

Cladding



General Planning Procedures

In most instances, job planning requirements and the application techniques used for the installation of gypsum board apply equally to gypsum panels and gypsum bases. For that reason the term “gypsum board” is used throughout this chapter wherever the recommendations apply to both types of products. Where the requirements differ, the products are treated separately.

Various organizations provide information about recommended standards or tolerances for installation of drywall systems. See page 435 and 442 in the Appendix for information about standards and tolerances.

For instructions on the safe use of gypsum panels, gypsum base and other products, see Chapter 13, Safety Considerations, Material Handling.

Planning the Job

Advance planning by the wall and ceiling contractor can mean savings in time and material cost and result in a better-appearing job. It also helps assure that the intended purpose of the walls is matched with the proper materials.

Since the last edition of this handbook, a number of new gypsum board products and systems have been developed that either speed the construction process, or improve the abuse resistance and performance of the finished wall. Wider gypsum board, for example, reduces the number of joints that need to be taped on walls between 2440 mm (8') and 2740 mm (9') tall. And gypsum boards with heavy-duty face paper and backing sheets (SHEETROCK Brand Abuse Resistant Panels) or cellulose or glass fiber reinforcement in the core (FIBEROCK Brand Panels or FIBEROCK Brand VHI Panels) improve the overall impact and abuse resistance of the finished wall system. In addition, panels have been developed to reduce ceiling sag (SHEETROCK Brand Interior Gypsum Ceiling Board, Sag-Resistant) and to improve the resistance of mould and mildew (HUMITEK Panels). Performance factors should be revisited at this time to make sure that the cladding products used are the best suited to meet the project's performance requirements.

Note that installation of FIBEROCK Brand products sometimes varies from the procedures used to install conventional drywall panels and gypsum base. See the most current literature on FIBEROCK Brand Panels for the latest installation information.

Proper planning achieves the most effective use of materials, elimination of unnecessary joints, and the placement of necessary joints in the least conspicuous locations. One gypsum board should span the entire length or width of the wall or ceiling, if possible. By using the longest practical board lengths obtainable, end joints are kept to a minimum. Where they do occur, end joints should be staggered.

In double-layer construction, end joints in the face layer must be offset at least 250 mm (10") from parallel joints in the base layer. Layout of the base layer must be planned to accommodate this offset and still provide optimum joint-finishing conditions and efficient use of materials in the face layer.

Fire-rated designs stipulate framing, fastener spacing, use of adhesive, joint details, etc. and those factors must be included in the planning stage.

Estimating Materials

Gypsum Board From practical experience, professional estimators have developed methods for determining footage required to complete various types of jobs. Basically, these methods stem from the simple principle of “scaling a plan,” and determining the length and width and ceiling height of each room on the plan. Frequently, door and window openings are “figured solid” with no openings considered. Exceptions may be large picture windows and large door openings. From these dimensions the estimator determines the square footage of each room. The footage of each room is added to determine total footage required. From these figures the number of gypsum boards needed may be determined. (Refer to Chapter 1 for available lengths of each panel.)

Screws For single-layer wall application to 400 mm (16") o.c. framing, approx. 1,000 Type W Screws are required for wood or TYPE S or TYPE S-12 for steel per 100 m² (1,000 ft.²) of gypsum board; approx. 850 for 600 mm (24") o.c. framing. See pages 435-436 in Appendix for complete information on estimating screws.

Fastener usage for other assemblies varies with the construction and spacing. Refer to specific system descriptions for fastener requirements.

Nails Usage for nails is shown in the Selector Guide for Gypsum Board Nails, page 44.

Adhesive The following table shows the amount of adhesive needed per 100 m² (1000 ft.²) of laminated board surface:

Coverage — Adhesives for Lamination

Product	Application	Approx. quantity			
		kg/100 m ²		lb./1000 ft. ²	
		Lam. blade 6.4 mm (1/4") notch spacing			
	50 mm	38 mm	2"	1-1/2"	
SHEETROCK Brand Ready-Mixed Joint Compound	Strip lam.	83	112	170	230
	Sheet lam.	166	227	340	465
SHEETROCK Brand Setting Type (DURABOND) Joint Compound	Strip lam.	45	60	93	123
	Sheet lam.	90	120	184	246
SHEETROCK Brand Lightweight Setting Type (EASY SAND)	Strip lam.	33	44	68	90
	Sheet lam.	66	87	134	179

Joint Treatment—Gypsum Panels Approximate quantities required for finishing 100 m² (1,000 ft.²) of gypsum panels: 113 m (370') of CGC Brand Joint tape; 33 kg (72 lb.) of conventional setting type powders, 24 kg (52 lb.) of lightweight setting-type powder (SHEETROCK 90); 63 kg (138 lb.) of CGC All Purpose Ready-Mixed or 36 L of CGC Lightweight All Purpose Ready-Mixed compound.

Joint Treatment—Veneer Plaster Gypsum Base For regular application, approx. 113 m (370') of either Type "P" or Type "S" IMPERIAL Brand Tape is required per 100 m² (1,000 ft.²) of base surface.

For application over metal framing, approx. 113 m (370') CGC Brand Joint Tape and 33 kg (72 lb.) of SHEETROCK Brand Setting Type (DURABOND) Joint Compound are required per 100 m² (1,000 ft.²) of surface. This application also is required for certain spacing requirements and when building temperature-humidity conditions fall in the rapid drying area of the graph on page 199.

Handling and Storage

Tip

See Chapter 13, *Safety Considerations, Material Handling for more information on the safe use of gypsum panels and base.*

When drywall and veneer construction moved into high-rise buildings, it brought with it the new challenge of moving large gypsum boards from ground level to the point of use, stories above. Inefficient materials handling at the job site can add cost and reduce profit. Time and money savings can be substantial when correct handling procedures are used.

Gypsum board products should be ordered for delivery several days in advance of installation. Materials stored on the job for a long period of time are subject to damage. Gypsum boards, like millwork, must be handled with care to avoid damage. Since joint compounds and veneer finishes are subject to aging, they must not be stored for extended periods.

Board should be placed inside under cover and stacked flat on a clean floor in the centers of the largest rooms. It is often desirable to place the necessary number of boards in the location where they will be used. All materials used on the job should remain in their packaging until ready for actual use.

When stacking heavy loads, it may be preferable to scatter smaller amounts of panels and distribute them around the perimeter of the room. See pages 379-381 of Chapter 13 more information on the safe handling of gypsum panels and base.

Gypsum boards intended for use on ceilings should be placed on top of pile for removal first. Avoid stacking long lengths atop short lengths.

All successful veneer plaster finish jobs require adequate equipment: power mixers, mortar boards, scaffolding and tools. Ample scaffolding should be provided. Rather than ship all veneer plaster finish to the job at one time, fresh material should be sent to the job every few days as needed. Plaster stored for long periods is subject to damage, variable moisture conditions and aging that probably will produce variations in setting time and create performance problems.

Store veneer plaster products inside, in a dry location and away from heavy traffic areas. Stack bags on planks or platforms away from damp floors and walls. Protect metal corner beads, casing beads and trim from being bent or damaged. All materials used on the job should remain in their packages until used.

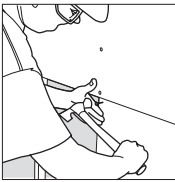
Environmental Conditions

In cold weather (outdoor temperature less than 13°C (55°F), controlled heat in the range of 13° (55°) to 21°C (70°F) must be provided. This heat must be maintained both day and night, 24 hours before, during and after entire gypsum board joint finishing and until the permanent heating system is in operation or the building is occupied. Minimum temperature of 10°C (50°F) should be maintained during gypsum board application.

Methods for Applying Drywall and Veneer Bases

Gypsum panels and gypsum bases may be applied in one or two layers directly to wood framing members, to steel studs or channels, or to interior masonry walls with adhesive. Use of stilts will provide convenience in application. See Chapter 13 for safety precautions.

Single Layer vs. Double Layer



Nailing technique for single-layer application

Single-Layer Application This basic construction is used to surface interior walls and ceilings where economy, fast erection and fire resistance are required. It is equally suitable for remodeling, altering and resurfacing cracked and defaced areas.

Double-Layer Application Consists of a face layer of gypsum board applied over a base layer of gypsum board that is directly attached to framing members. This construction can offer greater strength and higher resistance to fire and to sound transmission than single-layer applications. Double-layer construction when adhesively laminated is especially resistant to cracking and provides one of the finest, strongest walls available. Also, these adhesively laminated constructions are highly resistant to sag and joint deformation. In double-layer application, always apply all base-layer board in each room before beginning face-layer application.

Attachment Methods

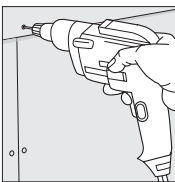
Gypsum boards are attached to framing by several methods depending on the type of framing and the results desired.

Single Nailing Conventional attachment for wood framing.

Double Nailing Minimizes defects due to loose board. See page 102 for a more detailed description of double nailing.

Screw Attachment Screws are excellent insurance against fastener pops caused by loosely attached board. Screws are recommended for wood frame attachment, and required for attachment to steel framing and resilient channels. When mounting to resilient channels, take care not to locate screws where they will also penetrate studs, thereby 'shorting out' or negating the resiliency.

Adhesive Attachment A continuous bead of drywall stud adhesive applied to wood framing plus supplemental nail or screw attachment improves bond strength and greatly reduces the number of face nails or screws needed.



Screw attachment along vertical edges of face-layer board in double-layer application

Adhesive Lamination (Double Layer) Produces the finest interior surfaces. Adhesive attachment of face layer to base layer in double-layer construction and of single-layer board to interior masonry walls usually requires only supplemental mechanical fastening until adhesive attains full bond. Reduces nails or screws required, saves finishing labor and minimizes fastener pops and joint ridging. DURABOND or SHEETROCK Brand Setting-Type Joint Compound or CGC Ready-Mixed Joint Compound—Taping or All Purpose is required for adhesive lamination with fire-rated assemblies.

Perpendicular vs. Parallel Application

Gypsum board may be applied perpendicular (long edges of board at right angles to the framing members) or parallel (long edges parallel to framing). Fire-rated partitions may require parallel application (see Chapter 10 for specific information on fire-rated systems).

Perpendicular application generally is preferred because it offers the following advantages:

1. Reduces the lineal footage of joints to be treated up to 25%.
2. Strongest dimension of board runs across framing members.
3. Bridges irregularities in alignment and spacing of frame members.
4. Better bracing strength—each board ties more frame members together than does parallel application.
5. Horizontal joints on wall are at a convenient height for finishing.

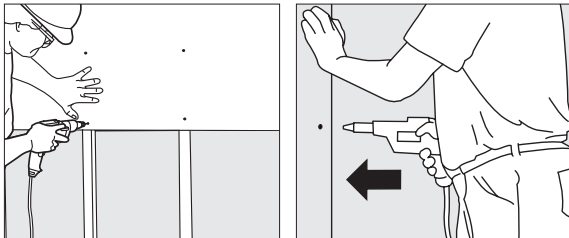
For wall application, if ceiling height is 2460 mm (8'1") or less, perpendicular application of standard 1220 mm (4') wide panels results in fewer joints, easier handling and less cutting. If ceiling height is greater than 2460 mm (8'1") or wall is 1220 mm (4 ft.) wide or less, parallel application is more practical.

Walls ranging in height from 2460 mm (8'1") to 2770 mm (9' 1") can be clad with perpendicular 1370 mm (54") wide panels, to eliminate the addition of more joints. See SHEETROCK Brand Gypsum Panels—54" in Chapter 1.

For ceiling application, use whichever method—parallel or perpendicular—results in fewer joints, or is required by frame spacing limitations.

For double-layer ceiling application, apply base-layer boards perpendicular to frame members; apply face layer parallel to framing with joints offset. On wall, apply base layer parallel with long edges centered on framing; apply face layer perpendicular. Exception: when using SHEETROCK Vinyl-Faced Gypsum Panels for face layer, apply base-layer boards at right angles to studs.

Starting at ceiling line, horizontal board is screw-attached (left). Parallel application (right) is used in special situations.



Gypsum Drywall and Plaster Base Application

General

Recommendations

General Recommendations for gypsum panels applied to wood and steel framing:

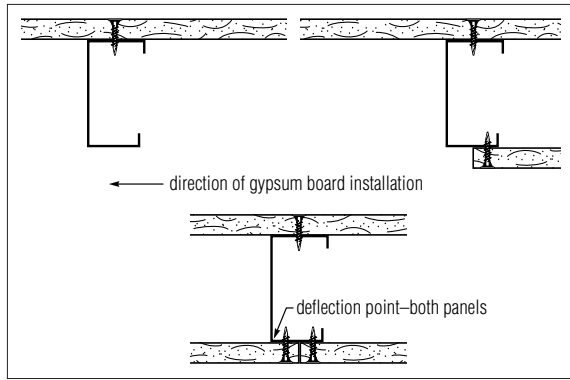
1. Apply ceiling boards first.
2. Cut boards so that they slip easily into place.
3. Butt all joints loosely. Never force panels into position.
4. Whenever possible, place tapered or wrapped edges next to one another.
5. Wherever possible, apply boards perpendicular to framing and in lengths that will span ceilings and walls without creating end (butt) joints. If butt joints do occur, stagger and locate them as far from the center of walls and ceilings as possible.
6. Support all ends and edges of gypsum board on framing, except long edges at right angles to framing and where end joints are to be floated between frame members and back-blocked. Back-blocking is covered later in this chapter on pages 115-116.
7. When fastening, apply hand pressure on panel next to fastener being driven to insure panel is in tight contact with framing member.
8. If metal or plastic trim is to be installed around edges, doors, or windows, determine if trim is to be installed before panel application. Refer to Chapter 1 for description of products.
9. Do not anchor panel surfaces across the flat grain of wide dimensional lumber such as floor joists and headers. Float panels over these members or provide a control joint to compensate for wood shrinkage.
10. To insure level surfaces at joints, arrange board application so that the leading edge of each board is attached to the open or unsupported edge of a steel stud flange. To do this, all studs must be placed so that their flanges point in the same direction. Board application is then planned to advance in the direction opposite to flange direction. When this simple procedure is followed, attachment of each board holds the stud flange at the joint in a rigid position for attachment of the following board.

If the leading edge of gypsum board is attached to the web edge of a flange, the open edge of the flange can deflect under the pressure of attachment of the following gypsum board. Friction between the tightly abutted board edges can then cause them to bind, preventing return of the second board to the surface plane of the first. A stepped or uneven joint surface results.

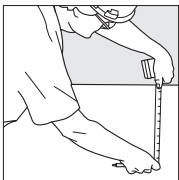
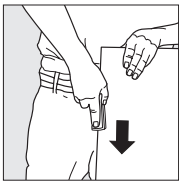
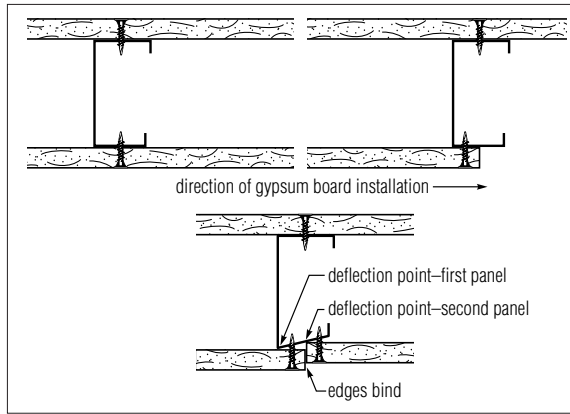
This recommended application procedure is absolutely essential for good results in steel-framed veneer and drywall assemblies. (See drawings following for correct methods.)

Measurements All measurements must be accurate. Make two measurements as a check. This procedure will usually warn of partitions or

Correct application



Incorrect application



Cut edges of board are smoothed with a rasp, coarse sandpaper or piece of metal lath stapled around wood block (top). Measurements for cutouts are carefully made with flexible rule (bottom).

