


GYPSUM ASSOCIATION

 201 NO. WELLS ST. CHICAGO 6, ILLINOIS
 1350 N. HIGHLAND, HOLLYWOOD 28, CALIF.

Special Recommendations

NAILING GYPSUM WALLBOARD

SINGLE AND TWO-PLY APPLICATION

(SINGLE AND DOUBLE NAILING METHODS)

RECOMMENDED NAILS AND SPACING

THICKNESS OR TYPE	DESCRIPTION OF NAIL	NAIL SPACING
SINGLE LAYER		
1/4" thickness (for application over existing surfaces only)	Flat head, diamond point nail of such length as to give not less than 1" penetration into the framing member.	Nails spaced not less than 3/8" from ends and edges. At each support space nails a maximum of 7" for ceilings and a maximum of 8" for walls. Do not stagger nails on adjoining ends and edges. (See reverse side.)
3/8" thickness	1-1/8" or 1-1/4" long, annular ringed GWB-54 nail complying with ASTM Spec. C380-58T or 4d, 14 gage, 1-3/8" long, 7/32" flat head, diamond point, bright finish cooler.	(A) Nails spaced not less than 3/8" from ends and edges. At each support space nails a maximum of 7" for ceilings, a maximum of 8" for walls. Do not stagger nails on adjoining ends and edges (see reverse side), or double nailing method may be used (see reverse side).
1/2" thickness	1-1/4" long, annular ringed GWB-54 nail complying with ASTM Spec. C380-58T or 5d, 13-1/2 gage, 1-5/8" long, 15/64" flat head, diamond point, bright finish cooler. For exterior use, use GWB-54 nail only.	Same as (A) above or double nailing method may be used (see reverse side).
5/8" thickness	6d, 13 gage, 1-7/8" long, 1/4" flat head, diamond point. (Use for fire rated constructions). 1-3/8" long, annular ringed GWB-54 nail complying with ASTM C380-58T where fire rated construction is not required. For exterior use, use GWB-54 nail only.	Same as (A) above. Double nailing method may be used (see reverse side), except for fire rated constructions.
TWO-PLY		
(1) Adhesive between layers	(1) First layer – same as for single layer application of thickness used. (2) Face layer – long enough to penetrate at least 3/4" into framing member.	(1) Same as (A) above; drive nails flush with paper surface. (2) Use only enough nails to hold wallboard in place until adhesive develops adequate bond. Suggested spacing 12" on ceilings and 16" on walls.
(2) No adhesive used between layers.	(1) First layer – same as for single layer application. (2) Face layer – long enough to penetrate at least 1-1/8" into framing member.	(1) Same as (A) above, except nails may be spaced a maximum of 14". Drive nails flush with paper surface. (2) Same as for single layer application or double nailing method may be used (see reverse side).
(3) Staple application of first-layer only. (Face layer applied as described above)	(1) Staples shall meet the following minimum requirements: Wire – 16 U. S. Standard gage flattened galvanized wire. Staple Crown – Flat, 7/16" wide (outside measure). Staple Legs – For 3/8" thick board – 1" long with divergent points. For 1/2" thick board – 1-1/8" long with divergent points.	(1) Staples shall be driven with the crown at right angles to the paper bound edges of the wallboard except where the paper bound edges fall on the framing members, the staples shall be driven parallel to the edges. Staples shall be driven in such a manner that the crown bears tightly against the wallboard but does not cut into the face paper. The legs of the staple shall be no less than 3/8" from the ends and edges of the wallboard. Spacing of staples shall be 7" o.c. maximum on ceilings and 8" o.c. maximum on walls.

