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Change 1 - 05/13

PREPARING ACTIVITY: NAVFAC Superseding
UFGS-09 29 00 (August 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2014

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SECTION 09 29 00

GYPSUM BOARD 05/11

NOTE: This guide specification includes the requirements for gypsum board, cementitious backer units, and accessories intended for use in drywall construction.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

Reference Section 05 40 00 COLD-FORMED METAL FRAMING for load bearing studwork. Reference Section 09 22 00 SUPPORTS FOR PLASTER AND GYPSUM BOARD for non-loadbearing studs, furring and ceiling suspension systems.

NOTE: On the drawings, show:

1. Locations of each type of gypsum board, backing board and cementitious backer units, using same terminology as in the specification.
2. Locations and UL or GA design numbers for fire rated gypsum board and cementitious backer unit assemblies.

3. Locations of asphalt impregnated building felt
if gypsum sheathing is used or if cementitious
backer units are used in wet areas.

PART 1 GENERAL

1.1 REFERENCES

NOTE: This paragraph is used to list the
publications cited in the text of the guide
specification. The publications are referred to in
the text by basic designation only and listed in
this paragraph by organization, designation, date,
and title.

Use the Reference Wizard's Check Reference feature
when you add a RID outside of the Section's
Reference Article to automatically place the
reference in the Reference Article. Also use the
Reference Wizard's Check Reference feature to update
the issue dates.

References not used in the text will automatically
be deleted from this section of the project
specification when you choose to reconcile
references in the publish print process.

The publications listed below form a part of this specification to the
extent referenced. The publications are referred to within the text by the
basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A108.11	(1992; Reaffirmed 2005) Specifications for Interior Installation of Cementitious Backer Units
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ASTM INTERNATIONAL (ASTM)

ASTM C1002	(2007; R 2013) Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
ASTM C1047	(2010a) Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
ASTM C1177/C1177M	(2013) Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C1178/C1178M	(2013) Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel
ASTM C1396/C1396M	(2014) Standard Specification for Gypsum

Board

ASTM C1629/C1629M	(2006; R 2011) Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels
ASTM C475/C475M	(2012) Joint Compound and Joint Tape for Finishing Gypsum Board
ASTM C514	(2004; E 2009; R 2009) Standard Specification for Nails for the Application of Gypsum Board
ASTM C557	(2003; E 2009; R 2009) Adhesives for Fastening Gypsum Wallboard to Wood Framing
ASTM C840	(2013) Application and Finishing of Gypsum Board
ASTM C954	(2011) Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
ASTM D1037	(2012) Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
ASTM D1149	(2007; R 2012) Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber
ASTM D226/D226M	(2009) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D2394	(2005; R 2011) Simulated Service Testing of Wood and Wood-Base Finish Flooring
ASTM D412	(2006a; R 2013) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D5420	(2010) Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Strike Impacted by a Falling Weight (Gardner Impact)
ASTM D624	(2000; R 2012) Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM E2129	(2010) Standard Practice for Data Collection for Sustainability Assessment of Building Products
ASTM E695	(2003; R 2009) Measuring Relative Resistance of Wall, Floor, and Roof

Construction to Impact Loading

ASTM E84 (2014) Standard Test Method for Surface Burning Characteristics of Building Materials

GYPSUM ASSOCIATION (GA)

GA 214 (2010) Recommended Levels of Gypsum Board Finish

GA 216 (2010) Application and Finishing of Gypsum Panel Products

GA 224 (2008) Installation of Predecorated Gypsum Board

GA 253 (2012) Application of Gypsum Sheathing

GA 600 (2009) Fire Resistance Design Manual

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS Scientific Certification Systems (SCS) Indoor Advantage

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED NC (2009) Leadership in Energy and Environmental Design(tm) New Construction Rating System

UL ENVIRONMENT (ULE)

ULE Greenguard UL Greenguard Certification Program

UNDERWRITERS LABORATORIES (UL)

UL Fire Resistance (2012) Fire Resistance Directory

1.2 SUBMITTALS

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated those items that require Government approval, due to their complexity or criticality, with a "G". Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within

the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.] [for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Cementitious backer units

Glass Mat Water-Resistant Gypsum Tile Backing Board

Water-Resistant Gypsum Backing Board

Glass Mat Covered or Reinforced Gypsum Sheathing

Glass Mat Covered or Reinforced Gypsum Sheathing Sealant

Impact Resistant Gypsum Board

Accessories

Submit for each type of gypsum board and for cementitious backer units.

Certification

Gypsum Board; (LEED NC)

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

[Adhesives; (LEED NC)
Joint Treatment Materials

Submit manufacturer's product data, indicating VOC content.]

[Local/Regional Materials; (LEED NC)

Documentation indicating distance between manufacturing facility

and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.]

