

SECTION 09 51 33 - ACOUSTICAL METAL PAN CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustical metal pans and associated suspension system for interior ceilings.

B. Related Requirements:

1. Section 09 51 13 "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.
2. Section 09 54 23 "Linear Metal Ceilings."

C. Products furnished, but not installed, under this Section include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include procedure for cutting metal pans.

B. Sustainable Design Submittals:

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
2. Product Data: For adhesives and sealants, indicating VOC content.
3. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
4. Laboratory Test Reports: For ceiling products, indicating compliance with requirements for low-emitting materials.
5. Laboratory Test Reports: For insulation, indicating compliance with requirements for low-emitting materials.
6. Environmental Product Declaration: For each product.
7. Health Product Declaration: For each product.
8. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

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- C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.
- D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below:
 - 1. Metal Pans: Set of full-size Samples of each type, finish, color, pattern, and texture. Show pan edge profile.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- long Samples of each type, finish, and color.
 - 3. Sound Absorber: Sample of each type matching size of Sample metal pan.
- E. Delegated-Design Submittal: For design of seismic restraints and attachment devices.

1.4 INFORMATIONAL SUBMITTALS

- A. 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:
 - 1. Suspended ceiling components.
 - 2. Structural members to which suspension systems will be attached.
 - 3. Size and location of access modules for acoustical panels.
 - 4. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - 5. Perimeter moldings.
- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical metal pan ceiling, for tests performed by a qualified testing agency.
- D. Evaluation Reports: For each acoustical metal pan ceiling suspension system and anchor and fastener type.
- E. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

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1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Metal Pans with Sound Absorber: Full-size units equal to 2 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each grid, exposed molding, and trim equal to 2 percent of quantity installed.
 - 3. Hold-Down Clips: Equal to 2 percent of quantity installed.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.
- B. Installer Qualifications: Engage an Installer who is licensed, approved, authorized, or otherwise acceptable to the manufacturer; with not less than 5 years experience in the installation of materials specified; and who has completed acoustical metal pan ceilings similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance.
- C. Source Limitations: Obtain each type of acoustical metal pan ceiling and supporting suspension system through one source from a single manufacturer.
- D. Performance Requirements: In areas where gypsum wallboard partitions are dependent on the ceiling suspension system for lateral support, design and install suspension system components to sustain the imposed load from the completed partition system including a minimum inward and outward pressure of 5 psf normal to the plane of the wall.
- E. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 450 or less.
- F. Sound Transmission Characteristics: For acoustical metal pan ceilings with STC ratings, provide materials and construction identical to those tested in assembly indicated according to the following standards:
 - 1. ASTM E 90 "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements."
 - a. Classified according to ASTM E 413 "Classification for Rating Sound Insulation" by a qualified independent testing agency.

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- G. **Seismic Performance:** Acoustical metal pan ceilings shall withstand the effects of earthquake motions determined according to IBC and ASCE/SEI 7 for the geographic location of the site.
- H. **Sample Installations:** Before installing acoustical metal pan ceilings, install sample installations, for each type of acoustical metal pan ceiling installation required to demonstrate aesthetic effects and qualities of materials and execution. The sample installation shall be complete in every way and include all attachments to structure, hangers, grids, ceiling panels, moldings and column trims, light fixtures, air outlets and inlets; speakers, sprinklers heads, heat and smoke detectors. Install sample installations to comply with the following requirements, using materials indicated for the completed Work:
 - 1. **Size and Location:** Provide 250 square foot sample installations in locations as directed by Architect.
 - 2. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 3. Obtain Architect's approval of sample installations before starting work.
 - 4. Maintain sample installations during construction in an undisturbed condition as a standard for judging the completed Work.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. 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.
- B. Handle acoustical metal pans, suspension-system components, and accessories carefully to avoid damaging units and finishes in any way.

