

**SECTION 09 5116****ACOUSTICAL TILE CEILINGS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install acoustical tile on backerboard as described in Contract Documents.
- B. Related Requirements:
1. Section 09 2226: 'Metal Suspension System' for Gypsum Board.
  2. Section 09 2900: 'Gypsum Board'.

**1.2 REFERENCES**

- A. Association Publications:
1. The Ceilings & Interior Systems Construction Association (CISCA), 405 Illinois Avenue, 2B, St Charles IL. [www.cisca.org](http://www.cisca.org).
    - a. '*Ceiling Systems Handbook*': Recommendations for direct hung acoustical tile installation.
    - b. '*Production Guide*': Practical reference for ceiling systems and estimating costs.
- B. Definitions:
1. Acoustical Tile: Prefinished material with various surface finishes installed in concealed suspension system or adhered to ceiling surface to provide improved sound absorption qualities.
  2. Acoustical Cement/Adhesive: Special type of adhesive or mastic used to stick up or adhere **12 inch x 12 inch (305 mm x 305 mm)** acoustical tile to concrete or gypsum board.
  3. Absorption: Materials that have capacity to absorb sound. Absorption is the opposite of reflection.
  4. Bevel Edge: Acoustical tile is considered bevel edge when face of tile camfered at approximately 45 degree for **1/8 inch (3 mm)** to **1/4 inch (6.4 mm)** around the perimeter of tile.
  5. Ceiling Attenuation Class (CAC): Rates ceiling's efficiency as barrier to airborne sound transmission between adjacent closed offices. Shown as minimum value, previously expressed as CSTC (Ceiling Sound Transmission Class). Single-figure rating derived from normalized ceiling attenuation values in accordance with classification ASTM E413, except that resultant rating shall be designated ceiling attenuation class. (Defined in ASTM E1414.) Acoustical unit with high CAC may have low NRC.
  6. Center Line: Line indicating midpoint of surface in either direction. Used as guide in starting ceiling.
  7. Class A: Fire classification for product with flame spread rating of no more than 25 and smoke developed rating not exceeding 50, when tested in accordance with ASTM E84 or UL 723.
  8. Flame Spread Index: Comparative measure, expressed as a dimensionless number, derived from visual measurements of the spread of flame versus time for a material tested in accordance with ASTM E84 or UL 723.
  9. Interior Finish: Interior finish includes interior wall and ceiling finish and interior floor finish.
  10. Kerf: Slit cut into midpoint of edge of tiles.
  11. Light Reflectance (LR): Percentage of light a surface reflected by ceiling surface expressed in decimal form.
  12. Mineral Base: Ceilings composed principally of mineral materials such as fibers manufactured from rock or slab, with or without binders.
  13. Noise Reduction Coefficient (NRC): Average sound absorption coefficient measured at four frequencies: 250, 500, 1,000 and 2,000 Hertz expressed to the nearest integral multiple of 0.05. Rates ability of ceiling or wall panel or other construction to absorb sound. NRC is fraction of