[Environmental Data]

SD-04 Samples

Predecorated gypsum board[; G][; G, [_____]]

Submit for each color and pattern of predecorated gypsum board. Where colors are not indicated, submit color selection samples of not less than eight of the manufacturer's standard colors.

SD-07 Certificates

Asbestos Free Materials[; G][; G, [_____]]

Certify that gypsum board types, gypsum backing board types, cementitious backer units, and joint treating materials do not contain asbestos.

SD-08 Manufacturer's Instructions

Material Safety Data Sheets

SD-10 Operation and Maintenance Data

Manufacturer maintenance instructions

Waste Management

SD-11 Closeout Submittals

Local/Regional Materials; (LEED)

LEED documentation relative to local/regional materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Gypsum Board; (LEED)

LEED documentation relative to recycled content credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Adhesives; (LEED)

LEED documentation relative to low emitting materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.3 [SUSTAINABLE DESIGN CERTIFICATION

NOTE: Products meeting the Gold standard will also meet the basic standard. Require Gold when the

facility will be used by people sensitive to air quality conditions, such as child development centers and medical facilities.

Product shall be third party certified in accordance with ULE Greenguard[Gold], SCS Scientific Certification Systems Indoor Advantage[Gold]or equal. Certification shall be performed annually and shall be current.]

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

Deliver materials in the original packages, containers, or bundles with each bearing the brand name, applicable standard designation, and name of manufacturer, or supplier.

1.4.2 Storage

NOTE: Gypsum board provides a sink for adsorbing high short-term emissions of VOCs, formaldehyde, particulates, or other air-borne compounds. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, wood preservatives, and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.

Keep materials dry by storing inside a sheltered building. Where necessary to store gypsum board and cementitious backer units outside, store off the ground, properly supported on a level platform, and protected from direct exposure to rain, snow, sunlight, and other extreme weather conditions. Provide adequate ventilation to prevent condensation. Store per manufacturer's recommendations for allowable temperature and humidity range. Gypsum wallboard shall not be stored with materials which have high emissions of volatile organic compounds (VOCs) or other contaminants, including [____]. Do not store panels near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

1.4.3 Handling

Neatly stack gypsum board and cementitious backer units flat to prevent sagging or damage to the edges, ends, and surfaces.

1.5 ENVIRONMENTAL CONDITIONS

1.5.1 Temperature

Maintain a uniform temperature of not less than 10 degrees C 50 degrees F in the structure for at least 48 hours prior to, during, and following the application of gypsum board, cementitious backer units, and joint treatment materials, or the bonding of adhesives.

1.5.2 Exposure to Weather

Protect gypsum board and cementitious backer unit products from direct exposure to rain, snow, sunlight, and other extreme weather conditions.

1.5.3 Temporary Ventilation

Provide temporary ventilation for work of this section.

1.6 SUSTAINABLE DESIGN REQUIREMENTS

1.6.1 Local/Regional Materials

NOTE: Using local materials can help minimize transportation impacts, including fossil fuel consumption, air pollution, and labor. Using materials harvested and manufactured within a 500 mile radius from the project site contributes to the following LEED credit: MR5. Coordinate with Section 01 33 29 LEED(tm) DOCUMENTATION. Use second option if Contractor is choosing local materials in accordance with Section 01 33 29 LEED(tm) DOCUMENTATION. First option shall not be used for USACE projects. Army projects shall include second option only if pursuing this LEED credit.

[Use materials or products extracted, harvested, or recovered, as well as manufactured, within a [800] [_____] kilometer [500] [_____] mile radius from the project site, if available from a minimum of three sources.] [See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total local material requirements. Gypsum board materials may be locally available.]

1.6.2 Environmental Data

NOTE: ASTM E2129 provides for detailed documentation of the sustainability aspects of products used in the project. This level of detail may be useful to the Contractor, Government, building occupants, or the public in assessing the sustainability of these products.

[Submit Table 1 of ASTM E2129 for the following products: [_____] .]

1.7 QUALIFICATIONS

Furnish type of gypsum board work specialized by the installer with a minimum of [3] [_____] years of documented successful experience.

1.8 SCHEDULING

NOTE: One or both of the following procedures shall be used to minimize the exposure of gypsum wallboard to materials or finishes which have high short-term emissions of VOCs, formaldehyde, particulates, or

other air-borne compounds.

[The gypsum wallboard shall be taped, spackled and primed before the installation of the highly-emitting materials, including [____].] [The gypsum wallboard shall be installed after the installation and ventilation period of the highly-emitting materials, including [____].]

PART 2 PRODUCTS

2.1 MATERIALS

NOTE: Check ASTM C840, GA 216 and ANSI A108.11 for details of materials, fasteners, and application.

Conform to specifications, standards and requirements specified. Provide gypsum board types, gypsum backing board types, cementitious backing units, and joint treating materials manufactured from asbestos free materials only.

