

SECTION 09 54 24

LINEAR WOOD CEILINGS



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The following spec is intended to cover continuous linear strip ceilings with 3/4 inch open joints. Rev 7/18/23

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PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Continuous linear wood ceiling strips, individually attached.
2. Concealed suspension system.
3. Accessories.
4. [LEED requirements.]

B. Related Sections:

List of specific Div 01 Sections generally not required.

1. [01 31 19 - Project Meetings.
2. 01 33 00 - Submittal Procedures.
3. 01 62 00 - Product Options.

LEED projects, only.

4. [01 81 13.13 - Sustainable Design Requirements – LEED for New Construction and Major Renovations.]

- or -

1. Division 01 – General Requirements.

Retain below as appropriate

2. 05 30 00 - Metal Decking: Attachment points.
3. 07 92 00 - Joint Sealants: Expansion joint fillers.
4. [09 22 26 - Metal Suspension Systems.]
5. 09 29 00 - Gypsum Board: Adjacent work.
6. [09 51 00 - Acoustical Ceilings: Grid suspension system.]
7. [09 53 13 - Acoustical Ceiling Suspension System.]
8. 09 81 00 - Acoustic Insulation: Acoustic blanket insulation.
9. 21 13 00 - Fire-Suppression Sprinkler Systems: Penetrations; coordination.

10. 23 37 13 - Diffusers, Registers, and Grilles.
11. 26 51 00 - Interior Lighting.

C. Drawings, the provisions of the Agreement, the General Conditions, and Division 01 specification sections apply to work of this Section.

1.02 REFERENCES

A. ASTM International:

1. [C 423-22: Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.]
2. C 635 / C 635M-22 - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
3. C 636 / C 636M-19 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
4. E 84-21a: Standard Test Method for Surface Burning Characteristics of Building Materials.
5. [E 580 / E 580M-22 - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.]

B. American National Standards Institute (ANSI):

1. ANSI HPVA HP-1-2020 - American National Standard for Hardwood and Decorative Plywood.
2. ANSI A208.1-2022 – Particleboard.
3. ANSI A208.2-2022 – Medium Density Fiberboard for Interior Applications.

C. Architectural Woodwork Institute: AWI 200 – Care and Storage.

D. FSC® (Forest Stewardship Council) International: FSC Principles and Criteria (P&C) for Forest Stewardship (FSC-STD-01-001 V5-2).

E. Ceilings and Interior Systems Construction Association (CISCA):

1. Ceiling Systems Handbook.
2. Wood Ceilings Technical Guidelines.

F. LEED (Leadership in Energy and Environmental Design): U.S. Green Building Council (USGBC) Green Building Certification Program.

G. California Air Resources Board (CARB): ATCM to Reduce Formaldehyde Emissions from Composite Wood Products.

H. SCS Global Services (SCS):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Include installers of suspension system and linear wood ceiling system. Comply with requirements in [Section 01 31 00 – Project Meetings.] <Insert Section number and title.> Address the following.

1. Scheduling and coordination.
2. Handling and protection requirements; protection from damage due to adjacent work; protection of adjacent work.
3. Shop drawing review.
4. Special conditions, reveals, expansion/movement joints, penetrations, accessories, field cutting requirements, treatment of cut edges.
5. [Seismic provisions.]
6. [Mockups.]
7. Tools.

8. Installation procedures, sequencing, tolerances, and control.
9. Disposition of overage and maintenance materials.
10. Inspection; criteria for acceptance requirements; documentation of work.

B. To extent practical, schedule installation of linear wood ceilings after work above ceiling is complete.

1.04 SUBMITTALS

A. Make submittals in accordance with Section 01 33 00.

B. Action Submittals:

1. Manufacturer's product data and installation instructions, as relevant to the proposed to product(s).
2. [Evidence of compliance with specified acoustical performance criteria.]
3. [Finish Selection Samples: Where finish is not specified or scheduled, submit printed color charts of available finishes. Where finish range has been indicated or directed, submit finished chips or samples for final selection.]
4. Finish Samples: Minimum four 12 inch lengths of [each type of] proposed strip, finished as proposed for the work, for review of stain color and sheen.
5. Accessories:
 - a. Four clips as proposed for attachment of linear members.
 - b. Four splice clips.
 - c. [Felt sight barrier attached to at least two of the finish sample strips.]

