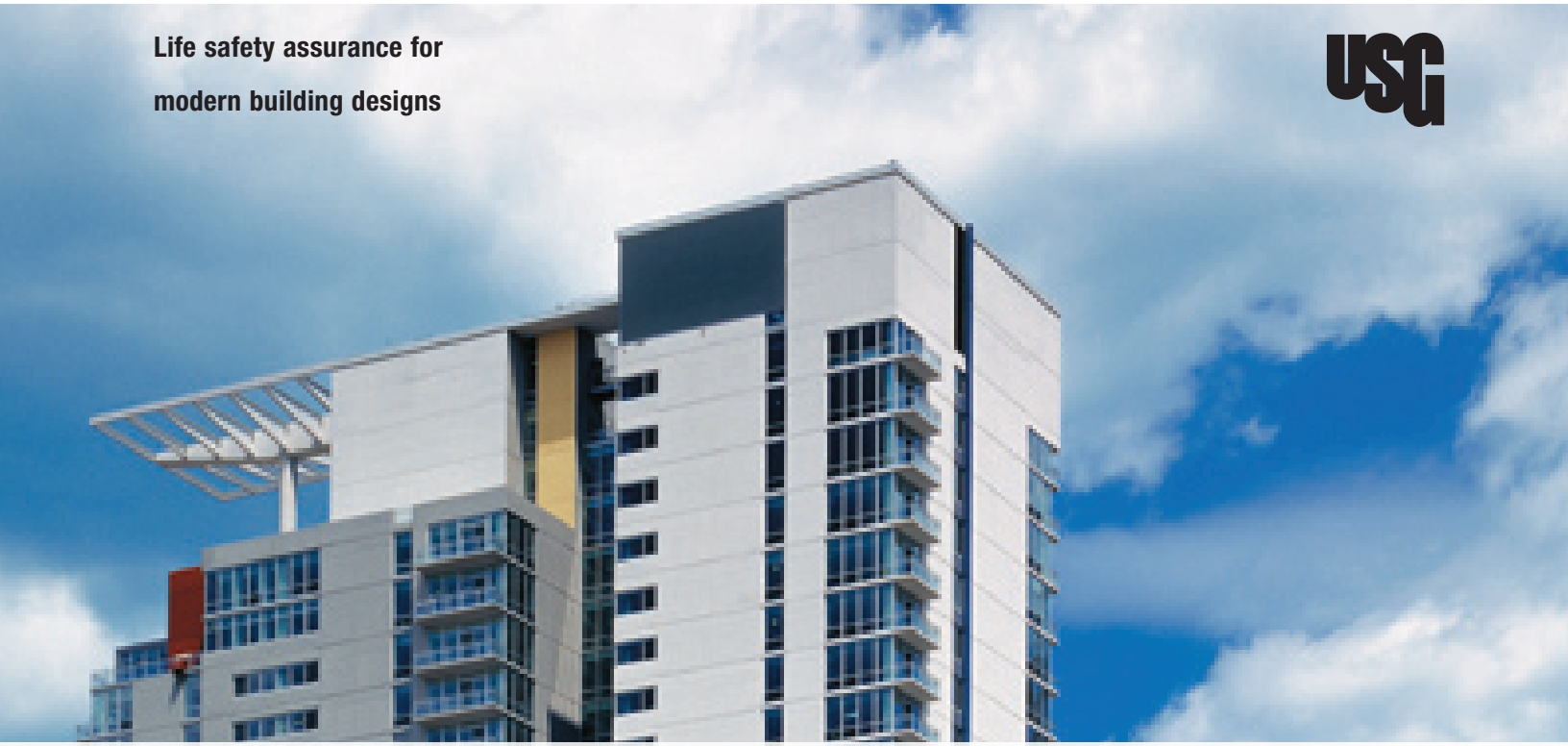
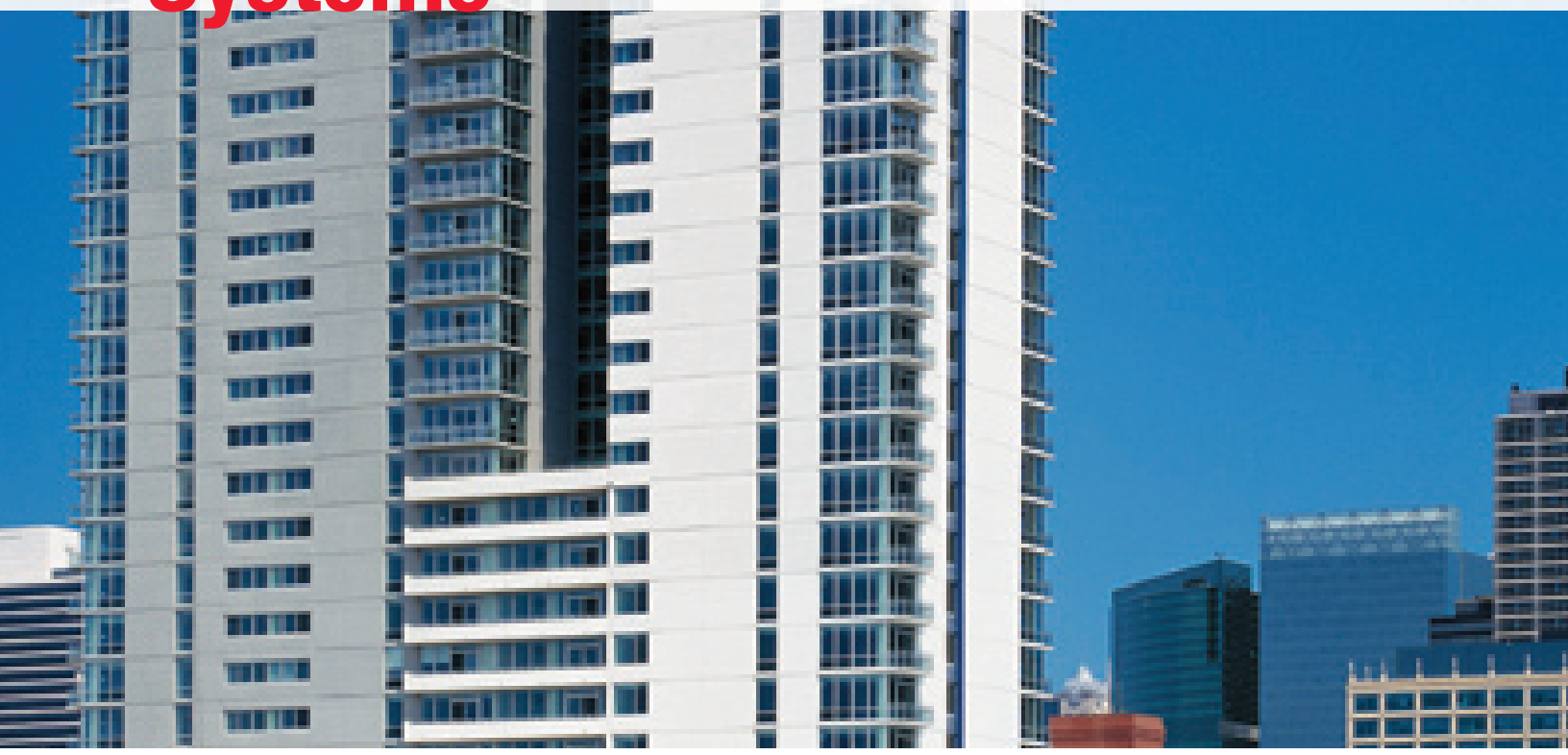
Life safety assurance for
modern building designs

USG



Shaft Wall

Systems



Walls that enclose elevator shafts, stairwells and other vertical shafts are the lifeline of a building. Should a fire occur, firefighters control the use of elevators, leaving stairwells as the only means for occupant egress or rescue within the building. Since these walls are an important part of the building, they must have the strength to withstand lateral loads and provide needed fire protection.

High-Performance Shaft Walls

User's Guide

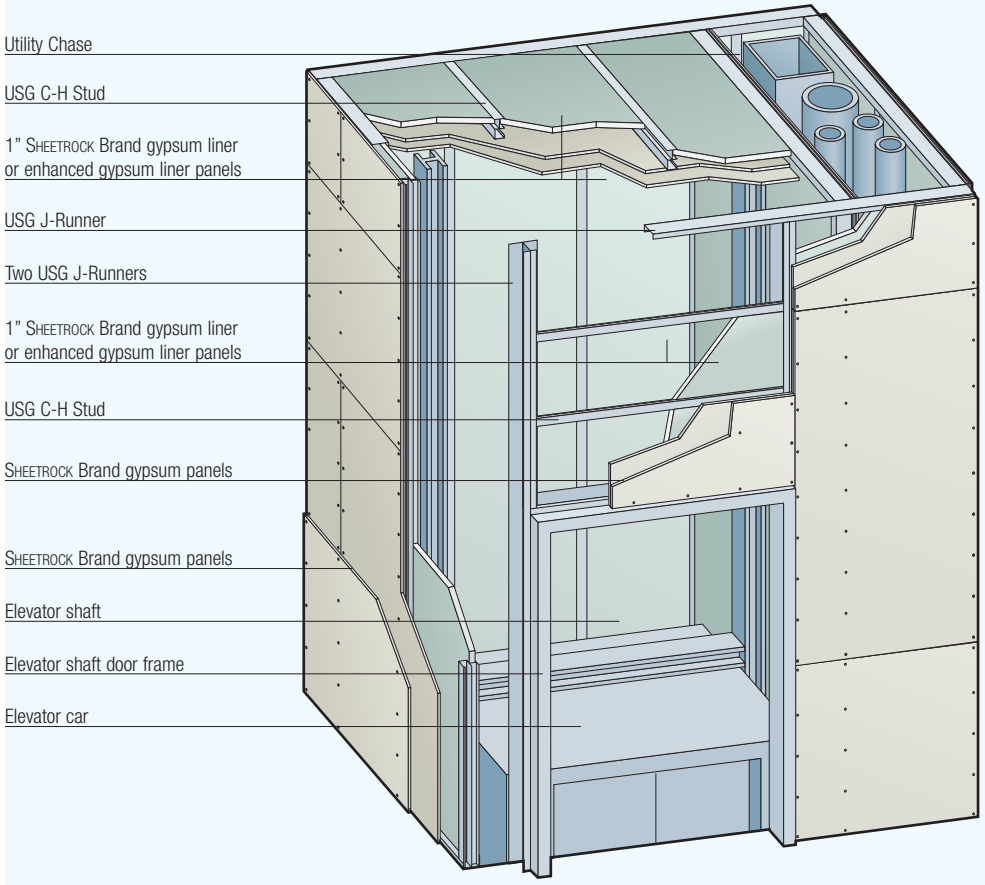
This brochure explains:

- What a shaft wall system comprises
- The different applications where shaft wall systems can be used
- How to select and specify the appropriate components of a shaft wall system

Overview

SHEETROCK Brand Shaft Wall Systems are non-loadbearing gypsum wall partition assemblies constructed from outside the shaft at each floor. Shafts are enclosed early in construction, and the walls are finished later along with interior partitions. Installation is quick and easy, using components and application procedures familiar to mechanics. This system installs faster than other multilayer gypsum panel systems because it is installed from one side, leaving the shaft free of scaffolding. The assemblies are constructed of gypsum liner panels friction-fitted into C-H studs in a progressive manner, with gypsum panels, gypsum fiber panels or cement board applied to the face.

Typical Shaft Wall Assembly

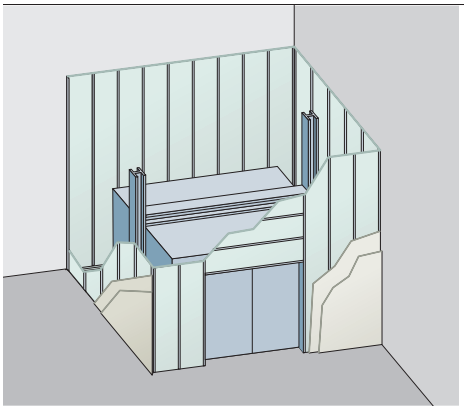


Applications

Use SHEETROCK Brand Shaft Wall Systems to construct elevator shafts, mechanical shafts, stairwells, air return shafts and horizontal membranes. These shafts are vital for vertical communication, power, water, fresh air, exhaust, and a means of egress.

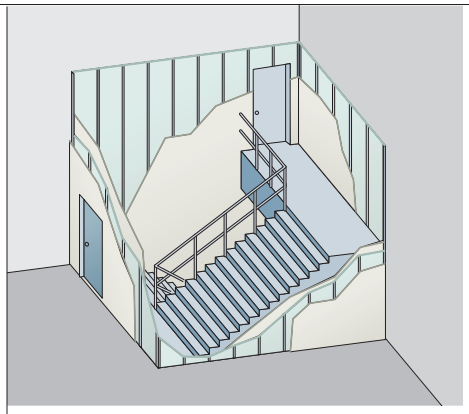
Walls

Intermittent Air Pressure Loads



Elevator shafts

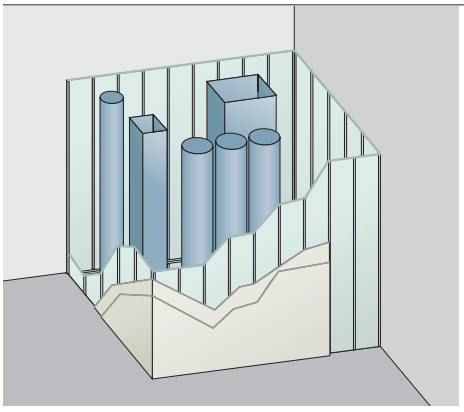
Ideal for elevator shafts since the walls can be constructed from one side, leaving the shaft free of scaffolding. This allows elevator equipment to be installed simultaneously.



Stair shafts

Accommodates stair shafts by allowing both sides of the wall to be finished when required. For added abuse resistance in stairwells, face layer panels can be substituted with FIBEROCK Brand Abuse-Resistant Panels.

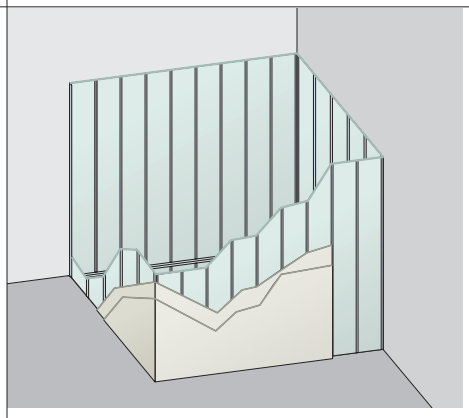
Intermittent Air Pressure Loads



Mechanical shafts

Vertical HVAC piping and ductwork can easily be contained within the system, as well as allowing for wall penetrations when required.

