



The Gypsum Construction HANDBOOK



Seventh Edition



WILEY

The Gypsum Construction

HANDBOOK



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Preface

Welcome to the seventh edition of *The Gypsum Construction Handbook*. This edition is the successor to a long line of earlier versions stretching back for more than a hundred years. Since it was first published in 1905, the *Handbook* has been a trusted reference and an invaluable toolbox companion. We believe this latest edition will faithfully maintain and build on that century-long tradition of excellence.

The people of USG are honored to provide the *Handbook* in light of the book's heritage and relevance to the building industry. This seventh edition, like its predecessors, represents a true collaborative effort on the part of our company, our people and our partners. It pools the collective experience, best knowledge and practices, and hands-on expertise of hundreds of USG employees. And it draws from USG's long history of innovative research and product development, cutting-edge production technologies, and the delivery of high-performance solutions—decade after decade.

The *Handbook* symbolizes USG's total commitment to our customers and our industry. Our dedication to unwavering service, state-of-art products, dynamic leadership and the development of lasting relationships motivates us to go the distance in everything we do—with no short-cuts and no tolerance for less than our best effort. We want the professionals who use our products to be confident that USG will deliver innovative, high-performance building solutions every time.

USG partners with our customers and inspires them to create the outstanding spaces where people live, work and play. We are proud of our products and the dedication and creativity inherent in producing them. We will continue to focus our company and people on the development of new materials, broader applications, and improved construction technologies—such as our game-changing portfolio of lightweight building products.

The *Handbook* is just one of the many ways we strive to exceed your expectations and we hope it serves as an indispensable resource for each of your construction projects.

It's Your World. Build It. We can help.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jim Metcalf', written in a cursive style.

Jim Metcalf
Chairman, President and CEO
USG Corporation

Trademarks

The trademarks Acoustibond, Acri-Add, A/P Lite, Aqua-Tough, Aspen, Astro, AX, Beadex, Baby Bull, Billo, Cadre, Celebration, Centricitee, Champion, Clean Room, ClimaPlus, Compasso, Cover Coat, Curvatura, Diamond, Donn, Dur-A-Bead, Durabond, Durock, DX, DXL, DXLA, DXW, Easy Sand, Eclipse, "F" Fissured, Fiberock, Fineline, Firecode, Fresco, Frost, Geometrix, Glacier, GridWare, Halycon, Hydrocal, Imperial, Levelrock, Libretto, Mars, Micro Bead, Millenia, Mold Tough, Olympia Micro, Oriental, Panz, Paraline, Pebbled, Plus 3, Premier Hi-Lite, Premier Nubby, Quadra, Radar, Red Top, Rock Face, Rocklath, Sandrift, Securock, Sheetrock, Smoke Seal, Structo-Base, Structocore, Structo-Gauge, Structo-Lite, Summit, Texolite, Topo, Touchstone, Tuff-Hide, Tuf-Tex, Ultracode, USG, WireWorks, ZXA, ZXL, the USG Logo™, It's Your World Build It™ and related marks are trademarks of USG Corporation or its affiliates.

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Editorial Committee

The Editorial Board for the seventh edition of *The Gypsum Construction Handbook* consisted of Rob Kay, Jose Estrada, Chris Baker, Scott Crandall, Jeff Hartin, Chris Borovka, Ryan Kirsch, Nester Sanchez, John Koch, Justin Dugas, Paul Shipp, Rik Master, Jason Kankey, Brett Link and Jennifer McDougall of USG.

Additional editorial contributors to this edition were Scott Feste, Kurt Peterson, Jeff Johnston, Kevin Moyer, Susan Raneri, Lee Tedesco, Al Zucco, and Joe Chambers of USG, and Steve Kalter of Kalter Design.

Using The Gypsum Construction Handbook

For over a century, *The Gypsum Construction Handbook* has been a trusted, reliable resource for architects, engineers, builders, dealers, distributors and contractors. The handbook was first introduced as *The Red Book for Builders and Plasterers*. Over the course of 100 years and more, it has been the building industry's most relied-on reference for gypsum products and systems and has grown and evolved with each new edition to meet the industry's changing needs.

The book is a comprehensive guide to the selection and use of gypsum drywall, veneer plaster, tile backers, ceilings and conventional plaster building materials. It provides information on current products and systems and describes correct time- and cost-saving installation methods designed to simplify and speed construction. The book has served as a standard text for training and apprenticeship classes, a guide for building inspectors and code officials, and a source of detailed product information and installation procedures for building professionals worldwide.

For architects and engineers: technical information on gypsum product construction standards, including available system descriptions, fire- and sound-rated construction, limitations and installation procedures.

For contractors, builders and dealers: full data on all aspects of gypsum products and accessories, tools and equipment, and applications, including information needed to estimate and plan projects.

For apprenticeship training schools: illustrated, easy-to-understand directions for applying gypsum products—from framing to finish.

For journeymen: a comprehensive index of contents and clear, concise, illustrated instructions and techniques for applying gypsum products at every stage of the construction process.

For building inspectors and code officials: an excellent source of fire, sound and physical test data and proper construction techniques for gypsum products to ensure compliance with performance criteria.