- sound energy, averaged over all angles of direction and from low to high sound frequencies that is absorbed and not reflected.
14. Smoke-Developed Index: Comparative measure, expressed as a dimensionless number, derived from visual measurements of smoke obscuration versus time for a material tested in accordance with ASTM E84 or UL 723.
  15. Sound Absorption: Property possessed by materials and objects, including air, of converting sound energy into heat energy. Sound wave reflected by surface always loses part of its energy. Fraction of energy that is not reflected is called sound absorption coefficient of reflecting surface. For instance, if material reflects 80 percent of sound energy, then sound absorption coefficient would be 20 percent (0.20).
  16. Surface Burning Characteristic: Rating of interior and surface finish material providing indexes for flame spread and smoke developed, based on testing conducted according to ASTM Standard E84 or UL 723.
  17. Textured Pattern: Granular or raised (fine, coarse, or a blend), felted or matted surface as an integral part of the basic product or superimposed on the product surface.
  18. Tile: Acoustical ceiling board, usually 12 inch x 12 inch (305 mm x 305 mm), which is stapled, cemented, or suspended by concealed grid system. Edges are often kerfed and cut back.
- C. Reference Standards:
1. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE):
    - a. ASHRAE Standard 62.1-2013, 'Ventilation for Acceptable Indoor Air Quality'.
  2. ASTM International;
    - a. ASTM D1779-98(2011), 'Standard Specification for Adhesive for Acoustical Materials'.
    - b. ASTM E84-15, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
    - c. ASTM E795-05(2012), 'Standard Practices for Mounting Test Specimens During Sound Absorption Tests'.
    - d. ASTM E1264-14, 'Standard Classification for Acoustical Ceiling Products'.
    - e. ASTM E1414/E1414-11a, 'Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum'.
    - f. ASTM E1477 - 98a(2013), 'Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers'.
  3. International Building Code (IBC) (2009 and 2012 Edition):
    - a. Chapter 8, 'Interior Finishes':
      - 1) Section 803, 'Wall And Ceiling Finishes':
        - a) 803.1.1, 'Interior Wall and Ceiling Finish Materials'.
        - b) 803.1.2, 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
  4. National Fire Protection Association:
    - a. NFPA 101: 'Life Safety Code' (2015 Edition).
    - b. NFPA 265: 'Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls' (2015 Edition).
  5. Underwriters Laboratories Inc.:
    - a. UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials' (Tenth Edition).

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
1. Participate in pre-installation conference specified in Section 09 2900 to review finish requirements for gypsum wallboard ceilings.
  2. Schedule acoustical tile ceiling pre-installation conference after installation of gypsum wallboard but before beginning installation of tile.
  3. In addition to items specified in Section 01 3100, review following:
    - a. Verify that tile comes from same dye lot and has same dye lot code.
    - b. Review requirements of acceptable and non acceptable tile.

## 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Samples:
    - a. One (1) sample of each variant of specified tile series.
- B. Informational Submittals:
  - 1. Certificates:
    - a. Installer(s):
      - 1) Provide each Installer's 'Certificate of Completion - LDS Duratile' from Manufacture showing Name and completion date with bid to be included in closing documents for project.
        - a) Certificate is valid for two (2) years from date printed on Certificate before recertification is required.
  - 2. Test And Evaluation Reports:
    - a. If requested by Owner, provide copies of Quality Assurance requirements for 'Class A' flame spread rating and 'Room-Corner Test'.
  - 3. Manufacturer Installations:
    - a. Published installation recommendations.
  - 4. Qualification Statement:
    - a. Installer(s):
      - 1) Provide Qualification documentation unless waived by Owner.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Include final, executed copy of warranty.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Manufacturer's literature on tile and adhesive.
        - b) Color and pattern selection.
      - 2) Installer(s) 'Certificate of Completion - LDS Duratile' submitted at time of bid.
- D. Maintenance Material Submittals:
  - 1. Extra Stock Materials:
    - a. Provide Owner with six (6) cartons of each type of tile with same dye lot code.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Fire-Test-Response Characteristics: As determined by testing identical ceiling tile applied with identical adhesives to substrates according to test method indicated below by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Surface-Burning Characteristics:
      - 1) Ceiling tile shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
        - a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
        - b) Flash point: None.
  - 2. Passage of 'Room-Corner Test' as recognized by AHJ, is required for system. Adhesive cited in test literature is required for installation of ceiling tile on Project.
    - a. Room Corner Tests:
      - 1) ASTM E84, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
      - 2) UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'.
- B. Qualifications:
  - 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:

- a. Minimum five (5) years satisfactorily completed projects of comparable quality, similar size, and complexity including a minimum of three (3) years of experience in glue-up ceiling tile installations, and shall have satisfactorily completed glue-up installation(s) within in past three (3) years before bidding.
- b. Review, understand, and comply Installer Qualifications and submitted 'DuraTile' published installation recommendations provided by Manufacturer:
  - 1) Contact Armstrong CSA customer service center at (800) 442-4212 to obtain and review compliance package on DuraTile prior to bidding.
  - 2) This requirement may be waived by Owner, if Installer has previously complied with Installer Qualification requirements and can document at least two (2) satisfactorily completed projects of comparable size using Armstrong 12 inch x 12 inch (300 mm x 300 mm) ceiling tile for glue-up within past three (3) years prior to bidding.
  - 3) Installer shall note complete compliance with Qualification requirements on submitted bid form.
  - 4) Submit qualification documentation unless waived by Owner.
- c. Agree to complete and pass 'LDS Duratile Personal Learning Module' (Certificate required for all Installer(s) for Church projects). Certification valid for two (2) years:
  - 1) Go to <http://www.armstrong.com/commceilingsna/#>.
  - 2) Click on My Armstrong Upper Right hand Corner.
  - 3) First time users: Click on 'Register' button and provide all appropriate information for username and password (you must register as a contractor to have access to 'ELearning System').
  - 4) Under My Armstrong Functions (left hand side), click on 'ELearning System'.
  - 5) Click on 'LDS Duratile Video'.
  - 6) Watch video and take Quiz (10 questions). Passing grade required for certificate.
  - 7) Print Certificate.
  - 8) Certificate must be submitted with Bid.
  - 9) Submit 'Certificate of Completion LDS - Duratile'. Required for all projects and may not be waived by Owner.

## 1.6 DELIVERY, STORAGE, AND HANDLING

### A. Delivery and Acceptance Requirements:

1. Materials shall be delivered in original, unopened packages with labels intact.

### B. Storage And Handling Requirements:

1. Store materials where protected from moisture, direct sunlight, surface contamination, and damage.
2. Store acoustic tile in cool, dry location, out of direct sunlight and weather, and at temperatures between **32 deg F (0 deg C)** and **86 deg F (30 deg C)**.
3. Store adhesive on site at installation temperature, between **65 and 90 deg F (18 and 32 deg C)**, for one week before installation.
4. Handle acoustical ceiling tiles carefully to avoid chipping edges or damage. Use no soiled, scratched, or broken material in the Work.

## 1.7 FIELD CONDITIONS

### A. Ambient Conditions:

1. Building shall be enclosed, mechanical system operating with proper filters in place, and temperature and humidity conditions stabilized within limits under which Project will operate before, during, and after installation until Substantial Completion.
2. Temperature at time of setting tile shall be **50 deg F (10 deg C)** minimum and **100 deg F (38 deg C)** maximum.

## 1.8 WARRANTY

- A. Manufacturer Warranty:
1. Provide Manufacturer's ten (10) year limited system warranty for the following:
    - a. Manufacturer's warranty to be free from defects in materials and factory workmanship.
    - b. Manufacturer's warranty against sagging and warping.
    - c. Manufacturer's warranty against mold/mildew, and bacterial growth.