Sustained Pressure Loads



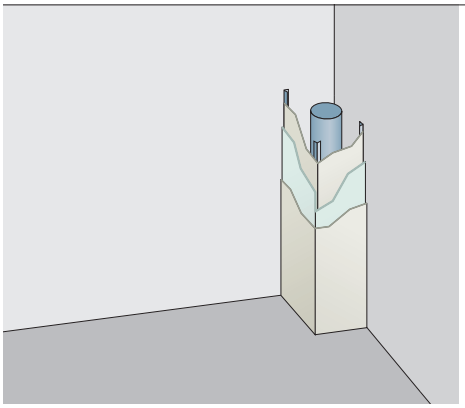
Air shafts (unlined)

The system can also be used for vertical air shafts within the building. Shafts can be unlined when specific conditions are met. Unlined shaft walls can accommodate sustained air pressure up to 10 psf.

Applications

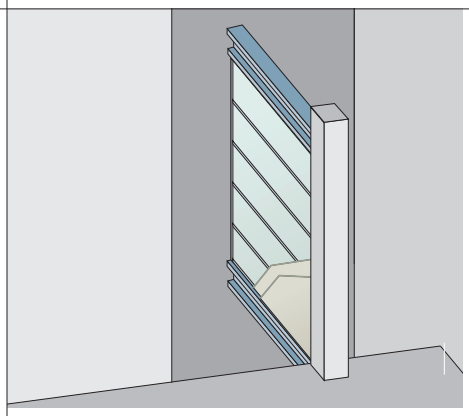
Walls

Solid Shafts



Solid shafts are normally used in areas where a small section of shaft wall is needed for a single vertical pipe penetration. The solid shaft is structurally limited to a height of 12 feet, since the system has no studs.

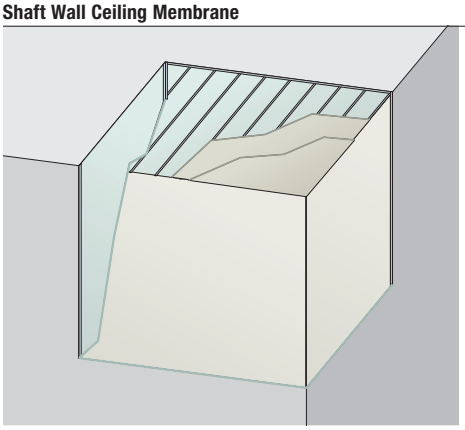
Horizontal Stud Shafts



For certain applications, equipment limitations sometimes make it difficult to install shaft liner panels and studs vertically. This is true for walls separating shafts when there is only a structural beam provided for supporting the wall.

Ceilings

Shaft Wall Ceiling Membrane



The system can also be installed horizontally when a horizontal fire-rated membrane is required. Membranes have been approved under NER-258 for 1- and 2-hour fire ratings.

Components

SHEETROCK Brand Shaft Wall Systems have been comprehensively tested for fire resistance ratings only when all of the system components are used together. Substitutions of any of the components are not recommended and are not supported by USG. Refer to the appropriate product material safety data sheet for complete health and safety information.

Gypsum Liner Panels

SHEETROCK® Brand Gypsum Liner Panels

- High-performance panels have a noncombustible core encased in a water-resistant 100% recycled green face and back paper
- Underwriters Laboratories (UL)/Underwriters Laboratories Canada (ULC) Classified for fire resistance
- Panels are 1″ thick and 24″ wide with beveled edges
- Refer to product submittal sheet WB2278 for more information

SHEETROCK Brand Enhanced Gypsum Liner Panels

- High-performance panels have a noncombustible and moisture-resistant gypsum core enclosed in a mold- and water-resistant, 100% recycled blue face and back paper
- UL/ULC Classified for fire resistance
- Panels are 1″ thick and 24″ wide with beveled edges
- Refer to product submittal sheet WB2313 for more information

Gypsum Panels and Cement Board

SHEETROCK Brand FIRECODE® Core Gypsum Panels

- All of the advantages of regular panels with additional resistance to fire
- Available in 5/8″ thickness, 4′ width
- Refer to product submittal sheet WB1473 for more information

SHEETROCK Brand FIRECODE C Core Gypsum Panels

- Provide improved fire resistance over standard FIRECODE panels because of additives that enhance integrity of the core under fire exposure
- Available in 5/8″ and 1/2″ thicknesses, 4′ width
- Refer to product submittal sheet WB1473 for more information

SHEETROCK Brand HUMITEK® FIRECODE Core Gypsum Panels

- Panels have a noncombustible, moisture- and mold-resistant gypsum core encased in a moisture-resistant, 100% recycled blue face and brown back papers
- Tapered long edges for easy finishing
- Available in 5/8″ thickness, 4′ width
- 5/8″ panels are UL Classified for fire resistance
- Refer to product submittal sheet WB2327 for more information

Components

SHEETROCK Brand ULTRACODE® Core Gypsum Panels

– 3/4″-thick panels require fewer layers of gypsum panels in approved designs
– Available in 4′ width
– Refer to product submittal sheet WB2167 for more information

DUROCK® Brand Cement Board

– Water-durable, mold-resistant substrate for high-moisture areas
– Suitable for application to wood or steel framing spaced 16″ o.c. in new construction and remodeling
– Refer to product submittal sheet CB399 for more information

FIBEROCK® Brand Abuse-Resistant Gypsum Fiber Interior Panels

– Resist denting, breaking, and puncturing, even in high-traffic areas
– Excellent fire resistance
– Made from 95% recycled materials
– Refer to product submittal sheet F102 for more information

FIBEROCK Brand AQUA-TOUGH™ Gypsum Interior Panels

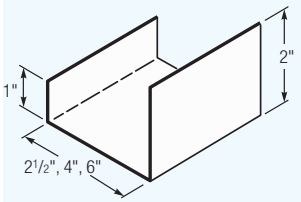
– Used only for wall designs
– Increased resistance to abrasion, indentation and penetration
– Made from 95% recycled materials
– Refer to product submittal sheet F134 for more information

IMPERIAL® Brand FIRECODE Core and FIRECODE C Core Gypsum Base

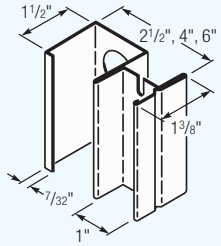
– Large size, rigid base for fire-rated gypsum veneer plaster systems
– Designed for direct or resilient attachment to wood or steel framing
– Multilayered laminated face paper to control water absorption and resist sag
– Refer to product submittal sheet P790 for more information

Steel Framing

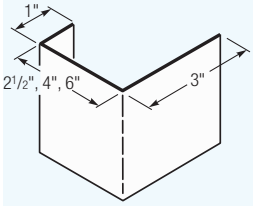
USG Steel J-Runner (JR)



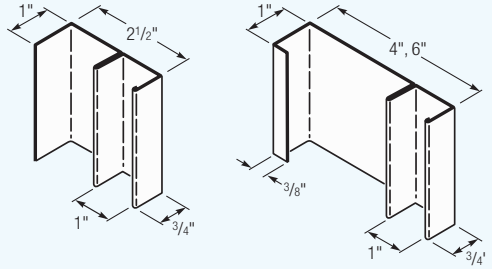
USG Steel C-H Stud (CH)



USG Steel Jamb-Strut (JS)



USG Steel E-Stud (ES)



Thickness–Steel Framing[a] Components

	Design Thickness[b]		Minimum Thickness		
Style	**in.**	**mils**	**in.**	**mils**	**ga.**
CH, ES	0.0188	18	0.0179	18	25
JR	0.0239	22	0.0227	23	24
CH, ES, JR, JS	0.0359	33	0.0341	34	20

Structural Properties–Steel Framing Components

Component and Size	Product Identification	Average Weight (lb./lin. ft.)	Area (sq. in.)	I_x (in.4)	S_x[c] (cu. in.)	Allowance Design Stress (ksi)
2-1/2″ C-H Stud	212CH-18	0.5186	0.1524	0.129	0.093	19.8
	212CH-34	0.998	0.2910	0.239	0.1741	24.0
4″ C-H Stud	400CH-18	0.6118	0.1798	0.383	0.162	19.8
	400CH-34	1.243	0.3433	0.730	0.318	24.0
6″ C-H Stud	600CH-34	1.366	0.4227	1.998	0.569	24.0
double 6″ E-Stud	600ES-18	1.546	0.3982	2.004	0.628	20.00
	600ES-34	2.372	0.6364	3.400	1.094	20.00
2-1/2″ J-Runner	212JR-23	0.448	0.1346	0.117	0.085	3.00
	212JR-34	0.670	0.2039	0.192	0.130	4.96
4″ J-Runner	400JR-23	0.573	0.1705	0.351	0.163	3.00
	400JR-34	0.857	0.2577	0.574	0.251	4.96
6″ J-Runner	600JR-23	0.740	0.2183	0.937	0.295	3.00
	600JR-34	1.107	0.3295	1.523	0.457	4.96
2-1/2″ Jamb Strut	212JS-34	0.818	0.2398	0.226	0.143	3.00
4″ Jamb Strut	400JS-34	1.006	0.2936	0.647	0.270	3.00
6″ Jamb Strut	600JS-34	1.256	0.3654	1.673	0.485	3.00

Note

(a) Studs and runners comply with ASTM C645. (b) Properties of steel framing members have been calculated in conformance with ANSI Specification for the Design of Cold-Formed Steel Structural Members, 1996 edition. (c) Full section modulus to be used with corresponding design stress.

Components

Interior Finishing Products

SHEETROCK Brand Acoustical Sealant

– Minimizes whistling and dirt accumulation due to air movement when applied to partition perimeter and penetrations
– Refer to product submittal sheet J678 for more information

SHEETROCK Brand First Coat

– A flat latex paint formulated to provide a superior first (prime) coat over interior gypsum board and concrete surfaces
– Equalizes porosity and surface texture differences to provide greater uniformity of finish coat
– Refer to product submittal sheet J1095 for more information

SHEETROCK Brand All Purpose Joint Compound

– Versatile performer: tape, finish, texture, laminate, or skim coat
– Combines single-package, ready-mixed convenience with good taping and topping performance
– Refer to product submittal sheet J60A for more information

SHEETROCK Brand PLUS 3™ Lightweight All Purpose Joint Compound

– Weighs up to 30% less than conventional compounds and sands with the ease of a topping compound
– With very low shrinkage, it requires only two coats over metal, such as corner beads and fasteners
– Refer to product submittal sheet J498A for more information

SHEETROCK Brand TUFF-HIDE™ Primer-Surfacer

– A high solids, vinyl, acrylic latex-based coating for interior spray application over new drywall
– Single spray application provides the same results achieved using a typical two-step process of skim coating surfaces with joint compound followed by a coat of primer
– Saves time and money
– Refer to product submittal sheet J1691 for more information

SHEETROCK Brand Paper Faced Metal Bead and Trim

– Cost-effective, problem-free, beautiful corners
– Superior solution to edge cracking and chipping
– Refer to product catalog J1424 for more information

Performance Testing

SHEETROCK Brand Shaft Wall Systems provide superior safety and performance for a very important component of a building.

Performance Tests

SHEETROCK Brand Shaft Wall Systems result from a program of extensive testing and continuous improvements to help you achieve the superior performance that your project demands. Systems provide up to 4-hour fire resistance and sound ratings up to 52 STC, and resist both sustained and intermittent lateral loads and fatigue under cyclic lateral loading.

Testing Methods

All USG products and systems undergo exhaustive testing to ensure that they meet exacting standards. USG's products are Classified as to fire resistance and fire-hazard properties. As part of this protocol, Underwriters Laboratories (UL) periodically audits production of these materials to ensure compliance with necessary properties. UL is an independent, not-for-profit organization that has tested products for public safety for over a century.

Products are manufactured and tested in accordance with recognized standards. ASTM International is one of the largest voluntary standards development organizations in the world, and is a trusted source for technical standards for materials, products, systems, and services.

These systems have been designed and tested using accepted engineering practices with deflection limits of L/120, L/240 and L/360. Additionally, limiting height tables listed herein account for flexural and shear stresses. A wide range of product and system combinations is available to meet performance requirements: intermittent and sustained air pressure loading of 5, 7-1/2, 10, 15 psf.

Testing Results

Fire Protection

In the event of a fire, mechanical shafts and stairs are vital channels for communication, power, water, air, exhaust and egress—making the shafts the lifelines of the building. Since it is critically important that these walls protect occupants and necessary services from fire, SHEETROCK Brand Shaft Wall Systems have been tested for fire endurance.

The primary attribute of SHEETROCK Brand Shaft Wall Systems and its components is fire resistance. Testing supporting this attribute ensures that this critical performance component will not be compromised when properly installed.

This fire testing results in the following:

- UL Classification of all gypsum panel components
- UL fire-resistance Classifications for 1 to 4 hours
- UL system testing with all major elevator door manufacturers
- UL listing for fire damper installation
- Fire test data for electrical panels, call button boxes and other interfaces
- UL listing of shaft wall head of wall

See the Good Design Practices section for more information on fire resistance.

Sound Control

Sound control test data demonstrate the effectiveness of SHEETROCK Brand Shaft Wall Systems in attenuating sound. When properly designed and installed, SHEETROCK Brand Shaft Wall Systems will increase comfort levels by reducing unwanted noise from adjacent spaces.

The standard assembly offers 39 STC rating; 47 STC is achieved by adding 1″ sound insulation within the partition cavity, and 52 STC with single-layer 3/4″ ULTRACODE and 3″ sound insulation.

Performance Testing

Testing Results

Moisture/Mold

The best way to minimize damage from moisture and mold is to minimize or eliminate exposure to water before, during and after construction. In all cases where moisture intrusion occurs, eliminate all sources of moisture immediately.

Both SHEETROCK Brand Gypsum Liner Panels and SHEETROCK Brand Enhanced Gypsum Liner Panels have water-resistant facings. In addition, SHEETROCK Brand Enhanced Gypsum Liner Panels have mold-resistant paper and a water-resistant core. SHEETROCK Brand HUMITEK Gypsum Panels have a moisture- and mold-resistant gypsum core encased in moisture-resistant, 100% recycled face and back papers.

When used in conjunction with good construction practices, these products will minimize, but not eliminate, the risk of moisture damage. For more information on moisture control and mold, see WB2317, *Moisture, Mold, Mildew and Construction Practices,* and SA934, *Moisture-Resistant Assemblies.* The following websites are another resource:

New York City Department of Health
www.ci.nyc.ny.us/html/doh
Search for mold resources.

United States Environmental Protection Agency
www.epa.gov
Search for mold resources.

Sustainability

The LEED® (Leadership in Energy and Environmental Design) program is a guideline for building solutions established by the U.S. Green Building Council (USGBC).

