



Framing

General Requirements

The choice and installation of framing depends on a number of factors. In the case of wood framing these include the species, size and grade of lumber used. In the case of steel framing, the cross-sectional shape of the frame member, size and the thickness and grade of steel must be considered. Equally important are height of the wall, the frame spacing and the maximum span of the surfacing material. Selection of steel stud size is usually derived from limiting height tables, based on the capacity of the steel and the allowable deflection of finish surfaces. The limiting heights tables included in the *Gypsum Construction Handbook* are from ASTM C754 and were developed by the Gypsum Association. CGC presents these data as a reference, but is not responsible for performance of the wall based on them.

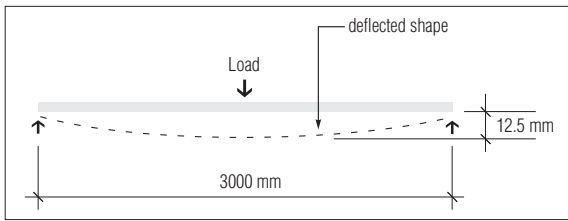
Tip

For instructions on safety in the application of framing, see Chapter 13.

Loads Framing members and their installation must be selected according to their ability to withstand the loads to which they will be subjected. These include live loads (contributed by the occupancy and elements such as wind, snow and earthquake) and dead loads (weight of the structure itself). Minimum lateral load for interior partitions is 240 Pa (5 psf); for exterior walls 720 Pa (15 psf) to 2160 Pa (45 psf) or greater depending on building height and geographic location.

Deflection Even though an assembly is structurally capable of withstanding a given load, its use may be restricted if the amount of deflection that would occur when the lateral load is applied exceeds that which the surfacing materials can sustain without damage. Obviously, this deflection factor influences the selection of surfacing materials.

For drywall assemblies it is desirable to limit deflection to L/240 (L = length of the span) and to never exceed L/120 (L/180 in some codes). The preferred limit for veneer assemblies is L/360 and should not exceed L/240. Using L/240 as an example, and where the length of a span (distance between supports) is 3 metres, deflection is determined as follows:



$$D = \text{Deflection Limit} = \frac{L}{240}$$

$$L = 3 \text{ m or } 3000 \text{ mm}$$

$$D = \frac{3000}{240}$$

$$D = 12.5 \text{ mm}$$

Bending Stress Framing members also must withstand any unit force exerted that will break or buckle the stud, based on the capacity of the studs acting alone.

End Reaction Shear This factor is determined by the amount of force applied to the stud which will bend or shear the runner, or buckle the web of the stud.

Frame Spacing A factor in load-carrying capability and deflection, it also is a limiting factor for the finishing materials. Every finishing or surfacing material is subject to a span limitation—the maximum distance between frame members that a material can span without undue sagging. For that reason, “maximum frame spacing” tables for the various board products are included in this chapter. However, where frame spacing exceeds maximum limits, furring members can be installed to provide necessary sag resistance support for the surfacing material (covered in this chapter under wall and ceiling furring).

Insulation and Services Chase walls provide vertical shafts where greater core widths are needed for pipe runs and other service installations. They consist of a double row of studs with gypsum panel or metal cross braces between rows. Plumbing, electrical and other fixtures, and mechanicals within the framing cavities must be flush with or inside the plane of the framing. Fasteners used to assemble the framing must be driven reasonably flush with the surfaces.

In wood frame construction, the flanges of batt-type insulation must be attached to the sides of frame members and not to their faces. Any obstruction on the face of frame members that will prevent firm contact between the gypsum board and framing can result in loose or damaged board and fastener imperfections.

Wood Framing

Wood framing meeting the following minimum requirements is necessary for proper performance of all gypsum drywall and plaster base assemblies:

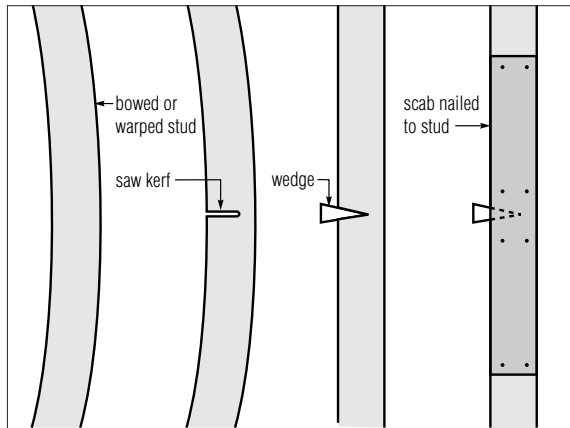
1. Framework should meet the minimum requirements of applicable building codes.
2. Framing members should be straight, true and of uniform dimension. Studs and joists must be in true alignment; bridging, fire stops, soil pipes, etc., must not protrude beyond framing.
3. All framing lumber should be the correct grade for the intended use, and 38 mm x 89 mm (nominal 2 x 4) or larger should bear the grade mark of a recognized inspection agency.
4. All framing lumber should have a moisture content not in excess of 19% at time of gypsum board application.

Failure to observe these minimum framing requirements, which are applicable to screw, nail and adhesive attachment, will substantially increase the possibility of fastener failure and surface distortion due to warping or dimensional changes. This is particularly true if the framing lumber has greater than normal tendencies to warp or shrink after erection.

The moisture content of wood framing should be allowed to adjust as closely as possible to the level it will reach in service before gypsum drywall or plaster base application begins. After the building is enclosed, delay board application as long as possible (consistent with schedule requirements) to allow this moisture content adjustment to take place.

Framing should be designed to accommodate shrinkage in wide dimensional lumber such as is used for floor joists or headers. Gypsum wallboard and veneer plaster surfaces can buckle or crack if firmly anchored across the flat grain of these wide wood members as shrinkage occurs. With high uninterrupted walls, such as are a part of cathedral ceiling designs or in two-story stairwells, regular or modified balloon framing can minimize the problem.

Framing Corrections If joists are out of alignment, 38 mm x 140 mm (2 x 6) leveling plates attached perpendicular to and across top of ceiling joists may be used. Toe-nailing into joists pulls framing into true horizontal alignment and ensures a smooth, level ceiling surface. Bowed or warped studs in non-load bearing partitions may be straightened by sawing the hollow sides at the middle of the bow and driving a wedge into the saw kerf until the stud is in line. Reinforcement of the stud is accomplished by securely nailing 19 mm x 89 mm (1 x 4) wood strips or “scabs” on each side of the cut.



Framing Member Spacing

To assure adequate support for gypsum panels, and the integrity of walls and ceilings, attention must be paid to the distance between framing members. Minimum spacing requirements will depend on a number of variables, including the location of the paneled surface (ceiling or wall), the thickness of the gypsum panels, the number of panel layers on each side of the completed wall, and the orientation of the panels to the framing members. For thicker gypsum panels or double-layer applications, the distance between framing members can be increased. For wood framing installed in the conventional manner, with lumber meeting requirements outlined above, maximum frame spacing is as shown in the tables on the following pages:

Maximum Frame Spacing—Drywall Construction**Direct Application**

Panel thickness ⁽¹⁾	Location	Application method ⁽²⁾	Max. frame spacing o.c.	
			mm	in.
Single-Layer Application				
9.5 mm (3/8")	ceilings ⁽³⁾	perpendicular ⁽⁴⁾	400	16
		parallel ⁽⁴⁾	400	16
12.7 mm (1/2")	ceilings	perpendicular	600	24 ⁽⁵⁾⁽⁶⁾
		parallel ⁽⁴⁾	400	16
	sidewalls	parallel or perpendicular	600	24
		parallel ⁽⁴⁾	400	16
15.9 mm (5/8")	ceilings ⁽⁶⁾	perpendicular	600	24
	sidewalls	parallel or perpendicular	600	24
Double-Layer Application				
9.5 mm (3/8")	ceilings ⁽⁷⁾	perpendicular	400	16
	sidewalls	perpendicular or parallel	600	24 ⁽⁸⁾
12.7 & 15.9 mm (1/2" & 5/8")	ceilings	perpendicular or parallel	600	24 ⁽⁸⁾
	sidewalls	perpendicular	600	24 ⁽⁸⁾

(1) 15.9 mm (5/8") thickness is recommended for the finest single-layer construction, providing increased resistance to fire and transmission of sound; 12.7 mm (1/2") for single-layer application in new residential construction and remodeling; and 9.5 mm (3/8") for repair and remodeling over existing surfaces. (2) Long edge position relative to framing. (3) Not recommended below unheated spaces. (4) Not recommended if water-based texturing material is to be applied. (5) Max. spacing 400 mm (16") if water-based texturing material is to be applied. (6) If 12.7 mm (1/2") SHEETROCK Brand Interior Ceiling Board is used in place of gypsum panels, max. spacing is 600 mm (24") o.c. for perpendicular application with weight of unsupported insulation not exceeding 6.5 kg/m² (1.3 psf.), 400 mm (16") o.c. with weight of unsupported insulation not exceeding 11 kg/m² (2.2 psf.) (7) Adhesive must be used to laminate 9.5 mm (3/8") board for double-layer ceilings. (8) Max spacing 400 mm (16") o.c. if fire rating required.