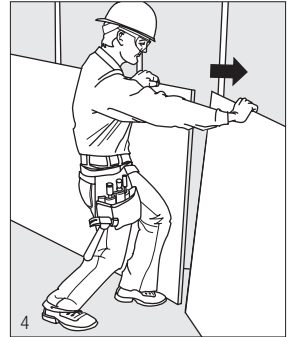
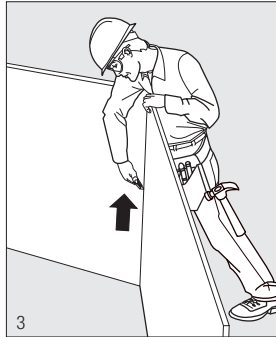
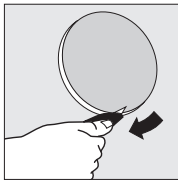
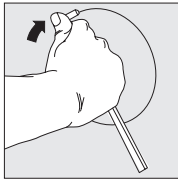
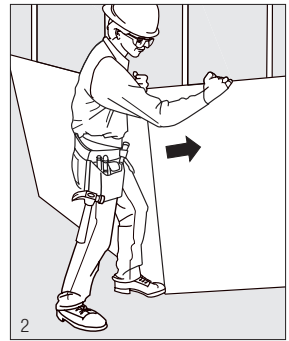
door openings that are out of plumb or out of square. Then, framing corrections can be made before the board is hung. A 3660 mm (12') to 7620 mm (25') steel power tape is recommended. Tools for measuring and cutting are shown in Chapter 14.

Cutting Make straight-line cuts across full width or length of board by scoring the face paper, snapping the board core and then cutting the back paper. The common tool used to score and cut gypsum board is a utility knife with replaceable blade. Regardless of the type knife used, its blade should be kept sharp so that score will be made through paper without tearing or rolling it up, and into the gypsum core. For FIBEROCK Brand Panels, several cuts may be required on panel surface and into core; no cut on panel back is required, unless cutting Very High Impact (VHI) panels.

Note that installation of FIBEROCK Brand products sometimes varies from the procedures used to install conventional drywall panels and gypsum base. See the most current literature on FIBEROCK Brand Panels for the latest installation information.

For cuts across the board width, a straightedge is recommended. An aluminum 1220 mm (4') drywall T-square, ruled on both edges, facilitates clean, straight cuts. For cuts along the long length of the board, use a steel

Left to right, gypsum board is cut by scoring with utility knife against drywall T-square, then snapping toward back (top), cutting back paper with same knife and separating sections (bottom)—quick method to obtain clean edges and precise fit.



Adjustable cutting tool makes quick work of circular holes, as cutter wheel on calibrated shaft rotates from center pin (top). Edges are trimmed with hook-bill knife (bottom). Stiff drywall saw and other tools are used to make odd-shaped cuts.

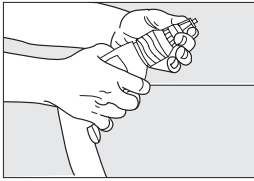
tape with an adjustable edge guide and a tip that accepts the utility knife blade. With this tape the edge guide is set for the desired width and placed against the board edge. The knife blade is then inserted into the slotted tape tip, and by moving both hands together the tool is drawn down the full length of the board to make a smooth and accurate cut. (See manufacturer instructions for proper use and any safety precautions.)

Cut and fit board neatly for pipes, electrical outlet boxes, medicine cabinets, etc. Holes for electrical outlet boxes can be made with a special outlet box cutting tool. For circular holes, an adjustable circular cutting tool or drywall router is available. Keyhole saws and similar cutting tools can be used for any type of cutout. After cutting hole, remove any loose face paper at cut. Refer to Chapter 14, Tools and Equipment, for examples of appropriate tools.

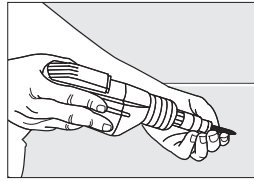
Screw Application

Screws are applied with a positive-clutch electric power tool, commonly called an electric screwgun, equipped with adjustable screw-depth control head and a Phillips bit. The use of screws provides a positive mechanical attachment of gypsum board to either wood or steel framing.

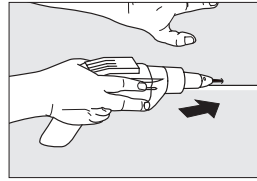
Adjust Screwgun Set adjustment for proper screw depth. For gypsum panels (drywall), screwhead must be driven slightly below face of panel (max. 0.8 mm (1/32")), but not deep enough to break the paper. For gypsum bases (veneer plaster), screwhead is set flush with the base surface. To adjust depth, rotate control head to provide proper screw depth. When proper adjustment has been made, secure control head to maintain adjustment.



Secure control head to maintain adjustment.



Phillips-head tip holds drywall screw for driving.



Hold screwgun as shown (not by pistol grip) to avoid stress on wrist.

Place Screw Phillips head tip holds drywall screw for driving (above, center). Bit tip does not rotate until pressure is applied to gypsum board during application.

Start Screw Straight Firm hand grip on electric screwgun is important for straight line of entry. To avoid stress on wrist, hold gun as shown (above), not by the pistol grip. Screw must enter perpendicular to board face for proper performance. Drive screws at least 10 mm (3/8") from ends or edges of board.

Operate electric screwgun constantly during usage. When the screw-head is driven solidly against the board, the screwgun head will automatically stop turning as the positive clutch disengages.

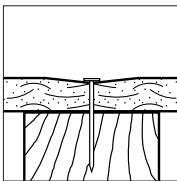
The electric screwgun technique is relatively simple and a proficiency with the tool can be developed after a few hours of use. For description of screws, see Chapter 1; for screw spacing, see the fastener spacing table on the next page.

Staple Application

Staples are recommended only for attaching base layer boards to wood framing in double layer assemblies. Staples should be 16-ga. flattened galvanized wire with 11 mm (7/16") wide crown, divergent points and leg lengths to provide min. 16 mm (5/8") penetration into supports. Drive staples with crown perpendicular to gypsum board edges except where edges fall on supports. Drive staples so crown bears tightly against board but does not cut paper.

Single-Nailing Application

1. Begin nailing from abutting edge of board and proceed toward opposite ends or edges. Do not nail perimeter before nailing field of board. Ceiling application may cause board to deflect or sag in center and prevent firm fastening.
2. Position nails on adjacent ends or edges opposite each other.
3. Drive nails at least 10 mm (3/8") from ends or edges of gypsum board.
4. Apply hand pressure on board adjacent to nail being driven to insure that board is in tight contact with framing member.
5. Drive nails with shank perpendicular to face of board.
6. Use a drywall hammer with crowned head for gypsum panels.
- 7a. For gypsum panels (drywall), seat nail so head is in a shallow, uniform dimple formed by last blow of hammer. Do not break paper or crush core at nailhead or around circumference of dimple by over-driving.



Nail driven to form slight dimple in drywall panel.

Never use a nail set. Depth of dimple should not exceed 0.8 mm (1/32") for gypsum panels.

- b. For gypsum bases (veneer plaster) nail heads should be driven flush with the board surface without dimpling.

Maximum Fastener Spacing—Constructions Using Drywall, Gypsum Base and Similar Products⁽¹⁾

Framing	Type const.	Type Fastener	Location	Maximum Fastener Spacing			
				Drywall Assemblies		Veneer Plaster Assemblies	
				SHEETROCK Brand Gypsum Panels or FIBEROCK Brand Abuse-Resistant Panels		GRAND PRIX Plaster Base or FIBEROCK Brand Abuse-Resistant Panels	
				mm	in.	mm	in.
wood	single layer ⁽²⁾ —mechanically attached	nails	ceilings	180	7	180	7
			sidewalls	200	8	200	8
		screws	ceilings	300	12	300	12
			sidewalls	400	16 ³	300	12
		screws—with RC-1 channels	ceilings	300	12	300	12
			sidewalls	300	12	300	12
	single layer—adhesively attached	nails/screws	ceilings (perpendicular)	400 mm or (16") o.c. at ends, edges—1 field fastener per frame member at mid-width of board		same as for gypsum panels	
			ceilings (parallel)	400 mm or (16") o.c. along each edge and 600 mm or (24") o.c. along intermediate framing		same as for gypsum panels	
			walls (perpendicular)	400 mm or (16") o.c. at ends, edges—1 field fastener per frame member at mid-width of board		same as for gypsum panels	
	base layer of double layer—both layers mechanically attached	nails	ceilings	600	24	600	24
			sidewalls	600	24	600	24
		screws	ceilings	600	24	600	24
			sidewalls	600	24	600	24
		staples	ceilings	400	16	400	16
			sidewalls	400	16	400	16
	face layer of double layer—both layers mechanically attached	nails	ceilings	180	7	180	7
			sidewalls	200	8	200	8
		screws	ceilings	300	12	300	12
			sidewalls	400	16	300	12
	base layer of double layer—face layer adhesively attached	nails	ceilings	180	7	180	7
sidewalls			200	8	200	8	
screws		ceilings	300	12	300	12	
		sidewalls	400	16	300	12	
staples		ceilings	180	7	180	7	
		sidewalls	180	7	180	7	
face layer of double layer—face layer adhesively attached	nails/screws	ceilings	400 mm or (16") o.c. at ends, edges—1 field fastener per frame member at mid-width of board		same as for gypsum panels		
		sidewalls	fasten top and ⁽⁴⁾ bottom as required		same as for ⁽⁴⁾ gypsum panels		

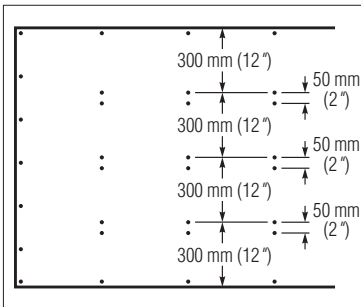
Maximum Fastener Spacing—Constructions Using Drywall, Gypsum Base and Similar Products⁽¹⁾

Framing	Type const.	Type Fastener	Location	Maximum Fastener Spacing			
				Drywall Assemblies		Veneer Plaster Assemblies	
				SHEETROCK Brand Gypsum Panels or FIBEROCK Brand Abuse-Resistant Panels		GRAND PRIX Plaster Base or FIBEROCK Brand Abuse-Resistant Panels	
				mm	in.	mm	in.
steel	single layer	screws	ceilings	300	12	300	12
			sidewalls	400	16 ⁽³⁾	300	12
	base layer of double layer—both layers mechanically attached	screws	ceilings	400	16	400	16
			sidewalls	600	24	600	24
	face layer of double layer—both layers mechanically attached	screws	ceilings	300	12	300	12
			sidewalls	400	16	300	12
	base layer of double layer—face layer adhesively attached	screws	ceilings	300 ⁽⁵⁾	12 ⁽⁴⁾	300 ⁽⁵⁾	12 ⁽⁵⁾
			sidewalls	400 ⁽⁵⁾	16 ⁽⁴⁾	300 ⁽⁵⁾	12 ⁽⁵⁾
	face layer of double layer—face layer adhesively attached	screws	ceilings	400 mm or (16") o.c. at ends and edges—1 field fastener per frame member at mid-width of board		same as for gypsum panels	
			sidewalls	fasten top and ⁽⁴⁾ bottom as required		same as for ⁽⁴⁾ gypsum panels	

(1) Fastener spacings based on wood framing 400 mm (16") o.c., steel framing 600 mm (24") o.c. Spacings are not for fire-rated assemblies; see test listing for fastener spacing for specific fire-rated assemblies. (2) See page 105 for fastener spacing using adhesive. (3) Water-resistant board spacing is 300 mm(12") o.c. (4) When board has been prebowed. For flat boards, use temporary nails or Type G screws called for in sheet or strip lamination section. (5) Spacing is 200 mm (8") o.c. at joint edges.

Double-Nailing Application (Walls and Ceilings)

In the double-nailing method for attaching gypsum board to wood framing, space the first nails 300 mm (12") o.c. along the supports in the field of the board and around the perimeter spaced 180 mm (7") o.c. for ceilings and 200 mm (8") o.c. for walls. Drive second nails about 50 mm (2") from first in field of board and make sure first nails are properly seated.



Double-nailing in field of board

This application method helps prevent loose panels and resultant nail pops that may occur when boards are not applied correctly and drawn tightly to framing. This method will not reduce the incidence or severity of nail pops due to wood shrinkage.

Adhesive Application

In the adhesive method, a continuous bead of drywall stud or construction adhesive is applied to the face of wood framing. Adhesives should meet Standard ASTM C557. Gypsum boards are applied and attached with only a minimum number of supplementary fasteners compared to conventional fastening methods (see preceding table for fastener spacing required).

Spacing of framing members is the same as that used for conventional attachment.

Advantages of attachment with adhesives are:

1. Reduces up to 75% of the number of fasteners used, and consequent problems.
2. Stronger than conventional nail application—up to 100% more tensile strength, up to 50% more shear strength.
3. Unaffected by moisture, high or low temperature.
4. Fewer loose panels caused by improper fastening.
5. Bridges minor framing irregularities.
6. Will not stain or bleed through most finishes.

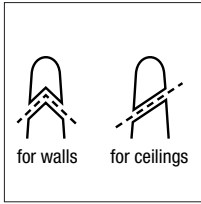
Adhesives are readily available in 850 ml (29-oz.) cartridges and applied with hand or powered-guns.

General Directions

The following recommendations will help explain the proper use of adhesives and the conditions which may affect the quality of the finished job.

1. Select the proper adhesive for specific job requirements. Read container directions carefully.
2. Make sure that all substrates are clean, sound and free from oil, dirt or contamination.
3. Exercise care regarding open flames when using flammable solvent adhesives in poorly ventilated areas.
4. Prevent freezing of adhesives.
5. Apply adhesives at temperatures between 10°C (50°F) and 38°C (100°F) except as directed by the manufacturer. Extremely high temperatures may cause solvent-base products to evaporate rapidly, shortening open time and damaging bond characteristics.
6. Close containers whenever adhesive is not in use. Evaporation (or escape) of vehicle can affect adhesive's wetting, bonding and application properties.
7. Do not exceed open time specified by manufacturer. Disregarding of directions may cause poor bonding.
8. Follow manufacturer's recommendation on proper amounts of adhesive to be applied. Too small or too large a bead will lead to performance problems or waste.
9. Apply adhesive with proper tools and as recommended by the manufacturer.

Cartridge Preparation



Nozzle cuts

Cut the cartridge tip in two different ways: for walls, make a chevron or 'V' cut in order to produce a round, uniform bead. The cut edge of the nozzle then rides along the stud easily.

For ceilings, use a single, angled slash across the nozzle. This gives a wipe-on effect on the ceiling joist to minimize dripping.

With a 10 mm (3/8") bead, approx. 11 to 19L of adhesive will prepare framing for 100 m² (1,000 sq. ft.) of gypsum board. See adhesive manufacturer information for specific product coverage.

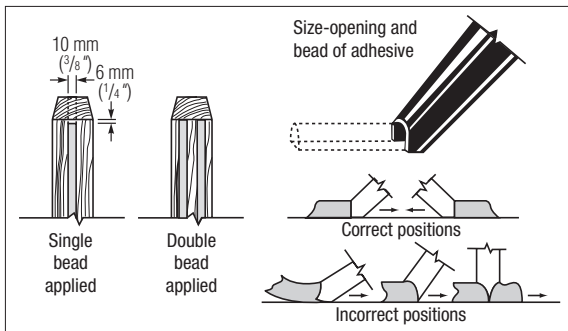
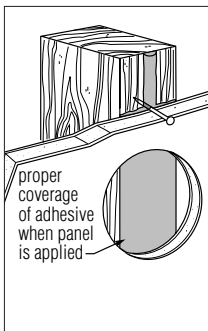
Proper nozzle opening and gun position (see sketches) are required to obtain the right size and shape of bead for satisfactory results. Initial height of bead over framing should be 10 mm (3/8") and of sufficient volume to provide 1.6 mm (1/16") thickness of adhesive over the entire support when compressed.