The handbook contains the latest information about proper gypsum drywall, plaster and cement board construction available at the time of its writing. The text describes framing installation, drywall and veneer plaster construction, joint treatment and plaster finishing, interior cement board construction, and conventional plaster application and the tools required for each job. The handbook also covers special engineered systems, product application factors, problems and solutions, and various repair and remodeling techniques.

Readers may use the table of contents or fully cross-referenced index to find desired information on drywall, veneer or conventional plaster, or tile backers construction. The book also includes a comprehensive glossary of terms with definitions of terms used throughout the text.

New in This Edition

The Seventh Edition covers the latest USG products, including

- USG Durock® Brand Cement Board Next Gen
- USG Durock™ Tile Membrane
- USG Sheetrock® Brand UltraLight Panels
- USG Sheetrock® Brand UltraLight Panels Firecode® 30
- USG Sheetrock® Brand UltraLight Panels Firecode® X
- USG Sheetrock® Brand UltraLight Gypsum Base Imperial®, 1/2"
- USG Sheetrock® Brand UltraLight Mold Tough Gypsum Panels
- USG Sheetrock® Brand UltraLightweight All-Purpose Joint Compound
- USG Firecode® Smoke-Sound Sealant

Drywall and Veneer Plaster Products

1



Since their introduction over 90 years ago, USG Sheetrock® Brand Gypsum Panels from the United States Gypsum Corporation (USG) have led the drywall industry and have become the standard for quality interior walls and ceilings. With the addition of veneer plaster bases and finishes, USG has the nation's largest-selling, broadest line of gypsum products with the highest quality and the best performance.

The gypsum products described in this chapter conform to product standards recommended by USG as well as applicable American Society for Testing and Materials (ASTM), government and commercial standards. These materials meet the essential requirements of economy, sound isolation, workability, strength, fire resistance and ease of decoration that are characteristic of quality construction.

USG continues to be at the forefront of technological advances in the industry. In recent years, the company's research and development staff has produced a series of materials that offer exceptional strength and durability. Those materials now are commercially available as abuse-resistant products and systems. These systems were initially developed for government buildings, commercial construction, schools, prisons and other structures where walls and ceilings are subject to considerable traffic and abusive wear and tear. They will also provide longer lasting quality in typical commercial and residential construction. You will find information on abuse-resistant products and systems throughout this text.

USG sales and technical representatives are available to consult with tradespeople, contractors, architects, dealers and code officials on gypsum products and systems and their application to individual job problems and conditions. For more in-depth information, visit the USG websites (usg.com and usgdesignstudio.com).

Gypsum Panel Products

USG Sheetrock® Brand is the preferred and most widely used brand of gypsum panels. It is available in more specialized forms than any other gypsum panel line. When used with USG's other high-quality components, USG Sheetrock® Brand gypsum panels provide high-performance walls and ceilings.

A USG Sheetrock® Brand panel is composed of a noncombustible gypsum core encased in a strong, smooth-finish paper on the face side and a natural-finish 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. The long edges of the panels are available in a choice of designs (including tapered), allowing joints to be reinforced and concealed with a USG joint treatment system.

Advantages

Interior walls and ceilings built with USG Sheetrock® Brand panels have a durable surface suitable for most types of decorative treatment and for redecoration throughout the life of the building.

Dry Construction Factory-produced panels do not contribute moisture during construction. The joint finishing system contributes very little.

Fire Protection The gypsum core will not support combustion or transmit temperatures greatly in excess of 212°F until completely calcined. Fire resistance ratings of up to 4 hours for partitions, 3 hours for floor-ceilings and 4 hours for column and beam assemblies are available with specific assemblies. (See Chapter 10, “System Design Considerations,” for specific ratings and related assemblies.)

Sound Control USG Sheetrock® Brand gypsum panels are a vital component in sound-resistive partition and floor-ceiling systems. (See Chapter 10 and the Appendix for specific rating data.)

Low In-Place Cost The easily cut gypsum panels install quickly, simplifying fixture attachment and installation of electrical and mechanical services.

Dimensional Stability Expansion or contraction under normal temperature and humidity changes is small and normally will not result in warping or buckling. With joints properly reinforced, USG Sheetrock® Brand panels are exceptionally resistant to cracking. (See the Appendix for thermal and hygrometric coefficients of expansion.)

Availability Over 40 USG manufacturing plants produce gypsum board and related products described herein throughout North America. Special warehouse facilities, in addition to these plants, increase total distribution and service efficiency to major markets and rural areas from coast to coast. All standard gypsum board products are readily available on short notice. Many products are available from USG subsidiary plants in Mexico and Canada.

Gypsum Panel Limitations

1. Exposure to excessive or continuous moisture and extreme temperatures should be avoided. Not recommended for use in solar or other heating systems when board will be in direct contact with surfaces exceeding 125°F.
2. Adequate protection must be provided against wetting when panels are used as a base for ceramic or other wall tile (see the Foil-Back Panel Limitations section under Products Available later in this chapter). Durock® brand cement board, USG Fiberock® Brand Aqua-Tough™ interior panels or Fiberock Aqua-Tough tile backerboard is recommended for partitions in moisture-prone areas.
3. Maximum spacing of framing members: 1/2" and 5/8" gypsum panels are designed for use on framing centers up to 24"; 3/8" panels are designed for use on framing centers up to 16". In both walls and ceilings, when 1/2" or 5/8" gypsum panels are applied across framing on 24" centers and joints are reinforced, blocking is not required. 1/4" USG Sheetrock® Brand panels are not recommended for single-layer applications on open framing.
4. Application of panels is not recommended over 3/4" wood furring applied across framing, since the flexibility of the furring under impact of the hammer tends to loosen nails already driven. Furring should be 2 × 2 minimum (may be 1 × 3 if panels are to be screw-attached).
5. Application of gypsum panels is not recommended over an insulating blanket that has first been installed continuously

across the face of the framing members. Blankets should be recessed and flanges attached to the sides of studs or joists.