Maximum Frame Spacing—Veneer Plaster Construction**Direct Application**

Gypsum base thickness	Construction	Location	Application method ⁽¹⁾	Max. frame spacing o.c.	
				mm	in.
12.7 mm (1/2")	one layer, 1-coat finish	ceilings	perpendicular	400	16
		sidewalls	perpendicular or parallel	400	16
	one layer, 2-coat finish	ceilings	perpendicular	400 or 600 ⁽²⁾	16 or 24 ⁽²⁾
		sidewalls	perpendicular or parallel	400 or 600 ⁽²⁾	16 or 24 ⁽²⁾
	two layer, 1 & 2-coat finish	ceilings	perpendicular	600	24
		sidewalls	perpendicular or parallel	600	24
15.9 mm (5/8")	one layer, 1-coat finish	ceilings	perpendicular	400 or 600 ⁽²⁾	16 or 24 ⁽²⁾
		sidewalls	perpendicular or parallel	400 or 600 ⁽²⁾	16 or 24 ⁽²⁾
	one layer, 2-coat finish	ceilings	perpendicular	600 ⁽²⁾	24 ⁽²⁾
		sidewalls	perpendicular or parallel	600 ⁽²⁾	24 ⁽²⁾
	two layer, 1 & 2-coat finish	ceilings	perpendicular	600	24
		sidewalls	perpendicular or parallel	600	24

(1) Perpendicular preferred on all applications for maximum strength. Where fire rating is involved, application must be identical to that in assembly tested. Parallel application not recommended for ceilings. (2) 600 mm (24") o.c. frame spacing with either one or two-coat veneer application requires CGC Brand Joint Tape Reinforcement and DURABOND or SHEETROCK Brand Setting-Type Joint Compound.

Ceiling Insulation To prevent objectionable sag in ceilings, 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 on 400 mm (16") o.c. framing 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 vapor retarder should be installed in all exterior ceilings, and the plenum or attic space properly vented.

Resilient Application On ceiling assemblies of both drywall and veneer plaster, install resilient channels perpendicular to framing and spaced 600 mm (24") o.c. for joists 400 mm (16") o.c.; 400 mm (16") o.c. for joists 600 mm (24") o.c. For sidewalls, install at 600 mm (24") o.c. max. See single-layer sections in tables, preceding pages, for limitations for specific board thickness. Fasten channels to framing with screws only.

Cable Heat Ceilings Maximum frame spacing is 400 mm (16") o.c. for 12.7 mm (1/2") IMPERIAL Brand Gypsum Base; 600 mm (24") o.c. for 15.9 mm (5/8") base.

Spray-Textured Ceilings Where water-based texturing materials or any slow-drying surface treatment are used over single-layer panels, max. frame spacing is 400 mm (16") o.c. for 12.7 mm (1/2") panels applied perpendicular to framing. Parallel application is not recommended, nor is use of 9.5 mm (3/8") thick panels. For best results use SHEETROCK Brand Interior Ceiling Board, Sag-Resistant, with max. spacing 600 mm (24") o.c. Note: Airless spraying of latex paint in one heavy application 0.25 to 0.36 mm (10 to 14 mil) also will sag ceilings. See "Ceiling Sag Precautions" in Chapter 10.

Water-based texturing materials applied to ceilings should be completely dry before insulation and vapor retarder are installed. Under most conditions, drying takes several days.

Partition Layout

Properly position partitions according to layout. Snap chalk lines at ceiling and floor. Be certain that partitions will be plumb. Where partitions occur parallel to and between joists, ladder blocking must be installed between ceiling joists. Double joists are recommended beneath partitions.

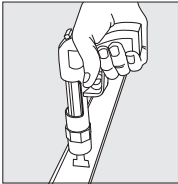
Steel Framing

Steel stud framing for non-load bearing interior partitions is secured to floors and ceilings with runners fastened to the supporting structure.

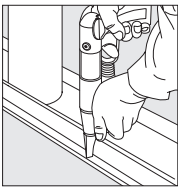
Runner Installation

Securely attach runners:

1. **To concrete and masonry** use stub nails, power-driven fasteners.
2. **To foam-backed metal (max. 14-ga.) concrete inserts** use 9.5 mm (3/8") TYPE S-12 Pan Head Screws.
3. **To suspended ceilings** use expandable hollow wall anchors, toggle bolts, screws or other suitable fasteners.
4. **To wood framing** use 32 mm (1-1/4") TYPE S Oval Head Screws or 8d nails.



Fastening channel runners



Fastening angles

To all substrates, secure runners with fasteners located 51 mm (2") from each end and spaced max. 600 mm (24") o.c. (Tall walls require that fasteners be spaced closer together. Contact your local sales office for more detailed information.) Attach runner ends at door frames with two anchors when 3-piece frames are used. (One-piece frames should be supplied with welded-in-place floor anchor plates, pre-punched for two anchors into structure.)

At partition corners, extend one runner to the end of the corner and butt the other runner to it. Runners should not be mitered.

Interior Framing Limiting Heights

Stud Depth mm (in.)	Stud Spacing mm in.	Design Limit Pa psf	Allowable Deflection	25 Gauge (18 mil) 0.455 mm min.(0.01799 min.)		20 Gauge (33 mil) 0.836 mm min.(0.03299 min.)	
				mm	(ft.-in.)	mm	(ft.-in.)
41 mm (1-5/8) (162S125-18/33)	600 24	240 5	L/120	2970	(9-9)	3350	(11-0)
41 mm (1-5/8) (162S125-18/33)	600 24	240 5	L/240	2410	(7-11)	2670	(8-9)
41 mm (1-5/8) (162S125-18/33)	600 24	240 5	L/360	2160	(7-1)	2340	(7-8)
41 mm (1-5/8) (162S125-18/33)	400 16	240 5	L/120	3230	(10-7)	3680	(12-1)
41 mm (1-5/8) (162S125-18/33)	400 16	240 5	L/240	2540	(8-4)	2950	(9-8)
41 mm (1-5/8) (162S125-18/33)	400 16	240 5	L/360	2490	(8-2)	2570	(8-5)
64 mm (2-1/2) (250S125-18/33)	600 24	240 5	L/120	3610	(11-10)	4520	(14-10)
64 mm (2-1/2) (250S125-18/33)	600 24	240 5	L/240	3230	(10-7)	3530	(11-7)
64 mm (2-1/2) (250S125-18/33)	600 24	240 5	L/360	2820	(9-3)	3050	(10-0)
64 mm (2-1/2) (250S125-18/33)	400 16	240 5	L/120	4040	(13-3)	5000	(16-5)
64 mm (2-1/2) (250S125-18/33)	400 16	240 5	L/240	3430	(11-3)	3910	(12-10)
64 mm (2-1/2) (250S125-18/33)	400 16	240 5	L/360	3000	(9-10)	3400	(11-2)
92 mm (3-5/8) (362S125-18/33)	600 24	240 5	L/120	4190	(13-9)	5640	(18-6)
92 mm (3-5/8) (362S125-18/33)	600 24	240 5	L/240	4090	(13-5)	4500	(14-9)
92 mm (3-5/8) (362S125-18/33)	600 24	240 5	L/360	3530	(11-7)	3890	(12-9)
92 mm (3-5/8) (362S125-18/33)	400 16	240 5	L/120	4670	(15-4)	6300	(20-8)
92 mm (3-5/8) (362S125-18/33)	400 16	240 5	L/240	4370	(14-4)	5000	(16-5)
92 mm (3-5/8) (362S125-18/33)	400 16	240 5	L/360	3760	(12-4)	4340	(14-3)
102 mm (4) (400S125-18/33)	600 24	240 5	L/120	4600	(15-1)	6320	(20-9)
102 mm (4) (400S125-18/33)	600 24	240 5	L/240	4320	(14-2)	5000	(16-5)
102 mm (4) (400S125-18/33)	600 24	240 5	L/360	3760	(12-4)	4340	(14-3)
102 mm (4) (400S125-18/33)	400 16	240 5	L/120	5230	(17-2)	7040	(23-1)
102 mm (4) (400S125-18/33)	400 16	240 5	L/240	4670	(15-4)	5590	(18-4)
102 mm (4) (400S125-18/33)	400 16	240 5	L/360	4060	(13-4)	4850	(15-11)
152 mm (6) (600S125-18/33)	600 24	240 5	L/120	5110	(16-9)	8280	(27-2)
152 mm (6) (600S125-18/33)	600 24	240 5	L/240	5110	(16-9)	6580	(21-7)
152 mm (6) (600S125-18/33)	600 24	240 5	L/360	5110	(16-9)	5740	(18-10)
152 mm (6) (600S125-18/33)	400 16	240 5	L/120	6020	(19-9)	9400	(30-10)
152 mm (6) (600S125-18/33)	400 16	240 5	L/240	6020	(19-9)	7470	(24-6)
152 mm (6) (600S125-18/33)	400 16	240 5	L/360	5460	(17-11)	6500	(21-4)

Notes: The number following the stud depth is a new industry-wide product identification, created by the Steel Stud Manufacturers Association; (U.S.) the number identifies the member depth, style, flange width and material thickness in mils.

This limiting heights data is from ASTM C754. CGC presents this information only as a reference, and will not be responsible for the performance of walls based on this table. Consult current information from ASTM C754 and S5MA (Steel Stud Manufacturers Association), and the stud manufacturers for limiting heights characteristics of their particular products.

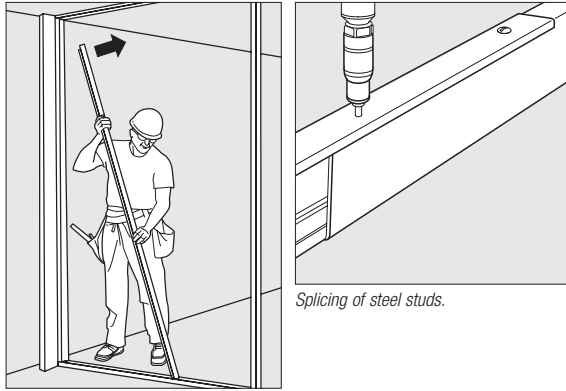
Limiting heights apply to walls constructed with minimum 12.7 mm (1/2") thickness of gypsum board and with a minimum of one full-height layer on both sides of the stud framing.

