trim and edge moldings, after removing strippable, temporary protective covering, if any. Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION 095133