

## **SECTION 09 21 16 – GYPSUM BOARD ASSEMBLIES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. Section includes furnishing and installing:
  - 1. Screw type steel board framing, framing for furring, and drywall ceiling suspension systems.
  - 2. Gypsum drywall board, gypsum sheathing and moisture resistant gypsum board.
  - 3. Gypsum board accessories.
  - 2. Gypsum board finishing.
  - 3. Extruded aluminum trim.

#### **1.3 RELATED WORK**

- A. Related Work of Other Sections:
  - 1. Division 03 Section – Cast-In-Place Concrete.
  - 2. Division 04 Section – Unit Masonry.
  - 3. Division 06 Section – Architectural Woodwork
  - 4. Division 07 Section – Building Insulation.
  - 5. Division 07 Section – Joint Sealants.
  - 6. Division 08 Section – Steel Doors and Frames.
  - 7. Division 08 Section – Aluminum Frames.
  - 8. Division 08 Section – Access Doors.
  - 9. Division 08 Section – Entrances and Storefront.
  - 10. Division 09 Section – Plaster Assemblies
  - 11. Division 09 Section – Painting and Coating.

#### **1.4 SUBMITTALS**

- A. Product Data: Submit product data for each board material and accessory required, including specifications showing compliance with requirements.
- B. Samples: For the following products:
  - 1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

#### **1.5 QUALITY ASSURANCE**

- A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

- B. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
- C. References and Industry Standard Guidelines:
  - 1. Association Publications
    - ASTM International. ASTM C 754: Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products. West Conshohocken, PA: ASTM, 2000.
  - 2. National Gypsum Company. Gypsum Construction Guide. 7th ed. Charlotte, NC: National Gypsum Company, 2001.
  - 3. USG Corporation. The Gypsum Construction Handbook. Centennial ed. Chicago, IL: USG Corporation, 2000.
  - 4. Gypsum Association Fire Resistance Design Manual GA-600.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

## **1.7 PROJECT CONDITIONS**

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

## **PART 2 - PRODUCTS**

### **2.1 PRODUCTS AND MANUFACTURERS**

- A. Subject to compliance with requirements, provide products of one of the following:
  - 1. Metal Support Materials;
    - a. Dale Industries, Inc., Dearborn, MI, (Tel) 313-846-9400.
    - b. Dietrich Industries, Inc., Hutchins, TX., (Tel) 214-225-1100.
    - c. Gold Bond Building Products Div., National Gypsum Co., Charlotte, NC, (Tel) 704-365-0950.
    - d. Amico/Maverick Steel Corp., Ennis, TX, (Tel) 800-528-5344.
    - e. Unimast, Inc., Mansfield, TX, (Tel) 817-473 9346.
  - 2. Gypsum Board and Related Products:
    - a. G-P Gypsum Products, Decatur, GA, (Tel) 404-987-5190.
    - b. Gold Bond Building Products Div., National Gypsum Co., Charlotte, NC, (Tel) 704-365-0950.
    - c. United States Gypsum Co., Chicago, IL, (Tel) 312-321-4000.

3. Direct Suspension Systems:

- a. Armstrong World Industries, Houston, TX, (Tel) 800-448-1405.
- b. Chicago Metallic Corp., Chicago, IL, (Tel) 312-563-4600.
- c. National Rolling Mills, Paoli, PA, (Tel) 215-644-6700.
- d. United States Gypsum Co., Chicago, IL, (Tel) 312-321-4000.

## 2.2 FRAMING AND SUPPORT SYSTEMS

- A. Screw Type Steel Studs and Runners: ASTM C 645, fabricated from minimum 0.0179" thick zinc coated steel in sizes indicated. Provide 1-1/2" x 1-1/2" angle runner at perimeter of ceiling suspension panels for support of board panel edge and extruded aluminum ceiling panel edge closure trim.
- B. Non-Fire Rated Furring Bar Suspension System for Gypsum Board Ceilings: Armstrong 7900 Board Furring System with 7945 cross tees, HD 7801 wall angle, and 8887 board furring shoe, or equivalent by Chicago Metallic, or USG. Provide galvanized steel wire hangers, ASTM A 641, soft temper, sized so that stress at 3x hanger load (ASTM C 635, Table 1, Direct Hung) is less than wire yield stress. Size hanger anchorage devices for 3x calculated hanger load, except size direct pull-out concrete inserts for 5x calculated hanger load as determined by testing (ASTM E 488) conducted by a qualified independent testing agency. Coordinate with Division 09 Section - Acoustical Ceilings.
- C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