Limiting heights are based on tests conducted with gypsum board attached with screws spaced 300 mm (12") o.c. to framing members.

Stud Installation

Insert floor-to-ceiling steel studs between runners, twisting them into position. Position studs vertically, with open side facing in same direction, engaging floor and ceiling runners and spaced 400 mm (16") or 600 (24") o.c. max. as required. Proper alignment will provide for proper bracing, utility runs and prevention of stepped or uneven joint surfaces. The recommended practice for most installations is to anchor only those studs adjacent to door and borrowed light frames. This would also be applicable to

Steel studs are positioned in floor and ceiling runners.



partition intersections and corners. In cases where a significant slab live load deflection must be accommodated, the anchoring of these studs may restrict slab movement and cause partition cracking. In these cases, anchoring of these studs may need to be omitted. The services of a design professional is desirable to identify these instances and address them on a case-specific basis.

Place studs in direct contact with all door frame jambs, abutting partitions, partition corners and existing construction elements. Spot grouting of door frames is always suggested and is required where heavy or oversize doors are used. Contact door frame manufacturer for specific requirements and recommendations.

Where a stud directly abuts an exterior wall and there is a possibility of condensation or water penetration through the wall, place a No. 15 asphalt felt strip between stud and wall surface.

Over metal doors and borrowed light frames, place a section of runner horizontally with a web-flange bent at each end. Secure runner to strut-studs with two screws in each bent web. At the location of vertical joints over the door frame header, position a cut-to-length stud extending to the ceiling runner. (See section 'Door and Window Openings' later in this chapter.)

Steel studs may be conveniently spliced together when required. To splice two studs, nest one into the other forming a box section, to a depth of at least 200 mm (8").

Fasten together with two 10 mm (3/8") TYPE S Pan Head Screws in each flange. Locate each screw (shown above) no more than 25 mm (1") from ends of splice.

Resilient Channel Framing—Steel Framing

Stud System Installation Attach steel runners at floor and ceiling to structural elements with suitable fasteners located 50 mm (2") from each end and spaced 600 mm (24") o.c. Position studs vertically, with open side facing in same direction, engaging floor and ceiling runners, and spaced 600 mm (24") o.c. For non-fire rated resilient channel system, anchor studs to floor and ceiling runners on the resilient side of the partition. Fasten runner to stud flange with 10 mm (3/8") TYPE S Pan Head Screw.

Resilient Channel Installation Position resilient channel at right angles to steel studs, space 600 mm (24") o.c. and attach to stud flanges with 10 mm (3/8") TYPE S Pan Head Screws driven through holes in channel mounting flange. Install channels with mounting flange down, except at floor to accommodate attachment. A strip of gypsum panel is sometimes used at the base of a partition in lieu of the first inverted resilient channel. Locate channels 50 mm (2") from floor and within 150 mm (6") of ceiling. Splice channel by nesting directly over the stud, screw-attach through both flanges. Reinforce with screws located at both ends of the splice.

Chase Wall Framing

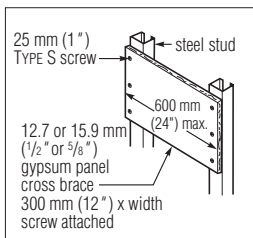
Align two parallel rows of floor and ceiling runners according to partition layout. Spacing between outside flanges of each pair of runners must not exceed 600 mm (24"). Follow instructions above for attaching runners.

Position steel studs vertically in runners, with flanges in the same direction, and with studs on opposite sides of chase directly across from each other. Except in fire-rated walls, anchor all studs to floor and ceiling runner flanges with 10 mm (3/8") or 13 mm (1/2") TYPE S Pan Head Screws.

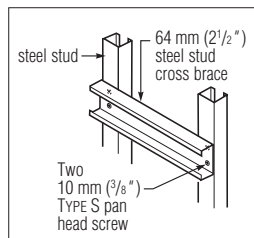
Cut cross-bracing to be placed between rows of studs from gypsum board 300 mm (12") high by chase wall width. Space braces 1220 mm (48") o.c. vertically and attach to stud web with screws spaced 200 mm (8") o.c. max. per brace.

Bracing of 64 mm (2-1/2") min. steel studs may be used in place of gypsum board. Anchor web at each end of metal brace to stud web with two 10 mm (3/8") pan head screws. When chase wall studs are not opposite, install steel stud cross-braces 600 mm (24") o.c. horizontally, and securely anchor each end to a continuous horizontal 64 mm (2-1/2") runner screw-attached to chase wall studs within the cavity.

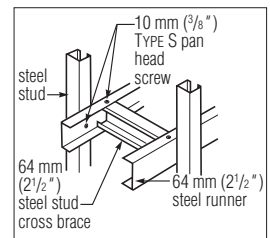
Methods of cross bracing



Gypsum brace



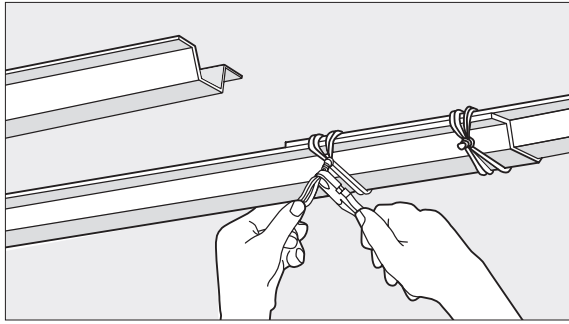
Steel stud brace



Steel stud & runner brace

Drywall and Plaster Ceiling Suspension Systems

Space metal furring channels 600 mm (24") o.c. at right angles to bar joists or other structural members. As an alternate, 41 mm (1-5/8") steel studs may be used as furring. Saddle-tie furring channels to bar joists with triple-strand 1.2 mm (18-ga.) tie wire at each intersection. Provide 25 mm (1") clearance between furring ends and abutting walls and partitions. At splices, nest furring channels with at least an 200 mm (8") overlap and securely wire-tie each end with triple-strand 1.2 mm (18-ga.) tie wire (see illustration). Frame around openings such as light troffers with additional furring channels and wire-tie to bar joists.



Max. allowable spacing for metal furring channel is 600 mm (24") o.c. for 12.7 mm (1/2") and 15.9 mm (5/8") thick gypsum panels or plaster base. See frame spacing tables for limiting spans.

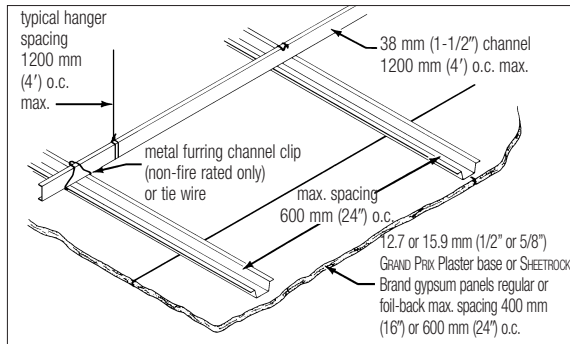
For bar joist spacing up to 1500 mm (60"), steel studs may be used as furring channels. Wire-tie studs to supporting framing as shown. Position 41 mm (1-5/8") studs with open side up; position larger studs with opening to side. See table for stud spacings and limiting spans.

Limiting Span⁽¹⁾—Metal Furring Members⁽²⁾

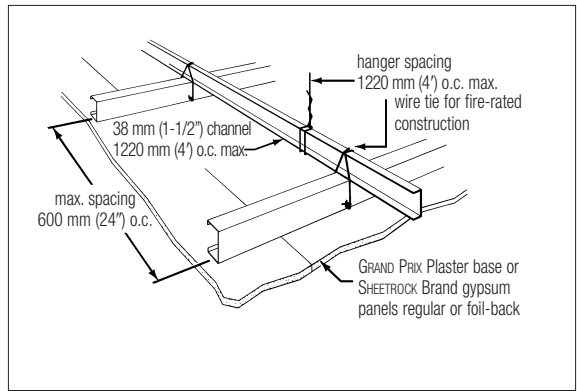
Type furring member	Member spacing mm in. o.c.	Single layer panels		Double layer panels	
		12 kg/m ² (2.5 psf max.)		24 kg/m ² (5.0 psf max.)	
		1-span	3-span	1-span	3-span
DWC-25-ga.	400 16	1750 mm (5'9")	2160 mm (7'1")	1400 mm (4'7")	1730 mm (5'8")
	600 24	1520 mm (5'0")	1880 mm (6'2")	1220 mm (4'0")	1500 mm (4'11")
DWC-20-ga.	400 16	2110 mm (6'11")	2590 mm (8'6")	1650 mm (5'5")	2060 mm (6'9")
	600 24	1830 mm (6'0")	2260 mm (7'5")	1450 mm (4'9")	1800 mm (5'11")
41 mm (1-5/8") stud, 25-ga.	400 16	2180 mm (7'2")	2690 mm (8'10")	1730 mm (5'8")	2130 mm (7'0")
	600 24	1910 mm (6'3")	2360 mm (7'9")	1520 mm (5'0")	1880 mm (6'2")

(1) For beams, joists, purlins, sub-purlins; not including 38 mm (1-1/2") cold rolled channel support spaced 1220 mm (4'0") max. Check Manufacturer's literature to verify that the selected furring member is capable of the indicated span. (2) Limiting spans for 12.7 mm (1/2") and 15.9 mm (5/8") thick panels, max. L/240 deflection and uniform load shown. Investigate concentrated loads such as light fixtures and exhaust fans separately.