Submit Material Safety Data Sheets and manufacturer maintenance instructions for gypsum materials including adhesives.

2.1.1 Gypsum Board

Use of materials with recycled content, calculated on the basis of post-industrial and post-consumer percentage content, contributes to the following LEED credit: MR4. Designer must verify suitability, availability and adequate competition (including verification of bracketed percentages included in this guide specification) before specifying product recycled content requirements. Use last option if Contractor is choosing recycled content products in accordance with Section 01 33 29 LEED(tm) DOCUMENTATION. Army projects shall specify recycled content only if pursuing this LEED credit

ASTM C1396/C1396M. [Gypsum board shall contain a minimum of [5] [10] [____] percent post-consumer recycled content, or a minimum of [20] [40] [____] percent post-industrial recycled content.] [Paper facings shall contain [100] [____] percent post-consumer recycled paper content. Gypsum cores shall contain a minimum of [95] [____] percent post-industrial recycled gypsum content.] [See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total recycled content requirements. Gypsum board may contain post-consumer or post-industrial recycled content.]

2.1.1.1 Regular

NOTE: Use tapered and featured edge gypsum board with embedding and finishing compounds when a very flat surface is required, such as long walls with lighting at the end of the wall and down or up lighted walls.

1200 mm 48 inch wide, [12.7] [15.9] mm [1/2] [5/8] inch thick, [tapered] [, tapered and featured] edges. [Provide tapered and featured edge gypsum board [in Rooms [_____]] [as indicated].]

2.1.1.2 Foil-Backed

1200 mm 48 inch wide, [12.7] [15.9] mm [1/2] [5/8] inch thick, [tapered] [tapered and featured] edges.

2.1.1.3 Type X (Special Fire-Resistant)

1200 mm 48 inch wide, [12.7] [15.9] mm [1/2] [5/8] inch thick, [tapered] [tapered and featured] edges.

2.1.2 Gypsum Backing Board

NOTE: When thicker board is needed, replace the term
"backing board" with "coreboard", and change
dimension to 19.05 to 25.4 mm 3/4" to 1", depending
on system used.

ASTM C1396/C1396M, gypsum backing board shall be used as a base in a multilayer system.

2.1.2.1 Regular

1200 mm 48 inch wide, [12.7] [15.9] mm [1/2] [5/8] inch thick, square edges.

2.1.2.2 Foil-Backed

1200 mm 48 inch wide, [12.7] [15.9] mm [1/2] [5/8] inch thick, square edges.

2.1.2.3 Type X (Special Fire-Resistant)

1200 mm 48 inch wide, [12.7] [15.9] mm [1/2] [5/8] inch thick, square edges.

2.1.3 Regular Water-Resistant Gypsum Backing Board

NOTE: For adhesive applied ceramic tile in wet areas (tubs, shower enclosures, saunas, steam rooms, gang shower rooms, etc.), use cementitious backer units (Tile Council of America (TCA) Handbook) as a substrate. Specify ASTM C1396/C1396M or ASTM C1178/C1178M for all other tiled areas including areas where only ceramic or quarry tile base is to be installed, and for ceilings in humid areas. When using water-resistant gypsum backing board at tile applications, the metal studs should not be spaced more than 406 mm 16 inches o.c. Specify moisture resistant gypsum board ASTM C1396/C1396M for humid areas that are not exposed to direct moisture.

When using moisture resistant board on ceilings,

spacing of supports should be no more than 305 mm 12
inch on center.

NOTE: Additives used to produce water-resistant
gypsum board ("green board") may include VOCs.
Water-resistant types may be difficult to recycle.

ASTM C1396/C1396M

2.1.3.1 Regular

1200 mm 48 inch wide, [12.7] [15.9] mm [1/2] [5/8] inch thick, tapered
edges.

2.1.3.2 Type X (Special Fire-Resistant)

1200 mm 48 inch wide, [12.7] [15.9] mm [1/2] [5/8] inch thick, tapered
edges.

2.1.4 Glass Mat Water-Resistant Gypsum Tile Backing Board

ASTM C1178/C1178M

2.1.4.1 Regular

1200 mm 48 inch wide, [12.7] [15.9] mm [1/2] [5/8] inch thick, square
edges.

2.1.4.2 Type X (Special Fire-Resistant)

1200 mm 48 inch wide, [12.7] [15.9] mm [1/2] [5/8] inch thick, square
edges.

2.1.5 [Glass Mat Covered or Reinforced Gypsum Sheathing

NOTE: This section should be used where exterior
gypsum sheathing with water resistance is required
(i.e. cavity sheathing over metal studs with brick
veneer or as substrate for EIFS systems). Always
use asphalt impregnated felt paper for sheathing
protection. For additional protection or if
recommended by the manufacturer, choose the
paragraph for sheathing sealant.

