**SECTION 09 50 00

 09 54 00 Integrated Ceiling Assemblies**

# Part 1 – General

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

1. Section Includes
	1. Acoustical ceiling panel
	2. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
	3. Perimeter Trim
2. Related Sections
3. Section 09 51 13 - Acoustical Fabric-Faced Panel Ceilings
4. Section 09 53 00 - Acoustical Ceiling Suspension Assemblies
5. Section 09 83 00 – Acoustical Finish
6. Section 09 20 00 - Plaster and Gypsum Board
7. Section 09 22 16 - Non-Structural Metal Framing
8. Section 01 81 13 - Sustainable Design Requirements
9. Section 01 81 19 - Indoor Air Quality Requirements
10. Section 02 42 00 - Removal and Salvage of Construction Materials
11. Divisions 23 - HVAC Air Distribution
12. Division 26 - Electrical
13. Alternates
	* 1. Prior Approval: Unless otherwise provided for in the Contract documents, submit proposed product substitutions 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 and acceptance. Approved products will be set forth by the Addenda. If a substitution is included in a Bid and is not approved by an Addendum, the specified products shall be provided as in place of the substitute without additional compensation.
	1. 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 (if specified in Section 1.5); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

## 1.3 REFERENCES

1. American Society for Testing and Materials (ASTM):
2. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
3. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
4. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
5. ASTM C 645 Standard Specification for Metal Suspension Systems
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
7. ASTM C754 AND C1858 All installations should be in compliance with these tests.
8. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
9. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
10. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
11. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
12. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation between Rooms Sharing a Common Ceiling Plenum
13. ASTM E 1264 Classification for Acoustical Ceiling Products
14. ASTM E3090 All references to suspension component property testing per this test method.
15. B. International Building Code
16. C. ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality
17. D. NFPA 70 National Electrical Code
18. E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures
19. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components
20. International Code Council-Evaluation Services Report - Seismic Engineer Report
	1. 1. ESR 1289 - Armstrong Suspension Systems
21. California Department of Public Health CDPH/EHLB Emission Standard Method Version 1.2 2017
22. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings
23. International Well Building Standard
24. Mindful Materials
25. Living Building Challenge

## 1.4 SYSTEM DESCRIPTION

Continuous/Wall-to-Wall or Cloud installation

## 1.5 SUBMITTALS

1. **Shop Drawings:** Layout and details of ceilings. Show locations of items that are to be coordinated with, or supported by the ceilings.
2. **Installation Instructions:** Submit manufacturer’s installation instructions as referenced in Part three, Installation.
3. **Product Data:** Submit manufacturer’s technical data for each type of ceiling unit and suspension system required.
4. **Samples:** Minimum 6 x 6 inch samples of specified panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.
5. **Certifications:** Manufacturer’s certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.
6. **Non-Conformance:** All products not conforming to the requirements of this specification and or the manufacturer’s published values are to be disposed. The Contractor performing the work will replace with approved product at their expense.

## 1.6 SUSTAINABLE MATERIALS

1. 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.
2. Health Product Declaration. 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.
3. 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).
4. Low Emitting products with VOC emissions data. Preference will also be given to manufacturers that can provide emissions data showing their products meet CDPH Standard Method v1.2, 2017 (Section 01350).
5. Life cycle analysis. Products that have communicated lifecycle data through Environmental Product Declarations (EPDs) will be preferred.
6. 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.
7. Products meeting LEED V4 requirements including:
	1. Storage & Collection of Recyclables
	2. Construction and Demolition Waste Management Planning
	3. Building Life-Cycle Impact Reduction
	4. Building Product Disclosure and Optimization Environmental Product Declarations
	5. Building Product Disclosure and Optimization Sourcing of Raw Materials
	6. Building Product Disclosure and Optimization Material Ingredients
	7. Construction and Demolition Waste Management

## 1.7 QUALITY ASSURANCE

1. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
2. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
3. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 Classification.
4. Acoustical Panels: As with other architectural features located at the ceiling that may obstruct or skew the planned fire sprinkler pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.
5. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers. ACOUSTIBuilt Panels are 7/8” thick.
6. Installer Qualification: Subcontractor is an experienced Installer that has reviewed and understands the system installation instructions thoroughly. Subcontractor will follow written installation instructions and utilize approved equipment and procedures for finishing installation.
7. ACOUSTIBuilt is finished to a level 4 drywall finish equivalent. Installing ACOUSTIBuilt requires special attention to finishing details. Light coves and low angle lighting will exaggerate imperfections. Mock-ups and hands-on training are strongly recommended.