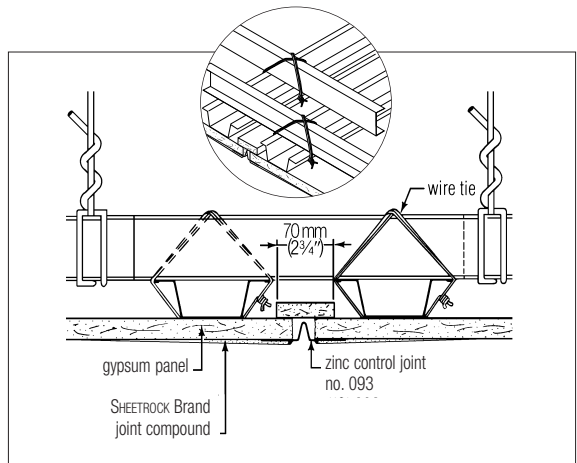
Metal furring channel



Steel stud furring



Control joint



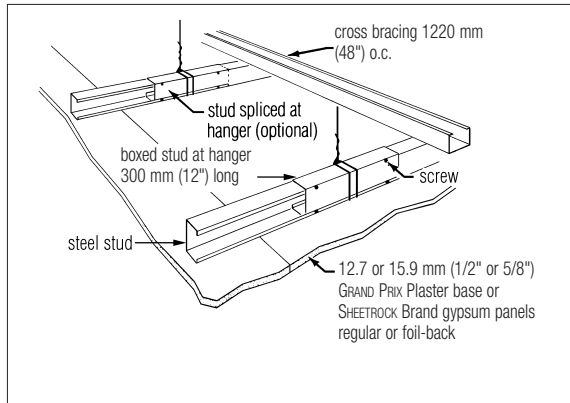
Suspended Ceiling Grillage Erection

Space 4.1 mm (8-ga.) hanger wires 1220 mm (48") o.c. along carrying channels and within 150 mm (6") of ends of carrying-channel runs. In concrete, anchor hangers by attachment to reinforcing steel, by loops embedded at least 50 mm (2") or by approved inserts. For steel construction, wrap hanger around or through beams or joists. Do not attach components to air ducts.

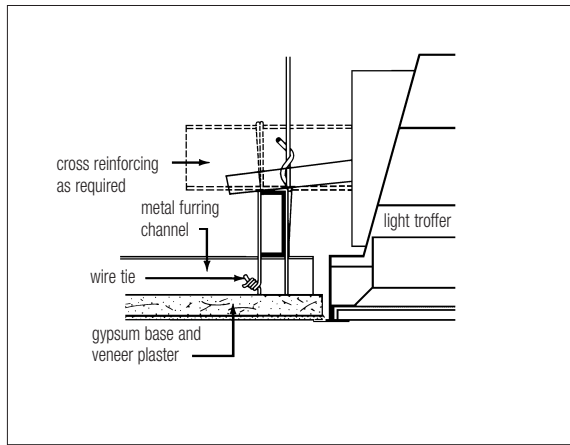
Install 38 mm (1-1/2") carrying channels 1220 mm (48") o.c. (spaced as tested for fire-rated construction) and within 150 mm (6") of walls. Position channels for proper ceiling height, level and secure with hanger wire saddle tied along channels (see illustration). Provide 25 mm (1") clearance between runners and abutting walls and partitions. At channel splices, interlock flanges, overlap ends 300 mm (12") and secure each end with double-strand 1.2 mm (18-ga.) tie wire.

Erect metal furring channels at right angles to 38 mm (1-1/2") carrying channels. Space furring within 150 mm (6") of walls. Provide 25 mm (1") clearance between furring ends and abutting walls and partitions. Attach furring channels to 38 mm (1-1/2") channels with wire ties or

Steel stud framing system



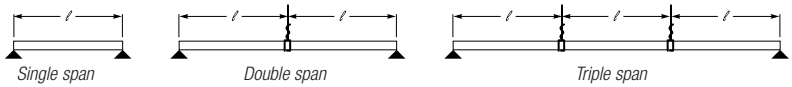
Lighting fixture



furring channel clips installed on alternate sides of carrying channel. Saddle tie furring to channels with double-strand 1.2 mm (18-ga.) tie wire when clips cannot be alternated. At splices, nest furring channels with at least an 200 mm (8") overlap and securely wire tie each end with double-strand 1.2 mm (18-ga.) tie wire.

Where required, in fire-rated assemblies, install double furring channels to support gypsum panel ends and back block with gypsum board strip. When staggered end joints are not required, control joints may be used.

At light troffers or any openings that interrupt the carrying or furring channels, install additional cross-reinforcing to restore the lateral stability of grillage.



Limiting Span-Steel Stud Ceiling System⁽¹⁾

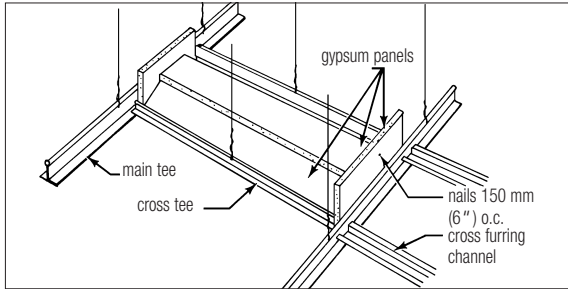
Stud Style	Stud Spacing (mm)	Single Span (mm) (uniform load-Pa)				Double and Triple Span (mm) (uniform load-Pa)			
		240	480	720	960	240	480	720	960
64 mm 25-ga.	300	3330	2640	2310	2060	4120	3100	2490	2110
	400	3020	2410	2080	1630	3760	2640	2110	1750
	600	2640	2060	1450	—	3100	2110	1750	1320
92 mm ⁽²⁾ 25-ga.	300	4440	3530	2950	2210	5310	3410	2540	2030
	400	4040	3200	2210	1650	44710	2800	2030	1600
	600	3560	2210	1450	—	3410	2030	1450	—
102 mm ⁽²⁾ 25-ga.	300	4800	3810	3150	2740	5330	3350	2440	1910
	400	4370	3350	2740	2290	4450	2670	1910	1470
	600	3810	2740	2030	1520	3350	1910	1320	—
64 mm 20-ga.	300	4010	3180	2770	2520	4980	3940	3450	3050
	400	3630	2900	2520	2290	4520	3580	3050	2670
	600	3180	2520	2210	1930	3940	3070	2490	2160
92 mm 20-ga.	300	5330	4240	3710	3350	6630	5260	4570	4040
	400	4850	3860	3350	3050	6020	4780	4040	3510
	600	4240	3350	2950	2540	5390	4040	3300	2840
102 mm 20-ga.	300	5790	4570	4010	3630	7160	5690	4950	4340
	400	5260	4170	3630	3300	6500	5160	4340	3760
	600	4570	3630	3150	2740	5690	4340	3530	2970
152 mm 20-ga.	300	8000	6350	5540	5030	9910	7850	6170	5130
	400	7260	5460	5030	4500	8990	6650	5130	4220
	600	6350	5030	4240	3660	7850	5130	4220	3100

Stud Style	Stud Spacing (in.)	Single Span (ft.-in.) (uniform load-psf)				Double and Triple Span (ft.-in.) (uniform load-psf)			
		5	10	15	20	5	10	15	20
2-1/2" 25-ga.	12	10'11"	8'8"	7'7"	6'9"	13'6"	10'2"	8'2"	6'11"
	16	9'11"	7'11"	6'10"	5'4"	12'4"	8'8"	6'11"	5'9"
	24	8'8"	6'9"	4'9"	—	10'2"	6'11"	5'9"	4'4"
3-5/8" ⁽²⁾ 25-ga.	12	14'7"	11'7"	9'8"	7'3"	17'5"	11'2"	8'4"	6'8"
	16	13'3"	10'6"	7'3"	5'5"	14'8"	9'2"	6'8"	5'3"
	24	11'7"	7'3"	4'9"	—	11'2"	6'8"	4'9"	—
4" ⁽²⁾ 25-ga.	12	15'9"	12'6"	10'4"	9'0"	17'6"	11'0"	8'0"	6'3"
	16	14'4"	11'0"	9'0"	7'6"	14'7"	8'9"	6'3"	4'10"
	24	12'6"	9'0"	6'8"	5'0"	11'0"	6'3"	4'4"	—
2-1/2" 20-ga.	12	13'2"	10'5"	9'1"	8'3"	16'4"	12'11"	11'4"	10'0"
	16	11'11"	9'6"	8'3"	7'6"	14'10"	11'9"	10'0"	8'9"
	24	10'5"	8'3"	7'3"	6'4"	12'11"	10'1"	8'2"	7'1"
3-5/8" 20-ga.	12	17'6"	13'11"	12'2"	11'0"	21'9"	17'3"	15'0"	13'3"
	16	15'11"	12'8"	11'0"	10'0"	19'9"	15'8"	13'3"	11'6"
	24	13'11"	11'0"	9'8"	8'4"	17'8"	13'3"	10'10"	9'4"
4" 20-ga.	12	19'0"	15'0"	13'2"	11'11"	23'6"	18'8"	16'3"	14'3"
	16	17'3"	13'8"	11'11"	10'10"	21'4"	16'11"	14'3"	12'4"
	24	15'0"	11'11"	10'4"	9'0"	18'8"	14'3"	11'7"	9'9"
6" 20-ga.	12	26'3"	20'10"	18'2"	16'6"	32'6"	25'9"	20'3"	16'10"
	16	23'10"	18'11"	16'6"	14'9"	29'6"	21'10"	16'10"	13'10"
	24	20'10"	16'6"	13'11"	12'0"	25'9"	16'10"	13'10"	10'2"

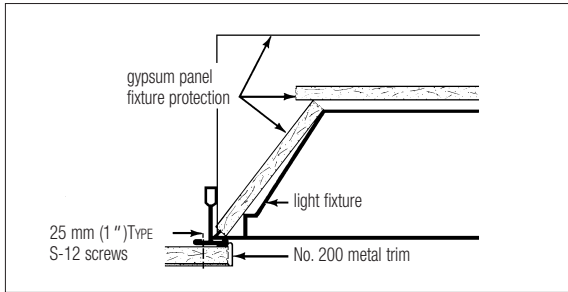
(1) Based on L/240 allowable deflection. Bracing of top flanges is required and must not exceed 1220 mm (48") o.c. Check manufacturer's literature to verify that the selected framing member is capable of the indicated span. (2) Stud end stiffening required. Additional hangers are necessary when span area exceeds 1.5 m² (16 ft.²)

Light Fixture Protection Use over recessed lighting fixtures installed in direct suspension grid when required in fire-rated construction. Cut pieces of 12.7 mm (1/2") or 15.9 mm (5/8") SHEETROCK Brand Gypsum Panels or GRAND PRIX Plaster Base with FIRECODE C Core to form a five-sided enclosure, trapezoidal in cross-section (see detail). Fabricate box larger than the fixture to provide at least 13 mm (1/2") clearance between the box and the fixture, and in accordance with fire test report.