PART 2 - PRODUCTS

2.1 ACOUSTICAL METAL PANS, GENERAL (CL##)

- A. **Recycled Content of Steel Products:** Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. **Recycled Content of Aluminum Components:** Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

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- D. **Regional Materials:** Products shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- E. **Acoustical Panel Standard:** Provide manufacturer's standard pans of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
1. **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.
- F. **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.
1. **Aluminum Sheet:** Rolled aluminum sheet, complying with ASTM B 209; alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
 2. **Steel Sheet:** Commercial-quality, cold-rolled, carbon-steel sheet; stretcher leveled; with protective coating complying with ASTM C 635/C 635M.
 - a. **Painted Finishes:** Electrolytic zinc-coated steel complying with ASTM A 879/A 879M, 13Z coating, surface treatment as recommended by finish manufacturer for type of use and finish indicated.
 - b. **Chemical/Mechanical Finishes:** Uncoated steel sheet complying with ASTM A 1008/A 1008M with luster or bright finish as required by finisher for applying electroplating or other metallic-finishing processes.
- G. **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 E 84.
1. **Bond fabric layer to panels in the factory with manufacturer's standard nonflammable adhesive.**
- H. **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 E 84, and to comply with the following requirements:
1. **Plastic Sheet-Wrapped, Mineral-Fiber Insulation:** Pads consisting of nonrigid, PVC plastic sheet encapsulating unfaced mineral-fiber insulation complying with ASTM C 553, Type I, Type II, or Type III, and as follows:

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- a. Mineral-Fiber Density: 1 lb/cu. ft..
2. Spacer Grids: Provide manufacturer's standard aluminum or galvanized-steel grid units that provide an air cushion between metal pans and insulation pads and that act to improve sound absorption.
- I. Sound Attenuation Panels: Provide manufacturer's standard aluminum or galvanized-steel unperforated metal backing unit that acts as a sound attenuation pan to reduce sound travel through ceiling plenum into adjoining rooms.
 1. 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.
- J. Adhesive: Manufacturer's standard nonflammable adhesive for sound-absorbent fabric and pads.
 1. Adhesives shall have a VOC content of 70 g/L or less.
 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 ALUMINUM PANS FOR ACOUSTICAL METAL PAN CEILING

- A. Manufacturers: Subject to compliance with requirements, provide products indicated on Drawings, or comparable product, acceptable to the Architect, by one of the following:
 1. American Decorative Ceilings (ADC).
 2. Armstrong World Industries, Inc.
 3. Ceilings Plus.
 4. Gage Corporation International (The).
 5. Hunter Douglas Architectural Products, Inc.
 6. Steel Ceilings Inc.
 7. USG Corporation.
 8. Arktura.
- B. Classification: Units complying with ASTM E 1264 for Type VII, perforated aluminum facing (pan) with mineral-base backing; Type XX, other types described as perforated aluminum facing (pan) units with sound-absorbent fabric backing; or Type XX, other types described as unperforated aluminum facing (pan) units.
 1. Patterns and Metal Pan Perforations: Of diameter, size, and pattern indicated on Drawings.

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- C. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.
 - 1. Lay-in Pans: Formed to set in exposed suspension grid.
 - 2. Torsion-Spring-Hinged Pans: Designed to be securely retained in preslotted, exposed suspension grid by torsion springs provided by manufacturer.
- D. Pan Thickness: Not less than 0.032 inch.
- E. Pan Edge Detail: As indicated on Drawings.
- F. Pan Joint Detail: Butt.
- G. Pan Size: As indicated on Drawings.
- H. Pan Face Finish: As indicated on Drawings.
- I. NRC: Not less than 0.70, unless otherwise indicated.

2.3 STEEL PANS FOR ACOUSTICAL METAL PAN CEILING

- A. Manufacturers: Subject to compliance with requirements, provide products indicated on Drawings, or comparable products, acceptable to the Architect, by one of the following:
 - 1. American Decorative Ceilings (ADC).
 - 2. Armstrong World Industries, Inc.
 - 3. Ceilings Plus.
 - 4. CertainTeed Corporation.
 - 5. Hunter Douglas Architectural Products, Inc.
 - 6. Lindner AG.
 - 7. Steel Ceilings Inc.
 - 8. USG Corporation.
- B. Classification: Units complying with ASTM E1264 for Type V, perforated steel facing (pan) with mineral-base backing; Type XX, other types described as perforated steel facing (pan) units with sound-absorbent fabric backing; or Type XX, other types described as unperforated steel facing (pan) units.
 - 1. Patterns and Metal Pan Perforations: Of diameter, size, and pattern indicated on Drawings.
- C. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.
 - 1. Lay-in Pans: Formed to set in exposed suspension grid.