LEED's mission is to transform the building industry by establishing a common standard of measurement to define what constitutes a "green building." To this end, LEED provides a framework for assessing building performance and meeting sustainability goals. This framework assigns points for certain sustainability criteria, such as sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

Specific products cannot be LEED-certified, because there are many contingent factors on each project that must be considered. However, certain products may assist you in obtaining LEED points for your design solution. For example:

USGBC LEED Credits	**MR 2**	
Construction Waste Management	2.1	Divert 50% of project waste (by weight) from landfill (1 point)
	2.2	Divert another 25% of project waste (by weight) from landfill (1 point)
Recycled Content	**MR 4**	
	4.1	If 25% of project materials by weight have 20% post-consumer or 40% post-industrial (1 point)
	4.2	Another 25% of project materials (1 point)
Local/Regional Materials	**MR 5**	
	5.1	If 20% of project materials are manufactured within 500 miles (1 point)
	5.2	If raw materials for above products are obtained within 500 miles of manufacturing (1 point)
Low-Emitting Materials	**EQ 4**	
	4.2	Drywall installation less than 200g/L per Green Seal, Table 5 (1 point)

The following chart lists the products in SHEETROCK Brand Shaft Wall Systems that may be eligible for LEED points. But using products with a high recycled content is only one part of the equation. Another key measure of sustainability is embodied energy, which assesses the total energy required to produce a particular material or building component and get it to a building site. For example, if you use a product with a high recycled content but need to ship it across the country, the embodied energy costs of transportation may outweigh any environmental advantages of using a recycled product. It may be more environmentally sound to ship products made of virgin material from a plant close to a job site.

USGBC LEED Credits	MR 4.1 and 4.2				EQ 4		MR 5.2
Product Family	**Post-Consumer**	**Post-Industrial**	**Embodied Energy[a, b]**	**Density lbs./cu. ft.**	**VOC[c]**	**Mfg. Efficiency**	**Raw Materials (% by weight)**
SHEETROCK Brand Panels—percent varies across 23 plants nationwide[d]	~5%	0%-95% 36.5% ave.	3.6 MJ/kg	43-50	none	95+%	95% gypsum, 5% paper, 1% starch; special panel with wax and glass fiber
SHEETROCK Brand Paper Tape	0	0	.6 MJ/kg		none	95+%	Paper
SHEETROCK Brand Paper-Faced Bead	0	25%	40.8 MJ/kg		none		Steel, paper, & non-solvent organic adhesive
SHEETROCK Brand Metal Bead	0	25%	34.8 MJ/kg		none		Steel
Joint Compound—Drying Type	0	0	3 MJ/kg	100	<2 g/L	98%	Limestone, latex & mica
Joint Compound—Setting Type	0	0	3 MJ/kg	100	none	98%	Plaster of paris, limestone & mica
SHEETROCK Brand Acoustical Sealant	0	0			<65 g/L		Limestone, water, acrylic polymer

Alternative Materials and Special Requirements

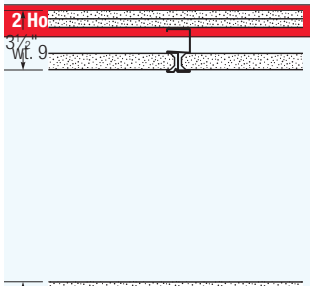
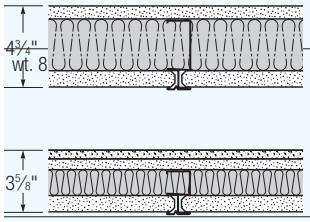
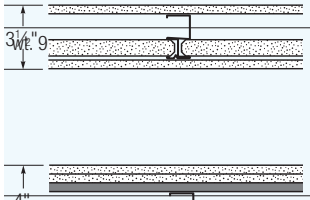
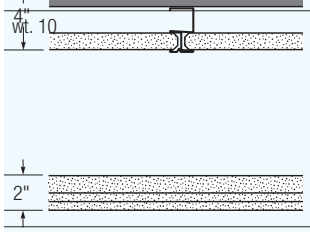
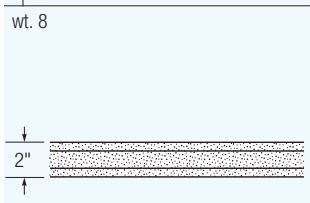
The following notes offer alternative methods of construction.

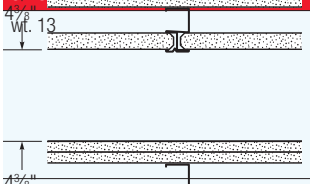
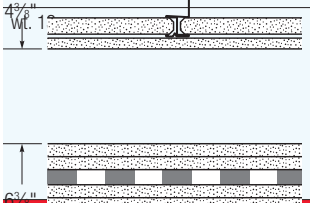
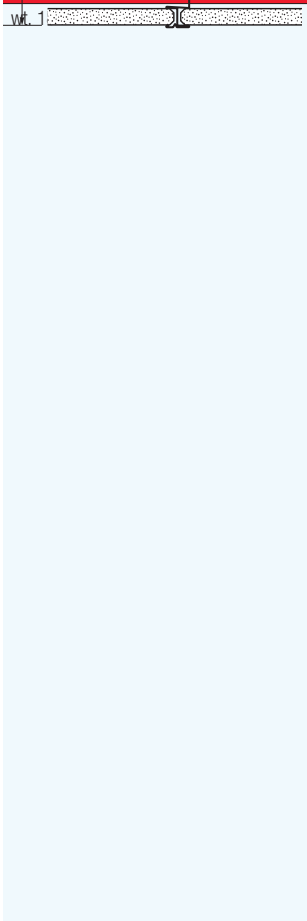
1. Where insulation is shown in assembly drawings, the specific type of product is required in the assembly to achieve the stated fire-resistance rating. Otherwise, mineral wool or glass fiber insulation may be incorporated into any assembly without compromising the fire-resistant rating.
2. Stud depths are minimum required for fire-resistance rating.
3. Where RC-1 Resilient Channel is indicated, RC-1 or equivalent may be used. RC-2 is not an equivalent substitution.
4. Use L/360 deflection criteria for limiting height/stud selection and 20 ga. minimum framing when applying DUROCK Brand Cement Board. Refer to SA934, *Moisture-Resistant Assemblies,* for more information on application and related products.
5. 5/8″ IMPERIAL Brand FIRECODE Core Gypsum Base, 5/8″ SHEETROCK Brand HUMITEK FIRECODE Core Gypsum Panels or 5/8″ FIBEROCK Brand AQUA-TOUGH Gypsum Interior Panels may be substituted for 5/8″ SHEETROCK Brand FIRECODE Core Gypsum Panels.
6. 1/2″ IMPERIAL Brand FIRECODE C Core Gypsum Base may be substituted for 1/2″ SHEETROCK Brand FIRECODE C Core Gypsum Panels.
7. 5/8″ SHEETROCK Brand FIRECODE Core Gypsum Panels, 5/8″ IMPERIAL Brand FIRECODE Core Gypsum Base or 5/8″ FIBEROCK Brand Panels can be substituted for 1/2″ SHEETROCK Brand FIRECODE C Core Gypsum Panels.
8. Use 20 ga. minimum framing with FIBEROCK panels.
9. 1″ SHEETROCK Brand Enhanced Gypsum Liner Panels may be substituted for 1″ SHEETROCK Brand Gypsum Liner Panels in all systems.
10. For detailed information regarding UL Classified designs shown in the Performance Selector, please refer to the UL Fire-Resistance Directory — Volume One or visit www.UL.com.

Notes

(a) Megajoules per kilogram. (b) Transportation of gypsum board accounts for over 10% of the board's embodied energy, while mining accounts for less than 1%. (c) Section 01350 of the Material Specifications adopted by the Collaborative for High Performance Schools (CHPS) for VOC emissions. (d) USG uses more recaptured (FGD or flue gas desulfurization) gypsum than any other wallboard supplier—over 3 million tons in 2003. Based on current operations, all FIBEROCK panels use FGD gypsum, but the FGD gypsum content of SHEETROCK panels changes from plant to plant and even day to day at any one plant, due to availability. The recycled contents above are approximate, based on plant averages for 2002. Most of the power plants that produce recaptured gypsum are east of the Mississippi River. While FGD gypsum is not available everywhere in North America, USG does have plants strategically located to meet your needs. Evaluation should be made for each job on the benefits of using FGD instead of natural gypsum.

Performance Selector

1 Hour Fire-rated Construction	Non-loadbearing		Acoustical Performance		Reference	
Construction Detail	Description	Test Number	STC	Test Number	ARL	Index
	• 5/8″ Sheetrock Brand Gypsum Firecode Core Panels, joints finished • 2-1/2″ USG C-H Studs 25 gauge 24″ o.c. • 1″ Sheetrock Brand Gypsum Liner Panels	**UL Des U415, System A** or **U469**	39	**USG-040901** Based on 4″ C-H studs 25 gauge	SA926	**1**
2 Ho						
	• 1/2″ Sheetrock Brand Firecode C Core Gypsum Panels, face layer joints finished • 2-1/2″ USG C-H Studs 25 gauge 24″ o.c. • 1″ Sheetrock Brand Gypsum Liner Panels	**UL Des U415, System B** or **U438**	38	**USG-040917**	SA926	**2**
			43	**USG-040912** Based on 4″ C-H studs 25 gauge		
			48	**RAL-OT-04-022** Based on 1″ sound batts in cavity		
			50	**RAL-OT-04-019** Based on 4″ C-H studs 25 gauge with 3″ mineral fiber insulation		
	• 3/4″ Sheetrock Brand Ultracode Core Gypsum Panels, joints finished • 4″ USG C-H Studs 25 gauge 24″ o.c. – 3″ Thermafiber SAFB • 1″ Sheetrock Brand Gypsum Liner Panels	**UL Des U415, System C**	51	**RAL-OT-04-020** Based on 4″ C-H studs with 3″ Thermafiber SAFB insulation	SA926	**3**
	• 1/2″ Durock Brand Cement Board, joints finished • 5/8″ Sheetrock Brand Firecode Core Gypsum Panels • 2-1/2″ USG C-H Studs 20 gauge 24″ o.c. – 1-1/2″ Thermafiber SAFB • 1″ Sheetrock Brand Gypsum Liner Panels • Durock Brand Cement Board screw attached and laminated to gypsum panel with 4″ vertical strip ceramic tile mastic centered between studs	**UL Des U415, System D**			SA926	**4**
	• 1/2″ Sheetrock Brand Firecode C Core Gypsum Panels • 2-1/2″ USG C-H Studs 25 gauge 24″ o.c. • 1″ Sheetrock Brand Gypsum Liner Panels – joints finished both sides	**UL Des U415, System E** or **U467**	44	**USG-040911** Based on 4″ C-H studs 25 gauge	SA926	**5**
	• 1/2″ Sheetrock Brand Firecode C Core Gypsum Panels applied vertically, face layer joints finished – RC-1 resilient channel or equivalent 24″ o.c. • 2-1/2″ USG C-H Studs 25 gauge 24″ o.c. • 1″ Sheetrock Brand Gypsum Liner Panels	**UL Des U415, System F**	53	**USG-040909** Based on 4″ C-H studs 25 gauge with 3″ mineral fiber insulation	SA926	**6**
			58	**USG-040910** Based on 4″ C-H studs 25 gauge with additional layer on liner panel side and 3″ mineral fiber insulation		
	– 1″ x 2″ perimeter angles 25 gauge • 1″ Sheetrock Brand Gypsum Liner Panel, fastened to angles • 1/2″ Sheetrock Brand Firecode C Core Gypsum Panels • 1/2″ Sheetrock Brand Firecode C Core Gypsum Panels, joints finished	**UL Des U529**			SA926	**7**

Construction Detail	Non-loadbearing		Acoustical Performance		Reference	
	Description	Test Number	STC	Test Number	ARL	Index
2 Hour Fire-rated Construction						
	• 5/8″ Sheetrock Brand Firecode Core Gypsum Panels, face layer joints finished • 4″ USG C-H Studs 20 gauge 24″ o.c. run horizontally and attached to vertical USG J-Runners, 20 gauge • 1″ Sheetrock Brand Gypsum Liner Panels	**UL Des U437**			SA926	**8**
3 Hour Fire-rated Construction						
	• 5/8″ Sheetrock Brand Firecode C Core Gypsum Panels, face layer joints finished • 2-1/2″ USG C-H Studs 25 gauge 24″ o.c. • 1″ Sheetrock Brand Gypsum Liner Panels	**UL Des U415, System G**	45 51	**USG-040903** Based on 4″ C-H Studs 25 gauge **RAL-OT04-018** Based on 4″ C-H Studs with 3″ mineral fiber insulation	SA926	**9**
	• 5/8″ Sheetrock Brand Firecode C Core Gypsum Panels, face layer joints finished • 2-1/2″ USG C-H Studs 25 gauge 24″ o.c. • 1″ Sheetrock Brand Gypsum Liner Panels • 5/8″ Sheetrock Brand Firecode C Core Gypsum Panels, joints finished	**UL Des U415, System H**	49	**USG-040902** Based on 4″ C-H Studs	SA926	**10**
4 Hour Fire-rated Construction						
	• 3/4″ Sheetrock Brand Ultracode Core Gypsum Panels, on furring channel 24″ o.c., over 2 layers 3/4″ Sheetrock Brand Ultracode Core Gypsum Panels, face layer joints finished • 2-1/2″ USG C-H Studs 25 gauge 24″ o.c. • 1″ Sheetrock Brand Gypsum Liner Panels – base layer over furring channel applied vertically **Note:** Stud size and gauge shown are minimums. Possible panels substitutions. **Note** Stud size and gauge shown are minimums. Possible panel alternatives shown on Cross Reference of USG Panels and UI Fire Ratings on page 7 of SA100, *Fire-Resistant Assemblies*.	**UL Des U415, System I**			SA926	**11**

Performance Selector

Wall Systems – Limiting Heights

SHEETROCK Brand Shaft Wall Systems are engineered to withstand pressure loads and provide in-service impact resistance to ensure long-term performance and durability. Use this section to determine the size and gauge of framing for the system you select. You will need to know elevator pressures and other in-service demands.

Structural Performance

Impact-Resistant for Durability

Impacted with a 60 lb. sand bag, SHEETROCK Brand Shaft Wall Systems proved durable. In the test, three impacts each were made at 15 ft.-lb., 30 ft.-lb., and each following 15 ft.-lb. interval until failure. At 270 ft.-lb. the test was stopped; while cracked, the wall was not penetrated. For additional information about abuse-resistant, secure or other hardened applications, contact United States Gypsum Company at 800 USG.4YOU.

Flexing Resistance for In-Service Performance

Shaft walls are subjected to both positive and negative pressures as elevator cabs rise and descend. This piston effect of an elevator in its shaft causes continual flexing of the shaft wall. In tests, SHEETROCK Brand Shaft Wall Systems were subjected to over one million full oscillation cycles to model wall performance through the life of the building. These tests showed that a 25 ga. J-Runner is inadequate at the top or bottom of a shaft wall. As the long runner leg is continually flexed from wall deflection, it can rupture and screws can strip out and fracture from the flexing. Oscillation tests showed 24 ga. J-Runners minimize these problems and are essential to long-term safety.