NOTE: Glass-fiber reinforced types may be difficult
to recycle.

Exceeds physical properties of ASTM C1396/C1396M and ASTM C1177/C1177M.
Provide [12.7] [15.9] mm [1/2] [5/8] inch, gypsum sheathing. Provide
gypsum board of with a noncombustible water-resistant core, with glass mat
surfaces embedded to the gypsum core or reinforcing embedded throughout the
gypsum core. Warrant gypsum sheathing board for at least twelve months

against delamination due to direct weather exposure. Provide continuous, asphalt impregnated, building felt to cover exterior face of sheathing. Seal [all joints, seams, and penetrations with compatible sealant.]

2.1.5.1 [Glass Mat Covered or Reinforced Gypsum Sheathing Sealant

Provide sealant compatible with gypsum sheathing, rubber washers for masonry veneer anchors, and other associated cavity wall components such as anchors and through wall flashing. Provide sealants for gypsum sheathing board edge seams and veneer anchor penetrations recommended by the gypsum sheathing manufacturer and have the following performance requirements:

- a. ASTM D412: Tensile Strength, 551 kilopascals 80 psi
- b. ASTM D412: Ultimate Tensile Strength (maximum elongation), 1172 kilopascals 170 psi
- c. ASTM D624: Tear Strength, dieB, 4.7 kN/m 27 ppi
- d. ASTM D1149: Joint Movement Capability after 14 Days cure, plus or minus 50 percent.

]2.1.6 [Impact Resistant Gypsum Board

Note: Impact Resistant Gypsum Board Should Be Used When Abuse Or Vandalism Of Walls Is Anticipated And Gypsum Board Is The Only Wall Material Alternative Feasible. Consult Manufacture For Use Restrictions Of Impact Resistant Gypsum Board On Exterior Walls. This Product Requires A Minimum Of 20 Gauge Metal Framing As Support, Coordinate with Section 09 22 00 SUPPORTS FOR PLASTER AND GYPSUM BOARD.

Some products rely on lexan backing for penetration resistance. The impervious layer will act as a vapor barrier which may not be desirable in certain wall systems and climates.

None of the paper faced gypsum products have high resistance to abrasion. Designer should consider high strength veneer plaster on wall systems using impact resistant gypsum wallboard, coordinate with Section 09 26 00 VENEER PLASTER.

1200 mm 48 inchwide, 15.9 mm 5/8 inch thick, tapered edges. Reinforced gypsum panel with imbedded fiber mesh or lexan backing testing in accordance with the following tests. Hard body impact test must attain a Level 2 performance in accordance with ASTM C1629/C1629M. Provide fasteners that meet manufacturer requirements and specifications stated within this section. Impact resistant gypsum board, when tested in accordance with ASTM E84, have [a flame spread rating of 25 or less and a smoke developed rating of 50 or less for [____]] [and] [a flame spread rating of 75 or less and a smoke developed rating of 100 or less for [____]].

2.1.6.1 Structural Failure Test

ASTM E695 or ASTM D2394 for structural failure (drop penetration). ASTM E695 using a 27.2 kg 60 lb sand filled leather bag, resisting no less than 407 N-m 300 ft. lb. cumulative impact energy before failure or ASTM D2394 using

139.7 mm 5.5 inch hemispherical projectile resisting no less than 357 N-m 264 ft. lb. before failure. Provide test specimen stud spacing a minimum 406 mm 16 inch on center.

2.1.6.2 Indentation Test

ASTM D5420 or ASTM D1037 for indentation resistance. ASTM D5420 using a .907 kg 32 oz weight with a 16 mm 5/8 inch hemispherical impacting head dropped once 915 mm 3 feet creating not more than 3.5 mm 0.137 inch indentation or ASTM D1037 using no less than 213 kg 470 lb weight applied to the 11.13 mm 0.438 inch diameter ball to create not more than a 0.5 mm 0.0197 inch indentation depth.

]2.1.7 Predecorated Gypsum Board

NOTE: Predecorated gypsum board is available only in 1200 mm 48 inch wide panels. Interior finish materials for exits, hospitals, individual rooms with capacity for 5 or more persons must have a flame spread rating of 25 or less and smoke developed rating of 50 or less. Interior finish materials for other locations must have flame spread rating of 75 or less and smoke developed rating of 100 or less. Flame spread rating greater than 75 and smoke developed rating greater than 100 are not permitted. Refer to UFC 3-600-01, "Fire Protection Engineering for Facilities," for further guidance on specifying flame spread and smoke developed ratings.

NOTE: If the optional phrase "as selected" is not used to designate a color (and pattern), insert a manufacturer's name and color (and pattern) designation in the blank and add the following to the end of this paragraph "The manufacturer's name and catalog designation are provided in order to describe the color (and pattern) desired. Other manufacturer's products having a similar color (and pattern) will be acceptable."