Apply adhesive in a continuous 10 mm (3/8") bead in center of attachment face (below) and to within 150 mm (6") of ends of all framing members. Where two gypsum boards meet on a framing member, apply two continuous 10 mm (3/8") beads to framing members at extreme edges of face, to insure adequate contact with paper on back of board. Do not apply adhesive to members such as bridging, diagonal bracing, etc. into which no supplemental fasteners will be driven. Adhesive is not required at inside corners, top and bottom plates or bracing and is not ordinarily used in closets.

Place gypsum boards shortly after adhesive bead is applied and fasten immediately, using proper screws or nails. After board has been fastened, impact by hand along each stud or joist to insure good contact at all points.

Where fasteners at vertical joints are objectionable (such as with pre-decorated panels), boards may be prebowed and adhesively attached with fasteners at top and bottom only.

Prebow boards by stacking face up with ends resting on nominal 38 x 89 mm (2 x 4) lumber or other blocks and with center of boards resting on floor. Allow to remain overnight or until boards have a 50 mm (2") permanent bow. (Under very humid conditions, board may be too flexible to assume stiff bow needed to provide adequate pressure against framing.)



To insure good bond, no more adhesive should be applied than can be covered in 15 minutes. If adhesive is left exposed to the air for longer periods, the volatile materials will evaporate, causing surface hardness or skimming that prevents a full bond. Remove excess adhesive from board and other finished surfaces and tools with a solvent-base cleaner before adhesive dries. Follow solvent manufacturer's safety procedures.

Allow adhesive to dry at least 48 hours before treating drywall joints or applying veneer finishes.

Fastener Spacing Using Adhesive

Ceilings—Long Board Edges Across Framing Fasten board at each framing intersection and 400 mm (16") o.c. at each end. Install one temporary field fastener per framing member required at midwidth of board.

Ceilings—Long Board Edges Parallel to Framing Space fasteners 400 mm (16") o.c. along board edges and at each framing intersection on ends. Space fasteners 600 mm (24") o.c. on intermediate supports.

Walls—Long Board Edges Across Framing Application Same as 'Ceilings'—above, except that no field fasteners are required.

Walls—Long Board Edges Parallel to Framing Same as 'Ceilings'—above, except that no fasteners are required on intermediate supports. Where fasteners at the vertical joints are objectionable, prebore the gypsum board and apply fasteners 400 mm (16") o.c. only at the top and bottom of the board.

Note: If using vinyl foam tape as a temporary supplementary fastener, follow manufacturer's directions for additional fasteners required.

Gypsum Board Ceiling Installation

The size and weight of standard gypsum boards makes them somewhat cumbersome for ceiling installation, even with two people doing the work. Installation typically is made easier if the installers wear stilts or erect temporary platforms to position their heads and hands so that initial fasteners can be easily driven. Marking the panel face for anticipated joist locations also is helpful for some installers.

For reasons of safety, ease of adjustment and more secure panel attachment, use of aids such as panel lifters or T-jacks are recommended. Panel lifters are essentially scissor jacks that lift panels into position and enable accurate alignment with ceiling joists. They also can hold the panels firmly in place so that fasteners can secure the gypsum board directly to the framing. T-jacks are simply bars on adjustable poles. They do a good job of holding the panels in place once they are in position, but do not facilitate alignment in the same manner as panel lifters. Nevertheless, either equipment addition can make ceiling installation easier and safer. (See Chapter 13 and equipment manufacturer instructions for safety precautions.)

Wood Frame Single-Layer Application

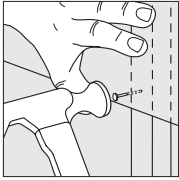
This basic construction provides economical, quickly completed walls and ceilings with wood framing; also usable for wall furring. All types of gypsum boards, including predecorated vinyl-faced panels, may be used in the assembly. For measuring and cutting, perpendicular or parallel application, framing requirements and fastening, refer to sections found earlier in this chapter. For complete information on fire and sound-resistant assemblies, refer to CGC publication, *Construction Selector*, SA-100.

Installation

Wood Studs and Joists Apply gypsum boards so that ends and edges occur over framing members, except when joints are at right angles to the framing members as in perpendicular application or when the end joints are to be back-blocked (see section following).

To minimize end joints, use boards of maximum practical lengths. When end joints occur, they should be staggered. Arrange joints on opposite sides of a partition so they occur on different studs.

Apply gypsum boards first to the ceiling and then to the walls. If foil-back gypsum boards are used, apply foil side against framing. Fit ends and edges closely but do not force boards into place. Cut boards accurately to fit around pipes and fixtures.



Fasteners are placed at least 10 mm (3/8") from edges and ends.

Usually two mechanics are required to install long-length board on ceilings. Fasten boards with screws or nails starting from abutting edges and working toward the opposite ends and edges. While fasteners are being driven, the boards must be held in firm contact with the framing or joists. When single fasteners are used, attach boards to framing with screws or nails spaced as shown in the Fastener Spacing Table on pages 109-110. Drive fasteners at least 10 mm (3/8") from edges and ends of board.

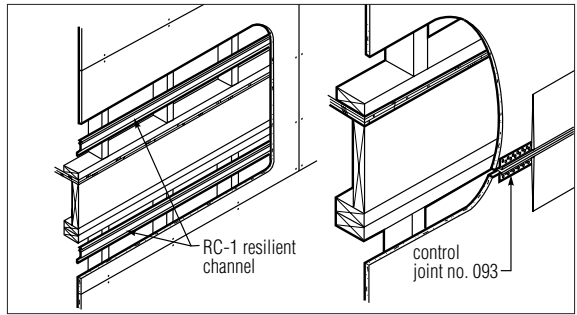
Apply gypsum boards to the sidewalls after ceilings are erected. Where long panel edges are across studs (perpendicular application), apply top wall board first, butted against ceiling. When long edges are parallel to studs (parallel application), span sidewall from ceiling to floor with a single length of board. For situations where ceiling height is greater than 2460 mm (8' 1") but less than 2770 mm (9' 1"), SHEETROCK Brand Gypsum Panels—54" provide the added board width needed to avoid additional joint finishing. Use parallel application where ceiling height is over 2770 mm (9' 1") or where this method reduces waste and joint treatment.

On sidewalls, space screws 400 mm (16") o.c. max. for gypsum panels, 300 mm (12") o.c. max. for gypsum base. Space nails 200 mm (8") o.c. (If wall is fire-rated, follow specific design specifications.)

Wherever possible, use board of sufficient length to span wall areas. If joints occur near an opening, apply boards so vertical joints are centered, if possible, over opening. Keep vertical joints at least 200 mm (8") away from external corners of windows, doors, or similar openings except at interior or exterior angles within the room or when control joints are used.

After installation, exert hand pressure against wall and ceiling surfaces to detect loose fasteners. If loose fasteners are found, drive them tight. Whenever nails or screws have punctured paper, hold board tight against framing and install another fastener properly, about 38 mm (1-1/2") from screw or nailhead which punctured paper. Remove the faulty fasteners. When nailing boards to second side of a partition, check opposite side for nails loosened by pounding and drive them tight again.

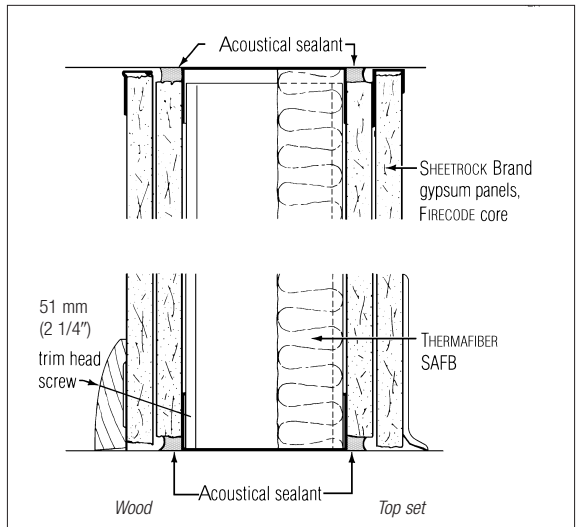
With platform framing and sidewall expanses exceeding one floor in height, fur the gypsum boards over floor joists using RC-1 Resilient Channels (see detail).



As an alternate, install a horizontal control joint between gypsum boards at the junction of the bottom of top plates and the first-floor studs (see detail). Do not fasten gypsum boards to the side face of joists or headers.

Acoustical Sealant Application

To prevent flanking and loss of the sound-control characteristics of sound-rated partitions, Acoustical Sealant must be used at all wood and steel floor runners (detailed below) to seal bottom edge of gypsum board and at wall angles where dissimilar materials meet. Caulking at possible leaks in all sound-rated systems is required to obtain comparable sound reduction to that obtained in the laboratory.

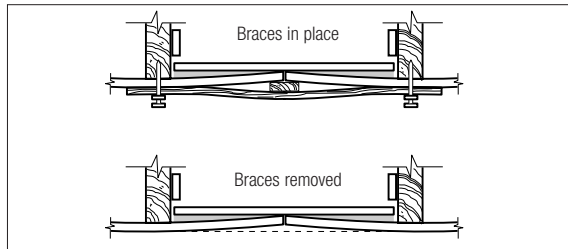


Back-Blocking Application

Back-Blocking is a system designed to minimize an inherent joint deformation "ridging" in single-layer gypsum board construction, which sometimes occurs under a combination of adverse job and weather conditions. The Back-Blocking System, developed by CGC, enables floating of end joints between studs or joists and makes it easier to form a good surface over a twisted stud or joist. The system has been widely used for years and produces outstanding results.

Back-Blocking consists of laminating cut-to-size pieces of gypsum board to the back surface of boards directly behind joints to provide resistance to ridding. To install the system, follow these steps:

- a. Cut backing blocks 200 mm (8") wide and long enough to fit loosely between framing.
- b. Install separate gypsum strips along sides of studs, set back enough to accommodate block thickness and keep face of blocks flush with or slightly behind stud faces.
- c. Spread the surface of the blocks with DURABOND or SHEETROCK Setting-Type Joint Compound or CGC Joint Compound—Taping or All Purpose. Apply the compound in beads 13 mm (1/2") high, 10 mm (3/8") wide at the base, spaced 38 mm (1-1/2") o.c.
- d. Apply gypsum boards horizontally with long edges at right angles to joists. Place backing blocks along full length of edge and ends of board.
- e. Immediately after all blocks are in place, erect the next board, butting ends loosely.
- f. Upon fastening the abutting board, install a block and bracing as shown in the cross-section illustration. This method forms a taper that remains after bracing strips are removed.



Double-Layer Adhesive Lamination

In adhesive application, face-layer gypsum boards or predecorated SHEETROCK Brand TEXTONE Vinyl-Faced Gypsum Panels are job-laminated to a base layer of gypsum board or interior masonry partitions.

In multilayer adhesive systems, the base layer must be attached with the same fastener, fastener spacing, and framing spacing as for a single-layer assembly of the same thickness as the base layer.

In fire-rated assemblies, permanent fasteners and the type of board used must be the same as in the particular tested assembly (see specific design for complete description).

Application of the base layer may have long edges either parallel or perpendicular to the framing. Plan the layout of the face layer so that all joints are offset a minimum of 250 mm (10") from parallel base-layer joints. It is preferable to apply the face layer perpendicular to the base layer. At inside vertical angles, only the overlapping base layer should be attached to the framing to provide a floating corner. Omit all face-layer fasteners within 200 mm (8") of vertical angles.

**Application —
Laminating
Adhesive**

Apply laminating adhesive in strips to center and along both edges of face layer board. Apply strips with a notched metal spreader having four 6.4 x 6.4 mm (1/4"x1/4") minimum notches spaced max. of 50 mm (2") o.c. Position face layer against base layer; fasten at top and bottom (vertical application) as required. For laminated ceilings, space fasteners 400 mm (16") o.c. along edges and ends, with one permanent field fastener per framing member installed at mid-width of board. Press board into place with firm pressure to insure bond; reimpact within 24 hr. if necessary.

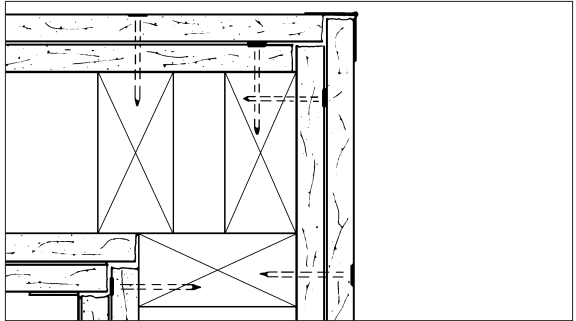
**Application —
Joint Compound
(used as
laminating
adhesive)**

DURABOND or SHEETROCK Brand Setting-Type and CGC Brand Ready-Mixed Joint Compounds—All Purpose and Taping may be used for two methods of lamination: sheet lamination and strip lamination.

When using Setting-Type Compounds, supplemental or temporary fasteners or supports are required until compound has hardened (minimum three hours depending on which type of compound is used). Because the compound is of heavy consistency, it provides a leveling action not obtainable with thinner-bodied adhesives.

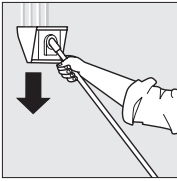
When using Ready-Mixed Joint Compounds for laminating, temporary nailing or permanent Type G Screws are needed until the compound is dry (usually overnight). In cold weather, provide heat to keep compound from freezing until adhesive is dry.

Corner detail

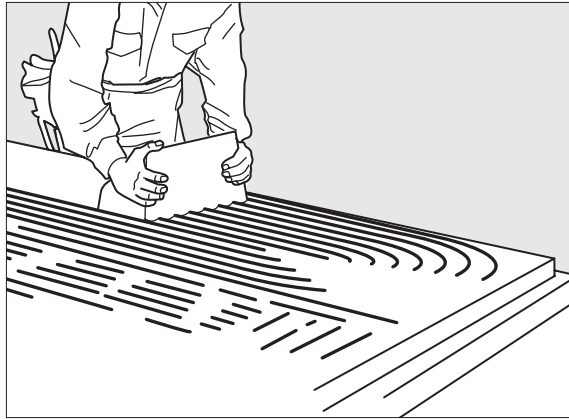


**Mixing —
SHEETROCK
Brand
Setting-Type
Compounds**

1. Mix in a clean plastic container.
2. Use only clean, potable water.
3. Mix according to bag directions, making sure compound is uniformly damp.
4. Do not contaminate with previously mixed DURABOND or SHEETROCK Brand Setting-Type Joint Compounds or other compounds or dirty water as it will affect the setting time.
5. Mix only as much compound as can be used within the time period indicated on the bag— usually one hour for DURABOND or SHEETROCK Brand Setting-Type 90, for example.
6. The addition of extra water (retempering) will not prevent set or increase working time with DURABOND or SHEETROCK Brand Setting-Type Joint Compounds.



In sheet lamination (right), notched spreader is used to spread compound over entire back surface of face-layer board. In strip lamination of vertical sidewall boards (above), adhesive can be applied to either base surface or face panel. Mechanical tool used is Ames Laminating Spreader.



**Mixing —
SHEETROCK Brand
Ready-Mixed
Compounds**

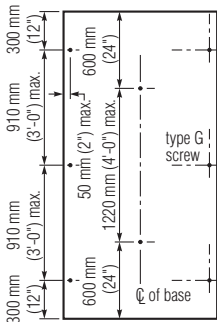
Use the compound at package consistency for best leveling action. If a thinner adhesive is desired, add cool water in half-pint increments to avoid overthinning. Remix lightly with a potato masher-type mixer and test apply after each water addition. If compound becomes too thin, add thicker compound from another container and remix.