6. To prevent objectionable sag in new gypsum panel ceilings, the weight of overlaid unsupported insulation should not exceed: 1.3 psf for 1/2"-thick panels with frame spacing 24" on center (o.c.); 2.2 psf for 1/2" panels on 16" o.c. framing (or 1/2" USG Sheetrock® Brand panels designed for sag resistance on 24" o.c. framing); 2.2 psf for 5/8" panels on 24" o.c. framing. 3/8"-thick panels must not be overlaid with unsupported insulation. A vapor retarder should be installed in all exterior ceilings, and the plenum or attic space should be properly vented.

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

Water-based textures, interior finishing materials and high ambient humidity conditions can produce sag in gypsum ceiling panels if adequate vapor and moisture control is not provided. The following precautions must be observed to minimize sagging of ceiling panels:

- a) Where a vapor retarder is required in cold-weather conditions, care must be taken to avoid moisture condensation. The temperature of the gypsum ceiling panels and vapor retarder must remain above the interior air dew point temperature during and after the installation of panels and finishing materials.
- b) The interior space must be adequately ventilated and air circulation must be provided to remove water vapor from the structure.

Most sag problems are caused by the condensation of water within the gypsum panel. The placement of vapor retarders, insulation levels and ventilation requirements will vary by location and climate and should be reviewed by a qualified engineer if in question.

7. Certain recommendations regarding surface preparation and painting products and systems must be adhered to for satisfactory performance and intended results.
8. Precaution should be taken against using gypsum panels as a base for highly water-vapor-resistant coverings when the wall already contains a vapor retarder, as this will create a double vapor retarder. Moreover, do not create a vapor retarder by such wall coverings on the interior side of exterior walls of air-conditioned buildings in hot-humid climates where conditions dictate a vapor retarder be located near the exterior side of the wall. Such conditions require assessment by a qualified mechanical engineer.

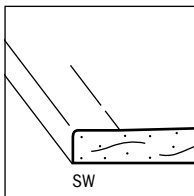
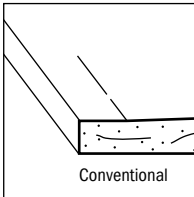
Products Available

1

USG Sheetrock® Brand UltraLight Panels 1/2" Up to 30% lighter than regular 1/2" wallboard, these are the lightest 1/2" gypsum panels available. The panels offer superior sag resistance and can replace 1/2" sag-resistant ceiling board and 5/8" Type X on ceilings with 24" o.c. frame spacing. This can reduce waste as only one type of panel is required for walls and ceilings. Available with tapered or smooth wall edges and 48" and 54" widths.

USG Sheetrock® Brand Regular Core These 48"-wide panels have long edges tapered on the face side to form a shallow recess (nominal 0.050" deep) to accommodate joint reinforcement. Made in three thicknesses for specific purposes:

- 1/2", recommended for single-layer application typical new construction and remodeling. The thickness provides resistance to fire exposure, sound transmission and sagging.
- 3/8", lightweight, applied principally in repair and remodel work over existing surfaces.
- 1/4", lightweight, low-cost, utility gypsum panel, used as a base layer for improving sound control in multilayer partitions and in covering old wall and ceiling surfaces. Also used for forming curved surfaces. Meets ASTM C1396.



Types of tapered edges

USG Sheetrock® Brand 54" Gypsum Panels Available as 1/2" regular and lightweight USG Sheetrock® Brand gypsum panels but 6" wider. The added width reduces cutting, waste, joint finishing and labor costs for walls that are 8'-6" or 9' tall.

USG Sheetrock® Brand Gypsum Panels, SW Feature an exclusive tapered rounded-edge design to help minimize ridging, beading and other joint imperfections. This edge produces a much stronger joint than a regular tapered edge when finished with joint treatment. Except for the rounded edge, panels are tapered like, and otherwise identical to, regular tapered-edge gypsum panels. Made in 5/8" and 1/2" thicknesses. Panels are available in regular or Firecode® Core (Type X and Type C) formulations. Meets ASTM C1396.

USG Sheetrock® Brand Firecode® Core 5/8" thick, combine all the advantages of regular panels with additional fire resistance—the result of a specially formulated core containing special additives that enhance the integrity of the core under fire exposure. Panels comply with ASTM requirements for Type X gypsum board. Meets ASTM C1396. Also available 54" wide.

USG Sheetrock® Brand Ultralight Panels Firecode® 30 A lightweight 5/8"-thick non-Type X panel that is up to 30% lighter than standard Type X wallboard. Ideal for use where 5/8" panels are desired for added strength, but Type X is not required for fire or sound ratings. Meets or exceeds ASTM C1396 physical properties for 5/8" wallboard. Available with tapered edges and 48" width.