Light fixture fire protection



Lighting fixture



CGC Drywall Suspension System

Flat Ceilings

Main tees shall be spaced a maximum of 1220 mm (48") on center and supported by hanger wires spaced a maximum 1220 mm (48") on center and as specified by ULC/UL Fire Resistance Directory, attaching hanger wires directly to structure above. Cross tees shall be spaced per manufacturers' recommendations and as specified by ULC or UL Fire Resistance Directory.

Curved Ceilings

Valley and Vault main tees shall be spaced a maximum 1220 mm (48"). Hanger wires shall be spaced a maximum 1220 mm (48") for Vault main tees. Hanger wires shall be spaced a maximum 600 mm (24") for Valley main tees. Cross tees shall be spaced as per manufacturers' recommendations. Additional hanger wires may be necessary to stabilize any curved ceiling during and after drywall attachment.

Transitions: Changes in Elevation in Soffit and Fascia Ceiling Applications

When constructing stepped soffits, bracing of the drywall suspension system and/or additional hanger wires may be necessary to ensure stability and structural performance during and after drywall attachment. The maximum vertical soffit height is 1220 mm (48"). (Maximum unsupported drywall area shall not exceed 1220 x 600 mm (48" x 24")). Intermediate cross tees are not necessary when bulkhead dimensions do not exceed 600 mm (24").

Cross tee spacing in horizontal soffit plane is not to exceed 600 mm (24"). Intermediate cross tees may be necessary to maintain visually acceptable drywall planes and drywall corners.

General Hanger Wire Notes Hanger wires are required within 300 mm (12") on both sides of a pivoted splice clip. At least 1 hanger wire is required within 300 mm (12") of a transition clip.

Limitations Do not support wires from mechanical and/or electrical equipment occurring above ceiling.

Accessories Install accessories as applicable to meet project requirements.

Gypsum Panel Installation Apply gypsum panels first to ceiling and then to walls. Position all ends and edges of gypsum panels at framing members. Extend ceiling board to corners and make firm contact with the wall angle, channel or top plate. To minimize end joints, use panels of maximum practical lengths. Fit ends and edges closely, but not forced together.

Cut ends, edges; scribe or make cutouts within the field of panels in a workmanlike manner. Cut gypsum board to size using a knife and straight edge.

Attach gypsum panels to the suspension system main runners, cross tees and cross channels with conventional gypsum panel fasteners (No. 6 TYPE S HiLo bugle head, self-drilling, self-tapping steel screws) spaced 200 mm (8") o.c. at periphery of gypsum panels and located 10 mm (3/8") in from panel edges and spaced 300 mm (12") o.c. in the field. Drive fasteners in field of panels first, working toward ends and edges. Hold panels in firm contact with framing while driving fasteners. Drive fastener heads slightly below surface of gypsum panels in a uniform dimple without breaking face paper. (See *Gypsum Panels and Accessories* Specification, SA927).

Install trim at all internal and external angles formed by the intersection of panel surfaces or other dissimilar materials. Apply corner bead to all vertical or horizontal external corners in accordance with manufacturer's directions.

Ceilings Note See *Drywall/Steel Framed Systems* Specifications, SA923. Spacing of drywall grid is designed to support only the dead load. Heavy concentrated loads should be independently supported. Lighting fixtures or troffers, air vents and other equipment should be separately supported from the structure; gypsum panels will not support these items.

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 gypsum panels with spacing of 600 mm (24") o.c.; 11 kg/m² (2.2 psf) for 12.7 mm (1/2") thick gypsum panels 400 mm (16") o.c. framing. Where SHEETROCK Brand Interior Gypsum Ceiling Panels, Sag-Resistant, are used, framing should be spaced 600 mm (24") o.c. for 12.7 mm (1/2") or 15.9 mm (5/8") panels. Note that 9.5 mm (3/8") thick gypsum panels must not be overlaid with unsupported insulation. A vapor retarder should be installed in exterior ceilings, and plenum or attic spaces should be properly vented.

During periods of cold or damp weather when a polyethylene vapor retarder is installed on ceilings behind the gypsum panels, it is important to install the ceiling insulation before or immediately after installing the gypsum panels. Failure to follow this procedure may result in moisture condensation in the back of the gypsum panels causing sag.

**Spray-Textured
Ceilings**

Where water-based texturing materials or any slow-drying surface treatment are used over single-layer panels, maximum frame spacing is 400 mm (16") o.c. for 12.7 mm (1/2") panels applied perpendicular to framing.

**Expansion
Joints**

Provide a separation in the suspension system at building expansion joints as shown on the drawings and carry the joint through the gypsum panels. Expansion joints are installed between two main tees to separate the suspension system and allow for movement in large buildings.

Control Joints

Provide control joint No. 093 which has a 2.4 mm (3/32") groove for drywall and veneer plaster. Ceiling dimensions should not exceed 15 m (50 ft.) or 225 m² (2500 sq. ft.) with perimeter relief and 9 m (30 ft.) or 81 m² (900 sq. ft.) without perimeter relief. Separate framing is required on each side of the control joints.

Wall Furring

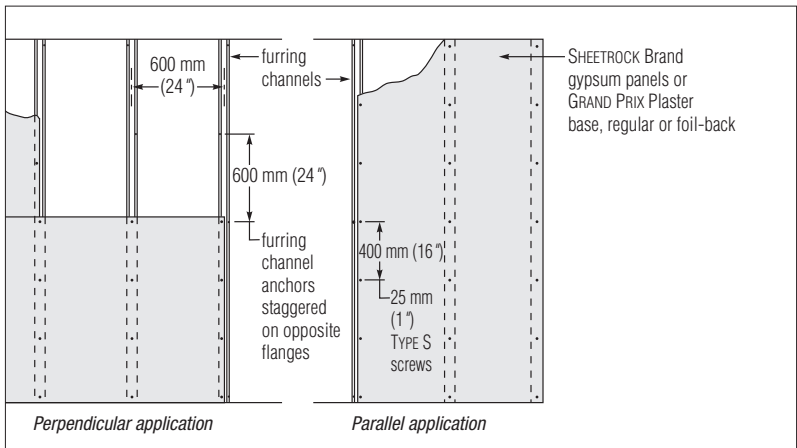
Exterior walls are readily furred using steel or wood furring to which 12.7 mm (1/2") regular or foil-back gypsum panels are screw attached. Use of foil-back board can provide an effective, low-cost vapor retarder. In these systems, different framing methods may be used to provide for a vapor retarder, thermal insulation, and chase space for pipes, conduits and ducts. Vinyl wall coverings are not recommended in furred walls containing foil-back gypsum panels or plaster base. The need for and location of a vapor retarder should be determined by a qualified mechanical engineer.

Metal furring channels are fastened directly to interiors of exterior walls or monolithic concrete and virtually any type of masonry—brick, concrete block, tile. This economical system provides an excellent vapor retarder and a durable, easily decorated interior surface, when foil-back gypsum panels or plaster base is screw-attached to channels, and appropriate sealants are applied at periphery and penetrations.

Z-furring channels are used with insulating blankets or rigid plastic foam insulation on interiors of exterior walls. The insulation panels are applied progressively as Z-furring channels are attached to the wall. Gypsum panels are screw-attached to channel flanges to provide an interior surface isolated to a great degree from the brick, concrete or concrete masonry wall. In new construction and remodeling, this system provides a highly insulative self-furring solid backup for gypsum boards.

Steel studs erected vertically between floor and ceiling runners serve as free-standing furring for foil-back gypsum panels screw-attached to one side of studs. This free-standing system with 41 mm (1-5/8") studs provides maximum clear chase space and minimizes possibilities for photographing or shadowing to occur. When heights greater than 3660 mm (12'0") are required, the stud framing is secured to the exterior wall with adjustable wall furring brackets at mid-height, in addition to the normal attachment of the studs at their head and base. Other furring providing greater height may be constructed with wider and heavier steel studs.

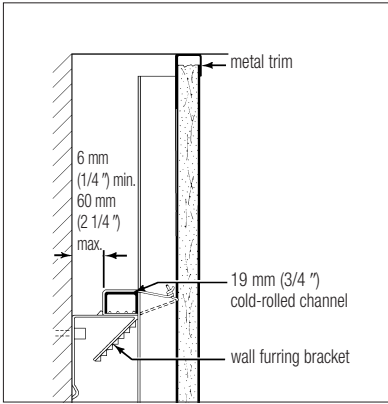
Wall elevation—furring



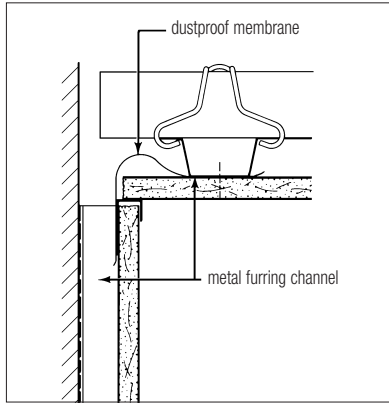
Temperature differentials on the interior surface of exterior walls may result in collection of dust on the colder areas of the surface. Consequently, shadowing (accumulated dust) may occur at locations of fasteners or furring channels where surface temperatures usually are lowest. CGC Inc. cannot be held responsible for surface discoloration of this nature. Where temperature, humidity and soiling conditions are expected to cause objectionable blemishes, use free-standing furring with insulation against the exterior wall.