NOTE: Insert designations of rooms or areas in which different flame spread and smoke developed ratings are required.

ASTM C1396/C1396M, [regular] [Type X] gypsum board, 1200 mm 48 inch wide, [12.7] [15.9] mm [1/2] [5/8] inch thick, with a decorative wall covering (Class I) [or coating (Class II)] applied in-plant by the gypsum board manufacturer. The color [and pattern] of wall covering shall be [_____] [as selected]. Provide [_____] color [and pattern] wall covering selected. [Furnish gypsum board with square edges, and a slight bevel to produce a shallow vee joint. Wrap all coverings around edges.] Furnish a predecorated gypsum board with [a flame spread rating of 25 or less and a smoke developed rating of 50 or less for [_____] [and] [a flame spread rating of 75 or less and a smoke developed rating of 100 or less for

[_____]]].

2.1.8 Cementitious Backer Units

NOTE: For adhesive applied ceramic tile in wet areas
(tubs, shower enclosures, saunas, steam rooms, gang
shower rooms), specify only cementitious backer
units.

In accordance with the Tile Council of America (TCA) Handbook.

2.1.9 Joint Treatment Materials

NOTE: VOCs may be emitted from taping compounds and
finishes during the curing process.

ASTM C475/C475M. [Use all purpose joint and texturing compound containing inert fillers and natural binders, including lime compound. Pre-mixed compounds shall be free of antifreeze, vinyl adhesives, preservatives, biocides and other slow releasing compounds.]

2.1.9.1 Embedding Compound

Specifically formulated and manufactured for use in embedding tape at gypsum board joints and compatible with tape, substrate and fasteners.

2.1.9.2 Finishing or Topping Compound

Specifically formulated and manufactured for use as a finishing compound.

2.1.9.3 All-Purpose Compound

Specifically formulated and manufactured to serve as both a taping and a finishing compound and compatible with tape, substrate and fasteners.

2.1.9.4 Setting or Hardening Type Compound

Specifically formulated and manufactured for use with fiber glass mesh tape.

2.1.9.5 Joint Tape

Use cross-laminated, tapered edge, reinforced paper, or fiber glass mesh tape recommended by the manufacturer.

2.1.10 Fasteners

2.1.10.1 Nails

ASTM C514. [For predecorated gypsum board provide special nails with factory coated heads of color to match wall covering materials as recommended by the predecorated gypsum board manufacturer.]

2.1.10.2 Screws

ASTM C1002, Type "G", Type "S" or Type "W" steel drill screws for fastening

gypsum board to gypsum board, wood framing members and steel framing members less than 0.84 mm 0.033 inch thick. ASTM C954 steel drill screws for fastening gypsum board to steel framing members 0.84 to 2.84 mm 0.033 to 0.112 inch thick. Provide cementitious backer unit screws with a polymer coating.

2.1.10.3 Staples

1.5 mm thick No. 16 USS gageflattened galvanized wire staples with 11.1 mm 7/16 inch wide crown outside measurement and divergent point for base ply of two-ply gypsum board application. Use as follows:

<u>Length of Legs</u>	<u>Thickness of Gypsum Board</u>
28.6 mm 1-1/8 inches	12.7 mm 1/2 inch
31.8 mm 1-1/4 inches	15.9 mm 5/8 inch

2.1.11 Adhesives

 Using interior low-VOC products contributes to the following LEED credit: EQ4. Include VOC submittal if pursuing this LEED credit. Coordinate with Section 01 33 29 LEED(tm) DOCUMENTATION. Designer must verify suitability, availability and adequate competition (including verification of bracketed VOCs included in this guide specification) before specifying product VOC requirements. Army projects shall specify bracketed LEED VOC option only if pursuing this LEED credit and allowing adhesive attachment.

Do not use adhesive containing benzene, carbon tetrachloride, or trichloroethylene.[Adhesive shall contain a maximum VOC content of 50 grams per liter.][Adhesive must meet the requirements of LEED low emitting materials credit.]

2.1.11.1 Adhesive for Fastening Gypsum Board to Metal Framing

 NOTE: Use adhesive only where screw type fastener attachment to metal framing is not possible to avoid difficulty with future gypsum recycling.

[Not permitted.] [Type recommended by gypsum board manufacturer.]

2.1.11.2 Adhesive for Fastening Gypsum Board to Wood Framing

 NOTE: Use adhesive only where screw type fastener attachment to wood framing is not possible to avoid difficulty with future gypsum recycling.

[Not permitted.] [ASTM C557.]

2.1.11.3 Adhesive for Laminating

NOTE: Use adhesive only where screw type fastener attachment is not possible to avoid difficulty with future gypsum recycling.

