**SECTION 09 54 00**

**Data Center Structural Ceiling Grid**

# 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

A. Section Includes

1. Acoustical ceiling panels

2. Exposed grid suspension system

3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings

4. Perimeter Trim

B. Related Selections

1. Section 09 51 00 - Acoustical Ceilings

2. Section 09 51 13 - Acoustical Fabric-Faced Panel Ceilings

3. Section 09 53 00 - Acoustical Ceiling Suspension Assemblies

4. Section 09 20 00 - Plaster and Gypsum Board

5. Section 02 42 00 - Removal and Salvage of Construction Materials

6. Divisions 23 - HVAC Air Distribution

7. Division 26 - Electrical

C: 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 approved by Addenda, the 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 (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

A. American Society for Testing and Materials (ASTM):

1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability

2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings

6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

7. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

8. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

9. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material

A. Armstrong Fire Guard Products

10. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint

11. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems

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

B. International Building Code

C. ASHRAE Standard 62 1 2004 Ventilation for Acceptable Indoor Air Quality

D. NFPA 70 National Electrical Code

E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

F. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

G. International Code Council-Evaluation Services Report - Seismic Engineer Report

1. ESR 1308 - Armstrong Suspension Systems

H. International Association of Plumbing and Mechanical Officials - Seismic Engineer Report

1. 0244 - Armstrong Single Span Suspension System

I. California Department of Public Health CDPH/EHLB Emission Standard Method Version 1.1 2010

J. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings

**1.4 SYSTEM DESCRIPTION**

Structural Suspension Ceiling System, with 48 inches by 48 inches hanging points, shall be capable and intended to directly support cable trays, utilities, light fixtures, HVAC registers and other accessories as indicated in area of work.

## 1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and structural suspension system required.

B. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 6 inch long samples of exposed wall molding and suspension system, including main runner and 6 inch cross tees.

C. Shop Drawings: Layout and details of structural ceilings show locations of items that are to be coordinated with, or supported by the ceilings.

D. 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 of NRC, CAC, and AC.

## 1.6 SUSTAINABLE MATERIALS

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. 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 also be given to manufacturers that can provide emissions data showing their products meet CDHP Standard Method v1.1 (Section 01350).

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:

Storage & Collection of Recyclables

Construction and Demolition Waste Management Planning

Building Life-Cycle Impact Reduction

Building Product Disclosure and Optimization Environmental Product Declarations

Building Product Disclosure and Optimization Sourcing of Raw Materials

Building Product Disclosure and Optimization Material Ingredients

Construction and Demolition Waste Management

## 1.7 QUALITY ASSURANCE

1. Single-Source Responsibility: Provide acoustical panel units and structural grid components by a single manufacturer.

2. Fire Performance Characteristics: Identify structural ceiling components with appropriate markings of applicable testing and inspecting organization.

A. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 Classification.

B. Fire Resistance: As follows tested per ASTM E119 and listed in the appropriate floor or roof design in the Underwriters Laboratories Fire Resistance Directory

3. Acoustical Panels: As with other architectural features located at the ceiling, may obstruct or skew the planned fire sprinkler water distribution 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.

4. 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.

## 1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver structural 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.

B. Before installing structural ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

## 1.9 ALTERNATE CONSTRUCTION WASTE DISPOSAL

A. Ceiling material being reclaimed must be kept dry and free from debris.

B. Contact the Armstrong Recycle Center a consultant will verify the condition of the material and that it meets the Armstrong requirements for recycling. The Armstrong consultant with provide assistance to facilitate the recycling of the ceiling.

C. Recycling may qualify for LEED Credits:

a. LEED 2009 - Category 4: Material and Resources (MR)

i. Credit MRc2: Construction Waste Management

b. LEEDv4 - MRp2 - 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.

c. LEEDv4-MRc5 -

i. Option 1: Divert ceilings to qualify for one of the 3 material streams (50%)

ii. Option 2: Divert ceilings to qualify for one of the 4 material streams (75%)

## 1.10 WARRANTY

A. Suspension: Submit a written warranty executed by the manufacturer, agreeing to repair or replace suspension system that fails within the warranty period. See Armstrong website for fully warranty information. Failures include, but are not limited to the following:

1. Grid System: Rusting and manufacturer's defects

B. Warranty Period

1. Grid: Ten years from date of substantial completion

2. System Warranty of 30 years when used with Armstrong Ceiling Panels (Single Source Solution)

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.

**1.11 PERFORMANCE**

A. Structural:

1. Capable of supporting a uniform load up to 75 lbs. / ft2

2. Capable of a maximum static point load of 1200 lbs.

3. Capable of a maximum static point lead of 1200 lbs. with heavy duty connector in line with turnbuckle connection to building structure.

4. Capable of supporting a mid-span point load of 320 lbs. with L/360 deflection (4’ member span)

5. Turnbuckle connection shall be capable of a maximum point load connection to building structure of 1200 lbs.

6. Contact local engineer for job-specific load and/or seismic requirements.

## 1.12 MAINTENANCE

A. 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. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

**PART 2 ‐ PRODUCTS**

**2.1 MANUFACTURERS**

A. Suspension Systems:

1. Armstrong World Industries, Inc. DynaMax Structural Aluminum Grid System

B. Ceiling Panels:

1. Armstrong World Industries, Inc.

**2.2.1 METAL SUSPENSION SYSTEMS**

A. Components:

Aluminum extrusions factory produced. Special bosses are designed to connect AXTBC T-bar connector clip and splice plate; to provide positive mechanical lock with no visible fasteners. Factory finished matching approved samples.