See Chapter 13, Safety Considerations, Material Handling, for more information on the safe use of joint compounds.

On all laminated ceilings, face layer must be permanently attached with fasteners spaced 400 mm (16") o.c. max. at ends and edges, plus one field fastener in each frame member at midwidth of board. Nails must penetrate wood framing a minimum of 19 mm (3/4"). Screws must penetrate steel framing a minimum of 9.5 mm (3/8").

On walls, permanently attach top and bottom of the face layer with fasteners driven 600 mm (24") o.c. max. (except prebowed boards). Provide temporary support fasteners, or Type G Screws 600 mm (24") o.c. max. in the field of the board.

1. **Temporary Nailing** Use double-headed scaffold nails driven through wood or gypsum board scraps so that nail penetrates framing a minimum of 19 mm (3/4").
2. **Type G Screws** Permanently attach face layer with screws driven into base layer to avoid framing. Apply compound just prior to face board erection to prevent wetting of base layer that would reduce holding power of screws. Press face layer firmly against base layer when driving screw. Compound should be thin enough to spread as screw is driven. Type G Screws should not be used with base-layer boards less than 12.7 mm (1/2") thick.



Strip Lamination (vertical face layer, sidewalls only) This method is often preferred because it requires less compound and improves sound attenuation. Apply strips (four beads, each 10 mm (3/8") wide by 13 mm (1/2") high spaced 38 mm (1-1/2") o.c.) 610 mm (24") o.c. max. Place permanent fasteners 600 mm (24") o.c. max. at each end of face layer. Drive Type G Screws as shown in diagram.

**Application—
Liquid Contact
Adhesive** Apply liquid contact adhesive according to manufacturer's directions. Use a short nap paint roller to cover both contact surfaces. Let adhesive air dry to the touch. Apply boards as soon as possible after drying occurs. On walls, fasten 400 mm (16") o.c. at top and bottom (vertical application) as required. In ceiling lamination, apply permanent supplementary fasteners at each corner of board, and along edges spaced max. 1220 mm (48") o.c. Press board into place with firm pressure to ensure bond.

Resilient Board Application

**Gypsum Board—
Sidewalls** Apply gypsum boards perpendicular to framing with long dimension of boards parallel to resilient channels. (Assure that resilient channels are oriented with attachment flange down except for baseboard channel which should be oriented with attachment flange up for easier board attachment.) To avoid compromising sound insulation, lift panels off floor and assure 3 mm (1/8") relief around perimeter to be filled later with Acoustical Sealant. Attach boards with 25 mm (1") TYPE S screws spaced 300 mm (12") o.c. along channels. Center horizontal abutting edges of boards over screw flange of channel, and screw-attach. Take particular care that these screws do not penetrate the resilient channels and enter studs since this "grounding" will nullify the resilient properties of the channels. For vertical applications, butt joints should be centered over the RC-1 Channels. Where fire rating is required, board must be applied with long dimension vertical.

For two-layer application of gypsum board, apply base layer vertically and attach to resilient channels with 25 mm (1") TYPE S screws spaced 600 mm (24") o.c. Apply face layer with long dimension at right angles to long edges of base layer and fasten with TYPE S screws spaced 400 mm (16") o.c., and of sufficient length to penetrate channels 10 mm (3/8") min.

**Gypsum Board—
Ceilings** **Single Layer** Apply boards of maximum practical length with long dimension at right angles to resilient channels and end joints staggered. To avoid compromising sound insulation, assure 3 mm (1/8") relief around perimeter to be filled later with Acoustical Sealant. End joints may occur over resilient channels or midway between channels with joint floated and back-blocked with sections of RC-1 Channels. Fit ends and edges closely, but not forced together. Fasten boards to channels with 25 mm (1") TYPE S screws spaced 300 mm (12") o.c. in field of boards and along abutting ends. Cut boards neatly and provide support around cutouts and openings.

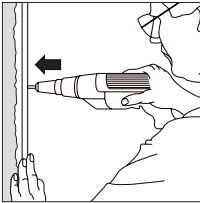
Two-Plane Assembly Provides two layers of gypsum panels for a specific fire-endurance rating, with resilient channel between layers. Base layer of gypsum board is applied with long edges across joists and end joints staggered. Attach resilient channels perpendicular to framing with 48 mm (1-7/8") TYPE S screws through the base layer. Face layer of gypsum boards is applied in the same manner as for single layer but at right angles to base layer. Fasten boards to resilient channels with 25 mm (1") TYPE S Screws. (See specific fire-rated assembly design for board type, fastener requirements and fastener spacing.)

Double Layer Assembly Provides two layers of gypsum panels with resilient channel between panels and framing. RC-1 Channel is applied 400 mm (16") o.c. perpendicular to joists. Base layer of 15.9 mm (5/8") gypsum boards is attached to RC-1 Channel with 25 mm (1") TYPE S screws. Face layer is attached at right angles to base layer. For added sound control and fire protection, install 76 mm (3") THERMAFIBER SAFB in cavity. (See specific fire-rated assembly design for board type, fastener requirements and fastener spacing.)

Steel Frame Single-Layer Partition Application

This noncombustible assembly has won wide acceptance because of its sound attenuation, low cost, speed of erection and light weight—only 20-29 kg/m² (4 to 6 lb./ft.²). Partitions are ideal for space division within units. Ceilings, both suspended and furred, conceal overhead structural and mechanical elements and provide a surface ready for either final decoration or adhesively applied acoustical tile.

Gypsum Board Erection



With long edges of panels applied parallel to steel framing, workman places screws at 400 mm (16") o.c. intervals for drywall, 300 mm (12") o.c. for gypsum base.

Apply gypsum boards with long dimension parallel or perpendicular to framing. (See Frame Spacing Tables on page 67 for limitations.) Use maximum practical lengths to minimize end joints. Position boards so all abutting ends and edges (except edges with perpendicular application) will be located in center of stud flanges. Plan direction of board installation so that lead edge or end of board is attached to open end of stud flange first. Be certain that joints are neatly fitted and staggered on opposite sides of the partition so they occur on different studs. Cut boards to fit neatly around all outlets and switch boxes.

For single-layer application, fasten boards to supports with 25 mm (1") TYPE S screws spaced according to Fastener Spacing Table. Stagger screws on abutting edges or ends.

For fire-rated construction, apply gypsum boards and fasten as specified in the fire-tested assembly (see specific design).

Steel Frame Double-Layer Partition Application

Double-layer construction using steel studs offers some of the best performances in both fire and sound resistance—up to 2-hr. fire ratings and 55 STC sound rating. These economical, lightweight partitions are adaptable as party walls or corridor walls in virtually every type of new construction.

In these assemblies a face layer of gypsum board is job-laminated to the base layer or screw-attached through the base-layer gypsum board to steel studs. The installation of steel studs and runners is the same as for single-layer application.

Base-Layer Erection

Apply gypsum board with long dimension parallel to studs. Position board so that abutting edges will be located in the center of stud flanges. Be certain joints are neatly fitted and staggered on opposite sides of partition so they occur on different studs. For double-layer screw attachment (both layers screw-attached), fasten panels to studs with TYPE S screws spaced 600 mm (24") o.c. Use 25 mm (1") screws for 12.7 mm (1/2") and 15.9 mm (5/8") thick board. For double-layer adhesively laminated construction, fasten board with 25 mm (1") screws

spaced 200 mm (8") o.c. at joint edges and 300 mm (12") o.c. in field for panels and gypsum base. For fire-rated construction, fasten board as specified in the fire-tested design being erected (see specific design).

Face-Layer Erection

Apply gypsum board with long dimension parallel to studs. Position board so abutting edges will be located in center of stud flanges. Stagger joints from those in base layer and on opposite sides of partition. For double-layer screw attachment (both layers screw-attached), fasten face layer to studs with TYPE S screws spaced 400 mm (16") o.c. for gypsum panels, 300 mm (12") o.c. for gypsum base. Use 41 mm (1-5/8") screws for 12.7 mm (1/2") and 15.9 mm (5/8") thick board. (As a rule of thumb, screws should be a min. 10 mm (3/8") longer than the total thickness of material to be attached to steel studs.) For double-layer laminated construction, attach face layer using adhesive lamination described earlier in this chapter. For fire-rated construction, fasten gypsum boards with screws as specified in the fire-tested design (see specific design).

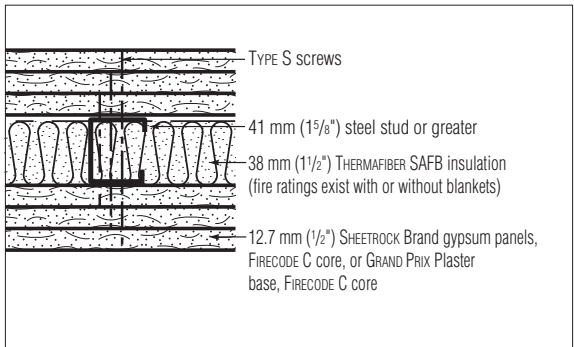
Steel Frame — Multilayer Application

Multilayer construction, using steel studs, 38 mm (1-1/2") or greater THERMAFIBER SAFB Insulation and 12.7 mm (1/2") or 15.9 mm (5/8") SHEETROCK Brand Gypsum Panels, FIRECODE C Core, SHEETROCK Brand Abuse Resistant Gypsum Panels, SHEETROCK Brand Gypsum Panels, ULTRACODE Core or 12.7 mm (1/2") GRAND PRIX Plaster Base, FIRECODE C Core, offers 3 and 4-hour fire ratings and up to 65 STC sound rating. These superior assemblies are low cost, much lighter weight and thinner than concrete block partitions offering equivalent performance.

3-Layer Application

Apply gypsum panels vertically with long dimension parallel to studs (except face layer may be applied horizontally across studs). Position base so abutting edges are located in center of stud flanges. Stagger joints from those in adjacent layers and on opposite sides of the partition.

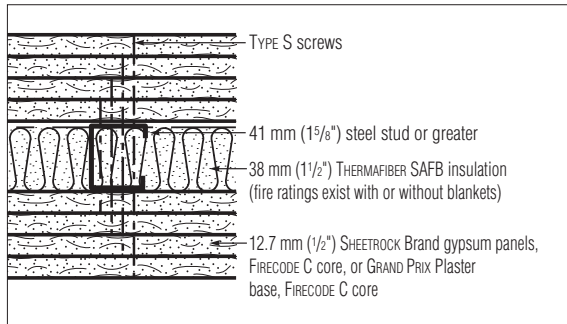
Fasten first layer to studs with 25 mm (1") TYPE S screws spaced 1220 mm (48") o.c. Fasten second layer to studs with 41 mm (1-5/8") TYPE S screws spaced 1220 mm (48") o.c. Fasten face layer to studs with 57 mm (2-1/4") TYPE S screws spaced 300 mm (12") o.c. Horizontally applied face layer requires 25 mm (1") Type G screws in base between studs and 38 mm (1-1/2") from horizontal joints.



4-layer Application

Apply gypsum boards vertically with long dimension parallel to studs (except face layer may be applied horizontally across studs). Position base so abutting edges are located in center of stud flanges. Stagger joints from those in adjacent layers and on opposite sides of the partition.

Fasten first layer to studs with 25 mm (1") TYPE S screws spaced 1220 mm (48") o.c. Fasten second layer to studs with 41 mm (1-5/8") TYPE S screws spaced 1220 mm (48") o.c. Fasten third layer to studs with 57 mm (2-1/4") TYPE S screws spaced 300 mm (12") o.c. Fasten fourth layer to studs with 67 mm (2-5/8") screws spaced 300 mm (12") o.c. Horizontally applied face layer requires 38 mm (1-1/2") Type G screws in base between studs and 25 mm (1") from horizontal joints.



Furred Framing Board Application

Apply gypsum board of maximum practical length with long dimension at right angles to furring channel. Center end joints over channel web; fit joints neatly and accurately; stagger end joints from those in adjacent rows of board. Fasten boards to furring channels with TYPE S screws spaced according to Fastener Spacing Table. Use 25 mm (1") screw length for 12.7 mm (1/2") or 15.9 mm (5/8") thick boards.

Masonry Single-Layer Direct Application

Gypsum boards adhesively applied directly to interior, above-grade monolithic concrete or unit masonry are laminated using a DURABOND or SHEETROCK Brand Setting-Type Joint Compound or Ready-Mixed Joint Compound (All Purpose or Taping) or an appropriate subfloor plywood construction adhesive. Either regular or predecorated SHEETROCK Brand TEXTONE Vinyl-Faced Gypsum Panels may be applied. Use the Metal Furring Channels or Z-Furring Channels system for gypsum board application to interior of exterior and below-grade wall surfaces. If cavity walls have been erected inside of exterior walls and have a continuous (25 mm (1") min.) clear air space, and the masonry wall surface is well dampproofed, the wall surfaces may be considered here as an interior wall surface.

Note: Gypsum panels should not be installed where they will be in continuous contact with moisture.

Preparation

Mortar joints on surface of unit masonry to which gypsum boards are to be bonded should be cut flush with the masonry to provide a level surface. The wall surface should be plumb and true. Grind off rough or

protruding areas before lamination is started. Fill pockets or holes greater than 100 mm (4") in diameter and 3 mm (1/8") deep with grout, mortar, or DURABOND or SHEETROCK Brand Setting-Type Joint Compound. Allow to dry before laminating.

The masonry surface must have all form oils, grease and other release agents removed. It must be dry and free of dust, loose particles and efflorescence. If masonry has been coated or painted, test by attaching a small section of board to surface. Pull from surface after allowing sufficient time for adhesive to bond. If attachment fails at bond line to masonry, the surface coating must be removed or a furring system used.

If wood base is used, attach a wood nailer to the wall with mechanical fasteners before laminating gypsum boards. Nailer should be equal to the board thickness and at least 38 mm (1-1/2") high (or 19 mm (3/4") less than wood base height).

**Board
Installation
With Adhesive**

Cut face boards to allow continuous clearance (3 mm (1/8") to 6.4 mm (1/4")) at floor. Apply DURABOND or SHEETROCK Brand Setting-Type Joint Compound, Ready-Mixed Joint Compound—All Purpose or Taping at center and near each board edge in strips consisting of 4 beads, 10 mm (3/8") wide by 13 mm (1/2") high and spaced 38 mm (1-1/2") to 50 mm (2") o.c. Position boards vertically over wall surface, press into place and provide temporary support until adhesive is hardened.

Trim and Finishing

Upon mounting the board, walls and ceilings are ready for trims and corner beads in preparation for finishing. Information regarding correct application of beads and trims is covered in Chapter 5. See page 161.

Predecorated Panel Application

The use of predecorated gypsum panels takes full advantage of the real economy of fire-resistant gypsum panels in providing highly serviceable, quickly installed decorative walls. With SHEETROCK Brand TEXTONE Vinyl-Faced Gypsum Panels, walls resist stains and minor scuffs, are readily washable and colorfast. They also resist dimensional change. (See Appendix for hygrometric and thermal coefficients.)

SHEETROCK Brand TEXTONE Vinyl-Faced Gypsum Panels are applied vertically to the walls so that ends occur at floor and ceiling lines. The beveled edges form an attractive joint not requiring joint treatment. Panels are not practical as a ceiling finish, as end joints are difficult to conceal. They can be used with wood or steel studs in single or double-layer application in new construction or over plaster or gypsum panel surfaces in remodeling; may also be applied to furring attached to masonry. Not recommended for use over foil-back panels in exterior walls. For additional information, fire-rated construction and technical data, see CGC technical folder SA-928.

