

SECTION 09 51 10 WOOD
ACOUSTICAL CEILINGS - LAY-IN

PART 1 - GENERAL

1.01 WORK INCLUDES

- A. Acoustical panels, lay-in.
- B. Related Sections:
 - 1. Section 09 53 30, Wood Acoustical Suspension Systems.

1.02 REFERENCE STANDARDS

- A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.
- B. CBC - California Building Code, 2022.
- C. ASTM E84 - Surface Burning Characteristics of Building Materials.
- D. ASTM E1264 - Acoustic Ceiling Products.

1.03 SUBMITTALS

- A. Product data for acoustical panels.
- B. Three samples illustrating material and finish of acoustic units.
- C. Manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

- A. Qualifications
 - 1. Manufacturer: Company specializing in manufacture of ceiling panels with five years minimum experience.
 - 2. Installer: Company with three years minimum experience.
- B. Fire Classification Requirements: ASTM E84, flame spread of less than 25 and smoke density rating of less than 450, Class I, California Building Code Table 803.11, 2016 CBC.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Interior wet work shall be completed prior to installation of panels. Windows and doors shall be in place. HVAC systems shall be installed and operable where necessary to maintain a temperature range of 60 to 85 degrees F and maximum 70 percent relative humidity.

1.06 WARRANTY

- A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
 - 1. Acoustical Panels: Sagging and warping
 - 2. Grid System: Rusting and manufacturer's defects
- B. Warranty Period:
 - 1. Acoustical panels: One (1) year from date of substantial completion
- C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.07 EXTRA STOCK

- A. Provide extra quantity of acoustic units in the amount of one box of each type specified.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products of the following manufacturers form the basis for design and quality intended.
 - 1. Armstrong World Industries, Lancaster, PA.
- B. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

2.02 MATERIALS

- A. Acoustical Panels: per drawings ACT-02 color Toffe see finish schedule for more information

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that existing conditions are ready to receive work.
- B. Verify that layout of hangers will not interfere with installation of acoustic units.
- C. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install per manufacturer's written installation instructions.
- B. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Where square units are indicated, lay directional patterned units in basket weave pattern. Fit border neatly against abutting surfaces.
- D. Install acoustic units level, in uniform plane, and free from twist, warp and dents. Replace damaged or soiled units.
- E. Provide for complete accessibility for all units.

END OF SECTION

SECTION 09 53 30 WOOD
ACOUSTICAL SUSPENSION SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Perimeter trim.
- C. Related Sections:
 - 1. Section 09 51 10, Acoustical Ceilings.

1.02 REFERENCE STANDARDS

- A. Conform to current adopted reference standards by date of issue of the current code cycle and the date of the Contract Documents.
- B. ASTM C635 - Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
- C. ASTM C636 - Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
- D. ASTM E84 - Surface Burning Characteristics of Building Materials.
- E. ASTM E580 - Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.
- F. ASCE/SEI 7-10 - American Society of Civil Engineers/Structural Engineering Institute, Standard 7-10.
- G. CBC - 2022 California Building Code.
- H. Chapter 19, 2022 California Building Code.
- I. Chapter 23, 2022 California Building Code.

1.03 SUBMITTALS

- A. Shop drawings indicating, grid layout and related dimensioning, junctions with other work or ceiling finishes and interrelation of mechanical and electrical items. Photographic reproductions of the contract drawings shall not be used.
- B. Product data.
- C. Three samples of each suspension system main runner, cross runner and edge trim.

- D. Manufacturer's installation instructions.
- 1.04 Submit one copy of ICC-ES Reports Armstrong ICC-ES, ESR-1308 QUALITY ASSURANCE
 - A. Manufacturer: Company specializing in manufacture of ceiling suspension system with five years minimum experience.
 - B. Installer: Company with five years minimum experience.
 - C. Fire Classification Requirements: ASTM E84, all materials shall have Flame Spread Index rating of less than 25 and Smoke Developed Index rating of less than 450.
 - D. Products must comply with ICC-ES Reports.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products of following manufacturers form basis for design and quality intended.
 - 1. Armstrong World Industries. Lancaster, PA. Product: per drawings finish schedule
- B. Or equal as approved in accordance with Division 01, General Requirements for substitutions.