## 2.3 BOARD MATERIALS

- A. Gypsum Board: ASTM C 36, 5/8" thick, unless otherwise shown.
  1. Fire rated (ASTM C 36, Type X requirements) where required for construction shown.
  2. Base Layer: Gypsum board, ASTM C 442 or gypsum board, ASTM C 36.
  3. Moisture and Mold Resistant Gypsum Board: ASTM C 1396, UL Classified for fire resistance (Type X), water-resistant gypsum backing board, mold resistant (ASTM D 3273); U.S. Gypsum "Humitek."
  4. Weather Resistant Gypsum Sheathing: Provide 1/2-inch thick, V-type T & G long edges and square butt ends, and with fiberglass reinforced faces for improved strength and weather resistance for up to 6 months of exposure; USG "Weatherock Exterior Sheathing" or Georgia-Pacific "Dens-Glass Gold."
    - a. Sheathing Tape: Carlisle Hardcast "VaporGrip-22" seam, flashing and vapor barrier sealing tape with "CCW-702," "CCW-1402 Primer/Adhesion Enabler," or Hardcast "GlasGrip-658" adhesive.

## 2.4 MISCELLANEOUS MATERIALS, ACCESSORIES, AND TRIM

- A. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
  1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
  2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

- B. Galvanized steel casing beads, corner beads, and other metal trim accessories as required.
- C. Joint Tape: ASTM C 475, plain or perforated.
- D. Interior Joint Compound: ASTM C 475 in two grades; one for bedding tape and filling depressions and one for topping and sanding.
- E. Joint Compound for Water Resistant Backing Board: Setting type for filling joints and treating fastener heads.
- F. Extruded Aluminum Trim: Fry Reglet Corp., Norcross, GA; MM Systems Corp, Tucker, GA; Gordon, or Pittcon Industries "Softforms", Riverdale, MD. Provide shapes as indicated.
- G. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool, minimum 2-inch thick.
  - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
  - 2. Acceptable Products: US Gypsum "Thermafiber Sound Attenuation Blanket" or Owens-Corning "Sound Attenuation Batts," or Knauf "Unfaced Thermal and Acoustical Blanket."
- H. Acoustical Sealant: See Section 07 92 00 – Joint Sealants.
- I. Acoustical Foam Double Stick Tape: Norton Plastics Corp., V740 Multipurpose medium density foam tape, 1/4" x 2" wide.
- J. Electrical box sound pads by Harry Lowery & Associates, Sun Valley, CA, (Tel) 818-768-4661.
- K. Acoustical Foam Gasket: Norton foam sealant tape, 1-1/2" x 1/8".

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. Suspended Ceilings: Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers at spacing required to support ceilings and that hangers will develop their full strength.
  - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed-on fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (600 mm) o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of gypsum board assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

### 3.3 INSTALLING STEEL FRAMING, GENERAL

A. Installation Standards: ASTM C 754, and ASTM C 840 requirements that apply to framing installation, except as follows:

1. Partitions With Brittle Finishes: Use stud manufacturer's published limiting heights for construction and single span conditions with a limiting deflection of L/360 and uniform transverse load values as indicated on the Drawings.
2. Partitions Without Brittle Finishes, More Than 10'-0" High: Use stud manufacturer's published limiting heights for construction and single span conditions with a limiting deflection of L/240 and uniform transverse load values as indicated on the Drawings.
3. Do not bridge building expansion joints with support system. Frame both sides of joints with supports as indicated.
4. Install supplementary framing, blocking and bracing at terminations in the work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar work to comply with details indicated or if not otherwise indicated, to comply with applicable published recommendations of gypsum board manufacturer, or if not available, of "Gypsum Construction Handbook" published by US Gypsum Co.
5. Isolate stud system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.
6. Install runner tracks at floors, ceilings, and structural walls and columns where gypsum board stud system abuts other work, except as otherwise indicated.
7. Terminate partition stud system at ceilings, except where indicated to be extended to structural support or substrate above.
8. Space studs 16" o.c., unless otherwise indicated.
9. Frame door openings to comply with details indicated. If not shown, comply with applicable published recommendations of gypsum board manufacturer or of "Gypsum Construction Handbook" published by U. S. Gypsum Co. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for jack studs) at head and secure to jamb studs.
10. Frame openings other than door openings to comply with details indicated or if not indicated, in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads.
11. Space wall furring members 24" o.c., unless otherwise indicated.