Furring Channel Erection — Direct Attachment Attach metal furring channels to masonry or concrete surfaces, either vertically (preferred) or horizontally (for spacing, see frame spacing tables). For channels positioned horizontally, attach a furring channel not more than 102 mm (4") from both the floor line and the ceiling line. Secure channels with fasteners placed on alternate channel flanges and spaced 600 mm (24") o.c. Use a 50 mm (2") cut nail in mortar joints of brick, clay tile or concrete block or in the field of lightweight aggregate block; 15.9 mm (5/8") concrete stub nail, or other power-driven fasteners in monolithic concrete.

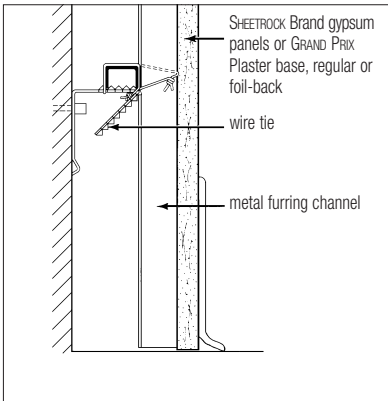
Channels may be furred using adjustable wall furring brackets and 19 mm (3/4") cold-rolled channels to provide additional space for pipes, conduits or ducts.



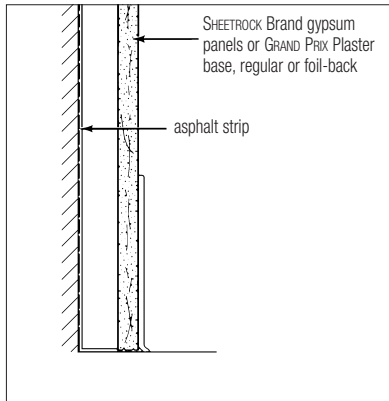
Ceiling attachments



Suspended ceiling



Floor attachments



Direct furring

At window locations, attach furring channels horizontally over the substrate returns to support gypsum board at corners (see detail).

Free-standing Furring

Free-standing furring consists of 41 mm (1-5/8") steel studs in 41 mm (1-5/8") steel runners. To erect, plumb and align runners at the desired distance away from the exterior wall. Fasten runners to floor and ceiling with suitable anchors. Snap studs into place in runners (see framing spacing tables for required stud spacing).

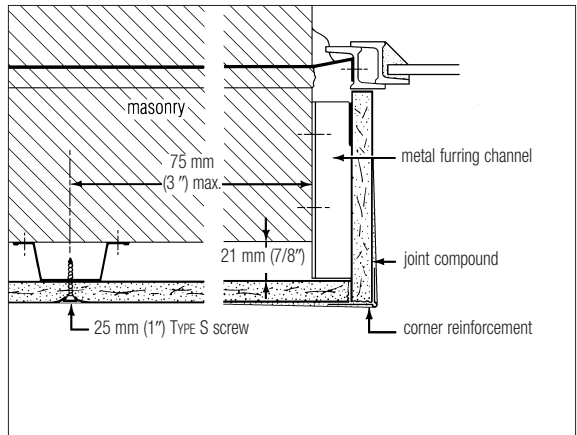
If greater height is required than can be attained with 41 mm (1-5/8") studs, wider or heavier gauge studs can be used. However, if space is critical, heights greater than 3660 mm (12'0") can be attained with 41 mm (1-5/8") studs by bracing them to the exterior wall at midheight or more frequently. For bracing, install adjustable furring brackets or sheet metal "L" pieces to the exterior wall and attach to the stud webs with 10 mm (3/8") pan head TYPE S screws.

Z-furring Channel Erection

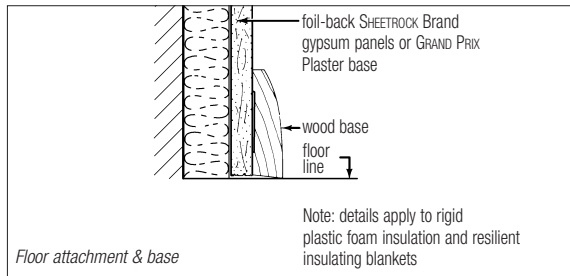
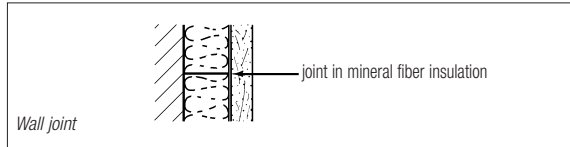
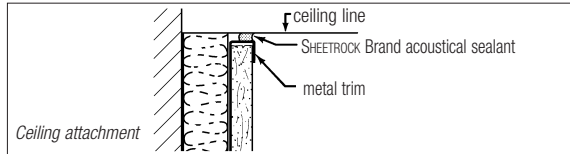
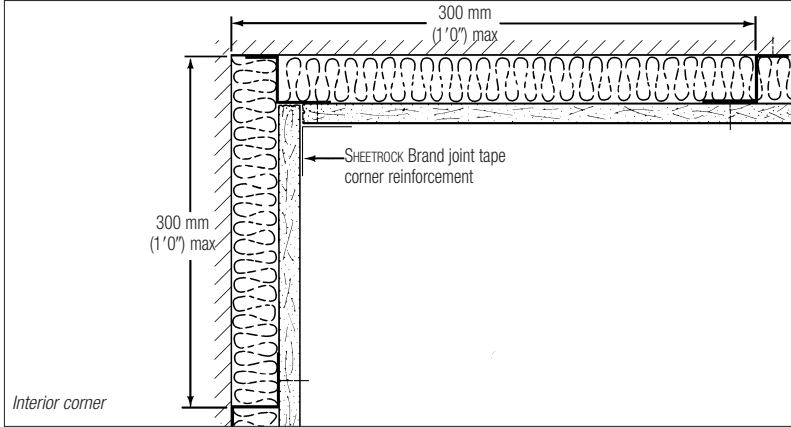
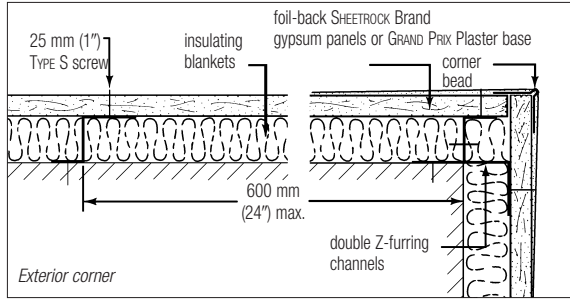
Erect insulation vertically and hold in place with Z-furring channels spaced 600 mm (24") o.c. Except at exterior corners, attach narrow flanges of furring channels to wall with concrete stub nails or power-driven fasteners spaced 600 mm (24") o.c. At exterior corners, attach wide flange of furring channel to wall with short flange extending beyond corner. On adjacent wall surface, screw attach short flange of furring channel to web of attached channel. Start from this furring channel with a standard width insulation panel and continue in regular manner. At interior corners, space second channel no more than 300 mm (12") from corner and cut insulation to fit. Hold mineral-fiber insulation in place until gypsum panels are installed with 250 mm (10") long staple field-fabricated from 18-ga. tie wire and inserted through slot in channel. Apply wood or other appropriate blocking around window and door openings and as required for attachment and support of fixtures and furnishings.

Apply gypsum drywall or plaster base panels parallel to channels with vertical joints occurring over channels. Attach gypsum panels with 25 mm (1") TYPE S Screws spaced 400 mm (16") o.c. in field and at edges, and with 32 mm (1-1/4") TYPE S Screws spaced 300 mm (12") o.c. at exterior

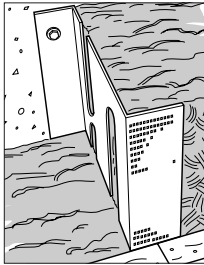
Metal window—jamb



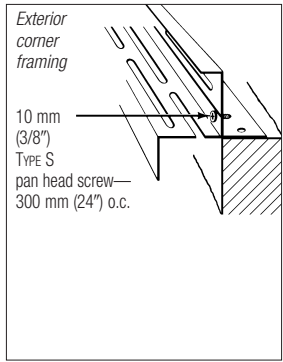
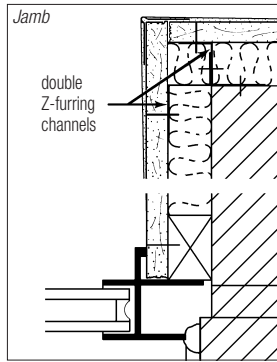
Z-furring application details



Z-furring application details



Design of Z-furring channels helps prevent wicking of moisture to inside surfaces.



corners. For gypsum base, space screws 300 mm (12") o.c. in the field and at edges. For double-layer application, apply first layer parallel to channels, face layer either perpendicular or parallel to channels with vertical joints offset at least one channel. Attach first layer with screws 600 mm (24") o.c. and face layer with 41 mm (1-5/8") screws 400 mm (16") o.c.

Wood Furring Erection

Wood furring strips over wood framing must be 38 x 38 mm (2" x 2") (nom.) min. size for nail-on application. Strips may be 19 x 64 mm (1" x 3") (nom.) if gypsum board is to be screw-attached.