2.02 SUSPENSION SYSTEM MATERIALS

- A. Grid: per drawings 9/16" tegular grid color black
- B. Beam End Retention Clip: slide clip for free end of main-runners and cross-tees with 2-inch movement capability.
 - 1. Acceptable Product: Armstrong, BERC2, or equal,
- C. Accessories: adapters, splices, edge trim and all necessary components required for the specified suspended grid system.

- D. Grid Materials: main runners, cross runners, splices, expansion devices and intersection connectors, commercial quality cold rolled steel with galvanized coating. Designed to carry a mean ultimate test load on not less than 180 lbs. compression and tension per ASTM E580 Section 5.1.2. The ceiling grid system must be rated as Heavy Duty as defined by ASTM C635.
- E. Grid Finish: per drawings
- F. Hanger Wire: No. 12 gauge wire shall be 0.106 inch in diameter conforming to ASTM A641. No. 12 gage wire shall be soft annealed, galvanized steel wire with a Class 1 zinc coating.
- G. Compression Struts, one of the following:
 - 1. Stud Design: Install a 20-gauge 4-inch stud. Attach to main runner with 2 #12 self-drilling self-tapping screws within 2 inches of splay intersection and to structure, with 2 #12 x 2 inch long screws to wood structure or 3/16-inch diameter expansion anchor at concrete/steel deck or 2 #10 x 1/2" self-tapping sheet metal screws to metal deck without concrete. Compression strut shall not replace hanger wire, refer to drawings.
 - 2. Pipe Design: Install a 12 GA. vertical hanger wire and tie to main runner no more than 2 inches from splay intersection. Run the hanger wire inside a sleeved 1/2-inch Electrical Rigid Steel Conduit or Steel Electrical Metallic Tubing (EMT) and 3/4 inch Electrical Rigid Steel Conduit (ERSC) or Steel Electrical Metallic Tubing (EMT) as indicated on drawings, extend tubes tight to structure above and ceiling grid below. To secure sleeved tubes drill a 5/32-inch hole and install through a 1/8-inch bolt with locking nut, tubes shall lap one another min. 4 inches in fully extended position. Cut a slot in the 3/4-inch conduit to straddle the main runner and secure with 2 #12 self-tapping sheet metal screws.
 - 3. Install a USG DONN Compression Strut Posts, Model VSA18/30 for up to 30 inches plenum depth, Model VSA30/48 for up to 48 inches and VSA 48/84 for up to 84 inches and VSA84/102 for up to 102 inches. Provide required accessories for seismic requirements and secure per manufacturer's specifications. Compression strut post shall not replace hanger wire.
 - 4. Truss Joists Design: Install web stiffeners at 24 inches long. Attach clip angle L 2-1/2 by 2-1/2 by 1/4 inches and secure to joist with 3/8 inch diameter bolts with washers, hang splay wire from angle with 3/8 inch eyebolt, secured with washers and nut. Attach 1/2 inch diameter galvanized pipe strut, maximum length 51 inches, to side of joist or web stiffener with 1/4 inch diameter. Lag bolt and washer, provide spacer between pipe and joist/stiffener.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that existing conditions are ready to receive work.
- B. Verify that layout of hangers will not interfere with other work.
- C. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Install system in accordance with ASTM C636 and Section 5.2 of ASTM E580, CBC Sections 1616A.1.21 and as supplemented in this Section.
- B. Measure each ceiling area and establish layout to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width grid panel at borders and comply with layout shown on reflected ceiling plans.
- C. Exitways shall be installed in accordance with Section 13.5.6.2.2.(1) of ASCE 7-10 as amended by 2016 CBC Section 1616A.1.21. A main or cross runner shall be installed on all sides of each piece of tile, board or panel and each light fixture or grill. Splices and intersections of such runners shall be attached with through-connectors such as pop rivets screws, pins, plates with bent tabs or by other approved connectors.
- D. Ceilings shall not support material or building components other than grilles or light fixtures except as herein provided. Ductwork, plumbing and like work shall have its own support system and shall not utilize the ceiling system or suspension wires.
- E. No. 12 gage hanger wires may be used for up to and including 4 ft. by 4 ft. grid spacing and shall be attached to main runners.
- F. Provide No. 12 gauge hanger wires at the ends of all main and cross runners within eight (8) inches of the support or within one-fourth (1/4) of the length of the end tee, whichever is least, for the perimeter of the ceiling area. Perimeter wires are not required when the length of the end tee is eight (8) inches or less.
- G. Ceiling grid members shall be attached to two (2) adjacent walls per ASTM E580 Section 5.2.3 Ceiling grid members shall be at least 3/4 inch clear of other walls. If walls run diagonally to ceiling grid system runners, one end of main and cross runners should be free, and a minimum of 3/4 inch clear of wall.
- H. The width of the perimeter supporting closure angle shall be not less than 2 inches. Grid systems with specialty or proprietary angles and support clips may be acceptable in accordance with Acceptance of Evaluation Reports and meeting the requirements of CBC Section 1616A.1.21, ASTM C635, C636 and E580.
- I. At the perimeter of the ceiling area, where main or cross runners are not connected to the adjacent wall, provide interconnection between the runners at the free end to prevent lateral spreading. A metal spreader strut or a No. 16 gage wire with a positive mechanical connection to the runner may be used and placed within 8 inches of the wall. Where the perpendicular distance from the wall to the first parallel runner is 8 inches or less, this interlock is not required.
- J. Expansion Joints, Seismic Separation Joints, and Penetration:
 - 1. Expansion joints shall be provided in the ceiling at intersections of corridors and at junctions of corridors with lobbies or other similar areas.
 - 2. For ceiling areas exceeding 2500 square feet a seismic separation joint shall be provided to divide the ceiling into areas not exceeding 2500 square feet. Alternatively comply with ASTM E580, Section 5.2.9.