[Not permitted.][Adhesive attachment is not permitted for multi-layer gypsum boards. For laminating gypsum studs to face panels, provide adhesive recommended by gypsum board manufacturer.]

2.1.12 Gypsum Studs

Provide 25 mm one inch minimum thickness and 150 mm 6 inch minimum width. Studs may be of 25 mm one inch thick gypsum board or multilayers fastened to required thickness. Conform to ASTM C1396/C1396M for material.

2.1.13 Shaftwall Liner Panel

NOTE: Shaftwall panels are typically used for elevators, stairwells and mechanical chases that penetrate rated floor systems. When using shaftwall system, edit Section 09 22 00 SUPPORTS FOR PLASTER AND GYPSUM BOARD to include shaftwall liner panel metal studs.

ASTM C1396/C1396M. Conform to the UL Fire Resistance for the Design Numbers(s) indicated for shaftwall liner panels. Manufacture liner panel for cavity shaftwall system, with water-resistant paper faces, bevel edges, single lengths to fit required conditions, [25.4 mm] [19.05 mm] [1"] [3/4"] thick, by 610 mm 24" wide.

2.1.14 Accessories

ASTM C1047. Fabricate from corrosion protected steel or plastic designed for intended use. Accessories manufactured with paper flanges are not acceptable. Flanges shall be free of dirt, grease, and other materials that may adversely affect bond of joint treatment. Provide prefinished or job decorated materials. [For predecorated gypsum board provide prefinished metal or plastic trim to match predecorated gypsum board.]

2.1.15 Asphalt Impregnated Building Felt

Provide a 6.7 kg 15 lb asphalt moisture barrier over gypsum sheathing. Conforming to ASTM D226/D226M Type 1 (No. 15) for asphalt impregnated building felt.

2.1.16 Water

Provide clean, fresh, and potable water.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Framing and Furring

Verify that framing and furring are securely attached and of sizes and spacing to provide a suitable substrate to receive gypsum board and cementitious backer units. Verify that all blocking, headers and supports are in place to support plumbing fixtures and to receive soap dishes, grab bars, towel racks, and similar items. Do not proceed with work until framing and furring are acceptable for application of gypsum board and cementitious backer units.

3.1.2 [Gypsum Board] [and] [Framing]

Verify that surfaces of [gypsum board] [and] [framing] to be bonded with an adhesive are free of dust, dirt, grease, and any other foreign matter. Do not proceed with work until surfaces are acceptable for application of gypsum board with adhesive.

3.1.3 [Masonry] [and] [Concrete] Walls

Verify that surfaces of [masonry] [and] [concrete] walls to receive gypsum board applied with adhesive are dry, free of dust, oil, form release agents, protrusions and voids, and any other foreign matter. Do not proceed with work until surfaces are acceptable for application of gypsum board with adhesive.

3.2 APPLICATION OF GYPSUM BOARD

NOTE: Coordinate with the drawings to ensure that all types of gypsum board specified are indicated. Terminology on the drawings should be identical to that in the specifications.

NOTE: Allow adhesive bonding of gypsum board and substrate members only when required for proper installation.

NOTE: Use of special clips designed to provide support at wall corners and wall-ceiling intersections in lieu of backup studs or blocking minimizes framing, and is approved except where not permitted in fire rated assemblies. Include gypsum or ceiling board over framing sentence when appropriate with design and meets industry guidance and requirements for fire rated assemblies. Ceilings insulated with heavy or compressed insulation (such as cellulose, mineral wool, or compressed fiberglass batts) may require 16 mm 5/8 inch gypsum board.

Apply gypsum board to framing and furring members in accordance with ASTM C840 or GA 216 and the requirements specified. Apply gypsum board with separate panels in moderate contact; do not force in place. Stagger end joints of adjoining panels. Neatly fit abutting end and edge joints. Use gypsum board of maximum practical length; select panel sizes to minimize waste. Cut out gypsum board to make neat, close, and tight joints around openings. In vertical application of gypsum board, provide panels in lengths required to reach full height of vertical surfaces in one continuous piece. Lay out panels to minimize waste; reuse cutoffs whenever feasible. Surfaces of gypsum board and substrate members may [not]be bonded together with an adhesive[, except where prohibited by fire rating(s)]. Treat edges of cutouts for plumbing pipes, screwheads, and joints with water-resistant compound as recommended by the gypsum board manufacturer. Minimize framing by floating corners with single studs and drywall clips. [Install [16 mm 5/8 inch][_____] gypsum or [13 mm 1/2 inch][_____] ceiling board over framing at [610 mm 24 inches][_____] on center.] Provide type of gypsum board for use in each system specified herein as indicated.

3.2.1 Application of Single-Ply Gypsum Board to Wood Framing

Apply in accordance with ASTM C840, System I or GA 216.

