1. Section 095100   
   Acoustical Ceilings - USG
   1. PART 1  GENERAL
      1. SECTION INCLUDES
         1. Suspended metal grid ceiling systems.
         2. Acoustical and nonacoustical units.
2. *The paragraph below is optional text*
   * + 1. Supplementary acoustical insulation above ceiling.
       2. Wall angles and shadow moldings.
3. *The paragraph below is optional text*
   * + 1. Special trims and accessories.
     1. RELATED REQUIREMENTS
        1. Section ​013000-Administrative Requirements​
4. *The paragraph below is optional text*
   * + 1. Section ​013329.04-Material Content Form​
5. *The paragraph below is optional text*
   * + 1. Section ​013329.02-Sustainable Design Reporting - LEED v4​
6. *The paragraph below is optional text*
   * + 1. Section ​013566.05-Project Sustainability Goal Credit Summary - LEED v4​
7. *The paragraph below is optional text*
   * + 1. Section ​013566.12-Sustainability Certification Project Procedures - LEED v4
8. *The paragraph below is optional text*
   * + 1. Section 031000 - Concrete Forming and Accessories:  Placement of special anchors or inserts for suspension system.
9. *The paragraph below is optional text*
   * + 1. Section 033000 - Cast-in-Place Concrete:  Placement of special anchors or inserts for suspension system.
10. *The paragraph below is optional text*
    * + 1. Section 053100 - Steel Decking:  Placement of special anchors or inserts for suspension system.
        2. Section 072100 - Thermal Insulation.
        3. Section 092116 - Gypsum Board Assemblies:  Acoustical insulation.
        4. Section 095153 - Direct-Applied Acoustical Ceilings.
        5. Section 211300 - Fire-Suppression Sprinkler Systems:  Sprinkler heads.
        6. Section 233700 - Air Outlets and Inlets:  Air diffusion devices.
        7. Section 265100 - Interior Lighting:  Light fixtures.
        8. Section 275116 - Public Address Systems:  Speakers.
        9. Section 284600 - Fire Detection and Alarm:  Fire alarm components.
      1. REFERENCE STANDARDS
         1. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2023.
         2. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019.
         3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
         4. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
         5. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.
         6. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.
         7. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019.
         8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023a.
         9. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.
11. *The paragraph below is optional text*
    * + 1. ASTM E413 - Classification for Rating Sound Insulation; 2022.
        2. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.
        3. ICC (IBC) - International Building Code; 2021.
        4. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.
      1. ADMINISTRATIVE REQUIREMENTS
         1. Coordination:  Coordinate work of this section with installation of mechanical and electrical components and with other construction activities affected by work of this section.
            1. Review with affected installers those locations of facility services lines and equipment within ceiling plenum that prevent installation of hangers at spacings compliant with limitations established in referenced standards.  Arrange for each affected mechanical or electrical installer to provide necessary number of additional structural support points for ceiling installer.
         2. Preinstallation Meeting:  Convene one week before starting work of this section.
         3. Sequencing:  Schedule work of affected trades to minimize or eliminate installation conflicts and rework.
            1. Supply hanger clips during steel deck erection.  Supply additional hangers and inserts as required.
            2. Ensure that acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.  Do not install acoustical units until after interior wet work is dry.
      2. SUBMITTALS
         1. See Section 013000 - Administrative Requirements for submittal procedures.
         2. Shop Drawings:  Indicate grid layout and related dimensioning.
         3. Product Data:  Provide data on suspension system components and acoustical units.
         4. Samples:  Two samples **[\_\_\_\_\_] by [\_\_\_\_\_] inches ([\_\_\_\_\_] by [\_\_\_\_\_]** mm) in size indicating material and finish of acoustical units.
         5. Samples:  Two samples each, **[\_\_\_\_] inches ([\_\_\_\_]** mm) long of suspension system main runner, cross runner, and perimeter molding.
12. *The paragraph below is optional text*
    * + 1. Manufacturer's Installation Instructions:  Indicate special procedures and perimeter conditions requiring special attention.
        2. Designer's qualification statement.
        3. Installer's qualification statement.
        4. Maintenance Materials:  Furnish the following for Owner's use in maintenance of project.
13. *The paragraph below is optional text*
    * + - 1. See Section 016000 - Product Requirements for additional provisions.
14. *The paragraph below is optional text*
    * + - 1. Extra Acoustical Units:  **[\_\_\_\_] sq ft ([\_\_\_\_]** sq m) of each type and size.
15. *The paragraph below is optional text*
    * + - 1. Extra Acoustical Units:  Quantity equal to 5 percent of total installed.
      1. QUALITY ASSURANCE
         1. Designer Qualifications for Seismic Design:  Perform under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
         2. Installer Qualifications:  Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.
      2. FIELD CONDITIONS
         1. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent before, during, and after acoustical unit installation.
    1. PART 2  PRODUCTS
       1. Ceiling COMPONENT PRODUCTS
          1. Suspension Systems:
             1. Metal Suspension Systems - General:  Complying with ASTM C635/C635M; die cut and interlocking components, with wall angles and moldings, curtain pockets, and splices as required.