Panel Installation

When installing patterns other than one-color patterns, place panels against wall, inverting alternate panels, and rearrange to obtain the best match in pattern and tone; there will be a slight variation from panel to panel. Number backs of panels for proper installation sequence. Panels used in the same area should be of the same lot number for best color match (lot numbers are imprinted on panel backs).

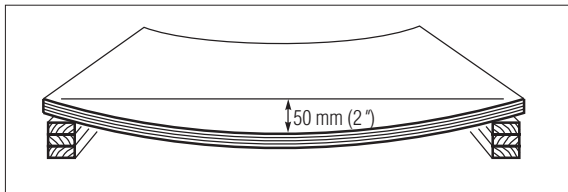
Apply panels vertically. Position less-than-full-width panels with cut edge at corner where the raw edge can be overlapped by the abutting panel or covered with a corner mould. Use Color-Matched Nails for nail-on application. Drive nails with plastic-headed hammer or rawhide mallet. Space 35 mm (1-3/8") nails at least 10 mm (3/8") from ends and edges, 200 mm (8") o.c.

Cut SHEETROCK Brand TEXTONE Vinyl-Faced Panels with a sharp knife. Cut through vinyl film into core; then snap board and cut back paper.

Prebowing Where fasteners at the vertical joints are objectionable, panels may be prebowed, adhesively applied and fastened at top and bottom only. Prebow by stacking panels face up with ends resting on 38 x 89 mm (2 x 4) lumber on edge or gypsum panel slitters and center of panel resting on floor. Allow to remain overnight or until panels show at least a 50 mm (2") permanent bow. During high humidity, it may be necessary to elevate ends as much as 200 mm (8") to achieve desired permanent bow.

Adhesives Generally, most water-based adhesives and some solvent-based adhesives may be used to install vinyl-covered SHEETROCK Brand TEXTONE Vinyl-Faced Panels. However, many solvent-based adhesives may not be compatible and could result in delamination and/or discoloration of the vinyl surface. It is recommended that 24 hours before installation, a small piece of SHEETROCK Brand TEXTONE Vinyl-Faced Gypsum Panel be test-laminated to the actual framing or backing with the actual adhesive. If results are acceptable after 24 hours, the job can begin. Also, check the adhesive manufacturer's recommendations before use with vinyl-covered panels.

The following commercially available adhesives may be used for applying SHEETROCK Brand TEXTONE Vinyl-Faced Gypsum Panels in non-fire rated assemblies: drywall stud adhesive (meeting ASTM C557) for application to wood or steel studs; laminating adhesive for bonding panels to monolithic concrete, concrete block, wood and mineral-fiber sound deadening board, polystyrene and urethane rigid-foam insulation and most other wall surfaces; contact adhesive for laminating SHEETROCK Brand TEXTONE Vinyl-Faced Panels to gypsum base-layer panels. Vinyl



foam tape may be used with adhesive for supplemental attachment (in lieu of prebowing or temporary shoring) until permanent adhesive attains ultimate strength.

DURABOND or SHEETROCK Brand Setting-Type Joint Compound or Ready-Mixed Joint Compound-All Purpose or Taping and mechanical fasteners are required for fire-rated construction (see page 108, "Double Layer Adhesive Application").

Adhesive Application to Wood or Steel Studs Apply 200 mm (8")-long strip of vinyl foam tape to face of each stud, positioned at midpoint of studs up to 2440 mm (8') long, at third-points on studs up to 3660 mm (12') long and quarter-points on studs over 3660 mm (12'). Where no mechanical fasteners are to be used at top or bottom of stud, apply an 200 mm (8")-long strip of tape. Apply a continuous 10 mm (3/8") bead of drywall stud adhesive to the entire face of studs between vinyl foam tape. Immediately apply SHEETROCK Brand TEXTONE Vinyl-Faced Gypsum Panels vertically and apply sufficient pressure to ensure complete contact with both tape and adhesive.

Adhesive Application to Base Layer of Gypsum Panels Apply liquid contact adhesive to back of SHEETROCK Brand TEXTONE Vinyl-Faced Panels and face of base layer according to manufacturer's directions. Allow adhesive to air dry, then bring panels in contact. Impact entire surface to assure complete contact.

Adhesive Application to Base Layer of Masonry, Gypsum Board or Mineral Fiber Board For interior masonry walls and gypsum board, apply continuous strips of vinyl foam tape to entire width of SHEETROCK Brand TEXTONE Vinyl-Faced Panel back at midpoint and 10 mm (3/8") from each end. Spread laminating adhesive over entire area of panels between tape using notched metal spreader with 6 x 6 mm (1/4" x 1/4") notches spaced 50 mm (2") o.c. Position panel and immediately apply sufficient pressure to assure complete contact over entire surface. (Mechanical fasteners may be substituted for tape at ends of panels.)

For application of SHEETROCK Brand TEXTONE Vinyl-Faced Gypsum Panels to wood or mineral board, prebow panels and apply laminating adhesive over entire back surface. Use mechanical fasteners at top and bottom of panel.

Moulding Installation

General Store mouldings at room temperature for 24 hr. before installation. Start installation from corner or door. Be sure that starting points are plumb and level. Fasten mouldings with flat-head wire nails, staples or drywall screws 300 mm (12") o.c. Fasten snap-on mouldings with nails or screws driven through holes in retainer. Use a fine-toothed hacksaw to cut mouldings. For mitering, use the same procedures as with wood moulding. Cut mouldings 1.6 mm (1/16") short for a loose fit to allow for thermal expansion; never force mouldings into place.

Inside Corner Install first panel so that vertical edge aligns with framing. Apply moulding over first panel, fastening exposed flange to framing. Insert opposite panel into moulding.

End Cap Align and fasten end cap to framing. Insert panel into moulding and apply panel to wall.

Snap-on Corner Apply panels, then place retainer strip over joint and fasten with nails or screws through holes provided. Snap corner face over retainer strip.

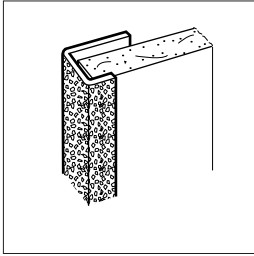
Snap-on Batten Apply panels, then place retainer strip over joint and fasten with nails or screws through holes provided. Snap batten face over retainer strip.

Ceiling Drive-in Trim Use only with steel stud partitions. Install after panels are applied. Insert grooved flange between runner and ceiling; tap trim into place. (Not recommended where perimeter must be acoustically sealed.)

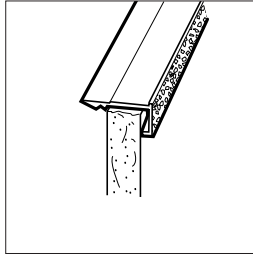
Painting If mouldings other than SHEETROCK Brand Vinyl-Faced Mouldings are used, they should be decorated prior to application over panels. Avoid applying masking tape to mouldings or predecorated panels when decorating.

RP-series mouldings should be used when painting is required. A good quality alkyd enamel or acrylic latex paint is recommended. Apply according to manufacturer's directions.

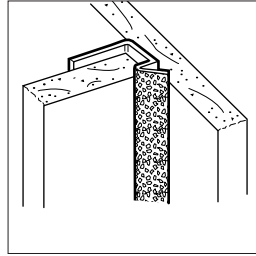
Vinyl Mouldings



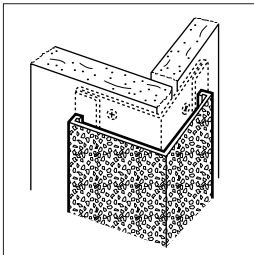
End Cap



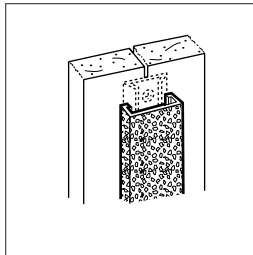
Ceiling Drive-in Trim



Inside Corner



Snap-On Corner



Snap-On Batten

Water-Resistant Gypsum Panel Application

FIBEROCK AQUA-TOUGH Interior Panels, SHEETROCK Brand Gypsum Panels, Water Resistant, Water Resistant FIRECODE Type X and Water Resistant FIRECODE C Core, are specially designed to minimize moisture problems and serve as a base for the adhesive application of ceramic tile. For use in new construction in areas such as bathrooms, powder rooms, kitchens and utility rooms. They install quickly and easily to wood or steel framing or furring using standard attachment methods. Maximum framing spacing for ceiling framing is 300 mm (12") o.c. for 12.7 mm (1/2") water-resistant board and 406 mm (16") o.c. for 15.9 mm (5/8") water-resistant board. Also do not use for single-layer resilient attachment where tile is to be applied.

Exposed edges and joints in areas to be tiled are treated with a coat of thinned down ceramic tile mastic or an approved waterproof flexible sealant (not necessary with FIBEROCK AQUA-TOUGH Interior Panels). Joints are treated with DURABOND or SHEETROCK Brand Setting-Type Joint Compound and CGC Brand Joint Tape.

Where water resistant panels are used in remodeling, old wall surfaces must be removed and water resistant panels applied to exposed studs as in new construction. Refer to page 7 for other limitations.

Installation

Framing Check alignment of framing. If necessary, fur out studs around shower receptor so that inside face of lip of fixture will be flush with gypsum panel face.

Install appropriate blocking, headers, or supports for tub and other plumbing fixtures, and to receive soap dishes, grab bars, towel racks or similar items. FIBEROCK AQUA-TOUGH Interior Panels, SHEETROCK Brand Gypsum Panels, Water Resistant are designed for framing 400 mm (16") o.c. but not more than 600 mm (24") o.c. When framing is spaced more than 400 mm (16") o.c., or when ceramic tile more than 8 mm (5/16") thick will be used, install suitable blocking between studs. Place blocking approx. 25 mm (1") above top of tub or receptor and at mid-point between base and ceiling. Blocking is not required on studs spaced 400 mm (16") o.c. or less. Vapor retarders must not be installed between water resistant panels and framing. DUROCK Brand Cement Board is recommended if a vapour retarder is used.

Store panels in an enclosed shelter and protect from exposure to the elements.

Panels are not intended for use in areas subject to constant moisture, such as interior swimming pools, gang showers and commercial food processing areas. DUROCK Cement Board is recommended for such purposes. See Chapter 4.

Receptors Install receptors before panels are erected. Shower pans, or receptors, should have an upstanding lip or flange at least 25 mm (1") higher than the water dam or threshold at the entry to the shower.

Gypsum Panels After tub, shower pan or receptor is installed, place temporary 6 mm (1/4") spacer strips around lip of fixture. Cut panels to required sizes and make necessary cut-outs. Before installing panels, apply thinned ceramic tile mastic to all cut or exposed panel edges at utility holes, joints and intersections (not necessary with FIBEROCK AQUA-TOUGH Interior Panels).

Install panels perpendicular to studs with paper-bound edge abutting top of spacer strip. Fasten panels with nails 200 mm (8") o.c. max., or screws 300 mm (12") o.c. max. Where ceramic tile more than 8 mm (5/16") thick will be used, space nails 100 mm (4") o.c. max. and screws 200 mm (8") o.c. max.

For tile 8 mm (5/16") thick or less, panels may be installed with stud adhesive (meeting ASTM C557) to wood framing. Apply 10 mm (3/8") bead to stud faces—two beads on studs where panels join. Do not apply adhesive to blocking where no fasteners will be used. Position panel and drive nails or screws at 400 mm (16") intervals around perimeter, 10 mm (3/8") from edges.

For double-layer applications, both face and base layer must consist of FIBEROCK AQUA-TOUGH Interior Panels or SHEETROCK Brand Gypsum Panels, Water Resistant.

In areas to be tiled, treat all fastener heads with DURABOND or SHEETROCK Brand Setting-Type Joint Compound. Fill tapered edges in gypsum panel completely with compound, embed CGC Brand Joint Tape firmly, and wipe off excess compound. When hardened, apply a second or skim coat over the taping coat, being careful not to crown the joint or to leave excess compound on panel (some setting-type compounds are difficult to sand and remove when dry). For butt joints and interior angles, embed CGC Brand Joint Tape with DURABOND or SHEETROCK Brand Setting-Type Joint Compound without crowning the joints. A fill coat is not necessary. Spot fastener heads at least once with DURABOND or SHEETROCK Brand Setting-Type Compound.

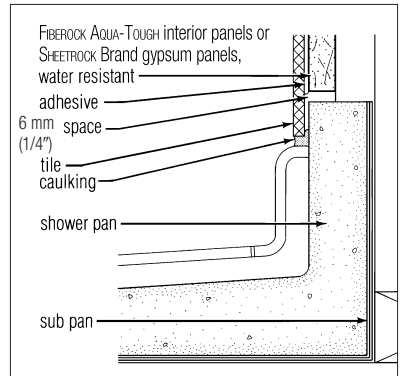
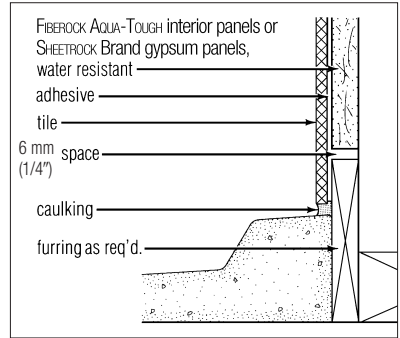
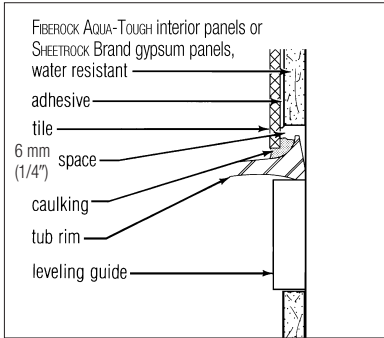
Fill and seal all openings around pipes, fittings and fixtures with a coat of thinned-down ceramic tile mastic or an approved waterproof flexible sealant (not necessary with FIBEROCK AQUA-TOUGH Interior Panels). To thin water-based mastic, add one-half pint of water per quart of mastic to make a paint-like viscosity. With a brush, apply the thinned compound onto the raw gypsum panel core at cut-outs. Allow areas to dry thoroughly prior to application of tile. Before compound dries, wipe excess material from surface of gypsum panels. Remove spacer strips but do not seal gap at bottom edge of panels. Install tile down to top edge of shower floor or tub and overlapping lip or return of tub or receptor.

For areas not to be tiled, embed tape with DURABOND or SHEETROCK Brand Setting-Type Joint Compound in the conventional manner. Finish with at least two coats of a CGC joint compound to provide a treated surface for painting and wallpapering.

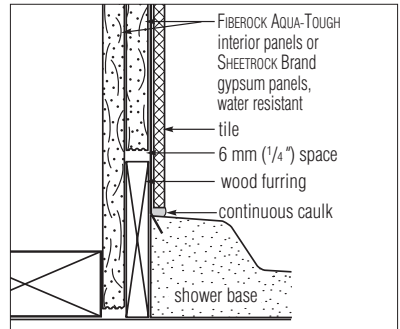
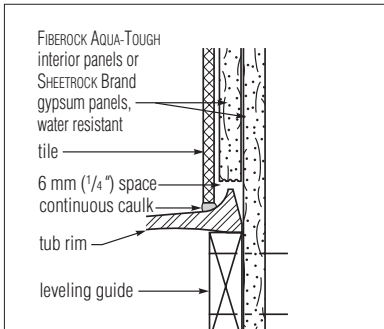
Fill all tile joints with grout. Apply nonsetting caulking compound, such as tub caulk, between wall surfacing material and shower floor, curb or tub rim. Weeps may be required in some applications.

Where FIBEROCK AQUA-TOUGH Interior Panels or SHEETROCK Brand Gypsum Panels, Water Resistant, are to be painted with a gloss enamel and subject to critical lighting, it is recommended that the panel surface be skim coated with a conventional joint compound prior to painting.