## 1.8 DELIVERY, STORAGE AND HANDLING

1. Deliver acoustical ceiling units to project site in original, unopened packages/crates and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
2. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content. Store all material within temperature limits required by manufacturer.
3. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

## 1.9 PROJECT CONDITIONS

1. Space Enclosure:
2. Building areas to receive ceilings shall be free of construction dust and debris. ACOUSTIBuilt panels should be installed in areas where the building is enclosed and the HVAC is continuously functioning. This product is not recommended for exterior applications, where standing water is present, or where moisture will come into direct contact with the ceiling.
	* 1. HVAC should be designed, installed, and operated in accordance with ASHRAE Standard 62.1. It is also necessary for the area to be enclosed, for the HVAC systems to be functioning, and in continuous operations for the life of the product. Product is not intended for use where natural ventilation is part of the ventilation strategy and not recommended in areas where a differential plenum pressure exists.

## 1.10 WARRANTY

1. 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: Manufacturer’s defects in material
	2. Grid System: Rusting and manufacturer's defects
2. Warranty Period:
	1. Acoustical panels: Ten (10) years from date of substantial completion
	2. Suspension: Ten (10) years from date of substantial completion
3. 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.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

1. Basis of Design ACOUSTIBuilt:
	1. Armstrong World Industries, Inc.
2. Finish
	1. Joint Compound Finish by Others
	2. Spray Applied Finish by Armstrong World Industries, Inc.
3. Suspension Systems
	1. Armstrong World Industries, Inc.
4. Perimeter Trim Systems
	1. Armstrong World Industries, Inc.
5. Soffit Construction
	1. Armstrong World Industries, Inc. Drywall Grid SimpleSoffit™

## 2.2.1 ACOUSTICAL CEILING UNITS

1. Acoustical Panels
	1. Surface Texture: Fine
	2. Composition: Mineral Fiber
	3. Color: White (Fine Texture Finish for ACOUSTIBuilt panels)
	 Black (Fine Texture Finish for ACOUSTIBuilt panels)

Custom Colors: Available in all colors tones

* 1. Size: 48 in x 72 in x 7/8 in - Item #2604
	2. Edge Profile: Tapered edges four sides
	3. Noise Reduction Coefficient (NRC): ASTM C 423; Panel 0.80 (UL)
	4. Ceiling Attenuation Class (CAC): ASTM C 1414; Panel 46 (UL), System up to 48
	5. Sabin: Cloud Applications: 0.80 Sabins/SF & 1.33 Sabins/SF with infill item 8200T10
	6. Flame Spread: ASTM E 1264; Class A
	7. Light Reflectance (LR) White Panel: ASTM E 1477; 0.87
	8. Dimensional Stability: HumiGuard Plus
	9. Recycle Content: Post-Consumer and Pre-Consumer – up to 75%
	10. Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label
	11. Life Cycle Assessment: Third Party Certified Environment Product Declaration (EPD)
	12. Acceptable Product: ACOUSTIBuilt panels #2604 No added formaldehyde as manufactured by Armstrong World Industries
	13. Contact your local Armstrong Representative for required installation training at least 4-6 weeks before ordering materials and scheduling installation.
1. Finish
	1. Joint Compound
		1. Setting Compound: Lightweight setting-type drywall joint compound, Ultra lightweight drying-type drywall joint compound
		2. Joint Tape: Self-Adhesive mesh drywall joint tape (Panel to Panel)
			1. Use Setting Type Compound for initial coats and use Drying Type Compound for final coats per the installation instructions.  DO NOT use any other type of drywall compound such as All-Purpose Compound.
			2. Paper tape at the wall intersection
	2. Spray Applied Finish – Required Product: #2605WH or 2605BL Fine Texture Finish for ACOUSTIBuilt panels – White as manufactured by Armstrong World Industries.

