SECTION 09 21 10
DRYWALL SUSPENSION SYSTEM

PART 1 GENERAL

1.1 STIPULATIONS

A. The specifications sections "General Conditions to the Construction Contract", "Special Conditions" and "Division 01 - General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

1.2 SECTION INCLUDES

A. Metal Suspension Systems framing members for Plaster and Gypsum Board Assemblies

B. Main Tees, Cross Tees, Perimeter Angles, Perimeter Channels, Hanger Wire, and Accessories

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions with Project conditions and materials clearly identified or detailed for each required system.

B. Samples: 12 inch long samples of suspension system components

1.4 SYSTEM REQUIREMENTS

A. Performance Requirements: Fabricate and install systems as indicated but not less than that required to comply with ASTM C754 under the following conditions:

1. A pre-engineered drywall suspension system consisting of straight main tees (for Wall-to-Wall system) or straight main tees and straight furring cross tees, that join together to support screw attached interior gypsum panels and independently supported light fixtures, and air diffusers, where applicable.

2. Maximum deflection of l/360 of distance between supports.

1.5 QUALITY ASSURANCE

A. Reference Standards

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

2. ASTM A 645 Standard for Nonstructural Framing Members

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

4. ASTM C635, Standard Specifications for Metal Suspension Systems

5. ASTM C636, Recommended Practice for Installation of Metal Suspension Systems

6. CISCA Ceiling Systems Installation Handbook

7. ASTM C1186, Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets. [Include if DUROCK panels are used, otherwise delete]

8. ASTM C1278, Standard Specification for Fiber-Reinforced Gypsum Panels [Include if FIBEROCK panels are used, otherwise delete]

9. ASTM C645, Standard Specification for Non-Bearing (Axial) Steel Studs, Runners, (Track), and Rigid Furring Channels for Screw Application of Gypsum Board

10. ASTM C754, Specification for Installation of Steel framing Members to Receive Screw-Attach Gypsum Boards

11. ASTM C840 Specification for Application & Finishing of Gypsum Board

12. (ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials)

13. (Underwriters Laboratories Inc. (UL) Fire Resistance Directory)

14. NOA # 17-09-19.03, TAS 202 and TAS 203

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver material to site promptly without undue exposure to weather.

2. Deliver in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade.

B. Inspection:

1. Promptly inspect delivered materials, file freight claims for damage during shipment, and order replacement materials as required. Any damaged materials shall be promptly removed from the job site.

C. Storage:

1. Store above ground in dry, ventilated space.

2. Protect materials from soiling, rusting, and damage.

3. Store board to be directly applied to masonry walls at 70°F for 24 hours prior to installation.

D. Handling:

1. Handle in such a manner to insure against racking, distortion or physical damage of any kind.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not install gypsum board when ambient temperature is below 40°F.

2. For adhesive attachment of gypsum board, and for finishing of gypsum board, maintain ambient temperature above 55°F from one week prior to attachment or joint treatment, and until joint treatment is complete and dry.

1.8 COORDINATION WITH OTHER WORK

A. General:

1. Coordinate with other work including mechanical and electrical work and partition systems. Installation of conduit and ductwork above suspension system shall be complete before installation of suspension system.

B. Protection:

1. Follow good safety and industrial hygiene practices during handling and installation of all products and systems, with personnel to take necessary precautions and wear appropriate personal protective equipment as needed. Read Material Safety Data Sheets and related literature for important information on products before installation. Contractor to be solely responsible for all personal safety issues during and subsequent to installation; architect, specifier, Client Agency and manufacturer will rely on contractor's performance in such regard.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. All manufactured by USG (United States Gypsum Company, USG Interiors), Chicago, IL, USA, in compliance with applicable ASTM Standards. Contact your local USG Sales Representative for requests.

