**SECTION 09 53 00**

**ACOUSTICAL CEILING SUSPENSION ASSEMBLIES**

**CLEAN ROOM GRID (Steel)**

**PART 1 – GENERAL**

* 1. **RELATED DOCUMENTS**

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

* 1. **SUMMARY**
1. Section Includes
	1. Exposed grid suspension system
	2. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
	3. Accessories
	4. Perimeter Trim
2. Related Sections
	1. Section 09 51 13 – Acoustical Panel Ceilings
	2. Section 09 51 14 – Acoustical Fabric Faced Panel Ceilings
	3. Section 09 51 23 – Acoustical Tile Ceilings
	4. Section 09 53 00 - Acoustical Ceiling Suspension Assemblies
	5. Section 09 20 00 - Plaster and Gypsum Board
	6. Section 01 81 13 - Sustainable Design Requirements
	7. Section 01 81 19 - Indoor Air Quality Requirements
	8. Section 02 42 00 - Removal and Salvage of Construction Materials
	9. Division 23 - HVAC Air Distribution
	10. Division 26 - Electrical
3. ALTERNATES
	1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been pre-approved by the architect and included in the Addenda, the originally specified products shall be provided without additional compensation.
	2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers; Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.
	3. **REFERENCES**
4. American Society for Testing and Materials (ASTM):
	1. ASTM A1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
	2. ASTM A641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
	3. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
	4. ASTM C423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
	5. ASTM C635/C635M Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
	6. ASTM C636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
	7. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
	8. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
	9. ASTM E580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
	10. ASTM E1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems
	11. ASTM E1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
	12. ASTM E1264 Classification for Acoustical Ceiling Products
	13. ASTM E283 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Difference Across the Specimen
5. International Building Code
6. ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality
7. NFPA 70 National Electrical Code
8. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures
9. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components
10. International Code Council-Evaluation Services Report - Seismic Engineer Report
	1. ESR 1308 - Armstrong Suspension Systems
11. California Department of Public Health CDPH/EHLB/Standard Method v1.2 2017
12. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings
13. International Well Building Standard
14. Mindful Materials
15. Living Building Challenge
16. U.S. Department of Agriculture BioPreferred program (USDA BioPreferred).
17. Clean Rooms up to ISO Class 5 (Class 100)
	1. **SYSTEM DESCRIPTION**
18. Acoustical Ceiling Suspension Assembly
	1. **SUBMITTALS**
19. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
20. Samples: Minimum 6-inch x 6-inch samples of specified acoustical panel; 8-inch-long samples of exposed wall molding and suspension system, including main runner and 4-foot cross tees with end detail.
21. Shop Drawings: Layout and details of acoustical ceilings show locations of items that are to be coordinated with or supported by the ceilings.
22. Acoustical Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification, such as Underwriter’s Laboratory (UL), of NRC, CAC, and AC.
	1. If the material supplied by the acoustical subcontractor does not have an independent laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of, and replaced with complying product at the expense of the Contractor performing the work.
	2. **SUSTAINABLE MATERIALS**
23. Transparency: Manufacturers will be given preference when they provide documentation to support sustainable requirements for the following: Material ingredient transparency, Removal of Red List Ingredients per LBCV3, Life Cycle impact information, Low-Emitting Materials, and Clean Air performance.
	1. Health Product Declaration (HPD). The end use product has a published, complete Health Product Declaration with disclosure at a minimum of 1000ppm of known hazards in compliance with the Health Product Declaration Open Standard.
	2. Declare Label. The end use product has a published Declare label by the International Living Future Institute with disclosure of 100 ppm with a designation of Red List Free or Compliant (less than 1% proprietary ingredients).
	3. Low Emitting products with VOC emissions data. Preference will be given to manufacturers that can provide emissions data showing their products meet any of the following: CDPH/EHLB/Standard Method v1.2-2017; Indoor Air Quality Certified to SCS-105 v4.2-2023 [Gold VOC Certificate]
	4. Life cycle analysis. Products that have communicated lifecycle data through Environmental Product Declarations (EPDs) will be preferred.
	5. End of Life Programs/Recycling: Where applicable, manufacturers that provide the option for recycling of their products into new products at end-of-life through take-back programs will be preferred.
	6. Products meeting LEED V4 requirements including:
		1. Building Product Disclosure and Optimization Environmental Product Declarations
		2. Building Product Disclosure and Optimization Sourcing of Raw Materials
		3. Building Product Disclosure and Optimization Material Ingredients
		4. Construction and Demolition Waste Management
	7. **QUALITY ASSURANCE**
24. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer to ensure fit and function.
25. Installer Qualifications: Company specializing in performing specified work type, a minimum of three years of documented experience, and approved by the manufacturer.
26. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
27. Surface Burning Characteristics: Tested per ASTM E 84 and complying with ASTM E 1264 Classification.
28. Seismic Design: Consult with a professional who has experience in seismic design and is licensed in the state in which the project is located.
	1. **DELIVERY, STORAGE, AND HANDLING**
29. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
30. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
31. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.
	1. **PROJECT CONDITIONS**
32. Space Enclosure:
	1. HumiGuard Plus Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Products with HumiGuard Plus performance and hot dipped galvanized steel, aluminum or stainless-steel suspension systems can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the ceiling.
	2. **ALTERNATE CONSTRUCTION WASTE DISPOSAL**
33. Ceiling material being reclaimed must be kept dry and free from debris.
34. Before disposing of ceilings, contact the Armstrong Recycling Center at 877-276-7876, select option #1 then #8 to review with a consultant the condition and location of building where the ceilings will be removed. The consultant will verify the condition of the material and that it meets the Armstrong requirements for recycling. The Armstrong consultant will help facilitate the process to recycle the ceiling.
35. Recycling may qualify for LEED Credits:
	1. LEED 2009 - Category 4: Material and Resources (MR)
		1. Credit MRc2: Construction Waste Management
	2. LEEDv4 - MRp2
		1. Construction Waste Management Planning Qualifies as a material stream (non-structural) targeted for diversion. Ceilings will be source-separated and diverted through the Armstrong Ceiling Recycling Program.
	3. LEEDv4-MRc5
		1. Option 1: Divert ceilings to qualify for one of the 3 material streams (50%)
		2. Option 2: Divert ceilings to qualify for one of the 4 material streams (75%)
	4. **WARRANTY**
36. 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 with HumiGuard® Max and HumiGuard® Plus performance: sagging and warping
	2. Acoustical panels with BioBlock® performance: growth of mold and mildew
	3. Grid System: rusting and manufacturer's defects
37. Warranty Period:
	1. Ceiling System: Thirty (30) years from date of substantial completion
38. 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. **MAINTENANCE**
39. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
	1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
	2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

