PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 and 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes acoustical panels and exposed suspension systems for ceilings.

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

C. Related Sections include the following:
1. Section 018113 “Sustainable Design Requirements.”

1.3 DEFINITIONS

A. AC: Articulation Class.

B. CAC: Ceiling Attenuation Class.

C. LR: Light Reflectance coefficient.

D. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittals: Credit MRc4. Refer to Section 018113 “Sustainable Design Requirements” for additional submittal requirements.

C. Test Reports: Submit certified copies of test reports from an independent NVLAP-accredited acoustical testing laboratory showing compliance with the standards and requirements listed below.

D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
1. Ceiling suspension system members.
2. Method of attaching hangers to building structure.
   a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
4. Minimum Drawing Scale: 1/4 inch = 1 foot.

E. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
1. Acoustical Panel: Set of 6-inch- square Samples of each type, color, pattern, and texture.

2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- long Samples of each type, finish, and color.

F. Maintenance Data: For finishes to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Manufacturer of Metal Suspension Systems Qualifications:
1. Manufacturer member in good standing of CISCA (Ceiling and Interior Systems Construction Association).
2. Provider of comprehensive Installer training (Ceiling Masters Training Course or equivalent).

B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
b. Identify materials with appropriate markings of applicable testing and inspecting agency.
2. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
a. Flame spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

D. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:
1. 2013 California Building Code
2. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
3. CISCA: Guidelines for Seismic Restraint Direct Hung Suspended Ceiling Assemblies Seismic Category D, E, and F.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

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

1.8 COORDINATION

A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
   2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 REFERENCES

A. ASTM C 423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

B. ASTM E 795 Standard Practices for Mounting Test Specimens during Sound Absorption Tests.

C. ASTM E-84 Standard Test Method for Surface Burning Characteristics of Building Materials.

2.2 ACOUSTICAL PANELS, GENERAL

A. Recycled Content: Provide acoustical panels with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 70 percent by weight.

B. Acoustical Panel Standard: Provide manufacturer's standard panels 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 per ASTM E 795.

C. Panels: Made with binder containing no urea formaldehyde.

D. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

E. LEED Materials: Credit MRc4. Refer to Section 018113 “Sustainable Design Requirements” for additional material requirements.

2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING (ACP1, ACP5 and ACP6)

A. Products: Subject to compliance with requirements, provide the following:
   1. Ultima Tegular by Armstrong World Industries (Basis-of-Design)
   2. or comparable product from the following:
      a. United States Gypsum Company.
      b. CertainTeed Ceilings

B. Classification: Provide fire-resistance-rated panels as follows:
   1. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted.
   2. Pattern: E (lightly textured).
   3. Surface Texture: Smooth.

C. Color: White.

D. Light Reflectance (LR): Not less than 0.90.

E. Ceiling Attenuation Class (CAC): Not less than 35.

F. Noise Reduction Coefficient (NRC): Not less than 0.70.

G. Edge/Joint Detail: 9/16-inch beveled tegular.

H. Thickness: 3/4-inch.

I. Modular Size: 24 by 24 inches and 24 by 48 inches as indicated.

J. Fire Rating: Class A.

K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING (ACP2, ACP3 and ACP4)

A. Products: Subject to compliance with requirements, provide the following:
   1. Ultima Health Zone by Armstrong World Industries (Basis-of-Design)
   2. or comparable product from the following:
      a. United States Gypsum Company.
      b. CertainTeed Ceilings

B. Classification: Provide fire-resistance-rated panels as follows:
   1. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted; with water-repellent overlay on face.
   2. Pattern: E (lightly textured).
   3. Surface Texture: Smooth.

C. Color: White.

D. Light Reflectance (LR): Not less than 0.86.

E. Ceiling Attenuation Class (CAC): Not less than 35.

F. Noise Reduction Coefficient (NRC): Not less than 0.70.

G. Edge/Joint Detail: Square or Tegular, as indicated.

H. Thickness: 3/4-inch.

I. Modular Size: 24 by 24 inches.

J. Fire Rating: Class A.

K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273, ASTM D 3274, or ASTM G 21 and evaluated according to ASTM D 3274 or ASTM G 21.

2.5 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING (ACP9)

A. Products: Subject to compliance with requirements, provide the following:
   1. Kitchen Zone by Armstrong World Industries (Basis-of-Design)
   2. or comparable product from the following:
      a. United States Gypsum Company.
      b. CertainTeed Ceilings

B. Classification: Provide fire-resistance-rated panels as follows:
   1. Type and Form: Type IX, Form 2, wet-formed mineral fiber.
   2. Pattern: G.
   3. Surface Texture: Smooth.

C. Color: White.

D. Light Reflectance (LR): Not less than 0.89.

E. Ceiling Attenuation Class (CAC): Not less than 33.

F. Edge/Joint Detail: Square.

G. Thickness: 5/8-inch.

H. Modular Size: 24 by 24 inches.

I. Fire Rating: Class A.

2.6 METAL SUSPENSION SYSTEMS, GENERAL

A. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.
   1. High-Humidity Finish (Where Required): Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C 635/C 635M.

C. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

D. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
   1. Post-installed 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 per ASTM E 488, conducted by a qualified testing and inspecting agency.
      a. Type: Post-installed expansion anchors.
      b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 for Class SC service condition (mild).
   2. Post-installed Powder-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 per ASTM E 1190, conducted by a qualified testing and inspecting agency.

E. 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 hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.

F. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

G. 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.

I. Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.