USG Sheetrock® Brand Ultralight Panels Firecode® X A lightweight 5/8"-thick Type X panel that is up to 15% lighter than standard

Type X wallboard. Listed in over 130 Underwriters Laboratories (UL) fire-rated designs, they can be substituted for Type X panels in most fire-rated assemblies. Available with tapered edges and 48" width.

USG Sheetrock® Brand Firecode® C Core Available in 1/2" and 5/8" thicknesses. Improved formulation exceeds ASTM requirements for Type X gypsum board. Based on tests at UL and other nationally recognized testing agencies, certain partition, floor-ceiling and column fire-protective assemblies using these special products provide fire resistance ratings of 1 to 4 hours.

In order to attain fire resistance ratings, the construction of all such assemblies must be consistent with the assembly tested. (See Chapter 10 for assemblies.) Meets ASTM C1396.

USG Sheetrock® Brand 1/4" Flexible Gypsum Panels Designed specifically for curved partitions, these panels are more flexible than standard panels of the same thickness, making them ideal for use anywhere a tight radius is required for curved walls, arches and stairways. (See curved surface section, Chapter 3, "Cladding.") They make construction of curved surfaces easy and fast. Double-layer installation improves surface smoothness and fire protection. Meet ASTM C1396.

USG Sheetrock® Brand Ultracode® Core 3/4" thick, UL tested to provide a 2-hour fire rating with single-layer construction and a 4-hour fire rating with double-layer construction in certain specified systems (steel studs only). Because fewer layers are needed to meet fire ratings, Ultracode Core panel systems reduce labor and material costs.

Gypsum Panels, Foil-Back

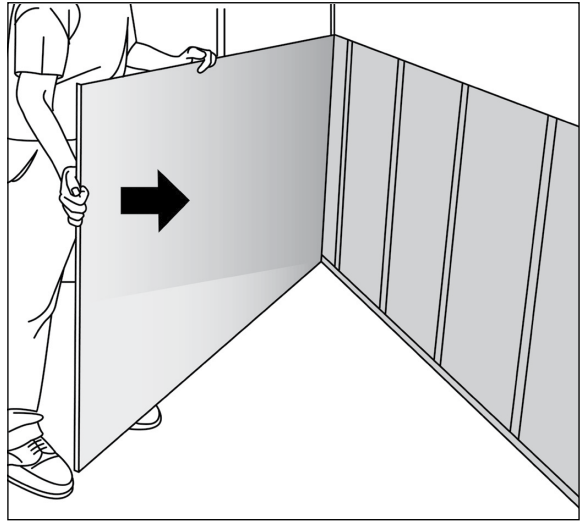
USG Sheetrock® Brand gypsum panels, foil-back are made by laminating special kraft-backed aluminum foil to the back surface of regular, SW, Firecode or Firecode C panels. Where required in cold climates, this panel forms an effective vapor retarder for walls and ceilings when applied with foil surface next to framing on the interior side of exterior wall in single-layer application or as the base layer in multilayer systems. Foil-backed gypsum panels provide a water vapor retarder to help prevent interior moisture from entering wall and ceiling spaces. In tests per ASTM E96 (desiccant method), 1/2" foil-back panels showed a vapor permeability of 0.06 perms. The permeance of the total exterior wall system is dependent on the closure of leaks with sealants at periphery and all penetrations such as outlet boxes.

These panels are designed for use with furred masonry or wood or steel framing. Thickness: 5/8", 1/2" and 3/8". Sizes, edges and finish are the same as for base panels.

Foil-Back Panel Limitations

1. Not recommended as a base for ceramic or other tile.
2. Not to be used in air-conditioned buildings in climates having sustained high outside temperature and humidity, such as the Southern Atlantic and Gulf Coast areas. Under these conditions, a qualified mechanical engineer should determine vapor retarder location.

Foil-back panels applied to steel framing over the interior of exterior walls provide an effective vapor retarder.



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Gypsum Panels, Moisture and Mold Resistant

USG Sheetrock® Brand Mold Tough® Gypsum Panels Have a noncombustible, moisture gypsum core encased in moisture- and mold-resistant, 100% recycled green face and brown back paper. The 5/8" Firecode and 1/2" Firecode C Core panels are UL classified for fire resistance (Type X).

Although all USG Sheetrock® Brand Mold Tough Gypsum Panels have improved moisture and mold resistance over standard gypsum panels by treating the face and back papers, independent lab tests conducted at the time of manufacture on only 5/8" USG Sheetrock® Brand Firecode® Mold Tough Gypsum Panels, 1/2" USG Sheetrock® Brand Mold Tough Firecode® C Core gypsum panels (Type X) and USG Sheetrock® Brand Ultracode® Gypsum Panels per ASTM D3273, "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber," the panel score was 10.

This ASTM lab test may not guarantee the mold performance of building materials in actual use. Given unsuitable project conditions may be present at any time during construction, any building material can be overwhelmed by mold. To manage the growth of mold, the best and most cost-effective strategy is to protect building products from water exposure during storage and installation and after completion of the building. This can be accomplished by using good design and construction practices.