* 1. Structural Classification: ASTM C 635 Heavy Duty
  2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
  3. Sustainability: Environmental Product Declaration (EPD), Health Product Declaration (HPD)
  4. Acceptable Product: DynaMax Main Beam #DM4301 144” x 2” x 2-3/8” manufactured by Armstrong World Industries
  5. Acceptable Product: DynaMax Cross Tee #DM4320 24” x 2” x 2-3/8” as manufactured by Armstrong World Industries
  6. Acceptable Product: DynaMax Cross Tee #DM4340 48” x 2” x 2-3/8” as manufactured by Armstrong World Industries
  7. Acceptable Product: DynaMax I Bracket #DMIB as manufactured by Armstrong World Industries
  8. Acceptable Product: DynaMax L Bracket #DMLB as manufactured by Armstrong World Industries
  9. Acceptable Product: DynaMax T Bracket #DMTB as manufactured by Armstrong World Industries
  10. Acceptable Product: DynaMax X Bracket #DMXB as manufactured by Armstrong World Industries
  11. Acceptable Product: DynaMax Hold Down Clip #DMHDC as manufactured by Armstrong World Industries
  12. Acceptable Product: DynaMax Hardware Kit #DMHWK as manufactured by Armstrong World Industries
  13. Acceptable Product: DynaMax Bottom Splice Plate #DMBSP as manufactured by Armstrong World Industries
  14. Acceptable Product: AXTBC - T-Bar Connector Clip manufactured by Armstrong World Industries

C. Wire for Hangers and Ties:

ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 12 gauge.

D. Edge Moldings and Trim:

1. DynaMax Structural Aluminum Data Center Wall Molding #DM4800 144” x 2-1/8” x 2 x ½" manufactured by Armstrong World Industries, Inc.

E. Structural Ceiling grid shall be installed with a FIXED or FLOATING condition option on a 2’x2’ OR 2’x4’ grid supported with spacing of 4’x4’ connection to structure above

F. Accessories:

3/8" threaded rod from structure.

1. Carries the system load with 3/8" threaded rod from structure.

G. Attachment Devices:

Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

E. DynaMax Lay in Ceiling Panels:

a. All panels should be factory cut to fit the DynaMax structural ceiling grid openings without field modifications to grid or panels.

1. Square Lay-In Nominal 2’ x 2’, 2’ x 4’ and 4’x4’ module sizes

2. Composition: Mineral Fiber

1. Fine Fissured 23 - ¼” x 23 - ¼" x 5/8" #4126
   1. Color White
2. Fine Fissured 23 - ¼” x 23 - ¼" x 5/8" #4126BL
   1. Color Black
3. Fine Fissured 47 ¼” x 23 ¼" x 5/8" #4127
   1. Color White
4. Fine Fissured 47 ¼” x 23 ¼" x 5/8" #4127BL
   1. Color Black
5. Calla 23 - ¼” x 23 - ¼" x 1" #2896
   1. Color White
6. Calla 23 - ¼” x 23 - ¼" x 1" #2896BK
   1. Color Black
7. Calla 47 ¼” x 23 ¼" x 1" #2897
   1. Color White
8. Calla 47 ¼” x 23 ¼" x 1" #2897BK
   1. Color Black
9. Dune 23 - ¼” x 23 - ¼" x 5/8" #4270
   1. Color White
10. Dune 47 ¼” x 23 ¼" x 5/8" #4271
    1. Color White
11. Ultima 23 - ¼” x 23 - ¼" x ¾” #1807
    1. Color White
12. Ultima 47 ¼” x 23 ¼" x 3/4" #1808
    1. Color White
13. Optima PB 47 ¼” x 47¼” x 1” #3210PB
    1. Color White
14. Ultima AirAssure 23 - ¼” x 23 - ¼” x ¾” #1599
    1. Color White
15. Ultima AirAssure 23 - ¼” x 47 - ¼” x ¾” #1638
    1. Color White

F. MetalWorks Lay in Panels for DynaMax Structural Grid:

a. All panels should be factory cut to fit the DynaMax structural ceiling grid openings without field modifications to grid or panels.

1. Square Lay-In Nominal 2’ x 4’ and 4’x4’ module sizes

2. Composition: .064 Aluminum

a. MetalWorks Lay-in for Dynamax 23” x 47” M1 Unperforated 6345W24L48M1WHA

a. Color Whitelume

b. Metalworks Lay-in for Dynamax 23” x 47” M19 Perforation 6345W24L48M19WHA

a. Color Whitelume

c. Metalworks Lay-in for Dynamax 47” x 47” M1 Unperforated 6345W48L48M1WHA

a. Color Whitelume

d. Metalworks Lay-in for Dynamax 47” x 47” M19 Perforation 6345W48L48M19WHA

a. Color Whitelume

# PART 3 – EXECUTION

## 3.1 EXAMINATION

A. 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)

## 3.3.1 PREPARATION

A. 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.

B. 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.

## 3.3.1 PREPARATION

A. 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.

B. 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.

## 3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. 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 eliminate evidence of damage.

C. 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 with provide assistance to facilitate the recycle of the ceiling.