B. Substitutions: See Section 01 25 00 - Substitution Procedures.

2.2 MATERIALS - SUSPENSION SYSTEMS

A. USG Drywall Suspension Systems – Commercial quality, cold-rolled steel, hot dipped galvanized finish.

1. Main Tees: Fire-Rated Heavy Duty classification 1.617" high x 144" long, integral reversible splice with knurled face. (DGLW-26 1-1/2" Face and 1.617" high)

a. Cross Members: Fire-Rated members with knurled face. Cross Tees: DGLW-424 cross tee 1-1/2" high x 48" long with 1-1/2" wide face; DGLW-224 Fire-Rated: 1-1/2" high x 24" long with 1-1/2" face

2. Quick release cross tee ends for positive locking and removability without tools

3. Accessory Cross Tees: Cross tees must have knurled faces and quick release cross tee ends for positive locking and removability without tools.

a. DGW-6026DM: 1.617" high x 5' long with a 1-1/2" face

b. DGW-7226DM: 1.617" high x 6' long with a 1-1/2" face

c. DGW-8426DM: 1.617" high x 7' long with a 1-1/2" face

d. DGW-9626DM: 1.617" high x 8' long with a 1-1/2" face

4. Wall Moldings: Single web with knurled face

a. DGWM-24: 1-1/2” x 1” x 144” long wall molding

b. DGCM-27: 144” x 1-5/8” x 1” x 1” channel molding

c. DGLC-12: 144” x 1-3/4” x 1” x 1” index channel molding

5. Accessories

a. DGSC-180: Splice Clip

b. DGTC-90: Transition Clip

c. DGWC: Wall Attachment Clip

d. DGSP-180: Splice Plate

e. DGHUB: Dome Hub

f. CMAC-1: Close Mount Attachment Clip

6. Wire: Hanger Wire 12 ga., galvanized or as noted on drawings

B. USG Drywall Wall-to-Wall Suspension Systems – Commercial quality, cold-rolled steel, hot dipped galvanized finish for use in corridors and short span applications.

1. Main Tees: Fire-Rated Heavy Duty classification 1.617” high x [6’] [8’] [10’] [12’] [14’] [Custom] long, integral reversible splice with 1-1/2” knurled face.

2. Wall Moldings: Single web with knurled face, 1-1/2” x 1” x 12’ long, DGWM24

3. Wall Channel: Single web with knurled face, 1-5/8” x 1” x 12’ long, DGCM27

4. Locking Wall Channel: Single web with knurled face, 1-3/4” x 1” x 12’ long, DGLC-12

C. Grid Suspension Assemblies: Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL

2.3 MATERIALS - BOARDS

A. Gypsum Board:

1. ASTM C36, Type X except where Type C fire-resistant type is indicated or required to meet UL assembly types.

2. Edges: Tapered

a. SHEETROCK Brand Gypsum Panels have long edges tapered on the face side to form a shallow channel for joint reinforcement.

b. SHEETROCK brand Gypsum Panels, SW Edge, have an exclusive tapered rounded edge design to help minimize ridging or beading and other joint imperfections and help compensate for extremes of temperature and humidity during construction. The SW system produces a stronger joint than with regular gypsum panels. Setting-type joint compound is recommended with this shape edge. Except for the rounded edge, SW Panels are tapered like, and otherwise identical to, regular tapered-edge gypsum panels.

c. Typical thickness for different applications include:
5/8 inch thick for commercial installations
½ inch thick for single-layer application in residential construction
1/4 inch thick used as base layer for improving sound control in double layer partitions, for use over old wall and ceiling surfaces and for forming curved surfaces with short radii

d. Where curved gypsum board construction is indicated, use 1/4 inch thick flexible facing board.

3. Acceptable products:

a. Typical partitions and ceilings: Equivalent to SHEETROCK Brand UltraLight FC 30, SHEETROCK Brand SW, FIRECODE or FIRECODE "C" Gypsum Panels by USG.

1) SHEETROCK brand Gypsum Panels, FIRECODE Core meet the definition of a Type X gypsum board for fire-rated assem blies in the Gypsum Association Fire Resistance Design Manual. Edges: SW tapered or tapered.

b. OR [depends on edge condition option]: Equivalent to SHEETROCK Brand Regular, FIRECODE or FIRECODE "C" Gypsum Panels by USG.

1) SHEETROCK brand Gypsum Panels, FIRECODE C Core provide improved fire protection over standard FIRECODE panels due to additives that enhance the integrity of the core under fire exposure. Comply with Type X requirements.

c. Acceptable product for fire-rated walls: Equivalent to Ultracode Core, 3/4 inch thick, by USG.