**PART 2 – PRODUCTS**

* 1. **MANUFACTURERS**
	2. Suspension Systems:
		1. Armstrong World Industries, Inc. (www.armstrongceilings.com)
	3. **METAL SUSPENSION SYSTEMS**
	4. Components:
		1. Main beams and cross tees, base material and end detail shall be roll-formed from commercial quality steel sheet/coil
		2. Main beams and cross tees shall have a fully integrated co-extruded gasketing.
			1. Integrated gasketing must be PVC-free
			2. Foam-gasketed systems will not be accepted
		3. Main beams and cross tees shall have a surface finish of baked polyester.
		4. Main beams and cross tees shall have a white steel capped face.
		5. Main beams and cross tees shall have rotary-stitching for additional torsion strength.
		6. The cross-tee end details shall be integral with XL® staked-on clip.
		7. The main beam/cross tee interface shall be flush fit.
	5. Structural Classification: Product must be manufactured and tested in accordance with ASTM C635/C635M. Intermediate or Heavy Duty.
	6. Testing in accordance with ASTM E283 is required
	7. Color: White (WH)
	8. Sustainability: Environmental Product Declaration (EPD), Health Product Declaration (HPD), Declare Label, Gold VOC Certificate
	9. Basis of Design:
		1. CLEAN ROOM™ 15/16” Exposed Tee Steel suspension system as manufactured by Armstrong World Industries, Inc.
	10. Substitutions: Refer to Alternates in Part 1.
1. Attachment Devices: Size for five times design load indicated in ASTM C635, Table 1, Direct Hung unless otherwise indicated.
2. Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 12 gauge.
3. Edge Moldings, as manufactured by Armstrong World Industries, Inc.
Select from the following:
	1. ES7801: 12’ Hemmed Angle Molding with co-extruded gasket on horizontal flange
4. AXIOM Trim & Transitions as manufactured by Armstrong World Industries, Inc. [www.armstrongceilings.com/axiom](http://www.armstrongceilings.com/axiom)
5. Accessories as manufactured by Armstrong World Industries, Inc.
Select from the following:
	1. BERC2 – Beam End Retaining Clip
	2. CHDC – Clear Hold Down Clip
	3. BHDC – Border Hold Down Clip

**PART 3 – EXECUTION**

**3.1 EXAMINATION**

1. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

**3.2 PREPARATION**

1. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.
2. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
	1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

**3.3 INSTALLATION**

1. Follow manufacturer installation instructions: [www.armstrongceilings.com/installation](http://www.armstrongceilings.com/installation)
2. Install suspension system and panels in accordance with the manufacturer's instructions. Grid installation should be square, level, and installed in compliance with ASTM C 636 and with the authorities having jurisdiction.
3. Suspend main beam from overhead construction with hanger wires spaced 4 feet on center along the length of the main runner. Install hanger wires plumb and straight.
4. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
5. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.
6. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.
7. Installations occurring in seismic design categories C, D, E, or F must follow the methods described in the Seismic Design: What You Need to Know document. This document outlines the Armstrong Seismic Rx methods for installing suspended ceilings in compliance with the International Building Code (IBC) requirements for seismic design categories C, D, E, and F. BERC2 (steel) and ALBERC2 (aluminum) are available as part of the Armstrong Seismic Rx solution.
8. If positive pressure is being maintained in the clean room, hold down clips may be required – one on each side of the 2' x 2' panel and two clips at the third point on each 4' cross tee. Hold down clips (CHDC) also may be required within 3" of the perimeter on the perimeter tee. Border hold down clips (BHDC) are recommended every 24" O.C.

**3.4 ADJUSTING AND CLEANING**

1. Replace damaged or broken panels and components with new panels and components to match original
2. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to match original and eliminate evidence of damage.