### 3.4 INSTALLING CEILING SUPPORT SUSPENSION SYSTEMS

- A. Secure hangers to structural support by connecting directly to structure where possible; otherwise connect to inserts or other direct pullout type anchorage devices as specified.
- B. Suspend ceiling hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
  - 3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
  - 4. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
  - 5. Do not attach hangers to steel deck tabs.
  - 6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  - 7. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- C. Space main runners 4'-0" o.c. and space hangers 4'-0" o.c. along runners, except as otherwise shown.
- D. Level main runners to a tolerance of 1/8" in 12'-0", measured both lengthwise on each runner and transversely between parallel runners.
- E. Furring Bar Suspension Support System: Attach perimeter wall track or angle wherever support system meets vertical surfaces. Mechanically joint support members to each other and butt-cut to fit into wall track.
  - 1. Main Runners: Support directly from wire hangers spaced at 4' o.c.; locate not more than 6" from parallel walls and space not more than 4' o.c., between parallel walls. Install manufacturer's standard splicing device at joints.
  - 2. Cross Runners: Support by interlocking ends of cross runners with main runners to form 90 degree angle between intersecting runners. Locate not more than 6" from parallel walls and space not more than 24" o.c.
  - 3. Other Components: Provide as recommended by manufacturer for support of other work resting in, or on, ceiling.
  - 4. Install auxiliary framing at termination of board work, and at openings for light fixtures and similar work, as required for support of both the board construction and other work indicated for support thereon.

- F. Carrying Channel and Rigid Furring Channel Suspension System: Attach 1-1/2" carrying channels (main runners) to hangers at maximum 48" on center. Install rigid furring channels at maximum 16" on center. Level support system to a tolerance of 1/8" in 12'-0", measured both lengthwise on each channel and transversely across adjacent parallel channels. Install auxiliary framing at termination of board work, and at openings for light fixtures and similar work, as required for support of both the board construction and other work indicated for support thereon. Cold rolled steel channels shall weigh not less than 300-lb./1000 lf. for 3/4-inch size, and 475-lb./1000 lf for 1-1/2-inch size; rust-inhibitive paint for interior locations except hot-dipped galvanized at "high humidity" areas.

### **3.5 APPLYING AND FINISHING PANELS, GENERAL**

- A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.
- B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
- C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- D. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- G. Attach gypsum panels to framing provided at openings and cutouts.
- H. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members using resilient channels, or provide control joints to counteract wood shrinkage.
- I. Form control and expansion joints with space between edges of adjoining gypsum panels.
- J. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  2. Fit gypsum panels around ducts, pipes, and conduits.

3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
4. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
5. STC-Rated Assemblies: Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.
6. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.

### **3.6 SINGLE LAYER APPLICATION**

- A. Partition/Walls: Apply gypsum board vertically with vertical joints located over supports, but offset at least one stud space on opposite faces of partition/walls. Use maximum practical length boards to minimize end joints.
- B. Wall Tile Base: Where board is base for thin-set ceramic tile and similar rigid applied wall finishes, install water resistant gypsum backing board glass mesh mortar units. Space fasteners not more than 8" o.c.
  1. At toilet room walls and similar "wet" areas, install moisture resistant gypsum board. Apply with uncut long edge at bottom of work. Seal edges, cut- edges and penetrations of each piece with water-resistant adhesive or, where recommended by backing board manufacturer, with water-resistant joint compound.
- C. Ceilings: Apply gypsum board with long dimension at right angles to supports with end joints located over supports. Use maximum practical length boards to minimize end joints. Stagger end joints in alternate courses of boards and locate as far away from center of ceiling as possible.