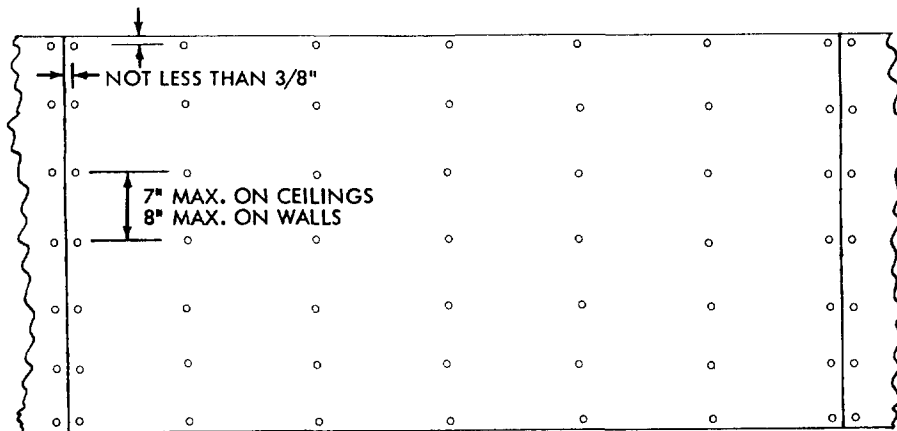
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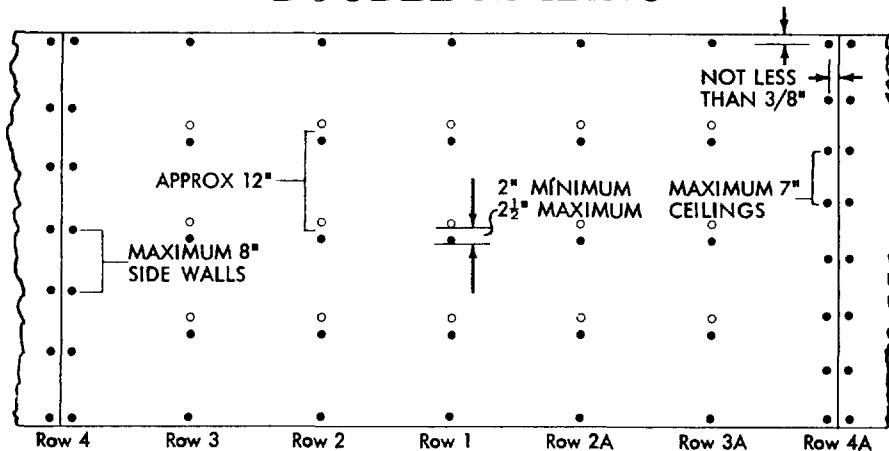
SINGLE NAILING



NAILS: (See Reverse Side)

"SINGLE NAILING" SYSTEM PROCEDURE: The wallboard shall be held in firm contact with the nailing member while the nails are being driven. Nailing preferably should proceed from the central portion of each piece of wallboard towards ends and edges. Nails shall not be staggered on adjoining edges or ends. Perimeter nailing at the top and bottom is not required.

DOUBLE NAILING



NAILS: (See Reverse Side)

"DOUBLE NAILING" SYSTEM PROCEDURE:

1. Two men are required to nail one ceiling board — one man nails rows 1, 2, 3 and 4; the other nails rows 2A, 3A and 4A.
2. Starting at center of board, nails shown by dot ● are applied in row 1, then rows 2 and 2A, 3 and 3A, 4 and 4A, etc., always nailing from center to edges of sheet.
3. Apply "double" nails shown by circle ○ in the same manner as first nails, also starting at row 1.
4. As alternate procedure, "double" nails may be applied immediately after nailing of first nails in each row is completed according to step "2" above.
5. Use single nails on perimeter of board.

IMPORTANT: All three field (first) nails in each row should be applied before the "double" (second) nails are applied. It may be necessary to "hit" the first nails in each row after the second nail is applied.



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Installation Procedure

FOR GYPSUM WALLBOARD IN BATHROOMS

In Preparation for the Adhesive Application of Ceramic, Plastic or Metal Tile

Since free water can damage wallboard and framing members in bathroom installations which are surfaced with tile adhesively applied, the Gypsum Association recommends the following procedure as a preventative measure. It has been included as a requirement in the *Constructions Standards of the Federal Housing Authority*.