USG Sheetrock® Brand Mold Tough® 1/2" thickness for single-layer application in residential construction.

USG Sheetrock® Brand Mold Tough® Firecode® Core 5/8" thickness with a Type X core to provide fire resistance for required ratings.

USG Sheetrock® Brand Glass Mat Panels Mold Tough® Firecode® X offer superior moisture and mold resistance with the added benefit of glass mat facers instead of paper. For use in interior applications where exposure to weather is anticipated during the construction process. Meets ASTM C1658 and C1177.

USG Sheetrock® Brand Mold Tough® Firecode® C Core 1/2" and 5/8" thicknesses with a special core to provide improved fire resistance for required ratings.

USG Sheetrock® Brand Mold Tough® 3/4" Ultracode® Core panel is UL classified as to fire resistance. One layer of 3/4" Ultracode Core panels may be substituted for two layers of 5/8" Firecode Core panels in many UL Listed assemblies. Refer to the *UL Fire Resistance Directory* for details.

Mold Tough Panel Limitations

1. Not suitable for sustained temperatures exceeding 125°F (52°C).
2. Should not be exposed to excessive, repetitive or continuous moisture before, during or after installation. Eliminate sources of moisture immediately.
3. Not suitable for use as a substrate for tile in wet areas such as tubs and showers, gang showers and other areas subject to direct water exposure. USG Durock® Brand Cement Board is recommended for these uses. (See Durock applications, Chapter 4, "Backerboard Installation.")
4. Non-load-bearing.

USG Fiberock® Brand Aqua-Tough™ Interior Panels Offer finishing flexibility and superior mold and moisture resistance in a single panel. Manufactured using USG's unique gypsum-fiber technology, these durable panels provide moisture and mold resistance superior to conventional drywall but can be installed and finished using basic drywall techniques. Uniform composition, without face paper, is based on a uniquely engineered gypsum/cellulose-fiber combination that won't weaken if the surface is penetrated by moisture. Panels comply with ASTM C1278.

USG Fiberock® Brand Aqua-Tough™ Tile Backerboard Unique fiber-reinforced gypsum product that represents a new era in substrate performance for wet or dry areas. This durable panel offers superior performance and tile bond because of its integral water-resistant core. Unlike traditional water-resistant gypsum board, Fiberock tile backerboard derives both strength and water resistance from its uniquely engineered gypsum/cellulose-fiber combination. With no paper to delaminate, Fiberock tile backerboard maintains its integrity even when wet.

Fiberock Panel Limitations

Panels are not intended for use in areas subject to constant moisture, such as interior swimming pools, gang showers, steam showers and saunas. (Durock brand cement board is recommended for these uses. See Chapter 4 for further information.)

Exterior Gypsum Ceiling Board

USG Sheetrock® Brand Exterior Gypsum Ceiling Board Weather-resistant board designed for use on the soffit side of eaves, canopies and carports and other commercial and residential exterior applications with indirect exposure to the weather. Noncombustible core is simply scored and snapped for quick application. Panels can be painted and provide good sag resistance.

Installed conventionally in wood- and metal-framed soffits. Batten strips or mouldings can be used over butt joints or joints can be treated. Backing strips are required for small vent openings. Natural finish. Available in 1/2" thickness with regular core and in 5/8" thickness with fire-rated Type X and Type C cores—both with eased edges. Board complies with ASTM C1396.

USG Securock® Brand Glass Mat Sheathing Also can be used for exterior ceiling applications where extra weather protection is desired. A direct-applied synthetic-type stucco system applied in accordance with the manufacturer's recommendations is recommended as a final finish.

USG Fiberock® Brand Aqua-Tough™ Interior Panels Suitable for use in exterior soffit and ceiling applications not directly exposed to the weather, such as open porches, walkways, soffits and similar applications that are horizontal or inclined downward away from the building. Manufactured using USG's unique gypsum-fiber technology, these durable panels provide moisture and mold resistance superior to conventional paper-faced products. Panels comply with ASTM C1278.

Sag-Resistant Ceiling Panels

Up to 30% lighter than regular 1/2" wallboard, **USG Sheetrock® Brand 1/2" Ultralight Panels** are the lightest 1/2" gypsum panels available. The panels offer superior sag resistance and can replace 1/2" sag-resistance ceiling board and 5/8" Type X on ceilings with 24" o.c. frame spacing, up to 2.2 psf of overlaid insulation and water-based texture applied. ICC Evaluation Service Compliant for ceiling installations, ESR-3365.

Abuse-Resistant Panel Products

Abuse-resistant panels are made with strong face paper and a heavy-duty backing sheet, which improve the integrity of the board. As a result, the panels are able to withstand impact better than standard gypsum board and are less likely to allow penetrations or show indentations. Meets ASTM C1396.

USG Sheetrock® Brand Abuse-Resistant Gypsum Panels Offer greater indentation and through-penetration resistance than standard gypsum panels. Available in 5/8" Firecode Core.