Retain below if LEED credit compliance is required; adjust list to reflect credits sought. Credits are based on LEED v4.1 BD+C for New Construction, Schools, Core and Shell, Retail, Data Centers, Hospitality, Warehouses and Distribution Centers, and Healthcare.

C. LEED Submittals: [In accordance with additional requirements of Section 01 81 13.13.]

Bio-Blend core has high recycled content.

1. MR Credit, Building Product Disclosure and Optimization – Sourcing of Raw Materials; Option 2 Recycled Content: Product Data indicating percentage by weight of post-consumer and post-industrial (pre-consumer) recycled content for products having recycled content. Include a statement indicating costs for each product having recycled content.

Linear wood ceilings contribute to credit below when specified with FSC®-certified cores and veneers.

1. MR Credit, Building Product Disclosure and Optimization - Sourcing of Raw Materials; Option 2 Wood Products: Chain-of-custody certificates certifying that wood products comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC®-accredited certification body. Include statement of costs for linear wood ceiling members.

This prerequisite only applies to LEED BD+C for Schools.

2. EQ Prerequisite, Minimum Acoustic Performance; Option 1: Test data indicating the NRC of the ceiling system.

Linear wood ceilings contribute to credit below when specified with recycled-fiber core.

3. EQ Credit, Low-Emitting Materials: For each composite-wood product used in ceiling system fabrication, provide documentation indicating that the bonding agent contains no urea formaldehyde. For each adhesive used in ceiling panel fabrication, documentation indicating that the adhesive contains no urea formaldehyde.

- D. Shop / Coordination Drawings: Reflected ceiling plans, drawn to scale, showing the following:
1. Strip layout, direction(s), perimeter and edge conditions, reveals, expansion joints (as applicable), and details. Indicate spacings and interface with adjacent construction, attachment and splice locations, and field cut details.
 2. Suspension system orientation and layout; locations and type(s) of attachments to building structure[; seismic restraints].
 3. [Access panels; assembly and attachment details.]

Omit if mock-up not required.

4. [Mock-up configuration and location.]
5. Lighting fixtures.
6. Sprinkler penetrations and details..
7. HVAC vents and diffusers.
8. [Provisions for audio-visual equipment mounting.]
9. <Insert item>.

LEED projects, only.

- E. [FSC® Chain of Custody Certification.]
- F. Closeout Submittals: In accordance with Section [01 78 00][____]. Include the following:
1. Record Documents: Include approved shop drawings, relevant change orders and other modifications to the [Contract][Agreement].
 2. Product data describing materials and finishes.
 3. Approved finish sample(s).
 4. Field test records, if applicable.
 5. Maintenance instructions.
 6. Special tools.
 7. Manufacturer and Installer contact information.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
1. Minimum 10 years' experience in the manufacture and successful installation of wood ceiling systems similar in type and scope to that specified.
 2. CISCA membership in good standing.

Retain the following paragraph if FSC® Certified wood products are required.

3. Licensed or certified by FSC®.

- B. Installer Qualifications: Experienced in installation of suspended linear wood ceilings similar in type and extent to that of this project; approved by the wood ceiling manufacturer.

Mockups are generally not required. Include only if necessary for review of installation quality or handling of special conditions.

- C. Mockups: [For each type,]Install full length strips, in quantity required for minimum [four] <Insert number> strips. Configure to include conditions at side and end-to-end joints. [Approved Mockups in good condition may remain in place and incorporated into completed Work.]

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Prior to installation of wood components, acclimatize for a minimum of 72 hours, in accordance with AWI 200, except as otherwise specified.