Stabilizer Bars:  Manufacturer's standard bars designed to provide system rigidity in large module applications.

1. *The paragraph below is optional text*

Lengths:  As applicable to module dimensions, main tee spacing, and panel sizes of ceiling assemblies specified.

Materials:

Steel Grid:  ASTM A653/A653M G30 coating, unless otherwise indicated.

* + - * 1. Exposed Suspension System:  Hot-dipped galvanized steel grid with aluminum cap; factory-applied white closed-cell foam gaskets.

Application(s):  Cleanroom.

Structural Classification:  **[Heavy-duty] [Intermediate-duty]**, when tested in accordance with ASTM C635/C635M.

Recycled Materials Content:  Classified as containing greater than 50 percent total recycled content.

Clean Room Classification:  ISO 14644-1, Class 5.

Profile:  Tee; 15/16 inch (24 mm) face width.

Finish:  Baked enamel.

Color:  **[Coordinating Matte White 3756] [Flat White 050] [Powder White 3767] [Silver Satin 002]**.

Products:

USG Corporation; **[DXACE] [DXLA]** 15/16 Inch Suspension System:  www.usg.com/ceilings/#sle.

Substitutions:  Not permitted.

* + 1. ACCESSORIES
       1. Support Channels, Plates, Clips and Molding:

1. MC11A25 1” x 1” Wall Angle

2. M7A 7/8” x 7/8” Wall Angle

3. US28CE 1” x 1-11/16” x ½” Wall Angle, and C-8/C-8CE Hold-Down Clip

4. M7Z 7/8” x 7/8” Wall Angle

5. M7ACE 7/8” x 7/8” Wall Angle, and L15/L15CE Hold-Down Clip

* + - 1. Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
      2. Suspension Wire:  Size and type as required for application, seismic requirements, and ceiling system flatness requirement specified.
         1. Concealed Suspension:

Suspension Wire:  Steel, annealed, galvanized finish, 12 gauge, 0.0808 (2.05 mm) diameter, complying with ASTM A641/A641M.

* + - * 1. Exposed (To View) Suspension:

Suspension Wire:  Stainless steel, 18 gauge, 0.0403 (1.02 mm) diameter, complying with ASTM A580/A580M.

1. *The paragraph below is optional text*

Suspension Rope:  1/32 inch (0.8 mm) stainless steel rope wire complying with ASTM A492, with **[\_\_\_\_] [loop and crimp-end] [turnbuckle] [wire crimp]** connection.

* + - 1. Hold-Down Clips:  Manufacturer's standard clips to suit application.