1) SHEETROCK brand Gypsum Panels, ULTRACODE Core, provide 1, 2, 3 and 4 hour fire ratings with fewer layers of gypsum panels than are usually required when used in approved designs.

4. Ceiling board

a. ASTM C36, non-sag type

b. Thickness: 1/2 inch

c. Acceptable product: Equivalent to SHEETROCK® Brand UltraLight Panels by USG

1) SHEETROCK® Brand UltraLight Panels are re-engineered, lightweight gypsum wallboard panels with a high strength-to-weight ratio composite design. The panels have superior sag resistance that eliminates the need for traditional 1/2" sag-resistant ceiling panels. The noncombustible gypsum core is encased in 100% recycled face and back papers. The natural finish face paper is folded around the long edges to protect the core and the ends are cut square and even. The long edges of the panels are tapered, allowing joints to be reinforced with Sheetrock® Brand joint treatment systems. Thickness: 1/2 inch, 5/8 inch, unless otherwise indicated.

5. Mold-resistant gypsum board

a. ASTM C1396, regular except where Type X (FIRECODE) or Type C (FIRECODE C) indicated or required to meet UL assembly types

b. Edges: Tapered

c. Thickness: 1/2 inch [5/8 inch](for FIRECODE only), [3/4 inch] inch (ULTRACODE)

d. Acceptable product: Equivalent to SHEETROCK brand MOLD TOUGH gypsum panels by USG

1) SHEETROCK® brand MOLD TOUGH™ gypsum panels have a noncombustible, moisture- and mold-resistant gypsum core that is encased in moisture- and mold-resistant, 100 percent recycled green face and brown back papers. The panels feature tapered long edges for easy finishing. The 5/8 inch FIRECODE and 1/2 inch FIRECODE C Core panels are UL Classified for fire resistance (Type X or Type C).

2.4 MATERIALS - ACCESSORIES

A. Metal trim for gypsum board

1. Conform to profile and dimensions indicated

2. Material for interior Work: Galvanized steel, 26 gauge minimum

3. Corner beads: Equivalent to Dur-A-Bead No. 103 [104] [800] [900] by USG

4. Casing beads (edge beads): Equivalent to 200A [200B] [401] [402] [P-1] [701-B] [801-A] [801-B] by USG

5. Control joints

a. Roll-formed zinc with perforated flanges

b. Size: 1-3/4 inch wide, with 1/4 inch wide center channel

c. Provide with removable tape strip over channel

d. Acceptable product: Equivalent to No. 093 by others

B. Paper-faced metal trim for gypsum board

1. Conform to profile and dimensions indicated

2. Material for interior Work: Comply with ASTM C1047

3. Outside corners: SHEETROCK Brand Paper Faced Metal Bead and Trim [81W] [B1XWEL] [B1 Super Wide] by USG

4. Outside Bullnose corners: SHEETROCK Brand Paper Faced Metal Bead and Trim [SLOC] [Danish] [Santa Fe] by USG

5. Inside corners: SHEETROCK Brand Paper Faced Metal Bead and Trim [B2] [SLIC] by USG

6. Trims: L shape - B4 SERIES, J shape: B9 SERIES by USG

C. Special Trim and Reveals: Extruded aluminum alloy 6063-T5, profiles as indicated

D. Gypsum Board Screws: Self-drilling, self-tapping steel screws

1. For steel framing less than 0.03 inch thick: Comply with ASTM C1002

2. For steel framing from 0.033 inch thick to 0.112 inch thick: Comply with ASTM C954

3. Provide Type S or Type S-12 screws

E. Acoustical Sealant: Equivalent to Acoustical Sealant by USG

1. SHEETROCK Acoustical Sealant is a highly elastic, water-based caulking for sound-rated partition and ceiling systems and sealing exterior walls to reduce infiltration. Non-bleeding and staining, pumpable and easily applied in beads. Provides excellent adherence to most surfaces, permanent flexibility and lasting seal. Meets ASTM C919 and ASTM C834.