## PART 2 - PRODUCTS

### 2.1 SYSTEM

- A. Manufacturers:
1. Manufacturer Contact List:
    - a. Armstrong World Industries, Strategic Accounts, Lancaster, PA [www.ceilings.com](http://www.ceilings.com).
      - 1) For pricing and ordering of tile, contact Sherry Brunt, Phyllis Miller, or Beth Rinehart at (800) 442-4212, or [Armstrongcsa@armstrong.com](mailto:Armstrongcsa@armstrong.com).
      - 2) For Strategic Account information, contact Deborah Pickens at (480) 695-9053 [dlpickens@armstrong.com](mailto:dlpickens@armstrong.com).
    - b. Franklin International, Inc., Columbus, OH [www.titebond.com](http://www.titebond.com).
- B. Materials:
1. Description:
    - a. Size: **3/4 inch (19 mm)** thick minimum by **12 inches (300 mm)** square.
    - b. Color: White.
    - c. Grid Face: Tile glue-up.
    - d. Surface Finish: Factory-applied.
    - e. Wet-formed high density mineral fiber.
  2. Design Criteria:
    - a. Meet requirements of ASTM E1264, Type III (mineral base with painted finish), Form 2 (water felted), Pattern CE (perforated, small holes – lightly textured), Fire Class A.
    - b. Acoustics:
      - 1) Noise Reduction Coefficient (Rating expressed according to ASTM E1284 requirements:
        - a) NRC rating: 60 minimum.
      - 2) CAC rating: 35 minimum.
    - c. Anti Mold / Mildew:
      - 1) Resistance against growth of mold/mildew.
    - d. Durable:
      - 1) Impact-resistant.
      - 2) Scratch-resistant.
    - e. Tongue and Groove.
    - f. Finish:
      - 1) Abuse-resistant/durable, factory applied vinyl latex paint.
    - g. Fire Performance:
      - 1) Panels meet ASTM E84 or UL 723 Type 1 surface burning characteristics.
    - h. High Recycled Content (HRC): Classified as containing greater than 50 percent total recycled content.
    - i. Light Reflectance (LR): 0.86 Average (Range of 0.84 to 0.88).
    - j. Sag Resistance:
      - 1) Resistance to sagging in high humidity conditions up to, but not including, standing water and outdoor applications.
    - k. Texture: Embossed texture with fine fissuring and small perforations with natural variation in texture and color appearance between tile.
    - l. VOC Emissions:
      - 1) Low formaldehyde: Contributing less than 13.5 ppb in typical conditions per ASHRAE Standard 62, 'Ventilation for Acceptable Indoor Air Quality'.

3. Acoustic Tile:
    - a. Category Three National Account Approved Product. See Section 01 6200 for definitions of Categories:
      - 1) DuraTile Item No. MN80377 by Armstrong.
      - 2) Panels meet ASTM E84 or UL 723 Type 1 surface burning characteristics.
    - b. High Recycled Content (HRC): Classified as containing greater than 50 percent total recycled content.
    - c. Light Reflectance (LR): 0.79 minimum.
    - d. VOC Requirements:
      - 1) Armstrong:
        - a) Low formaldehyde: Contributing less than 13.5 ppb in typical conditions per ASHRAE Standard 62, 'Ventilation for Acceptable Indoor Air Quality'.
      - 2) USG:
        - a) Zero.
  4. Acoustic Tile:
    - a. Category Three National Account Approved Product. See Section 01 6200 for definitions of Categories:
      - 1) DuraTile Item No. MN80377 by Armstrong.
- C. Accessories:
1. Adhesive:
    - a. Description:
      - 1) For use on acoustical ceiling tiles.
    - b. Design Criteria:
      - 1) Meet requirements of ASTM D1779.
      - 2) Meet NFPA Class A fire rating when tested in accordance with ASTM E84.
      - 3) Fast grab and 'no sag' installation.
      - 4) Water cleanup.
      - 5) Not recommended for use on tiles larger than 12 inch x 12 inch (305 mm x 305 mm).
    - c. Type Two Acceptable Products:
      - 1) Titebond No. 2704 Solvent Free Acoustical Ceiling Tile Adhesive by Franklin International.
      - 2) Highest quality of adhesive from manufacturer recommended by Tile Manufacturer as approved by Architect before use. See Section 01 6200.
  2. Edge Molding:
    - a. Steel 'U' molding with baked enamel finish.
    - b. Type Two Acceptable Products:
      - 1) 7843 Series by Armstrong.
      - 2) Equal as approved by Architect before installation. See Section 01 6200.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
  1. Inspect for defects in backing and support that are not acceptable.
    - a. Examine areas around HVAC diffusers and light fixtures for tile installation problems.
    - b. Examine ceiling for levelness. Cisca 'Code of Practice' requires ceiling to be free of irregularities and be level to within 1/4 inch (6 mm) in 12 foot (305 mm).
    - c. Examine substrate for any problems that will compromise adhesion of ceiling tile.
  2. Notify Architect in writing of unacceptable conditions.
  3. Do not apply ceiling tile until defects in backing and support are corrected.