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2. Torsion-Spring-Hinged Pans: Designed to be securely retained in preslotted, exposed suspension grid by torsion springs provided by manufacturer.
- D. Pan Thickness: Not less than 0.028 inch.
- E. Pan Edge Detail: As indicated on Drawings.
- F. Pan Joint Detail: Butt.
- G. Pan Size: As indicated on Drawings.
- H. Pan Face Finish: As indicated on Drawings.
- I. NRC: Not less than 0.70, unless otherwise indicated.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
 - B. Regional Materials: Products shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
 - C. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635/C 635M requirements.
 - D. 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.
 - E. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, unless otherwise indicated. Comply with seismic design requirements.
 - F. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488/E 488M conducted by a qualified testing agency.
1. Refer to Section 01 45 00 "Structural Testing and Inspection", Article 3.3 "Concrete Reinforcement and Embedded Items" for testing of anchors.

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- G. Power-Actuated Anchors: 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 allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- H. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 2. Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, is less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.
- I. Rod Hangers: ASTM A 510, mild carbon steel.
1. Diameter: 1/4-inch.
 2. Protective Coating: ASTM A 153/A 153M, hot-dip galvanized.
- J. Flat Hangers: Commercial-sheet steel, ASTM A 653/A 653M with G60, hot dip galvanized zinc coating.
1. Size: 1 by 3/16 inch by length indicated.
- K. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.
- L. Carrying Channels: ASTM C 754 with G60 coated cold rolled steel channels, 1-1/2-inch, 475 pounds per 1,000 feet.
- M. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- N. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- O. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical metal pans in place.
- P. Hold-Down Clips: Manufacturer's standard hold-down clips spaced to secure acoustical metal pans in place at each metal pan.

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

2.5 DIRECT-HUNG, STANDARD-GRID, METAL SUSPENSION SYSTEM FOR ACOUSTICAL METAL PAN CEILING

- A. Manufacturers: Subject to compliance with requirements, provide products indicated on Drawings:
- B. Suspension System: For clip-in, lay-in, or torsion-spring-hinged pans.
- C. Suspension System for Torsion-Spring-Hinged Metal Pans: Provide runners with factory-cut slots fabricated to accept torsion-spring-hinged attachment.

2.6 ACOUSTICAL SEALANT

- A. Acoustical Sealant for Exposed and Concealed Joints:
1. Exposed: Refer to Section 07 92 00 "Joint Sealants".
 2. Concealed: Manufacturer's standard.
- B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.
 2. Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant.
 3. Sealant shall have a VOC content of 250 g/L or less.
 4. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

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2.7 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. 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.
- C. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

2.8 ALUMINUM FINISHES

- A. 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.
- B. 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.

2.9 METALLIC-COATED STEEL SHEET FINISHES

- A. 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.

2.10 STEEL SHEET FINISHES

- A. 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.

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- B. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. 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.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. 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.

3.3 INSTALLATION

- A. General: Install acoustical metal pan ceiling assemblies to comply with ASTM C 636/C 636M, seismic design requirements, and manufacturer's written instructions.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. 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.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. 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.

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4. 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.
 5. 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.
 6. 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.
 7. 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.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. 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.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical metal pans.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. 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.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. 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.
- F. Install acoustical metal pans in coordination with suspension system and exposed moldings and trim. Comply with manufacturer's installation tolerances.
1. For pans, position pans according to manufacturer's written instructions.

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2. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
 3. Fit adjoining units to form flush, tight joints.
 4. Install directionally patterned or textured metal pans in directions indicated.
 5. Install sound-absorbent fabric layers in, and bond to, perforated metal pans.
 6. Install sound-absorbent pads in perforated metal pans.
- G. 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.
- H. Install hold-down clips where indicated.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
1. Seismic design compliance.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. 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.
1. 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.
 - a. 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.
 - b. 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.
- D. Acoustical metal panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

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3.5 CLEANING

- A. 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 09 51 33