### **3.7 DOUBLE LAYER APPLICATION**

- A. Mechanically Fastened Layers: Fasten both layers to supports with screws. For base layer, do not exceed 24" o.c. spacing at edges and intermediate supports, and for face layer do not exceed 16" o.c. spacing along supports of non-fire rated construction. At fire rated construction, comply with requirements of fire rated design indicated.
- B. On walls, apply both layers vertically with vertical joints staggered on opposite side of partitions and offset not less than 12" between layers.
- C. On ceilings, apply first layer as specified for single layer application prior to wall face layer application; apply face layer on ceiling, offsetting joint between layer at least one back-up member spacing in both directions.

### **3.8 INSTALLATION OF BOARD TRIM AND ACCESSORIES, GENERAL**

- A. Where feasible, use the same fasteners, to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges by nailing or stapling in accordance with manufacturer's instructions and recommendations.
  - 1. Install metal corner beads at external corners of board work.
  - 2. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed. Provide type with face flange to receive joint compound. Install L-type trim where work is tightly abutted to other work, and install special kerf-type where other work is kerfed to receive long leg of L-type trim. Install U-type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints).
  - 3. Install extruded aluminum trim at locations indicated. Cope and miter joints for neat appearance without voids.

### **3.9 INSTALLATION OF GYPSUM SHEATHING**

- A. Except as otherwise indicated, comply with manufacturer's instructions and industry standards for the installation of gypsum sheathing.
  - 1. Install 2-foot wide panels horizontally with V-grooved edge down, and with end joints on supports and staggered two support spacings where possible, but not less than one support spacing or 12-inches.
  - 2. Fasten at each support with four screws (spaced approximately 8-inches on center) set back 3/8-inch minimum from edge.
  - 3. Cut boards at penetrations, edges, and other obstructions of the work; fit tight against abutting work, except provide 3/8-inch setback where non- load bearing work abuts structural elements at head and jambs.
  - 4. Do not bridge building expansion joints with gypsum sheathing; cut and space edges to match spacing of structural support elements.

### **3.10 FINISHING GYPSUM BOARD ASSEMBLIES**

- A. Apply treatment at gypsum board joints (both directions), flanges of trim accessories, penetrations, fastener heads, surface defects and elsewhere as required to prepare work for decoration. Prefill open joints and rounded or beveled edges, if any, using type of compound recommended by manufacturer.
- B. Exposed Board to Receive Paint and Other Finishes (Except Tile): Apply joint compound in 3 coats (not including prefill of openings in base), and sand between last two coats and after last coat.
- C. Concealed Board: Omit third coat and sanding on concealed board work which is not indicated for board finishing or for which finishing is not required to achieve fire-resistance rating, sound rating or to act as air or smoke barrier.
- D. Water-Resistant Backing Board Tiled Areas: Comply with recommendations of gypsum backing board manufacturer for treatment of joints behind ceramic tile.
  - 1. Treat fastener heads with water-resistant joint compound.

2. Fill tapered edges in gypsum panels with water-resistant joint compound, embed joint tape firmly and wipe off excess compound; follow immediately with a second coat of water-resistant joint compound over taping coat, being careful not to crown the joint.
  3. Fold and embed tape in all interior angles to form true angles.
  4. In water-resistant backing board areas not to be tiled, treat fastener heads and embed tape as indicated above using water-resistant joint compound but finish with two coats of joint compound used for regular gypsum board work.
- E. Provide the following levels of gypsum board finish per ASTM C 840 and GA-214:
1. Level 0: Gypsum board within unfinished areas; taping, floating and trim is not required.
  2. Level 1: Gypsum board within ceiling plenum areas, concealed areas, unless a higher finish is required for fire resistance rated assemblies and sound rated assemblies.
  3. Level 2: Gypsum board substrates to receive ceramic tile and similar solid finish materials.
  4. Level 3: Gypsum board ceiling and wall surfaces to receive flat and satin paint over non-textured surfaces.
  5. Level 4: Gypsum board wall surfaces to receive flat or semi-gloss paint and.
  6. Level 5: Gypsum board ceiling and wall surfaces specified to receive gloss paint and other reflective applied finishes over non-textured surfaces.

**END OF SECTION 09 21 16**