H. Vertical Load Compression Posts: Provide metal telescoping compression post as indicated on Drawings.

I. Seismic Clips: Manufacturer's standard seismic clips as allowed by authorities having jurisdiction, designed and spaced to secure acoustical panels in place.

2.7 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING (ACP1)

A. Products: Subject to compliance with requirements, provide one of the following:
1. Silhouette XL 1/8” Reveal from Armstrong World Industries (Basis-of-Design)
2. or comparable product from the following:
a. United States Gypsum Company.
b. Chicago Metallic Ceilings.
c. Or Equal.

B. Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation.
1. Structural Classification: Heavy-duty system.
2. Face Design: Bolt slot design with 1/8” reveal
3. Cap Material: Steel cold-rolled sheet.
4. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
5. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
6. Provide seismic perimeter clip as alternate to 2-inch wall molding per ICC report.
7. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.
8. Accessories: Provide accessories as required for complete installation.

2.8 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING (ACP2)

A. Products: Subject to compliance with requirements, provide one of the following:
1. Clean Room Aluminum Grid System from Armstrong World Industries (Basis-of-Design)
2. or comparable product from the following:
a. Chicago Metallic Ceilings.
b. Or Equal.

A. Wide-Face, Double-Web, Extruded-Aluminum Suspension System: Main and cross runners formed from extruded aluminum to produce structural members with 15/16-inch-wide faces.
1. Structural Classification: Intermediate-duty system.(Note: Hanger wires required more than 36-inches on center or main tees spaced at 24-inches on center to meet heavy-duty load requirements)
2. Face Design: Flat, flush.
3. Face Finish: PVC.
4. Gasket System: Clean-room type.
5. Color: White.
6. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

7. Provide seismic perimeter clip as alternate to 2-inch wall molding per ICC report.
8. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load.
9. Accessories: Provide accessories as required for complete installation.

2.9 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING (ACP3, ACP5 and ACP6)

A. Products: Subject to compliance with requirements, provide one of the following:
1. Suprafine XL from Armstrong World Industries (Basis-of-Design)
2. or comparable product from the following:
   a. United States Gypsum Company.
   b. Chicago Metallic Ceilings.
   c. Or Equal.

B. Narrow-Face, Steel-Capped, Double-Web, Fire-Rated Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished, cold-rolled, 9/16-inch-wide metal caps on flanges.
1. Structural Classification: Heavy-duty system.
2. Face Design: Flat, flush.
3. Cap Finish: Powder coated white to match lay-in panel.
4. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
5. Provide seismic perimeter clip as alternate to 2-inch wall molding per ICC report.
6. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load.
7. Accessories: Provide accessories as required for complete installation.

2.10 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING (ACP4)

A. Products: Subject to compliance with requirements, provide one of the following:
1. CG20 Extruded Aluminum Ceiling Suspension System from Gordon, Inc. (Basis-of-Design)
2. Or Equal.

B. Wide-Face, Double-Web, Extruded-Aluminum Suspension System: Main and cross runners formed from extruded aluminum.
1. Structural Classification: Heavy Duty.
2. All grid components have factory applied 3/32-inch by 3/4-inch white closed-cell polyethylene gasket with adhesive on one side.
3. Gasket System: Polyethylene gasket shall pass fungus resistance test method 508.1 mill-std 810C flame resistance test FMYSS 302 with burn rate of 4-inches per minute.
   a. Shore hardness of gasket shall be 7 on AA scale and 51 on OO scale per ASTM D-2240.
   b. The gasket shall be 2 lb. density per cubic foot and meet USDA approval.
4. Color: White.
5. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
6. Aluminum extrusions shall be 6063-T-5 alloys. (ASTM B221)
7. Provide seismic perimeter clip as alternate to 2-inch wall molding per ICC report.
8. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load.

9. Accessories: Provide accessories as required for complete installation.

2.11 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILINGS (ACP9)

A. Products: Subject to compliance with requirements, provide one of the following:
   1. Prelude XL by Armstrong World Industries, Inc.(Basis-of-Design)
   2. Or comparable product from the following:
      a. United States Gypsum Company.
      b. Chicago Metallic Ceilings.
      c. Or Equal.

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation, with prefinished 15/16-inch-wide metal caps on flanges.
   1. Structural Classification: Heavy-duty system.
   2. End Condition of Cross Runners: Override (stepped) type.
   3. Face Design: Flat, flush.
   4. Cap Material: Steel cold-rolled sheet.
   5. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
   6. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
   7. Provide seismic perimeter clip as alternate to 2-inch wall molding per ICC report.
   8. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.
   9. Accessories: Provide accessories as required for complete installation.

2.12 ACOUSTICAL SEALANT

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), 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.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing interior concealed joints to reduce airborne sound transmission.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with

requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 635 and ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
   1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

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.
   4. Secure wire hangers to ceiling suspension members 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 will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
   6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed 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. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
   1. Install seismic clips per manufacturer’s written instructions and ICC ES report.
   2. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
   3. 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.
   4. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
   1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
   2. For reveal-edged panels on suspension system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
   3. Paint cut edges, including cut-in penetrations, of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
   4. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.
   5. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

## 3.4 FIELD QUALITY CONTROL

A. Special Inspections: 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 and prepare test reports.

C. Tests and Inspections: Testing and inspecting of completed installations of acoustical panel ceiling hangers and anchors and fasteners shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
   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 will select 1 of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and

will test them for 200 lbf of tension; it will also select one of every 2 postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.

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

D. Remove and replace acoustical panel ceiling hangers and anchors and fasteners that do not pass tests and inspections and retest as specified above.

3.5 CLEANING

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

END OF SECTION