Limiting Heights

Maximum partition heights are shown for four different intermittent air pressure loads and three allowable deflections. The applied pressure load is selected by the designer based on elevator cab speed and the number of elevators per shaft. Instead of using only deflection criteria, United States Gypsum Company design data consider several additional factors in determining limiting partition heights.

A. **Bending stress**—the unit force exerted which will break or distort the stud.

B. **End reaction shear**—determined by the amount of force applied to the stud which will bend or shear the J-Runner or cripple the stud.

C. **Deflection**—the actual deflection under a load. Allowable deflection is based on the amount of bending under load that a particular wall can experience without exceeding a prescribed ratio related to partition height.

Elevator Shaft Pressures

The air pressure load on shaft walls depends upon the elevator cab speed and the number of elevators per shaft. The following recommendations are derived from United States Gypsum Company tests conducted in three high-rise buildings ranging in height from 17 to 100 stories.

Recommended Elevator Shaft Pressure Load

Elevator velocity ft./min.	One or two elevators per shaft	Three or more elevators per shaft
0 to 180	5.0 psf	5.0 psf
180 to 700	7.5 psf	5.0 psf
700 to 1,600	10.0 psf	7.5 psf
1,600 to 2,000	15.0 psf[a]	7.5 psf

Note

(a) Single-cab high-speed elevator shafts may require special design considerations.

Wall Systems – Limiting Heights Table

Intermittent Air Pressure Load (wind load)–psf[a]

Stud Type and Size	Designation	Allowable deflection	Fire-rated system B, D, F, G, H, I				Fire-rated system E[b]			
			5	7.5	10	15	5	7.5	10	15
2-1/2″ C-H Studs 	212CH-18	L/120	12′10″(f)	10′5″(f)	9′0″(f)	7′5″(f)	12′10″(f)	10′5″(f)	9′0″(f)[e]	7′5″(f)
		L/240	12′1″(d)	10′5″(f)	9′0″(f)	7′5″(f)	11′8″(d)	10′2″(d)	9′0″(d)	7′5″(f)
		L/360	10′7″(d)	9′3″(d)	8′5″(d)	7′4″(d)	10′2″(d)	8′11″(d)	8′0″(d)	7′1″(d)
	212CH-34	L/120	19′2″(d)	15′9″(f)	13′8″(f)	11′2″(f)	17′7″(d)	15′4″(d)	13′8″(f)	11′2″(f)
		L/240	15′3″(d)	13′4″(d)	12′1″(d)	10′7″(d)	14′0″(d)	12′2″(d)	11′1″(d)	9′8″(d)
		L/360	13′4″(d)	11′7″(d)	10′7″(d)	9′3″(d)	12′2″(d)	10′8″(d)	9′8″(d)	8′6″(d)
4″ C-H Studs 	400CH-18	L/120	16′11″(f)	13′10″(f)	11′11″(f)	9′8″(v)[e]	16′10″(f)	13′9″(f)[e]	10′4″(v)[e]	6′11″(v)[e]
		L/240	16′11″(f)	13′10″(f)	11′11″(f)	9′8″(v)[e]	16′3″(d)	13′9″(f)[e]	10′4″(v)[e]	6′11″(v)[e]
		L/360	14′3″(d)	12′5″(d)	11′11″(f)	9′8″(v)[e]	14′3″(d)	12′5″(d)	10′4″(v)	6′11″(v)[e]
	400CH-34	L/120	22′10″(d)	20′0″(d)	18′2″(d)	15′0″(f)[e]	23′7″(d)	20′7″(d)	18′5″(f)	15′0″(f)[e]
		L/240	18′2″(d)	15′10″(d)	14′5″(d)	12′7″(d)	18′9″(d)	16′4″(d)	14′10″(d)	13′0″(d)
		L/360	15′10″(d)	13′10″(d)	12′7″(d)	11′0″(d)	16′4″(d)	14′3″(d)	13′0″(d)	11′4″(d)
6″ C-H Studs	600CH-34	L/120	28′0″(c)	27′7″(d)	24′8″(f)[e]	18′0″(v)[e]	28′0″(c)	26′5″(d)[e]	24′0″(d)[e]	18′0″(v)[e]
		L/240	25′1″(d)	21′11″(d)	19′11″(d)	17′5″(d)[e]	24′0″(d)	20′11″(d)[e]	19′0″(d)	16′8″(d)[e]
		L/360	21′11″(d)	19′2″(d)	17′5″(d)	15′2″(d)	20′11″(d)	18′4″(d)	16′8″(d)	14′6″(d)
Double 6″ E-Studs[d] 	600ES-34	L/120	28′0″(c)	28′0″(c)[e]	28′0″(c)[e]	20′0″(v)[e]	28′0″(c)	28′0″(c)[e]	28′0″(c)[e]	20′0″(v)[e]
		L/240	28′0″(c)	26′3″(d)[e]	24′0″(d)[e]	20′0″(v)[e]	28′0″(c)	26′0″(d)[e]	23′6″(d)[e]	20′0″(v)[e]
		L/360	26′3″(d)	23′0″(d)	21′0″(d)[e]	18′3″(d)[e]	26′3″(d)	22′9″(d)	20′6″(d)[e]	18′0″(d)[e]

Stud type and Size	Designation	Allowable deflection	Fire-rated system C[c]				Fire-rated system A[c]			
			5	7.5	10	15	5	7.5	10	15
2-1/2″ C-H Studs 	212CH-18	L/120	—	—	—	—	12′3″(d)	10′5″(f)	9′0″(d)[e]	6′0″(v)[e]
		L/240	—	—	—	—	9′9″(d)	8′6″(d)	7′9″(d)[e]	6′0″(v)[e]
		L/360	—	—	—	—	8′6″(d)	7′5″(d)	6′9″(d)	5′11″(d)
	212CH-34	L/120	—	—	—	—	17′2″(d)	14′8″(f)	12′9″(f)	10′5″(f)
		L/240	—	—	—	—	14′0″(d)	12′3″(d)	11′1″(d)	9′8″(d)
		L/360	—	—	—	—	12′3″(d)	10′8″(d)	9′0″(d)	8′6″(d)
4″ C-H Studs 	400CH-18	L/120	16′10″(f)	13′9″(f)	10′4″(v)[e]	6′1″(v)[e]	16′10″(f)	13′9″(f)	10′4″(v)[e]	6′1″(v)[e]
		L/240	15′10″(d)	13′4″(d)	10′4″(v)[e]	6′11″(v)[e]	15′10″(d)	13′4″(d)	10′4″(v)[e]	6′11″(v)[e]
		L/360	13′4″(d)	11′8″(d)	10′4″(v)[e]	6′11″(v)[e]	13′4″(d)	11′8″(d)	10′4″(v)[e]	6′11″(v)[e]
	400CH-34	L/120	22′0″(d)	19′3″(d)	17′6″(d)[e]	15′0″(f)[e]	22′0″(d)	19′3″(d)	17′6″(d)[e]	15′0″(f)[e]
		L/240	17′6″(d)	15′3″(d)	13′11″(d)	12′2″(d)[e]	17′6″(d)	15′3″(d)	13′11″(d)	12′2″(d)[e]
		L/360	15′3″(d)	13′4″(d)	12′2″(d)	10′7″(d)[e]	15′3″(d)	13′4″(d)	12′2″(d)	10′7″(d)[e]
6″ C-H Studs	600CH-34	L/120	28′0″(c)	26′8″(d)[e]	20′2″(v)[e]	13′6″(v)[e]	28′0″(c)	26′8″(d)[e]	20′2″(v)[e]	13′6″(v)[e]
		L/240	24′3″(d)	21′2″(d)[e]	19′3″(d)[e]	13′6″(v)[e]	24′3″(d)	21′2″(d)[e]	19′3″(d)[e]	13′6″(v)[e]
		L/360	21′2″(d)	18′6″(d)	16′9″(d)[e]	13′6″(v)[e]	21′2″(d)	18′6″(d)	16′9″(d)[e]	13′6″(v)[e]
Double 6″ E-Studs[d] 	600ES-34	L/120	28′0″(c)	28′0″(c)[e]	28′0″(c)[e]	20′0″(v)[e]	28′0″(c)	28′0″(c)[e]	28′0″(c)[e]	20′0″(v)[e]
		L/240	28′0″(c)	24′9″(d)	22′6″(d)[e]	20′0″(v)[e]	28′0″(c)	24′9″(d)	22′6″(d)[e]	20′0″(v)[e]
		L/360	25′3″(d)	21′9″(d)	19′6″(d)	17′3″(d)[e]	25′3″(d)	21′9″(d)	19′6″(d)	17′3″(d)[e]

Notes

Runner fasteners should withstand 193 lb. single shear and 200 lb. bearing force; attachment spacing should not exceed 24″ o.c. See the Performance Selector for system references and rated assembly details. L/180 data available upon request from United States Gypsum Company. Limiting criteria: f–bending stress, d–deflection, v–end reaction shear, c–practical limitation. (a) Stud spacing of 24″ for all values. (b) For assembly with single-layer board both sides of studs. (c) For assembly with single-layer board attached to studs. (d) Attachment of USG Steel Double 6″ E-Stud for SHEETROCK Brand Shaft Wall Systems. The studs are to be attached back-to-back (web to web) with pairs 1/2″ of type S-12 pan head screws installed in two rows, spaced as widely apart as possible. The first and last pairs of fasteners shall start within 6″ of each end of the studs. They shall then be spaced at a maximum of 12″ on center throughout the body of the entire stud. (e) Use JR20 runner for this height.

Performance Selector

Wall Systems – Limiting Heights

Unlined Shafts

Gypsum shaft walls have been used for many years for vent and air shafts. Their fire-resistant features and economical dry construction make them ideal for this use. To function properly, vent and air shaft systems should be designed with the following performance provisions:

1. Gypsum board surface temperature does not exceed 125 °F.
2. Separate approved liners should be installed in areas subject to continuous moisture overspray, condensation or air stream temperature over 125 °F.
3. Air stream dew point temperatures are maintained below gypsum board surface temperature.
4. The assembly is constructed to withstand sustained design uniform air pressure loads not exceeding 10 psf. Startup surge loads should not be greater than 1-1/2 times the design static load. (See table below for limiting heights.)
5. To ensure airtight construction, select appropriate sealants and apply where required.

Sustained pressure load–psf

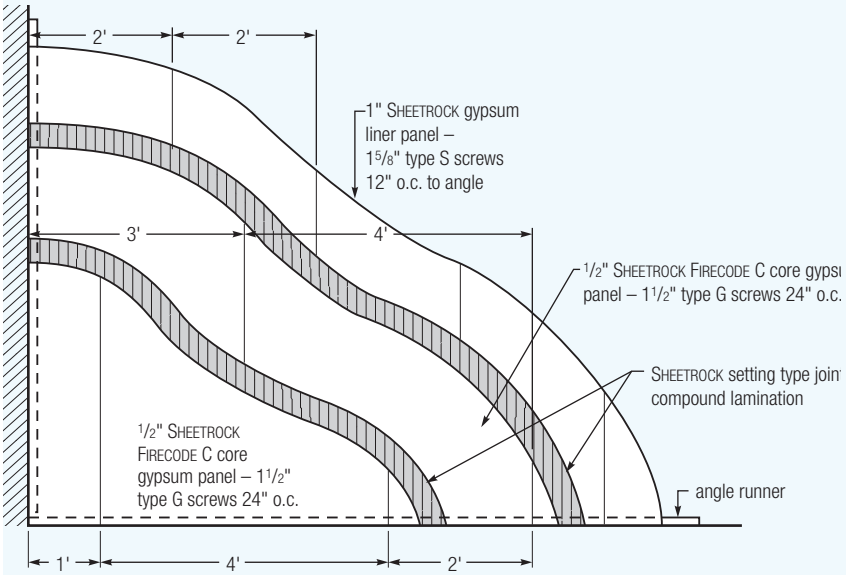
				2-hr. fire-rated system		1-hr. fire-rated system	
Stud Type and Size	**Designation**	**Stud Spacing**	**Allowable deflection**	**5**	**10**	**5**	**10**
2-1/2″ C-H Studs 	212CH-18	24″	L/120	10′5″	7′5″	10′5″[a]	6′0″[a]
			L/240	10′5″	7′5″	8′6″	6′0″[a]
			L/360	9′3″	7′5″	7′5″	5′11″[a]
	212CH-34	24″	L/120	14′8″	10′5″	14′8″	10′5″
			L/240	13′4″	10′7″	12′2″	9′8″
			L/360	11′7″	9′3″	10′8″	8′3″
4″ C-H Studs 	400CH-18	24″	L/120	13′10″	9′8″[a]	13′9″[a]	6′11″[a]
			L/240	13′10″	9′8″[a]	13′4″	6′11″[a]
			L/360	12′5″	9′8″[a]	11′8″	6′11″
	400CH-34	24″	L/120	20′0″	15′0″[a]	19′3″	15′0″[a]
			L/240	15′10″	12′7″	15′3″	12′2″[a]
			L/360	13′10″	11′0″	13′4″	10′7″[a]
6″ C-H Studs	600CH-34	24″	L/120	27′7″	18′0″[a]	26′8″[a]	13′6″[a]
			L/240	21′11″	17′5″[a]	21′2″	13′6″[a]
			L/360	19′2″	15′2″	18′6″	13′6″[a]
Double 6″ E-Studs 	600ES-34	24″	L/120	28′0″	20′0″[a]	28′0″[a]	20′0″[a]
			L/240	26′3″	20′0″[a]	24′9″	20′0″[a]
			L/360	23′0″	18′3″[a]	21′9″	17′3″[a]

Notes
Runner fasteners should withstand 193 lb. single shear and 200 lb. bearing force; attachment spacing should not exceed 24″ o.c. (a) Use JR20 runner for this height.

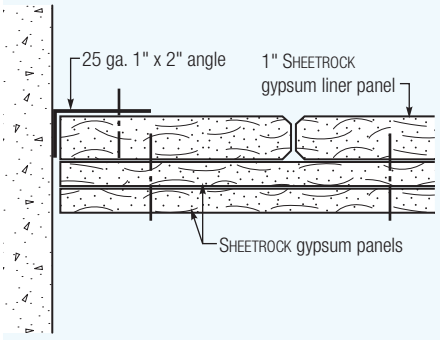
Wall Systems – Solid Shaft Wall

SHEETROCK Brand Shaft Wall Systems can be used as a vent enclosure for vertical shafts with a 2 hr. fire rating per UL Design U529. This shaft assembly is particularly suited for structures having a number of relatively small and separated mechanical, service and ventilator shafts.