### 3.2 PREPARATION

- A. Surface Preparation:

1. Follow Manufacturer recommendations for surface preparation:
  - a. Substrate must be clean, free of grease and dirt, sound, smooth, even and level before applying tile to surface.
    - 1) Do not install new ceiling tile over old glue globs or bad substrate with any surface finish that is incompatible with tile adhesive.
  - b. Painted Surfaces: Avoid applying tile to newly painted ceiling.
  - c. Materials shall be dry and clean at time of application.

### 3.3 INSTALLATION

#### A. Special Techniques:

1. Installation shall be in accordance with Manufacturer's recommendations:
  - a. Do not install tile when room temperature exceeds or below recommended ambient conditions.
  - b. Tile is directional tile and must be installed in same direction of pattern running parallel to long dimension of each room.
  - c. Remove loose dust from back of tile and ceiling where adhesive is to be applied.
  - d. Prime **3 inch (75 mm)** minimum circle near each corner by buttering very thin coat of adhesive.
  - e. Apply daub of adhesive to each corner. Daubs will be of sufficient size to form a circle **2-1/2 to 3 inches (63 to 75 mm)** in diameter and **1/8 to 1/4 inch (3 to 6 mm)** thick when tile is pressed firmly in place. Do not apply daubs so far in advance of installation that adhesive skins over.
  - f. Do not bend tile during installation.
2. Tile Layout:
  - a. Lay out tile symmetrically about center lines of room.
  - b. Lay out so tiles at room perimeters are at least **1/2** full tile size.
  - c. Leave tile in true plane with straight, even joints.
  - d. Tile joints shall be straight and in alignment, and exposed surface flush and level.
  - e. Furnish and install specified molding wherever tile has exposed edges or abuts walls, columns, and other vertical surfaces, except at curves of **3 inch (75 mm)** radius or smaller.
  - f. Cut around penetrations that are not to receive moldings cleanly with sharp knife and at a slight angle away from cutout.
3. Ceiling mounted items:
  - a. Locate light fixtures, speakers, and mechanical diffusers and grilles symmetrically in room and centered on tile centers or tile joints insofar as possible, unless shown otherwise.
  - b. Keep method of locating ceiling mounted items as consistent as possible throughout building.
  - c. Ceiling mounted item location method within each room shall always be consistent.

### 3.4 FIELD QUALITY CONTROL

#### A. Non-Conforming Work:

1. Acoustical Tile. The following have been identified by the Manufacturer as tile defects, should not be installed, and will be replaced at no charge to Owner. Manufacturer will replace any material that does not meet product specifications. Installer to call 1 (800) 442-4212 immediately to report any tile discrepancies:
  - a. Obvious Tile Defects:
    - 1) Gross surface defects or damage.
    - 2) Gross damage to edges and corners.
    - 3) Bevels without paint.
  - b. Size Measurement:
    - 1) Tiles measure **12 inches (305 mm)**, plus or minus **1/32 inch (0.8 mm)**, measured across center of two (2) parallel sides.
  - c. Squareness Measurement:
    - 1) Measure two (2) diagonals of an individual ceiling tile.
    - 2) Diagonal measurements need to be within **1/16 inch (1.6 mm)** of each other. No more than **1/16 inch (1.6 mm)** difference.

- d. Warp:
  - 1) Tiles specification is plus or minus 0.050 inch (1.27 mm) as measured in the center of tile.
- 2. Installer:
  - a. Substrate preparation and installation of ceiling tile not following CISCA Code of Practice will be unacceptable and considered defective and subject to replacement at no cost to Owner.

### 3.5 ADJUSTING

- A. 'Touch-up' minor abraded surfaces.

### 3.6 CLEANING

- A. Remove from site debris connected with work of this Section.

**END OF SECTION**