

MANUFACTURED HOUSING

GYP SUM CONSTRUCTION GUIDE



*YOUR COMPLETE TECHNICAL
RESOURCE FOR
NATIONAL GYPSUM COMPANY
BUILDING PRODUCTS
AND THEIR APPLICATIONS
IN THE MANUFACTURED
HOUSING MARKET.*

- *WALLBOARD PRODUCTS
& SPECIFICATIONS*
- *JOINT TREATMENT PRODUCTS
& SPECIFICATIONS*
- *SPRAY TEXTURE PRODUCTS
& SPECIFICATIONS*
- *STORAGE AND HANDLING*
- *PROBLEMS & SOLUTIONS*
- *SHEAR TESTS*

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TRADEMARKS

The following names are trademarks owned by National Gypsum Company or its subsidiary National Gypsum Properties, LLC:

DURABASE®	HIGH FLEX®	PERFECT SPRAY®
DURASAN®	HI-ABUSE®	PERMABASE®
EASY FINISH®	HI-IMPACT®	PERMABASE FLEX®
EDGE GRIP™	KAL-KORE®	PROFORM®
E-Z STRIP®	KAL-KORNER BEAD®	SEASPRAY®
FIRE-SHIELD®	KAL-KOTE®	SPRAY QUICK™
FIRE-SHIELD C™	KAL-MESH®	STA-SMOOTH®
GOLD BOND®	LITE™	TRIPLE-T®
GRIDSTONE®	MR®	UNI-KAL®
GYSOLITE®	MULTI-FLEX®	X-KALIBUR®



National Gypsum Company is a fully integrated manufacturer and supplier of building and construction products worldwide. Our primary emphasis is on Gold Bond® BRAND gypsum wallboard, ProForm® BRAND joint treatment products, PermaBase® BRAND cement board and plaster. The privately held National Gypsum Company operates more than 40 facilities throughout the U.S. and Canada and is based in Charlotte, North Carolina.

OUR VISION:

To be recognized as the industry leader for extraordinary service and products that consistently meet our customers' toughest standards.

Driving and sustaining our Vision are these core Values:

- Customer satisfaction as our priority
- Honesty, integrity, fairness and respect
- Communications and openness with all those with whom we deal
- Teamwork, empowerment and continuous improvement
- Work hard, be safe, and have fun

NATIONAL GYPSUM HELPS YOU GET THE JOB DONE RIGHT, RIGHT FROM THE START

YOUR TECHNICAL RESOURCE

Today, more than ever, clear, accurate information is vital to every construction job. The challenges of manufactured housing continue to grow: increasingly innovative home designs, tighter budgets and schedules, and the continuing development of new materials and construction techniques. With years of research, on-the-job experience and knowledge of building products and their applications, National Gypsum is your best source for the technical information you need to meet those challenges.

A NETWORK OF TECHNICAL SUPPORT

In keeping with our corporate mission to become the preferred supplier for our customers, National Gypsum has made a total commitment to technical assistance. We have created a support network to provide valuable assistance for the manufactured housing manufacturer.

Field representation. Our field representatives have the experience and training to ensure that the products you need and specify are right for the job. They are backed up by thoroughly trained customer service representatives who also can help with product selection and purchase.

Continuing research. Because manufactured housing is constantly changing, National Gypsum maintains a full-scale research center that continually tests and evaluates products, applications, construction systems and techniques.

Immediate answers. For those times when you need an answer to a pressing situation or question, National Gypsum operates a Technical Assistance Hotline: 1-800-NATIONAL (1-800-628-4662). With one toll-free telephone call, you have a direct, personal link to a technical expert with up-to-date knowledge of specifications, building codes, product information and more. Or, you may access our website at: www.nationalgypsum.com.

COMMITMENT TO QUALITY SYSTEMS

At National Gypsum, we concentrate not only on individual building products, but also on complete construction systems. In such systems, products are evaluated together as complete building assemblies — walls, partitions, floors and ceilings.

Before National Gypsum releases a system to the manufactured housing industry, the system is thoroughly tested and the results are correlated and charted, making it easier for the manufacturer to match a system to his needs. This extensive database of technical information is available to you not only through technical bulletins such as this one, but also through our technical support network.

The construction systems referred to in this manual are designed primarily with materials manufactured by National Gypsum. **Substitutions of other products or brands are not recommended.**

Field installation of tested systems must be identical to the laboratory installation to produce optimum performance of these systems. Performance tests are conducted according to accepted national standards under controlled laboratory conditions to minimize variances and to permit comparison of test results of all types of systems, similar and dissimilar.



National Gypsum's Technical Innovation Center in Charlotte, North Carolina, has historically assumed a leadership role in gypsum-based product and systems development. Many of today's most innovative gypsum, joint treatment, plaster and metal products and systems were developed and tested at National Gypsum's Research Center.

Shown are 1-800-NATIONAL technical service experts. From left to right: Lisa Roberts, Mark Chapman and Bob Ek.



MSDS are available on the web at: www.nationalgypsum.com, or by calling National Gypsum Technical Service at: 1-800-NATIONAL (1-800-628-4662).

For assistance in obtaining technical support about the proper use of National Gypsum products, call 1-800-NATIONAL (1-800-628-4662).

GYPSUM WALLBOARD PRODUCTS – GENERAL INFORMATION

Gypsum board is the name for a family of panel products consisting of a noncombustible core, primarily of gypsum, with a paper surfacing on the face, back and long edges.

The popularity of gypsum wallboard results from a number of factors. It takes virtually any decoration — from paint or textures to vinyl and paper laminates. It also lends itself to creative shaping of interior surfaces, allowing maximum design flexibility. Gypsum wallboard is an economical alternative to other products. Because it is lightweight, it is easy to handle for speedy installation. With its natural properties, it is durable yet easy to repair. In addition, gypsum wallboard's fire resistance and sound-control capabilities further demonstrate its desirability in building systems.

National Gypsum produces its wallboard with 100% recycled paper on both the face and back.

National Gypsum's wallboard is available in a variety of edge configurations. The tapered edge provides a monolithic surface and easy joint finishing.

National Gypsum Company features a wide variety of gypsum wallboard products and accessories for the manufactured housing industry including 1/2" High Strength Ceiling Board, Seaspray Hi-Strength MVR, regular wallboard, Fire-Shield wallboard and Durabase.



METRIC CAPABILITIES

The federal government has mandated that each federal agency make a transition to the use of metric units in all federal procurement, grants and business-related activities. National Gypsum Company, in complying with this order, provides a full line of wallboard products in "hard" metric dimensions with regard to width and length. Standard boards have a width of 1200 mm and a length of 3600 mm. Special lengths are available on a special-order basis, which requires minimum orders and extended lead times. Contact your local National Gypsum Company representative for further information. Thickness of wallboard will be "soft," converted to the metric equivalent.

ENVIRONMENTAL CONDITIONS

Maintain a room temperature of not less than 40°F (4°C) during application of gypsum board except when adhesive is used for the attachment of gypsum board. To promote effective bonding of adhesive, joint treatment, texturing and decoration, maintain a room temperature of not less than 50°F (10°C) for 48 hours prior to application and continuously thereafter until completely dry.

RECOMMENDATIONS

- When a temporary heat source is used, the temperature should not exceed 95°F (35°C) in any given room or area.
- Maintain adequate ventilation in the working area during the installation and curing period.
- Protect gypsum products from direct exposure to rain, snow, sunlight or other excessive weather conditions.

LIMITATIONS

- Recommended spacing of the framing for 1/2" regular and 5/16" wallboards is 16" o.c.
- Maximum spacing of the framing for 1/2" High Strength, 5/8" gypsum wallboard and Seaspray Hi-Strength MVR is 24" o.c.
- Partitions should not be used where frequently exposed to excessive moisture unless all surfaces are waterproofed.
- To prevent weakening due to calcining, gypsum wallboard should not be exposed to temperatures over 125°F (52°C) for extended periods of time.
- Wallboard joints on a single layer shall not occur within 1/2" of the corners of door frames unless control joints are installed at the corners.

PRODUCT SPECIFICATION DIRECTORY

FOREWORD

This directory provides a convenient, up-to-date reference to some of the products marketed by National Gypsum Company and to the ASTM and federal specifications with which they comply.

The General Services Administration has canceled many federal procurement documents. These have been superseded by ASTM Specifications. Federal Specifications are listed for reference.

This is to certify that the following materials comply in all respects with listed specifications.

GYPSUM BOARD PRODUCTS

Product	Description and Use	Specification Standards	
		ASTM	Federal
Seaspray Hi-Strength MVR Ceiling Panels	5/16" (7.9 mm) or 1/2" (12.7 mm) gypsum wallboard with white linear textured pattern. Has a water vapor permeance of less than 1 perm.	C 960/C 1396	None
High Strength Ceiling Board	1/2" (12.7 mm) wallboard with core formulated to provide increased sag resistance.	C 36/C 1396	SS-L-30D Type III
Regular Gypsum Wallboard or Sta-Smooth Wallboard	Fire resistant. Will take decoration after proper surface preparation of interior walls and ceilings.	C 36/C 1396	SS-L-30D Type III
Fire-Shield Gypsum Wallboard (Includes "C")	1/2" (12.7 mm) and 5/8" (15.9 mm) gypsum wallboard with specially processed core highly resistant to fire; type X core.	C 36/C 1396 Type X	SS-L-30D Type III Grade X
Regular or Fire-Shield Moisture Resistant (MR) Wallboard	Gypsum wallboard specially processed for use as a base for ceramic and other nonabsorbent-type wall tiles in bath and shower areas.	C 630/C 1396 Type X	SS-L-30D Type VII Grade X
1/4" High Flex Wallboard	1/4" (6.4 mm) gypsum wallboard designed for radius construction.	C 36/C 1396	SS-L-30D Type III
Durabase Wallboard	5/16" (7.9 mm), 3/8" (9.5 mm) or 1/2" (12.7 mm) gypsum wallboard for printing applications or as a laminating base. May also be used for walls of furnace rooms and closets on factory-built structures.	C 36/C 1396	None

Note: All products tested in accordance with ASTM E 84 Standard Test Method for Surface Burning Characteristics (Fire hazard classification)
 Flame Spread — 15
 Smoke Developed — 0

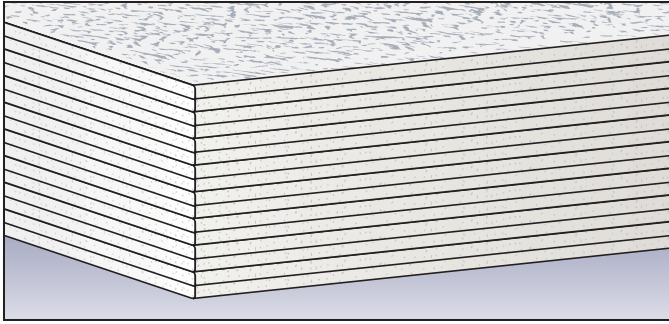
JOINT TREATMENT, TEXTURES AND ACCESSORIES

Product	Description and Use	Specification Standards	
		ASTM	Federal
Joint Treatment Sta-Smooth Compounds • High Strength • Lite	A hardening or setting-type powder compound used for joint finishing.	C 475	SS-J-570B
Textures ProForm Perfect Spray ProForm Perfect Spray II	White, aggregated spray textures for interior use over ceilings of gypsum wallboard or monolithic concrete.	None	None
ProForm Perfect Spray EM ProForm Perfect Spray HF	A white, spray texture for interior use. Contains no aggregate.	None	None
ProForm Ready Mix Joint Compounds • Regular • Lite	Ready-mixed joint compounds in a smooth-working paste form. Ready to use.	C 475	SS-J-570B
Finishing Accessories Wallboard Cornerbead	Used to reinforce and trim around corners.	C 1047	None
ProForm Joint Tape	Paper tape for concealment of gypsum wallboard joints. Provides a smooth wall or ceiling, ready for any type of decoration.	C 475	SS-J-570B
Sta-Smooth BRAND HS Tape	A glass fiber mesh tape to be used only with setting compounds.	C 475	None
ProForm Multi-Flex Tape Bead	Protects corners formed at any angle.	None	None

CEMENT BACKERBOARDS

Product	Description and Use	Specification Standards	
		ASTM	Federal
1/2" PermaBase® BRAND Cement Board	Cementitious Backer Unit (CBU): A nailable, screwable backerboard or underlayment panel which is composed of Portland Cement, aggregates and reinforcements that has a significant ability to remain unaffected by prolonged exposure to moisture, For walls, ceilings, countertops and floors.	C 1325	None
5/16" PermaBase® BRAND Cement Board	Cementitious Backer Unit (CBU): A nailable, screwable underlayment panel for interior floors and countertops.	C 1325	None

SEASPRAY® BRAND HI-STRENGTH MVR CEILING PANELS



GENERAL INFORMATION

Seaspray Hi-Strength MVR ceiling panels save you materials, time and money in manufactured housing ceiling installations. Seaspray Hi-Strength MVR gypsum ceiling panels provide an attractive textured ceiling and a code-approved moisture/vapor retarder, all in one easy-to-install product. The deeper texture of these noncombustible gypsum panels not only creates a bolder, more appealing look, but also helps to hide joints.

Use of Seaspray Hi-Strength MVR ceiling panels means no more vapor retarder paint to stock and apply. With quality ensured by National Gypsum's longstanding reputation, you can now meet HUD code requirements without concerns about over or underspraying. Most important, National Gypsum's competitive price means cost efficiency as well as production efficiency.

FEATURES/BENEFITS

- 5-year limited warranty against visible sag.
- Vapor retarder built into the texture finish ensures uniform performance without the risk of over or underspraying.
- Square-edged linear panels are coated with durable latex texture finish that resists surface marking.
- Bolder, heavier texture helps hide joints.

- Fire-resistant gypsum core panels are UL labeled and meet HUD Manufactured Home Construction and Safety Standards for homeowner security.
- Easy installation. Ceiling panel and vapor retarder in one eliminates the need for vapor retarder paint, polyethylene or kraft-face insulation, depending on application.
- Improved sag resistance.
- 24" o.c. foam adhesive attachment.
- Built-in vapor barrier.
- Hard painted surface.
- Easy touch-up.
- Vapor retarder characteristics meet code standards of 1 perm or less as required by HUD Manufactured Home Construction and Safety Standards, Section 3280.504(a). (Per NGC test PTL-4-88G.)

SPECIFICATIONS

- Thickness:** 5/16" and 1/2" nominal
- Width:** 4'
ASTM permissible variation: +0", - 3/32" (2.4 mm)
- Lengths:** 84"-192" (1/2" increments). ASTM permissible variation: +/- 1/4" (6.4 mm)
- Corners:** Square
ASTM permissible variation: +/- 1/8" (3.2 mm) in the full width of the board
- Edges:** Square
- Weight:**
5/16"—Approx. 1.3 lbs./sf
1/2"—Approx. 1.9 lbs./sf



Packaged:
5/16"—60 pieces per skid
1/2"—30 pieces per skid

Colorfastness: No significant color change with normal sunlight exposure. Test report available on request.

ASTM E 84 Surface Burning Characteristics
(Fire Hazard Classification)
Flame Spread: 15
Smoke Developed: 0

GENERAL APPLICATION

Note: If blown-in cellulose insulation is used, take care to follow insulation manufacturer's specifications on addition of water. Excess moisture in this insulation can cause Seaspray Hi-Strength MVR to sag.

No vapor barrier is needed with Seaspray Hi-Strength MVR ceiling panels. Staple panel ends to the sideboards (rails). Lay out rafters (trusses) and nail sideboards to them. Then, staple panel edges to the framing. Staples must be driven flush with the Seaspray Hi-Strength MVR ceiling panel surface — either parallel or perpendicular (stitched) to adjoining edges. Drive screws through rosettes into the framing member. Be careful not to overdrive screws as it could result in stripped threads or broken board.

For specific applications and shear values, please refer to section titled "Shear Tests."

Note: Figure No. 1 (page 6) illustrates how to repair small holes in Seaspray Hi-Strength MVR panels.

Foam Method: *Make sure trusses are 24" o.c. or less.* After ceiling trusses are placed on gypsum board, foam adhesive should be applied per the manufacturer's instructions.

For a finished look, use either a vinyl spline or a flat wood batten over board joints.

Staple Method: *Make sure trusses are 24" o.c. or less.* Staples are spaced 4" o.c. around the perimeter with the crown 1/4" from and parallel to board edge. Rosette placement should not exceed 24" o.c. in the field of the board.

SEASPRAY® BRAND MVR TOUCH-UP PAINT SYSTEM SPECS

Seaspray Hi-Strength MVR Ceiling Panels, like any other prefinished product, can be scuffed or damaged during handling and installation. Most touch-up can be avoided with close supervision and constant focus on minimizing damage through correct handling and installation.

IN-PLANT PROCEDURES TO REDUCE DAMAGE TO SEASPRAY HI-STRENGTH MVR CEILING PANELS:

- Use forklift extenders to unload trucks and move Seaspray units into the plant.
- Do not drag one board over another or down the ceiling jig.
- Do not drop one board over another unless both are aligned like pages in a book.
- Care must be taken by plant personnel while bringing items into the home.

WHERE SEASPRAY MVR TOUCH-UP IS NEEDED:

- There are two types of Seaspray MVR Touch-Up paint available: **aggregate** and **non-aggregate**. Each is tinted to match the board produced at that particular manufacturing plant.
- For best results, keep paint and board manufacturing dates within three months of each other. The touch-up paint should be stirred thoroughly before use.
- Before use of either paint, look at the damage and decide which paint would work best. If only a small scratch is involved, the non-aggregate paint will work well. If major scrapes or damage is involved, the aggregate paint is normally needed. With textured paint, the foam covered roller (such as Hyde Tools part #30430) or a small brush will apply the paint satisfactorily.

- Best results are achieved by covering only the damaged area. Do not repaint major areas of the panel unless necessary. For very small scratches, use the corner of the foam roller or a small artist's paintbrush. For larger areas, use only as much paint as is needed. If care is taken to only touch-up the affected area, normally it is not necessary to scrape off additional texture around the damaged area. If all texture is gone from an area, two or possibly three light coats will produce the best results. Do not try to apply one heavy coat, as this will be readily visible after drying.

REPAIR PROCEDURES

Minor Cracks With No Texture Loss: Using a small brush and brushing perpendicular to the crack, force the coating into the opening. Dabbing the coating with a fingertip is an acceptable alternative.

Minor Scratches With Minimal Texture Loss: Lightly dab the coating on the scratch with a small brush.

Major Cracks Aligned To The Linear Texture: Scrape off a nominal 1" wide path of the texture the length of the crack. Fill the crack with a setting compound or a putty-type caulking compound. Allow to dry. Loose board at the crack may require backing up and refastening to a framing member. Reapply the texture as needed with Seaspray MVR Touch-Up and roller.

Major Cracks Perpendicular To The Linear Texture: Same as above. You may use a brush if texture loss is not very wide.

Major Texture Loss/Paper And Core Not Damaged: Reapply the texture to the damaged area using the rubber roller. Roll out the coating in the machine direction to align the new texture in the same direction as the original.

Major Panel Damage/Surface Paper Torn, Exposed Gypsum Core, Holes Through Entire Panel: Fill the area with a setting type compound and smooth the surface with a putty knife. Scrape the texture off the panel in the area immediately around the defect. Allow to set before topcoating with Seaspray MVR Touch-Up paint. Use a roller or a brush as needed. An alternate method is to fill with caulking compound. Allow to dry before coating.

Note: Very deep gouges or holes may require multiple coats of filler to reduce shrinkage or cracking. Allow to dry between coats.

CLEANUP

Tools may be cleaned with ordinary tap water. Use a mild soap solution to clean hands, brushes and rollers.

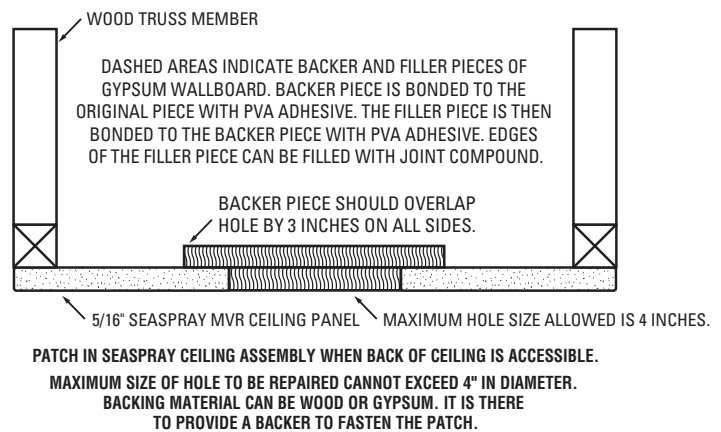
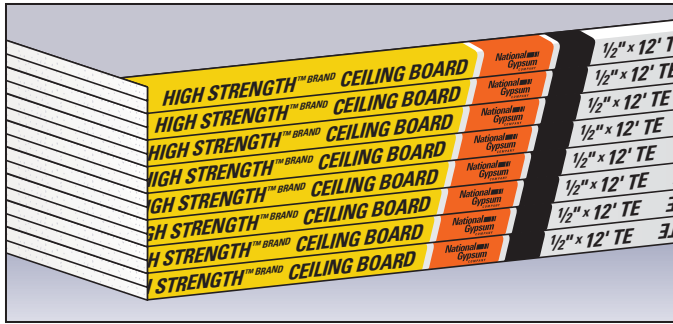


FIGURE NO. 1

1/2" HIGH STRENGTH™ BRAND CEILING BOARD



GENERAL INFORMATION

1/2" High Strength Ceiling Board gives manufactured home builders an alternative to 5/8" wallboard for ceiling construction. A specially formulated core provides superior sag resistance required for parallel installation to trusses spaced 24" o.c., especially when water-based ceiling textures are applied. Since 1/2" High Strength weighs less than 5/8" wallboard, the lower weight means additional bottom-line savings.

FEATURES/BENEFITS

- Meets HUD Manufactured Home Construction and Safety Standards — promotes security for the homeowner.
- Lower weight of 1/2" wallboard, compared with 5/8", reduces the total weight of the unit and provides easier handling.
- 1/2" High Strength Ceiling Board can be used in place of 5/8" wallboard when applied with foam adhesive to the ceiling trusses. The special core exhibits sag-resistant properties that allow for parallel installation to trusses spaced 24" o.c. It is approved for non-fire rated ceiling assemblies where trusses are spaced no wider than 24" o.c. and ceiling is finished with water based spray textures.

SPECIFICATIONS

Thickness: 1/2"
ASTM permissible variations: In the nominal thickness of +/- 1/64" (0.4 mm) with local variations of +/- 1/32" (0.8 mm) from the nominal thickness.

Width: 48" and 54"
ASTM permissible variation: +0", -3/32" (2.4 mm)

Lengths: 6'-16' (1/2" increments)
ASTM permissible variation: +/- 1/4" (6.4 mm)

Corners: Square
ASTM permissible variation: +/- 1/8" (3.2 mm) in the full width of the board

Edges: Tapered

Weight: Approx. 1.7 lbs./sf

SAG RESISTANCE TECHNICAL DATA

The sag resistance for High Strength Ceiling Board is equivalent to that of 5/8" type X wallboard. Under the strict ASTM C 473 Physical Testing for Humidified Deflection, National Gypsum 1/2" High Strength Ceiling Board exhibited average sag-resistant qualities equivalent to 5/8" type X wallboard. In a test witnessed by an independent testing agency, 1/2" High Strength Ceiling Board exhibited an average sag of only 0.033" (approximately 1/32") on joists spaced 24" o.c. with spray texture applied. The test was conducted over one month at temperatures between 66° and 79°F with a relative humidity between 30% and 60%.

ASTM E 84 Surface Burning Characteristics
(Fire Hazard Classification)
Flame Spread: 15
Smoke Developed: 0

GENERAL APPLICATION

Note: If blown-in cellulose insulation is used, take care to follow insulation manufacturer's specifications on addition of water. Excess moisture in this insulation can cause 1/2" High Strength Ceiling Board to sag.

Note: To minimize foam leakage, the back of each joint may be taped with 3/4" masking tape prior to applying foam.

For specific applications and shear values, please refer to section titled "Shear Tests."

TOUCH-UP

Fill gouges, nicks, hammer marks, etc., with joint treatment compound. Sand smooth before applying final surface texture or finish. Panel replacement may be necessary if damage cannot be corrected satisfactorily.

Foam Method: After ceiling trusses are placed on the gypsum board, foam adhesive should be applied as recommended per the manufacturer's instructions.

Staple Method: Staples (16 gauge with 1" crown and 1-1/2" legs) must be spaced 4" o.c. around the perimeter of the board, either parallel or stitched, and 1/4" in from both ends. Screws in the field of the board should be 1-1/4" to 1-1/2" drywall screws with maximum spacing of 12" o.c. Tools must be properly adjusted so screws, nails and staples are driven straight and flush with the board surface, without breaking the face paper of the gypsum board.

Insulation should not exceed 2.2 lbs./sq. ft. (10.7 kg/m²).

GOLD BOND® BRAND GYPSUM WALLBOARD

48" AND 54" WIDE PANELS



GENERAL INFORMATION

The strength, fire resistance and consistent quality of Gold Bond® BRAND gypsum wallboard make it the first choice for manufactured home builders looking for a competitive, high-quality look for their homes. Gypsum wallboard can be used in both wall and ceiling construction. More important, gypsum wallboard gives you greater flexibility in finishing options. On the ceilings, use ProForm Perfect Spray textures. On the walls, your options are unlimited. Once the wallboard is taped and finished, you can give home buyers all the decorating options available in site-built homes by using different paints or textures.

FEATURES/BENEFITS

- Gypsum's density provides greater resistance to sound penetration — results in quieter rooms.
- Noncombustible core — adds protection from fire.
- Meets HUD Manufactured Home Construction and Safety Standards — promotes security for homeowners.
- Cuts quickly for easy installation.
- Versatile for both ceiling and wall construction.
- Unfinished surface allows for a variety of finishing options.
- Low cost creates greater economy — bottom-line savings.

SPECIFICATIONS

Thickness: 3/8" and 1/2"
ASTM permissible variations: In the nominal thickness of +/- 1/64" (0.4 mm) with local variations of +/- 1/32" (0.8 mm) from the nominal thickness.

Width: 3/8" – 48" wide
1/2" – 48", 54" wide
ASTM permissible variation: +0", - 3/32" (2.4 mm)

Lengths: 6'-16' (1/2" increments)
ASTM permissible variation: +/- 1/4" (6.4 mm)

Corners: Square
ASTM permissible variation: +/- 1/8" (3.2 mm) in the full width of the board

Edges: Tapered

Weight: 3/8"– Approx. 1.4 lbs./sf
1/2"– Approx. 1.8 lbs./sf

Gypsum Board Insulating Properties

For purposes of calculating "U" values, the "C" factor for 1" gypsum board is 1.2. Resistance "R" for 3/8" board is 0.32; for 1/2" board, 0.45; and for 5/8" board, 0.56.

ASTM E 84 Surface Burning Characteristics
(Fire Hazard Classification)
Flame Spread: 15
Smoke Developed: 0

Note: Maximum spacing of framing for regular 1/2" gypsum wallboard ceiling surfaces to be decorated with water thinned spray texture shall not exceed 16" o.c.



GENERAL APPLICATION

Note: If blown-in cellulose insulation is used, take care to follow insulation manufacturer's specifications on addition of water. Excess moisture in this insulation can cause gypsum wallboard to sag.

Note: National Gypsum Company recognizes that some manufacturers normally use 1/2" regular gypsum board in installations with 24" o.c. rafter spacing. While shear tests have been conducted to allow its use in this application, National Gypsum does not recommend or warrant this application due to the possibility of ceiling sag.