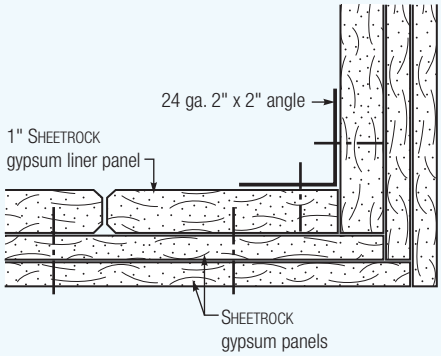
Vent Shaft Elevation



Wall Intersection



Corner



Note
Limiting height of system is 12.0". Install panels vertical and full height only.

Performance Selector

Ceiling System – Limiting Spans

Horizontal Assemblies

SHEETROCK Brand Shaft Wall Systems installed horizontally provide economical construction for fire-resistive duct enclosures, corridor ceilings and stairway soffits.

Triple Layer

With 1″ liner panels inserted in USG C-H Studs 24″ o.c. and triple-layer 1/2″ SHEETROCK Brand FIRECODE C Core Gypsum Panels screw-attached to studs, the system provides 2-hour protection from fire.

Double Layer

With double-layer 1/2″ SHEETROCK Brand FIRECODE C Core Gypsum Panels screw-attached to studs, the assembly provides 2-hour fire-resistive ceiling construction for corridors and stair soffits (see Design Details).

Single Layer

With single-layer 5/8″ SHEETROCK Brand FIRECODE C Core Gypsum Panels screw-attached to studs, the assembly provides one-hour fire-resistive ceiling construction for corridors and stair soffits.

Limitations

1. USG C-H Studs are not designed to carry live loads or mechanical equipment or provide material storage area.
2. Maximum stud spacing is 24″ o.c.; maximum spans are shown in table below.

Limiting Spans— Horizontal Shaft Walls[a]

2-Hr. Horizontal Membrane or Metal Duct Enclosure

Triple-layer 1/2″ gypsum panels[b]	Maximum Span
212CH-18	6′ 5″
212CH-34	8′ 3″
400CH-18	8′ 6″
400CH-34	12′ 0″
600CH-34	12′ 8″

2-Hr. Corridor Ceilings and Stair Soffits

Double-layer 1/2″ gypsum panels[c]	Maximum Span
212CH-18	6′ 0″
212CH-34	9′ 2″
400CH-18	7′ 10″
400CH-34	13′ 2″
600CH-34	15′ 10″
1-Hr. Single-layer 5/8″ gypsum panels[c]	**Maximum Span**
212CH-18	6′ 7″
212CH-34	10′ 3″
400CH-18	8′ 8″
400CH-34	14′ 6″
600CH-34	17′ 5″

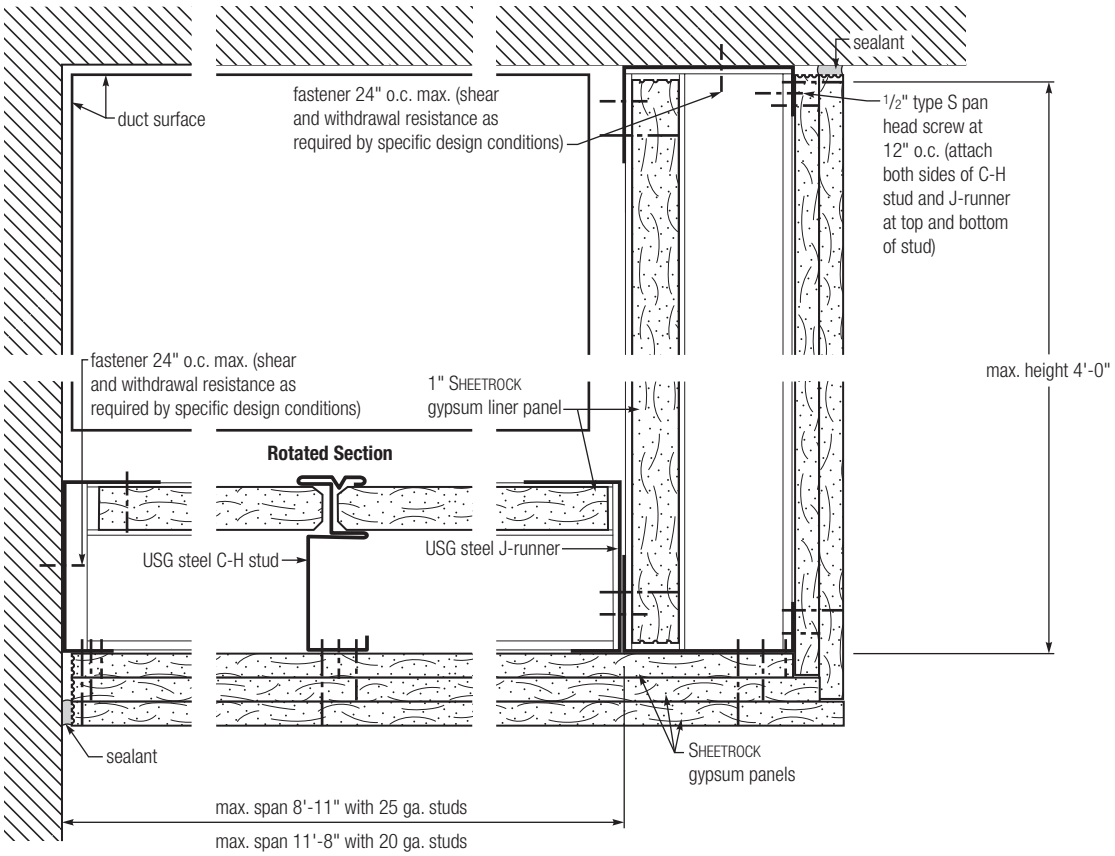
Note

(a) Based on L/240 allowable deflection with studs at 24″ o.c. and JR24 runner. (b) Full steel stress allowed based on ASTM E119. (c) Allowable steel stress reduced 50%.

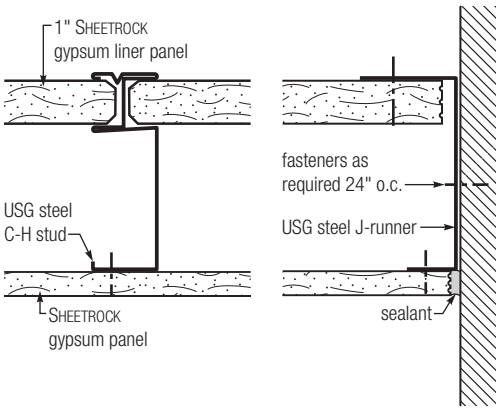
Design Details

Ceiling Membrane

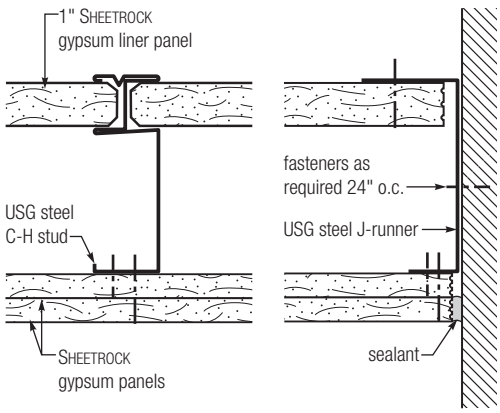
2-Hr. Rated Assembly – Horizontal Membrane or Metal Duct Enclosure



1-Hr. Fire Rated Assembly (see NER-258) – Corridor Ceiling and Stair Soffit



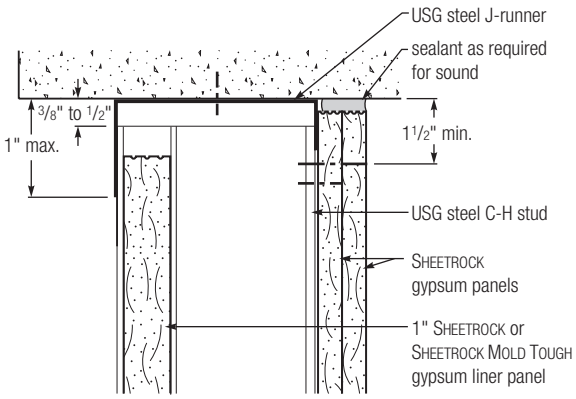
2-Hr. Fire Rated Assembly (see NER-258) – Corridor Ceiling and Stair Soffit



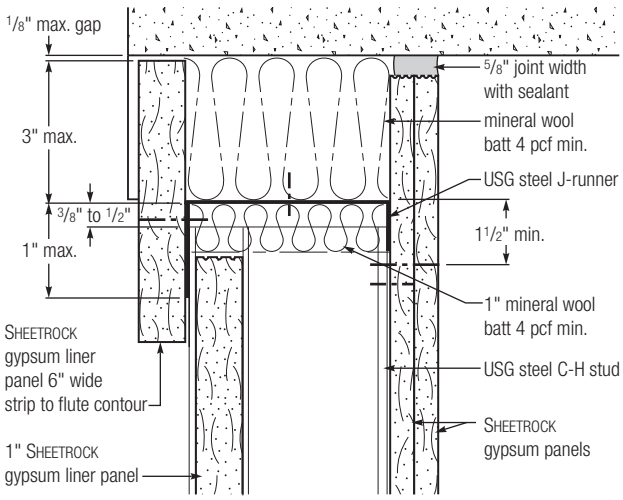
Design Details

Basic Interfaces – System B

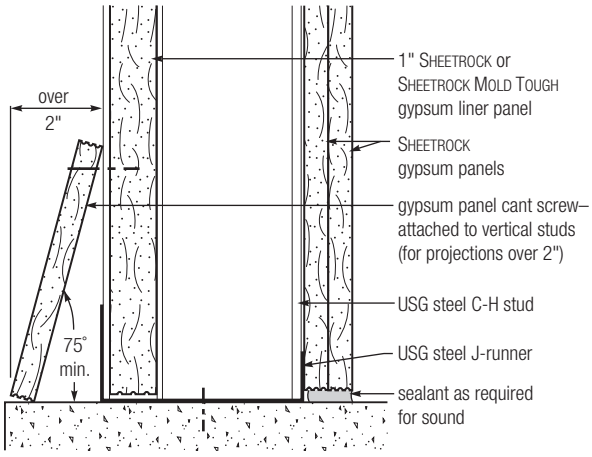
Head Section



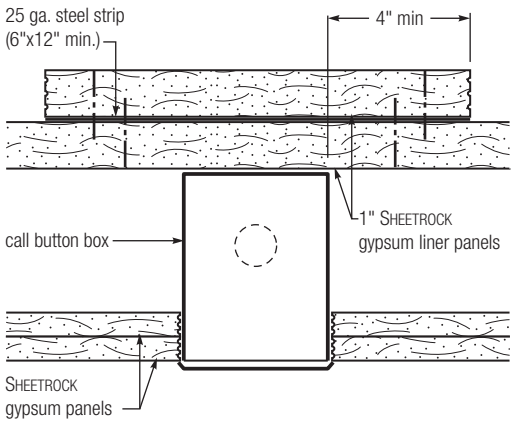
Dynamic Head Section (UL Design HW-D-0372)