3.2.2 Application of Two-Ply Gypsum Board to Wood Framing

Apply in accordance with ASTM C840, System II or GA 216.

3.2.3 Adhesive Nail-On Application to Wood Framing

Apply in accordance with ASTM C840, System III or GA 216. This method may be used in lieu of ASTM C840, System I at the option of the Contractor.

3.2.4 Semi-Solid Gypsum Board Partitions

Provide in accordance with ASTM C840, System IV or GA 216 .

3.2.5 Solid Gypsum Board Partitions

Provide in accordance with ASTM C840, System V or GA 216.

3.2.6 Adhesive Application to Interior Masonry or Concrete Walls

Apply in accordance with ASTM C840, System VI or GA 216.

3.2.7 Application of Gypsum Board to Steel Framing and Furring

Apply in accordance with ASTM C840, System VIII or GA 216.

3.2.8 Arches and Bending Radii

Apply gypsum board in accordance with ASTM C840, System IX or GA 216.

3.2.9 Gypsum Board for Wall Tile or Tile Base Applied with Adhesive

NOTE: For adhesive applied ceramic tile in wet areas (tubs, shower enclosures, saunas, steam rooms, gang shower rooms), specify cementitious backer board (in accordance with the Tile Council of America

Handbook) as the substrate; specify ASTM C1178/C1178M glass mat water-resistant backing board or ASTM C1396/C1396M water-resistant gypsum backing board for other tiled areas including areas where only ceramic or quarry tile base is to be installed.

In dry areas (areas other than tubs, shower enclosures, saunas, steam rooms, gang shower rooms), apply glass mat water-resistant gypsum tile backing board [or water-resistant gypsum backing board] in accordance with ASTM C840, System X or GA 216.

3.2.10 Exterior Application

Apply exterior gypsum board (such as at soffits) in accordance with ASTM C840, System XI or GA 216.

3.2.11 Glass Mat Covered or Fiber Reinforced Gypsum Sheathing

NOTE: Choose the bracketed option below if sealant will be applied to sheathing joints and penetrations in addition to the asphalt impregnated building felt.

Apply gypsum sheathing in accordance to gypsum association publications GA 253. Follow gypsum sheathing manufacturer's requirements of design details for joints and fasteners and be properly installed to protect the substrate from moisture intrusion. Do not leave exposed surfaces of the gypsum sheathing beyond the manufacturer's recommendation without a weather barrier cladding. Provide continuous asphalt impregnated building felt over sheathing surface in shingle fashion with edges and ends lapped a minimum of 150 mm 6 inch. Property flash the openings. [Seal all joints, seams, and penetrations with a compatible silicone sealant.]

3.2.12 Floating Interior Angles

NOTE: Use of special clips designed to provide support at wall corners and wall-ceiling intersections in lieu of backup studs or blocking minimizes framing, and is approved except where not permitted in fire rated assemblies. Include gypsum or ceiling board over framing sentence when appropriate for design and meets industry guidance and requirements for fire rated assemblies.

Minimize framing by floating corners with single studs and drywall clips. Locate the attachment fasteners adjacent to ceiling and wall intersections in accordance with ASTM C840, System XII or GA 216, for [single-ply] [and] [two-ply] applications of gypsum board to wood framing.

3.2.13 Control Joints

Install expansion and contraction joints in ceilings and walls in accordance with ASTM C840, System XIII or GA 216. Fill control joints between studs in fire-rated construction with firesafing insulation to

match the fire-rating of construction.

3.2.14 Application of Foil-Backed Gypsum Board

Apply foil-backed gypsum board in accordance with ASTM C840, System XIV or GA 216.

3.2.15 Application of Predecorated Gypsum Board

Apply predecorated gypsum board in accordance with GA 224. Attach predecorated gypsum board with adhesive and fasteners as recommended by the manufacturer. Conceal fasteners in the finished work.

3.2.16 Application of Impact Resistant Gypsum Board

Apply in accordance with applicable system of ASTM C840 as specified or GA 216. Follow manufacturers written instructions on how to cut, drill and attach board.

3.3 APPLICATION OF CEMENTITIOUS BACKER UNITS

3.3.1 Application

In wet areas (tubs, shower enclosures, saunas, steam rooms, gang shower rooms), apply cementitious backer units in accordance with ANSI A108.11. Place a 7.6 kg 15 lb asphalt impregnated, continuous felt paper membrane behind cementitious backer units, between backer units and studs or base layer of gypsum board. Place membrane with a minimum 150 mm 6 inch overlap of sheets laid shingle style.

3.3.2 Joint Treatment

ANSI A108.11.