CEILING

Foam Method: After ceiling trusses are placed on the gypsum board, foam adhesive should be applied as recommended per the manufacturer's instructions.

To minimize foam leakage, the back of each joint may be taped with 3/4" masking tape prior to applying foam.

Staple Method: Staples (16 gauge with 1" crown and 1-1/2" legs) must be spaced 4" o.c. around the perimeter of the board, either parallel or stitched, and 1/4" in from both ends. Screws in the field of the board should be 1-1/4" to 1-1/2" drywall screws with maximum spacing of 12" o.c. Tools must be properly adjusted so screws, nails and staples are driven straight and flush with the board surface, without breaking the face paper of the gypsum board.

Insulation should not exceed 1.3 lbs./sq. ft. (6.3 kg/m²).

WALLS (TAPED AND FINISHED/TEXTURED)

FRAMING

1. Use extra care in cutting headers, jack studs or blocking to fit them snugly in the area desired, with no gaps left between pieces. Any gap reduces the strength of the fastener used and allows for movement between framing members as the house is moved or set up.
2. Carefully place studs in walls and partitions as they are being built, keeping them straight and at right angles to the top/bottom plates. Discard any studs that are twisted or warped, as well as those with large

holes or knots. (These may be cut for jack studs or blocking.) Drywall applied over twisted studs is under stress as it is hung and is much more likely to break or have joint cracks.

3. Consider use of 2x4 lumber for all bottom plates. This will raise costs slightly, but will offer much more rigidity against flexing along the wall length, especially near the axles and at the front and rear of the house.
4. Consider building "sandwich" beams from two pieces of 2x6 or 2x8 lumber, screwed or stapled together for use as headers over double or triple windows, steel-insulated entrance doors or sliding glass doors. At junction of this beam and all adjacent framing, use "Gang Nail" metal truss plate connectors to fasten. This will ensure adequate support for large openings. (See sketch below).
5. Consider use of 2x6 blocking in wall on each side of steel entrance door or large windows to add strength. (See sketch below.)

FASTENING

Gypsum board can be applied vertically or horizontally on walls. Use full sheets with window and door openings routed out. Nails shall be standard gypsum wallboard nails of sufficient length to penetrate wood framing a minimum of 3/4". Screws shall be standard gypsum wallboard screws of sufficient length to penetrate framing a minimum of 5/8". Adjust tools so fasteners will not be driven too deep, resulting in the face paper breaking. Recommended fastener spacing is 6" o.c. across top and bottom plates, 8" o.c. at wallboard joints and 12" o.c. on intermediate studs (between joints). Fasteners should not be closer than 3/8" to wallboard edges. Adhesive used may be either an approved white glue, urethane adhesive or construction adhesive.

For specific applications and shear values, please refer to section titled "Shear Tests."

The following tips may help to reduce any joint or stress cracks in taped and finished walls:

Joint Finishing

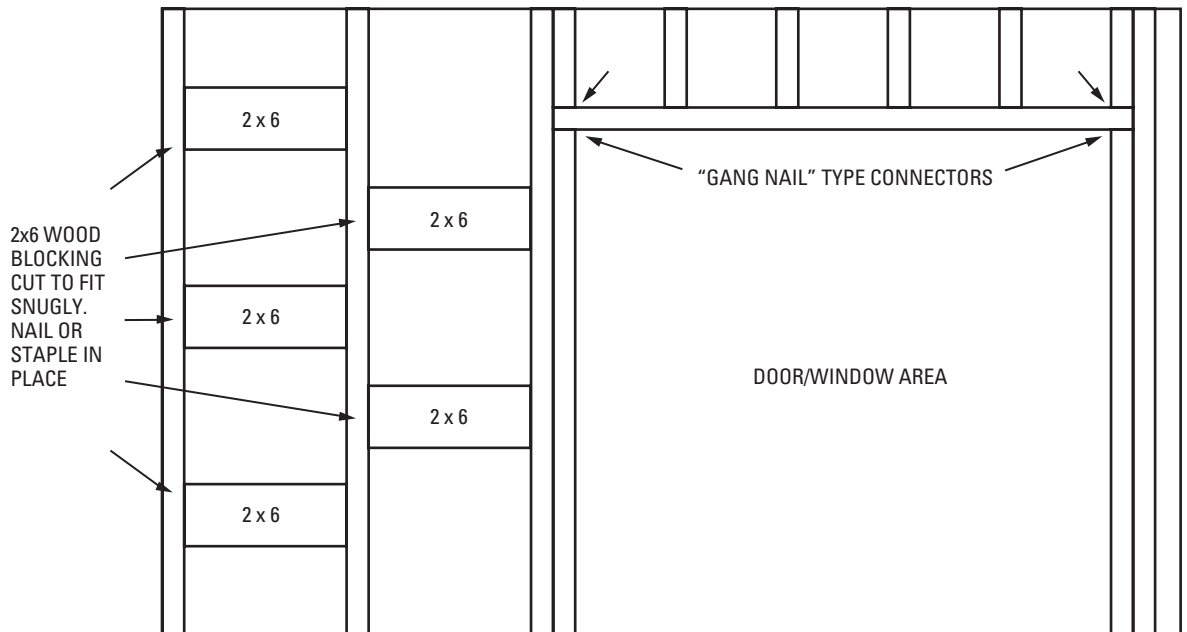
1. Stagger joints over wall area when hanging gypsum board. Avoid butt joints. Use full-size pieces of gypsum board, cutting or routing out door and window openings.
2. Consider using paper joint tape for joints on walls. With this type of tape, the joint area is mudded first, then the tape is "bedded" and excess mud removed. After the first coat is set, a second coat is applied to cover the tape and smoothed out. A third coat is applied and either wet or dry sanded as necessary to make the joint area completely smooth and ready for paint.
3. Be sure that all coats of joint compound are either set or dry before applying another coat of compound or paint.

FOR CRITICAL (SEVERE) LIGHTING AREA

Wall and ceiling areas abutting window mullions or skylights, long hallways or large surface areas flooded with artificial and/or natural lighting are a few examples of

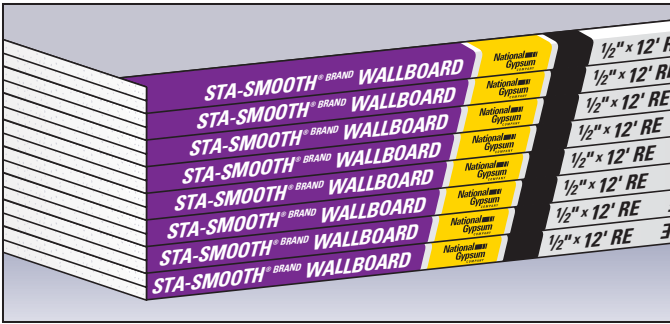
critical lighting areas. Strong sidelighting from windows or surface-mounted light fixtures may reveal even minor surface imperfections. Light striking the surface obliquely, at a very slight angle, greatly exaggerates surface irregularities. If critical lighting cannot be avoided, the effects can be minimized by skim coating the gypsum board surfaces, decorating the surface with medium to heavy textures or using draperies and blinds that soften shadows. In general, gloss, semigloss and enamel finishes highlight surface defects; textures hide minor imperfections. Certain types of paint will require the use of a primer in order to obtain best results. Consult with the finish paint manufacturer for specific recommendations.

For total finishing and texturing information, please refer to the "Joint Compound" and "Spray Texture" sections.



SKETCH OF 2x6 BLOCKING IN WALLS, EACH SIDE OF HEAVY DOORS OR LARGE WINDOWS

STA-SMOOTH® BRAND WALLBOARD



GENERAL INFORMATION

Sta-Smooth is a drywall system offering maximum joint strength and easy application. It can be used in any gypsum drywall system where conventional types of gypsum wallboard are recommended. This system features Sta-Smooth gypsum wallboard with a unique edge. The two edge configurations relieve joint deformity, damaged wallboard edges, poor alignment and extremes in humidity and temperature.

The Sta-Smooth System produces a superior joint because the Sta-Smooth compound is a hardening-type compound that is not affected by humidity once it has hardened and dried. It also maintains its hard core even with moisture added by the use of the regular joint compounds for the finishing work. Sta-Smooth compound firmly bonds the tape to the board and the panel "V" edges to each other, making a strong, rigidized joint.

FEATURES/BENEFITS

- Improved durability — The Sta-Smooth System produces a smooth, flat, durable surface that relieves beading, ridging and other joint deformity problems.
- Greater speed — All flat joints in the Sta-Smooth System are filled and taped with Sta-Smooth Compound in one easy operation, the same as conventional wallboard application methods.

- Alignment — Sta-Smooth board, with its unique edge (either configuration), allows easy alignment of the panels in the same way as conventional tapered-edge wallboard. The taper is scientifically designed to reduce crowned joints.
- Stronger bond — The bonding area of the Sta-Smooth joint compound increases with the "V" edge panels.
- Strength — The Sta-Smooth joint shape and the joint compound provide greater mass and integral bond for increased strength.

SPECIFICATIONS

- Thickness:** 1/2"
ASTM permissible variations: In the nominal thickness of +/- 1/64" (0.4 mm) with local variations of +/- 1/32" (0.8 mm) from the nominal thickness.
- Width:** 4'
ASTM permissible variation: +0", - 3/32" (2.4 mm)
- Lengths:** 6'-16' (1/2" increments)
ASTM permissible variation: +/- 1/4" (6.4 mm)
- Corners:** Square
ASTM permissible variation: +/- 1/8" (3.2 mm) in the full width of the board
- Edges:** Tapered with bevel
- Weight:** Approximately 1.7-1.8 lbs./sf

AVAILABILITY

Contact National Gypsum Company or your local distributor.

TECHNICAL DATA

- Gold Bond Sta-Smooth components must be used with each other to achieve full performance benefits.
- Application, except as modified herein, shall be in accordance with ASTM C 840.

ASTM E 84 Surface Burning Characteristics
(Fire Hazard Classification)
Flame Spread: 15
Smoke Developed: 0

GENERAL APPLICATION

Note: If blown-in cellulose insulation is used, take care to follow insulation manufacturer's specifications on addition of water. Excess moisture in this insulation can cause Sta-Smooth Wallboard to sag.

CEILING

Maximum spacing of framing for regular 1/2" gypsum wallboard ceiling surfaces to be decorated with water thinned spray texture shall not exceed 16" o.c.

Foam Method: After ceiling trusses are placed on the gypsum board, foam adhesive should be applied as recommended per the manufacturer's instructions.

To minimize foam leakage, the back of each joint may be taped with 3/4" masking tape prior to applying foam.

Staple Method: Staples (16 gauge with 1" crown and 1-1/2" legs) must be spaced 4" o.c. around the perimeter of the board, either parallel or stitched, and 1/4" in from both ends. Screws in the field of the board should be 1-1/4" to 1-1/2" drywall screws with maximum spacing of 12" o.c. Adjust tools properly so screws, nails and staples are driven straight and flush with the board surface, without breaking the face paper of the gypsum board.

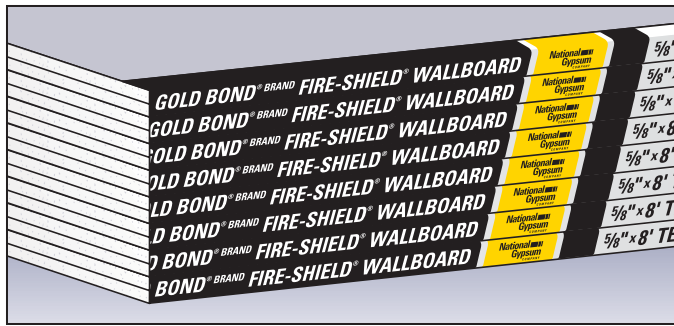
Insulation should not exceed 1.3 lbs./sq. ft. (6.3 kg/m²).

For specific applications and shear values, please refer to section titled "Shear Tests."

Note: National Gypsum Company recognizes that some manufacturers normally use 1/2" Sta-Smooth gypsum board in installations with 24" o.c. rafter spacing. While shear tests have been conducted to allow its use in this application, National Gypsum does not recommend or warrant this application due to the possibility of ceiling sag.

GOLD BOND® BRAND FIRE-SHIELD® WALLBOARD

48" AND 54" WIDE PANELS



GENERAL INFORMATION

Fire-Shield wallboard was developed to work in combination with other products in an assemblies to protect a building from fire for certain intervals of time. Fire-Shield wallboard is manufactured with a core formulated to offer greater fire resistance than regular wallboard. Generically, fire-resistant wallboards that are used to prevent rapid heat transfer to structural members, protecting them for specified times, are designated as "type X" products.

The gypsum core of Fire-Shield wallboard works as a natural "sprinkler system." Gypsum naturally contains about 21% water. When the board is heated, the water in the core begins to evaporate and is released as steam, retarding heat transfer. Fire-Shield wallboard remains noncombustible. However, as shrinkage occurs because of the loss of water volume, cracks that permit passage of heat and fire occur. To lessen this process, Fire-Shield wallboard is formulated by adding noncombustible fibers in the gypsum to help maintain the integrity of the core as water volume is lost while providing greater resistance to heat transfer.

FEATURES/BENEFITS

- 5/8" Fire-Shield board is required for certain types of wall and/or ceiling construction, which include school classrooms or units built for commercial purposes that require a timed fire rating.
- Fire-Shield can be used for ceilings in HUD construction with 24" o.c. truss spacing where ceiling sag is a possibility. In this type application, however, 1/2" High Strength Ceiling Board will provide equal sag-resistant performance at a reduced cost and with less weight.

SPECIFICATIONS

- Thickness:** 5/8"
ASTM permissible variations: In the nominal thickness of +/- 1/64" (0.4 mm) with local variations of +/- 1/32" (0.8 mm) from the nominal thickness.
- Width:** 48" and 54" wide
ASTM permissible variation: +0", - 3/32" (2.4 mm)
- Lengths:** 6'-16' (1/2" increments)
ASTM permissible variation: +/- 1/4" (6.4 mm)
- Corners:** Square
ASTM permissible variation: +/- 1/8" (3.2 mm) in the full width of the board
- Edges:** Tapered or beveled tapered (Gold Bond Smooth edge).
- Weight:** 5/8" – Approx. 2.4 lbs./sf
- Fire-Rated Gypsum Board:**
A gypsum core wall panel with additives to enhance fire resistance of the core and surfaced with paper on front, back and long edges and complying with ASTM C 36/C1396 Type X.

ASTM E 84 Surface Burning Characteristics
(Fire Hazard Classification)
Flame Spread: 15
Smoke Developed: 0

Staple Method: Staples (16 gauge with 1" crown and 1-1/2" legs) must be spaced 4" o.c. around the perimeter of the board, either parallel or stitched, and 1/4" in from both ends. Screws in the field of the board should be 1-1/4" to 1-1/2" drywall screws with maximum spacing of 12" o.c. Adjust tools properly so screws, nails and staples are driven straight and flush with the board surface, without breaking the face paper of the gypsum board.

Insulation should not exceed 2.2 lbs./sq. ft. (10.7 kg/m²).

For specific applications and shear values, please refer to section titled "Shear Tests."

GENERAL APPLICATION

Note: If blown-in cellulose insulation is used, take care to follow insulation manufacturer's specifications on addition of water. Excess moisture in this insulation can cause Fire-Shield Wallboard to sag.

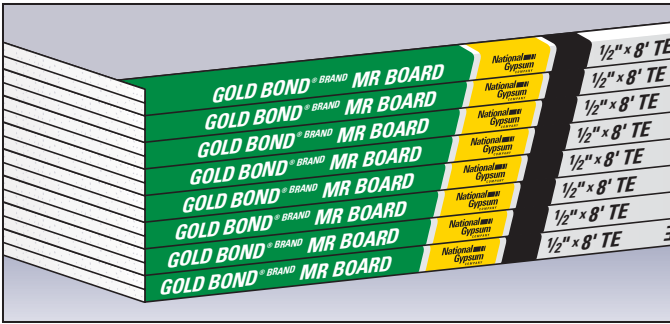
CEILING

Foam Method: After ceiling trusses are placed on the gypsum board, foam adhesive should be applied as recommended per the manufacturer's instructions.

Note: To minimize foam leakage, the back of each joint may be taped with 3/4" masking tape prior to applying foam.

GOLD BOND® BRAND MR® BOARD

MOISTURE-RESISTANT GYPSUM WALLBOARD



GENERAL INFORMATION

MR (Moisture-Resistant) Board is a specially processed gypsum wallboard for use as a base for ceramic tile and other nonabsorbent finish materials in wet areas. The core, face paper and back paper of MR Board are treated to withstand the effects of moisture and high humidity. Its facing paper is colored light green to make it readily distinguishable from regular gypsum wallboard. MR Board may be extended beyond the area to be tiled. A tapered edge is provided so joints can be treated in the normal manner where MR Board extends beyond the tiled area. No special tapes or edge sealants are required. The tile adhesive eliminates the need for further corner treatment, nail spotting and edge sealing, or filling the edge taper in the area to be tiled.

FEATURES/BENEFITS

- Inexpensive backer for tile and other nonabsorbent finish materials.
- Same installation procedure as regular gypsum board on walls. No additional tools or fasteners are required.

SPECIFICATIONS

Thickness: 1/2" and 5/8"
ASTM permissible variations:
In the nominal thickness of
+/- 1/64" (0.4 mm) with local
variations of +/- 1/32" (0.8 mm)
from the nominal thickness.

Width: 4'
ASTM permissible variation:
+0", - 3/32" (2.4 mm)

Lengths: 6'-16' (1/2" increments)
ASTM permissible variation:
+/- 1/4" (6.4 mm)

Corners: Square
ASTM permissible variation:
+/- 1/8" (3.2 mm) in the full
width of the board

Edges: Tapered

Weight: 1/2" – Approx. 1.9 lbs./sf
5/8" – Approx. 2.4 lbs./sf

TECHNICAL DATA

ASTM E 84 Surface Burning
Characteristics
(Fire Hazard Classification)
Flame Spread: 15
Smoke Developed: 0

GENERAL APPLICATION

FRAMING

Framing members shall be plumb and true. Place studs (wood or metal) not to exceed 24" o.c.

Install the bath or shower receptor before MR Board is applied. If stud spacing is greater than 16" o.c., horizontal framing or blocking should be installed approximately 1" above the edge of the fixture and at MR Board horizontal joints in area to receive tile.

Provide appropriate blocking, headers or supports to support tub, other plumbing fixtures and to receive soap dishes, grab bars, towel racks and similar items as may be required.

Allow sufficient framing space between framing and fixtures so the inside lip of the fixture shall be in the same plane as the face of the MR Gypsum Wallboard. Fur as necessary.

- Plumbing fixtures

Install shower pans, receptors or tubs prior to erecting MR Gypsum Wallboard.

FASTENING

Apply MR Gypsum Wallboard horizontally to the framing using nails or screws spaced no more than 8" o.c. driven flush with the gypsum board. Nails shall be standard gypsum wallboard nails of sufficient length to penetrate wood framing a minimum of 3/4". Screws shall be standard gypsum wallboard screws of sufficient length to penetrate framing a minimum of 5/8". During board application, coat all cut edges with approved water-resistant adhesive as recommended for tile application. In bath or shower areas, maintain a 1/4" space between the lower paper-bound edge of the board and the lip of the tub or shower receptor.

■ Joint treatment and caulking

Using water-resistant tile adhesive, meeting requirements of ANSI A136.1-1985, Type 1, lay a bead of adhesive on the tub or shower receptor flange and caulk all corners and around all openings prior to tile application. Spot nail and screw heads with water-resistant tile adhesive on surfaces to be covered with tile.

■ Decoration beyond tiled area

Treat all joints beyond the area to be tiled in a conventional manner using tape and joint compound.

PAINTING

1. Prime all exposed MR Board with a high-quality latex primer. If surface becomes marred or is not thoroughly covered, a second prime coat should be applied.
2. When the prime coat(s) has dried, apply a finish coat of high-quality paint such as latex semi-gloss enamel.

WALLCOVERING

1. Prime all exposed MR Board as in step 1 of Painting section above, using one or two coats of primer as required to adequately cover the surface, and allow to dry. This treatment ensures adhesion of the wallcovering paste to the board and facilitates subsequent removal of wallcovering when redecorating.
2. Apply wallcovering in the conventional manner after primer is thoroughly dry.

■ Limitations

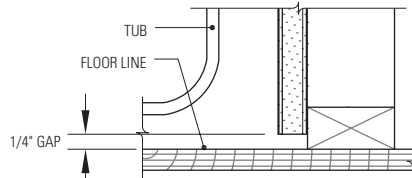
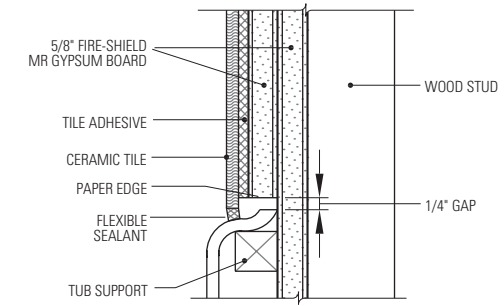
— MR Board is not recommended for use where there will be direct exposure to water or continuous high-humidity conditions such as found in saunas, steam rooms, gang shower rooms or swimming pool enclosures. Cementitious tile backer board should be considered.

— No vapor retarder should be placed behind the MR Board where tile is to be applied to the face. A vapor retarder can be created on the face of the MR Board by applying a skim coat of tile adhesive or by using a silicone grout for tile.

— The MR Board should not be used on exterior ceilings. Gold Bond Soffit Board is recommended for protected exterior ceiling applications.

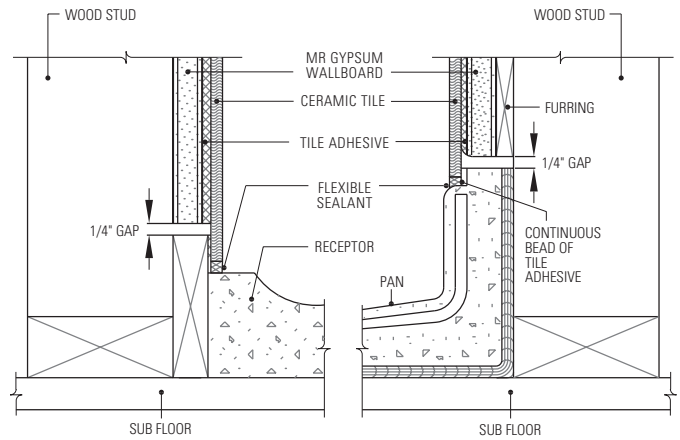
— National Gypsum recommends application of MR Board to interior ceilings when framing does not exceed 12" o.c. for 1/2" MR Board and 16" o.c. for 5/8" MR Board, including use as a substrate when ceramic tile or similar materials are to be applied to the ceiling.

— Do not apply joint compound to joints or fasteners to be tiled.*



**TUB AND WALL SECTION-AFTER TILING
FOR FIRE OR SOUND RATED CONSTRUCTION**

09250D
Scale: 3" = 1'-0"



SHOWER RECEPTOR

SHOWER PAN

09250C
Scale: 3" = 1'-0"

* This requirement may be waived if the applied tile in combination with the bonding adhesive employed fully protects the gypsum board and water-sensitive materials, if present (such as when joint compound is used), from penetration of water. Responsibility of performance of completed installations shall rest with the surfacing material manufacturer and/or the surfacing material applicator.

1/4" HIGH FLEX® BRAND WALLBOARD



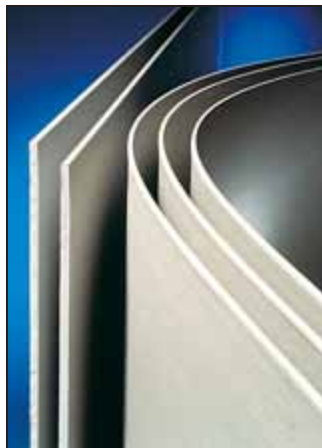
GENERAL INFORMATION

1/4" High Flex Wallboard is specifically designed for radius construction such as curved walls, archways and stairways. It can be used for both concave and convex surfaces. 1/4" High Flex is typically applied in double layers.

1/4" High Flex Wallboard panels consist of a fire-resistive gypsum core encased in heavy natural-finish paper on the face side and strong liner paper on the back side. The face paper is folded around the long edges to reinforce and protect the core and the ends are square-cut and finished smooth. Long edges of panels are slightly tapered allowing joints to be reinforced and concealed with joint tape and joint treatment products.

FEATURES/BENEFITS

- Lightweight, cost-efficient material that readily accepts a wide range of decorative finishes.
- 1/4" High Flex Wallboard is easily cut for quick installation, permitting painting or other decoration and the installation of metal or wood trim almost immediately.
- The gypsum core will not support combustion.
- With joints reinforced with ProForm joint compound, gypsum wallboard forms walls and ceilings exceptionally resistant to cracks caused by structural and thermal changes.
- Expansion and contraction under normal atmospheric changes is negligible.



SPECIFICATIONS

Thickness: 1/4" (6.4 mm)
ASTM permissible variations:
In the nominal thickness of
+/- 1/64" (0.4 mm) with local
variations of +/- 1/32" (0.8 mm)
from the nominal thickness.

Width: 4' (1219 mm)
ASTM permissible variation:
+0", - 3/32" (2.4 mm)

Length: 8'
ASTM permissible variation:
+/- 1/4" (6.4 mm)

Corners: Square
ASTM permissible variation:
+/- 1/8" (3.2 mm) in the full
width of the board

Edges: Slightly tapered

Weight: Approximately
.95-1.0 lbs./sf

**ASTM E 84 Surface Burning
Characteristics**
(Fire Hazard Classification)
Flame Spread: 15
Smoke Developed: 0

GENERAL APPLICATION

Installation of 1/4" High Flex Wallboard should be consistent with methods described in GA216, "Recommended Specifications for the Application and Finishing of Gypsum Board," ASTM C 840, "Standard Specification for the Application and Finishing of Gypsum Board."

RECOMMENDATIONS

For best painting results, all surfaces, including joint compound, should be clean, dust-free and not glossy. To improve fastener and joint concealment, a coat of a quality primer is recommended to equalize the absorption between surface paper and joint compound.

1/4" High Flex Wallboard should be applied first to ceiling at right angles to framing members, then to walls. Boards of maximum practical length should be used so that an absolute minimum number of end joints occur. Board edges should be brought into contact with each other but should not be forced into place.

1/4" High Flex Wallboard is significantly more flexible in the vertical direction (long edges parallel to the framing) than in the horizontal direction. (See Table 1)

Wallboard joints at openings should be located so that no end joint will align with edges of openings unless control joints will be installed at these points. End joints should be staggered, and joints on opposite sides of a partition should not occur on the same stud.

1/4" High Flex Wallboard is typically installed in double layer construction. To prevent flat spots, framing members should be spaced closer together than required for typical flat wall and ceiling surfaces. (See Table 1). 1/4" High Flex Wallboard should be held in firm contact with the framing member while fasteners are being driven.

For concave surfaces, a stop shall be applied to one end of the curve to restrain one end or edge of the board during installation. Pressure shall be applied to the unre-

strained end or edge of the gypsum board forcing the field of the gypsum board into firm contact with the framing. Gypsum board shall be fastened by working from the "stopped" end or edge. The gypsum board shall be held tightly against the framing while fasteners are being driven.

For convex surfaces, one end of the gypsum board shall be attached to the framing with nails or screws. The gypsum board shall be progressively pushed into contact with the framing members, working from the fixed end to the free end. The gypsum board shall be held tightly against each framing member while fasteners are being driven.

Fasteners should be set with the heads slightly below the surface of the wallboard in a dimple formed by the hammer or power screwdriver. Care should be taken to avoid breaking the face paper of the wallboard. Improperly driven nails or screws should be removed.