FRAMING - All framing around tub enclosures and shower stalls should permit the inside lip of the tub, prefabricated receptor or pan to be flush with the outside face of the wallboard. This may require furring of the studs behind the wallboard or the fixture as shown in accompanying illustrations.

WALLBOARD INSTALLATION - Use full size sheets to eliminate butt joints. The bathroom is one place where scraps of wallboard should never be used. Start with the paper bound edge of the wallboard down over the tub, receptor or pan...and allow 1/4" clearance between the wallboard and the fixture. Never start with a cut edge here.

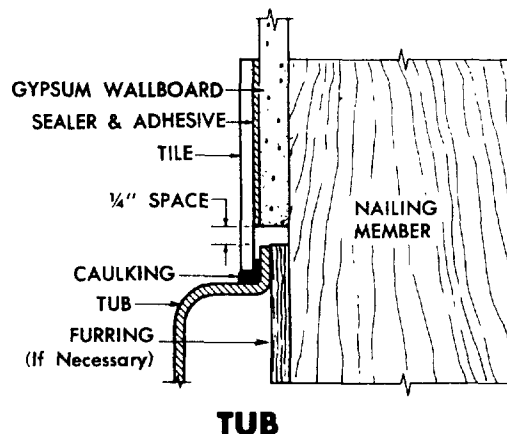
To properly position the wallboard above the fixture, insert a 1/4" thick temporary wood spacer or nails 1/4" above fixture. After the wallboard is secured to the studding, the temporary spacer must be removed to prevent capillary action of water.

All joints should be treated with tape and two coats of joint cement - adhesive.

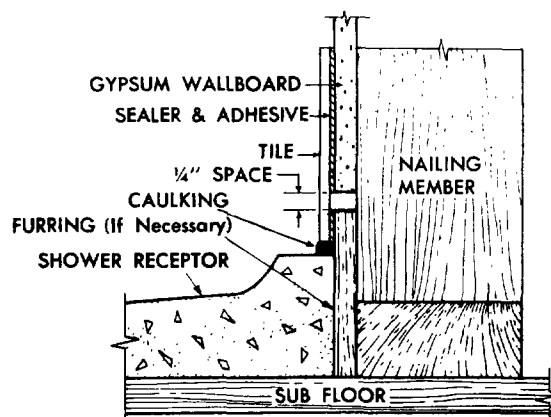
SEALING - Now we come to one of the most important steps of all. Before applying the tile or tile adhesive, apply a waterproof sealer to the entire surface of the gypsum wallboard and all edges of cutouts made for pipes or fixtures. It is extremely important that the entire surface be waterproofed. Use a rubber base or varnish type sealer.

If a waterproof tile adhesive is used as a sealer, it should be applied in a separate operation 1/16" thick, independent of application used for holding the tile.

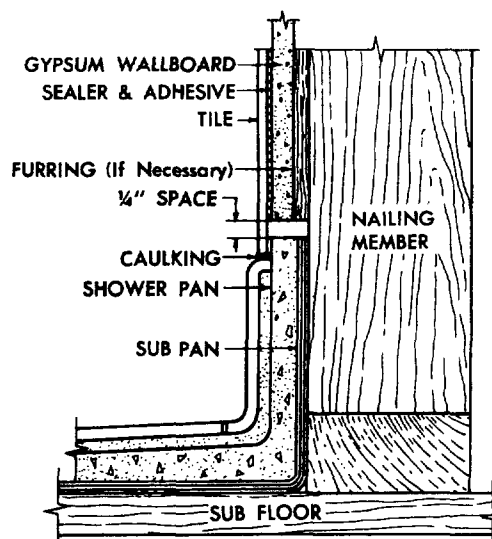
With these steps completed, the wallboard is now ready for the application of adhesive to receive the bathroom tile. Once installed, the tile is grouted in the standard manner.



TUB



SHOWER RECEPTOR



SHOWER PAN

RECOMMENDED SPECIFICATIONS

For Application of Gypsum Wallboard to Receive Ceramic, Plastic or Metal Tile or Plastic Finished Wall Panels by Adhesive Application

A. GENERAL

All work shall be performed in accordance with the requirements of American Standards Association, Standard Specification for Gypsum Wallboard Finishes A97, except as otherwise specified.