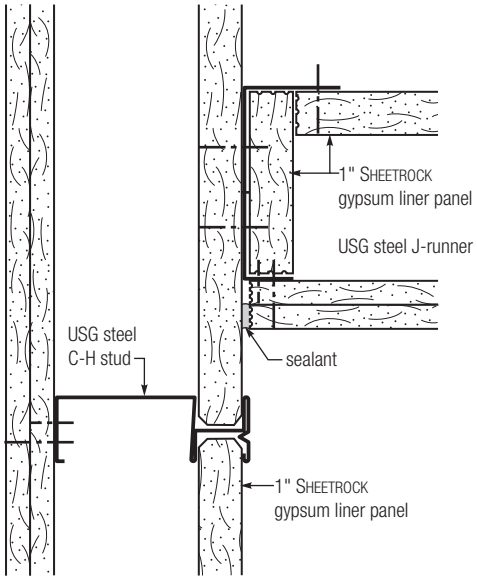
Base Section



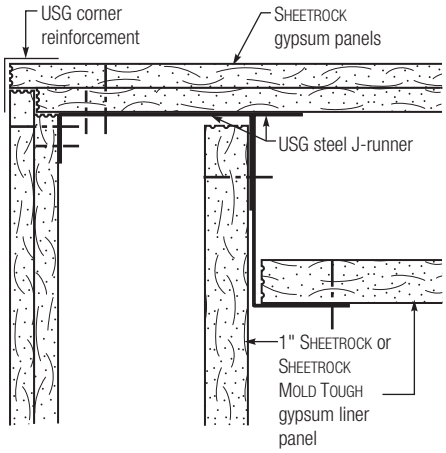
Call Button Box



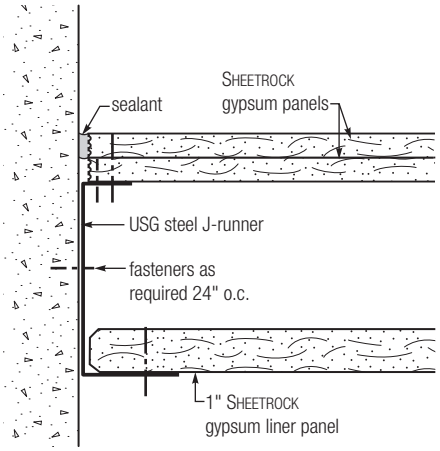
Wall Junction



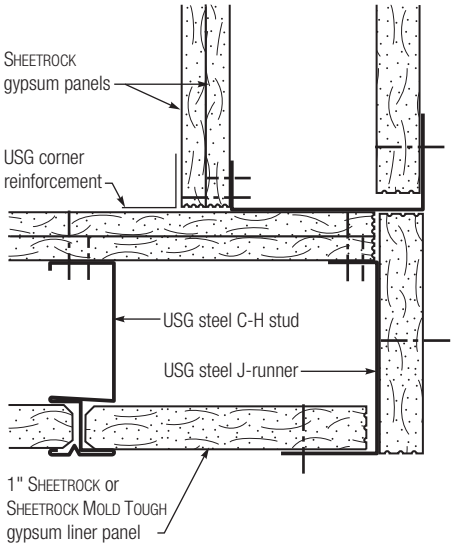
Outside Corner



Wall Intersection



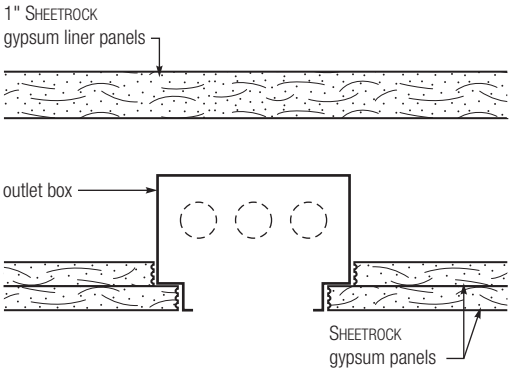
Inside Corner



Design Details

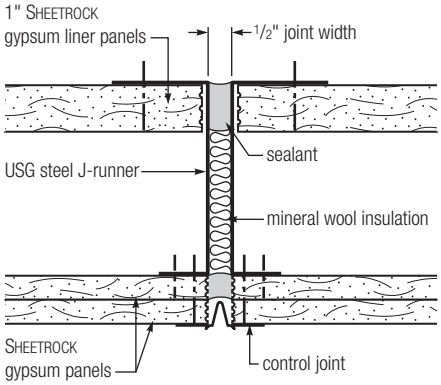
Basic Interfaces – System B

Outlet/Switch Box

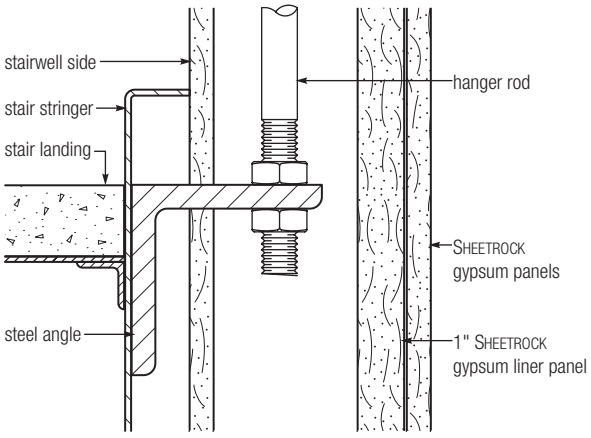


Note: the surface area of individual outlet or switch boxes shall not

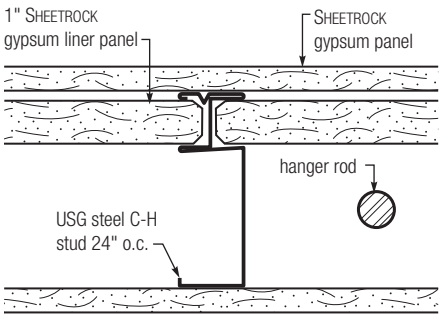
Control Joint



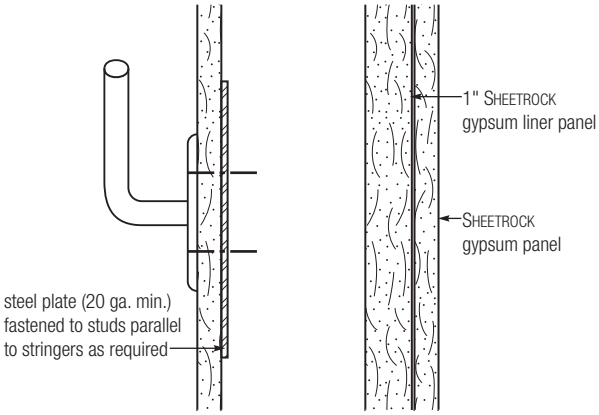
Stair Hanger and Rod Application



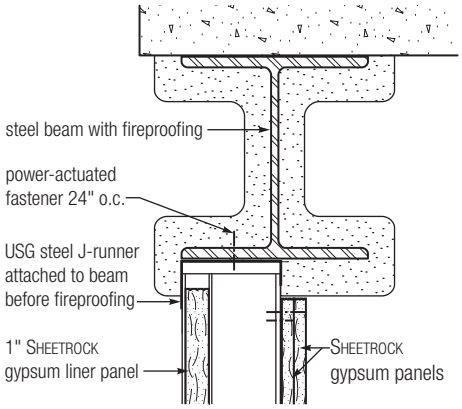
Cross Section at Stair Hanger



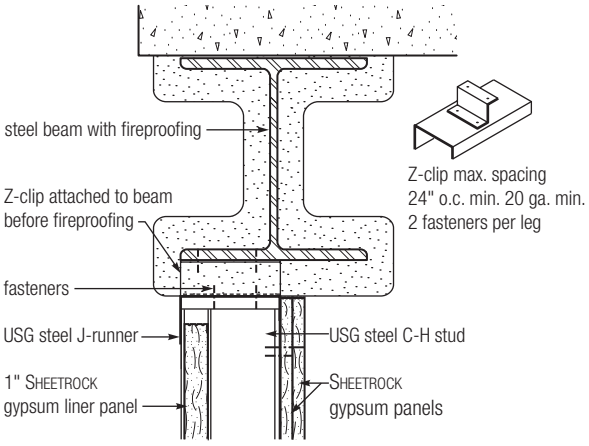
Handrail Application



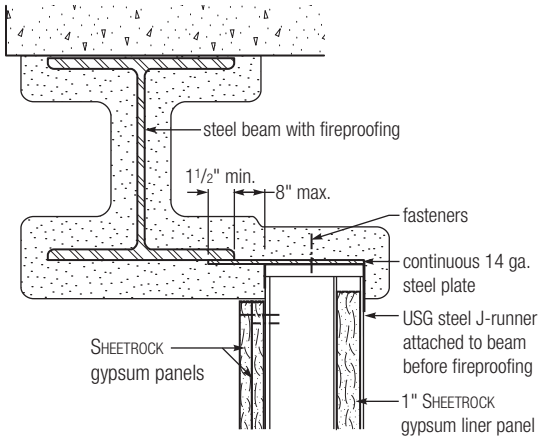
Steel Beam



Steel Beam with Z-Clip



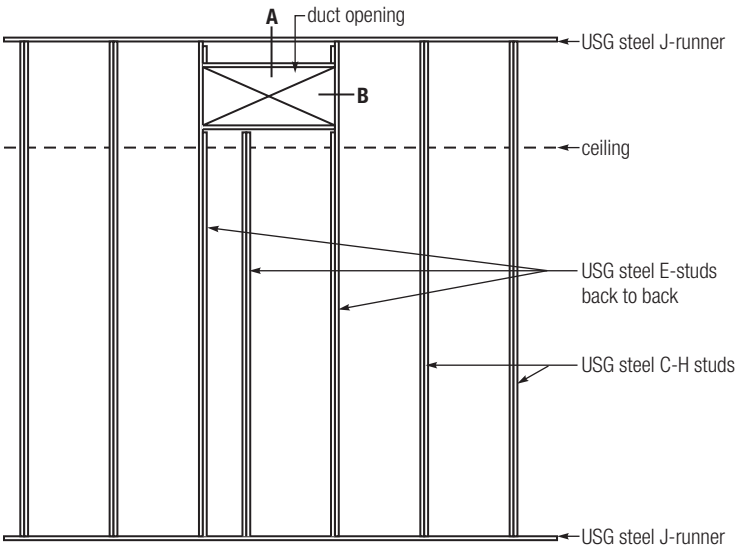
Steel Beam with Offset



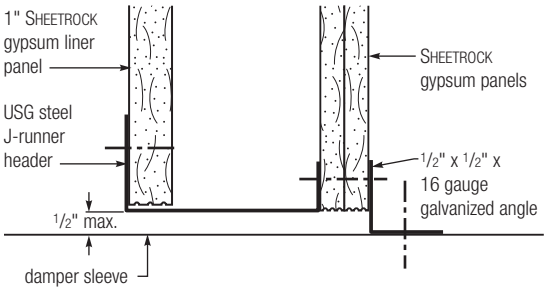
Design Details

Fire Damper

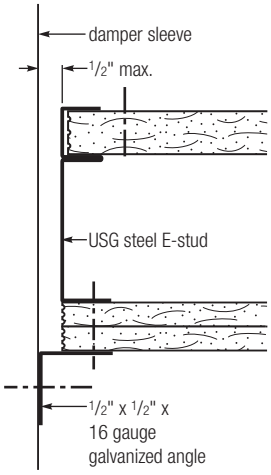
Typical Penetrations Elevation at Duct Opening



Section A
1-1/2 Hr. Fire Damper Tested per UL R13479

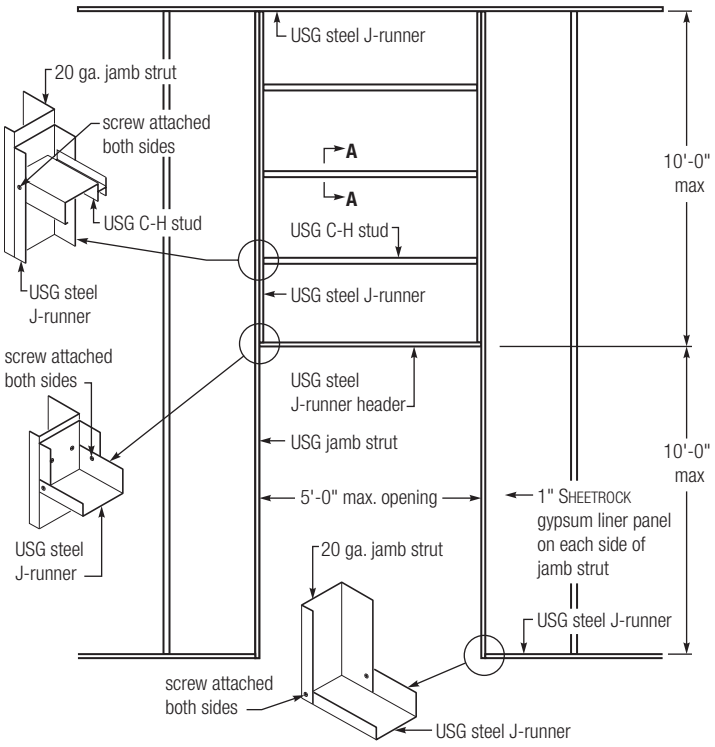


Section B
1-1/2 Hr. Fire Damper Tested per UL R13479

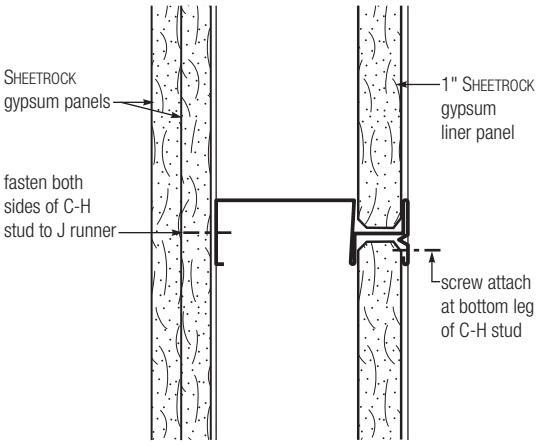


Elevator Door Framing

Elevator Door Rough Opening



Section A-A Detail



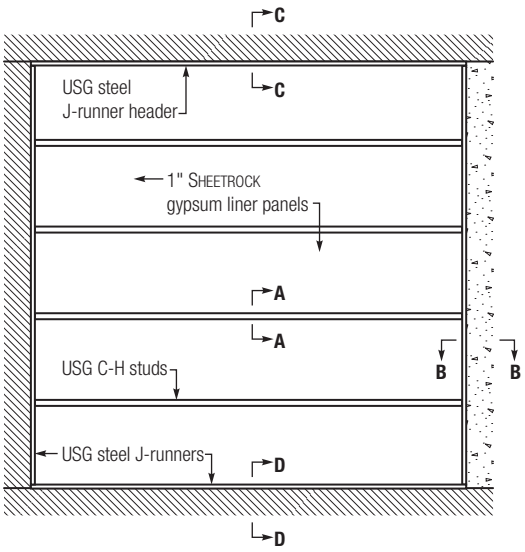
Notes

1. Framing at elevator door shall be a minimum 4″ studs and runners 20 gauge.
2. Horizontal placement of liner panel and C-H Studs per UL Design U437.
3. Flanges of the jamb strut must be continously braced by screw connections to the liner and face panels 12″ o.c.
4. For doors greater than 5′ wide and/or transom heights greater than 4′, reinforce the 400JS-34 with a nested 400ES-34.

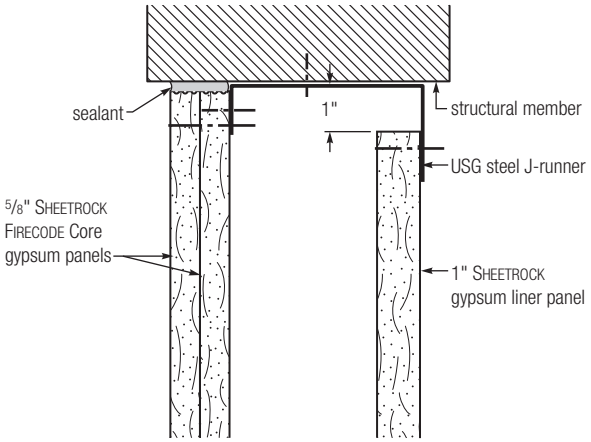
Design Details

Wall Systems – Horizontal C-H Studs

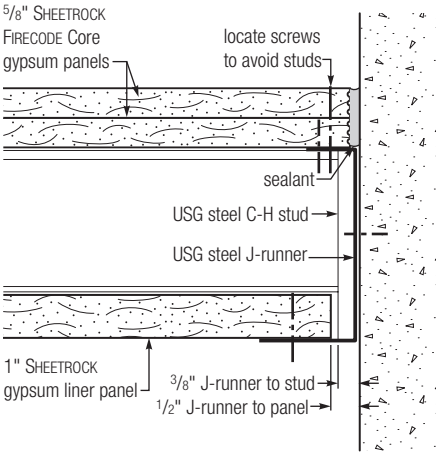
Horizontal Shaftwall Elevation



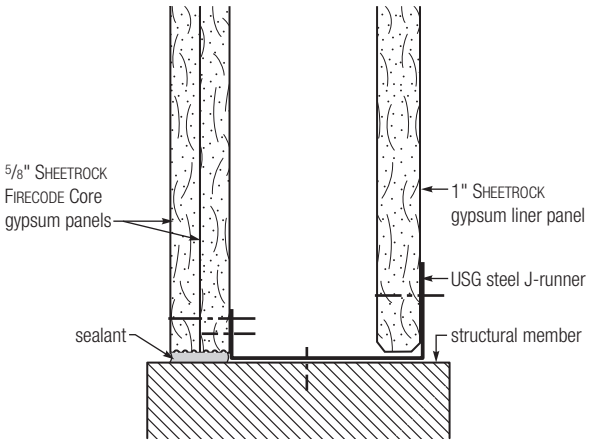
Section C-C Head Section



Section B-B Wall Intersection



Section D-D Base Section



Note

Horizontal framing shall be a minimum 4″ C-H Studs and runners 20 gauge.

Good Design Practices

Use this section as a reference if questions arise during the design or application of SHEETROCK Brand Shaft Wall Systems.

This section is an overview of good design, application, installation and safety considerations that should be addressed when USG's products and systems are used. This section outlines some major issues, but is not intended to be comprehensive.