Table 1

MINIMUM BENDING RADII FOR 1/4" HIGH FLEX WALLBOARD

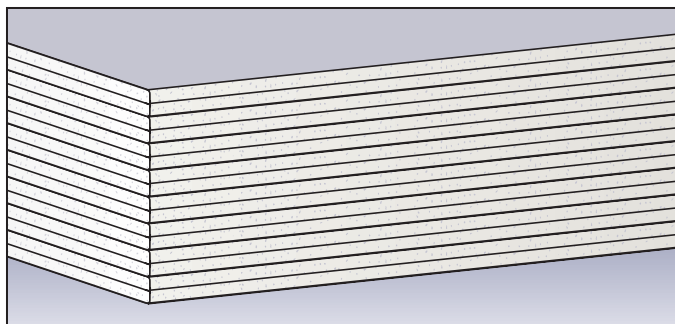
Application	Lengthwise		Widthwise	
	Bend Radii	Max. Stud Spacing	Bend Radii	Max. Stud Spacing
Inside (Concave) Dry	32"	9" o.c.	20"	9" o.c.
Outside (Convex) Dry	30"	9" o.c.	15"	8" o.c.
Inside (Concave) Wet	20"	9" o.c.	10"	6" o.c.
Outside (Convex) Wet	14"	6" o.c.	7"	5" o.c.

Lengthwise denotes long edges perpendicular to the framing members. Widthwise denotes long edges parallel to the framing members. The values listed in Table 1 were achieved at 65°F and 45% relative humidity. Lower temperatures and lower humidity will decrease the flexibility.

Wetting the board is only required on extremely tight radii, or when temperature and humidity conditions are lower than 65°F and 45% relative humidity. When wetting the board, apply 10-15 ounces of clean water per side with a paint roller or sprayer. Allow to soak 10-15 minutes before bending.



DURABASE® BRAND GYPSUM WALLBOARD



GENERAL INFORMATION

Gypsum wallboard is a versatile and highly regarded construction material that has impressive advantages as a lamination substrate. Durabase gypsum wallboard can be surfaced with a wide variety of decorative laminates for use as wall panels in manufactured housing. In addition to its availability in a variety of thicknesses and lengths, gypsum wallboard's principal advantages include fire resistance, low surface flammability, good sound isolation characteristics and impact resistance.

Manufactured especially to meet HUD fire safety requirements of flame spread not over 25. When used in furnace room, wallboard gives furnace and water heater areas an extra measure of protection where they need it most — giving home buyers peace of mind.

In addition, the inherent sound-deadening characteristics of Durabase make your home quieter as well as safer. This is a true value any way you look at it.



FEATURES/BENEFITS

- Adaptable to different types of laminas (paper or vinyl).
- Gypsum core cuts quickly — allows easy installation.
- High gypsum density also provides greater resistance to sound penetration — results in quieter rooms.
- UL labeled and meets all HUD Manufactured Mobile Home Construction and Safety Standards — promotes security for homeowners.
- Noncombustible core — provides excellent fire protection.

SPECIFICATIONS

Thickness: 5/16", 3/8" and 1/2"
 ASTM permissible variations: In the nominal thickness of +/- 1/64" (0.4 mm) with local variations of +/- 1/32" (0.8 mm) from the nominal thickness.

Width: 4'
 ASTM permissible variation: +0", - 3/32" (2.4 mm)

Lengths: 7'-10'
 ASTM permissible variation: +/- 1/4" (6.4 mm)

Corners: Square
 ASTM permissible variation: +/- 1/8" (3.2 mm) in the full width of the board

Edges: Square

Weight:
 5/16" — Approx. 1.2 lbs./sf
 3/8" — Approx. 1.4 lbs./sf
 1/2" — Approx. 1.8 lbs./sf

ASTM E 84 Surface Burning Characteristics
 (Fire Hazard Classification)
 Flame Spread: 15
 Smoke Developed: 0

RECOMMENDED ADHESIVES

1. PVA White Glue. Bottle-grade.
2. PVA Fortified White Glue. Pump or gun-grade. For greater gap-filling and beading properties.
3. Solvent-Type Stud or Panel Adhesives.
4. One-part urethanes.
5. Two-part urethanes.

Note: For shear construction, use specified adhesive. See "Shear Tests" section.

PROPER STORAGE AND HANDLING OF GYPSUM WALLBOARD

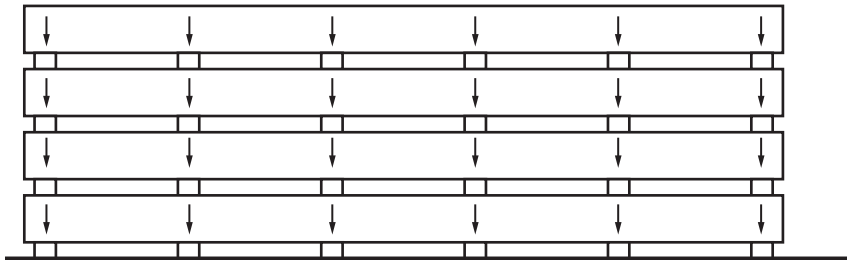
One of the problems involved in handling gypsum wallboard involves proper size and placement of supports in storage. This is particularly important in instances where warehouse handling is mechanized and the majority of the board is transported by forklift. The Gypsum Association Materials Handling Committee recommends the following procedures for correct storage and handling.

Diagram No. 1 shows the correct method of placing supports when wallboard is tiered several units high. If risers are not placed according to the diagram, the cumulative pressure on lower units can cause sag, as the diagram shows.

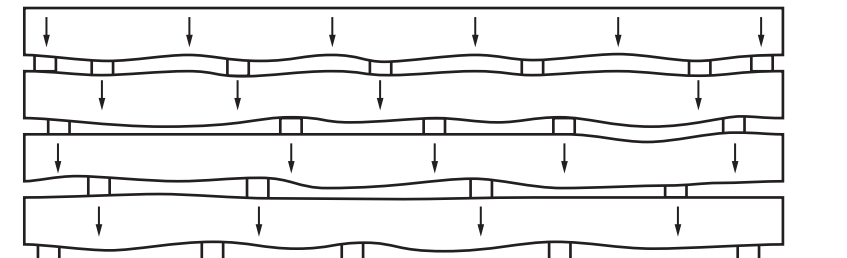
Diagram No. 2 shows the recommended number of supports for various lengths of board, regardless of thickness. With slow-moving items that require prolonged storage, the problems of wavy-edged boards can be solved by reducing the span between risers to 28" or less. Materials used for supports should be 4" in width. Take great care in placing the risers and, as the units are tiered, align the risers from bottom to top so that each tier rests on solid bearing.

Dry storage is essential and weather protection should be provided for all gypsum products in storage.

DIAGRAM NO. 1



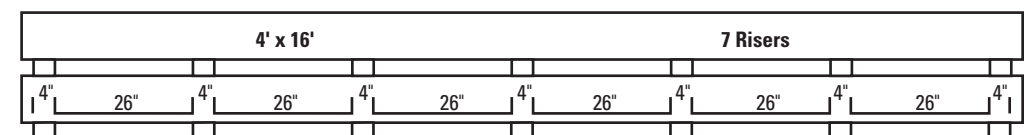
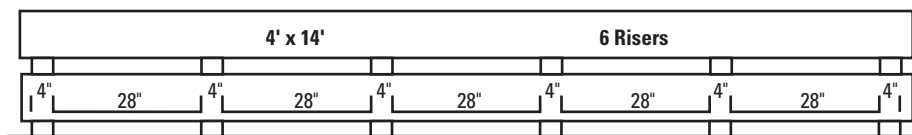
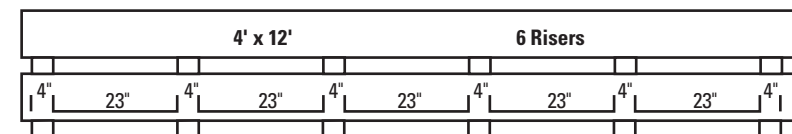
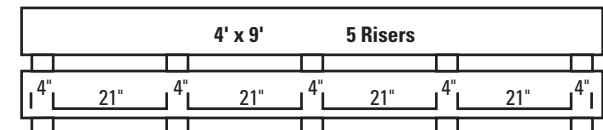
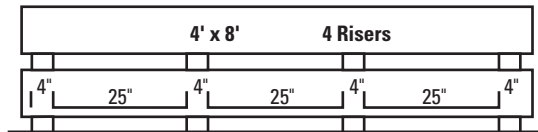
CORRECT METHOD OF PLACING RISERS



INCORRECT METHOD OF PLACING RISERS

(ARROWS INDICATE CUMULATIVE PRESSURE ON LOWER UNITS CAUSING SAG OF WALLBOARD)

DIAGRAM NO. 2

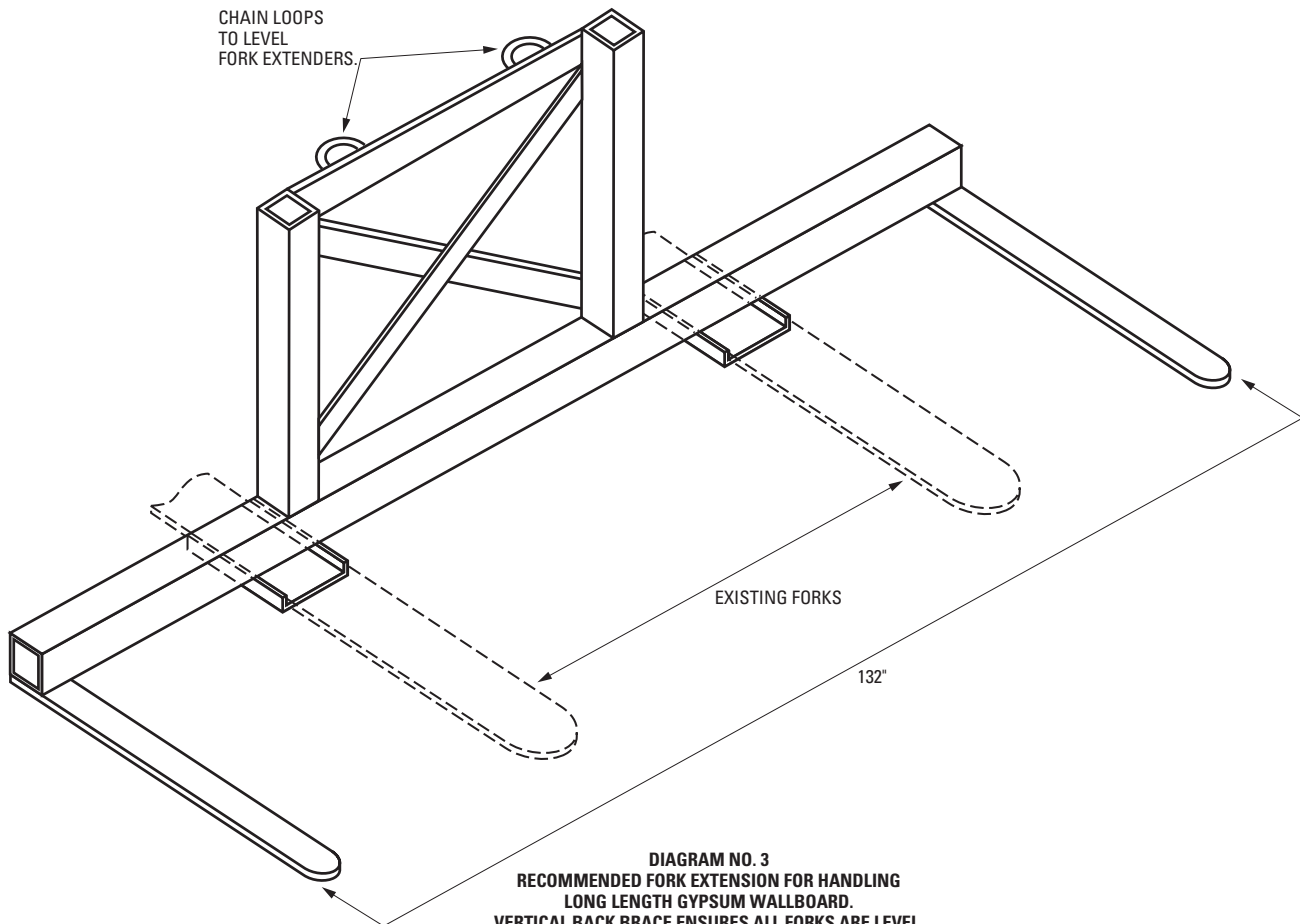


NOTE 1) THE NUMBER OF RISERS AS RECOMMENDED APPLIES TO ALL THICKNESSES OF BOARD OF THAT SPECIFIC LENGTH.

2) MINOR ALTERATIONS IN LOCATION OF RISERS MAY BE REQUIRED TO ADAPT TO DIFFERENT FORK SPACING.

TIPS FOR STORAGE, HANDLING AND USE

1. Storing panels indoors is desired. Keep them clean and dry.
2. Rotate stock — first in, first out. Rotate all gypsum boards at least every six months.
3. During periods of cold weather, bring the next day's material inside to warm up before use.
4. Regularly check pallets (if used) for damage and loose nails or screws. Repair and resurface as needed.
5. When putting units of boards on pallets, pull forks straight out — slowly and gently — as unit is lowered to surface of pallet. Do not drop! Use fork extenders. (See Diagram No. 3)
6. When stacking loaded pallets, set them flat on the one underneath and keep them in vertical alignment with each other to avoid damage. Maximum height should be no more than four loaded pallets.
7. Keep ceiling jig clean and in good repair. Re-level and/or resurface as needed.
8. When laying out ceiling boards, do not drop one board over another. This can cause a core fracture in the dropped board. In addition, do not drop boards onto the ceiling jig; this also can fracture the board core.
9. Do not drag Seaspray Hi-Strength MVR panels face down over the ceiling jig, because this may damage the surface. Also avoid this with regular ceiling board because the face of the board may be damaged.
10. When pulling a panel off a unit to lay out on the jig, do not drop the board on its edge. Instead, set it down carefully. Dropping the board on its edge will crush the core and can break the paper.
11. Avoid walking on ceiling board and do not throw rafters or lumber on the back side. This can break the gypsum core.
12. Clean any leakage of foam adhesive from the face of the panels, to avoid damage to the paint finish or face paper.
13. If it is necessary to cut or rip a Seaspray Hi-Strength MVR panel, cut from face side and snap. Then cut back paper. This will minimize damage to the paint coat on the face.
14. For best results, Seaspray MVR paint should be kept fresh. Keep cans closed tightly. Before using, shake can thoroughly and stir to mix pigment, which may have settled.



STA-SMOOTH® BRAND HI-STRENGTH (HS) JOINT COMPOUND



GENERAL INFORMATION

Sta-Smooth HS is a high-strength, quick-setting compound developed by National Gypsum specifically for the manufactured housing industry. Designed primarily for ceilings, Sta-Smooth HS minimizes the costly cracking that often occurs when ceiling panels are moved for assembly.

Unlike other compounds, Sta-Smooth HS develops its high strength within the first hour of application, minimizing the potential for cracks and fractures. Sta-Smooth's quick-setting formula also promotes quality and efficiency on the production floor. One coat of Sta-Smooth HS Compound is normally all that is required when the surface is to be spray-textured.

ProForm® BRAND spray textures can be sprayed on the treated joint the moment the compound is hard, but not dry. Spraying can begin from the time the compound is set.

For best results, Sta-Smooth HS must be used in combination with reinforcing tapes such as Sta-Smooth HS Tape or ProForm Paper Joint Tape. For unsprayed ceilings, Sta-Smooth Lite is recommended as a second coat prior to stomp/knockdown or smooth finish.

Spray textures on ceilings create a monolithic look while concealing minor surface imperfections and irregularities.

FEATURES/BENEFITS

- Sta-Smooth HS Joint Compound develops its high strength in less than one hour, minimizing the potential for cracking.
- Available in five working-set times to meet industry needs.
- Packaged in easy-to-carry 25-lb. (11.3 kg) bags.
- When a spray texture is specified for ceilings, the usual second coat of compound can be eliminated, saving time and labor.
- Noncombustible.

SPECIFICATIONS

Sta-Smooth HS is available in the following working and setting times: (It is difficult to regulate setting-times to the exact minute; time ranges are used when discussing setting-type joint compounds.)

Product	Working Time (Min.)	Setting Time (Min.)
HS 15	10-15	15-20
HS 20	10-20	20-25
HS 30	15-30	25-35
HS 45	25-35	35-55
HS 60	45-60	45-65

Coverage: 45-55 lbs/1,000 sq. ft. (22-27 kg/100m²)

Note: Compound hardens and chemically sets before it completely dries. Always close bags as airtight as possible. Do not mix with any other material.

GENERAL APPLICATION

When mixing the compound with water, use only clean, drinkable water. Use of dirty water or other materials could result in inconsistent set times and possibly no bond to the wallboard. Clean mixing equipment and tools thoroughly between batches. Material should not be overmixed; this will result in shortened working times.

Sta-Smooth HS should not be used over another product until the first coat is set hard to the touch.

Each coat of Sta-Smooth HS must be set hard to the touch before adding a second coat or a vapor barrier spray.

Apply Sta-Smooth HS Joint Compound at a heavy consistency, making sure to completely fill the wallboard joint through the tape. For optimum results, use Sta-Smooth HS Tape or ProForm Paper Joint Tape.

As soon as Sta-Smooth HS starts to harden, shave off all trowel, knife or joint marks or excess compound using a 6" finishing knife. Do not wait to smooth out marks and protrusions or the compound will be extremely difficult to sand.

If the surface will not be textured, apply a second, wider coat of Sta-Smooth Lite Joint Compound. Sta-Smooth Lite is a lightweight setting compound that produces a smooth, easy-to-sand finish.

Once a second coat has been applied, feather all edges and finish the surface smooth and level. The wet sponge sanding method offers excellent results, avoids creating dust and can be started as soon as the compound has hardened.

When ProForm spray textures will be applied, the second coat of compound can be eliminated. This saves valuable time and labor in assembly-line operations.

Sta-Smooth HS can be decorated with either a good-quality wall or ceiling paint or a spray texture. Apply paint after priming according to the recommendations of the paint manufacturer. ProForm spray texture products can be used as directed after priming with an alkyd flat paint or a vapor barrier seal.

STA-SMOOTH® LITE BRAND JOINT COMPOUND



GENERAL INFORMATION

Sta-Smooth Lite is 30% lighter than Sta-Smooth HS and features excellent workability and easy sanding. Its primary use is as a finish coat over joints on walls and untextured ceilings. It is not intended for taping.

As with Sta-Smooth HS, Sta-Smooth Lite's quick-setting formula also promotes quality and efficiency on the production floor.

FEATURES/BENEFITS

- Easy mixing.
- Easy sanding.
- Available in five working-set times to meet industry needs.
- Noncombustible.
- Intended primarily for finish coat over joints.
- Packaged in easy-to-carry 18-lb. (8.2 kg) bags.

AVAILABILITY

Entire U.S.

SPECIFICATIONS

Sta-Smooth Lite is available in the following working and setting times:

Product	Working Time (Min.)	Setting Time (Min.)
Lite 5	5	8-12
Lite 20	10	20-30
Lite 45	30	35-55
Lite 90	70	75-100
Lite 210	170	180-220

Coverage: 45-55 lbs./1,000 sq. ft. (22-27 kg/100m²)

Note: Compound hardens and chemically sets before it completely dries. Always close bags as airtight as possible. Do not mix with any other material.

GENERAL APPLICATION

Sta-Smooth Lite should not be used over another product until the first coat is set hard to the touch.

As noted previously, Sta-Smooth Lite is not recommended for prefilling or taping joints in a manufactured housing production environment. Therefore, use of this product should be limited to the finish coat of the joints.

When mixing the compound with water, use only clean, drinkable water. Use of dirty water or other materials could result in inconsistent set times and possibly no bond to the wallboard. Clean mixing equipment and tools thoroughly between batches. Material should not be overmixed; this will result in shortened working times.

When applying finish coat, feather all edges and finish the surface smooth and level. The wet sponge sanding method offers excellent results, avoids creating dust and can be started as soon as the compound has hardened.

After walls or ceilings are sanded, paint or texture may be applied.

Allow Sta-Smooth Lite to set hard to the touch before sanding or decorating.

TEXTURE PRODUCTS (AGGREGATED)

PROFORM® BRAND PERFECT SPRAY® ■ PERFECT SPRAY® II



GENERAL INFORMATION

ProForm® Perfect Spray and Perfect Spray II are decorative texture products for fast application to interior ceiling surfaces. Their shredded polystyrene aggregates give these texturing products greater whiteness, better hide and bold accent.

Perfect Spray Texture is a decorative texture product for fast spray application to interior surfaces. Its shredded polystyrene aggregate gives this texturing product greater whiteness, better hide and bold accent. Perfect Spray's texture effectively hides minor surface defects and irregularities.

Perfect Spray II is a competitively priced interior ceiling texture designed for fast spray application. Its white appearance effectively hides minor surface defects and irregularities.

They readily mix with water to deliver the consistency and application control desired.

AGGREGATE SIZE

Perfect Spray

- Coarse, Medium, Fine

Perfect Spray II

- Coarse

FEATURES/BENEFITS

- Shredded polystyrene aggregate.
- Easy mixing, low fallout.
- Designed to work with standard spray equipment.
- Excellent hide characteristics.

SPECIFICATIONS

Bag size	Coverage
40 lbs. (18.1 kg)	300-400 sq. ft. (27.6-36.8 m ²)

Note: Coverage will vary with the type of equipment used and the type of finish desired. Good hide and appearance can be accomplished if it is applied at a rate not to exceed 8-10 sq. ft./lb. (1.6-2 m²/kg). At coverage rates less than 8 sq. ft. per pound, two coats are recommended. Allow the first coat to dry thoroughly before applying the second.

GENERAL APPLICATION

Temperatures should be maintained at a minimum 50°F (10°C), both day and night, before and during spray operations and until sprayed surfaces have fully dried.

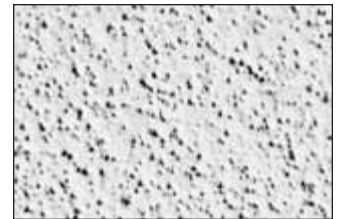
Adequate ventilation should be provided to eliminate excess moisture in the spray booth will aid in drying and will help prevent many problems associated with slow drying of water-based texture products. Use of a respirator and eye protection is recommended during spray application.

Gypsum wallboard: Surfaces, including joint treated areas, must be smooth, clean and dry. First, apply and coat of good quality, sealing latex primer. Mask appropriate areas before spraying, and promptly remove overspray from unprotected surfaces afterward.

Spray textures should not be applied over a vapor barrier spray which is not dry.



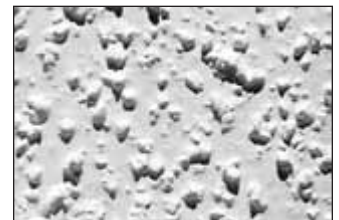
Perfect Spray Ceiling Texture
-Coarse



Perfect Spray Ceiling Texture
-Fine



Perfect Spray Ceiling Texture
-Medium



Perfect Spray II Ceiling Texture

Low Pressure: Hopper-type hand guns should have nozzle openings of 1/4" to 3/8" and operating pressures of 20-30 psi.

High Pressure: Pole guns should have nozzle openings of 1/4" to 3/8", feed pressure of 40-60 psi and air pressure of 80-120 psi at the tank. (As a general rule, air pressure at the tank should be twice that of the material pressure.)

Caution: Avoid creating dust. When mixing, ventilate area, wear eye protection and a NIOSH- or MSHA-approved respirator for dust. Keep out of reach of children.

Note: These are general instructions. Complete, easy-to-follow application guidelines are printed on all bags of ProForm drywall textures. Close adherence to instructions for surface preparation and priming will avoid the problems of color variation, bleeding or sagging and will permit the texture to achieve its full potential.

TEXTURE PRODUCTS (NON-AGGREGATED)

PROFORM® BRAND PERFECT SPRAY® EM ■ PERFECT SPRAY® HF



GENERAL INFORMATION

Perfect Spray EM and Perfect Spray HF are non-aggregated spray textures used to create a wide range of textures for wall and ceiling surfaces.

Perfect Spray EM is specially formulated for easy mixing and easy pumping.

Perfect Spray HF mixes and pumps easily and dries to a harder finish.

FEATURES/BENEFITS

- Designed to work with standard spray equipment.
- Excellent pumpability.
- Wide array of patterns: spatter, spatter knockdown, and orange peel.
- Used for both walls and ceilings.

SPECIFICATIONS/MIXING

Sizes:

Perfect Spray EM

Bag Size: 50 lb. (22.7 kg)

Coverage: 500-1,500 sq. ft./bag
(46.5-139.2 m²/22.7 kg)

Perfect Spray HF

Bag Size: 40 lb. (22.7 kg)

Coverage: 400-1,200 sq. ft./bag
(46.5-139.2 m²/22.7 kg)

Note: Coverage of Perfect Spray EM and Perfect Spray HF will vary with the type of equipment used and the type of texture desired.

GENERAL APPLICATION

SPRAY EQUIPMENT

Low Pressure: Application can be accomplished by using Hopper-type hand guns with nozzle openings of 3/16" to 1/4" and adjusting operating pressures and consistency of mix to achieve desired texture effects.

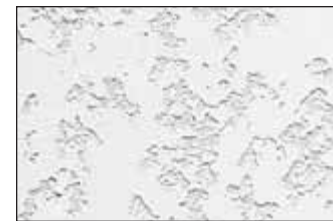
High Pressure: Application using a spray texture gun fed by a piston pump, a Mayno-type pump or a bottom outlet pressure pot. Spatter size can be changed by adjusting atomizing pressure and consistency of mix. Higher atomizing pressure and thinner mix will result in smaller spatter while lower atomizing pressure and heavier mix will give a larger spatter.

Caution: Avoid creating dust. When mixing, ventilate area, wear eye protection and a NIOSH- or MSHA-approved respirator for dust. Keep out of reach of children.

Note: These are general instructions. Complete, easy-to-follow application guidelines are printed on all bags of Perfect Spray EM or Perfect Spray HF. Close adherence to instructions for surface preparation and priming will avoid the problems of color variation, bleeding or sagging, and will permit the texture to achieve its full potential.



Perfect Spray EM/HF
-Orange Peel



Perfect Spray EM/HF
-Spatter + Knockdown



Perfect Spray EM/HF
-Spatter

TEXTURE PRODUCTS (NON-AGGREGATED)

PROFORM® BRAND ALL PURPOSE READY MIX ■ MULTI-USE ■ TOPPING



GENERAL INFORMATION

ProForm All Purpose Ready Mix, Multi-Use and Topping is primarily used in manufactured housing for texturing walls and/or ceilings when a “stomp or knockdown” look is desired. They can also be used for complete joint finishing of gypsum wallboard applied to walls.

Due to the manufactured housing industry’s need for extra joint strength and timed drying, these products are not usually recommended for use on ceilings.

FEATURES/BENEFITS

- Ready to use.
- Excellent adhesion/bond.
- Versatile.

SPECIFICATIONS

Sizes:

- Multi-Use**
4.5 gal. (17L) pail
4.5 gal. (17L) carton
3.5 gal. (13L) carton

Topping

- 50 lb. (22.7 kg) carton
61.7 lb. (28 kg) pail

All Purpose

- 48 lb. (21.7 kg) carton
50 lb. (22.7 kg) carton
61.7 lb. (28 kg) pail
61.7 lb. (28 kg) carton

SPECIFICATIONS

If ProForm Ready Mix product freezes, allow material to thaw at room temperature for at least 24 hours. When thawed, turn the container upside-down for at least 15 minutes. Turn pail right side up, remove lid, and immediately remix with an electric drill. ProForm Ready Mix products should be lump-free and ready to use within 1 minute. Discard all ProForm Ready Mix products that do not remix to a lump-free consistency.