3. Penetrations through the ceiling for sprinkler heads and other similar devices that are not integrally tied to the ceiling system in the lateral direction shall have a two (2) inch oversized ring, sleeve or adapter through the ceiling tile to allow free movement of one (1) inch in all horizontal directions. Alternatively, per ASTM E580, Section 5.2.8.5, a flexible sprinkler hose fitting that can accommodate one (1) inch of ceiling movement shall be permitted to be used in lieu of the oversized ring, sleeve or adapter.

K. Lateral Force Bracing:

1. Lateral force bracing is required for all ceiling areas. The spacing of the bracing assemblies as indicated on drawings.
 - a. Exception: Lateral force bracing may be omitted for suspended acoustical ceiling systems with a ceiling area 144 sq. ft. or less, when perimeter support, in accordance with Paragraph H above or with ASTM E580 Sections 5.2.2 and 5.2.3, are provided and perimeter walls are designed to carry the ceiling lateral forces.
2. Provide lateral-force bracing assemblies consisting of a compression strut and four (4) No. 12 gage splayed bracing wires oriented 90 degrees from each other.
3. The spacing of the bracing assemblies must be shown on the construction documents.
4. There shall be a brace assembly a distance not more than one half (1/2) the calculated spacing from the surrounding wall, expansion joint and at the edges of any ceiling vertical offset.
5. Bracing assemblies spaced at a maximum of 12 feet by 12 feet on centers for school buildings and 8 feet by 12 feet on centers for essential services buildings, and
6. The slope of bracing wires shall not exceed 45 degrees from the plane of the ceiling and wires shall be taut. Splices in wires are not permitted without special approval.
7. Compression struts shall be adequate to resist the vertical component induced by the bracing wires, and shall not be more than 1 (horizontal) in 6 (vertical) out of plumb.
8. The maximum slenderness ratio (kL/R) of the compression strut is 200 or less.

L. Attachment of Hanger and Bracing Wires:

1. Fasten hanger wires with not less than three (3) tight turns in three inches. Hanger wire loops shall be tightly wrapped and sharply vent to prevent any vertical movement or rotation of the member within the loops.
2. Fasten bracing wires with four (4) tight turns. Make all tight turns within a distance of 1-1/2 inches.
3. Hanger or bracing wire anchors to the structure should be installed in such a manner that the direction of the anchor aligns as closely as possible with the direction of the wire.
4. Separate all ceiling hanger and bracing wires at least six (6) inches from all un-braced ducts, pipes, conduits, etc.
5. Hanger wires shall not attach to or bend around interfering materials or equipment. Provide trapeze or other supplementary support members at obstructions to typical hanger spacing. Provide additional hangers, struts or braces as required at all ceiling breaks, soffits, or discontinuous areas.