B. FRAMING

1. Framing members shall be plumb and true. If necessary, fur out studs around tub enclosures and shower stalls so that inside lip of the tub, prefabricated receptor or subpan will be flush with the face of the gypsum wallboard. The top of such furring shall be flush with the upper edge of receptor, pan or tub.
2. Appropriate blocking, headers or supports shall be provided for tub, plumbing fixtures, soap dishes, grab bars, towel racks, etc., as may be required.
3. Where surfacing walls with ceramic tiles over $\frac{1}{4}$ " thick, suitable blocking shall be installed between all studs if $\frac{3}{8}$ " gypsum wallboard is to be used on studs spaced 16" o.c. or $\frac{1}{2}$ " or $\frac{5}{8}$ " gypsum wallboard on studs spaced more than 16" o.c. One row of blocking shall be located approximately 1" above the top of the tub or receptor and another row at the mid point between the tub and ceiling.

C. MATERIALS

1. Gypsum wallboard $\frac{3}{8}$ ", $\frac{1}{2}$ " or $\frac{5}{8}$ " in thickness, shall comply with the requirements of ASTM Designation C36, for Gypsum Wallboard. Insulating or foil surface wallboard shall not be used.

2. Materials for treating joints and concealing nail-heads shall be as recommended by the manufacturer of the gypsum wallboard.

3. The surface sealer shall be either the waterproof adhesive recommended by the manufacturer of the surfacing material or a waterproof sealer as recommended by the manufacturer of the gypsum wallboard. Shellac shall not be used.

4. The adhesive used for application of the surfacing material shall be approved by the manufacturer of the surfacing material for use over gypsum wallboard.

5. The surfacing material shall provide a durable surface and prevent passage of free water or water vapor to backing material.

6. Fixture receptors and pans shall have an upstanding lip or flange 1" higher than the water dam or threshold of shower.

D. APPLICATION

1. Shower pans, receptors or tubs shall be installed prior to the erection of the gypsum wallboard. See framing requirements in B.

2. Gypsum wallboard shall be applied horizontally with the paper bound edge abutting the top edge of a temporary wood strip (or spacing nails) which shall allow a minimum of a $\frac{1}{4}$ " space between the lip of the receptor, tub or subpan and the gypsum wallboard.

3. Gypsum wallboard shall be applied and joints shall be treated as specified in

American Standard A97. Where ceramic tiles over $\frac{1}{4}$ " thick are to be used as a surfacing material, nails shall be spaced a maximum of 4" o.c.

4. The waterproof sealer shall be applied to the entire surface to receive tile. When a waterproof adhesive is used as a sealer it shall be applied in a continuous film $\frac{1}{16}$ " thick and allowed to partially dry. This is a separate operation, independent of the adhesive application used to secure the surfacing material. All edges of cutouts made in the gypsum wallboard for pipes, fixtures, etc., shall be sealed in like manner.

5. Before placing surfacing material, all openings around pipes, fixtures, etc., shall be caulked flush with waterproof, non-hardening caulking compound. The surfacing material shall then be applied and the lower edge shall overlap the top lip of receptor, pan or tub. The space between the fixture and the tile shall be filled with a non-setting caulking compound.

6. Where plastic finished wall panels and similar materials are used, only those mouldings recommended by the manufacturer of the surfacing materials shall be used. All angles shall be treated with mouldings having a flange projecting behind the surfacing material on each leg of the angle. Mouldings shall be used at the base where the surfacing materials abut the tub or around the top edge of the surfacing material. All such mouldings shall be set in caulking compound.



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Special Recommendations

FOR RADIANT HEATING with Gypsum Wallboard

GENERAL

The purpose of these recommendations is to explain the proper use of gypsum wallboard when used with radiant heating. Gypsum wallboard or backing board can be satisfactorily used in conjunction with radiant heating installations, however, certain precautions must be taken to minimize the possibility of such things as cracking due to thermal shock, shadowing under the heating system due to unequal initial drying rates, or calcination of the gypsum wallboard due to over-heating. These recommendations are intended to provide information which should help avoid such difficulties.