GENERAL APPLICATION

Temperatures should be maintained at a minimum 50°F (10°C), both day and night, before and during spray operations and until sprayed surfaces have fully dried.

Adequate ventilation should be provided to eliminate excess moisture in the spray booth, will aid in drying and will help prevent many problems associated with slow drying of water-based texture products. Use of a respirator and eye protection is recommended during spray application.

Gypsum wallboard: Surfaces, including joint treated areas, must be smooth, clean and dry. First, apply a coat of good quality primer. Mask appropriate areas before spraying, and promptly remove overspray from unprotected surfaces afterward. Follow the instructions of the spray equipment manufacturer for adjusting controls and cleaning. If a second coat is desired, allow the first coat to dry completely. Surface then must be painted after texture is dry.

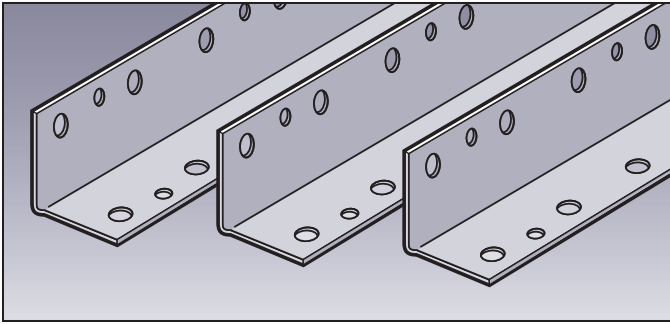
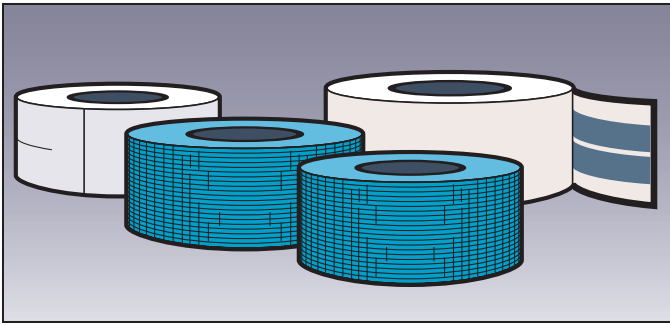
ProForm Ready Mix products may be hand-applied to the ceiling from a flat surface or may be thinned slightly with water and spray-applied.

If spray application is chosen, adequate equipment should be used and adequate control of air pressure should be available. By adjusting mixture consistency and/or varying the air pressure, ProForm Ready Mix creates an almost endless variety of textures, the most typical of which are Spray Spatter, Spatter Knock-Down and Orange Peel.

Caution: Avoid creating dust. When mixing, ventilate area, wear eye protection and a NIOSH- or MSHA-approved respirator for dust.

ProForm Ready Mix products are not considered a finished surface, but need no further preparation in order to be painted.

FINISHING ACCESSORIES



ProForm® BRAND Paper Joint Tape — Joint tape conceals and reinforces wallboard joints. The tape is buffed on both sides to ensure the best working qualities and bond. A center creasing process allows easy folding for use at corners. 75', 250' and 500' rolls.

Sta-Smooth® BRAND HS Tape — A 2" wide, self-adhering fiberglass tape for use with Sta-Smooth compounds. 300' per roll. Not recommended for use with ProForm Ready Mix (drying-type) joint compounds.

ProForm® BRAND Multi-Flex Tape Bead — A combination of joint tape and metal strips laminated to form an outside or inside corner for gypsum wallboard. It is particularly recommended for inside corners on cathedral ceilings, kneewalls, stairways or any outside or inside corner less or greater than 90°. It is applied with the metal side to the face of the gypsum wallboard and is embedded into the joint compound. 100' per roll.

Wallboard Cornerbead
Designed for use with all wallboard thicknesses. Galvanized steel. Manufactured to meet ASTM C 1047.

WALLBOARD CORNERBEAD

Size	Stocked Length	Pieces/ Carton	Feet/ Carton	Weight 1,000 lin. ft. (305 m)
1-1/4" x 1-1/4"	8' (2438 mm)	63	504	137 lbs. (62 kg)
(31.75 mm x 31.75 mm)	10' (3048 mm)	50	500	137 lbs. (62 kg)

PROBLEMS AND SOLUTIONS

CONDITIONS	PROBABLE CAUSE	PREVENTIVE ACTION	CORRECTIVE ACTION
GYPSUM BOARD PROBLEMS			
Wavy board	Improper storage/slow stock rotation (less than 3 months)	Be sure gypsum is stored indoors, and kept dry. Risers must be spaced properly, and be vertically aligned.	If using foam adhesive application, store the gypsum on a flat surface, possibly on long length wood pallets. Keep on this surface for several days prior to using. If a mechanical attachment is used, simply decrease fastener spacing to "pull" gypsum to rafters, thereby flattening gypsum board.
Uneven joints (See "High joint" for finishing)	Debris on the ceiling jig. Unlevel ceiling jig. Wavy board.	Keep ceiling jig clean and free of debris. Re-level and resurface as needed.	Store board properly. Tape joints on the back side to minimize foam adhesive leaking through to the ceiling jig.
Foam adhesive leakage between gypsum boards	Warped rafters, or rafters with excess camber. Unlevel or unclean ceiling jig.	Apply 3/4" masking tape over joints on back side of board prior to laying rafters on them. "Stitch stapling" of joints on back side helps to keep boards in position while rafters are positioned. Check rafters regularly – bottom chords should be flat and straight, with the least camber possible.	Clean leakage off front of board, taking extra care not to damage paint/texture finish when using Seaspray MVR.
Wet board	Poor storage area that is not protected from weather.	Store gypsum board in covered, dry area.	Gypsum board may be used if it is only damp, and is allowed to dry completely. If board exhibits any of the following qualities, do not use it: board is wet with stains on face; mildew is present; gypsum core is separating from paper.
Gypsum core fracture	Rough handling. Dropped board on its edge, or dropping one board across another.	Do not allow board to be dropped on ceiling jig. Lay out panels with care. Avoid walking on back of board while on ceiling jig unless jig has a solid, flat surface.	Cracks less than 12" in length can be finished with joint compound. Small Seaspray Hi-Strength MVR cracks can be filled with DAP tub and tile caulk and covered with touch-up paint. Cracks greater than 12" in board should result in board replacement.
Cracks in field of board created during ceiling movement in plant	Ceiling hoists not picking up tops uniformly. Inadequate support of top. Excess flexing due to lightweight side or edge rail. Inadequate or incorrectly positioned splice blocks.	Provide an adequate number of pick-up points in the hoist. Synchronize hoist motors. Use 2"x3" or 2"x4" instead of 1"x3" or 1"x4" for side or edge rail. Splice blocks should not be positioned at the same place on opposite sides of the top, or at the transition areas between vaulted and flat ceilings.	Small cracks (less than 12" in length) can be finished with joint compound. Small Seaspray Hi-Strength MVR cracks can be filled with DAP tub and tile caulk and covered with touch-up paint. Large cracks (greater than 12") in board should result in board replacement.

CONDITIONS	PROBABLE CAUSE	PREVENTIVE ACTION	CORRECTIVE ACTION
Seaspray texture “skips” (no paint/texture in areas of the board)	Manufacturing defect.	Immediately notify National Gypsum, or its distributor. It will be necessary to communicate the manufacturing code (on the back of the board), and save a sample showing the problem.	If ceiling is already up, use touch-up paint on all spots. If areas requiring touch-up are excessive, it may be necessary to paint entire ceiling. If problem is noticed prior to laying board on jig, do not use.
Seaspray texture appears “scuffed” or nonexistent on areas of board (board is totally covered with paint, but texture is not evident in areas)	Rough handling of board. Dragging face of Seaspray Hi-Strength MVR across ceiling jig.	Handle board carefully when laying out on ceiling jig.	Use Seaspray MVR touch-up paint on affected areas.
Seaspray touch-up paint not matching board finish	Old touch-up inventory. Paint is not properly mixed.	Turn inventory – if paint is older than 3 months, it should not be sold. Prior to use, shake and stir paint thoroughly to mix pigment.	Mix paint thoroughly. If it does not match, contact local distributor or National Gypsum immediately for fresh paint.
Sag	Failure to prime prior to texturing allowing board to absorb excess moisture. Excess insulation weight. Condensation in roof cavity.	Prime ceiling prior to texturing. Use a HUD-approved vapor barrier. Support insulation weight independent of gypsum. Use framing 16" o.c., or 1/2" High Strength Ceiling Board where 24" o.c. rafter spacing is desired.	Replace ceiling board and employ preventive actions.
Sag	The addition of excessive water to blown-in cellulose insulation.	Care must be taken to follow the insulation manufacturer’s specifications on addition of water.	Replace ceiling board and employ preventive actions.
JOINT PROBLEMS			
Tape photographing	Slow drying of finishing coats. Too much compound under tape. Joint compound too thin. Overthickness of edges of tape. Tape too absorbent.	Correct drying conditions. Embed tape properly. Use joint compound thicker. Use ProForm Joint Tape.	Sand down the tape outline and seal. Refloat if necessary before decoration. Prevent finish coat moisture from rewetting the tape by applying a thinner coat for fast drying.
Starved joint	Compound applied too thin in viscosity and thickness. Too little compound over joint. Excessive sanding.	Use finishing compound at heavier viscosity and proper thickness of coats. Do not oversand.	Allow to dry thoroughly, then apply an additional coat of topping or joint compound.
High joint	Excess joint compound under or over the tape and improper feathering. Poor framing. Improper wallboard application. Improper sanding. Use of compound too heavy.	Proper thickness of compounds for taping and finishing. Feather finishing coats wider than previous coats. Correct poor framing and improper wallboard application to ensure proper alignment. Sand properly.	Sand joint to near flush without sanding into tape. Apply a wider finishing coat properly feathered, if necessary. Apply a second finishing coat or skim coat.
Beading	Lumber expansion and contraction. Improper heating and ventilation. Cold weather with high humidity. Improper application of wallboard. Excess compound over joints and needless wide joints. Delayed shrinkage. Rough or poorly cut butt joint.	Use Sta-Smooth System to minimize beading or ridging. Alternatives include double-layer lamination system.	Allow one full heating cycle — six months to one year — before repairing. Sand ridge flush and apply one or more finishing coats of joint or topping compound. Use critical lighting to determine if bead is eliminated prior to decoration.

CONDITIONS	PROBABLE CAUSE	PREVENTIVE ACTION	CORRECTIVE ACTION
FASTENER PROBLEMS			
“Nail pops”	Framing out of alignment. Lumber shrinkage. Improper wallboard application. Improper heating and ventilation.	Provide heat and ventilation to dry framing lumber. Align framing lumber. Nail center of wallboard first. Hold wallboard firm to nailing member when nailing. Use proper nails. Systems recommended to reduce or eliminate nail pops include double-layer lamination, double nailing system, floating angle system, adhesive nail-on system and screw application.	When nail pops occur before decoration, repair immediately. If problem occurs after decoration, repair after framing lumber is dry (usually one heating cycle). To repair, drive a 1-1/4" drywall nail 1-1/2" from each side of popped nail while holding wallboard firm to the nailing member. Countersink popped nail, remove loose joint compound, then apply finishing coats of joint or topping compound.
Depressed nails or staples	Framing out of alignment. Lumber expansion due to moisture absorption. Improper wallboard application. Too few nails, improper furring, structural movement. Nails or staples fastened too deeply.	Align framing lumber. Allow dry lumber to become acclimated. Correct wallboard application as described for nail pops. Use proper nail spacing. When furring, use no less than 2" x 2". Use systems recommended to reduce or eliminate nail pops. Avoid fracturing paper when driving nails.	Repair as described for nail pops, unless most nails are depressed and wallboard is loose (usually ceilings). Renail entire surface using proper spacing. Dimple depressed nails and apply finishing coats of joint or topping compound.
PAPER PROBLEMS			
Joint blisters	Too little joint compound under tape. Joint compound too dry before embedding tape. Improper bedding of tape into joint compound. Loss of bond (see bond failure). End ply separation. Ruptured wallboard ends or edges. Joints too wide and unfilled.	Follow joint compound mixing and application instruction. Embed tape properly into ample joint compound. Cut out any ruptured ends or edges of wallboard and fill all wide holes and joints with Sta-Smooth HS prior to taping (see end ply separation).	Repair tape blisters by slitting and filling with joint compound and smooth out with finishing knife. Cut out other loose areas, fill with joint compound when necessary. Let dry, then retape and finish.
Wallboard blisters	Usually caused by ruptured board or a manufacturing flaw.	Check field of board prior to decoration for imperfections. Make any necessary repairs.	Before decoration, cut out loose area and fill flush with joint compound, if deep. Tape and finish. After decoration, use a PVA glue to fill blister adequately to ensure good bond. Roll smooth with small, dry paint roller.
CRACKING PROBLEMS			
Cracking	Adverse drying conditions. High temperatures and low humidity and drafts, or low temperatures and high humidity. Joint compound applied in excessive thickness.	Fill all wide wallboard joints with Sta-Smooth HS. Correct drying conditions. Apply joint or topping compound less thickly, but use more coats. Allow thorough drying between coats.	Additional coats of joint or topping compound will fill the cracks without reoccurrence.
Inside corner cracking	Joint too wide or not filled. Improper drying between coats. Excess thickness of compound over tape at apex of corner. Extremely fast or slow drying conditions. Applying compound to both sides of inside corner at same time.	Fill wide joints with Sta-Smooth HS prior to taping. Embed tape properly and allow to dry. Apply compound to one side and allow to dry, then treat other side.	Fill wide cracks with joint or topping compound. For hairline cracks, run a pointed object (10D or 16D nail) along the apex of corner with adequate pressure to close crack.

CONDITIONS	PROBABLE CAUSE	PREVENTIVE ACTION	CORRECTIVE ACTION
Bond failure	Improper heating and drying conditions. Dry powder compounds used too soon after mixing. Use of compounds that have been mixed for a prolonged period of time. Old stock. Excessive thinning of compounds. Too little compound under tape. Unbuffered joint tape. Oily surfaces. Poor-quality compound. Mixing with dirty or excessively cold water. Compound too dry before embedding tape.	Proper drying conditions. Mix in clean container with clean tap water and allow to stand for 20-30 minutes, then remix before using. Rotate stock. Avoid using dry powder compounds that have been mixed longer than 48 hours. Avoid overthinning of compound and removing too much compound from under tape.	Remove all loose joint tape and compounds by sanding or scraping and repair as necessary.
Discoloration, banding, dirt collection	Dirt collection may occur more rapidly over nail or screw heads, nailing members or over voids in insulation due to a greater heat loss and condensation.	Two-layer laminated system. Foil-backed gypsum board. Proper insulation. Eliminate protrusion of nails through wood furring on exterior walls and ceiling.	Wash or repaint. Decrease dust particles in the air by filtration in forced-air heating and exhaust fans in kitchen.
Variations in surface textures	Failure to sand properly, causing scratching of compound and scuffing of the wall-board paper. No primer or poor-quality primer. Overthinning of primer. Spray application of primer.	Use finer-grit sandpaper with care to prevent raising nap of paper. Use wet sanding method. Prime all surfaces with a quality primer as directed. Brush or roll primer. Back roll after spray application.	When condition exists after painting, sand as necessary and prime before finish coat of paint.
Joint darkening or lightening	Joints not dry when painted. Painting under humid conditions. Painting with low-grade latex paints. Suction variations of joint compounds.	Allow joints to dry thoroughly. Avoid painting in extremely high humidity. Prime entire surface with sealing primer prior to applying texture finish as finish decoration. Apply two coats of good-quality paint.	Allow thorough drying. Select test area where condition is more prevalent and repaint with good-quality sealing primer. If condition persists, prime and seal affected areas with a good-quality primer, then repaint.
Joint yellowing	Slow drying. Fumes from partially combusted gases. Painting over wet joints and high alkaline material.	Use permanent heat in cold weather. Avoid painting over wet joints. Avoid painting in high humidity.	Repaint with good-quality alkyd flat paint after all joints are thoroughly dry.
TEXTURING PROBLEMS			
Lumping	Too much water added to initial mix. Adding water to powder.	Add powder to water using less water than initially specified. After mix is smooth and lump-free, add remaining water to adjust mix to a workable viscosity.	Add powder until mix thickens. Continue mixing until lumps disappear.
Mix too thin	Too much water added in initial mix or inadequate soaking time in cold water.	Use recommended water requirements in initial mix. Allow mixed ingredients to soak for several minutes, when necessary, if using cold water.	Add powder until mix thickens.

CONDITIONS	PROBABLE CAUSE	PREVENTIVE ACTION	CORRECTIVE ACTION
Aggregate fallout (during spraying)	Spray gun too close to surface and/or excessive air pressure at nozzle.	Hold spray gun at proper distance and angle from surface to prevent fallout.	Lower air pressure. Hold spray gun at proper distance and angle from surface to prevent fallout.
Aggregate floatout	Too much water added during initial mix and/or inadequate mixing after initial water is added.	Use recommended water requirements and make sure water is properly blended into mix.	Add powder until mix thickens.
Poor coverage	Mix too thick for proper spray viscosity and/or improper application such as spraying too slow, overloading surface with spray material and using incorrect spray pressures.	Use recommended water volume for mixing to ensure sprayable viscosity. Use proper spray application to ensure uniform dispersion of aggregate and proper coverage.	Carefully add water to mix. Use proper spray techniques. Adjust spray pressure.
Poor hide	Overthinned mix, causing a reduction in both wet and dry hide. Mix too thick, causing poor atomization that results in surface show-through. Improper application/overextending spray. Selecting improper spray pressures. Failure to prime.	Use recommended water volume for mixing to ensure sprayable viscosity. Use proper spray application to ensure uniform dispersion of aggregate and proper coverage.	Add powder or water depending on mix consistency. Adjust spray pressure. Use proper spray technique.
Poor bond or hardness	Overthinned mix results in overdilution of latex binder in spray texture. Improper surface preparation. Contamination with other materials.	Use recommended water volume for mixing. Remove all loose materials, dust, grease and oil, and prime surface with a quality primer. Do not intermix with other products. Always use a clean mixing container and clean water.	Scrape down surface and repeat application following recommendations under "Preventive Action."
Clogged spray equipment	Contamination of mix with oversized particles can sometimes clog spray nozzle orifice.	Prevent contamination during mixing and spraying. Use correct nozzle size for aggregate being sprayed.	Check mix for contamination and/or oversized particles. If contaminated, screen out contaminants or discard and mix new batch.
Material pumping problems	Mixed spray material too heavy. Pump equipment old and worn. Equipment improper size for spray product.	Use recommended water volume for mixing. Make sure proper equipment is being used and that spray machine is in good repair.	Thin mix if too heavy for pumping.
Unsatisfactory spray pattern	Worn spray equipment (either fluid or spray nozzle) and/or improper air pressure. Improper spray technique and/or poor spray mix consistency.	Inspect spray nozzles to ensure good working condition. Replace any worn parts.	Improve spraying technique. Add recommended water volume to ensure proper spraying consistency.

CONDITIONS	PROBABLE CAUSE	PREVENTIVE ACTION	CORRECTIVE ACTION
Texture build-up	Spraying or texturing over surfaces with major differences in surface porosity or suction (improperly primed). Thin texture will tend to build up over high-suction surfaces.	Prime entire surface with a good-quality sealing latex primer during periods of cool, humid, slow-drying weather.	Remove all texture from sprayed surface and reapply following instructions under "Preventive Action."
Joint show-through	Overextended and overthinned material won't adequately hide the contrast between finished joints and gypsum wallboard paper.	Use recommended water volume when mixing texture and apply at recommended coverage rates. Prime surface with sealing primer prior to application of spray texture.	Allow spray to dry thoroughly, then prime and respray.
Joint shows through as white band	Spraying over unprimed surfaces during cool, humid, slow-drying conditions. Joint stays white, water solubles in gypsum wallboard paper bleed through.	When texture dries, paint entire textured surface. Prime surface with a good-quality sealing latex primer before applying texture.	Allow spray to dry thoroughly, then paint textured surface.
SHRINKAGE PROBLEMS			
Shrinkage	Compound used too thin or watery. Applied too soon after mixing. Improper drying between coats. Painting before joints are thoroughly dry. Too deep fills in one coat. Slow drying.	Use compound at heaviest workable consistency. Allow to stand before using. Allow thorough drying of compound between coats and prior to painting. Apply additional coats on deep fills. Provide proper drying.	Allow to dry thoroughly and recoat. Provide proper drying.
Delayed shrinkage	Improper drying conditions. Painting before compound and wallboard are thoroughly dry. Under high humidity or slow drying conditions, joints and wallboard may hold moisture for weeks.	Provide proper drying conditions. Allow complete drying before each coat of joint treatment and before repainting.	Allow to dry thoroughly and recoat affected joints.
Misinterpreted shrinkage	Improper wallboard application including: nails dimpled too deep, fractured core of wallboard, fractured face paper, cornerbead applied improperly, tape photographing, defective wallboard-high shoulders. Overcalcined core.	Less dimple of nails. Press wallboard snug to nailing member before dimpling nails. Renail where necessary. Use Sta-Smooth HS compound for at least the first coat on nails and cornerbead. (See tape photographing.)	Nails: Renail where necessary. Cut out any loose areas and fill with two or more coats of Sta-Smooth HS or regular joint compound. Recoat cornerbead. (See joint photographing.)

CONDITIONS	PROBABLE CAUSE	PREVENTIVE ACTION	CORRECTIVE ACTION
MISCELLANEOUS PROBLEMS			
Putrefaction	Compounds mixed with contaminated water, dirty mixer or pails. Mixed compounds allowed to stand for prolonged period of time. Hot weather.	Use clean water and clean mixing equipment. Avoid water used for soaking and cleaning tools. Avoid exposure of bagged compound to sun for extended periods.	Do not use compounds that have started to putrefy.
Pock marking	Entrapment of air in the mixed compound and in application. Overmixing of compound. Compound mixed too thinly. Heavy fills. Improper application technique. Compound applied too loosely.	Mix compound as quickly as possible and let stand until binder is in solution before remixing. Mechanical mixers should have 500 RPM maximum. Use heavier mix. Make additional passes over joints and bead with hand or mechanical tools. File trowel edges square regularly to avoid entrapment in application. Apply compound thinly and use more pressure on finish coat.	Remove sanding dust that may collect in "pocks" prior to painting and refloat joint as necessary. When condition exists after painting, float with compound and repaint.
Let down	Too much water used in initial mix of dry powder compound. Extremely cold water and/or compound.	Use no more water than directed for mixing. Store compound in heated area in winter. Use water with temperature above 60°F. Mix powder in water to very heavy consistency. Allow to stand (winter, 30 minutes; summer, 15-20 minutes), then remix.	Add additional powder and mix to a heavier consistency than required. Allow to stand (winter, 30 minutes; summer, 15-20 minutes), then remix.

Note: During October 1994, HUD revised the "Heating and Ventilation" section 3280.504 so that the omission of the ceiling vapor retarder in climate Zone 1 is permitted if certain other ventilation requirements are met. In climate Zones 2 and 3, a vapor retarder will still be required in all ceilings.

Ceiling board which is to be textured in plant must be primed with a sealing drywall primer to improve texture "hide" and prevent discoloration problems. Primer must be dry before texture is applied.

The intent of these recommendations is to ensure an acceptable ceiling appearance. Most of climate Zone 1 is a high-humidity area. Humidity and certain temperature conditions can result in excess moisture build-up in roof cavities which can lead to severe ceiling panel problems. Continued use of a vapor retarder will help control potential moisture problems.

Additional Ventilation and Moisture Control

To ensure maximum performance of all components in a home, adequate ventilation through the roof cavity is essential. Whether the method of ventilating the cavity is by passive means or powered vents, we would suggest as a minimum the following construction tips:

- If the house has a soffit overhang, some positive means to stop blown-in insulation at the heel of the roof truss must be used. Air flow is at best limited through the typical lower pitch roof and the perforated soffit area must be clear and unobstructed.
- If power roof vents are used, they should be of good quality and thermostatically controlled. Be sure that vents used are capable of moving enough air for the space involved.
- If a passive system is used, vents should be spaced evenly over the roof area, and should be sufficient size. These vents should be in both halves of multi-section models and as high up as possible for maximum convection to occur.
- Consider building ridge beams with openings cut through both, to allow for cross flow of air between halves of the house.
- Another good way to achieve additional flow of air through a roof cavity is by using gable vents on both halves of the house.
- Proper site preparation before the house is set is critical. The site should be graded to ensure that water flows away from the house in all directions.
- Whether the house is skirted or to be set on a permanent foundation, adequate ventilation here is also critical, to minimize moisture build-up under the home.
- Before setting the house, we would also suggest placing a plastic ground cover underneath, to cover the entire under house area.

Moisture build-up over a period of time can cause ceiling sag or discoloration, cracking of finished joints in the gypsum board and even mold or mildew. These problems may be greatly minimized by ensuring an adequate flow of air, both under the house and in the roof cavity.