Single-Layer application



Double-Layer application



Note that ceiling framing must be 300 mm (12") o.c. Panels should not be installed over a vapor retarder or on a wall acting as a vapor retarder.

FIBEROCK AQUA-TOUGH Interior Panels are now available for water-resistant applications. However, note that installation of FIBEROCK Brand products sometimes varies from the procedures used to install conventional dry-wall panels and gypsum base. See the most current literature on FIBEROCK Brand Panels for the latest installation information.

Gypsum Sheathing Application

Paper-faced gypsum sheathing is not intended for use where the subsequent building materials (such as expanded polystyrene foam insulation) are to be adhesively applied with no mechanical fasteners. Sheathing should be covered with a continuous water barrier over its face. Refer to page 14 for other limitations.

Installation

GYPLAP Brand Gypsum Sheathing Apply 1220 x 2440 mm (4' x 8') or 2740 mm (9') (12.7 mm (1/2") or 15.9 mm (5/8")) square-edge GYPLAP Brand Gypsum Sheathing Treated Core vertically with face side out. Space nails 200 mm (8") o.c. on framing members. Sheathing may also be installed horizontally. (Use 11-ga. galvanized roofing nails 45 mm (1-3/4") long, spaced 200 mm (8") o. c. Use diagonal bracing where necessary.)

For staple or screw application, use same fastener spacing as for nails. Drive staples parallel to long dimension of framing, heads flush with sheathing surface but not breaking face paper.

SHEETROCK Brand HUMITEK Exterior Panels Apply 1220 x 2440 mm (4' x 8') 12.7 mm (1/2") or 15.9 mm (5/8") SE vertically or horizontally with face side out. Space nails 200 mm (8") o.c. on framing members. Because HUMITEK Panels are new please refer to current literature for latest installation and uses.

The sheathing products above are not designed to perform as shear or racking braces. Install diagonal corner braces, or equal, at all external corners as required by applicable code.

Refer to CGC folder E/FWB-1253 for complete data on gypsum sheathing. Refer to separate Technical Folder SA-923 for sheathing application to exterior steel framing systems.

FIBEROCK Brand Sheathing with Aqua-TOUGH is now available for exterior applications. However, note that installation of FIBEROCK Brand products sometimes varies from the procedures used to install conventional drywall panels and gypsum base. See the most current literature on FIBEROCK Brand Panels for the latest installation information.

Interior Ceiling Panels Application

12.7 mm (1/2") SHEETROCK Brand Interior Ceiling Panels, Sag-Resistant, are specially formulated to support water-based spray texture paints and overlaid insulation with the same sag resistance as regular 15.9 mm (5/8") gypsum board. Can be substituted for regular 12.7 mm (1/2") board in other applications, such as on sidewalls, reducing waste and lowering in-place cost. Ideal for new construction or renovation over wood or steel framing.

Handling Store and handle 12.7 mm (1/2") SHEETROCK Brand Interior Ceiling Panels, Sag-Resistant, in the same manner as other gypsum board. Stack flat and store under cover.

Installation Apply 12.7 mm (1/2") SHEETROCK Brand Interior Ceiling Board, Sag-Resistant, to ceilings before applying gypsum boards to walls. Joists must be spaced 600 mm (24") o.c. or less. Board may be cut by scoring and snapping in the same manner as other gypsum board.

SHEETROCK Brand Interior Ceiling Board, Sag-Resistant, is designed for parallel or perpendicular application to framing components spaced up to 600 mm (24") o.c. with a maximum 11 kg/m² (2.2 lb./ft.²) insulation loading and wet texturing for ceiling application. For single-layer wood-framed ceilings, nails are spaced 180 mm (7") o.c.; 32 mm (1-1/4") Type W screws are placed 300 mm (12") o.c. Adhesive/nail-on fastening improves bond strength and reduces face nailing. Finish with a CGC joint treatment system.

In new construction or renovation applications, steel furring channels can be used (RC-1 Resilient Channels or metal furring channels spaced a maximum of 600 mm (24") o.c., fastened to bottom of joists). For complete information on application to steel framing, consult publication SA923, *Drywall/Steel Framed Systems*.

Caution: Careful attention should be paid to framing construction and alignment. Problems will "telegraph" through the board if the framing is not true. Excessively long drying times may also cause problems with the ceiling finish, such as joint banding and staining. Ensure proper ventilation to remove excess moisture during and after finishing. Supplemental heat or dehumidification may be required.

Surface Preparation Before texturing, apply a high-quality, undiluted latex or alkyd primer/sealer. Follow manufacturer's directions for application.

Sagging To prevent objectionable sag in new gypsum panel ceilings, the weight of overlaid unsupported insulation should not exceed 6.5 kg/m² (1.3 psf) for 12.7 mm (1/2") thick panels with frame spacing 600 mm (24") o.c.; 11 kg/m² (2.2 psf) for 12.7 mm (1/2") panels with frame spacing 400 mm (16") o.c. (or 12.7 mm (1/2") SHEETROCK Brand Interior Ceiling Board, Sag-Resistant, with framing 600 mm (24") o.c.) and 15.9 mm (5/8") panels 600 mm (24") o.c. 9.5 mm (3/8") thick panels must not be overlaid with unsupported insulation. A separate vapor retarder should be installed where required in roofed ceilings, and the plenum or attic space vented with a minimum 1 m² (one sq. ft.) of free vent area per 150 m² (150 sq. ft.) of horizontal space, or per local code.

See "Ceiling Sag Precautions" on page 321 for more information on the application of water-based textures and interior finishing materials.

Exterior Ceiling Board Application

SHEETROCK Brand Exterior Ceiling Board embodies a specially treated gypsum core encased in chemically treated paper. The result is an ideal surface material for sheltered exterior ceiling areas such as covered walkways and malls, large canopies, open porches, breezeways, carports and exterior soffits.

Weather and fire-resistant, 12.7 mm (1/2") or 15.9 mm (5/8") thick SHEETROCK Brand Exterior Ceiling Board may be applied directly to wood framing or to cross-furring of wood or metal furring channels attached to main supports.

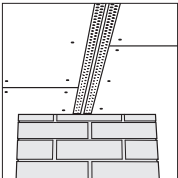
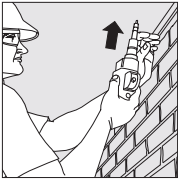
Special Conditions

Wood Framing Requirements 19 x 64 mm (1" x 3") wood furring may be used for screw application where support member spacing is 600 mm (24") o.c. max. Furring of 38 mm (2" nom.) thickness should be used for nail application of board or where framing spacing is from 600 mm (24") to 1220 mm (48") max. o.c.

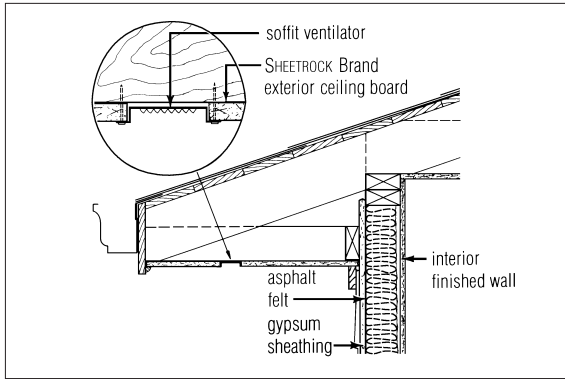
Steel Framing Requirements Installation of grillage should be the same as for "Steel Frame Single-Layer Application" previously described in this chapter on page 112.

Ventilation Where the area above the ceiling board opens to an attic space above habitable rooms, the space should be vented to the outside in accordance with local building codes. Where the ceiling board is applied directly to rafters or to roof-ceiling joists (as in flat roof construction) that extend beyond habitable rooms, vents are required at each end of each rafter or joist space. Vents should be screened and be a minimum of 51 mm (2") wide x full length between rafters (or joists). Vents should be attached through the board to minimum 19 x 38 mm (1" x 2") backing strips installed prior to board application. Vent openings should be framed and located within 150 mm (6") of the outer edge of the eave.

Soffit ventilation



Exterior Ceiling Board application showing wall intersection (top), and control joint.



Weather Protection At the perimeter and at vertical penetrations, the exposed core of panels must be covered with Metal Trim or securely fastened mouldings.

In areas subject to freezing temperatures and other severe weather conditions, shingled roofs should be installed in accordance with good roofing practices.

Fascia boards should extend at least 6 mm (1/4") below the Ceiling Board or adjacent trim mouldings, whichever is lower to provide a drip edge.

Intersections Where Ceiling Board expanse exceeds 1220 mm (4'), a space of at least 6 mm (1/4") should be provided between edge of Exterior Ceiling Board and adjacent walls, beams, columns and fascia. This space may be screened or covered with moulding but must not be caulked.

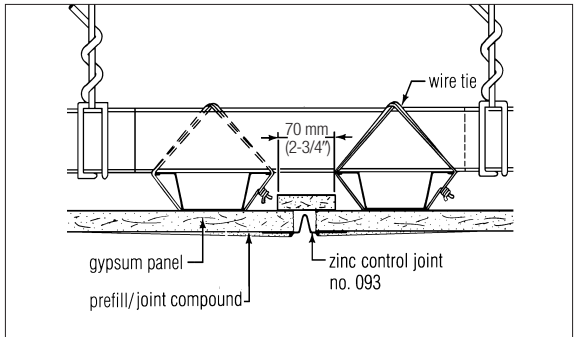
Control Joints SHEETROCK Brand Exterior Ceiling Board, like other building materials, is subject to structural movement, expansion and contraction due to changes in temperature and humidity.

Install a Control Joint No. 093 or a control joint consisting of two pieces of Metal Trim back-to-back in Ceiling Board where expansion or control joints occur in the exterior wall or roof.

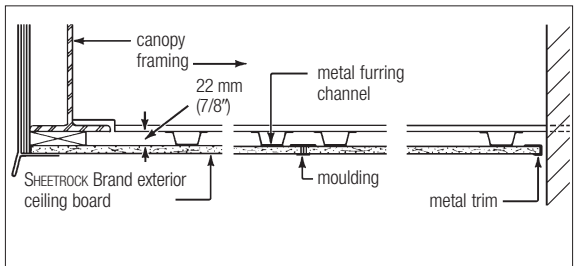
Long narrow areas should have control joints spaced no more than 9 m (30') apart. Wings of "L", "U" and "T"-shaped areas should be separated with control joints. Also, intersections of dissimilar materials should be separated with control joints. These joints usually are placed to intersect light fixtures, vents, etc. to relieve stress concentrations. Canopy must be designed to resist uplift.

Fixtures Provide backing or blocking for electrical boxes, vents and heavy fixtures. Cut board neatly and accurately to fit within 6 mm (1/4") of fixtures and vents. Cover openings with trim.

*Steel frame canopy
(commercial)*



Steel frame furred canopy



Installation

Apply Exterior Ceiling Board with long dimension across supports. For 12.7 mm (1/2") board, max. support spacing is 400 mm (16") o.c.; for 15.9 mm (5/8") board, 600 mm (24") o.c. max. Position end joints over supports. Use maximum practical lengths to minimize end joints. Allow 1.6 mm (1/16") to 3 mm (1/8") space between butted ends of board. Fasten board to supports with screws spaced 300 mm (12") o.c. or nails spaced 200 mm (8") o.c.

For steel framing, use 25 mm (1") Type S corrosion-resistant screws. (Type S-12 for 20-ga. and thicker steel). For wood framing, use 32 mm (1-1/4") Type W Screws or 38 mm (1-1/2") galvanized box nails or 38 mm (1-1/2")

Hotel entrance canopy, faced with SHEETROCK Brand Exterior Ceiling Board.



aluminum nails. Treat fasteners and joints using a DURABOND or SHEETROCK Brand Setting-Type Joint Compound. If desired, panel joints may be concealed with batten strips or by installing panels with ends inserted into aluminum H-mouldings (by others). After joint compound has dried, apply one coat of oil-based primer-sealer and one coat exterior oil or latex paint or other balanced finishing system recommended by paint manufacturer to all exposed surfaces.

Gypsum Board Suspended Ceilings

Gypsum board applications for suspended ceilings provide excellent fire protection and appearance with exceptional economy. Applications include SHEETROCK Brand Gypsum Lay-In Panels in standard DOWN suspension grid or surface mounted SHEETROCK Brand Gypsum Panels on CGC Drywall Suspension System.

Lay-In Panels SHEETROCK Brand Gypsum Lay-In Panels have a regular and FIRECODE C Core and square-cut edges. They are available in 610 x 610 mm (2' x 2') or 610 x 1220 mm (2' x 4') sizes and either natural paper facing or a laminated white vinyl facing with stipple pattern. Tiles may be installed in DOWN Brand DX, DXL or DXLA suspension systems for most interior applications or ZXA, ZXLA or AX suspension systems for exterior applications or high humidity areas (see CGC ceilings catalogs for complete information).

Install tiles beginning at one corner of the room and work one row at a time. Tilt tiles up through opening and lower it to rest squarely on all four tees. Snap firmly in place. Where partial tiles are required, use a straight edge and cut face of tiles with utility knife, snap at score and cut through backing. Trim rough edges as necessary to fit.

Surface Mounted Panels SHEETROCK Brand Gypsum Panels provide a monolithic ceiling when mounted to CGC Drywall Suspension System. System offers 1, 1-1/2, 2 and 3-hr. fire ratings when constructed with SHEETROCK Brand Gypsum Panels, FIRECODE C or Type X formulations (consult ULC or UL Fire Resistance Directory).

Beginning at one corner of room, mount panels parallel to main tees with butt ends meeting in center of cross channels. Hold panels firmly in place against channels and secure with 32 mm (1-1/4") TYPE S screws. Complete assembly in the same manner as conventional gypsum board ceiling construction. Finish with a CGC joint treatment system and caulk perimeter with Acoustical Sealant.

Mineral Fiber Blanket Application

3

Many CGC drywall and veneer partitions have been developed to meet the demand for increased privacy between units in residential and commercial construction. Designed for wood stud, steel stud or laminated gypsum board construction, these assemblies offer highly efficient sound-control properties, yet are more economical than other partitions offering equal sound isolation. These improved sound-isolation properties and ratings are obtained by using THERMAFIBER Sound Attenuation Fire Blankets and decoupling the partition faces. Decoupling is achieved with resilient application or with double rows of studs on separate plates. General application procedures for these products follow. See Chapter 1 for product descriptions and SA-100, *Construction Selector* for sound ratings.

Installation

Install blankets to completely fill stud cavity from bottom to top and with the vapor retarder oriented according to job specifications. If necessary to tightly fill height, cut stock-length blankets with a serrated knife for insertion in the void. Tightly butt ends and sides of blankets within a cavity. Cut small pieces of THERMAFIBER Blankets for narrow stud spaces next to door openings or at partition intersections. Fit blankets carefully behind electrical outlets, bracing, fixture attachments, medicine cabinets, etc.

In ceilings, insulation should be carefully fitted around recessed lighting fixtures. Covering fixtures with insulation causes heat to build up which could possibly result in fire.

Creased THERMAFIBER Sound Insulation Systems



Creased THERMAFIBER application—THERMAFIBER SAFB 25 mm (1") wider than stud cavity is field cut with utility, carpet or hook-blade knife. Crease will press against gypsum panel to dampen sound vibrations.

Creased THERMAFIBER assemblies are non-load bearing, steel-framed, 1-hr. fire-rated systems that offer high sound ratings (50-55 STC) plus the lower in-place cost of lightweight single-layer gypsum board. The systems consist of 15.9 mm (5/8") SHEETROCK Brand Gypsum Panels, FIRECODE C Core; 92 mm (3- 5/8") steel studs spaced 610 mm (24") o.c. and set in runners; and THERMAFIBER Sound Attenuation Fire Blankets, 635 mm (25") wide.