We recommend that architects and contractors seek the assistance of safety professionals, especially at the construction site, because there are many factors to consider that are not included here. For more detailed information on safety and material handling, please refer to Chapter 13 of *The Gypsum Construction Handbook, Centennial Edition.*

1 System Performance

United States Gypsum Company conducts tests on products and systems to meet performance requirements specified by various agencies. Upon written request we will provide test certification for published fire, sound, structural and other pertinent data covering systems designed and constructed according to our published specifications. Substitutions of any of the components are not recommended and are not supported by United States Gypsum Company.

Standards

The following standards apply:

ASTM C36/1396: Standard Specification for Gypsum Board

ASTM C475: Standard Specification for Joint Treatment Materials for Gypsum Wallboard Construction

ASTM C645: Standard Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board

ASTM C754: Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board, Backing Board, or Water-Resistant Backing Board

ASTM C840: Standard Specification for Application and Finishing of Gypsum Board

ASTM C1002: Standard Specification for Steel Drill Screws for the Application of Gypsum Board

ASTM C1047: Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base

2 Fire Resistance

Use fire test data to compare and select materials and assemblies, and to secure acceptance by the authority having jurisdiction. SA100, *Fire-Resistant Assemblies,* shows tested fire resistance for various systems.

For assemblies tested at Underwriters Laboratories Inc. (UL), ratings are specific to the designs tested, and do not necessarily apply to alternate products or construction. For example, insulation may not be added to floor- or roof-ceiling assemblies, unless described in the UL design. Addition of insulation in the concealed space between the ceiling membrane and the floor or roof structure may reduce the hourly rating of an assembly by causing premature disruption of the ceiling membrane and/or higher temperatures on structural components under fire exposure conditions.

Increasing the size or gauge of the stud (e.g., 2-1/2″ C-H Stud 25 gauge to 4″ C-H Stud 20 gauge) does not affect the fire resistance rating of the assembly.

For more detailed information, refer to the system fire resistance Performance Selector on pages 14-15.

Good Design Practices

3 Structural Criteria

Structure design must take into account the conditions that will exist and the resulting stresses and movements. Loadbearing walls include the exterior walls of a building and some interior walls. These structures must be designed to carry the weight of the structure, its components, and other loads that occur once the building is occupied.

The amount of axial load that structural members can bear will vary with the amount of lateral load (pressure from wind or other horizontal stresses) that the final assembly may incur.

Manufacturers of structural components, particularly steel framing (studs, runners, joists) provide tables that identify the maximum allowable loads for various components under specific conditions. These tables typically start at 5 psf lateral loads and increase in 5 or 10 psf increments to about 40 psf. Interior partitions are per code designed for 5 psf lateral loads.

Interior non-bearing partitions such as SHEETROCK Brand Shaft Wall are not designed to carry axial loads. Limiting heights are based on stress or deflection limits for given lateral loads. Height limitations depend on the gauge of the steel used, dimensions of the stud, stud spacing, and the allowable deflection limit. For limiting height tables, see page 17; for horizontal shaft wall span table, see page 20; and for limiting heights, unlined return air shafts, see page 18. Note: Size and gauge availability is based upon limiting heights tables. Other sizes and gauges have not been evaluated for performance.

4 Control Joints — Building Movement

Locating control joints is the responsibility of the design professional/architect. Integrate these suggestions with project conditions when determining specific locations for control joints.

"Control joint" is a general term for methods used to minimize (not eliminate the potential for) cracking in partitions and ceilings. Specifically, a control joint minimizes cracking in the face of a partition or ceiling. At the perimeter of a partition or ceiling, it is called a perimeter relief joint.

A control joint is effective in minimizing cracking caused by tensile or compressive movement in a membrane resulting from thermal, hygrometric and structural movement. Isolate shaft wall surfaces with control joints or other means where:

- construction changes within the plane of the shaft wall
- shaft wall run exceeds 30′
- expansion or control joints occur through the building itself
- in stairwells at each floor level

Ceiling-height door frames may be used as control joints. Less-than-ceiling-height door frames should have control joints extending to ceiling from both corners on both sides of the partition. Treat window openings in same manner as doors.

Zinc control joints, when properly insulated and backed by gypsum panels, have been fire-endurance tested for use in one- and two-hour fire-rated walls.

Proper installation of control joints in partitions and ceilings requires breaking the gypsum panels or lath behind the control joint. In ceiling construction, the framing should also be broken. In partitions, separate studs are used on each side of the joint with the runner track separated at that location.

5 Pressure Loads — Minimizing Wind Noise

Where shaft walls enclose elevator and return air vents, and intermittent pressures up to 15 psf are expected, SHEETROCK Brand Acoustical Sealant is recommended at intersections with floors, ceilings, columns, ducts, etc. to seal peripheries and penetrations and minimize whistling and dirt accumulation due to air movement. Sealant selection including joint treatment, surface coatings and details to seal the wall under these sustained pressures must be provided by the designer. See pages 16-17 for information on evaluating pressure loading and selecting the appropriate framing components based upon these design criteria.

6	**Pressure Loads — Air Handling**	Shaft walls may be used for air handling with sustained pressures up to 10 psf. When air pressure exceeds 10 psf, air handling should be contained with a metal duct. See pages 18-19 for information about air handling and vent shaft enclosures.
7	**Penetrations**	Penetrations of the shaft wall, such as door frames and duct openings, require additional reinforcement at corners to distribute concentrated stresses if a control joint is not used. Penetrations greater than 48″ wide require supplemental support for the shaft wall at the opening. Where access panels or large duct penetrations occur in shafts having pressure loads, headers, sills and adjacent channels may require reinforcing to properly distribute these loads.
8	**Sound Control**	Use sound test data to compare and select materials and constructions. These data frequently are essential for securing compliance by the agency having jurisdiction. See SA200, *Acoustical Assemblies,* for acoustical performance. Sound control refers to the ability to attenuate sound passing through a partition. The Sound Transmission Class (STC) is a widely used rating of sound attenuation performance. It is relatively accurate for speech sounds but not for music, mechanical equipment noise or any sound with substantial low-frequency energy. It is tested per ASTM E90 and rated per ASTM E413. See the Performance Selector for the STC ratings for SHEETROCK Brand Shaft Wall Systems. Sound tests are conducted under ideal laboratory conditions per ASTM procedures. USG products are assembled in a specific manner to meet the requirements of these ASTM procedures. Substitution of materials other than those tested or deviation from the specified construction may adversely affect performance. Field performance depends on building design and careful attention to detailing and workmanship. Where these partitions are used for sound control, seal the partition perimeter with 1/4″ min. round bead of SHEETROCK Brand Acoustical Sealant. Seal around all penetrations.
9	**Moisture and Mold**	Understanding water and mold and their impact on the construction process and building materials are integral to good design and construction practices. USG offers references and additional sources that reinforce good design, construction and maintenance practices. These practices are generally recognized as necessary to minimize moisture-related problems and the growth of mold in a building environment. If you have additional questions please contact those sources or USG. The best way to address mold is to make sure that building materials do not get wet before and during installation and are not exposed to moisture inside the finished building. See Moisture/Mold in the Performance Testing section for more information.
10	**Air and Water Infiltration**	Flashing and sealants as shown in the construction documents and as selected by the architect and/or structural engineer should be provided to resist air and water infiltration. The flashing and sealants selected shall be installed in a workmanlike manner in appropriate locations to maintain continuity of air/water barriers, particularly at windows, doors and other penetrations of exterior wall.
11	**Vapor Retarders**	Water vapor control must always be considered in the design of exterior wall systems. Humidity and temperature conditions may require the installation of a vapor retarder to prevent moisture condensation within the wall and the resulting damage. To determine the necessity and location of vapor retarders, a water vapor transmission and dew point analysis of the layered wall assembly should be conducted by a qualified engineer.

Good Design Practices

12	**Product Handling and Storage**	**Gypsum Panels** Protect all gypsum products from exposure to excessive or continuous moisture and the elements elements before, during and after installation. Eliminate sources of moisture immediately. **Metal Framing Protection** Give light gauge metal components such as steel studs and runners, furring channels and resilient channels adequate protection in the warehouse and on the jobsite against rusting caused by moisture. In marine areas such as the Caribbean, Florida and the Gulf Coast where chloride and sea salt are present in combination with excessively high humidity, use of components which offer increased protection against corrosion is recommended.
13	**Application**	**Call Button Floor Indicator and Electric Boxes** Shaft walls will accommodate outlet boxes with depths up to the stud width. See page 24 for details. **Framing Attachment** Runners and studs attached to beams or columns may need to be installed before steel is spray-fireproofed. Excess fireproofing should be removed from runners and studs before installing shaft wall liner and sealant. **SHEETROCK Brand Gypsum Liner Panel Application – Butt Joints** When an installation of SHEETROCK Brand Shaft Wall height exceeds maximum available panel length it is necessary to incorporate a butt joint between two liner panels. Stagger butt joints in adjacent panels top and bottom to prevent a continuous horizontal joint. Joint should be located in top or bottom third of wall. Per UL evaluation of SHEETROCK Brand Shaft Wall Systems, joints may be butted together or reinforced with horizontal C-H stud cut to fit between adjacent vertical studs.
14	**Painting Systems**	Painting products and systems should be used which comply with recommendations and requirements in Appendixes of ASTM C840. For priming and decorating with paint, texture or wall covering, follow manufacturer's directions. All surfaces, including applied joint compound, must be thoroughly dry, dust-free, and not glossy. Prime with SHEETROCK Brand First Coat or with an undiluted, interior latex flat paint with high-solids content. Allow to dry before decorating. To improve fastener concealment, where gypsum panel walls and ceilings will be subjected to severe artificial or natural side lighting and decorated with a gloss paint (egg shell, semi-gloss or gloss), the gypsum panel surface should be skim coated with joint compound to equalize suction and texture differences between the drywall face paper and the finished joint compound before painting. SHEETROCK Brand TUFF-HIDE Primer-Surfacer skims and primes in a single application.
15	**Screws**	TYPE S Screws are suitable for gypsum panel or gypsum base attachment to 25 and 20 ga. steel studs. TYPE S-12 screws should be specified for other applications to steel heavier than 20 ga. Screw lengths should be 1″ for base layer (1-1/4″ when 3/4″ ULTRACODE is used) and 1-5/8″ for face layer and at least 3/8″ longer than the total thickness for other applications. Walls over 16′ high should have studs screw-attached to runners.
16	**Steel Door Frames**	Ordered separately, should be at least 16 ga. steel, shop primed, and have throats accurately formed to overall thickness of the shaft wall plus 3/32″ minimum. They should be anchored at floor with 16 ga. steel plates welded to trim flanges, with provision for two power-driven anchors or equal per plate. Jamb anchors should be 18 ga. steel welded in jamb and screw-attached to anchors. United States Gypsum Company reserves the right to make changes or improvements in the design of all catalogued items without notice and without obligation to incorporate these changes or improvements in items already manufactured.

Application Guide Specifications

This guide specification is provided to assist you in specification of SHEETROCK Brand Shaft Wall Systems. If you have additional questions or would like more information regarding this or other USG products and systems, please contact USG at 800 USG.4YOU.

Part 1: General

1.1 Related Documents

Drawings and general provisions of the project contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section. USG System Folder SA926 – SHEETROCK Brand Shaft Wall Systems.

1.2 Scope

Specify the appropriate SHEETROCK Brand Shaft Wall System to meet project requirements for fire resistance, structural performance, sound control and aesthetics.

1.3 Summary

A. This section includes the following SHEETROCK Brand Shaft Wall Systems

1. Vertical shaft enclosures
2. Stair enclosures
3. Horizontal assemblies
4. Vent shaft enclosures

B. Related Sections

1. Division 9 SHEETROCK Brand Gypsum Panels and Assemblies
2. Division 9 IMPERIAL Brand Plaster Base and veneer plaster assemblies

1.4 Definitions

A. Shaft Wall: An assembly of steel framing, gypsum boards and other materials used to enclose elevator shafts, stairways, air shafts and mechanical components.

B. Gypsum Board Construction Terminology: Refer to ASTM C11 for definition of terms for gypsum board construction not defined in this document.

1.5 Performance Requirements

A. The systems are UL Listed for fire resistance

B. System fire-resistance testing with elevator door manufacturer at UL

C. Fire-resistance tested penetration details for call button boxes and position indicators

D. Oscillation tested to one million cycles to ensure performance of the life of the building

E. UL Listed fire damper application

F. **Air Pressure Loads**—Select based on project requirements. See details in this brochure for SHEETROCK Brand Shaft Wall system data.

G. **Deflection Limit**—Select based on project requirements. See details in this brochure for SHEETROCK Brand Shaft Wall system data.

H. **STC Rating**—Select based on project requirements.

1.6 Submittals

A. Product and System Data – Submit system folder SA926, which can be downloaded at www.usg.com.

B. Submit certification of manufacturer compliance with fire and sound requirements indicated.

C. Fire rating compliance shall include verification of compatibility with labeled elevator door frame installation and test verification of call box and similar penetrations.

Application Guide Specifications

1.7 Delivery, Storage and Handling of Materials

A. Deliver materials in their original unopened packages bearing manufacturer identification.

B. Protect materials from wetting and damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes.

C. **Warning:** Store all SHEETROCK Brand Gypsum Panels flat. Panels are heavy and can fall over, causing serious injury or death. Do not move unless authorized.

1.8 Project Conditions

A. All materials shall be suitably protected from the weather during installation to prevent damage to the shaft wall.

B. Install gypsum panels following environmental conditions, room temperatures and ventilation specified in USG's *The Gypsum Construction Handbook.*

1.9 Quality Assurance

A. Protect SHEETROCK Brand Shaft Wall System and components from moisture before, during and after installation. Eliminate sources of moisture immediately.

B. Fire-Resistance Rated Assemblies: Provide UL Design Number (e.g., U415) for basic systems.

C. **Sound-Rated Assemblies (STC)**—Provide sound-rated system whose materials and construction comply with requirements of ASTM E90 and are classified according to ASTM E413 by a qualified testing agency.

D. Preinstallation Conference – Conduct conference at project site. Review methods and procedures for work related to SHEETROCK Brand Shaft Wall System assemblies.

Part 2: Products

2.1 Manufacturer

A. Supply materials manufactured by or for the United States Gypsum Company which comply with requirements of fire-resistance rated assemblies indicated in System Folder SA926.

B. **Basis of Design**—SHEETROCK Brand Shaft Wall System

2.2 Materials

A. **Gypsum Liner Panels**—ASTM C442, C1396, 1″ SHEETROCK Brand Gypsum Liner Panels, 100% recycled green face and back paper, beveled edge, 24″ wide, lengths as required. Stamped with UL Classification label documenting UL Classifications for fire resistance, surface burning characteristics, and noncombustibility. Panels should also be identified with the following language: "SHEETROCK Brand Gypsum Liner Panel, A Component of United States Gypsum Company Fire Rated Systems."