3.4 FINISHING OF GYPSUM BOARD

Tape and finish gypsum board in accordance with ASTM C840, GA 214 and GA 216. Finish plenum areas above ceilings to Level 1 in accordance with GA 214. Finish water resistant gypsum backing board, ASTM C1396/C1396M, to receive ceramic tile to Level 2 in accordance with GA 214. Finish walls and ceilings to receive a heavy-grade wall covering or heave textured finish before painting to Level 3 in accordance with GA 214. Finish walls and ceilings without critical lighting to receive flat paints, light textures, or wall coverings to Level 4 in accordance with GA 214. Unless otherwise specified, finish all gypsum board walls, partitions and ceilings to Level 5 in accordance with GA 214. Provide joint, fastener depression, and corner treatment. Tool joints as smoothly as possible to minimize sanding and dust. Do not use fiber glass mesh tape with conventional drying type joint compounds; use setting or hardening type compounds only. Provide treatment for water-resistant gypsum board as recommended by the gypsum board manufacturer. Protect workers, building occupants, and HVAC systems from gypsum dust.

3.4.1 Uniform Surface

Wherever gypsum board is to receive eggshell, semigloss or gloss paint finish, or where severe, up or down lighting conditions occur, finish gypsum wall surface in accordance to GA 214 Level 5. In accordance with GA 214 Level 5, apply a thin skim coat of joint compound to the entire

gypsum board surface, after the two-coat joint and fastener treatment is complete and dry.

3.4.2 [Metal Trim for Predecorated Gypsum Board

Finish edges, ends, and joints of predecorated gypsum board, except prefinished vee joints and monolithic type joints, with metal or plastic trim selected to match the gypsum board finish.

] 3.5 SEALING

Seal openings around pipes, fixtures, and other items projecting through gypsum board and cementitious backer units as specified in Section 07 92 00 JOINT SEALANTS. Apply material with exposed surface flush with gypsum board or cementitious backer units.

3.5.1 [Sealing for Glass Mat or Reinforced Gypsum Board Sheathing

Apply silicone sealant in a 9.5 mm 3/8 inch bead to all joints and trowel flat. Apply enough of the same sealant to all fasteners penetrating through the glass mat gypsum board surface to completely cover the penetration when troweled flat. Do not place [construction and materials behind sheathing until a visual inspection of sealed joints during daylight hours has been completed by Contracting Officer.]

] 3.6 FIRE-RESISTANT ASSEMBLIES

NOTE: Coordinate with the drawings to ensure that UL or GA design numbers are indicated for fire-resistant assemblies. If review of building code requires pressurized enclosures, include the following:

Pressurized fire-rated gypsum board enclosures shall allow the mechanical and electrical life-safety systems to operate in accordance with the design intent. Air pressure within elevator shaft shall be 360 Pa. 7.5 psf. Air pressure within stair shaft shall be 240 Pa. 5.0 psf. Maximum mid-span deflection shall be L/360.

Wherever fire-rated construction is indicated, provide materials and application methods, including types and spacing of fasteners, [wall[and ceiling] framing] in accordance with the specifications contained in [UL Fire Resistance for the Design Number(s) indicated], [or] [GA 600 for the File Number(s) indicated]. Joints of fire-rated gypsum board enclosures shall be closed and sealed in accordance with UL test requirements or GA requirements. Seal penetrations through rated partitions and ceilings tight in accordance with tested systems.

3.7 PATCHING

Patch surface defects in gypsum board to a smooth, uniform appearance, ready to receive finishes. [Remove predecorated gypsum board which cannot be restored to like-new condition. Provide new predecorated gypsum board.]

3.8 SHAFTWALL FRAMING

Install the shaftwall system in accordance with the system manufacturer's published instructions. Coordinate bucks, anchors, blocking and other items placed in or behind shaftwall framing with electrical and mechanical work. Patch or replace fireproofing materials which are damaged or removed during shaftwall construction.

3.9 WASTE MANAGEMENT

NOTE: Diverting waste from the landfill contributes to the following LEED credit: MR2. Coordinate with Section 01 74 19 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT. Designer shall verify that items are able to be disposed of as specified. Army projects include bracketed text only if pursuing this credit.

As specified in Waste Management Plan and as follows. Separate clean waste gypsum products from contaminants. Do not include wood, plastic, metal, asphalt-impregnated gypsum board, or any gypsum board coated with glass fiber, vinyl, decorative paper, or other finish. Place in designated area and protect from moisture and contamination. Coordinate with Section 32 05 33 LANDSCAPE ESTABLISHMENT to identify requirements for gypsum soil amendment and to prepare scrap gypsum board for use as soil amendment.

NOTE: Take-back programs refer to programs in which the product manufacturer "takes-back" scrap material and/or packaging associated with its product.

[Identify manufacturer's policy for collection or return of remaining [construction scrap,] [unused material,] [demolition scrap,] and [packaging material]. Institute demolition and construction recycling to take advantage of manufacturer's programs. When such a service is not available, seek local recyclers to reclaim the materials.]

-- End of Section --