[Project No.]
[Date]

[Project Name]
[Project Location]

- B. Deliver linear wood components after building is enclosed, concrete [and plaster]work is complete, and HVAC system is operating and maintaining temperature between 60° and 85°F, and relative humidity between 25% and 75%.
- C. Store wood components in conditioned space, away from local heat sources and out of direct sunlight. Keep components dry.
- D. Maintain packaging as necessary to prevent damage to linear members, except that packaging may be opened after delivery to facilitate inspection and ventilation.

1.07 WARRANTY

- A. Furnish warranties in accordance with Section 01 77 00.
- B. Furnish from the manufacturer, a minimum one-year written warranty, executed to the Owner, against defects in workmanship and materials.
- C. Furnish from the installer, a one-year warranty covering linear wood ceiling system(s), commencing on the date of final acceptance of the completed ceiling work.

1.08 MAINTENANCE

- A. Extra Stock: Furnish minimum [2][3] percent of the quantity of [each]type of linear wood member used in the work, but not less than four full size pieces. Include attachment clips and accessories.
- B. Leave at site where directed, in clearly marked sealed cartons. Obtain receipt for extra stock.
- C. Wood strips which are used to satisfy extra stock requirements shall be free of damaged materials, seconds, or components which are not in conformance with these specifications.

PART 2 PRODUCTS

2.01 LINEAR WOOD CEILINGS

- A. Manufacturer: Madrid, Inc., Pico Riviera CA, (562) 942-0707, sales@madridinc.com.
- B. Substitutions will not be considered.

Select substitution limitation paragraphs above or below.

- A. Manufacturer; Basis of Design: Madrid, Inc. Pico Riviera CA, (562) 942-0707, sales@madridinc.com).
- B. Substitutions will be considered subject to[provisions of Section 01 62 00,] compliance with all requirements of these specifications, and Architect's approval of conformance to design intent.

Select proper system(s).

- C. Ceiling System: ["Continuous Linear – 1"; 3/4 inch x 3-1/4 inch wide x 95 inch long]["Continuous Linear – 2"; 3/4 inch x 5-1/4 inch wide x 95 inch long] veneered wood ceiling planks, including accessories for a complete suspended linear wood ceiling system.

[Author]
[File Name]

Linear Wood Ceilings
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2.02 PERFORMANCE CRITERIA

- A. Surface-Burning Characteristics of Wood and Composite Members: Comply with ASTM E 84.
1. Flame-Spread Index: 25 or less.
 2. Smoke-Developed Index: 65 or less.

Omit in applications where acoustic control is not required.

- B. Sound Absorption: Independently tested in configuration similar to that shown to achieve the following in accordance with ASTM C 423, Type [A][C] mounting.

Insert values in accordance with Madrid Inc. current test data.

1. NRC: \geq [].
2. SAA: \geq [].

2.03 MATERIALS

Solid wood not recommended for most applications. Verify.

- A. [Solid Wood: <Insert species, cut, and grade>.]
- B. Linear Members: Veneer faced [MDF][proprietary core][particleboard].

Select one of the three following core options.
Maintain CARB requirement, regardless of LEED certification requirements.

1. Core: Medium density fiberboard, ANSI A208.2, Grade 130; made with no added urea formaldehyde per applicable CARB requirements. [minimum [50][< >] percent pre-consumer (post industrial) recycled content,][FSC certified,][Fire retardant-treated per ASTM E 84; Class A].
2. Core: Particleboard; Madrid, Inc. ANSI A208.1 Grade M-2; "Bio-Blend."
 - a. Recycled Content: 100 percent pre-consumer recycled content, SCS Recycled Content Certification.
 - b. Indoor Air Quality: Made with no added urea formaldehyde per applicable CARB requirements.

Retain the following subparagraph if FSC certified core is required.

- c. FSC[®] Certified.
3. Core: Particle board: ANSI A208.1 Grade M-2; made with no added urea formaldehyde per applicable CARB requirements.