USG Sheetrock® Brand Mold Tough® Firecode® Core AR Abuse-resistant panels that offer greater resistance to surface indentation and impact damage than 5/8" **USG Sheetrock® Brand AR** gypsum panels. They feature a noncombustible moisture-resistant Type X core encased in moisture- and mold-resistant face and back papers, available in 5/8" thickness and 48" width. **USG Sheetrock® Brand Mold Tough® Firecode® Core VHI** are produced with a fiberglass mesh imbedded in the backside for superior impact resistance. They feature a noncombustible moisture-resistant Type X core encased in moisture- and mold-resistant face and back papers, available in 5/8" thickness and 48" width.

USG Fiberock® Brand Abuse-Resistant Panels Engineered to provide increased resistance to abrasion, indentation and penetration for interior walls and ceilings in demanding construction applications. These gypsum fiber panels are designed to outperform paper-faced gypsum board. Strong, solid and durable, they resist denting, breaking and puncturing—even in high-traffic areas. They also are manufactured

with 95% recycled content. They have exceptional surface-burning characteristics (ASTM E84, flame spread 5, smoke developed 0) and fire resistance (ASTM E119). 5/8" Fiberock abuse-resistant panels may be used in lieu of Type X gypsum panels in over 50 fire-rated wall assemblies as listed in the *UL Fire Resistance Directory* under "Type FRX."

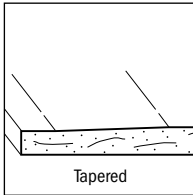
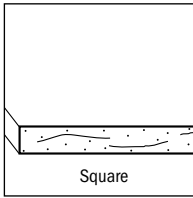
Specifications—Gypsum Panel Products

	Thickness		Length	Approx. Wt.	
	in.	mm	ft.	lb./SF	kg/m ²
USG Sheetrock® Brand Regular Panels	1/4	6.4	8 and 10	1.2	5.9
	3/8	9.5	8, 9, 10, 12, 14	1.4	6.8
	1/2	12.7	8, 9, 10, 12, 14	1.7	8.3
USG Sheetrock® Brand UltraLight Panels	1/2	12.7	8, 9, 10, 12, 14	1.7	8.3
Firecode Core Panels, standard and lightweight	5/8	15.9	8, 9, 10, 12, 14	2.2	10.7
Firecode C Core Panels	1/2	12.7	8, 9, 10, 12, 14	1.9	9.3
	5/8	15.9	8, 9, 10, 12, 14	2.5	12.2
Ultracode Core Panels	3/4	19.0	8, 9, 10, 12	2.8	13.7
USG Sheetrock® Brand UltraLight Mold Tough Panels	1/2	12.7	8, 10, 12	1.35	6.6
Mold Tough Firecode Core Panels	5/8	15.9	8, 10, 12	2.2	10.7
Mold Tough Firecode C Core Panels	1/2	12.7	10	1.9	9.3
Fiberock Brand Aqua-Tough	1/2	12.7	5, 8, 9, 10	2.2	10.7
Interior Panels/Fiberock Brand Tile-Backerboard	5/8	15.9	5, 8, 9, 10	2.7	13.2
Exterior Ceiling Board Regular Board	1/2	12.7	8, 12	1.9	9.3
Firecode Board	5/8	15.9	8, 12	2.4	11.7
Interior Ceiling Panels Sag Resistant	1/2	12.7	8, 12	1.6	7.8
1/4" Flexible Panels	1/4	6.4	8, 10	1.2	5.9
54" Panels	1/2	12.7	8, 9, 10, 12, 14	1.7	8.3
Abuse-Resistant Panels	5/8	15.9	8, 9, 10, 12, 14	2.7	13.2
Fiberock Brand Abuse-Resistant Panels	1/2	12.7	8, 9, 10, 12	2.2	10.7
	5/8	15.9	8, 9, 10, 12	2.7	13.2
USG Sheetrock® Brand UltraLight Panels Firecode® 30	5/8"	15.9	8, 9, 10, 12, 14	1.6 - 1.8	7.8 - 8.8
USG Sheetrock® Brand Abuse-Resistant Gypsum Panels	5/8"	15.9	8, 10, 12	2.8	13.7
USG Sheetrock® Brand Mold Tough® AR Firecode® Core Panels	5/8"	15.9	8, 10, 12	2.8	13.7
USG Sheetrock® Brand Mold Tough® VHI Firecode® Core Panels	5/8"	15.9	8, 10, 12	2.8	13.7

USG Fiberock® Brand Aqua-Tough™ Interior Panels Have all the benefits of Fiberock abuse-resistant panels with the added benefit of mold and moisture resistance. Available in 1/2" and 5/8" Firecode Core.

USG Fiberock® Brand VHI Abuse-Resistant Panels Very high impact (VHI) panels have all the benefits of the Fiberock abuse-resistant panels but are also glass-fiber-mesh reinforced to provide penetration resistance and rigidity for a single-layer gypsum panel. Available in 1/2" and 5/8" Firecode Core.

Veneer Plaster Gypsum Base Products



Types of edges

Gypsum bases finished with veneer plasters are recommended for interior walls and ceilings in all types of construction. For these interiors, a veneer of specially formulated gypsum plaster is applied in one coat (1/16" to 3/32" thick) or two coats (approximately 1/8" thick) over the base. The resulting smooth or textured monolithic surfaces are preferred for hard-wear locations where durability and resistance to abrasion are required.