1. *The paragraph below is optional text*
   * + 1. Seismic Clips:  Manufacturer's standard clips for seismic conditions and to suit application.
       2. Unopposed Tee Attachment Clip:  Manufacturer's standard clip designed to create code-compliant cross tee connections when a cross tee is installed in a main tee without another cross tee directly opposite ("ashlar" installations).
       3. Touch-Up Paint For Concealed Items:  Zinc rich type, as recommended by ceiling system manufacturer.
     1. Fabrication
        1. Shop fabricate ceiling components to the greatest extent possible.
        2. Fabricate components to allow access to ceiling plenum as required.
   1. PART 3  EXECUTION
      1. EXAMINATION
         1. Verify existing conditions before starting work.
         2. Verify that layout of hangers will not interfere with other work.
         3. Verify that field measurements are as indicated on shop drawings.
         4. Start of installation constitutes acceptance of project conditions.
      2. Preparation
         1. Coordinate the location of hangers with other work.
         2. Provide hanger clips during steel deck erection.  Provide for anticipated additional hangers and inserts as required.
2. *The paragraph below is optional text*
   * + 1. Install ceiling system after major above-ceiling work is complete.
       2. Acclimate wood ceiling materials by removing from packaging in installation area a minimum of 72 hours prior to installation.
     1. INSTALLATION - SUSPENSION SYSTEM
3. *The paragraph below is optional text*
   * + 1. Install suspension system in accordance with ASTM C636/C636M and manufacturer's instructions and as supplemented in this section.
4. *The paragraph below is optional text*
   * + 1. Install hangers and inserts coordinated with overhead work.  Provide additional hangers and supports as required.
       2. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
       3. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
5. *The paragraph below is optional text*
   * + 1. Locate system on room axis according to reflected ceiling plan.
       2. Suspension System, Nonseismic:  Hang suspension system independent of walls, columns, ducts, pipes and conduit.  Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
6. *The paragraph below is optional text*
   * + 1. Seismic Suspension System, 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.
7. *The paragraph below is optional text*
   * + 1. Seismic Suspension System, 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.
       2. 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.
       3. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
       4. Support fixture loads using supplementary hangers located within 6 inches (152 mm) of each corner, or support components independently.
       5. Do not eccentrically load system or induce rotation of runners.
8. *The paragraph below is optional text*
   * + 1. Form expansion joints as detailed.  Form to accommodate plus or minus 1 inch (25 mm) movement.  Maintain visual closure.
       2. Edge Moldings:  Install at intersection of ceiling and vertical surfaces and penetrations, using components of maximum length; set level. Provide edge moldings at junction with other ceiling finishes. Miter corners. Provide preformed edge closures to match bullnosed cornered partitions.
          1. Install in bed of acoustical sealant.
          2. Use longest practical lengths.
          3. Overlap and rivet corners.
       3. Install light fixture boxes constructed of gypsum board above light fixtures in accordance with fire rated assembly requirements and light fixture ventilation requirements.
     1. INSTALLATION - ACOUSTICAL UNITS
        1. Install acoustical units in accordance with manufacturer's instructions.
        2. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
        3. Fit edge trim neatly against abutting surfaces.
        4. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
        5. Cutting Acoustical Units:
           1. Cut to fit irregular grid and perimeter edge trim.
           2. Make field cut edges of same profile as factory edges.
        6. Lay acoustical insulation for a distance of 48 inches (1219 mm) either side of acoustical partitions as indicated.
        7. Install hold-down clips on acoustical units within 20 ft (6 m) of an exterior door.
     2. INSTALLATION OF TRANSITION TRIM
9. *The paragraph below is optional text*
   * + 1. After the grids are installed, for each grid end that meets the transition trim, insert one tee attachment clip into the lower and upper bosses and secure the set screw. Leave enough tension for adjustment.
10. *The paragraph below is optional text*
    * + 1. At drywall suspension systems install gypsum panels after the transition trim is installed.
11. *The paragraph below is optional text*
    * + 1. Secure a tee attachment clip to each grid member that will connect to the transition trim. Install one framing screw into the center of the slotted screw hole. Leave enough tension so the attachment clip can be adjusted if needed. Follow manufacturer's instructions when aligning the attachment clip.
12. *The paragraph below is optional text*
    * + 1. Install the splice plates by sliding them into the bosses at the end of each transition trim joint. Loosely tighten the set screws and align the system square and true.
13. *The paragraph below is optional text*
    * 1. INSTALLATION OF Perimeter "Cloud" TRIM
14. *The paragraph below is optional text*
    * + 1. General:  Install in accordance with manufacturer's instructions.
15. *The paragraph below is optional text*
    * + - 1. Examine the reflected ceiling layout and carefully plan the layout of the trim on the ceiling grid.
16. *The paragraph below is optional text*
    * + - 1. Lay trim segments on top of the grid in the desired pattern and temporarily secure them in place.
17. *The paragraph below is optional text*
    * + - 1. Temporarily splice the segments together.
18. *The paragraph below is optional text*
    * + - 1. Assemble trim system, arranging the trim into smooth curves.
19. *The paragraph below is optional text*
    * + - 1. Mark and cut the suspension grid.
20. *The paragraph below is optional text*
    * + - 1. Install an attachment clip to each cut end of the grid. Attach the clip to trim section segment.
21. *The paragraph below is optional text*
    * + - 1. Join trim and permanently splice the segments together.
        1. 10-Inch and 12-Inch Trim:
22. *The paragraph below is optional text*
    * + - 1. Support segments by attaching diagonal braces to the installation clips using fasteners recommended by manufacturer.  Attach one end of the brace to back of trim segment and the other to the tee. Ensure that the clip remains at 90 degrees to the ceiling plane. Repeat this procedure at  24 inches (610 mm) increments along the entire perimeter of the grid.
23. *The paragraph below is optional text*
    * + - 1. Attach trim segments to the grid.
24. *The paragraph below is optional text*
    * + 1. Corners:
25. *The paragraph below is optional text*
    * + - 1. Outside Corners:  Slide a permanent splice plate into each side of the preformed outside corner. Attach one side of the outside corner to a trim segment. Connect a trim segment to the other side of the corner and secure with appropriate splice plate.
          2. Inside Corners:  Follow manufacturer's instructions for installation of preformed and welded corners or for field-assembled corners from separate premitered pieces.
26. *The paragraph below is optional text*
    * 1. Installation of Curtain Pocket Trim
         1. Mounting:  Mount curtain pocket trim in accordance with manufacturer's instructions and as appropriate for project conditions:
27. *The paragraph below is optional text*
    * + - 1. Wall Cleat Mounting:
28. *The paragraph below is optional text*