Veneers in paragraph below are examples of Madrid standard. See <https://madridinc.com/veneer/> for other veneer options. Contact manufacturer for custom veneers.

4. Veneer: [Cherry-PS][Maple-PS-L][Oak-Red-RIFT-L] [Ash-White-QTR-L][Birch-White-QTR-L] [Beech-Euro-STM-PS-L][Bamboo-Light-QTR-NRW-L][As scheduled][Custom; < >][FSC certified].

2.04 LINEAR WOOD CEILING STRIPS

Certified materials are not standard. Retain paragraph below for LEED projects.

- A. Certified Materials: Furnish wood components certified as "FSC[®] 100%" or "FSC[®] Mixed" according to FSC[®] STD-01-001.
- B. Linear Members:
1. Size: [3-1/4][5-1/4] inches wide by 95 inches long.
 2. Complete fabrication and finishing before shipment to Project site.
- C. Access Panel[s]: Configure to match linear wood panel design as necessary to conceal to the greatest practical extent.
1. Size: [24 by 20 inches] <Insert size>.

2. Opening: [Upward.] [Downward.] [Upward or downward.]
3. Latch: Cam latch operated by screwdriver [knob,]or hex wrench.

2.05 SUSPENSION SYSTEM

- A. Grid: Specified in Section 09 51 00.[Section 09 53 13.][Section <Insert section number>.]

Retain paragraph above if the suspension system is specified in another section. If the suspension system is not specified in another section, delete paragraph above and retain two paragraphs below.
Where sound attenuation blankets or felt strip closures are indicated between panels, black finish not necessary.

- B. Grid: 15/16 inch x 1-1/2 inch high metal T-grid system including main runners and cross tees per ASTM C 635; 2' x 4' layout unless otherwise indicated or required; heavy duty structural classification[; black finish].
- C. Suspension System Attachment:
1. Wire Hangers, Braces, and Ties:
 - a. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 61M, Class 1 zinc coating, soft temper.
 - b. Size: AWG minimum 12 gage, unless otherwise necessary to resist at least 3 times design load indicated in ASTM C 635, Table 1 "Direct Hung."
 2. Anchors: Sized to resist at least 3 times design load.
 - a. Anchors: Contractor's option; drive pins with hangers, eyes, or other devices suitable for attachment of wires to structure above.
 - b. Channels: Furnish for secondary supports as necessary to span above-ceiling services.

2.06 ACCESSORIES

- A. Clips:
1. For Attachment of Wood Panels to Suspension System: Proprietary; Madrid, Inc, "Continuous Linear Clip"; galvanized sheet metal; configured for 3/4-inch spacing between panels; black finish.
 2. Splice Clips: Proprietary; Madrid, Inc. "Continuous Linear Alignment Clip"; 1-3/4 inch minimum length; configured to hold end-to-end splices in accurate horizontal and vertical alignment; black finish.

Retain paragraph / subparagraphs below as appropriate to the design, and in accordance with acoustical and ventilation requirements. If ceiling is to be open, then verify that above-ceiling items to be furnished under other Sections are specified with black finish, or painted prior to installation.

- B. Miscellaneous:
1. Felt Sight Barriers: Black; factory-installed to one side of each linear strip.
 2. Sound Attenuation Blankets / Barriers: Provided under Section 09 81 00.

2.07 FINISHES

- A. Transparent Finish:
1. Stain: [As necessary to match veneer selected from manufacturer's standard offering.] [Match Architect's sample.] <Insert stain color>.

Satin (matte) finish is standard

2. Varnish: Waterborne, UV-curable acrylated epoxy, polyester, or urethane; [flat][satin][semi-gloss][gloss]sheen.

Following paragraph only applicable to pre-assembled linear panels.