TYPES OF RADIANT HEATING SYSTEMS

Electrical systems where cables are located between two layers of gypsum wallboard.

Hot water systems in which the heat conducting mediums, such as pipes, are located between two layers of gypsum wallboard.

Systems in which the heating elements are located behind the gypsum wallboard.

SPECIFICATIONS

Gypsum wallboard shall be applied in accordance with the requirements of ASA A97.1, "Standard Specifications for Gypsum Wallboard Finishes" except as herein modified.

Systems Using Two Layers of Gypsum Wallboard

The first layer of gypsum wallboard or backing board shall be applied horizontally to nailing members using nails as specified below. Nails shall be spaced a maximum of 14" o.c. for the first layer and 7" o.c. for the face layer.* Nails shall be driven flush with surrounding wallboard surfaces for application of the first ply.

*For exception see "Note", Electric Heating Systems.

Nails:

Gypsum Wallboard (Thickness)	Recommended Nails
First Ply	
3/8"	1-1/8" or 1-1/4" GWB-54 or 4d, 14 gage, 1-3/8" long, 7/32" flat head, diamond point, bright finish cooler.
1/2"	1-1/4" GWB-54 or 5d, 13-1/2 gage, 1-5/8" long, 15/64" flat head, diamond point, bright finish cooler.
5/8"	1-3/8" GWB-54 or 6d, 13 gage, 1-7/8" long, 1/4" flat head, diamond point, bright finish cooler.
Second Ply	
GWB-54 Type nails providing 3/4" penetration or "Cooler" nails providing 1" penetration.	

Staples:

The first ply only of two-ply construction may be attached by power driven staples. When staples are used, the following recommendations should be employed.

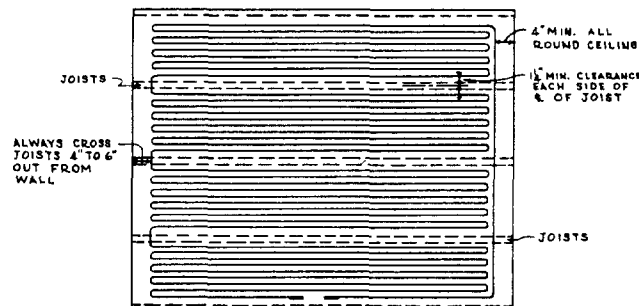
The staples shall meet the following minimum requirements: 16 U.S. Standard gage flattened galvanized wire, 7/16" wide crown, 1" long legs for 3/8" thick board, 1-1/8" long for 1/2" thick board and 1-1/4" long for 5/8" thick board, with divergent points.

The spacing of staples shall not exceed 7" on center on ceilings.

Staples shall be driven with the crown at right angles to the paper bound edges of the gypsum wallboard, except where the paper bound edges fall on the framing members, then the staples shall be driven parallel to the edges. Staples shall be driven in such a manner that the crown bears tightly against the wallboard, but does not cut into the face paper. The legs of the staples shall be no less than 3/8" from the ends and edges of the gypsum wallboard.

ELECTRIC HEATING SYSTEMS:

Electric heating cables shall be securely attached to the base or first layer of gypsum wallboard in accordance with cable manufacturer's recommendations, with cables parallel to and between nailing members. Cable shall be positioned at least 1-1/4" from center of nailing member on each side so that at least a 2-1/2" unobstructed channel is provided under each nailing member. This is necessary to prevent nails, used to subsequently attach the face layer of gypsum wallboard, from being driven into the cable. Cables shall cross nailing members only at ends of ceiling 4" to 6" from wall. There shall be at least a 4" space completely around the perimeter of each ceiling, which is clear of cables. Cables shall be kept at least 8" clear of all openings.



TYPICAL CEILING LAYOUT PATTERN

All inspections and testing of the heating system shall be completed before application of face layer of gypsum wallboard.