Imperial gypsum bases are 48"-54" wide gypsum board panels that are rigid and fire-resistant. A gypsum core is faced with specially treated, multilayered paper (blue) designed to provide a maximum bond to veneer plaster finishes. The paper's absorbent outer layers quickly and uniformly draw moisture from the veneer plaster finish for proper application and finishing. The moisture-resistant inner layers keep the core dry and rigid to resist sagging. The face paper is folded around the long edges. Ends are square-cut and finished smooth.

Gypsum Base Advantages

Gypsum bases, in conjunction with selected veneer plaster finishes, provide the lasting quality of plaster walls and ceilings at a lower cost and with less weight and residual moisture than conventional plaster.

Rapid Installation Walls and ceilings can be completed quickly—in 3 to 4 days, from bare framing through decorated interiors.

Fire Resistance Ratings of up to 4 hours for partitions, 3 hours for floor-ceilings and 4 hours for column fire protection assemblies have been obtained.

Sound Control Gypsum base partitions faced with veneer plaster finishes on both sides have high resistance to sound transmission. (Resilient attachment of base and use of insulation further improve sound isolation.)

Durability Hard, high-strength surfaces provide excellent abrasion resistance, resulting in minimum maintenance, even in high-traffic areas.

Easily Decorated Smooth-surfaced interiors readily accept paints, texture, fabric and wallpaper. Veneer plaster finishes also may be textured. If completely dry, finishes can be painted with breather-type paints the day following application. For additional information, reference PM15, Preparation for Painting.

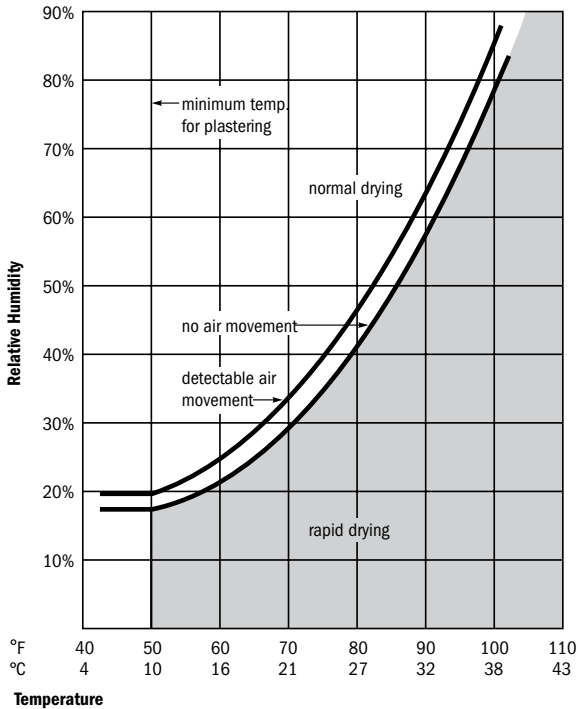
Gypsum Base Limitations

1. Maximum frame and fastener spacing is dependent on thickness and type of base used.
2. Recommended for use with Imperial veneer basecoat, Imperial veneer finish, Diamond® veneer basecoat and Diamond veneer finish. Do not apply gauged lime-putty finishes or Portland cement plaster directly to base; bond failure is likely.
3. Not recommended for use in areas exposed to moisture for extended periods or as a base for adhesive application of

ceramic tile in wet areas (Durock brand interior cement board and Fiberock Aqua-Tough tile backerboard are recommended for this use).

4. Gypsum base that has faded from the original light blue color due to exposure to sunlight should be treated with either USG plaster bonder or a solution of USG accelerator—alum catalyst before Diamond veneer finish or any veneer plaster finish containing lime is applied. When using USG plaster bonder, a two-coat veneer system (basecoat and finish coat) is required for adequate smoothness. Imperial veneer basecoat and veneer finish and Diamond veneer basecoat plasters do not contain lime and are not susceptible to bond failure over faded base.
5. Joints and internal angles must be treated with USG Sheetrock® Brand joint tape and setting-type joint compound (Durabond®) or lightweight setting-type joint compound (Easy Sand™) when building temperature-humidity conditions fall in the “rapid-drying” area of the graph when metal framing is specified or when 24” o.c. wood frame spacing and a single-layer gypsum base veneer system is specified (5/8” base with one-coat veneer finish and 1/2” or 5/8” base with two-coat veneer finish). Single-layer 1/2” base is not recommended with 24” o.c. spacing and one-coat veneer plaster.

Plaster Drying Conditions



Products Available

USG Imperial® Gypsum Base A special gypsum board that has been specifically engineered for use with Imperial veneer finish and Diamond veneer finish or Imperial and Diamond veneer basecoat plasters. It provides the strength and absorption characteristics necessary for top-quality veneer plaster finishing performance. Large sheets minimize the number of joints and speed installation. The high-density, fire-resistant gypsum core has a superior controlled-absorption paper lightly tinted blue on the face side and a strong liner paper on the back side. Available in two thicknesses with square or tapered edges: 1/2" for single-layer application in new light construction; 5/8" recommended for the finest high-strength veneer plaster finish construction. The greater thickness provides increased resistance to fire exposure and sound transmission and allows 24" o.c. spacing of wood framing. Imperial gypsum base may be used with Diamond veneer finish to embed cables for radiant heat ceilings. Meets ASTM C588.