- B. Opaque Wood Finish: Flat black; water-based latex acrylic, unless otherwise approved.
- C. Apply varnish finish to all exposed wood surfaces. Stain may be omitted from top surfaces not exposed to view.
- D. Suspension System Components: Prefinished; manufacturer's standard.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas to receive linear ceilings, including structural framing, for compliance with requirements. Verify that above-ceiling work is complete, and properly finished.

3.02 SUSPENSION SYSTEM INSTALLATION

- A. Coordinate installation of [wire hanger]and][hanger rod]suspension system(s) with work of [Section 09 22 26.][Section 09 51 00.][Section 09 53 13.][Section <Insert section number>.]

Retain paragraph above if the suspension system is specified in another section. If the suspension system is not specified in another section, delete paragraph above and retain paragraphs below.
ASTM E 580 for seismic areas, only.

- B. Install suspension system in accordance with ASTM C 636 / C 636M, [ASTM E 580 / E 580M], applicable requirements of CISCA "Ceiling Systems Handbook," applicable Building Code requirements, suspension system manufacturer's instructions, and as supplemented in this section.
- C. Install hangers and inserts coordinated with overhead work. Provide additional hangers and supports as necessary to complete system.
- D. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of L/240.
- E. Lay out system to a balanced grid design in accordance with approved shop drawings, with edge unit lengths and widths as indicated. Orient and position grid as necessary to align with intended linear ceiling member attachment points. Install supplementary cross members where necessary to ensure support of strip ends, as specified.
- F. Hang suspension system independent of walls, columns, ducts, pipes and conduit.

Select one of the following if appropriate.

- G. Seismic Design Category C: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Maintain a 3/8 inch (9 mm) clearance between grid ends and wall. Provide diagonal bracing in accordance with building code and seismic design requirements.
- H. Seismic Design Categories D, E, F: Hang suspension system with grid ends attached to the perimeter molding on two adjacent walls; on opposite walls, maintain a 3/4 inch (19 mm) clearance between grid ends and wall, unless otherwise indicated. Provide diagonal bracing in accordance with building code and seismic design requirements.

- I. Where ducts, facility services, or equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- J. Coordinate with other trades as necessary to accommodate fixture loads, light fixture boxes, etc.
- K. Form expansion joints as necessary to accommodate thermal and seismic movement.

3.03 LINEAR WOOD CEILING INSTALLATION

- A. Install linear wood strips in accordance with manufacturer's installation instructions and applicable requirements of CISCA wood ceilings guidelines.
 - 1. Coordinate with suspension system installation.
 - 2. [Sequence with installation of sound attenuation blankets.]
 - 3. Install attachment clips to suspension grid in sequence with panel installation; space clips at 24 inches o.c., except use additional clips attached to supplementary grid members to ensure that panel end/joint is no greater than 8 inches from endmost clip.
 - 4. Neatly cut or bore wood components as necessary to accommodate in- and through-ceiling items such as sprinklers and light fixtures.
 - 5. Install strips with orientation as indicated on the approved shop drawings and in accordance with the manufacturer's installation instructions. For continuous runs, stagger end-to-end joints for random non-repeating pattern, with no two adjacent joints closer than 12 inches.
 - 6. Attach panels to suspension system using manufacturer-approved clips or fasteners. Install one splice clip at each side of each end-to-end joint.
 - 7. Use full length strips to the greatest reasonable extent. End-to-end splices are not permitted where installed strip run is less than stock panel length. Where installed run exceeds stock strip length, configure so that no end-to-end splices occur less than 24 inches from strip end.
 - 8. Maintain end and edge reveals as indicated; where strip edge trimming is necessary, position strips so that no less than one third of the edge of the linear panel member remains.
- B. Where indicated for black felt sight barriers, orient strips to accommodate pre-installed felt. Cut felt as necessary for neat installation around attachment clips.

3.04 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/4 inch in 10 feet (6 mm in 3 m).

3.05 CLEANING

- A. Clean and touch up minor finish damage in accordance with manufacturer's instructions. Remove and replace components that cannot be successfully cleaned and repaired.

END OF SECTION