For information regarding the ACOUSTIBuilt products, contact your Armstrong Sales Representative:

<https://www.armstrongceilings.com/commercial/en/rep-locator.html>

1. Suspension Systems
	1. Armstrong Drywall Suspension Systems all main beams and cross tees shall be commercial quality hot-dipped galvanized steel
		1. Main beam: manufactured main beam- 1-1/2" knurled face with ScrewStop™ reverse hem by 1-11/16 inches high. Drywall Main Beams are factory punched with cross tee routs, hanger wire holes, and SuperLock™ main beam clip for a strong secure connection and fast accurate alignment. Drywall Main Beams are Heavy-duty performance per ASTM C635
		2. HD8906 - 12ft HD Drywall Main Beam 1-1/2 in
	2. Cross Tees: manufactured cross tee- 1-1/2" knurled face with ScrewStop™ reverse hem by 1-1/2 inches high with factory punched cross tee routs and hanger wire holes and XL stake on clip for a strong secure connection.
		1. XL8945P - 4ft Drywall Cross Tee
	3. Wall Molding:
		1. KAM12 - 12ft Knurled Angle Molding 1-1/4" Face
	4. Hanger wire: a Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three times the design load, but not less than 12-gauge.
	5. Fasteners (for Panel attachment)
		1. #6 x 1-5/8” Fine thread drywall screws
		2. Recommended Adhesives: Loctite PL Premium Polyurethane Construction Adhesive, OSI F38 Drywall Panel Adhesive.
	6. Perimeter Systems
		1. Commercial quality extruded aluminum alloy 6063 trim channel, factory finished in baked polyester paint. Commercial quality galvanized steel unfinished T-bar connection clips; galvanized steel splice plates.
			1. Color: White
			2. Size: 120 in X 4 in (also available in 6”)
			3. Recycle Content: Post-Consumer - 50% Pre-Consumer - 0%
			4. Acceptable Product: AXIOM One Piece for Drywall, 4in Straight – AX1PC4STR or Curved AX1PC4CUR as manufactured by Armstrong World Industries
		2. Axiom Trim Channel:
			1. AX4STR 4in Axiom Classic Straight
			2. AX1PC4STR 4IN One –Piece Drywall Trim
		3. Axiom Bottom Trim with taping flange
			1. AXBTASTR – Bottom Trim for ACOUSTIBuilt (also available in curved)
		4. Axiom Accessories:
			1. AXSPLICE - Splice Plate
2. Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label
3. Life Cycle Assessment: Third Party Certified Environmental Product Declaration (EPD)

# PART 3 - EXECUTION

1. Prior to installation, contact your Armstrong Installation Systems Specialist (ISS). Before installation, inspect previous work of all other trades. Verify that all work is complete and accurate to the point where this installation may properly proceed in strict accordance with framing shop drawings.
2. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
3. The system installation is similar to a conventional drywall installation. However, there are key differences in both material substrate and methods of finishing and installation that make this system unique. Installers should review and follow all written directions of the installation instructions and view the installation video.
<https://www.armstrongceilings.com/commercial/en/commercial-ceilings-walls/acoustibuilt-ceiling-panels.html#!video=6034280272001>
4. Installation: In accordance with all approved plans, details, and manufacturer's installation guidelines located in the Armstrong ACOUSTIBuilt Assembly and Installation Instructions (BPLA-299099) [Click to follow to ACOUSTIBuilt Installation Instructions](https://www.armstrongceilings.com/pdbupimages-clg/221597.pdf/download/installation-instructions-acoustibuilt.pdf), and Drywall Grid Systems Hanging and Framing Flat Ceilings Installation Guides (BPCS3539) [Click to follow to Hanging and Framing Flat Drywall Instructions.](https://www.armstrongceilings.com/pdbupimages-clg/219715.pdf/download/technical-guide-hanging-framing-flat-ceilings.pdf)
	1. Install seismic components if required by the building code. Seismic components to be specified on the architectural plans by the project engineer or design team.
	2. Suspend main beam from overhead construction with hanger wires spaced 4-0 ft. on center along the length of the main runner. Install hanger wires plumb and straight.
	3. 48” Cross tees shall be installed 16” on center. Extra cross tees are required at 72” every 12’. All 4 panel edges must be supported by a grid main or tee.
	4. Install wall moldings/perimeter trim at intersection of suspended ceiling and vertical surfaces
	5. Main runners and cross tees shall be attached at perimeter conditions
	6. When determining the grid layout, consider the long edges of the boards must run parallel with the mains.
	7. This system relies on a square grid system to ensure panel edges align at centers of cross tees. If the installation does not meet these squareness requirements, the panel edges may run off the grid system.
		1. The system must be square to within 1/8" over a 48" x 48" module.
		2. The suspension system must be leveled to within 1/4" in 10'.
	8. Floating perimeters must be trimmed with either Axiom® One-Piece Drywall Trim or Axiom® Classic with Bottom Trim for ACOUSTIBuilt™. Refer to the installation instructions for integration with ACOUSTIBuilt installations.
	9. Install access doors where plenum access is required. Refer to the RCP for the location)