QUICK SELECTOR FOR MANUFACTURED HOUSING SHEAR TESTED SYSTEMS

I. CEILING MECHANICAL FASTENER APPLICATIONS

Ceiling Application - M001

Staples and Rosettes or Staples
Minimum Ceiling Width
11' 8-1/4"

Maximum Ceiling Diaphragm
Span Between Shear Walls
28' 0"

Ultimate Shear Resistance
367 lbs./lin. ft.
of Ceiling Width
(UL Application A)*

Ceiling Application - M002

Staples and Rosettes or Screws
Minimum Ceiling Width
11' 8-1/4"

Maximum Ceiling Diaphragm
Span Between Shear Walls
28' 0"

Ultimate Shear Resistance
367 lbs./lin. ft.
of Ceiling Width
(UL Application B)*

Ceiling Application - M003

Staples and Rosettes
Minimum Ceiling Width
11' 8 1/4"

Maximum Ceiling Diaphragm
Span Between Shear Walls
28' 0"

Ultimate Shear Resistance
303 lbs./lin. ft.
of Ceiling Width
(UL Application C)*

Ceiling Application - M004

Staples and Rosettes
Minimum Ceiling Width
11' 8-1/4"

Maximum Ceiling Diaphragm
Span Between Shear Walls
28' 0"

Ultimate Shear Resistance
303 lbs./lin. ft.
of Ceiling Width
(UL Application D)*

Ceiling Application - M007

Staples and Rosettes
Minimum Ceiling Width
11' 9"

Maximum Ceiling Diaphragm
Span Between Shear Walls
28' 0"

Ultimate Shear Resistance
287 lbs./lin. ft.
of Ceiling Width
(PTL Report 5-79CS-1)

Ceiling Application - M010

Staples and Rosettes
or Staples and Screws
Minimum Ceiling Width
11' 9"

Maximum Ceiling Diaphragm
Span Between Shear Walls
40' 0"

12-Hour Shear Resistance
260 lbs./lin. ft.
of Ceiling Width
(UL Application N)*

Ceiling Application - M013

Screw or Screws and Staples
Minimum Ceiling Width
13' 8"

Maximum Ceiling Diaphragm
Span Between Shear Walls
40' 0"

12-Hour Shear Resistance
249 lbs./lin. ft.
of Ceiling Width
(UL Application H)*

Ceiling Application - M015

Staples or Staples and Rosettes
or Staples and Foamseal
F2100

Minimum Ceiling Width
13' 8"

Maximum Ceiling Diaphragm
Span Between Shear Walls
40' 0"

12-Hour Shear Resistance
251 lbs./lin. ft.
of Ceiling Width
(UL Application J)*

Ceiling Application - (Cathedral) - M016

Staples, Staples and Rosettes or
Staples and Screws

Minimum Ceiling Width
13' 8"

Maximum Ceiling Diaphragm
Span Between Shear Walls
40' 0"

Ultimate Shear Resistance
384 lbs./lin. ft.
of Ceiling Width
(PE 90-1598)

Ceiling Application - M019

Staples and Rosettes or Staples
and Screws or Staples and
Staples

Minimum Ceiling Width
15' 6"

Maximum Ceiling Diaphragm
Span Between Shear Walls
40' 0"

12-Hour Shear Resistance
218 lbs./lin. ft.
of Ceiling Width
(UL Application O)*

II. CEILING FOAM APPLICATIONS

Ceiling Application - F001

Foamseal F2100 Polyurethane
Adhesive

Minimum Ceiling Width
11' 8"

Maximum Ceiling Diaphragm
Span Between Shear Walls
28' 0"

Ultimate Shear Resistance
348 lbs./lin. ft.
of Ceiling Width
(UL Project 77NK158)

Ceiling Application - F002

Foamseal F2100 Polyurethane
Adhesive

Minimum Ceiling Width
11' 8"

Maximum Ceiling Diaphragm
Span Between Shear Walls
28' 0"

Ultimate Shear Resistance
383 lbs./lin. ft.
of Ceiling Width
(UL Project 82NK9974)

Ceiling Application - (Cathedral) - F003

FSI Foamnail
Polyurethane Adhesive
Minimum Ceiling Width
9' 6"

Maximum Ceiling Diaphragm
Span Between Shear Walls
52' 0"

Ultimate Shear Resistance
550.3 lbs./lin. ft.
of Ceiling Width
(PE 99-1348 Addendum A)

Ceiling Application - F005

Foamseal F2100 Polyurethane
Adhesive

Minimum Ceiling Width
11' 8"

Maximum Ceiling Diaphragm
Span Between Shear Walls
32' 0"

Ultimate Shear Resistance
344 lbs./lin. ft.
of Ceiling Width
(UL Project 82NK9974)

Ceiling Application - F006

Foamseal F2100 Polyurethane
Adhesive

Minimum Ceiling Width
11' 0"

Maximum Ceiling Diaphragm
Span Between Shear Walls
44' 0"

Ultimate Shear Resistance
655.3 lbs./lin. ft.
of Ceiling Width
(PE 95-1920)

Ceiling Application - (Cathedral) - F007

Dow Chemical Voramer AA
3022 Polyurethane Adhesive
Minimum Ceiling Width
11' 8"

Maximum Ceiling Diaphragm
Span Between Shear Walls
44' 0"

Ultimate Shear Resistance
641 lbs./lin. ft.
of Ceiling Width
(PE 97-1206 Addendum A)

Ceiling Application - F008

Foamseal F2100 Polyurethane
Adhesive

Minimum Ceiling Width
11' 9"

Maximum Ceiling Diaphragm
Span Between Shear Walls
44' 0"

Ultimate Shear Resistance
392 lbs./lin. ft.
of Ceiling Width
(UL Project 89NK3257)

Ceiling Application - (Cathedral) - F009

FSI Foamnail
Polyurethane Adhesive
Minimum Ceiling Width
11' 9"

Maximum Ceiling Diaphragm
Span Between Shear Walls
44' 0"

Ultimate Shear Resistance
567.8 lbs./lin. ft.
of Ceiling Width
(PE 97-1906 Addendum A)

Ceiling Application - F011

Foamseal F2100 Polyurethane
Adhesive

Minimum Ceiling Width
11' 9"

Maximum Ceiling Diaphragm
Span Between Shear Walls
48' 0"

Ultimate Shear Resistance
452 lbs./lin. ft.
of Ceiling Width
(PE 93-1066)

Ceiling Application - (Cathedral) - F014

Foamseal F2100 Polyurethane
Adhesive

Minimum Ceiling Width
11' 9"

Maximum Ceiling Diaphragm
Span Between Shear Walls
48' 0"

Ultimate Shear Resistance
429 lbs./lin. ft.
of Ceiling Width
(PE 93-1068)

* UL Shear Resistance Classification MH 10176

Ceiling Application - (Cathedral) - F015

Dow Chemical Voramer AA
3022 Polyurethane Adhesive
Minimum Ceiling Width
11' 8"
Maximum Ceiling Diaphragm
Span Between Shear Walls
52' 0"
Ultimate Shear Resistance
430 lbs./lin.ft.
of Ceiling Width
(PE 2000-886 Addendum A)

Ceiling Application - F017

Foamseal F2100 Polyurethane
Adhesive
Minimum Ceiling Width
13' 8"
Maximum Ceiling Diaphragm
Span Between Shear Walls
36' 0"
Ultimate Shear Resistance
324 lbs./lin. ft.
of Ceiling Width
(NAHB HUD Contract
HC-14362)

Ceiling Application - F023

Foamseal F2100 Polyurethane
Adhesive
Minimum Ceiling Width
13' 9"
Maximum Ceiling Diaphragm
Span Between Shear Walls
44' 0"
Ultimate Shear Resistance
392 lbs./lin. ft.
of Ceiling Width
(UL Project 89NK5259)

Ceiling Application - F026

Foamseal F2100 Polyurethane
Adhesive
Minimum Ceiling Width
15' 5"
Maximum Ceiling Diaphragm
Span Between Shear Walls
44' 0"
Ultimate Shear Resistance
430 lbs./lin. ft.
of Ceiling Width
(UL Project 89NK5259)

Ceiling Application - F029

Foamseal F2100 Polyurethane
Adhesive
Minimum Ceiling Width
15' 6"
Maximum Ceiling Diaphragm
Span Between Shear Walls
48' 0"
Ultimate Shear Resistance
462 lbs./lin. ft.
of Ceiling Width
(PE 93-1070)

Ceiling Application (Cathedral) - F032

Foamseal F2100 Polyurethane
Adhesive
Minimum Ceiling Width
15' 6"
Maximum Ceiling Diaphragm
Span Between Shear Walls
48' 0"
Ultimate Shear Resistance
382 lbs./lin. ft.
of Ceiling Width
(PE 93-1072)

III. WALL APPLICATIONS

Wall Application - W001

One Side 2x3 Studs 16" o.c.
Staples and White Glue
Ultimate Shear Resistance -
638 lbs./lin. ft.
Load at 1/8" Deflection -
410 lbs./lin. ft.
(UL Application 1)*

Wall Application - W002

One Side 2x3 Studs 16" o.c.
Staples and White Glue
Ultimate Shear Resistance -
554 lbs./lin. ft.
Load at 1/8" Deflection -
312 lbs./lin. ft.
(UL Application 2)*

Wall Application - W003

One Side 2x3 Studs 16" o.c.
(Horizontal Application)
Staples and White Glue
Ultimate Shear Resistance -
561 lbs./lin. ft.
Load at 1/8" Deflection -
341 lbs./lin. ft.
(UL Application 3)*

Wall Application - W006

One Side 2x3 Studs 24" o.c.
Foamseal F2100 Polyurethane
Adhesive
Ultimate Shear Resistance -
610 lbs./lin. ft.
Design Shear/2.5 safety factor -
244 lbs./lin. ft.
(PE 94-764)

Wall Application - W007

One Side 2x3 Studs 16" o.c.
Foamseal F2100 Polyurethane
Adhesive
Ultimate Shear Resistance -
667 lbs./lin. ft.
Design Shear/2.5 safety factor -
266.8 lbs./lin. ft.
(PE 91-1890 E)

Wall Application - W008

Two Sides 2x3 Studs 16" o.c.
Foamseal F2100 and PR-32
Polyurethane Adhesive
Ultimate Shear Resistance -
680 lbs./lin. ft.
Design Shear/2.5 safety factor -
272 lbs./lin. ft.
(PE 91-2094 A)

Wall Application - W009

Two Sides 2x3 and 1x3 Studs
16" o.c.
Foamseal Elasto-Bond
Polyurethane Adhesive
Ultimate Shear Resistance -
756 lbs./lin. ft.
Design Shear/2.5 safety factor -
302.4 lbs./lin. ft.
(PE 93-1494)

Wall Application - W010

One Side 2x3 Studs 24" o.c.
Foamseal F2100 Polyurethane
Adhesive
Ultimate Shear Resistance -
782.6 lbs./lin. ft.
Design Shear/2.5 safety factor -
313.0 lbs./lin. ft.
(PE 94-388)

Wall Application - W011

One Side 2x3 Studs 16" o.c.
Staples and Foamseal F6000
Urethane Adhesive
Ultimate Shear Resistance -
608.7 lbs./lin. ft.
Design Shear/2.5 safety factor -
243.5 lbs./lin. ft.
(PE 96-652)

Wall Application - W012

One Side 2x3 Studs 16" o.c.
Staples and Foamseal F6300
Polyurethane Adhesive
Ultimate Shear Resistance -
642.9 lbs./lin. ft.
Design Shear/2.5 safety factor -
257.1 lbs./lin. ft.
(PE 97-610 A)

Wall Application - W013

One Side 2x3 Studs 16" o.c.
Staples and Pemco 5100
Polyurethane Adhesive
Ultimate Shear Resistance -
747.0 lbs./lin. ft.
Design Shear/2.5 safety factor -
298.8 lbs./lin. ft.
(PE 95-1344 C)

Wall Application - W014

One Side 2x3 Studs 16" o.c.
Staples and Pemco 5100
Polyurethane Adhesive
Ultimate Shear Resistance -
568.5 lbs./lin. ft.
Design Shear/2.5 safety factor -
227.4 lbs./lin. ft.
(PE 95-1344 A)

Wall Application - W015

One Side 2x3 and 1x3 studs
24" o.c.
Staples and Pemco 5100
Polyurethane Adhesive
Ultimate Shear Resistance -
537.6 lbs./lin. ft.
Design Shear/2.5 safety factor -
215.0 lbs./lin. ft.
(NTA96-0529-4)

Wall Application - W016

One Side 2x3 Studs 16" o.c.
Staples and Pemco 5100
Polyurethane Adhesive
Ultimate Shear Resistance -
819.6 lbs./lin. ft.
Design Shear/2.5 safety factor -
327.8 lbs./lin. ft.
(NTA96-0212-3)

Wall Application - W017

One Side 2x3 Studs 16" o.c.
Staples and Tacc international
Gun'n Go Adhesive
Ultimate Shear Resistance -
506.8 lbs./lin. ft.
Design Shear/2.5 safety factor -
203.0 lbs./lin. ft.
(NTA96-0105-3)

* UL Shear Resistance Classification MH 10176

Wall Application - W018

One Side 2x3 Studs 16" o.c.
Staples and Tacc international
Gun'n Go Adhesive
Ultimate Shear Resistance -
600.0 lbs./lin. ft.
Design Shear/2.5 safety factor -
240.0 lbs./lin. ft.
(NTA970115-1)

Wall Application - W019

One Side 2x3 Studs 16" o.c.
Staples and Tacc International
Gun'n Go Adhesive
Ultimate Shear Resistance -
563.7 lbs./lin. ft.
Design Shear/2.5 safety factor -
225.1 lbs./lin. ft.
(NTA970154-1)

Wall Application - W020

One Side 2x3 Studs 16" o.c.
Staples and Clayton Corp.
Touch'n Seal Adhesive
Ultimate Shear Resistance -
561.8 lbs./lin. ft.
Design Shear/2.5 safety factor -
225.0 lbs./lin. ft.
(NTA960715-1)

Wall Application - W021

One Side 2x3 Studs 24" o.c.
Staples and Sun No. 99 Adhesive
Ultimate Shear Resistance -
382 lbs./lin. ft.
Load at 1/8" Deflection -
282 lbs./lin. ft.
(UL Application 5)*

Wall Application - W022

One Side 2x3 Studs 16" o.c.
Staples and Sun No. 99 Adhesive
Ultimate Shear Resistance -
545 lbs./lin. ft.
Load at 1/8" Deflection -
366 lbs./lin. ft.
(UL Application 9)*

Wall Application - W023

One Side 2x3 Studs 16" o.c.
Staples and Sun No. 99 Adhesive
Ultimate Shear Resistance -
373 lbs./lin. ft.
Load at 1/8" Deflection -
324 lbs./lin. ft.
(UL Application 10)*

Wall Application - W024

One Side 2x3 Studs 16" o.c.
Staples and EnerBond DW
Adhesive
Ultimate Shear Resistance -
494.3 lbs./lin. ft.
Design Shear/2.5 safety factor -
197.7 lbs./lin. ft.
(CTL AB96-10)

Wall Application - W025

One Side 2x3 Studs 16" o.c.
Staples and EnerFoam
Polyurethane Adhesive
Ultimate Shear Resistance -
486.7 lbs./lin. ft.
Design Shear/2.5 safety factor -
194.7 lbs./lin. ft.
(BR10585A-06)

Wall Application - W026

One Side 2x3 Studs 24" o.c.
Staples and EnerFoam
Polyurethane Adhesive
Ultimate Shear Resistance -
467.2 lbs./lin. ft.
Design Shear/2.5 safety factor -
186.9 lbs./lin. ft.
(CTL AB95-01)

Wall Application - W027

One Side 2x3 and 1x3 Studs
24" o.c.
Staples and Foamseal F6300 or
F6400 Polyurethane Adhesive
Ultimate Shear Resistance -
388.4 lbs./lin. ft.
Design Shear/2.5 safety factor -
155.3 lbs./lin. ft.
(PE 97-1388 C)

Wall Application - W028

One Side 2x3 Studs 16" o.c.
Staples and Tacc International
Sta Sealed 910 Adhesive
Ultimate Shear Resistance -
452.8 lbs./lin. ft.
Design Shear/2.5 safety factor -
181.1 lbs./lin. ft.
(NTA970012-1)

Wall Application - W029

One Side 2x3 Studs 16" o.c.
Staples and Tacc International
Sta Sealed 9000 Adhesive
Ultimate Shear Resistance -
690.6 lbs./lin. ft.
Design Shear/2.5 safety factor -
276.2 lbs./lin. ft.
(PE 95-304)

Wall Application - W030

One Side 2x3 Studs 16" o.c.
Staples and EnerBond MH
Polyurethane Adhesive
Ultimate Shear Resistance -
649.0 lbs./lin. ft.
Design Shear/2.5 safety factor -
260.0 lbs./lin. ft.
(CTL FP98-01)

Wall Application - W031

One Side 2x3 Studs 16" o.c.
Staples and EnerFoam
Polyurethane Adhesive
Ultimate Shear Resistance -
539.0 lbs./lin. ft.
Design Shear/2.5 safety factor -
216.0 lbs./lin. ft.
(CTL FP98-02)

Wall Application - W032

One Side 2x3 Studs 16" o.c.
Staples and EnerBond SF
Polyurethane Adhesive
Ultimate Shear Resistance -
739.0 lbs./lin. ft.
Design Shear/2.5 safety factor -
296.0 lbs./lin. ft.
(CTL FP98-03)

Wall Application - W033

One Side 2x3 Studs 16" o.c.
Staples and EnerFoam
Polyurethane Adhesive
Ultimate Shear Resistance -
638.0 lbs./lin. ft.
Design Shear/2.5 safety factor -
255.0 lbs./lin. ft.
(CTL FP98-04)

Wall Application - W034

One side 2x3 Studs 16" o.c.
Dow Chemical Voramer AA
3022 Polyurethane Adhesive
Ultimate Shear Resistance -
529.4 lbs./lin.ft.
Design Shear/2.5 safety factor -
211.7 lbs./lin.ft.
(PE 2001-631)

Wall Application - W035

One Side 2x3 Studs 16" o.c.
Staples and Parr CA-40
Construction Adhesive
Ultimate Shear Resistance -
454.0 lbs./lin.ft.
Design Shear/2.5 safety factor-
181.6 lbs./lin.ft.
(PE 2001-710 A)

Wall Application - W036

One Side 2x3 Studs 16" o.c.
Staples and Parr CA-40
Construction Adhesive
Ultimate Shear Resistance -
766.9 lbs./lin.ft.
Design Shear/2.5 safety factor-
306.7 lbs./lin.ft.
(NTA990011A)

Wall Application - W037

One Side 2x3 Studs 16" o.c.
Staples and Parr CA-40
Construction Adhesive
Ultimate Shear Resistance -
660.2 lbs./lin.ft.
Design Shear/2.5 safety factor-
264.0 lbs./lin.ft.
(NTA200121A)

Wall Application - W038

One Side 2x3 Studs 16" o.c.
FSI FoamNail
Polyurethane Adhesive
Ultimate Shear Resistance -
573.0 lbs./lin.ft.
Design Shear/2.5 safety factor-
229.2 lbs./lin.ft.
(PE 99-1346 A)

Wall Application - W039

One Side 2x3 Studs 16" o.c.
FSI FoamNail
Polyurethane Adhesive
Ultimate Shear Resistance -
649.1 lbs./lin.ft.
Design Shear/2.5 safety factor-
259.6 lbs./lin.ft.
(PE 99-1346 B)

Wall Application - W040

One Side 2x3 Studs 16" o.c.
FSI FoamNail
Polyurethane Adhesive
Ultimate Shear Resistance -
768.3 lbs./lin.ft.
Design Shear/2.5 safety factor
307.3 lbs./lin.ft.
(PE 99-2792 C)

Wall Application - W041

One Side 2x3 Studs 16" o.c.
FSI FoamNail
Polyurethane Adhesive
Ultimate Shear Resistance -
560.8 lbs./lin.ft.
Design Shear/2.5 safety factor-
224.3 lbs./lin.ft.
(PE 99-2462 D)

* UL Shear Resistance Classification MH 10176

Wall Application - W042

One Side 2x3 Studs 16" o.c.
FSI FoamNail
Polyurethane Adhesive
Ultimate Shear Resistance -
622.0 lbs./lin.ft.
Design Shear/2.5 safety factor-
248.8 lbs./lin.ft.
(PE 2001-1215 B)

Wall Application - W043

One Side 2x3 Studs 16" o.c.
Staples and EnerBond BA
Polyurethane Adhesive
Ultimate Shear Resistance -
526.7 lbs./lin.ft.
Design Shear/2.5 safety factor-
210.7 lbs./lin.ft.
(CTL PF00-04)

Wall Application - W205

Two Sides 2x3 and 1x3 Studs
24" o.c.
Staples and Foamseal F6300 or
F6400 Polyurethane Adhesive
Ultimate Shear Resistance -
677.4 lbs./lin. ft.
Design Shear/2.5 safety factor -
270.9 lbs./lin. ft.
(PE 97-1388 E)

Wall Application - W206

Two Sides 2x3 Studs 16" o.c.
Staples and Foamseal F2100 or
F6200 Polyurethane Adhesive
Ultimate Shear Resistance -
847.5 lbs./lin.ft.
Design Shear/2.5 safety factor -
339.0 lbs./lin. ft.
(PE 96-1472 B)

Wall Application - W207

Two Sides 2x3 Studs 16" o.c.
Staples and Foamseal F6300
Polyurethane Adhesive
Ultimate Shear Resistance -
1170.6 lbs./lin. ft.
Design Shear/2.5 safety factor -
468.2 lbs./lin. ft.
(PE 97-610 D)

Wall Application - W208

Two Sides 2x3 Studs 16" o.c.
Staples and Pemco 5100 and
3100 Polyurethane Adhesive
Ultimate Shear Resistance -
1093.7 lbs./lin. ft.
Design Shear/2.5 safety factor -
437.5 lbs./lin. ft.
(NTA96-0212-4)

Wall Application - W209

Two Sides 2x3 and 1x3 Studs
24" o.c.
Staples and Pemco 5100 and
3100 Polyurethane Adhesive
Ultimate Shear Resistance -
821.2 lbs./lin. ft.
Design Shear/2.5 safety factor -
328.0 lbs./lin. ft.
(NTA96-0529-3)

Wall Application - W210

Two Sides 2x3 Studs 16" o.c.
Staples and Tacc international
Gun'n Go Adhesive
Ultimate Shear Resistance -
1004.8 lbs./lin. ft.
Design Shear/2.5 safety factor -
401.9 lbs./lin. ft.
(NTA970154-2)

Wall Application - W211

Two Sides 2x3 Studs 16" o.c.
Staples and Tacc international
Sta Sealed 910 Adhesive
Ultimate Shear Resistance -
854.4 lbs./lin. ft.
Design Shear/2.5 safety factor -
342.0 lbs./lin. ft.
(NTA970012-2)

Wall Application - W212

Two Sides 2x3 Studs 16" o.c.
Staples and Tacc international
Gun'n Go Adhesive
Ultimate Shear Resistance -
1004.4 lbs./lin. ft.
Design Shear/2.5 safety factor -
401.8 lbs./lin. ft.
(NTA970115-2)

Wall Application - W213

Two Sides 2x3 Studs 16" o.c.
Staples and Clayton Corp.
Touch'n Seal Adhesive
Ultimate Shear Resistance -
918.9 lbs./lin. ft.
Design Shear/2.5 safety factor -
368.0 lbs./lin. ft.
(NTA960715-2)

Wall Application - W214

Two Sides 2x3 Studs 24" o.c.
Staples and Sun No. 99 Adhesive
Ultimate Shear Resistance -
545 lbs./lin. ft.
Load at 1/8" Deflection -
435 lbs./lin. ft.
(UL Application 4)*

Wall Application - W215

Two Sides 2x3 Studs 24" o.c.
Staples and Sun No. 99 Adhesive
Ultimate Shear Resistance -
539 lbs./lin. ft.
Load at 1/8" Deflection -
436 lbs./lin. ft.
(UL Application 6)*

Wall Application - W216

Two Sides 2x3 Studs 16" o.c.
Staples and Sun No. 99 Adhesive
Ultimate Shear Resistance -
649 lbs./lin. ft.
Load at 1/8" Deflection -
548 lbs./lin. ft.
(UL Application 7)*

Wall Application - W217

Two Sides 2x3 Studs 16" o.c.
Staples and Sun No. 99 Adhesive
Ultimate Shear Resistance -
687 lbs./lin. ft.
Load at 1/8" Deflection -
500 lbs./lin. ft.
(UL Application 8)*

Wall Application - W218

Two Sides 2x3 Studs 24" o.c.
Staples and EnerFoam
Polyurethane Adhesive
Ultimate Shear Resistance -
738.4 lbs./lin. ft.
Design Shear/2.5 safety factor -
295.4 lbs./lin. ft.
(CTL AB95-02)

Wall Application - W219

Two Sides 2x3 Studs 24" o.c.
Staples and EnerFoam
Polyurethane Adhesive and
Sun No. 99 Adhesive
Ultimate Shear Resistance -
661.6 lbs./lin. ft.
Design Shear/2.5 safety factor -
264.6 lbs./lin. ft.
(CTL AB95-03)

Wall Application - W220

Two Sides 2x3 Studs 16" o.c.
Staples and EnerFoam
Polyurethane Adhesive
Ultimate Shear Resistance -
982.0 lbs./lin. ft.
Design Shear/2.5 safety factor -
393.0 lbs./lin. ft.
(CTL FP98-05)

Wall Application - W221

Two Sides 2x3 Studs 16" o.c.
Staples and Parr CA-40
Construction Adhesive
Ultimate Shear Resistance -
770.2 lbs./lin.ft.
Design Shear/2.5 safety factor-
308.0 lbs./lin.ft.
(PE 2001-710 B)

Wall Application - W222

Two Sides 2x3 Studs 16" o.c.
Staples and Parr CA-40
Construction Adhesive
Ultimate Shear Resistance -
1047.5 lbs./lin.ft.
Design Shear/2.5 safety factor-
419.0 lbs./lin.ft.
(NTA200121)

Wall Application - W223

Two Sides 2x3 Studs 16" o.c.
Staples and Parr CA-40
Construction Adhesive
Ultimate Shear Resistance -
1062.7 lbs./lin.ft.
Design Shear/2.5 safety factor-
425.1 lbs./lin.ft.
(NTA200121)

Wall Application - W224

Two Sides 2x3 Studs 16" o.c.
Staples and EnerBond SF and
BA polyurethane Adhesives
Ultimate Shear Resistance -
1272 lbs./lin.ft.
Design Shear/2.5 safety factor-
508.8 lbs./lin.ft.
(CTL DCC01-01)

Wall Application - W225

Two Sides 2x3 Studs 16" o.c.
Staples and EnerBond SF
Polyurethane Adhesive
Ultimate Shear Resistance -
1097 lbs./lin.ft.
Design Shear/2.5 safety factor-
438.8 lbs./lin.ft.
(CTL PF98-08)

Wall Application - W226

Two Sides 2x3 Studs 16" o.c.
Staples and EnerBond SF
Polyurethane Adhesive
Ultimate Shear Resistance -
1013.3 lbs./lin.ft.
Design Shear/2.5 safety factor-
405.3 lbs./lin.ft.
(CTL PF98-06)

Note: These test reports refer to maximum spans between shear walls which were based on the 25 psf wind pressure. The design wind pressures since July 13, 1994 are much higher in Wind Zones 2 and 3. The allowable ceiling diaphragm spans now are less due to these increased wind pressures. The ultimate shear resistance is still a valid number. The reader is cautioned not to use the allowable ceiling diaphragm spans in Wind Zones 2 and 3.

* UL Shear Resistance Classification MH 10176

SHEAR TEST/NATIONAL GYPSUM SPECIFICATION SHEET (IH-001)

I. CEILING MECHANICAL FASTENER APPLICATIONS

CEILING APPLICATION - M001

(Staples and Rosettes or Staples)

Minimum Ceiling Width —
11' 8-1/4"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 28'

Gold Bond 5/16" or 3/8" gypsum panels fastened to trusses 16" o.c. 16 gauge staples, 1-1/4" leg, 1" crown, spaced 4" o.c. around perimeter of board, with crown parallel to and 1/4" in from edges. No. 6 1-1/4" flat-head steel screws and 1-1/8" rosettes 24" o.c. in the field. Alternately, fasten to trusses 16" o.c. using 16 gauge staples with 1" crown and 1-1/4" leg spaced 4" o.c. around the perimeter with the crown parallel and 1/4" from the edges of the board and spaced 15" o.c. at the intermediate supports. UL project 76NK3479 (Application A).*

Ultimate shear resistance —
367 lbs./lineal ft. of ceiling
width

CEILING APPLICATION - M002

(Staples and Rosettes or
D.W. Screws)

Minimum Ceiling Width —
11' 8-1/4"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 28'

Gold Bond 1/2" or 5/8" gypsum panels fastened to trusses 16" o.c. using 16 gauge staples with 1" crown and 1-1/2" leg spaced 4" o.c. around the perimeter with the crown 1/4" from and parallel to the edge of the board and 1-1/2" long. No. 6 flat-head steel screws with 1-1/8" diameter rosettes spaced 24" o.c. in the field. Alternately, 1-1/4" nominal type S or W drywall screws spaced 12" o.c. in the field or 16 gauge staples with 1" crown and 1-1/2" leg spaced 15" o.c. (intermediate trusses) may be used in place of the No. 6 flat-head screws and plastic rosettes. UL project 87NK4541 (Application B).*

Ultimate shear resistance —
367 lbs./lineal ft. of ceiling
width

CEILING APPLICATION - M003

(Staples and Rosettes)

Minimum Ceiling Width —
11' 8-1/4"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 28'

Gold Bond 5/16" or 3/8" gypsum panels fastened to trusses 16" o.c. using 16 gauge staples, with 1-1/4" leg and 1" crown at 4" o.c. around perimeter of board, crown perpendicular and centered across joints and parallel to and 1/4" in from both ends and 1-1/4" No. 6 oval-head steel screws with 1-1/8" diameter rosettes spaced 24" o.c. in the field. Alternately, fasten to trusses 16" o.c. using 16 gauge staples with 1" crown and 1-1/4" leg spaced 4" o.c. around the perimeter with the crown parallel and 1/4" from the edges of the board and spaced 15" o.c. at the intermediate supports. UL project 77NK158 (Application C).*

Ultimate shear resistance —
303 lbs./lineal ft. of ceiling
width

CEILING APPLICATION - M004

(Staples and Rosettes)

Minimum Ceiling Width —
11' 8-1/4"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 28'

Gold Bond 1/2" or 5/8" gypsum panels fastened to trusses 16" o.c. using 16 gauge staples with 1" crown and 1-1/2" leg spaced 4" o.c. around the perimeter with the crown placed perpendicular and centered across joints and parallel to and 1/4" in from both ends, and 1-1/2" long No. 6 oval-head screws with 1-1/8" diameter rosettes spaced 24" o.c. in the field. UL project 77NK158 (Application D).*

Ultimate shear resistance —
303 lbs./lineal ft. of ceiling
width

CEILING APPLICATION - M007

(Staples and Rosettes)

Minimum Ceiling Width —
11' 9"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 28'

Gold Bond 5/16" gypsum panels fastened to trusses 24" o.c. using 16 gauge staples having a 1" crown and 1-1/4" leg spaced 4" o.c. around perimeter, crown placed perpendicular and centered across joints and parallel to and 1/4" from both ends and 1-1/4" No. 6 oval-head screws with 1-1/8" diameter plastic rosettes spaced 24" o.c. in the field. PTL Report 5-79CS-1.