When panels are to be applied parallel to furring strips securely attached to masonry walls, use strips 38 x 64 mm (2" x 3") or 19 x 64 mm (1" x 3") (nom.) min. size; where long edges of board are to be applied across the furring, use strips 38 x 38 mm (2" x 2") or 19 x 38 mm (1" x 2") (nom.) min. size. Space furring strips as specified by frame spacing tables. For board application select a screw length that will not penetrate through furring.

Where there is a possibility of water penetration through the walls, install a layer of asphalt felt between furring strips and wall surface.

Note: Nail application of gypsum board over 25 mm (1") (nom.) thickness wood furring applied across framing members is not recommended since the relative flexibility of undersize furring prevents proper fastening and tends to loosen nails already driven.

Resilient Framing—Wood Frame

Resilient attachment of gypsum board with RC-1 Resilient Channels provides low-cost, highly efficient, sound-rated drywall and veneer-partitions and floor-ceilings. The steel channels float the panels away from the studs and joists and provide a spring action that isolates the gypsum board from the framing. This spring action also tends to level the panel surface when installed over uneven framing. Additional features include excellent fire resistance (from the total assembly) and simple, fast installation for overall economy. For fire- and sound-resistant assemblies, refer to *CGC Construction Selector*, SA-100.

Resilient Channels Partitions

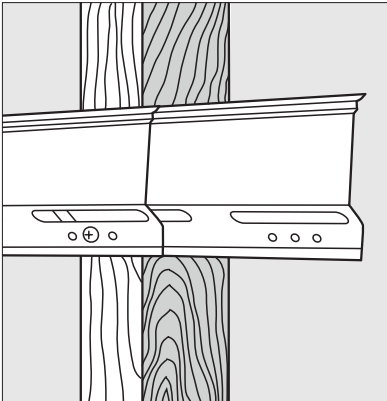
Attach RC-1 Resilient Channels attachment flange down and at right angles (perpendicular) to wood studs. Position bottom channel with attachment flange up for ease of attachment. Use 32 mm (1-1/4") Type W

Screws driven through the flanges for attachment. Nails are not recommended. Fasten channels to studs at each intersection with the slotted hole directly over a framing member.

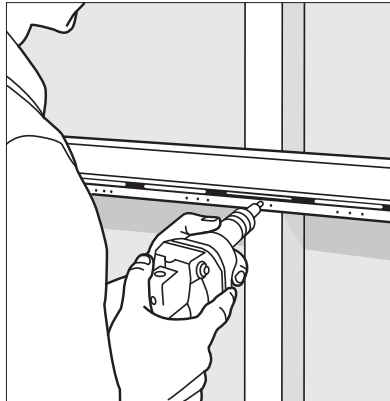
Locate channels 50 mm (2") max. up from floor, within 150 mm (6") of the ceiling and at no more than 600 mm (24") intervals. (For some veneer assemblies max. channel spacing is 400 mm (16") o.c. Refer to frame spacing tables earlier in this chapter.) Extend channels into all corners and attach to corner framing. Splice channels directly over studs by nesting (not butting) the channels and driving fastener through both flanges into the support.

Where cabinets are to be installed, attach RC-1 Channels to studs directly behind cabinet hanger brackets. When distance between hangers exceeds 600 mm (24") o.c., install additional channel at midpoint between hangers.

For cabinet installation with resilient framing, refer to section on Fixture Installation, Chapter 3.



RC-1 channel splice

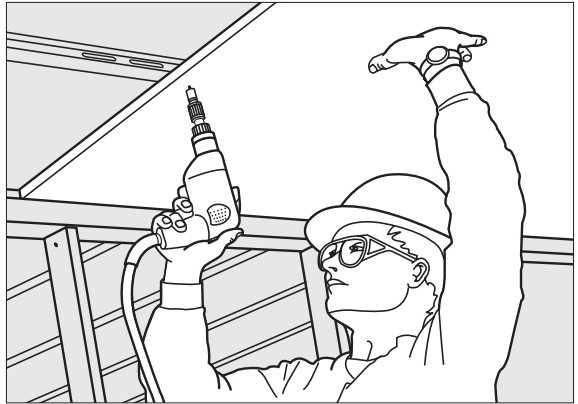


Channel attachment to stud

Resilient Channels Ceilings

Attach RC-1 Resilient Channels at right angles to wood joists. Use 32 mm (1-1/4") Type W or TYPE S Screws driven through channel attachment flange for single-layer construction. Fasten channels to joists at each intersection. Do not use nails to attach channels to joists in either single or double-layer assemblies. For the channels to function acoustically, they should be held away from adjacent walls a minimum of one inch. THERMAFIBER SAFB is required when sound control is needed.

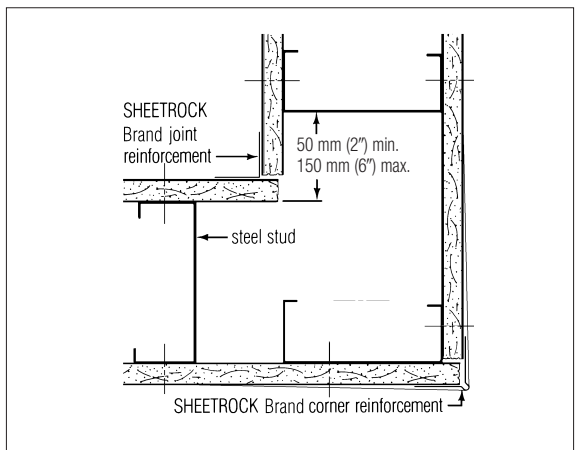
A 2-hr. floor/ceiling system with STC ratings as high as 60 is achievable with a ceiling of double-layer 15.9 mm (5/8") SHEETROCK Brand Gypsum Panels, FIRECODE C Core, attached to RC-1 Channels mounted across joists and 76 mm (3") THERMAFIBER SAFB in the cavity. The same fire rating applies to the system using GRAND PRIX FIRECODE or FIRECODE C Gypsum Base and any CGC veneer plaster finish.



For fire-rated, double-layer assembly, apply RC-1 Channels over base layer and attach with 48 mm (1-7/8") Type S Screws driven through channel flange and base layer into joist (see UL Des L511—**not recommended when sound control is a major consideration**).

Framing—Partition Corners

Framing for partition corners must assure firm fastening of the gypsum panels to vertical studs and allow enough room from the inside corner to do so. Studs should be attached to runners a minimum of 50 mm (2") but not more than 150 mm (6") from where the runners intersect. While the edges of the panels will extend slightly beyond these corner studs, the edge of the second-applied panel will overlap the plane of the first enough to assure good taping of the inside corner. Outside corners of partition intersections require firm attachment of panels to perpendicular edges of the outside corner stud.



Framing—Door and Window Openings

Rough framing for most door and window openings is the same for gypsum panels and gypsum base veneer systems.

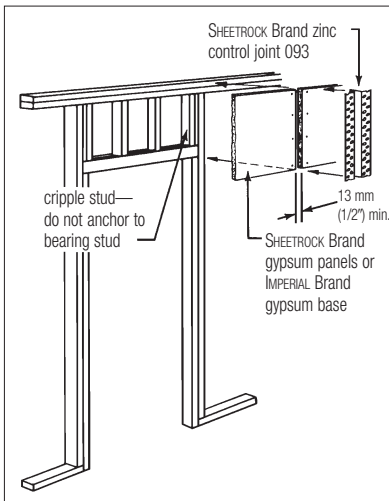
Wood Framing

Install additional cripple studs above header and 13 mm (1/2") from bearing studs where control joints are required. Do not anchor cripple stud to bearing stud, header or plate.

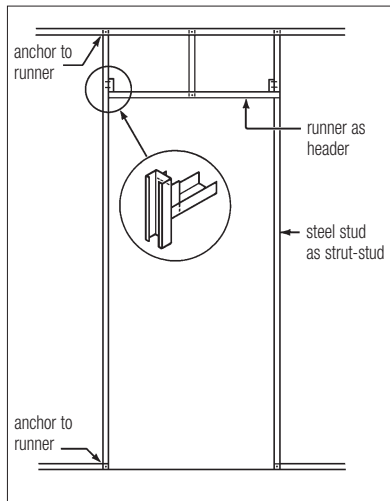
In long runs, treat window openings in same manner as shown for doors.

Steel Framing

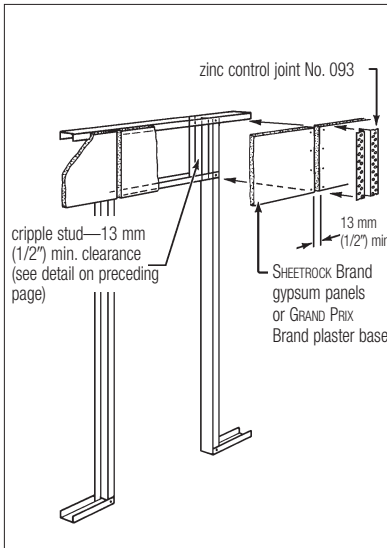
Door and borrowed light openings should be rough-framed with steel studs and runners. The recommended practice for most installations is to position floor to ceiling height strut studs vertically, adjacent to frames, and anchor them securely to the top and bottom runners with screws. However, in cases where significant slab live-load deflection must be accommodated in the vicinity of the door, the anchoring of these studs may need to be omitted in order to accommodate the slab movement. The services of a design professional is desirable to identify these instances and address them on a case-specific basis. Where heavy or oversize doors are used, install additional strut-stud at jamba. Fabricate sill and header sections from steel runners and install over less-than-ceiling-height door frames and above and below borrowed light frames. Fabricate from a section of runner cut-to-length approx. 150 mm (6") longer than rough opening. Slit flanges and bend web to allow flanges to overlap adjacent vertical strut-studs. Securely attach to jamb-studs with screws. For frames with jamb anchor clips, fasten clips to strut-studs with two 10 mm (3/8") TYPE S Pan Head Screws. Install cripple studs in the center above the door opening and above and below borrowed light openings spaced 600 mm (24") o.c. max.