F. Miscellaneous Accessories: Provide as required for complete installations.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Standard reference: Install grid members in accordance with ASTM C636, CISCA installation standards, and other applicable references.

B. Manufacturer’s reference: Install in accordance with manufacturer’s current printed recommendations.

C. Drawing reference: Install in accordance with approved shop drawings and locate ceiling in accordance with main tee dimensions relative to elevations.

D. Install in accordance with reference standards and manufacturer's instructions [and as required to comply with seismic requirements].

3.3 APPLICATION INSTALLATION REQUIREMENTS

A. Flat Ceiling Applications

1. Hanger Wire Installation: Secure hanger wires to upper structural elements and space hangers so that each hanger wire supports a maximum of 16 sq. ft.

2. Space main tee members a maximum span of 48 inches on center (or as specified by the UL Fire Resistance Directory)

3. Space cross tees recommended 16 inches o.c. (5/8 inch SHEETROCK Brand gypsum Board or 5/8 inch FIBEROCK Interior panels can span 24 inches o.c. Check USG AC3095, for maximum allowable spacing based on wind load) (or as specified by the UL Fire Resistance Directory) Install extra cross tees where butt joints occur, 8 inches from

each side of the butt joint.

4. Install compression struts per manufacturer's specifications and spacing, in accordance with wind load if applicable. Adjust main and cross tee spacing as necessary for loading conditions. (See AC3095, USG)

5. Install fiber glass insulation (R____) in plenum, resting on top of main tees and cross members.

6. Do not install insulation within 3 inches of light fixtures unless fixtures are approved for use with insulation.

7. Limit insulation thickness so that combined weight of supported panels and insulation on grid main tees does not exceed 16 plf

8. Attach (SHEETROCK gypsum Board) (FIBEROCK Interior panels) (DUROCK Cement Board) to the suspension system main runners, cross tees, and cross channels with (1-1/4 inch bugle head screws – single layer of board) spaced (16 inches o.c. – SHEETROCK gypsum Board) (8 inches o.c.- FIBEROCK) (6 inches o.c. – DUROCK) in the field and at the perimeter of the panels, locate 3/8 inch in from panel edges. Hold panels in firm contact with framing while driving fasteners. Drive fastener heads flush with, or slightly below surface of (SHEETROCK gypsum board) (FIBEROCK panels). (Drive fasteners so bottoms of heads are flush with surface of DUROCK cement boards.)

9. Install trim, and similar accessories as necessary and as applicable to meet project requirements where indicated on drawings.

10. Install control joints at locations of properly detailed control joints, including additional cross tees as necessary, per direction of architect and/or design professional.

11. Finish boards as described to achieve 'Level of Finish' specified.

B. Corridor (Wall-to-Wall) Applications

1. Hanger Wire Installation: Secure hanger wires to upper structural elements and space hangers so that each hanger wire supports a maximum of 16 sq. ft.

    a. Note:
    If using 1/2 inch single layer of drywall no hangers are required for spans up to 7'-0" (L/240 uniform load, single span design).
    If using 5/8 inch single layer of drywall no hangers are required for spans up to 6'-0" (L/240 uniform load, single span design).
    If using 1/2 inch single layer of drywall for spans over 7'-0" to 14'-0" one hanger at mid span per each main is required (L/240 uniform load, single span design).
    If using 5/8 inch single layer of drywall for spans over 6'-0" to 12'-0" one hanger at mid span per each main is required (L/240 uniform load, single span design).
    If using 5/8 inch single layer of drywall for spans over 12'-0" to 14'-0" two hangers at 1/3 point per each main is required (L/240 uniform load, single span design).

2. Space main tee members as required by span and design load

    a. Note:

Maximum load (lbs/sf)	Unsupported span	Main tee spacing

18	4’-0”	16” o.c.
12	4’-0”	24” o.c.
9.2	5’-0”	16” o.c.
6.1	5’-0”	24” o.c.
5.3	6’-0”	16” o.c.
3.6	6’-0”	24” o.c.
3.4	7’-0”	16” o.c.