Ultimate shear resistance —
287 lbs./lineal ft. of ceiling
width

CEILING APPLICATION - M010

(Staples and Rosettes or Staples
and Screws)

Minimum Ceiling Width —
11' 9"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 40'

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels fastened to wood roof trusses 24" o.c. using 16 gauge staples having a 1" crown and 1-1/4" leg spaced 4" o.c. of each side of each joint and panel ends (width) into the edge rail. Crowns are parallel to and 1/4" from the edges. 1-1/2" No. 6 wood screws in 1-1/8" diameter plastic rosettes spaced at a maximum of 24" o.c. in the field. A nominal 1 x 3 x 22" long block of the same edge rail material was glued together with a continuous application of Tanco XA 2600 adhesive. The block is fastened together with six 1" crown and 1-1/4" leg, 16 gauge staples on each side of each joint at edge rail splice locations.

The nominal 1 x 4 top plate is spliced together with a 14" long block of the same material glued with a continuous application of Tanco XA 2600 adhesive and secured with six 1" crown, 1-1/4" leg 16 gauge staples, on each side of the joint at top plate splice locations.

Alternately, 1-1/4" nominal Type W or S drywall screws spaced 12" o.c. or 16 gauge staples with 1" crown and 1-1/4" nominal leg spaced 15" o.c. in the field (intermediate trusses) may be used in place of the plastic rosettes. UL project 89NK18380 (Application N).*

12-hour shear resistance —
260 lbs./lineal ft. of ceiling
width

CEILING APPLICATION - M013

(Screws or Screws and Staples)

Minimum Ceiling Width —
13' 8"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 40'

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels fastened to trusses 24" o.c. using (1" long bugle-head screws for 5/16", 3/8" panels) (1-1/4" long bugle-head screws for 1/2", 5/8" panels) spaced 4" o.c. along the edges (length) of each panel and spaced 12" o.c. for intermediate supports with the same screws at 8" o.c. at panel ends (width) into the edge rails. The edge rails are spliced together with a full bead of Swift - 49109 (Peter Cooper 7099-T) adhesive and secured with six 1" crown, 1-1/4" leg 16 gauge staples, each side of the joint.

Alternately, 1" crown by 1-1/4" leg nominal 16 gauge staples spaced 8" o.c. at panel ends (width) into the edge rail may be used in place of the bugle-head screws. UL project 88NK3278 (Application H).*

12-hour shear resistance —
249 lbs./lineal ft. of ceiling
width

* UL Shear Resistance Classification MH 10176

CEILING APPLICATION - M015

(Staples or Staples and Rosettes or Staples and **Foamseal F2100 Adhesive**)

Minimum Ceiling Width — 13'8"

Maximum Ceiling Diaphragm Span Between Shear Walls — 40'

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels fastened to wood roof trusses 24" o.c. using 16 gauge staples (1" crown and 1-1/4" leg for 5/16", 3/8" panels) (1" crown and 1-1/2" leg for 1/2", 5/8" panels) spaced:

- (a) 4" o.c. of each double panel joint with crowns perpendicular to and centered across the panel joints,
- (b) 4" o.c. into the edge rails with staple crowns parallel to and 3/8" from the edges and
- (c) 16" o.c. in the field (intermediate) with crowns parallel with the roof trusses.

Alternately, U.L. Classified Foamseal Inc., two-component polyurethane foam designated as Foamseal F2100, Type A-ISO component and B-RESIN component, may be used to fasten panels in the field to trusses in place of staples. The foam plastic is applied to opposite sides of the bottom chord along each half of the truss in the field of the ceiling boards, overlapping a minimum of 6" at the center span.

The nominal 4" rails are spliced together with a minimum of 22" long 1 x 4 splice blocks of the same material as used for the edge rails glued together with a full bead of Swift - 49109 (Peter Cooper 7099-T) adhesive and secured with six 1" crown, 1-1/4" leg 16 gauge staples, each side of the joint. UL project 88NK28314.

12-hour shear resistance — 251 lbs./lineal ft. of ceiling width

CEILING APPLICATION - CATHEDRAL - M016

(Staples, Staples and Rosettes or Staples and Screws)

Minimum Ceiling Width — 13'8"

Maximum Ceiling Diaphragm Span Between Shear Walls — 40'

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels fastened to cathedral trusses spaced 24" o.c. using 16 gauge staples (1" crown and 1-1/4" leg for 5/16", 3/8" panels) (1" crown and 1-1/2" leg for 1/2", 5/8" panels) spaced 4" o.c. stitch pattern at the joints and No. 6 x 1-1/2" screws and rosettes spaced 24" o.c. to the field trusses.

Alternately, 1-1/4" nominal type S or W drywall screws or 16 gauge staples with 1" crown and 1-1/4" leg spaced 12" o.c. can be used in lieu of rosettes.

The nominal 1 x 4 side wall was spliced with 1" x 4" x 14-1/2" long splice blocks to create 40' long plates. The splice blocks were attached with PVA adhesive and six (6) 1" crown x 1-1/4" leg x 16 gauge staples on each side of the joint. A 1-1/2" wide wedge was placed on the top plates to match the ceiling angle.

At peak of ceiling, paper on back of gypsum board may be cut and gypsum core broken as long as the face paper is not broken. No backer or reinforcement of the gypsum is required at the peak. PE 90-1598.

Ultimate shear resistance — 384 lbs./lineal ft. of ceiling width

CEILING APPLICATION - M019

(Staples and Rosettes or Staples and Screws or Staples and Staples)

Minimum Ceiling Width — 15'6"

Maximum Ceiling Diaphragm Span Between Shear Walls — 40'

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels fastened to wood roof trusses 24" o.c. using 16 gauge staples having a 1" crown and 1-1/4" leg spaced 4" o.c. of each side of each joint and panel ends (width) into the edge rail. Crowns are parallel to and 1/4" from the edges. 1-1/2" No. 6 wood screws in 1-1/8" diameter plastic rosettes spaced at a maximum of 24" o.c. in the field. A nominal 1 x 4 x 14" long block of the same edge rail material was glued together with a continuous application of Tanco XA 2600 adhesive. The block is fastened together with six 1" crown and 1-1/4" leg 16 gauge staples on each side of each joint at edge rail splice locations.

The nominal 1 x 3 top plate is spliced together with a 14" long block of the same material as used for the edge rails glued together with a continuous application of Tanco XA 2600 adhesive and secured with six 1" crown, 1-1/4" leg 16 gauge staples, each side of each joint at the top plate splice locations.

Alternately, 1-1/4" nominal Type W or S drywall screws spaced 12" o.c. or 16 gauge staples with 1" crown and 1-1/4" nominal leg spaced 15" o.c. in the field (intermediate trusses only) may be used in place of the plastic rosettes. UL project 89NK27074 (Application O).*

12-hour shear resistance — 218 lbs./lineal ft. of ceiling width

II. CEILING FOAM APPLICATIONS

CEILING APPLICATION - F001

(**Foamseal F2100 Adhesive**)

Minimum Ceiling Width — 11'8"

Maximum Ceiling Diaphragm Span Between Shear Walls — 28'

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels fastened to trusses 16" o.c. using Foamseal Inc., two-component polyurethane foam designated as Foamseal F2100, A-ISO component and B-RESIN component, applied in accordance with the application instructions provided with the foam material.

The foam plastic is applied at the intersection formed by the sides of the bottom chords of the trusses and the gypsum wallboard ceiling material. The foam plastic is applied to:

- (a) both sides of the trusses across the entire width of the ceiling assembly at all ceiling board joints,
- (b) opposite sides of the bottom chord along each half of the truss in the field of the ceiling boards overlapping a minimum of 12" at the center and
- (c) the entire length of the inside face of the end trusses and edge rails.

The minimum in-place finished foam fillet height and width shall not be less than 1-1/4" at any location. The minimum height of the bottom chord of the trusses shall not be less than 1-1/4". UL project 77NK158.

Ultimate shear resistance — 348 lbs./lineal ft. of ceiling width

* UL Shear Resistance Classification MH 10176

CEILING APPLICATION - F002

(Foamseal F2100 Adhesive)

Minimum Ceiling Width —
11' 8"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 28'

Gold Bond 5/16", 3/8", 1/2" or
5/8" gypsum panels fastened
to trusses 16" o.c. using
Foamseal Inc., two-compo-
nent polyurethane foam
designated as Foamseal
F2100, A-ISO component
and B-RESIN component,
applied in accordance with
the application instructions
provided with the foam
material.

The foam plastic is applied at the
intersection formed by the
sides of the bottom chords of
the trusses and the gypsum
wallboard ceiling material.
The foam plastic is applied to:

- both sides of the trusses
across the entire width of
the ceiling assembly at all
ceiling board joints,
- opposite sides of the bottom
chord along each half of the
truss in the field of the ceil-
ing boards overlapping a
minimum of 6" at the center
and
- the entire length of the
inside face of the end trusses.
The ceiling board is attached
to the top plate with 1"
crown by 1-1/4" leg 16
gauge staples spaced 4" o.c.

The minimum in-place finished
foam fillet height and width
shall not be less than 1-1/4" at
any location. The minimum
height of the bottom chord of
the trusses shall not be less
than 1-1/8". UL project
82NK9974.

Ultimate shear resistance —
383 lbs./lineal ft. of ceiling
width

CEILING APPLICATION CATHEDRAL - F003

(Foam Supplies Inc. FoamNail
Adhesive)

Minimum Ceiling Width —
9' 6"

Maximum Ceiling Diaphragm
Span Between Shear Walls -
— 52' 0"

Gold Bond 5/16" gypsum pan-
els fastened to roof trusses
spaced 24" o.c. using FSI

FoamNail two-part
polyurethane adhesive, com-
posed of a isocyanate com-
ponent and a polyol compo-
nent, applied in accordance
with manufacturer's instruc-
tions. The adhesive was
applied to both sides of the
bottom chord of the trusses
at all gypsum seams and to
one side of the bottom chord
on field trusses. One bead
was also applied the ceiling
peak. Adhesive was not
applied along truss end rails
and was left 3" short of end
rails on all trusses. Gypsum
panels were laid out on a
wood fixture built to match
the cathedral trusses. The
gypsum panels were scored
at their center line on the
back side before laid on the
fixture. 3/4" wide masking
tape was applied to all gyp-
sum seams. The 1x3 edge
rails were spliced with
1x3x14 splice blocks. The
splice blocks were attached
with PVA adhesive and six
(6) 1" c. x 1-1/4" leg x 16
gauge staples on each side of
joint. Previously constructed
edge rails were stapled to the
truss heels with (2) 7/16" c. x
2-1/2" leg x 16 gauge staples
at each truss heel. The ridge
rail was then stapled to the
trusses with two (2) 7/16" c. x
2" leg x 16 gauge staples.
The 1x4 side wall top plates
were spliced with 1x4x14
splice plates. The splice
blocks were attached with
PVA adhesive and six (6) 1"
c. x 1-1/4" leg x 16 gauge
staples on each side of joint.
A 1-1/2" wide wedge was
stapled to the top plates to
match the ceiling angle. Each
truss heel was toe-nailed to
the top plate with (1) 0.131"
diameter x 3-1/2" long nail.
The two (2) end trusses were
screwed 3" o.c. along the
bottom chords into the top
plates with #8 x 2-1/2" lg.

Washer head wood screws.
The gypsum was attached to
the exterior wall top plate
with 1" c. x 1-1/2" leg x 16
gauge staples at 4" o.c.
PE 99-1348, Addendum A.

Ultimate Shear Resistance
550.3 lbs./lin.ft. of ceiling
width

CEILING APPLICATION - F005

(Foamseal F2100 Adhesive)

Minimum Ceiling Width —
11' 8"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 32'

Gold Bond 5/16", 3/8", 1/2" or
5/8" gypsum panels fastened
to trusses 24" o.c. using
Foamseal Inc., two-compo-
nent polyurethane foam
designated as Foamseal
F2100, A-ISO component
and B-RESIN component,
applied in accordance with
the application instructions
provided with the foam
material.

The foam plastic is applied at
the intersection formed by
the sides of the bottom
chords of the trusses and the
gypsum wallboard ceiling
material. The foam plastic is
applied to:

- both sides of the trusses
across the entire width of
the ceiling assembly at all
ceiling board joints,
- opposite sides of the bottom
chord along each half of the
truss in the field of the ceil-
ing boards overlapping a
minimum of 12" at the cen-
ter and
- the entire length of the inside
face of the end trusses. The
ceiling board is attached to
the top plate with 1" crown
by 1-1/4" leg 16 gauge stap-
les spaced 4" o.c. The edge
rails are double 1" x 2" or
minimum 2" x 2" members.

The minimum in-place finished
foam fillet height and width
shall not be less than 1-1/4" at
any location. The minimum
height of the bottom chord of
the trusses shall not be less
than 1-1/8". UL project
82NK9974.

Ultimate shear resistance —
344 lbs./lineal ft. of ceiling
width

CEILING APPLICATION - F006

(Foamseal F2100 Adhesive)

Minimum Ceiling Width —
11' 0"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 44' 0"

Gold Bond 5/16" gypsum panels
fastened to roof trusses 24"
o.c. using Foamseal F2100,
composed of an A-ISO
component and a B-RESIN
component. The F2100 was
applied along both sides of
the trusses at all wallboard
seams and one side of the
bottom chord on field trusses.
One bead was applied along
the ceiling peak. F2100 was
not applied along truss end
rails. The F2100 was left 3"
short of end rails on all truss-
es. 3/4" wide masking tape
was applied to all gypsum
seams. The 1x3 edge rails
were spliced with 1x3x14"
splice blocks. The splice
blocks were attached with
PVA adhesive six 1" crown x
1-1/4" leg x 16 gauge staples
on each side of joint.
Previously constructed edge
rails were stapled to truss
heels with two 7/16" crown x
2-1/2" leg x 15 gauge staples
at each truss heel. The ridge
rail was stapled to trusses with
two 7/16" crown x 2" leg x 16
gauge staples per truss. The
1x4 side wall top plates were
spliced with 1x4x14" splice
plates and attached with PVA
adhesive and six 1" crown x
1-1/4" leg x 16 gauge staples
on each side of joint. Gypsum
wallboard was attached to
exterior wall top plate with 1"
crown x 1" leg x 16 gauge stap-
les at 4" o.c. The two end
trusses were screwed along
trusses at 4" o.c. into top
plates with #8x3" long wood
screws. PE 95-1920

Ultimate shear resistance -
655.3 lbs./lineal ft.
of ceiling width

CEILING APPLICATION CATHEDRAL- F007

(Dow Chemical Voramer AA 3022 Adhesive)

Minimum Ceiling Width —
11' 8"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 44' 0"

Gold Bond 5/16" gypsum panels fastened to roof trusses spaced 24" o.c. using Dow Chemical Voramer AA 3022 two-part polyurethane adhesive, composed of isocyanate and polyol components, applied in accordance with manufacturers instructions. The adhesive was applied to both sides of the bottom chord of the trusses at all gypsum seams and to one side of the bottom chord on field trusses. One bead was also applied the ceiling peak. Adhesive was not applied along truss end rails and was left 3" short of end rails on all trusses. Gypsum panels were laid out on a wood fixture built to match the cathedral trusses. The gypsum panels were scored at their center line on the back side before laid on the fixture. 3/4" wide masking tape was applied to all gypsum seams. The 1x3 edge rails were spliced with 1x3x14 splice blocks. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4" leg x 16 gauge staples on each side of joint. Previously constructed edge rails were stapled to the truss heels with (2) 7/16" c. x 2-1/2" leg x 15 gauge staples at each truss heel. The ridge rail was then stapled to the trusses with two (2) 7/16" c. x 2" leg x 16 gauge staples. The 1x4 side wall top plates were spliced with 1x4x14 splice plates. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4" leg x 16 gauge staples on each side of joint. A 1-1/2" wide wedge was stapled to the top plates to match the ceiling angle. Each truss heel was toe-nailed to the top plate with (1) 0.131" diameter x 3-1/2" lg. Nail. The two (2) end trusses were screwed 3" o.c. along the

bottom chords into the top plates with #8 x 3" lg. Washer head wood screws. The gypsum was attached to the exterior wall top plate with 1" c. x 1" leg x 16 gauge staples at 4" o.c. PE 97-1206, Addendum A.

Ultimate Shear Resistance
641 lbs./lin.ft. of ceiling
width

CEILING APPLICATION - F008

(Foamseal F2100 Adhesive)

Minimum Ceiling Width —
11' 9"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 44'

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels fastened to trusses 24" o.c. using Foamseal Inc., two-component polyurethane foam designated as Foamseal F2100, A-ISO component and B-RESIN component. The foam plastic is applied at the intersection formed by the sides of the bottom chords of the trusses and the gypsum wallboard ceiling material. The foam plastic is applied to:

- both sides of the trusses across the entire width of the ceiling assembly at all ceiling board joints,
- opposite sides of the bottom chord along each half of the truss in the field of the ceiling boards overlapping a minimum of 6" at the center and
- the entire length of the inside face of the end trusses. The ceiling board is attached to the top plate with 1" crown by 1-1/4" leg 16 gauge staples spaced 4" o.c.

The minimum in-place finished foam fillet height and width shall be 1" and 1-1/4", respectively, at any location. The minimum height of the bottom chord of the trusses shall be 1".

The 1 x 4 edge rail and 2 x 3 top plate are spliced with a minimum of 14" long nominal 1 x 4 or 1 x 3 blocks of the same material as used for the edge rails glued together with a full bead of Swift - 49109 (Peter Cooper 7099-T) adhesive and secured with

six 1" crown, 1-1/4" leg, 16 gauge staples, on each side of each splice joint. UL project 89NK3257.

Ultimate shear resistance —
392 lbs./lineal ft. of ceiling
width

CEILING APPLICATION CATHEDRAL - F009

(Foam Supplies Inc. FoamNail Adhesive)

Minimum Ceiling Width —
11' 9"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 44' 0"

Gold Bond 5/16" gypsum panels fastened to roof trusses spaced 24" o.c. using FSI FoamNail two-part polyurethane adhesive, composed of an isocyanate component and a polyol component, applied in accordance with manufacturer's instructions. The adhesive was applied to both sides of the bottom chord of the trusses at all gypsum seams and to one side of the bottom chord on field trusses. One bead was also applied the ceiling peak. Adhesive was not applied along truss end rails and was left 3" short of end rails on all trusses. Gypsum panels were laid out on a wood fixture built to match the cathedral trusses. The gypsum panels were scored at their center line on the back side before laid on the fixture. 3/4" wide masking tape was applied to all gypsum seams. The 1x3 edge rails were spliced with 1x3x14 splice blocks. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4" leg x 16 gauge staples on each side of joint. Previously constructed edge rails were stapled to the truss heels with two (2) 7/16" c. x 2-1/2" leg x 16 gauge staples at each truss heel. The ridge rail was then stapled to the trusses with two (2) 7/16" c. x 2" leg x 16 gauge staples. The 1x4 side wall top plates were spliced with 1x4x14 splice plates. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4" leg x 16 gauge staples on each side of joint. A 1-1/2" wide wedge was stapled to the top plates to match the ceiling angle. Each truss

heel was toe-nailed to the top plate with (1) 0.131" diameter x 3-1/2" long nail. The two (2) end trusses were screwed 3" o.c. along the bottom chords into the top plates with #8 x 2-1/2" lg. Washer head wood screws. The gypsum was attached to the exterior wall top plate with 1" c. x 1-1/2" leg x 16 gauge staples at 4" o.c. PE 97-1906, Addendum A

Ultimate Shear Resistance
567.8 lbs./lin.ft. of ceiling
width

CEILING APPLICATION - F011

(Foamseal F2100 Adhesive)

Minimum Ceiling Width —
11' 9"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 48'

Gold Bond 5/16" gypsum panels fastened to roof trusses spaced 24" o.c. using Foamseal F2100, composed of an A-ISO component and a B-RESIN component, applied in accordance with the manufacturer's instructions. The F2100 was applied to both sides of the bottom chord of field trusses. The intersection of the ceiling board and edge rail were not sprayed. The F2100 was held 3" short of the edge rail on both ends of all trusses. 3/4" wide masking tape was applied to all gypsum seams. The gypsum was attached to the exterior wall top plate with 1" c. x 1" leg x 16 gauge staples at 4" o.c. The 1x3 edge rails were spliced with 1x3x14 splice blocks. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4" leg x 16 gauge staples on each side of joint. Previously constructed edge rails were stapled to the truss heels with two (2) 7/16" c. x 2-1/2" leg x 16 gauge staples at each truss heel. The ridge rail was then stapled to the trusses with two (2) 7/16" c. x 2" leg x 16 gauge staples per truss. The 1x4 side wall top plates were spliced with 1x4x14 splice plates. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4" leg x 16 gauge staples on each side of joint. PE 93-1066.

Ultimate shear resistance —
452 lbs./lineal ft. of ceiling
width

CEILING APPLICATION - CATHEDRAL - F014

(Foamseal F2100 Adhesive)

Minimum Ceiling Width — 11' 9"

Maximum Ceiling Diaphragm Span Between Shear Walls — 48'

Gold Bond 5/16" gypsum panels fastened to roof trusses spaced 24" o.c. using Foamseal F2100 urethane adhesive foam, composed of an A-ISO component and a B-RESIN component, applied in accordance with the manufacturer's instructions. The F2100 was applied to both sides of the bottom chord of the trusses at all gypsum seams and to one side of the bottom chord of field trusses. One bead was applied along the ceiling peak. F2100 was not applied along truss end rails. The F2100 was left 3" short of end rails on all trusses. Gypsum panels were laid out on a wood fixture built to match the cathedral trusses. The gypsum panels were scored at their center line on the back side before laid on the fixture. 3/4" wide masking tape was applied to all gypsum seams and along the peak. The gypsum was attached to the exterior wall top plate with 1" c. x 1" leg x 16 gauge staples at 4" o.c. The 1x3 edge rails were spliced with 1x3x14" splice blocks. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4 leg x 16 gauge staples on each side of joint. Previously constructed edge rails were stapled to the truss heels with two (2) 7/16" c. x 2-1/2" leg x 16 gauge staples at each truss heel. The ridge rail was then stapled to the trusses with two (2) 7/16" c. x 2" leg x 16 gauge staples. The 1x4 side wall top plates were spliced with 1x4x14 splice plates. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4" leg x 16 gauge staples on each side of joint. A 1-1/2" wide wedge was stapled to the top plates to match the ceiling angle. Each truss heel was toe-nailed to the top plate with one (1) 0.131" diameter x 3-1/2" long nail. PE 93-1068.

Ultimate shear resistance — 429 lbs./lineal ft. of ceiling width

CEILING APPLICATION - CATHEDRAL - F015

(Dow Chemical Voramer AA 3022 Adhesive)

Minimum Ceiling Width — 11' 8"

Maximum Ceiling Diaphragm Span Between Shear Walls — 52' 0"

Gold Bond 5/16" gypsum panels fastened to roof trusses spaced 24" o.c. using Dow Chemical Voramer AA 3022 two-part polyurethane adhesive, composed of isocyanate and polyol components, applied in accordance with manufacturers instructions. The adhesive was applied to both sides of the bottom chord of the trusses at all gypsum seams and to one side of the bottom chord on field trusses. One bead was also applied the ceiling peak. Adhesive was not applied along truss end rails and was left 3" short of end rails on all trusses. Gypsum panels were laid out on a wood fixture built to match the cathedral trusses. The gypsum panels were scored at their center line on the back side before laid on the fixture. 3/4" wide masking tape was applied to all gypsum seams. The 1x3 edge rails were spliced with 1x3x14 splice blocks. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4" leg x 16 gauge staples on each side of joint. Previously constructed edge rails were stapled to the truss heels with (2) 7/16" c. x 2-1/2" leg x 15 gauge staples at each truss heel. The ridge rail was then stapled to the trusses with two (2) 7/16" c. x 2" leg x 16 gauge staples. The 1x4 side wall top plates were spliced with 1x4x14 splice plates. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4" leg x 16 gauge staples on each side of joint. A 1-1/2" wide wedge was stapled to the top plates to match the ceiling angle. Each truss heel was toe-nailed to the top plate with (1) 0.131" diameter x 3-1/2" long nail. The two (2) end trusses were screwed 3" o.c. along the bottom chords into the top plates with #8 x 3" lg. washer

head wood screws. The gypsum was attached to the exterior wall top plate with 1" c. x 1-1/2" leg x 16 gauge staples at 4" o.c. PE 2000-886, Addendum A

Ultimate Shear Resistance 430 lbs./lin.ft. of ceiling width

CEILING APPLICATION - F017

(Foamseal F2100 Adhesive)

Minimum Ceiling Width — 13' 8"

Maximum Ceiling Diaphragm Span Between Shear Walls — 36'

Gold Bond 5/16" gypsum panels fastened to trusses 24" o.c. using Foamseal Inc., two-component polyurethane foam designated as Foamseal F2100, A-ISO component and B-RESIN component. The foam plastic is applied at the intersection formed by the sides of the bottom chords of the trusses and the gypsum wallboard ceiling material. The foam plastic is applied to:

- both sides of the trusses across the entire width of the ceiling assembly at all ceiling board joints,
- opposite sides of the bottom chord along each half of the truss in the field of the ceiling boards overlapping a minimum of 6" at the center and
- the entire length of the inside face of the end trusses.

The ceiling board is secured at the top plate with 1" x 1-1/4" 16 gauge staples at a maximum of 4" o.c. The 1 x 4 edge rail and 2 x 3 top plate are spliced with a minimum of 14-1/2" long nominal 1 x 4 or 1 x 3 blocks of the same material glued with a full bead of PVA adhesive and fastened with six 1" crown, 1-1/4" leg, 16 gauge staples on each side of splice joint. NAHB HUD contract HC-14362.