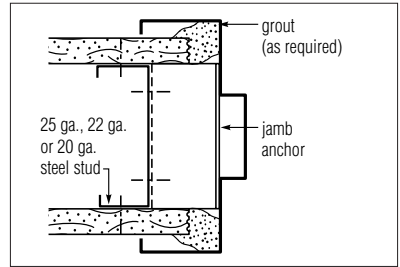
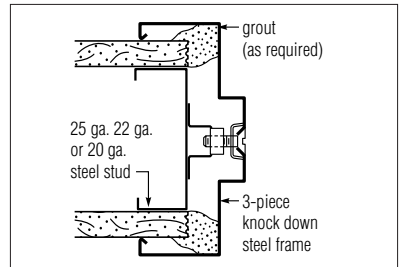
Wood frame door opening



Door frame with steel runner as header



Steel stud door opening



Jamb standard door

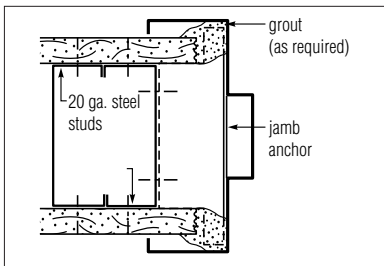
Where control joints in header panels are required, install cripple studs away from strut-studs but do not attach cripple to runners or strut-studs.

Note: Three-piece frames are recommended for drywall and veneer plaster construction since these frames are installed after drywall or plaster base is in place. One-piece frames, which must be installed before the gypsum panels, are more difficult to use because the panels must be inserted under the frame returns as it is installed.

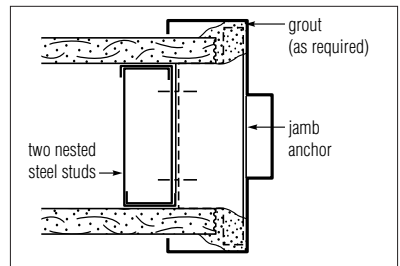
Framing for Heavy and Oversize Doors

The steel framing method described above is suitable for standard doors up to 810 mm (2'8") wide, weighing not more than 45 kg (100 lb.) max. Use 25-ga. steel studs and runners for framing the opening. For wider or heavier doors, the framing must be reinforced.

For solid-core doors and hollow-core doors 810 mm (2'8") to 1220 mm (4'0") wide (91 kg (200 lb.) max.), rough framing should be 20-ga. steel studs and runners. For heavy doors up to 1220 mm (4'0") wide (136 kg (300 lb.) max.), two 20-ga. studs should be used. For doors over 1220 mm (4'0") wide, double doors and extra-heavy doors (over 136 kg (300 lb.)),



Cross-section through frame (heavy doors)

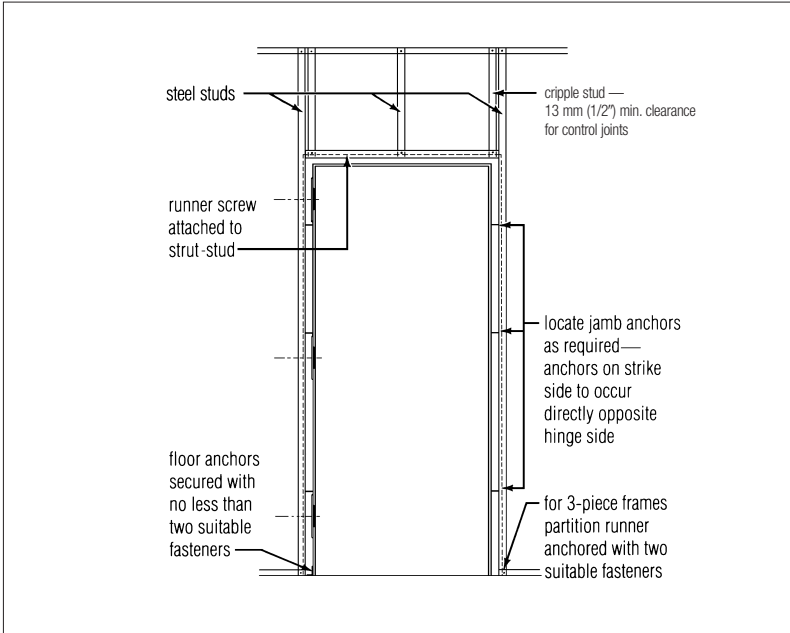


framing should be specially designed to meet load conditions. Rough framing for all doors in fire-rated partitions should be 20-ga. studs and runners.

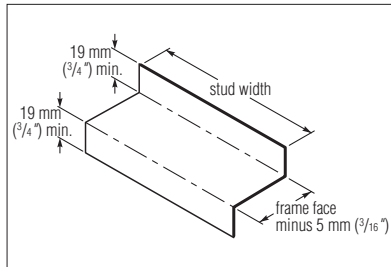
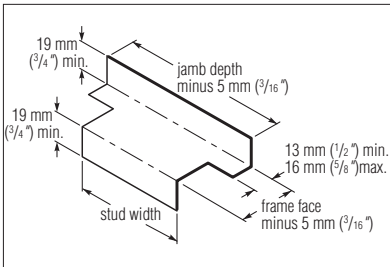
Door Frame Installation

The following general recommendations apply to one-piece and three-piece door frames and are basic considerations for satisfactory performance.

Rough framing and rough frame reinforcement for these frames should be installed as previously described.



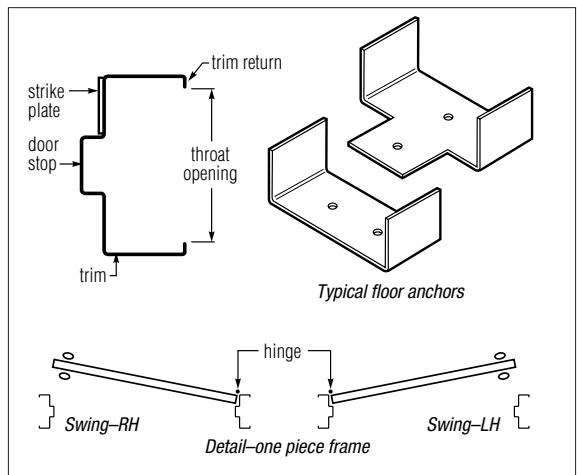
Frame for standard door



Jamb anchors (furnished with frame)

Installation One-piece metal door (and borrowed light) frames used with gypsum panel and gypsum base partitions must be constructed and installed properly to prevent twisting or movement. Basic considerations for satisfactory performance are:

1. Frames must be securely anchored. If frames are free to twist upon impact, or trim returns are free to vibrate, movement of the frame will tend to pinch gypsum board face paper and crush core, resulting in unsightly cracks in the finish and loose frames.
2. Partition must fit securely in frame so that wall and frame work as a unit. Impact stresses on frame will then be dissipated over entire partition surface and local damage minimized.
3. The frame must have a throat opening between trim returns that accurately fits the overall thickness of the partition. The face-layer panels should be enclosed by the trim and not butted against the trim return. This throat opening measurement is critical, as too large a tolerance between panels and trim return will cause door frame to twist and vibrate against the panels. Too small a tolerance will prevent the panels from fully entering frame opening; as a result, the door frame will not be held securely by the partition.
4. One-piece metal door (and borrowed light) frames should be formed from 18-ga. steel min., shop-primed. Floor anchor plates for door frames should be 16-ga. steel min., designed with two anchor holes to prevent rotation, and shop-welded to frame rabbets to dampen door impact vibrations. Floor anchorage should be by two power-driven anchors or equivalent per plate. Jamb anchors should be formed of 18-ga. steel min., fit tightly in jambs, and screw-attached to the stud. A minimum of three anchor clips per jamb is recommended with locations at approximate hinge points.
5. Spot grouting of one-piece door jambs will increase the rigidity of the frame and improve resistance to frame rotation caused by the weight of the door. To spot grout, apply DURABOND Setting-Type Joint Compound



mixed in accordance with bag instructions to each jamb anchor filling the inside face of the jamb at each point. Immediately insert the gypsum panels into the jamb and attach to framing. Do not terminate the gypsum board against the trim.

Full grouting of the jambs flush with the jamb anchors prior to installation of framing may be used as an option to spot grouting. RED TOP Gypsum Plaster (job-aggregated) or STRUCTO-LITE Gypsum Plaster (mill-mixed) is recommended for this purpose.

6. Door closers and bumpers are required on all doors where door weight (including attached hardware) exceeds 23 kg (50 lb.), or where door width exceeds 915 mm (36"). These doors require grouting.
7. When installing a three-piece knock-down door frame, secure runner ends with two floor anchors and allow space in the rough framing for the adjustment shoes in the frame.
8. When ordering metal door frames, the factors to be considered include: Gauge of frame; width and height of door; swing direction of door; type and thickness of door; stud size, and overall thickness of partition.

Metal Window Framing

In climates where extremes in summer or winter temperatures may result in condensation on metal frames, gypsum board (drywall and veneer) should be isolated from direct contact with the frame.

By placing metal trim between the gypsum board and window frame, protection against moisture damage is provided.

Waterproof insulating tape, 6 mm (1/4") thick and 13 mm (1/2") wide, or a waterproof acrylic caulk is required to separate metal sash and metal trim and will provide some measure of insulation between the two different metals. Direct contact of an aluminum frame and steel trim in the presence of condensation moisture may cause electrolytic deterioration of aluminum frame.

Detail—window trim