Heating cable spacing between joists shall be as re-

(OVER)

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commended by the heating cable manufacturer. Under no operating conditions shall the gypsum board core exceed a temperature of 125°F.

Complete embedding of the heating elements is necessary. The area between the heating elements shall be filled with a filler which shall be level so there is complete contact between the face layer and the back layer of gypsum wallboard. (Note: Where the filler serves as an adhesive to hold the face layer, nail spacing may be 7" o.c. for the first layer and 16" o.c. for the face layer.) When required to produce a uniform thickness of the filler and to provide a firm base for nailing, furring strips of a thickness equal to that of the layer of the filler, may be attached over the base layer to the ceiling joist at parallel relationship. The face layer shall be erected immediately after the filler has been spread. The last nails around the perimeter of the ceiling shall be spaced 8" to 10" away from the adjoining wall to prevent them from striking the electric cables where they cross the framing members.

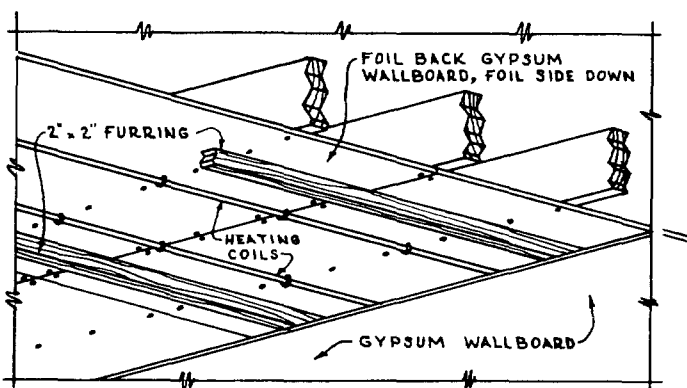
All joints and nail heads shall be finished according to the wallboard manufacturer's recommendations. Allow a minimum of one week with good drying conditions and two weeks in the cold season before turning on the heating system.

HOT WATER HEATING SYSTEMS:

Apply insulating gypsum wallboard for the first layer parallel to the joist with the aluminum foil facing downward to act as a reflector behind the heating elements. Nails shall be spaced not more than 8" o.c. They shall be driven flush with surrounding wallboard surfaces.

Nail 2" x 2" furring strips 16" o.c. over the insulating gypsum wallboard and at right angles to the joists.

The heating elements shall be suspended from and supported by the framing members and not from the gypsum wallboard.



TYPICAL HOT WATER SYSTEM

All inspections and testing of the heating system shall be completed before application of the face layer.

Under no operating conditions shall the gypsum board core exceed a temperature of 125°F.

Apply the final or face layer in the normal manner, at right angles to the furring strips. Nails shall be as specified for the first ply and shall be spaced not more than 7" o.c. Do not use insulating or foilback wallboard for face layer.

All joints and nail heads shall be finished according to the wallboard manufacturer's recommendations. Allow a minimum of one week with good drying conditions and two weeks in the cold season before turning on the heating system.

OTHER SYSTEMS:

Where the heating system is located behind the gypsum wallboard, the recommendations for the applicable system shall be complied with.

Under no operating conditions shall the gypsum board core exceed a temperature of 125°F.

All joints and nail heads shall be finished according to wallboard manufacturer's specifications. Allow a minimum of one week good drying conditions and two weeks in the cold season before turning on the heating system.

DESIGN DATA

It is the responsibility of the architect to prepare and correlate complete plans and specifications. The limitations and characteristics of the materials used for the structure shall be taken into consideration. It is the responsibility of the heating engineer to properly design the radiant heating system to work effectively with these materials.

Be certain to follow the job specifications. Substitutions in materials might change the rate of heat flow, which in turn might give results that would make the entire installation unsatisfactory.

The following design data is recommended for use in calculating the heat transmission coefficients (U) for gypsum wallboard.