Ultimate shear resistance — 324 lbs./lineal ft. of ceiling width

CEILING APPLICATION - F023

(Foamseal F2100 Adhesive)

Minimum Ceiling Width — 13' 9"

Maximum Ceiling Diaphragm Span Between Shear Walls — 44'

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels fastened to trusses 24" o.c. using Foamseal Inc., two-component polyurethane foam designated as Foamseal F2100, A-ISO component and B-RESIN component. The foam plastic is applied at the intersection formed by the sides of the bottom chords of the trusses and the gypsum wallboard ceiling material. The foam plastic is applied to:

- both sides of the trusses across the entire width of the ceiling assembly at all ceiling board joints,
- opposite sides of the bottom chord along each half of the truss in the field of the ceiling boards overlapping a minimum of 6" at the center and
- the entire length of the inside face of the end trusses.

The ceiling board is attached to the top plate with 1" crown by 1-1/4" leg by 16 gauge staples spaced 4" o.c.

The minimum in-place finished foam fillet height and width shall be 1" and 1-1/4", respectively, at any location. The minimum height of the bottom chord of the trusses shall be 1".

The 1 x 4 edge rail and 2 x 3 top plate are spliced with a minimum of 14" long nominal 1 x 4 or 1 x 3 blocks of the same material as used for the edge rails glued together with a full bead of Swift - 49109 (Peter Cooper 7099-T) adhesive and secured with six 1" crown, 1-1/4" leg, 16 gauge staples, on each side of each splice joint. UL project 89NK5259.

Ultimate shear resistance — 392 lbs./lineal ft. of ceiling width

CEILING APPLICATION - F026

(Foamseal F2100 Adhesive)

Minimum Ceiling Width —
15'5"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 44'

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels fastened to trusses 24" o.c. using Foamseal Inc., two-component polyurethane foam designated as Foamseal F2100, A-ISO component and B-RESIN component. The foam plastic is applied at the intersection formed by the sides of the bottom chords of the trusses and the gypsum wallboard ceiling material. The foam plastic is applied to:

- both sides of the trusses across the entire width of the ceiling assembly at all ceiling board joints,
- opposite sides of the bottom chord along each half of the truss in the field of the ceiling boards overlapping a minimum of 6" at the center and
- the entire length of the inside face of the end trusses.

The ceiling board is attached to the top plate with 1" crown by 1-1/4" leg by 16 gauge staples spaced 4" o.c.

The minimum in-place finished foam fillet height and width shall be 1" and 1-1/4", respectively, at any location. The minimum height of the bottom chord of the trusses shall be 1-3/16".

The 1 x 4 edge rail and 2 x 3 top plate are spliced with a minimum of 14" long nominal 1 x 4 or 1 x 3 blocks of the same material as used for the edge rails glued together with a full bead of Swift - 49109 (Peter Cooper 7099-T) adhesive and secured with six 1" crown, 1-1/4" leg, 16 gauge staples, on each side of each splice joint. UL project 89NK5259.

Ultimate shear resistance —
430 lbs./lineal ft. of ceiling
width

CEILING APPLICATION - F029

(Foamseal F2100 Adhesive)

Minimum Ceiling Width —
15'6"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 48'

Gold Bond 5/16" gypsum panels fastened to roof trusses spaced 24" o.c. using Foamseal 2100 urethane adhesive foam, composed of an A-ISO component and a B-RESIN component, applied in accordance with the manufacturer's instructions. The F2100 was applied to both sides of the bottom chord of the trusses at all gypsum seams and to one side of the bottom chord of field trusses. The intersection of the ceiling board and edge rail was not sprayed. The F2100 was held 3" short of the edge rail on both ends of all trusses. 3/4" wide masking tape was applied to all gypsum seals. The 1x3 edge rails were spliced with 1x3x14" splice blocks. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4" leg x 16 gauge staples on each side of joint. Previously constructed edge rails were stapled to the truss heels with two (2) 7/16" c. x 2-1/2" leg x 16 gauge staples at each truss heel. The ridge rail was then stapled to the trusses with two (2) 7/16" c. x 2" leg x 16 gauge staples per truss. The 1x4 side wall top plates were spliced with 1x4x14" splice plates. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4" leg x 16 gauge staples on each side of joint. The gypsum was attached to the exterior wall top plate with 1" c. x 1" leg x 16 gauge staples at 4" o.c. PE 93-1070.

Ultimate shear resistance —
462 lbs./lineal ft. of ceiling
width

CEILING APPLICATION - CATHEDRAL - F032

(Foamseal F2100 Adhesive)

Minimum Ceiling Width —
15'6"

Maximum Ceiling Diaphragm
Span Between Shear Walls
— 48'

Gold Bond 5/16" gypsum panels fastened to roof trusses spaced 24" o.c. using Foamseal F2100 urethane adhesive foam, composed of an A-ISO component and a B-RESIN component, applied in accordance with the manufacturer's instructions. The F2100 was applied on both sides of trusses on gypsum seams, as well as on one side of trusses between gypsum seams. One bead was also applied along the ceiling peak. F2100 was not applied along truss end rails. F2100 was left 3" short of end rails on all trusses. Gypsum panels were laid out on a wood fixture built to match the cathedral trusses. The gypsum panels were scored at their center line on the back side before laid on the fixture. 3/4" wide masking tape was applied to all gypsum seams and along the peak. The 1x3 edge rails were spliced with 1x3x14" splice blocks. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4" leg x 16 gauge staples on each side of joint. Previously constructed edge rails were stapled to the truss heels with two (2) 7/16" c. x 2-1/2" leg x 16 gauge staples at each truss heel. The ridge rail was then stapled to the trusses with two (2) 7/16" c. x 2" leg x 16 gauge staples. The 1x4 side wall top plates were spliced with 1x4x14" splice plates. The splice blocks were attached with PVA adhesive and six (6) 1" c. x 1-1/4" leg x 16 gauge staples on each side of joint. A 1-1/2" wide wedge was stapled to the top plates to match the ceiling angle. Each truss heel was toe-nailed to the top plate with one (1) 0.131" diameter x 3-1/2" long nail. The gypsum was attached to the exterior wall top plate with 1" c. x 1" leg x 16 gauge staples at 4" o.c. PE 93-1072.

Ultimate shear resistance —
382 lbs./lineal ft. of ceiling
width

III. WALL APPLICATIONS

WALL APPLICATION - W001

(One Side 2 x 3 Members —
Staples and Adhesives)

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels applied to one side of 2" x 3" wood plates and studs 16" o.c. and adhered with **Tanco XA2600 adhesive** 1/4" bead on studs, double beads at joints, and plates. Temporary staples, 1/4" crown by 1" leg, .044" thick and 0.050" wide steel wire spaced at 6" o.c. along the top and bottom plates (staple crowns parallel) and 24" o.c. at end studs and joint stud (two staples side by side at butt joint) and 24" o.c. along the length of each intermediate stud with staple crowns parallel and a minimum of 3/8" from edges. Temporary staple fastening was used to ensure permanent adhesive bond of panels to framing.

As an alternate, permanent staples (with leg 11/16" minimum longer than gypsum board thickness), 0.098" diameter ring shank or gypsum board nails (7/8" minimum longer than gypsum board thickness) or Type S or W drywall screws (5/8" minimum longer than gypsum board thickness), spaced 6" o.c. into the top and bottom plates only, can be used. At 24" o.c. along the length of each stud, temporary (minimum 6 hr. period) or permanent positive support or fastening is to be used to ensure permanent adhesive bond of panels to framing. UL project 89NK27074 (Application 1).*

Other adhesives approved:

a. Swift - 49109 (Peter Cooper 7099-T)

b. National Starch Woodlok 40-0272

c. Elixer Instant Bond White Glue

Ultimate shear resistance —
638 lbs./lineal foot

Load at 1/8" deflection —
410 lbs./lineal foot

* UL Shear Resistance Classification MH 10176

WALL APPLICATION - W002

(One Side 1x3 Plates and 2x3 Studs — Staples and Adhesives)

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels applied to one side of 1" x 3" wood plates and 2" x 3" wood studs 16" o.c. and adhered with 1/4" bead of **Tanco XA 2600 adhesive** on studs, double beads at joints, and plates. Staples having 1/4" crown by 1" leg, .044" thick and 0.050" wide steel wire were spaced 6" o.c. along the top and bottom plates (staple crowns parallel), 24" o.c. at end studs and joint stud (two staples side by side at butt joint) and 24" o.c. along the length of each intermediate stud with staple crowns parallel and a minimum of 3/8" from edges.

As an alternate, permanent staples (with leg 11/16" minimum longer than gypsum board thickness), 0.098" diameter ring shank or gypsum board nails (7/8" minimum longer than gypsum board thickness) or Type S or W drywall screws (5/8" minimum longer than gypsum board thickness), spaced 6" o.c. into the top and bottom plates only, can be used. At 24" o.c. along the length of each stud, temporary (minimum 6 hr. period) or permanent positive support or fastening is to be used to ensure permanent adhesive bond of panels to framing. UL project 89NK27074 (Application 2).*

Other adhesives approved:

a. **Swift - 49109 (Peter Cooper 7099-T)**

b. **National Starch Woodlok 40-0272**

c. **Elixer Instant Bond White Glue**

Ultimate shear resistance – 554 lbs./lineal ft.

Load at 1/8" deflection – 312 lbs./lineal ft.

WALL APPLICATION - W003

(One Side 1x3 Plates and 2x3 Studs — Staples and Adhesives) Horizontal Application

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels applied "horizontally" (2" x 3" blocking behind gypsum board joint) to one side of 1" x 3" wood plates and 2" x 3" wood studs 16" o.c. and adhered with 1/4" wide bead of **Tanco XA 2600 adhesive** on studs and plates. Staples having 1/4" crown by 1" leg, .044" thick and .050" wide steel wire were spaced 6" o.c. along the top and bottom plates, 8" o.c. along the horizontal joint with one staple at mid-height of each panel width of each end and intermediate stud with staple crowns parallel to and not less than 1/4" from edges.

As an alternate, permanent staples (with leg 11/16" minimum longer than gypsum board thickness), 0.098" diameter ring shank or gypsum board nails 7/8" minimum longer than gypsum board thickness) or Type S or W drywall screws (5/8" minimum longer than gypsum board thickness), spaced 6" o.c. into the top and bottom plates and 8" o.c. at the wallboard joint only, can be used. At 24" o.c. along the length of each stud, temporary (minimum 6 hr. period) or permanent positive support or fastening is to be used to ensure permanent adhesive bond of panels to framing. UL project 89NK27074 (Application 3).*

Other adhesives approved:

a. **Swift - 49109 (Peter Cooper 7099-T)**

b. **National Starch Woodlok 40-0272**

c. **Elixer Instant Bond White Glue**

Ultimate shear resistance – 561 lbs./lineal ft.

Load at 1/8" deflection – 341 lbs./lineal ft.

WALL APPLICATION - W006

(One Side 1x3 Plates and 2x3 Studs – **Foamseal F2100 Adhesive**)

Gold Bond 5/16" gypsum panels applied to one side 1"x3" ungraded SPF bottom plate. Studs are 2"x3" studgrade SPF at 24" o.c. and gypsum panels adhered with Foamseal F2100 in accordance with the manufacturer's instructions. PE 94-764.

Ultimate shear resistance – 610 lbs./lineal ft.

Design shear/2.5 safety factor – 244.0 lbs./lineal ft.

WALL APPLICATION - W007

(One Side 1x3 Plates and 2x3 Studs – **Foamseal F2100 Adhesive**)

Gold Bond 1/2" gypsum panels with 1/16" gap between panels applied horizontally to one side 1"x3" ungraded SPF plates and 2"x3" stud grade SPF studs at 16" o.c. and adhered with Foamseal F2100 applied in accordance with the manufacturer's instructions. Horizontal joint treated with Gold Bond joint tape and one coat Gold Bond Sta-Smooth HS 45 (mixed and applied per instructions on bag). PE 91-1890(E).

Ultimate shear resistance – 667 lbs./lineal ft.

Design shear/2.5 safety factor – 266.8 lbs./lineal ft.

WALL APPLICATION - W008

(Two Sides 1x3 Plates and 2x3 Studs – **Foamseal F2100 and PR-32 Adhesives**)

Gold Bond 5/16" gypsum panels applied to both sides of 1"x3" ungraded SPF plates and 2"x3" stud grade SPF studs at 16" o.c. and adhered as follows: First side adhered with Foamseal F2100 applied in accordance with the manufacturer's instructions. Panels on opposite side of partition adhered with 1/8" bead of Foamseal PR-32 to all framing members, and 1/4" crown x 1" leg and 18 ga. staples spaced 12" o.c. along plates and 24" o.c. along studs. PE 91-2094(A).

Ultimate shear resistance – 680 lbs./lineal ft.

Design shear/2.5 safety factor – 272 lbs./lineal ft.

WALL APPLICATION - W009

(Two Sides 2x3 Plates and 2x3 Perimeter Studs and 1x3 Interior Studs – **Foamseal Elasto-Bond Urethane Adhesive**)

Gold Bond 1/2" gypsum panels horizontally applied to both sides of 2"x3" stud grade SPF plates and 2"x3" stud grade SPF perimeter studs at 16" o.c. and 1"x3" ungraded SPF interior studs at 16" o.c. Gypsum panels were applied using Elasto-Bond urethane adhesive with average bead size of 1/8" dia. on interior studs and 3/16" to 1/4" dia. on perimeter studs. A bead of Elasto-Bond was also put on one edge of the gypsum panel that was to be the horizontal seam edge. Gypsum panels applied in same manner on opposite side of wall. PE 93-1494.

Ultimate shear resistance – 756 lbs./lineal ft.

Design shear/2.5 safety factor – 302.4 lbs./lineal ft.

WALL APPLICATION - W010

(One Side 1x3 top plate and 2x3 bottom plate and 2x3 studs - **Foamseal F2100 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 ungraded SPF top plate and 2x3 stud grade SPF bottom plate and 2x3 stud grade SPF studs at 24" o.c. and adhered with Foamseal F2100 in accordance with manufacturer's instructions. PE 94-388

Ultimate shear resistance – 782.6 lbs./lineal ft.

Design shear/2.5 safety factor – 313.0 lbs./lineal ft.

* UL Shear Resistance Classification MH 10176

WALL APPLICATION - W011

(One Side 1x3 Plates and 2x3 Studs - Staples and **Foamseal F6000 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 ungraded SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with F6000 adhesive 1/8" single bead on plates and double 1/8" bead on all stud framing. Staples 1/4" crown by 1" leg by .030" thick spaced 6" o.c. around gypsum panel perimeter and temporary fasteners used at 32" o.c. along intermediate studs. PE 96-652

Ultimate shear resistance – 608.7 lbs./lineal ft.

Design shear/2.5 safety factor – 243.5 lbs./lineal ft.

WALL APPLICATION - W012

(One Side 2x3 Plates and 2x3 Studs - Staples and **Foamseal F6300 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 2x3 stud grade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with F6300 adhesive double 1/16" bead on all framing. Staples 1" crown by 1" leg by 16 gauge spaced 6" o.c. along plates and 1/4" crown by 1" leg by .030" thick spaced 6" o.c. along perimeter studs. Along intermediate studs temporary fasteners through temporary 1x3 at 12" and 48" from plates. PE 97-610 (A)

Ultimate shear resistance – 642.9 lbs./lineal ft.

Design shear/2.5 safety factor – 257.1 lbs./lineal ft.

WALL APPLICATION - W013

(One Side 1x3 Plates and 2x3 Studs and Corner Blocks - Staples and **PEMCO 5100 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 stud grade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and

adhered with Pemco 5100 adhesive double 1/16" to 1/8" bead on all stud framing and single 1/16" to 1/8" bead on plates and four beads on block on edge and double bead on flat block. Staples 3/16" crown by 3/4" leg by 21 gauge spaced 6" o.c. around gypsum panel perimeter and 21" o.c. along intermediate studs. PE 95-1344 (C)

Ultimate shear resistance – 747.0 lbs./lineal ft.

Design shear/2.5 safety factor – 298.8 lbs./lineal ft.

WALL APPLICATION - W014

(One Side 2x3 Top Plate and 1x3 Bottom Plate and 2x3 Studs - Staples and **PEMCO 5100 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 2x3 stud grade SPF top plate and 1x3 ungraded SPF bottom plate and 2x3 stud grade SPF studs at 16" o.c. and adhered with double 1/16" to 1/8" bead of Pemco 5100 adhesive on all 2x3 framing and single 1/16" to 1/8" bead on 1x3 framing. Staples 3/16" crown by 3/4" leg by 21 gauge spaced 6" o.c. around gypsum panel perimeter and 21" o.c. along intermediate studs. PE 95-1344 (A)

Ultimate shear resistance – 568.6 lbs./lineal ft.

Design shear/2.5 safety factor – 227.4 lbs./lineal ft.

WALL APPLICATION - W015

(One side 2x3 Top Plate and 1x3 Bottom Plate and 2x3 end studs and center stud and 1x3 intermediate studs - Staples and **PEMCO 5100 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 2x3 stud grade SPF top plate and 1x3 utility grade SPF bottom plate and 2x3 stud grade SPF studs 48" o.c. at panel edges and 1x3 utility grade SPF studs at intermediate panel spacing. Adhered with PEMCO 5100 adhesive double 1/16" to

1/8" bead on 2x3 plate and 2x3 studs and single 1/16" bead on 1x3 plate and 1x3 stud framing. Staples 3/16" crown by 3/4" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter and secured at 12" o.c. along intermediate 1x3 studs. NTA96-0529-4

Ultimate shear resistance – 537.6 lbs./lineal ft.

Design shear/2.5 safety factor – 215.0 lbs./lineal ft.

WALL APPLICATION - W016

(One Side 1x3 Plates and 2x3 Studs - Staples and **PEMCO 5100 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 utility grade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with PEMCO 5100 adhesive single 1/16" bead on plates and double 1/16" to 1/8" bead on all stud framing. Staples 3/16" crown by 3/4" leg by 19 gauge spaced 6" o.c. along plates and edge secured 6" from plates at each stud and one fastener 6" above and below mid height of studs on gypsum panel perimeter and field fastened at mid height of stud framing. NTA96-0212-3

Ultimate shear resistance – 819.6 lbs./lineal ft.

Design shear/2.5 safety factor – 327.8 lbs./lineal ft.

WALL APPLICATION - W017

(One Side 2x3 Top Plate and 1x3 Bottom Plate and 2x3 studs - Staples and **TACC International GUN 'N GO Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side 2x3 stud grade SPF top plate and 1x3 utility grade SPF bottom plate and 2x3 stud grade SPF studs at 16" o.c. and adhered with GUN 'N GO adhesive 3/8" single bead on plates and stud framing. Staples 1/4" crown by 1" leg by 18 gauge spaced 6" o.c. around gypsum panel perimeter and no

field fasteners along interior studs. NTA96-0105-3

Ultimate shear resistance – 506.8 lbs./lineal ft.

Design shear/2.5 safety factor – 203.0 lbs./lineal ft.

WALL APPLICATION - W018

(One Side 2x3 Plates and 2x3 Studs - Staples and **TACC International GUN 'N GO Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 2x3 stud grade SPF plates and 2x3 stud grade SPF studs spaced 16" o.c. and adhered with GUN 'N GO adhesive 3/8" single bead on plates and studs and 3/8" single serpentine bead on center stud at gypsum seam. Staples 1/4" crown by 1" leg by 18 gauge spaced 6" o.c. around gypsum panel perimeter and one temporary fastener at midpoint of intermediate studs. NTA970115-1

Ultimate shear resistance – 600.0 lbs./lineal ft.

Design shear/2.5 safety factor – 240.0 lbs./lineal ft.

WALL APPLICATION - W019

(One Side 2x3 Top Plate and 1x3 Bottom Plate and 2x3 studs - Staples and **TACC International GUN 'N GO Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 2x3 stud grade SPF top plate and 1x3 ungraded SPF bottom plate and 2x3 stud grade SPF studs spaced 16" o.c. and adhered with GUN 'N GO adhesive 3/8" single bead on plates and studs and 3/8" single serpentine bead on center stud at gypsum panel seam. Staples 1/4" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter and no fasteners on intermediate studs. NTA970154-1

Ultimate shear resistance – 563.7 lbs./lineal ft.

Design shear/2.5 safety factor – 225.1 lbs./lineal ft.

WALL APPLICATION - W020

(One Side 2x3 Top Plate and 1x3 Bottom Plate and 2x3 Studs - Staples and **Clayton Corp. Touch 'N Seal Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 2x3 stud grade SPF top plate and 1x3 utility grade SPF bottom plate and 2x3 stud grade SPF studs at 16" o.c. and adhered with Touch 'N Seal adhesive 1/2" single bead on plates and studs and double 3/8" bead on center stud at gypsum panel seam. Staples 1/4" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter and no field fasteners along intermediate studs. NTA960715-1

Ultimate shear resistance – 561.8 lbs./lineal ft.

Design shear/2.5 safety factor – 225.0 lbs./lineal ft.

WALL APPLICATION - W021

(One Side 1x3 Plates and 2x3 Studs - Staples and **SUN No. 99 Adhesive**)

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels vertically applied to one side of 1x3 wood plates and 2x3 wood studs 24" o.c. and adhered with 1/4" single bead of SUN No. 99 adhesive on plates and studs and double 1/4" bead on center stud at gypsum panel joint. Staples 1/4" crown by 1" leg by 18 gauge spaced 12" o.c. along top and bottom plates and spaced 24" o.c. along all stud framing with crowns parallel to and not less than 1/4" from edges.

As an alternate, permanent staples (with leg 11/16" minimum longer than gypsum panel thickness), 0.098" diameter ring shank nails (7/8" minimum longer than gypsum panel thickness), or Type S or W drywall screws (5/8" minimum longer than gypsum panel thickness), spaced 12" o.c. along top and bottom plates. At 24" o.c. along each intermediate stud and center stud at gypsum panel joint, temporary (minimum 6 hr. period) or

permanent positive support or fastening is to be used to insure permanent adhesive bond of panels to framing. UL Project 95NK23891 (Application 5)*

Ultimate shear resistance – 382.0 lbs./lineal ft.

Load at 1/8" deflection – 282.0 lbs./lineal ft.

WALL APPLICATION - W022

(One Side 2x3 Plates and 2x3 Studs - Staples and **SUN No. 99 Adhesive**)

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels vertically applied to one side of 2x3 wood plates and 2x3 wood studs 16" o.c. and adhered with 1/4" single bead of SUN No. 99 adhesive on plates and studs and double 1/4" bead on center stud at gypsum panel joint. Staples 1/4" crown by 1" leg by 18 gauge spaced 12" o.c. along top and bottom plates and end studs and spaced 24" o.c. along intermediate studs and center stud at gypsum panel joint with crowns parallel to and not less than 1/4" from edges.

As an alternate, permanent staples (with leg 11/16" minimum longer than gypsum panel thickness), 0.098" diameter ring shank nails (7/8" minimum longer than gypsum panel thickness), or Type S or W drywall screws (5/8" minimum longer than gypsum panel thickness), spaced 12" o.c. along top and bottom plates. At 24" o.c. along each intermediate stud and center stud at gypsum panel joint, temporary (minimum 6 hr. period) or permanent positive support or fastening is to be used to insure permanent adhesive bond of panels to framing. UL Project 95NK23891 (Application 9)*

Ultimate shear resistance – 545.0 lbs./lineal ft.

Load at 1/8" deflection – 366.0 lbs./lineal ft.

WALL APPLICATION - W023

(One Side 1x3 Plates and 2x3 Studs - Staples and **SUN No. 99 Adhesive**)

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels vertically applied to one side of 1x3 wood plates and 2x3 wood studs 16" o.c. and adhered with 1/4" single bead of SUN No. 99 adhesive on plates and studs and double 1/4" bead on center stud at gypsum panel joint. Staples 1/4" crown by 1" leg by 18 gauge spaced 12" o.c. along top and bottom plates and end studs and spaced 24" o.c. along intermediate studs and center stud at gypsum panel joint with crowns parallel to and not less than 1/4" from edges.

As an alternate, permanent staples (with leg 11/16" minimum longer than gypsum panel thickness), 0.098" diameter ring shank nails (7/8" minimum longer than gypsum panel thickness), or Type S or W drywall screws (5/8" minimum longer than gypsum panel thickness), spaced 12" o.c. along top and bottom plates. At 24" o.c. along each intermediate stud and center stud at gypsum panel joint, temporary (minimum 6 hr. period) or permanent positive support or fastening is to be used to insure permanent adhesive bond of panels to framing. UL Project 95NK23891 (Application 10)*

Ultimate shear resistance – 373.0 lbs./lineal ft.

Load at 1/8" deflection – 324.0 lbs./lineal ft.

WALL APPLICATION - W024

(One Side 1x3 Plates and 2x3 Studs - Staples and **Dow Chemical Canada Inc. EnerBond DW Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 stud grade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with EnerBond DW adhesive 1/2" single bead on plates and studs and double 1/2" bead on center stud at gypsum panel seam. Staples

3/16" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter. CTL AB96-10

Ultimate shear resistance – 494.3 lbs./lineal ft.

Design shear/2.5 safety factor – 197.7 lbs./lineal ft.

WALL APPLICATION - W025

(One Side 1x3 Plates and 2x3 Studs - Staples and **Dow Chemical Canada Inc. EnerFoam Adhesive**)

Gold Bond 5/16" gypsum panels applied vertically to one side of 1x3 ungraded SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with EnerFoam adhesive 1/2" single bead on plates and studs and double 1/2" bead on center stud at gypsum panel seam. Staples 3/16" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter and 12" o.c. along intermediate stud framing. Trow Consulting Engineers Ltd. BR10585A-06

Ultimate shear resistance – 486.7 lbs./lineal ft.

Design shear/2.5 safety factor – 194.7 lbs./lineal ft.

WALL APPLICATION - W026

(One Side 2x3 Top Plate and 1x3 Bottom Plate and 2x3 Studs; Block on Bottom Plate - Staples and **Dow Chemical Canada Inc. EnerFoam Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 2x3 stud grade SPF top plate and 1x3 ungraded SPF bottom plate (two 2x3x14" ungraded SPF blocks fastened to bottom plate centered between studs in one stud cavity) and 2x3 stud grade SPF studs at 24" o.c. and adhered with EnerFoam adhesive 1/2" single bead on plates and studs and double 1/2" bead on center stud at gypsum panel seam. Staples 1/4" crown by 1" leg by .030

* UL Shear Resistance Classification MH 10176

thick spaced 12" o.c. around gypsum panel perimeter and 18" o.c. along intermediate studs. CTL AB95-01

Ultimate shear resistance – 467.2 lbs./lineal ft.

Design shear resistance – 186.9 lbs./lineal ft.

WALL APPLICATION - W027

(One Side 1x3 Plates and 1x3 and 2x3 Studs - Staples and **Foamseal F6300 or F6400 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 ungraded SPF plates and 2x3 stud grade SPF studs 48" o.c. at panel edges and 1x3 ungraded SPF at intermediate panel spacing. Adhered with Foamseal F6300 or F6400 adhesive double 1/16" bead on 2x3 framing and single 1/16" bead on 1x3 framing members. Staples 3/16" crown x 3/4" leg x .038" thick spaced 12" o.c. around gypsum panel perimeter and 30" o.c. along intermediate stud framing. 97-1388 (C)

Ultimate shear resistance – 388.4 lbs./lineal ft

Design shear/2.5 safety factor – 155.3 lbs./lineal ft.

WALL APPLICATION - W028

(One Side 1x3 Plates and 2x3 Studs - Staples and **TACC International STA SEALED 910 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 utility grade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with STA SEALED 910 adhesive 3/8" single bead on plates and studs and double 3/8" bead on center stud at gypsum panel joint. Staples 1/4" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter and no field fasteners along intermediate studs. NTA970012-1

Ultimate shear resistance – 452.8 lbs./lineal ft.

Design shear/2.5 safety factor – 181.1 lbs./lineal ft.