Since the blanket is 25 mm (1") wider than the cavity, it is installed with a slit that is field cut down the center and partially through the blanket. This allows the blanket to flex or bow in the center, easing the pressure against the studs and transferring it to the face panel, thereby dampening sound vibrations more effectively. Gypsum panels may be screw attached directly or resiliently to the steel framing.

Perimeter Isolation

Perimeter relief should be provided for gypsum construction surfaces where (a) partition or furring abuts a structural element (except floor) or dissimilar wall or ceiling; (b) ceiling or soffit abuts a structural element, dissimilar partition or other vertical penetration; (c) ceiling, partition or furring run exceeds 9 m (30') in either direction; (d) expansion or control joints occur throughout the building itself.

In addition, less-than-ceiling-height frames should have control joints extending to the ceiling from both corners. Ceiling-height door frames may be used as control joints. Treat window openings in the same manner as doors.

Isolation is important to reduce potential cracking in partitions, ceilings, wall, column, and beam furring, and reduces the likelihood of sound flanking in rated construction. Generally, methods for isolating surfaces are detailed and specified according to the job. The typical intersection application described below may be adapted as required.

Gypsum Board Edge Treatment Where boards intersect dissimilar materials or structural elements, appropriate trim should be applied to the face-layer perimeter and Acoustical Sealant applied to close the gap. P-1 Vinyl Trim may be used without sealant or joint treatment.

Partition-Structural Ceiling Attach steel runner to structural ceiling to position partition. Cut steel stud 10 mm (3/8") min., 13 mm (1/2") max. less than floor-to-ceiling height. Attach gypsum board to stud at least 64 mm (2-1/2") down from ceiling. Allow 10 mm (3/8") min. clearance atop gypsum boards; finish as required. Also, special detailing may be required to meet fire ratings. Check ULC or UL listings for specifications.

Partition-Radiant Heat Ceiling Allow at least 3 mm (1/8") clear space between radiant-heated ceilings and walls or partition framing. Finish ceiling angle with P-2 Vinyl Trim or wood moulding fastened to wall members only.

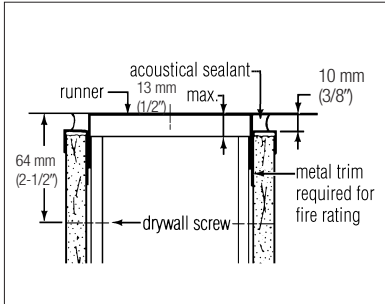
Partition-Exterior Wall or Column Attach steel stud to exterior wall or column to position partition. Attach gypsum board only to second steel stud erected vertically at max. 150 mm (6") from wall. Allow at least 10 mm (3/8") clearance between partition panel and wall. Caulk as required with Acoustical Sealant.

Perimeter relief at columns reduces possibility of cracking.

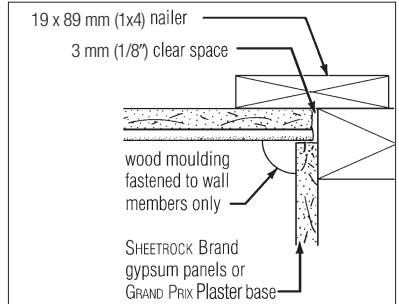


Furring-Exterior Wall Allow 6 mm (1/4") min. clearance between acoustical trim and intersecting exterior wall or column. Apply Acoustical Sealant as required.

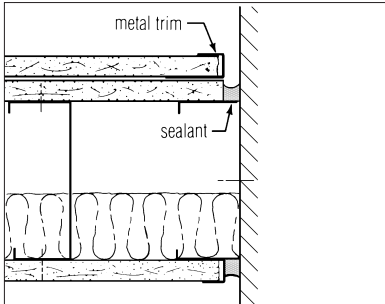
Ceiling-Exterior Wall On suspended or furred ceilings, locate supports for gypsum board within 150 mm (6") of abutting surfaces but do



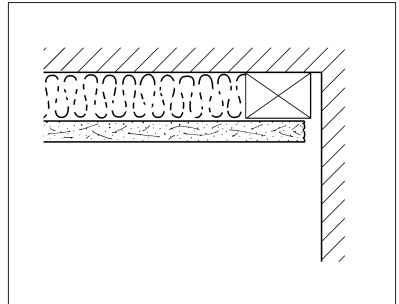
Partition-structural ceiling



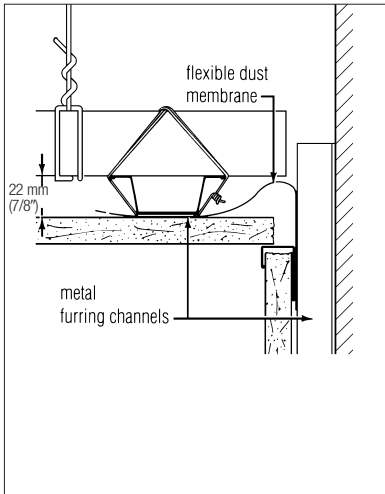
Partition-radiant heat ceiling



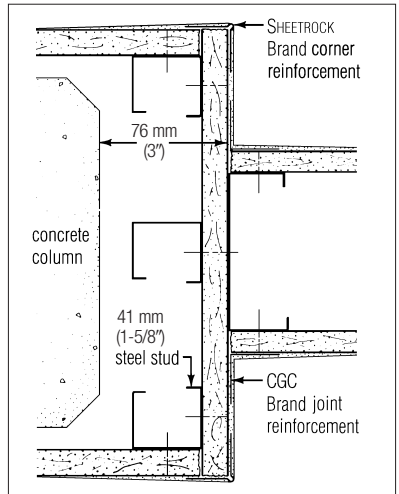
Partition-exterior wall



Furring-exterior wall



Ceiling-exterior wall



Partition-column

not allow main runner or furring channels to be let into or come into contact with abutting masonry walls.

Partition-Column Fur gypsum board away from concrete column using vertical steel studs. Attach stud in intersecting partition to stud within free-standing furring.

Floating Interior Angle Application

The floating interior angle method of applying gypsum board effectively reduces angle cracking and nail pops resulting from stresses at intersections of walls and ceilings. Fasteners are eliminated on at least one surface at all interior angles, both where walls and ceilings meet and where sidewalls intersect. Follow standard framing practices for corner fastening. Conventional framing and ordinary wood back-up or blocking must be provided where needed at vertical and horizontal interior angles. Apply gypsum board to ceilings first.

Ceilings

Use conventional single nail or screw application. Apply the first nail or screws approx. 180 mm (7") from the wall and at each joist. Use conventional fastening in the remainder of the ceiling area.

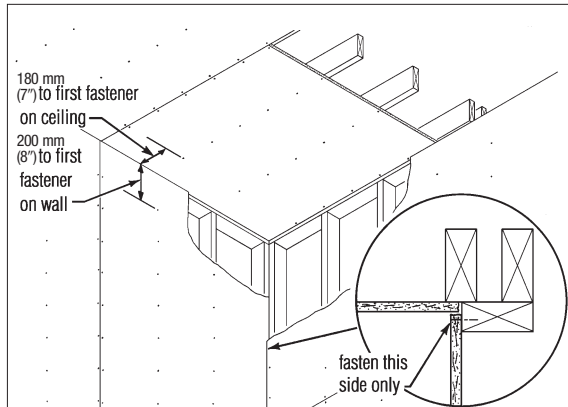
Sidewalls

Apply gypsum board on walls so that its uppermost edge (or end) is in firm contact with and provides support to the perimeter of the board already installed on the ceiling. Apply the first nails or screws approx. 200 mm (8") below the ceiling at each stud. At vertical angles omit corner fasteners for the first board applied at the angle. This panel edge will be overlapped and held in place by the edge of the abutting board. Nail or screw-attach the overlapping board in the conventional manner. Use conventional fastening for remainder of sidewall area.

Double Nailing

When double nailing is used with a floating interior angle, follow above spacing on first nail from intersection and use double nailing in rest of area. Conventional framing and ordinary wood back-up or blocking at vertical internal angles must be provided.

Detail—floating interior angle



Fixture Installation

Electrical Fixtures

After electrical services have been roughed in and before gypsum board is installed, cut necessary openings in base and face layers of board to accept switches, outlet and fixture boxes, etc. Cut out openings with a keyhole saw or with specially designed cutting tools which produce more precise openings. (See Tools and Equipment, Chapter 14.)

On SHEETROCK Brand TEXTONE Vinyl-Faced Gypsum Panels, holes made with a special outlet cutter should be cut from back of panel to avoid loosening vinyl around the cut. Erect panel in the usual manner.

Sealant Where the partition is used as a sound barrier, do not install boxes back-to-back or in the same stud cavity. Apply Acoustical Sealant around all boxes to seal the cutout. See typical sealant application, earlier in this chapter. Electrical boxes having a drywall ring or device cover for use as a stop in caulking are recommended.

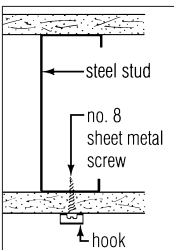
Fixture Attachment

Gypsum board partitions can provide suitable anchorage for most types of fixtures normally found in residential and commercial construction. To ensure satisfactory job performance it is important to have an understanding of particular fixture attachment so that sound-control characteristics will be retained and attachment will be within the allowable load-carrying capacity of the assembly.

In wood-frame construction, fixtures are usually attached directly to the framing or to blocking or supports attached to the framing. Blocking or supports should be provided for plumbing fixtures, towel racks, grab bars and similar items. Fixture supports used with DUROCK Brand Cement Board are shown in Chapter 4. Single or double-layer gypsum boards are not designed to support loads imposed by these items without additional support to carry the main part of the load.

The attachment of fixtures to partitions may impair the sound-control characteristics. Only lightweight fixtures should be attached to resilient wall surfaces constructed with RC-1 Resilient Channel unless special framing is provided (see Cabinet Attachment System, following). Refrain from attaching fixtures to party walls so as to provide a direct flow path for sound. Gypsum boards used in the ceiling are not designed to support light fixtures or troffers, air vents or other equipment. Separate supports must be provided.

Fixture Attachment Types



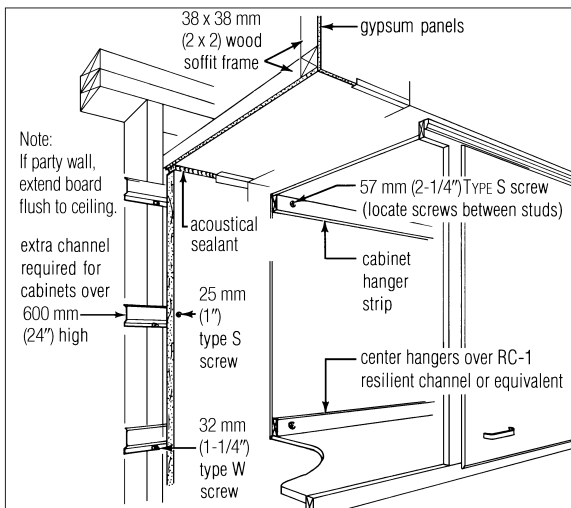
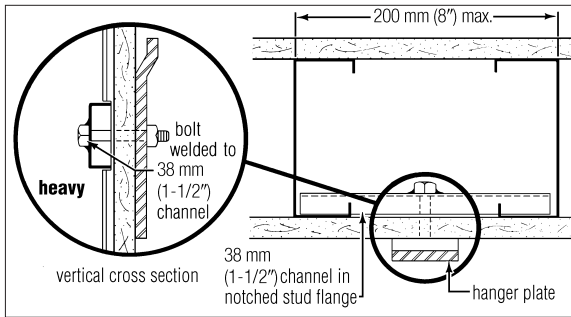
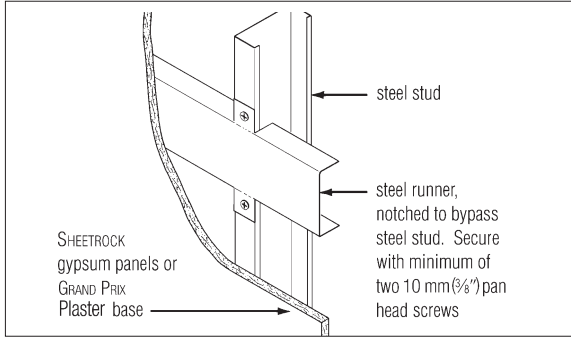
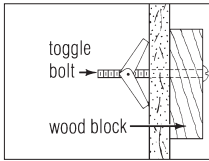
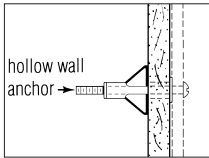
Loading capacities of various fasteners and fixture attachments used with gypsum board partitions appear in load table on page 434. Fasteners and methods follow:

No. 8 Sheet Metal Screw Driven into 25-ga. min. sheet metal plate or strip, laminated between face board and base board in laminated gypsum partitions. Also may be driven through gypsum board into a steel stud. Ideal for planned light fixture attachment.

Continuous Horizontal Bracing Back-up for fixture attachment is provided with notched runner attached to steel studs with two 10 mm (3/8") TYPE S pan head screws.

Bolt and Nested Channels Bolt welded to nested 38 mm (1-1/2") channels for use in mounting hanger brackets for heavy fixtures. Suitable for use in laminated gypsum partitions, provided that fixture attachments do not contact opposite coreboard.

Hollow Wall Anchors 6 mm (1/4") hollow wall anchors installed in gypsum boards only. One advantage of this fastener is that threaded section



remains in wall when screw is removed. Also, widespread spider support formed by the expanded anchor spreads load against wall material, increasing load capacity.

Anchor Inserts Inserted into drilled holes, these anchors spread when a fastener is inserted, gripping the inside of the hole. Good for fastening small objects.

Screw Anchors Also inserted into a drilled hole, these anchors have broad screw planes for more positive attachment to the gypsum board. The screw attachment improves pull-out resistance capacity.

Toggle Bolt 6 mm (1/4") Toggle Bolt installed in gypsum board only. One disadvantage of toggle bolt is that when bolt is removed, wing fastener on back will fall down into hollow wall. Another disadvantage is that a large hole is required to allow wings to pass through wall facings.

Bolt and 38 mm (1-1/2") Channel Bolt welded to single 38 mm (1-1/2") channel and inserted in notches cut in steel stud for use in mounting hanger brackets for heavy fixtures.

Fixture Attachment Load Data—Drywall and Veneer Plaster Construction

fastener type	size			allowable withdrawal resistance		allowable shear resistance	
	mm	in.	base ⁽¹⁾	N ⁽²⁾	lb.	N ⁽²⁾	lb.
Toggle Bolt or Hollow Wall Anchor	3	1/8	12.7 mm (1/2") gypsum board	89	20	178	40
	5	3/16		133	30	222	50
	6	1/4		178	40	267	60
No. 8 sheet metal screw	3	1/8	12.7 mm (1/2") gypsum board and 25-ga. steel stud or 25-ga. steel insert	311	70	445	100
	5	3/16		356	80	556	125
	6	1/4		689	155	778	175
Type S bugle head screw				267	60	445	100
Type S-12 bugle head screw				378	85	600	135
9.5 mm (3/8") Type S pan head screw			25-ga. steel to 25-ga. steel	311	70	534	120
Two bolts welded to steel insert	5	3/16	12.7 mm (1/2") gypsum board, plate and steel stud	778	175	890	200
	6	1/4	12.7 mm (1/2") gypsum board, plate and steel stud	890	200	1112	250
Bolt welded to 38 mm (1-1/2") chan.	6	1/4	(see drawing)	890	200	1112	250

(1) Comparable information is available for FIBEROCK Brand Panels. See the most current literature on FIBEROCK Brand Panels for data.

(2) Newton.