6. Hanger wires that are more than 1 (horizontal) in 6 (vertical) out of plumb shall have counter-sloping wires. Perimeter hanger wires at main runners that are positively attached to the perimeter closure angle, counter-sloping is optional.
7. When drilled-in concrete anchors or shot-in anchors are used in reinforced concrete for hanger wires, 1 of 10 wire/anchor assemblies must be field tested for 200 lbs. in tension. When drilled-in concrete anchors are used for bracing wires, 1 out of 2 wire/anchor assemblies must be field tested for 440 lbs. in tension in the direction of the wire. Power actuated fasteners in concrete are not permitted for bracing wires.

M. Ceiling Fixtures, Terminals, and Devices:

1. All fixture, terminals, and other devices shall be mounted in a manner that will not compromise ceiling performance in accordance with Section 13.5.6.2.2(5) of ASCE 7-10 as amended by 2016 CBC Section 1616A.1.21 (1616.10.16) and ASTM E580 Sections 5.3 and 5.4.
2. Attach all light fixtures and ceiling mounted air terminals, to the ceiling grid runners to resist a horizontal force equal to the weight of the fixtures. Screws or approved fasteners are required.
3. Ceiling panels shall not support any light fixtures, air terminals or devices.
4. All light fixtures shall be positively attached to the ceiling suspended systems by mechanical means to resist a horizontal force equal to the weight of the fixture. Screws or approved fasteners are required. A minimum of two attachments are required at each light fixture, per ASTM E580, Section 5.3.1.
5. Light fixtures weighing less than or equal to 10 lb shall have a minimum of (1) #12 gauge slack safety wire connected from the fixture housing to the structure above.
6. Light fixtures weighing greater than 10 lbs but less than 56 lbs may be supported directly on the ceiling runners, but they shall have a minimum of two (2) #12 gauge slack safety wires connected from the fixture housing at diagonal corners and anchored to the structure above.
7. Light fixtures weighing greater than 56 lbs. shall be independently supported by not less than four (4) taut No. 12 gauge wires, each attached to the housing and to the structure above. The four (4) # 12 taut #12 wires, including their attachment to the structure above, must be capable of supporting four (4) times the weight of the unit.
8. All 4ft. x 4 ft. light fixtures must have slack safety wires at each corner.
9. Surface-mounted fixtures shall be attached to the main runner with at least two positive clamping devices made of material with a minimum #14 gauge. Rotational spring catches do not comply. A #12 gauge suspension wire shall be attached to each clamping device to the structure above. Provide additional supports when light fixtures are eight (8) feet or longer. Maximum spacing between supports shall not exceed eight (8) feet.
10. Support pendant-mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting two (2) times the weight of the fixture. A bracing assembly is required where the pendant hanger penetrates the ceiling. If the pendant mounted light fixture is directly and independently braced below the ceiling, i.e. aircraft cables to walls, then brace assembly is not required above the ceiling.

11. If the pendant mounted light fixture is not directly and independently braced below the ceiling, than a bracing assembly is required where the pendant hanger penetrates the ceiling. Special details are required to attach the pendant hanger to the bracing assembly to transmit horizontal force. Exception: where the weight of the fixture is less than 20 pounds, the compression strut is not required.
 12. Rigid conduit shall not be used for attachment of the fixtures.
- N. Partitions: If non-bearing partitions that extend to and terminate at a suspended ceiling are supported laterally by opposing bracing wires spaced a maximum of 8 ft oc along the top edge of the partition or by other equivalent means, they shall be considered as not adding to the lateral load required to be resisted by the ceiling system.
- O. Do not eccentrically load system or produce rotation of runners.
- P. Install edge angle at intersection of ceiling and vertical surfaces using longest practical lengths. Miter corners. Provide edge angles at junctions with other interruptions. Where curved obstructions occur, provide preformed closers to match edgemolding.
- Q. Form expansion joints as indicated on drawings.
- R. Install Suspension Accent Trims per manufacturer's instructions including all related accessories.
- 3.03 ADDITIONAL REQUIREMENTS
- A. For Suspended Acoustical Ceilings Below Gypsum Board Ceilings: Where gypsum board or other ceiling finishes are attached to the framing, specific details will be required for the vertical hanger wire and lateral bracing wire support connections to the framing.
- 3.04 TOLERANCES
- A. Variation from Flat and Level Surface: 1/8 inch in 10 feet.

END OF SECTION