WALL APPLICATION - W029

(One Side 1x3 Plates and 2x3 Studs - Staples and **TACC International MH 9000 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 #3 grade SPF plates and 2x3 stud grade SPF studs 16" o.c. and adhered with MH 9000 adhesive 3/8" single bead on all framing. Staples 3/16" crown by 3/4" leg by .025 thick spaced 6" o.c. around gypsum panel perimeter and temporary finish nails in the field.

Fasteners of equal or higher lateral and withdrawal values may be substituted for 3/16" crown by 3/4" leg by .025 thick staples using the same spacing. PE 95-304

Ultimate shear resistance – 690.6 lbs./lineal ft.

Design shear/2.5 safety factor – 276.2 lbs./lineal ft.

WALL APPLICATION - W030

(One Side 1x3 Plates and 2x3 Studs - Staples and **Dow Chemical Canada Inc. EnerBond MH Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 ungraded SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with EnerBond MH adhesive 1/2" single bead on plates and studs and double bead on center stud at gypsum panel seam. Staples 3/16" crown by 1" leg by 15 gauge spaced 6" o.c. around gypsum panel perimeter. CLT FP98-01

Ultimate shear resistance – 649.0 lbs./lineal ft.

Design shear/2.5 safety factor – 260.0 lbs./lineal ft.

WALL APPLICATION - W031

(One Side 1x3 Plates and 2x3 Studs - Staples and **Dow Chemical Canada Inc. EnerFoam Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 stud grade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with EnerFoam adhesive 1/2" single bead on plates and studs and double bead on center stud at gypsum panel seam. Staples 3/16" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter. CLT FP98-02

Ultimate shear resistance – 539.0 lbs./lineal ft.

Design shear/2.5 safety factor – 216.0 lbs./lineal ft.

WALL APPLICATION - W032

(One Side 2x3 Top Plate and 1x3 Bottom Plate and 2x3 Studs - Staples and **Dow Chemical Canada Inc. EnerBond SF Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 2x3 stud grade SPF top plate and 1x3 stud grade SPF bottom plate and 2x3 stud grade SPF studs at 16" o.c. and adhered with EnerBond SF adhesive 1/2" single bead on plates and studs and double bead on center stud at gypsum panel seam. Staples 3/16" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter. CLT FP98-03

Ultimate shear resistance – 739.0 lbs./lineal ft.

Design shear/2.5 safety factor – 296.0 lbs./lineal ft.

WALL APPLICATION - W033

(One Side 2x3 Top Plate and 1x3 Bottom Plate and 2x3 Studs - Staples and **Dow Chemical Canada Inc. EnerFoam Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 2x3 stud grade SPF top plate and 1x3 stud grade SPF bottom plate and 2x3 stud grade SPF studs at 16" o.c. and adhered with EnerFoam adhesive 1/2" single bead on plates and studs and double bead on center stud at gypsum panel seam. Staples 3/16" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter. CLT FP98-04

Ultimate shear resistance – 638.0 lbs./lineal ft.

Design shear/2.5 safety factor – 255.0 lbs./lineal ft.

WALL APPLICATION - W034

(One Side 1x3 plates and 2x3 Studs - **Dow Chemical Voramar AA 3022 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 ungraded SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with Voramar AA 3022 adhesive 1/2" single bead on plates and 3/8" single bead on studs with double bead on center stud at gypsum panel seam. PE 2001-631

Ultimate shear resistance – 529.4 lbs./lineal ft.

Design shear/2.5 safety factor – 211.7 lbs./lineal ft.

WALL APPLICATION - W035

(One Side 1x3 plates and 2x3 Studs - staples and **H.B. Fuller Co. Parr CA-40 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 ungraded SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with Parr CA-40 Adhesive, 3/8" single bead on plates and studs and 3/8" double bead on center stud at gypsum panel seam.

Staples 1/4" crown by 3/4 leg by .030 thick spaced 6" o.c. around gypsum panel perimeter. Temporary fasteners .080" dia. x 1-5/8" long nails and 3" sq. luan washers spaced 32" o.c. along field studs. PE 2001-710 (A)

Ultimate shear resistance – 454.0 lbs./lineal ft.

Design shear/2.5 safety factor – 181.6 lbs./lineal ft.

WALL APPLICATION - W036

(One Side 1x3 plates and 2x3 Studs - staples and **H.B. Fuller Co. Parr CA-40 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 ungraded SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with Parr CA-40 Adhesive 3/8" single bead on plates and studs and 3/8" double bead on center stud at gypsum panel seam. Staples 1/4" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter and 21" o.c. along field studs. NTA 990011A

Ultimate shear resistance – 766.9 lbs./lineal ft.

Design shear/2.5 safety factor – 306.7 lbs./lineal ft.

WALL APPLICATION - W037

(One Side 1x3 plates and 2x3 Studs - staples and **H.B. Fuller Co. Parr CA-40 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 ungraded SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with Parr CA-40 Adhesive 3/8" single bead on plates and studs and 3/8" serpentine bead on center stud at gypsum panel seam. Staples 1/4" crown by 3/4" leg by .030 thick spaced 6" o.c. around gypsum panel perimeter, no field fasteners. NTA 200121A

Ultimate shear resistance – 660.2 lbs./lineal ft.

Design shear/2.5 safety factor – 264.0 lbs./lineal ft.

WALL APPLICATION - W038

(One Side 1x3 plates and 2x3 Studs - **Foam Supplies Inc. FoamNail Adhesive**)

Gold Bond 1/2" gypsum panels horizontally applied to one side of 1x3 ungraded SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with FoamNail two-part polyurethane adhesive applied in accordance with manufacturers instructions. The adhesive was applied to one side of plates and studs with an average contact area of 1-3/8" on studs and plates and 2" on wallboard. The horizontal gypsum seam finished with 2" wide fiberglass mesh joint tape and Sta-Smooth High Strength joint compound. PE 99-1346 (A)

Ultimate shear resistance – 573.0 lbs./lineal ft.

Design shear/2.5 safety factor – 229.2 lbs./lineal ft.

WALL APPLICATION - W039

(One Side 2x3 plates and 2x3 Studs - **Foam Supplies Inc. FoamNail Adhesive**)

Gold Bond 1/2" gypsum panels horizontally applied to one side of 2x3 stud grade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with FoamNail two-part polyurethane adhesive applied in accordance with manufacturers instructions. The adhesive was applied to one side of plates and studs with an average contact area of 1-1/4" on studs, 1-1/2" on plates and 1-3/4" on wallboard. The horizontal gypsum seam finished with 2" wide fiberglass mesh joint tape and Sta-Smooth High Strength joint compound. PE 99-1346 (B)

Ultimate shear resistance – 649.1 lbs./lineal ft.

Design shear/2.5 safety factor – 259.6 lbs./lineal ft.

WALL APPLICATION - W040

(One Side 2x3 plates and 2x3 Studs - **Foam Supplies Inc. FoamNail Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 2x3 stud grade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with FoamNail two-part polyurethane adhesive applied in accordance with manufacturers instructions. The adhesive was applied to one side of plates and studs and to both sides of center stud at gypsum panel seam with an average contact area of 7/8" on studs 1-1/4" on plates and 1-5/8" on wallboard. PE 99-2792 (C)

Ultimate shear resistance – 768.3 lbs./lineal ft.

Design shear/2.5 safety factor – 307.3 lbs./lineal ft.

WALL APPLICATION - W041

(One Side 1x3 plates and 2x3 Studs - **Foam Supplies Inc. FoamNail Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 ungrade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with FoamNail two-part polyurethane adhesive applied in accordance with manufacturers instructions. The adhesive was applied to one side of plates and studs and to both sides of center stud at gypsum panel seam with an average contact area of 1" on studs, 1-1/8" on plates and 1-5/8" on wallboard. PE 99-2462 (D)

Ultimate shear resistance – 560.8 lbs./lineal ft.

Design shear/2.5 safety factor – 224.3 lbs./lineal ft.

WALL APPLICATION - W042

(One Side 1x3 plates and 2x3 Stud - **Foam Supplies Inc. FoamNail Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to one side of 1x3 ungrade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with FoamNail one-part urethane adhesive 1/16"

to 1/8" single bead on plates and two 1/16" to 1/8" beads on studs. Staples 1/4" crown by 3/4" leg by 19 gauge spaced 6" o.c. along top and bottom plates, spaced 18" o.c. along gypsum panel perimeter studs and spaced 12", 48" and 84" along field studs. PE 2001-1215 (B)

Ultimate shear resistance – 622.0 lbs./lineal ft.

Design shear/2.5 safety factor – 248.8 lbs./lineal ft.

WALL APPLICATION - W043

(One Side 1x3 plates and 2x3 Studs - Staples and **Dow Chemical Canada Inc. EnerBond BA Adhesive**)

Gold Bond 1/2" gypsum panels horizontally applied to one side of 1x3 utility grade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with EnerBond BA construction adhesive 1/8" single bead on plates and studs. Staples 3/16" crown by 1-1/8" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter, except along seam, where gypsum panels were stapled at intermediate studs at 16" o.c., no fasteners in field. CLT FP00-04

Ultimate shear resistance – 526.7 lbs./lineal ft.

Design shear/2.5 safety factor – 210.7 lbs./lineal ft.

WALL APPLICATION - W205

(Two Sides 1x3 Plates and 1x3 and 2x3 Studs - Staples and **Foamseal F6300 or F6400 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 1x3 ungraded SPF plates and 2x3 stud grade SPF studs 48" o.c. at panel edges and 1x3 ungraded SPF studs at intermediate spacing and adhered with Foamseal F6300 or F6400 adhesive double 1/16" to 1/8" bead on 2x3 framing and single 1/16" to 1/8" bead on 1x3 framing. Staples 3/16" crown by 3/4" leg by .038 thick spaced 12"

o.c. around gypsum panel perimeter and spaced 30" o.c. along intermediate studs. PE 97-1388 (E)

Ultimate shear resistance – 677.4 lbs./lineal ft.

Design shear/2.5 safety factor – 270.9 lbs./lineal ft.

WALL APPLICATION - W206

(Two Sides 2x3 Plates and 2x3 Studs - **Foamseal F2100 Adhesive** and Staples/**Foamseal F6200 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 2x3 stud grade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered as follows: First side adhered with Foamseal F2100 adhesive applied in accordance with manufacturer's instructions. Panels on opposite side of partition adhered with double 1/16" bead of Foamseal F6200 adhesive on all framing members. Staples 1/4" crown by 3/4" leg by .030 thick spaced 6" o.c. around gypsum panel perimeter. Temporary fasteners placed at 12" and 48" from plates along intermediate studs. PE 96-1472 (B)

Ultimate shear resistance – 847.5 lbs./lineal ft.

Design shear/2.5 safety factor – 339.0 lbs./lineal ft.

WALL APPLICATION - W207

(Two Sides 2x3 Plates and 2x3 Studs - Staples and **Foamseal F6300 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 2x3 stud grade SPF plates and 2x3 stud grade SPF studs 16" o.c. and adhered with F6300 adhesive double 1/16" to 1/8" beads on all framing. Staples 1" crown by 1" leg by 16 gauge spaced 6" o.c. along plates and 1/4" crown by 1" leg by .030" thick spaced 6" o.c. around gypsum panel perimeter. Temporary fasteners 7/16" crown by 1-3/4" leg by 16 gauge through temporary 1x3 at 12" and 48" from plates along intermediate studs. PE 97-610 (D)

Ultimate shear resistance – 1170.6 lbs./lineal ft.

Design shear/2.5 safety factor – 468.2 lbs./lineal ft.

WALL APPLICATION - W208

(Two Sides 1x3 Plates and 2x3 Studs - Staples and **PEMCO 5100 Adhesive** and **PEMCO 3100 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to 1x3 utility grade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered as follows: First side adhered with PEMCO 5100 adhesive single 1/16" to 1/8" bead on plates and double 1/16" to 1/8" bead on stud framing. Panels on opposite side adhered with PEMCO 3100 adhesive single 1/4" bead on plates and stud framing. Staples 3/16" crown by 3/4" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter and field fasteners spaced 6" from top and bottom plates and 21" o.c. on intermediate studs. NTA96-0212-4

Ultimate shear resistance – 1093.7 lbs./lineal ft.

Design shear/2.5 safety factor – 437.5 lbs./lineal ft.

WALL APPLICATION - W209

(Two Sides 2x3 Top Plate and 1x3 Bottom Plate and 2x3 and 1x3 Studs - Staples and **PEMCO 5100 Adhesive** and **PEMCO 3100 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 2x3 stud grade SPF top plate and 1x3 utility grade SPF bottom plate and 2x3 stud grade SPF studs 48" o.c. at center and ends and 1x3 utility grade SPF studs at intermediate stud spacing and adhered as follows: First side adhered with PEMCO 5100 adhesive single 1/16" to 1/8" bead on plates and 1x3 studs and double 1/16" to 1/8" bead on 2x3 stud framing. Panels on opposite side adhered with PEMCO 3100 adhesive single 1/4" bead on plates and all stud framing. Staples 3/16" crown by 3/4" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter and

field fasteners spaced 12" o.c. along intermediate studs. NTA96-0529-3

Ultimate shear resistance – 821.2 lbs./lineal ft.

Design shear/2.5 safety factor – 328.0 lbs./lineal ft.

WALL APPLICATION - W210

(Two Sides 2x3 Top Plate and 1x3 Bottom Plate and 2x3 Studs - Staples and **TACC International GUN 'N GO Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 2x3 stud grade SPF top plate and 1x3 ungraded SPF bottom plate and 2x3 stud grade SPF studs at 16" o.c. and adhered with GUN 'N GO adhesive 3/8" single bead on plates and stud framing and 3/8" single serpentine bead on center stud at gypsum panel seam. NTA970154-2

Ultimate shear resistance – 1004.8 lbs./lineal ft.

Design shear/2.5 safety factor – 401.9 lbs./lineal ft.

WALL APPLICATION - W211

(Two Sides 1x3 Plates and 2x3 Studs - Staples and **TACC International STA SEALED 910 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 1x3 utility grade SPF plates and 2x3 stud grade SPF studs spaced 16" o.c. and adhered with STA SEALED 910 adhesive 3/8" single bead on plates and studs and double 3/8" bead on center stud at gypsum seam. Staples 1/4" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter and no field fasteners along interior studs. NTA970012-2

Ultimate shear resistance – 854.4 lbs./lineal ft.

Design shear/2.5 safety factor – 342.0 lbs./lineal ft.

WALL APPLICATION - W212

(Two Sides 2x3 Plates and 2x3 Studs - Staples and **TACC International GUN 'N GO Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 2x3 stud grade SPF plates and 2x3 stud grade SPF studs spaced 16" o.c. and adhered with GUN 'N GO adhesive 3/8" single bead on plates and studs and 3/8" single serpentine bead on center stud at gypsum panel seam. Staples 1/4" crown by 1" leg by 18 gauge spaced 6" o.c. around gypsum panel perimeter and one temporary fastener at midpoint of interior studs. NTA970115-2

Ultimate shear resistance – 1004.4 lbs./lineal ft.

Design shear/2.5 safety factor – 401.8 lbs./lineal ft.

WALL APPLICATION - W213

(Two Sides 2x3 Top Plate and 1x3 Bottom Plate and 2x3 studs - Staples and **Clayton Corp. Touch 'N Seal Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 2x3 stud grade SPF top plate and 1x3 utility grade SPF bottom plate and 2x3 stud grade SPF at 16" o.c. and adhered with Touch 'N Seal adhesive 1/2" single bead on plates and studs and double 3/8" bead on center stud at gypsum panel seam. Staples 1/4" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter and no field fasteners along interior studs. NTA960715-2

Ultimate shear resistance – 918.9 lbs./lineal ft.

Design shear/2.5 safety factor – lbs./lineal ft.

WALL APPLICATION - W214

(Two Sides 1x3 Plates and 1x3 and 2x3 Studs - Staples and **SUN No. 99 Adhesive**)

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels applied vertically to both sides of 1x3 wood plates and 2x3 wood studs 48" o.c. at center and ends and 1x3 wood studs at intermediate stud spacing adhered with SUN No. 99 adhesive 1/4" single bead on plates and studs and double 1/4" bead on center stud at gypsum panel joint. Staples 1/4" crown by 1" leg by 18 gauge spaced 12" o.c. along plates and end studs and spaced 24" o.c. along intermediate studs and center stud at gypsum panel joint with crowns parallel to and not less than 1/4" from edges.

As an alternate, permanent staples (with leg 11/16" minimum longer than gypsum panel thickness), 0.098" diameter ring shank nails (7/8" minimum longer than gypsum panel thickness), or Type S or W drywall screws (5/8" minimum longer than gypsum panel thickness), spaced 12" o.c. along top and bottom plates. At 24" o.c. along each intermediate stud and center stud at gypsum panel joint, temporary (minimum 6 hr. period) or permanent positive support or fastening is to be used to insure permanent adhesive bond of panels to framing. UL Project 95NK23891 (Application 4)*

Ultimate shear resistance – 545.0 lbs./lineal ft.

Load at 1/8" deflection – 435.0 lbs./lineal ft.

WALL APPLICATION - W215

(Two Sides 1x3 Plates and 2x3 Studs - Staples and **SUN No. 99 Adhesive**)

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels vertically applied to both sides of 1x3 wood plates and 2x3 wood studs 24" o.c. and adhered with 1/4" single bead of SUN No. 99 adhesive on plates and studs and double 1/4" bead on center stud at gypsum panel joint. Staples 1/4"

crown by 1" leg by 18 gauge spaced 12" o.c. along top and bottom plates and end studs and 24" o.c. along intermediate studs and center stud at gypsum panel joint with crowns parallel to and not less than 1/4" from edges.

As an alternate, permanent staples (with leg 11/16" minimum longer than gypsum panel thickness), 0.098" diameter ring shank nails (7/8" minimum longer than gypsum panel thickness), or Type S or W drywall screws (5/8" minimum longer than gypsum panel thickness), spaced 12" o.c. along top and bottom plates. At 24" o.c. along each intermediate stud and center stud at gypsum panel joint, temporary (minimum 6 hr. period) or permanent positive support or fastening is to be used to insure permanent adhesive bond of panels to framing. UL Project 95NK23891 (Application 6)*

Ultimate shear resistance – 539.0 lbs./lineal ft.

Load at 1/8" deflection – 436.0 lbs./lineal ft.

WALL APPLICATION - W216

(Two Sides 1x3 Plates and 2x3 Studs - Staples and **SUN No. 99 Adhesive**)

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels vertically applied to both sides of 1x3 wood plates and 2x3 wood studs 16" o.c. and adhered with 1/4" single bead of SUN No. 99 adhesive on plates and studs and double 1/4" bead on center stud at gypsum panel joint. Staples 1/4" crown by 1" leg by 18 gauge spaced 12" o.c. along top and bottom plates and end studs and 24" o.c. along intermediate studs and center stud at gypsum panel joint with crowns parallel to and not less than 1/4" from edges.

As an alternate, permanent staples (with leg 11/16" minimum longer than gypsum panel thickness), 0.098" diameter ring shank nails (7/8" minimum longer than gypsum panel thickness), or Type S or W drywall screws (5/8" minimum longer than

gypsum panel thickness), spaced 12" o.c. along top and bottom plates. At 24" o.c. along each intermediate stud and center stud at gypsum panel joint, temporary (minimum 6 hr. period) or permanent positive support or fastening is to be used to insure permanent adhesive bond of panels to framing. UL Project 95NK23891 (Application 7)*

Ultimate shear resistance – 649.0 lbs./lineal ft.

Load at 1/8" deflection – 548.0 lbs./lineal ft.

WALL APPLICATION - W217

(Two Sides 2x3 Plates and 2x3 Studs - Staples and **SUN No. 99 Adhesive**)

Gold Bond 5/16", 3/8", 1/2" or 5/8" gypsum panels vertically applied to both sides of 2x3 wood plates and 2x3 wood studs 16" o.c. and adhered with 1/4" single bead of SUN No. 99 adhesive on plates and studs and double 1/4" bead on center stud at gypsum panel joint. Staples 1/4" crown by 1" leg by 18 gauge spaced 12" o.c. along top and bottom plates and end studs and spaced 24" o.c. along intermediate studs and center stud at gypsum panel joint with crowns parallel to and not less than 1/4" from edges.

As an alternate, permanent staples (with leg 11/16" minimum longer than gypsum panel thickness), 0.098" diameter ring shank nails (7/8" minimum longer than gypsum panel thickness), or Type S or W drywall screws (5/8" minimum longer than gypsum panel thickness), spaced 12" o.c. along top and bottom plates. At 24" o.c. along each intermediate stud and center stud at gypsum panel joint, temporary (minimum 6 hr. period) or permanent positive support or fastening is to be used to insure permanent adhesive bond of panels to framing. UL Project 95NK23891 (Application 8)*

Ultimate shear resistance – 687.0 lbs./lineal ft.

Load at 1/8" deflection – 500.0 lbs./lineal ft.

WALL APPLICATION - W218

(Two Sides 2x3 Top Plate and 1x3 Bottom Plate and 2x3 Studs; Block on Bottom Plate - Staples and **Dow Chemical Canada Inc. EnerFoam Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 2x3 stud grade SPF top plate and 1x3 ungraded SPF bottom plate (two 2x3x14" ungraded SPF blocks fastened to bottom plate centered between studs in one stud cavity) and 2x3 stud grade SPF studs at 24" o.c. and adhered with EnerFoam adhesive 1/2" single bead on plates and studs and double 1/2" bead on center stud at gypsum panel seam. Staples 1/4" crown by 1" leg by .030 thick spaced 12" o.c. around gypsum panel perimeter and 18" o.c. along field studs. CTL AB95-02

Ultimate shear resistance – 738.4 lbs./lineal ft.

Design shear/2.5 safety factor – 295.4 lbs./lineal ft.

WALL APPLICATION - W219

(Two Sides 2x3 Top Plate and 1x3 Bottom Plate and 2x3 Studs; Block on Bottom Plate - Staples and **Dow Chemical Canada Inc. EnerFoam Adhesive and Sun No. 99 Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 2x3 stud grade SPF top plate and 1x3 ungraded SPF bottom plate (two 2x3x14" ungraded SPF blocks fastened to bottom plate centered between studs in one stud cavity) and 2x3 stud grade SPF studs at 24" o.c. and adhered as follows: First side adhered with EnerFoam adhesive 1/2" single bead on plates and studs and double 1/2" bead on center stud at gypsum panel seam. Second side adhered with SUN No. 99 adhesive applied with deep-pile paint roller for total coverage on all framing. Both sides utilized staples 1/4" crown by 1" leg by .030 thick spaced 12" o.c. around gyp-

* UL Shear Resistance Classification MH 10176

sum panel perimeter and 18" o.c. along intermediate studs. CTL AB95-03

Ultimate shear resistance – 1062.7 lbs./lineal ft.

Design shear/2.5 safety factor – 425.1 lbs./lineal ft.

WALL APPLICATION - W220

(Two Sides 1x3 Plates and 2x3 Studs - Staples and **Dow Chemical Canada Inc. EnerFoam Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 1x3 stud grade SPF plates and 2x3 stud grade SPF studs 16" o.c. and adhered with EnerFoam adhesive 1/2" single bead on plates and studs and double bead on center stud at gypsum panel seam. Staples 3/16" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter. CLT FP98-05

Ultimate shear resistance – 982.0 lbs./lineal ft.

Design shear/2.5 safety factor – 393.0 lbs./lineal ft.

WALL APPLICATION - W221

(Two sides 1x3 plates and 2x3 Studs - Staples and **H.B. Fuller Co. Parr CA-40 Construction Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 1x3 stud grade SPF top plate, 1x3 ungraded SPF bottom plate and 2x3 stud grade SPF studs 16" o.c. and adhered with Parr CA-40 adhesive 3/8" single bead on plates and studs and double 3/8" bead on center stud at gypsum panel seam. Staples 1/4" crown by 3/4" leg by .030 thick spaced 6" o.c. around gypsum panel perimeter and temporary .080" dia. x 1-5/8" nails with 3"x3"x5/32" luan washers 32" o.c. to field studs until glue dried and then removed prior to test. (PE 2001-710 B)

Ultimate shear resistance – 770.2 lbs./lin.ft.

Design Shear/ 2.5 safety factor – 308.0 lbs./lin.ft.

WALL APPLICATION - W222

(Two sides 1x3 plates and 2x3 Studs - Staples and **H.B. Fuller Co. Parr CA-40 Construction Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 1x3 ungraded SPF plates and 2x3 stud grade SPF studs 16" o.c. and adhered with Parr CA-40 adhesive 3/8" single bead on plates and studs and 3/8" serpentine bead on center stud at gypsum panel seam. Staples 1/4" crown by 3/4" leg by .030 thick spaced 6" o.c. around gypsum panel perimeter, no field fasteners. (NTA 200121)

Ultimate shear resistance – 1047.5 lbs./lin.ft.

Design Shear/ 2.5 safety factor – 419.0 lbs./lin.ft.

WALL APPLICATION - W223

(Two sides 1x3 plates and 2x3 Studs - Staples and **H.B. Fuller Co. Parr CA-40 Construction Adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 1x3 ungraded SPF plates and 2x3 stud grade SPF studs 16" o.c. and adhered with Parr CA-40 adhesive 3/8" single bead on plates and studs and two 3/8" beads on center stud at gypsum panel seam. Staples 1/4" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter and 21" o.c. to field studs. (NTA 990011)

Ultimate shear resistance – 1062.7 lbs./lineal ft.

Design shear/2.5 safety factor – 425.1 lbs./lineal ft.

WALL APPLICATION - W224

(Two Sides 1x3 plates and 2x3 Studs- Staples and **Dow Chemical Canada Inc. EnerBond SF & EnerBond BA adhesive**)

Gold Bond 1/2" gypsum panels horizontally applied to both sides of 1x3 utility grade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with EnerBond SF adhesive 1/2" single bead on plates and studs on one side and Enerbond BA adhesive 1/8" single bead on plates and studs on opposite side. Staples 3/16" crown by 1-1/8" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter, except along seam, where gypsum panels stapled at intermediate studs at 16" o.c., no fasteners in the field. (CLT DCC01-01)

Ultimate shear resistance – 1272 lbs./lineal ft.

Design shear/2.5 safety factor – 508.8 lbs./lineal ft

WALL APPLICATION - W225

(Two Sides 1x3 bottom plate, 2x3 top plate and 2x3 Studs- staples and **Dow Chemical Canada Inc. EnerBond SF adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 1x3 stud grade SPF bottom plate, 2x3 stud grade SPF top plate and 2x3 stud grade SPF studs at 16" o.c. and adhered with EnerBond SF adhesive 1/2" single bead on plates and studs with two 1/2" beads on center stud at gypsum panel seam. Staples 3/16" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter, no staples on intermediate studs. (CLT FP98-08)

Ultimate shear resistance – 1097 lbs./lineal ft.

Design shear/2.5 safety factor – 438.8 lbs./lineal ft.

WALL APPLICATION - W226

(Two Sides 1x3 plates and 2x3 Studs- Staples and **Dow Chemical Canada Inc. EnerBond SF adhesive**)

Gold Bond 5/16" gypsum panels vertically applied to both sides of 1x3 stud grade SPF plates and 2x3 stud grade SPF studs at 16" o.c. and adhered with EnerBond SF adhesive 1/2" single bead on plates and studs with two 1/2" beads on center stud at gypsum panel seam. Staples 3/16" crown by 1" leg by 19 gauge spaced 6" o.c. around gypsum panel perimeter, no staples on intermediate studs. (CLT FP98-06)

Ultimate shear resistance – 1013.3 lbs./lineal ft.

Design shear/2.5 safety factor – 405.3 lbs./lineal ft.



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