3. Attach (SHEETROCK gypsum board) (FIBEROCK interior panels) (DUROCK cement board) to the suspension system main runners, cross tees, and cross channels with (1-1/4 inch bugle head screws – single layer of board) spaced (16 inches o.c. – SHEETROCK gypsum Board) (8 inches o.c.- FIBEROCK) (6 inches o.c. – DUROCK) in the field and at the perimeter of the panels, locate 3/8 inch in from panel edges. Hold panels in firm contact with framing while driving fasteners. (Drive fastener heads flush with, or slightly below surface of (SHEETROCK gypsum board) (FIBEROCK panels). (Drive fasteners so bottoms of heads are flush with surface of DUROCK cement boards.)

4. Install trim, and similar accessories as necessary and as applicable to meet project requirements where indicated on drawings.

5. Install control joints at locations of properly detailed control joints, including additional cross tees as necessary, per direction of architect and/or design professional.

6. Finish boards as described to achieve ‘Level of Finish’ specified.

C. Curved, vaults, or dome applications

1. Drawing reference: Install in accordance with approved shop drawings and locate ceiling in accordance with main tee dimensions relative to elevations.

2. Hanger Wire Installation: Secure hanger wires to upper structural elements and space hangers so that each hanger wire supports a maximum of 12 sq. ft.

    a. Note: Note: Curved surfaces can be achieved with the attachment of panels, however, in order to achieve the best application, plaster is recommended. Due to the width of the grid flange (greater than 3/4 inch) STRUCTO-BASE gypsum basecoat plaster should be used to reduce cracking. If other gypsum plasters or portland plaster are being used then it is recommended to secure narrow flanged framing members or offset the metal lath to reduce cracking due to reduced mechanical key at framing/lath intersection.
    Total weight of ceiling membrane plus overlaid insulation and surface finish material (e.g. ceramic tile) supported by the grid assembly should not exceed 4.0 psf. If the load exceeds 4.0 psf, then spacing of the hanger wires and/or main tees must be reduced (see sample calculation below). For guidance the following are design weights:

1/2" SHEETROCK Exterior Gypsum Ceiling Board	2.0 psf
5/8” SHEETROCK Exterior Gypsum Ceiling Board	2.5 psf
1/2” FIBEROCK Sheathing	2.2 psf
5/8” FIBEROCK Sheathing	3.0 psf
1/2” DUROCK Cement Board	3.0 psf

5/8” DUROCK Cement Board	3.75 psf

b. If main tee hanger wires are at 4' o.c., the mains’ load capacity is: 4 FT * 4 psf = 16 #/LF.
By reducing the hanger wires to 3' o.c., the mains can carry 32 #/LF.
By reducing the hanger wires to 2' o.c., the mains can carry 64 #/LF.

3/4" of plaster wet would be about 8.75 #/SF + 5/8" FIBEROCK Sheathing at 3 #/SF for about 12 #/SF.
Mains are at 4 ft centers with 4’ hangers; this load would be 12 #/SF * 4 FT = 48 #/LF.
If the Mains are at 2 ft centers with 4’ hangers; this load would be 12 #/SF * 2 FT = 24 #/LF.

Therefore, there are two options:
1.) Space the main tees at 4' o.c. with the 12 ga. hanger wire at 24" o.c. and within 8" from any wall, cross tees at 16" o.c. with hanger wire support at midspan and/or within 8" from any wall.
2.) Space the main tees at 2' o.c. with the 12 ga. hanger wire at 36" o.c. and within 8" from any wall, cross tees at 16" o.c.

3. Space main and cross tee members so the maximum span of metal lath is (16 inches) (12 inches)

4. Secure self-furring metal lath to tee members with screws spaced 6 inches o.c. max., applied at lath dimples. Lap metal lath ends and edges and secure with 18 gauge tie wire spaced 6-inches o.c.

5. Mix STRUCTO-BASE Gypsum Plaster with sand in proportions of 2 cu. ft. of sand per 100 lbs. of plaster for scratch and brown coats. Apply plaster to metal lath to a thickness of 5/8” (min.) Measured from the face of the lath.

6. Select a plaster mix for the finish coat to provide a smooth trowel or sand float (textured) finish. (Reference SA 920)

7. Use template(s) to insure uniform and even curvature of the finished surface.

END OF SECTION