B. **Enhanced Gypsum Liner Panels**—ASTM C442, C1396, 1″ SHEETROCK Brand Enhanced (e+) Gypsum Liner Panels, 100% recycled blue face and back paper, beveled edge, 24″ wide, lengths as required. Stamped with UL Classification label documenting UL Classifications for fire resistance, surface burning characteristics, and noncombustibility. Panels should also be identified with the following language: "SHEETROCK Brand Enhanced e+ Gypsum Liner Panel, A Component of United States Gypsum Company Fire Rated Systems."

C. **Gypsum Wallboard**—(1/2″) (5/8″) (3/4″) (select thickness), 4′ wide, tapered edge, SHEETROCK Brand Gypsum Panels, (FIRECODE Core) (FIRECODE C Core) (ULTRACODE Core) (HUMITEK FIRECODE Core) (FIBEROCK Brand AQUA-TOUGH Gypsum Interior Panel) (FIBEROCK Brand Abuse-Resistant Gypsum Fiber Interior Panels) (select core type), lengths as required. Identified with UL Classification label.

D. **Gypsum Base for Gypsum Veneer Plaster**—(1/2″) (5/8″) (select thickness), 4′ wide, IMPERIAL Brand Gypsum Base (FIRECODE Core) (FIRECODE C Core) (select core type), lengths as required.

E. **Cement Board**—DUROCK Brand Cement Board, 1/2″ and 5/8″ thickness, 48″ width x 96″ length.

F. **Gypsum Wallboard and Gypsum Base Joint Treatment Materials**—select a United States Gypsum Company Interior Finishing System (see product folder J1424).

G. **Fasteners**—Screws: (3/8″) (1/2″) Type (S) (S-12) pan head; 5/8″ TYPE S-12 low profile head; (1″) (1-5/8″) (2-1/4″) TYPE S bugle head. DUROCK Brand Steel Screws: 1-5/8″. Type G Screws: 1-1/2″.

H. **Metal Trim**—No. (200A) (200B) (401) (402) (701B) (801B).

I. SHEETROCK Brand Paper Faced Metal Bead and Trim.

J. Steel Furring Channels.

K. RC-1 Resilient Channels or equivalent.

L. USG Steel C-H Studs, (212CH-18) (212CH-34) (400CH-18) (400CH-34) (600CH-34) hot-dipped galvanized, lengths as required (select from tables).

M. USG Steel E-Studs, (400ES-34) (600ES-34) hot-dipped galvanized, lengths as required (select from tables).

N. USG Steel J-Runners, (212JR-23) (400JR-23) (600JR-23) (212JR-34) (400JR-34) (600JR-34) hot-dipped galvanized.

O. Steel Angle Clips 20 gauge, (2″ x 2″ x 2″) (2″ x 2″ x 4″) (horizontal shaft wall only)

P. USG Steel Jamb Struts, (212JS-34) (400JS-34) (600JS-34) hot-dipped galvanized

Q. Runner fasteners, power-driven type, to withstand required single shear and bearing force when driven through structural head or base and without exceeding allowable design stress in runner, fastener or structural support (obtain locally).

R. SHEETROCK Brand Acoustical Sealant.

S. Sound Batts – (1″) (1-1/2″) (3″).

T. Zinc Control Joint #093.

Part 3: Execution

3.1 Examination

Examine substrates and abutting assemblies with installer present. Proceed with installation after conditions determined to be satisfactory.

3.2 Preparation

A. Check that system components are available to construct SHEETROCK Brand Shaft Wall System

- SHEETROCK Brand Gypsum Liner Panels
- SHEETROCK Brand Enhanced Gypsum Liner Panels
- SHEETROCK Brand FIRECODE, FIRECODE C, or ULTRACODE Core Gypsum Panels
- SHEETROCK Brand HUMITEK FIRECODE Core Gypsum Panels
- DUROCK Brand Cement Board
- FIBEROCK Brand Abuse-Resistant Gypsum Interior Panels
- FIBEROCK Brand AQUA-TOUGH Gypsum Interior Panel
- IMPERIAL Brand FIRECODE Core or FIRECODE C Core Gypsum Base
- USG Steel Framing Components (C-H Studs, J-Runner, E-Studs, Jamb Struts)

B. Other Fire-Resistive Elements/Materials: Coordinate installation of SHEETROCK Brand Shaft Wall assembly with sprayed fire-resistive materials and other fire-resistive elements so that both elements remain complete and undamaged.

Application Guide Specifications

3.3 Shaft Wall Installation

A. USG Steel Framing and SHEETROCK Brand Gypsum Liner Panels

1. Position steel J-runners at floor and ceiling with the short leg toward finish side of wall.
2. Securely attach runners to structural supports with powder actuated fasteners at both ends and max. 24″ o.c.
3. For attachment to steel frame construction install floor and ceiling J-Runners and J-Runners or E-Studs on columns and beams before steel is fireproofed.
4. For attachment to structural steel use Z-shaped stand-off clips secured to structural steel before fireproofing application.
5. Remove spray-fireproofing from J-Runners and E-Studs before installing gypsum liner panels.
6. For wall heights less than maximum available panel height cut gypsum liner panels no more than 1″ less than floor-to-ceiling height and erect vertically between J-Runners.
7. Where shaft wall height shaft exceed maximum available panel length pieces of gypsum liner panel must be butted together at factory cut ends.
   a. Position gypsum liner panel end joints within upper and lower third points of wall.
   b. Stagger joints top and bottom in adjacent panels.
   c. Screw studs to runners on walls over 16′.
8. Cut C-H Studs 3/8″ to not more than 1/2″ less than floor-to-ceiling height.
9. Install C-H Studs between gypsum liner panels with liner securely engaged.
10. Terminations: Install full-length steel E-Studs or J-Runners vertically at T-intersections, corners, door jambs, and columns.
11. Openings: Frame with vertical E-Stud or J-Runner at vertical edges, horizontal J-Runner at head and sill. Reinforce as shown in this brochure. Suitably frame all openings to maintain structural support for wall.
12. Elevator Door Frames: Install jamb struts each side of elevator door frames to act as strut-studs.
13. Steel Hinged Door Frames: Install floor-to-ceiling steel E-Studs each side to act as strut-studs.
14. Attach strut-stud (see 3.2.A.12 or 3.2.A.13) to floor and ceiling runners with two 3/8″ TYPE S-12 pan head screws. Attach strut-studs to jamb anchors with 1/2″ TYPE S-12 screws. Over steel doors, install a cut-to-length section of J-Runner and attach to strut-studs with 3/8″ TYPE S-12 screws.

B. Resilient Channels

1. Install Resilient Channels (RC-1 or equivalent) horizontally to face of studs, within 6″ of floor and ceiling.
2. Apply Resilient Channels a maximum of 24″ o.c. vertically (with open face up).
3. Attach Resilient Channels to studs with 3/8″ TYPE S screws driven through holes in mounting flange.
4. Splice channel by nesting directly over stud; screw-attach through both flanges. Reinforce with screws at both ends of splice.
5. Install 1/2″ x 3″ wide continuous gypsum filler strips to top and bottom runner.
6. Gypsum Panel application with Resilient Channel: Apply base layer horizontally to resilient channels with end joints staggered. Fasten with 1″ TYPE S screws 12″ o.c. Apply face layer vertically with joints staggered; attach to channels with 1-5/8″ TYPE S screws 12″ o.c.

C. SHEETROCK Brand Gypsum Panels

Gypsum panels and fastening must be per the corresponding fire-resistance design number that is the basis of design. See the Performance Selector in this brochure for specific fire-resistance design numbers. The System references below correspond to the Performance Selector found on pages 14-15.

Per UL Design U415 SHEETROCK Brand Gypsum Panels may be applied vertically or horizontally in all of the systems below except System F. Please note appropriate fastener spacing.

System A—U415 or U469, 1 hour fire-resistance rating. Apply one layer 5/8″ SHEETROCK Brand FIRECODE Core Gypsum Panels to studs and runners with 1″ TYPE S or S-12 (typical) Screws. Fastener Spacing – Space screws 12″ o.c. for vertical panel application, 8″ o.c. for horizontal panel application.

System B—U415 or U438, 2 hour fire-resistance rating. Apply two layers of 1/2″ SHEETROCK Brand FIRECODE C Core Gypsum Panels. Apply base layer to studs with 1″ TYPE S or S-12 (typical) screws. Space screws 24″ o.c. along edges and in the field of the panels for vertical application, 16″ o.c. for horizontal application. Apply face layer to studs and J-Runners with 1-5/8″ TYPE S or S-12 (typical) screws. Space screws 12″ along the edges and in the field when applied vertically, 8″ o.c. when applied horizontally. Stagger all joints between base and face layers.

System D—U415 or U459, 2 hour fire-resistance rating. Install 1-1/2″ THERMAFIBER SAFB mineral wool batts in stud cavity. Apply base layer of 5/8″ SHEETROCK Brand FIRECODE C Core Gypsum Panels using 1″ TYPE S or S-12 (typical) screws spaced 24″ o.c. when applied vertically. Space screws 16″ o.c. when board applied horizontally. Apply face layer of 1/2″ DUROCK Brand Cement Board to C-H Studs with 1-5/8″ DUROCK Brand Screws spaced 8″o.c.

System E—U415 or U467, 2 hour fire-resistance rating. Apply one layer 1/2″ SHEETROCK Brand FIRECODE C Core Gypsum Panels to both sides of C-H Studs. Fasten with 1″ TYPE S or S-12 (typical) screws. Space screws 12″ o.c. along the edges and in the field for vertical panel application, 8″ o.c. for horizontal.

System F—U415, 2 hour fire-resistance rating. Apply base layer 1/2″ SHEETROCK Brand FIRECODE C Core Gypsum Panels to resilient channels with 1″ TYPE S or S-12 (typical) screws spaced 24″o.c. Stagger end joints. Apply face layer 1/2″ SHEETROCK Brand FIRECODE C Core Gypsum Panels with 1-5/8″ TYPE S or S-12 (typical) screws spaced 12″ o.c.

System G—U415, 3 hour fire-resistance rating. Apply two layers of 5/8″ SHEETROCK Brand FIRECODE C Core Gypsum Panels using TYPE S or S-12 (typical) screws spaced 12″ o.c. Apply first and second (inner) layers vertically or horizontally over room side of steel C-H Studs. When applied vertically, center joints between panels over studs. Stagger all joints a minimum 24″. When panels are applied horizontally stagger joints a minimum 12″. Apply third layer of 5/8″ SHEETROCK Brand FIRECODE C Core Gypsum Panels vertically or horizontally over room side of steel C-H Studs using 2-1/4″ TYPE S or S-12 (typical) screws. Space screws 16″ o.c when board is applied vertically, 12″ o.c. when board is applied horizontally.

System H—U415, 3 hour fire-resistance rating. Alternate to System G above. Apply third layer of 5/8″ SHEETROCK Brand FIRECODE C Core Gypsum Panels to other side of steel C-H Studs.

Horizontal Assemblies—2 hour fire-resistance rating. Install three layers of 1/2″ SHEETROCK Brand FIRECODE C Core Gypsum Panels to horizontally installed C-H and/or E-Studs. Apply the base layer with 1″ TYPE S or S-12 (typical) screws spaced 24″ o.c. Apply the mid layer in the same manner with joints offset 2′ and attached with 1-5/8″ TYPE S or S-12 (typical) screws spaced 12″ o.c. Apply the face layer attached with 2-1/4″ TYPE S or S-12 (typical) screws spaced 12″ o.c. Place face layer end joints between studs and secure with 1-1/2″ Type G screws 8″ o.c.

Horizontal Stud Shaft Wall

1. Attach horizontal J-Runners at the floor and top of wall and vertical J-Runners to structural supporting elements with powder actuated fasteners located not greater than 2″ from ends and spaced no more than 24″ on center with short leg of J-Runner toward the finish side of the wall.
2. Install Gypsum Liner Panels horizontally without butt joints, which limits the width of the wall to the available length of the Liner Panels.
3. Cut Gypsum Liner Panels 1″ less than the width of the wall, and center the panels between the vertical J-Runners. The top edge of the uppermost Liner Panel to be cut 1″ less than the wall height to clear the 1″ leg of the top J-Runner.
4. Free edge of the uppermost and lower Liner Panels attached to the long leg of the top and bottom J-Runners with 1-5/8″ long Type S or S-12 steel screws spaced no greater than 12″ on centers.
5. Cut C-H Studs to maintain a 1/4″ gap at each end of the wall.
6. Install C-H Studs horizontally with the open “C” section of the studs facing down, and spaced 24″ on center.

7. Steel Angles should be minimum 20 gauge, 2″ x 2″ x 2″ for 4″ C-H Studs, and 2″ x 2″ x 4″ for 6″ C-H Studs. Clips are centered under and tight to the web of the C-H Studs, but not attached to the studs. Clips are attached through the web of the vertical J-Runners to the underlying structural supporting element with a minimum of two 1/2″ Type S-12 pan head screws.
8. As an alternative to the preceding Angle Clip, fasten each end of the horizontal C-H Stud to the vertical J-Runner legs with 1/2″ Type S-12 pan-head steel screws on both sides of the wall.
9. End reactions of the horizontal C-H Studs must be accommodated by the structural element required at the ends of the wall, and must be determined by a licensed professional engineer.
10. The allowable height of the wall is predicated on the structural adequacy of the vertical structural elements.

D. **SHEETROCK Brand Gypsum Panels (for vertical and horizontal shaft walls)**

Vent Shaft Enclosure—U529, 2-hour fire-resistance rating. Install 1″ x 2″ x 25 ga. galvanized steel angles as runners on floor, ceilings, and partition ends. Fasten runners or angles securely to structure with suitable fasteners spaced 24″ o.c. max. Install 1/2″ SHEETROCK Brand FIRECODE C Core Gypsum Panels vertically. Fasten to angles with 1″ TYPE S or S-12 (typical) screws spaced 12″ o.c. Apply SHEETROCK Brand DURABOND Setting-Type or EASY SAND Lightweight Setting-Type Joint Compound on back side of liner panel and sheet-laminate to shaft-side board with vertical joints offset 12″ from inner board joints. Also screw to shaft side board with 1-1/2″ long Type G screws spaced 24″ o.c. in both directions. Laminate face board to liner panels in similar manner. Install face boards vertically with joints offset 12″ from liner panel joints. Apply pressure when placing boards to ensure good adhesive bond and fasten to liner panel with 1-1/2″ Type G screws, spaced 24″ o.c.

3.4 Accessory Application

A. **Gypsum Panel Joints**—Finish all face layer joints and internal angles with a SHEETROCK Brand Interior Finishing System installed according to manufacturer's directions. See product folder J1424 for detailed recommendations.

B. **Corner Bead**—Reinforce all vertical and horizontal exterior corners with SHEETROCK Brand Paper Faced Bead. See product folder J1424 for detailed recommendations.

C. **Metal Trim**—Where shaft wall terminates against masonry or other dissimilar material, apply SHEETROCK Brand Paper Faced Bead and Trim over face layer edge.

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