Determine the mounting height of the pocket and cleat combination.  Mount wall cleats on the perimeter wall at that height.

1. *The paragraph below is optional text*

Mount cleats at framing stud locations, on the center of the stud flange or face for the length of the pocket.

1. *The paragraph below is optional text*

Secure cleat and pocket to wall using fasteners appropriate for attachment substrates.

1. *The paragraph below is optional text*

Hook pocket on the mounting cleats.  Use a metal screw for locking pocket to cleat.

1. *The paragraph below is optional text*
   * + - 1. Hanger Wire Mounting:
2. *The paragraph below is optional text*

Mount using hanger wire located at 16 inches (406 mm) on center by drilling a 1/4 inch (6 mm) diameter hole into vertical mounting leg located on top of the extrusion, no more than 48 inches (1219 mm) on center.

1. *The paragraph below is optional text*
   * + - 1. Metal Framing Mounting:
2. *The paragraph below is optional text*

Hang curtain pockets using standard 2-1/2-Inch (64 mm) metal framing members 48 inches (1219 mm) on center, maximum, hung from and braced with kickers attached to the underside of the structure.

1. *The paragraph below is optional text*
   * + 1. Continuous Lengths Installation:  Use wall cleat, hanger wire, or metal framing mounting method specified above. Connect curtain pocket segments with standard system splice plates. Use three (3) splice plates for a tight, seamless connection; one located on the top of the pocket and two (2) along the vertical surface.
       2. Corners Installation:  For 90-degree turns use manufacturer's pre-engineered inside and outside corners. Position corner segments in place using mounting method selected for the system. Use three (3) splice plates for a tight, seamless connection to the main curtain pocket; one located on the top of the pocket and two (2) along the vertical surface.
       3. End Cap Terminations:  Use the appropriate end cap for the indicated ceiling integration. Install using self-tapping mini screws in two or three locations depending on the end cap selected.
2. *The paragraph below is optional text*
   * + 1. Partition Wall Termination:  Use a single splice plate bent in half at 90-degrees. Mount one flange of the plate to the curtain pocket and mount the other to the partition wall above the ceiling grid wall molding.
       2. Install extension plates in accordance with manufacturer's instructions.
3. *The paragraph below is optional text*
   * + 1. Connection to Suspension Grid:  Use clips recommended by manufacturer.
     1. TOLERANCES
        1. Maximum Variation from Flat and Level Surface:  1/8 inch in 10 feet (3 mm in 3 m).
        2. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads:  Two degrees.
     2. Cleaning
        1. Clean and touch up minor finish damage.  Remove and replace components that cannot be successfully cleaned and repaired.
4. END OF SECTION