USG Sheetrock® Brand UltraLight Gypsum Base Imperial®, 1/2" lightweight gypsum base ideally suited for veneer plaster systems. Meets ASTM C1396.

USG Imperial® Gypsum Base, Firecode® and USG Firecode® C Core Imperial Gypsum Base, Firecode® Core in 5/8" thickness and Firecode C Core in 1/2" and 5/8" thicknesses combine all the advantages of regular Imperial gypsum base with additional resistance to fire exposure—the result of specially formulated mineral cores. UL classified for fire resistance. Meets ASTM C588. For additional information, reference PM16, Application of Electric Heat Cable Systems.

Other Veneer Plaster Base Products

USG Durock® Brand Cement Board A glass-fiber-mesh reinforced aggregated Portland cement panel that provides a high-strength substrate for improved abuse resistance. Requires the use of USG plaster bonder, which is only suitable for two-coat plaster application. Available 1/2" thick (5/8" available under minimum order conditions) in 4' × 8' and 4' × 10' dimensions.

Fiberock Abuse-Resistant Panels deliver greater impact and puncture resistance than any other gypsum panel. Made with a unique gypsum/cellulose fiber core, the panels impede penetrations by sharp objects, including sharp blows from small objects, and exhibit more rigidity than standard gypsum panels. They also provide greater flexural strength and screw withdrawal properties than other gypsum panels. Requires the use of USG plaster bonder, which is only suitable for two-coat plaster application. VHI panels are glass-fiber-mesh reinforced to provide extraordinary penetration resistance and rigidity for a single-layer gypsum panel. Available in 1/2" and 5/8" thicknesses. They have exceptional surface-burning characteristics (ASTM E84, flame spread 5, smoke developed 0) and fire resistance (ASTM E119). 5/8" Fiberock brand abuse-resistant panels may be used in lieu of Type X gypsum panels in over 50 fire-rated wall assemblies as listed in the *UL Fire Resistance Directory* under "Type FRX."

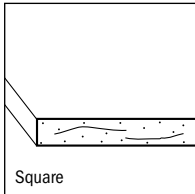
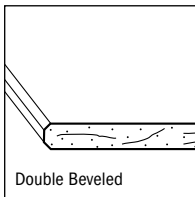
Specifications—Gypsum Bases

Product	Thickness		Length	Approx. wt	
	in.	mm	ft ⁽¹⁾	lb./SF	kg/m ²
Imperial Gypsum Base ⁽²⁾					
Ultralight	1/2	12.7	8, 9, 10, 12, 14	1.25-1.35	8.8
Firecode	5/8	15.9	8, 9, 10, 12, 14	2.3	11.2
Firecode C	1/2	12.7	8, 9, 10, 12, 14	2.0	9.8
Firecode C	5/8	15.9	8, 9, 10, 12, 14	2.5	12.2
Durock Brand Cement Board	1/2	12.7	8, 9, 10, 12, 14	3.0	14.6
Fiberock Brand Abuse-Resistant Panels	1/2	12.7	8, 9, 10	2.2	10.9

(1) Metric lengths: 8 ft. = 2440 mm; 9 ft. = 2745 mm; 10 ft. = 3050 mm; 12 ft. = 3660 mm; 14 ft. = 4270 mm.

(2) Also available in foil-back base.

Gypsum Liner and Sheathing Products



Types of edges

USG Sheetrock® Brand Gypsum Liner Panels Have a 1"-thick, special fire-resistant gypsum core that is encased in multilayered, moisture-resistant green paper. Panels are used in USG cavity shaft walls, area separation walls, select floor assemblies and infill panel systems for exterior curtain walls. Panels have beveled edges for easy insertion between the supporting flanges of steel C-H studs, E-studs or H-studs. Meet ASTM C1396.

USG Sheetrock® Brand Mold Tough Gypsum Liner Panels Have a noncombustible, moisture gypsum core that is encased in moisture- and mold-resistant, 100% recycled blue face and back papers. The panels are UL classified as to fire resistance (Type SLX) and feature double beveled edges for easy installation. May be substituted for USG Sheetrock® Brand gypsum liner panels in all USG Sheetrock® Brand shaft wall and area separation wall systems.

USG Sheetrock® Brand Glass Mat Liner Panels Feature a noncombustible, moisture-resistant gypsum core encased in moisture- and mold-resistant glass mats. They offer a 12-month exposure warranty, and they can be used in any fire-rated cavity shaft wall and separation wall system assembly where regular USG Sheetrock® Brand gypsum liner panels and USG Sheetrock® Brand Mold Tough gypsum liner panels are specified.

Note: These USG Sheetrock® Brand gypsum liner panels have been comprehensively tested for fire resistance, structural performance and sound control *only* when used with USG shaft wall and area separation wall framing components. All USG shaft wall and area separation wall system components must be used together to ensure superior system performance and safety. Substitutions of any components are not recommended and are not endorsed by USG.

USG Sheetrock® Brand Gypsum Sheathing A fire-resistant gypsum board, with a water-resistant gypsum core encased in specially treated water-repellent paper on both sides and long edges. Its weather resistance, water repellency, fire resistance and low applied cost make it suitable for use in exterior wall construction of garden apartments and light commercial buildings as well as in homes. Also used in steel stud curtain wall construction.