Cabinet Attachment Method

Detailed below, allows kitchen, bathroom and other cabinets and fixtures (except lavatories and wall-mounted toilets) of moderate weight, and "Hollywood" style headboards on party walls using RC-1 Resilient Channel to be mounted without reducing the sound rating. Recommended only for residential and light commercial wood-frame construction. Suitable for loads including cabinet weight of 31 kg (67-1/2 lb.) for studs spaced 400 mm (16") o.c. and 18 kg (40 lb.) for studs 600 mm (24") o.c. Loads are max. per lin. ft. of RC-1 Channel installed for cabinet attachment. Mounting cabinets back-to-back on a partition should be avoided since this practice creates a flanking path that increases sound transmission.

In this system, 15.9 mm (5/8") gypsum board is installed with long dimension parallel to channels and fastened with 25 mm (1") Type S Screws spaced 300 mm (12") o.c. along channels. Cabinets are attached to channels with 57 mm (2-1/4") Type S Screws spaced 300 mm (12") o.c. and located between studs. Screws must be driven between studs. Screws which penetrate the stud cause a significant loss in the partition's sound rating.

Curved Surfaces

Versatile SHEETROCK Brand Gypsum Panels and GRAND PRIX Plaster Base can be formed to almost any cylindrically curved surface. Boards can be applied either dry or wet depending on the radius of curvature desired and the thickness and flexibility of the board. To prevent flat areas between framing, shorter bend radii require closer than normal stud and furring spacing.

SHEETROCK Brand 6.4 mm (1/4") Flexible Gypsum Panels are specifically designed for this purpose. These 6.4 mm (1/4") panels are more flexible than standard gypsum panels of the same thickness and adapt quickly to the curved framing for walls, archways and circular stairways. Multiple layers may be applied.

Boards are horizontally or vertically applied, gently bent around the framing, and securely fastened to achieve the desired radius. When boards are applied dry, the minimum radius of curvature meets many applications (see table for dry gypsum boards). By thoroughly moistening the face or back paper prior to application, and replacing in the stack for at least one hour, the board may be bent to still shorter radii (see table for wetted gypsum board). When the board dries thoroughly, it will regain its original hardness.

Minimum Bending Radii of Dry Gypsum Board⁽¹⁾

Board Thickness		Board Applied With Long Dimension Perpendicular to Framing		Board Applied with Long Dimension Parallel to Framing	
		m	ft.	m	ft.
6.4	1/4	0.9	3	1.8	5
9.5	3/8	1.8	6	2.7	9
12.7	1/2	3.7	12 ⁽¹⁾	—	—
15.9	5/8	5.5	18	—	—

(1) Comparable information is available for FIBEROCK Brand Panels. See the most current literature on FIBEROCK Brand Panels for data.

(2) Bending two 6.4 mm (1/4") pieces successively permits radii shown for 6.4 mm (1/4") gypsum board.

Minimum Radii of SHEETROCK Brand 6.4 mm (1/4") Flexible Gypsum Panels

Application	Condition	Lengthwise Bend Radii		Max. Stud Spacing		Widthwise Bend Radii		Max. Stud Spacing	
		mm	in.	mm	in.	mm	in.	mm	in.
Inside (concave)	Dry*	813	32	229	9	1143	45	229	9
Outside (convex)	Dry*	864	34	229	9	508	20	152	6

*@ 24°C (75°F)/50% relative humidity.

Minimum Bending Radii of Wetted Gypsum Board⁽¹⁾

Board Thickness	Radius	Inside Length of Arc ⁽²⁾ mm (ft)	Outside Length of Arc ⁽²⁾ mm (in)	No. of Studs on Arc Including at Tangents ⁽³⁾	Approx. Stud Spacing c. to c. ⁽⁴⁾ mm (in)	Max. Stud Spacing c. to c. ⁽⁴⁾	Oz. of Water Required per Panel One Side-L (oz ⁽⁵⁾)
6.4 mm (1/4")	610 mm (2'0")	957 (3.14)	1118 (44.0)	9	140 (5.50)	150 mm (6")	0.9 (30)
6.4 mm (1/4")	760 mm (2'6")	1198 (3.93)	1356 (53.4)	10	151 (5.93)	150 mm (6")	0.9 (30)
9.5 mm (3/8")	915 mm (3'0")	1436 (4.71)	1595 (62.8)	9	199 (7.85)	200 mm (8")	1.0 (35)
9.5 mm (3/8")	1067 mm (3'6")	1676 (5.50)	1834 (72.2)	11	183 (7.22)	200 mm (8")	1.0 (35)
12.7 mm (1/2")	1220 mm (4'0")	1914 (6.28)	2073 (81.6)	8	297 (11.70)	300 mm (12")	1.3 (45)
12.7 mm (1/2")	1372 mm (4'6")	2155 (7.07)	2314 (91.1)	9	290 (11.40)	300 mm (12")	1.3 (45)

(1) For gypsum board applied horizontally to a 100 mm(4") thick partition (2) Arc length = $\frac{3.14 \cdot R}{2}$ (for a 90° arc).

(3) No. studs = outside arc length/maximum spacing +1 (rounded up to next whole number). (4) Stud spacing = outside arc length/no. of studs -1 (measured along outside of runner). (5) Wet only the side of board that will be in tension. Water required per board side is based on 1220 x 2440 mm (4' x 8') sheet.

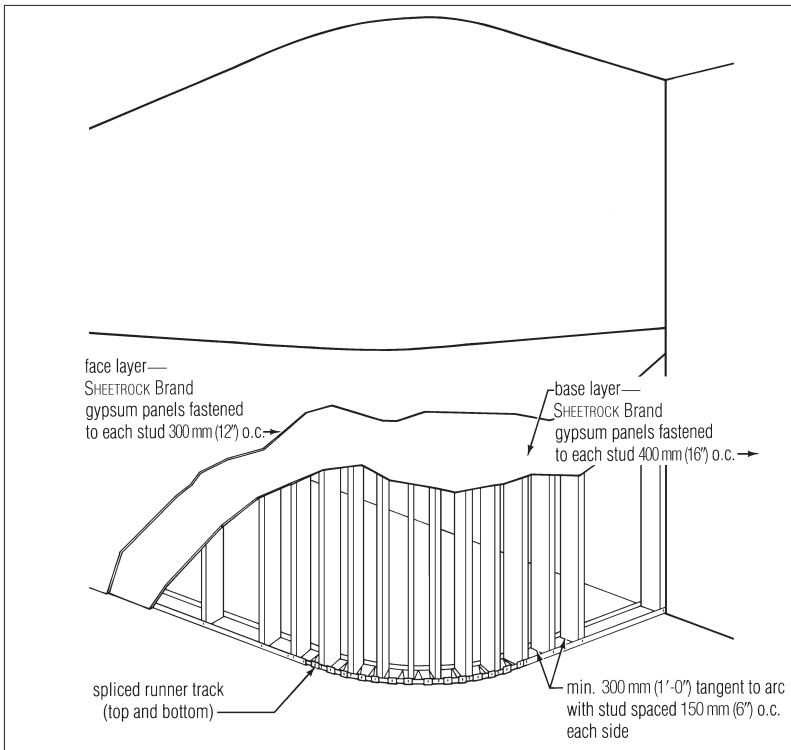
Installation

Framing Cut one leg and web of top and bottom steel runner at 51 mm (2") intervals for the length of the arc. Allow 300 mm (12") of uncut steel runners at each end of arc. Bend runners to uniform curve of desired radius (90° max. arc). To support the cut leg of runner, clinch a 25 mm (1") x 25-ga. steel strip to inside of leg. Select the runner size to match the steel studs; for wood studs, use a 89 mm (3-1/2") steel runner. Attach steel runners to structural elements at floor and ceiling with suitable fasteners as previously described. Position studs vertically, with open side facing in same direction and engaging floor and ceiling runners. Begin and end each arc with a stud and space intermediate studs equally as measured on outside of arc. Secure steel studs to runners with 10 mm (3/8") TYPE S pan head screws; secure wood studs with suitable fasteners. On tangents, place studs 152 mm (6") o.c. leaving last stud free standing. Follow directions previously described for erecting balance of studs.

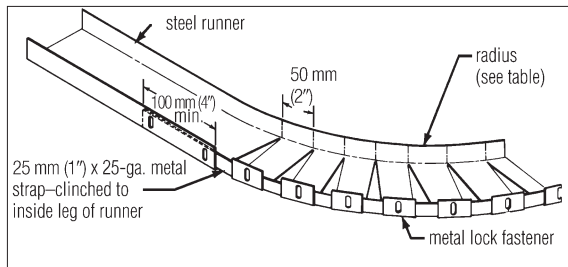
Panel Preparation Select length and cut board to allow one unbroken panel to cover the curved surface and 300 mm (12") tangents at each end. Outside panel must be longer than inside panels to compensate for additional radius contributed by the studs. Cutouts for electrical boxes are not recommended in curved surfaces unless they can be made after boards are installed and thoroughly dry.

When wet board is required, evenly spray water on the surface which will be in tension when board is hung. Apply water with a conventional garden sprayer using the quantity shown in the table. Carefully stack boards with wet surfaces facing each other and cover stack with plastic sheet (polyethylene). Allow boards to set at least one hour before application.

Panel Application Apply panels horizontally with the wrapped edge perpendicular to the studs. On the convex side of the partition, begin installation at one end of the curved surface and fasten panel to studs as it is wrapped around the curve. On the concave side of the partition, start fastening panel to the stud at the center of the curve and work outward to the ends of the panel. For single-layer panels, space screws 300 mm (12") o.c. Use 25 mm (1") TYPE S screws for steel studs and 32 mm (1-1/4") Type W screws for wood studs.



Board application



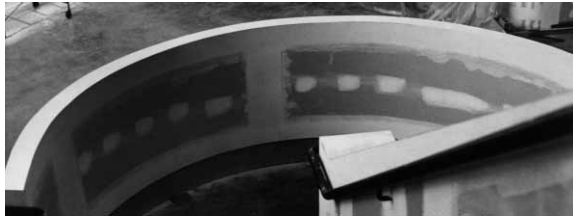
Runner installation

For double-layer application, apply base layer horizontally and fasten to stud with screws spaced 400 mm (16") o.c. Center face layer panels over joints in the base layer and secure to studs with screws spaced 300 mm (12") o.c. Use 25 mm (1") TYPE S screws for base layer and 41 mm (1-5/8") TYPE S screws for face layer. Allow panels to dry completely (approx. 24 hrs. under good drying conditions) before applying joint treatment.

Arches

Arches of any radii are easily faced with gypsum panels or base and finished with a CGC joint system, or veneer plaster finish. Score or cut through back paper of panels at 25 mm (1") intervals to make them flexible. The board should previously have been cut to desired width and length of arch.

Curved stairwell, faced with drywall, forms attractive design element in a shopping mall (right). Radius of curved gypsum board, joints treated, is shown in construction view (below).



After board has been applied to arch framing with nails or screws, apply tape reinforcement (CGC Brand Joint Tape for drywall panels or IMPERIAL Brand Type P or S for plaster base). Crease tape along center. Make scissor cuts half-way across tape and 19 mm (3/4") apart to make tape flexible. Apply uncut half to curved surface, and fold cut half of tape onto wall surface. Finish as appropriate for drywall or veneer plaster construction.

Soffits

Gypsum board soffits provide a lightweight, fast and economical method of filling over cabinets or lockers and of housing overhead ducts, pipes or conduits. They are made with wood framing or with steel stud and runner supports, faced with screw-attached gypsum board. Braced soffits up to 600 mm (24") deep are constructed without supplementary vertical studs. Select components for the soffit size desired from table following. Unbraced soffits without horizontal studs are suitable for soffits up to 600 x 600 mm (24" x 24"). To retain fire protection, partitions and ceilings are finished with gypsum board before soffits are installed.

Installation

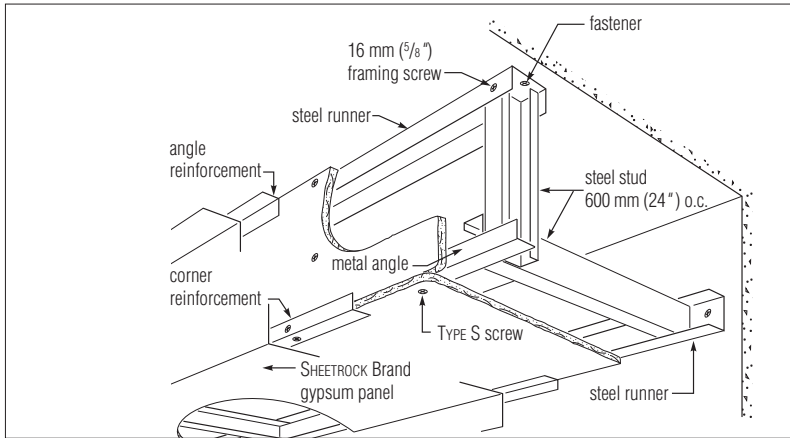
Braced Soffit Attach steel runners to ceiling and sidewall as illustrated on page 138, placing fasteners close to outside flange of runner. On stud walls, space fasteners to engage stud. Fasten vertical gypsum face board to web of face corner runner and flange of ceiling runner with TYPE S screws spaced 300 mm (12") o.c. Place screws in face corner runner at least 25 mm (1") from edge of board. Insert steel studs between face corner runner and sidewall runner and attach alternate studs to runners with screws. Attach bottom face board to studs and runners with TYPE S screws spaced 300 mm (12") o.c. Attach corner bead and finish. Where sound control is important, attach RC-1 Resilient Channel to framing before attaching gypsum board.

Unbraced Soffit Attach steel studs and runners to ceiling and sidewall, placing fasteners to engage wall and ceiling framing. Cut gypsum board to soffit depth and attach a soffit-length stud with TYPE S screws spaced 300 mm (12") o.c. Attach this preassembled unit to ceiling stud flange with screws spaced 300 mm (12") o.c. Attach bottom panel with TYPE S screws spaced 300 mm (12") o.c. Attach corner bead and finish.

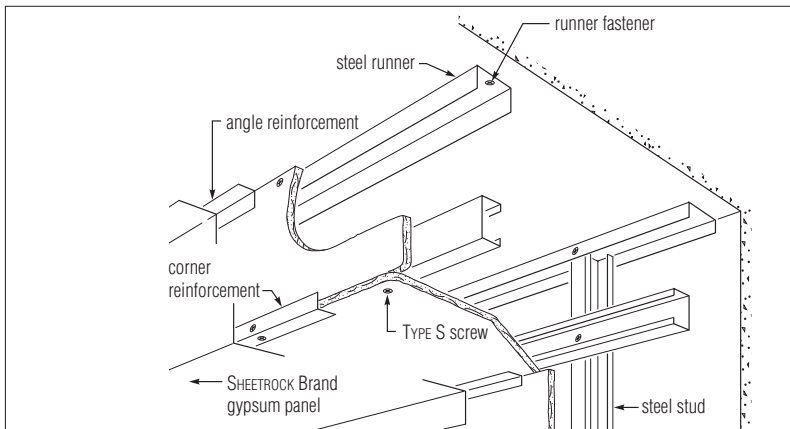
Braced Soffit Design Maximum Dimensions⁽¹⁾

Gypsum Board Thickness ⁽²⁾		Steel Stud Size		Maximum Vertical ⁽³⁾		Max. Horizontal for Max. Vertical Shown	
mm	in.	mm	in.	mm	in.	mm	in.
12.7	1/2	41	1-5/8	1525	60	1220	48
12.7	1/2	64, 92	2-1/2, 3-5/8	1830	72	915	36
15.9	5/8	42	1-5/8	1525	60	760	30
15.9	5/8	64, 92	2-1/2, 3-5/8	1830	72	455	18

(1) The construction is not designed to support loads other than its own dead weight. (2) Double-layer applications and 9.5 mm (3/8") board are not recommended for this construction. (3) Widths shown are based on construction having no supplemental vertical studs.



Braced soffit



Unbraced soffit