**3.2.1 PREPARATION**

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.
2. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
3. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.
	* 1. **INSTALLATION**

Follow manufacturer installation instructions. Armstrong ACOUSTIBuilt Assembly and Installation Instructions (BPLA-299099) [Click to follow to ACOUSTIBuilt Installation Instructions](https://www.armstrongceilings.com/pdbupimages-clg/221597.pdf/download/installation-instructions-acoustibuilt.pdf)  Check

1. Control joints are required following the standards used for gypsum board listed in ASTM C840, Section 20
	1. Ceilings with perimeter relief cannot exceed 50 LF and 2500 SF between control joints
	2. Ceilings without perimeter relief cannot exceed 30 LF and 900 SF between control joints
2. Panel joints and fasteners are finished with tape and compound to create a flat surface. While the materials used to finish ACOUSTIBuilt panels are also used to finish drywall, the procedure has unique requirements.
3. Joint compound coverage shall be limited to preserve the acoustical performance of the panels. Compound at panel joints shall not exceed 8 inch widths. Compound applied to field fasteners shall not exceed 2 inch by 2-inch areas. All compound shall be smooth and free of tool marks and ridges. Panels are to be finished with taping knives. Production tools, including boxes, are detailed on the installation instructions.
4. Sanding and inspection: Throughout the sanding process, inspect the surface frequently for flatness. Direct a light across the ceiling to highlight unevenness that requires attention.
5. Fine Texture Finish shall be applied in 4-5 coat process (additional coat may be used to achieve the desired finish) as called out in the installation instructions. Fine Texture Finish for ACOUSTIBuilt is applied in multiple coats, layered to achieve a uniform appearance and acoustical performance. It is strongly encouraged to practice spraying to ensure proper calibration and technique are achieved. Refer to the installation video.
	1. ACOUSTIBuilt fine texture finish MUST be sprayed with a Graco Mark V texture system. This equipment properly atomizes the finish for acoustics and aesthetics. Fine texture finish is not intended for use with any other airless paint systems not recommended by Armstrong or to be applied by brush or rolling.
	2. See Manufactures installation instructions for correct spray tip, pressure settings for spray system, finish preparation, spray calibration and spray procedure and technique.
		1. **ADJUSTING AND CLEANING**
6. To remove soot, dirt, and dust use a vacuum operating at low power with a soft brush or use a dry soot cleaning sponge.
7. 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.

**End of Section**

**ACOUSTIBuilt™ FINISH SCHEDULE**

**ACT-1** Armstrong ACOUSTIBuilt™ Seamless Acoustical Ceiling System – Panel #2604 (48”x72”x7/8”), UL Classified NRC of 0.80 and tapered edges on all 4 sides. Panels are to be installed on Armstrong 1-1/2” Drywall grid system with Main Runner #HD8906 installed 4’0” OC, 4’Tee #XL8945P installed 16” OC and KAM wall angle #KAM1512. Finish joint seams and field to a level 4 finish with required joint compound. Color is to be white, black or any custom color. Spray with 4-5 coats of Fine Texture Finish #2605WH. The installed wall to wall system performance is to be NRC up to 0.80, CAC 48, Cloud installations are 0.80 Sabins/SF or 1.33 Sabins/SF with infill item 8200T10, LR .87(White only), Class A, BioBlock and HumiGuard Plus Sag Performance . Install all steps per the manufacturer’s installation instructions. Contact local Armstrong rep name here at xxx-xxx-xxxx and/or RepName@ArmstrongCeilings.com for required installation training at least 4-6 weeks before ordering materials and scheduling installation.

Accessories:

-Axiom One Piece 4” or 6” for floating conditions

-Axiom Classic 4” or 6” with Axiom Bottom Trim for AcoustiBuilt for floating conditions