Thermal Conductivity Values:

Material	Conductance "C"	Resistance "R"
	(Thickness as stated)	(1/C)
3/8" gypsum wallboard	3.73	0.27
1/2" gypsum wallboard	2.76	0.36
5/8" gypsum wallboard	2.42	0.41

DECORATION

Decoration of the finished work including sizing or sealing shall not proceed until the heating system has been test operated for a minimum of 24 hours. The system should then be turned off and decorating of the gypsum wallboard performed. Do not decorate the wallboard while the heating system is being tested, or is in operation. It is also recommended that where texture finishes are used, such finishes be allowed to thoroughly set or dry prior to the operation of the heating system.



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Special Recommendations

AIA FILE NUMBER 23-L

Application of GYPSUM WALLBOARD ON EXTERIOR LOCATIONS

MATERIALS AND APPLICATION:

Gypsum wallboard (1/2 or 5/8 inches thick) may be used for carport and open porch ceilings and the soffits of eaves that are horizontal or incline downward away from the building.

Materials and application shall be in strict conformance with the requirements of American Standard for Gypsum Wallboard Interior Finishes A97, except as modified below:

Nails for 1/2 inch board shall be the annular ringed gypsum wallboard nail GWB-54, complying with the requirements of ASTM Designation C380-56T. Nails for 5/8 inch board shall meet the same requirements except that the length shall be 1-3/8 inches.

Suitable drips and mouldings shall be provided around the perimeter to protect from direct exposure to water. The edges of the board shall be placed not less than 1/4 inch from masonry.

The wallboard shall be applied horizontally on nailing members spaced not to exceed 24 inches on center.

Joints may be covered with battens or finished with joint treatment.

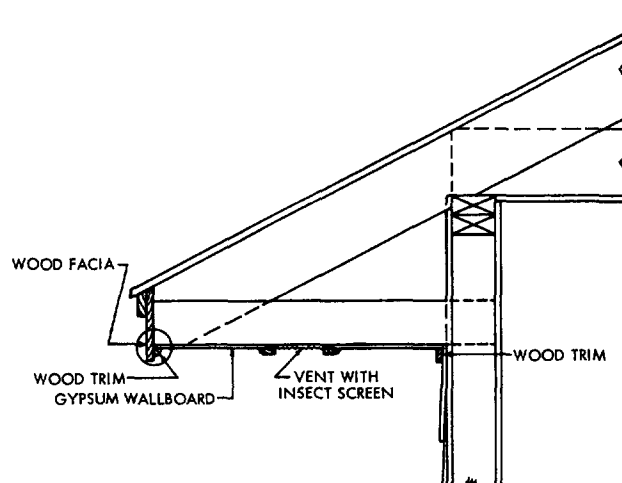
Nailheads shall receive joint treatment in the usual manner.

VENTILATION:

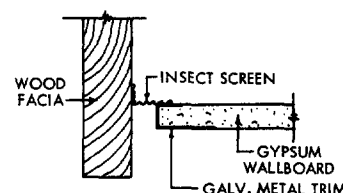
Adequate ventilation shall be provided for the space immediately above such installations. (Note: The minimum acceptable ventilation shall be as required in the current Minimum Property Requirements of the Federal Housing Administration.)

PAINTING:

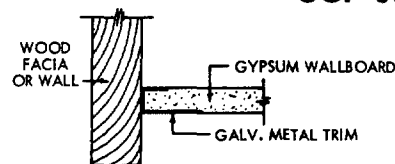
The exposed surface of the board shall be painted with not less than two coats of exterior type oleo-resinous or water-thinned emulsion paint.



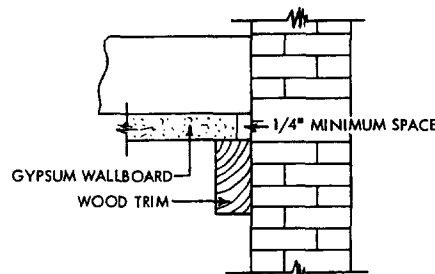
FRAME WALL



SGP 0027172



ALTERNATE FACIA DETAILS



MASONRY WALL

AIA FILE NUMBER 23-L