

CGC
Interior
Panel &
Finishing
Solutions

CGC SHAFT WALL SYSTEMS SA-926

LIFE SAFETY ASSURANCE
FOR MODERN BUILDING DESIGNS

cgcinc.com

CGC 
IT'S YOUR WORLD. BUILD IT.™

HIGH-PERFORMANCE SHAFT WALLS

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.



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

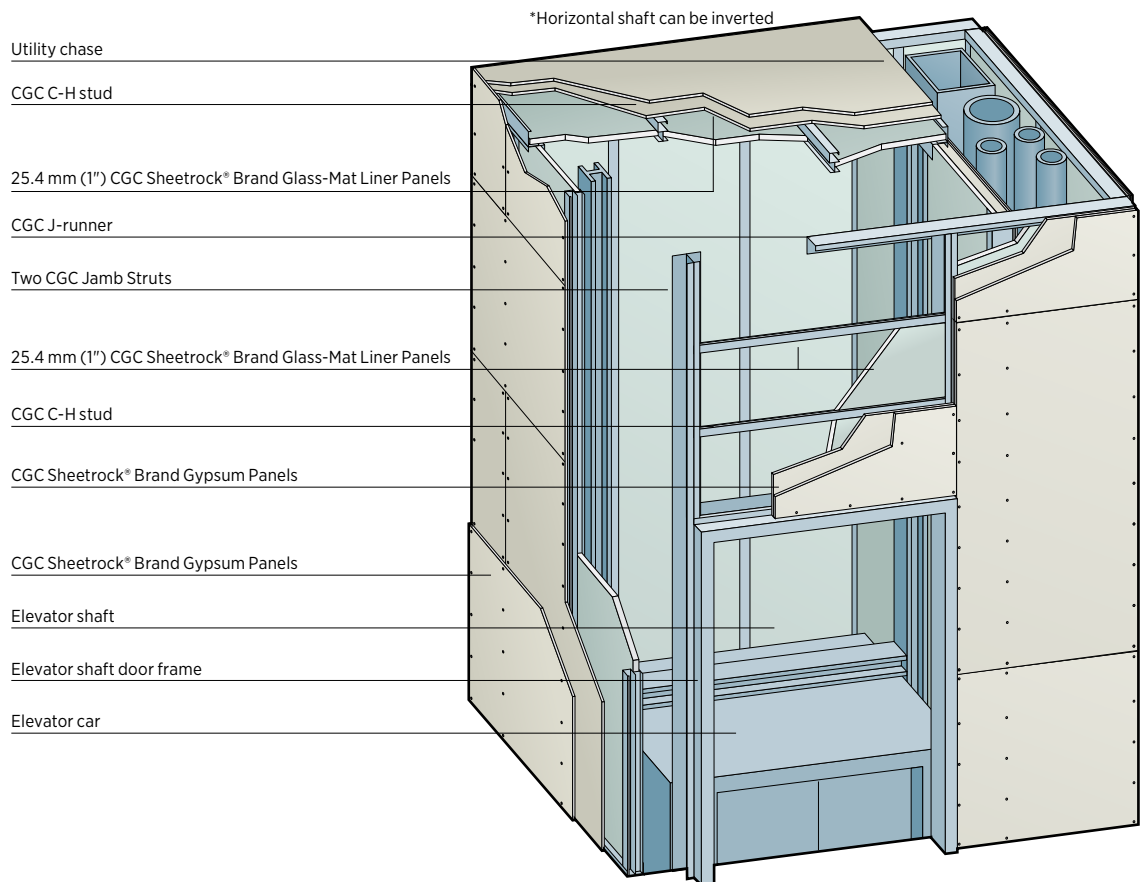
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OVERVIEW

CGC Shaft Wall Systems are non-load-bearing 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 drywall contractors. 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.

All details, specifications and data contained in this literature are intended as a general guide. These products must not be used in a design or construction of any given structure without complete and detailed evaluation by a qualified structural engineer or architect to verify suitability of a particular product for use in the structure.

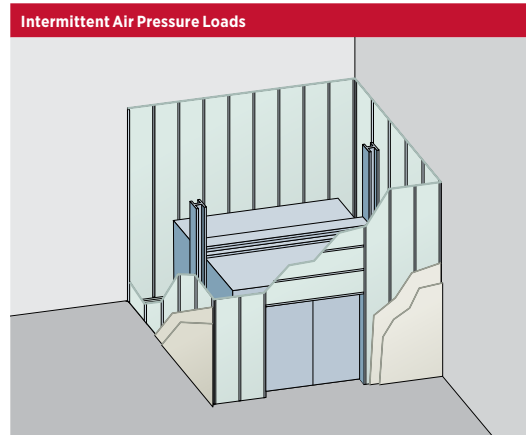
TYPICAL SHAFT WALL ASSEMBLY



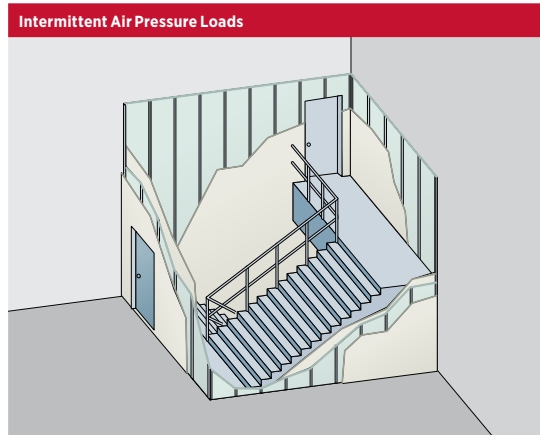
APPLICATIONS

Use CGC 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.

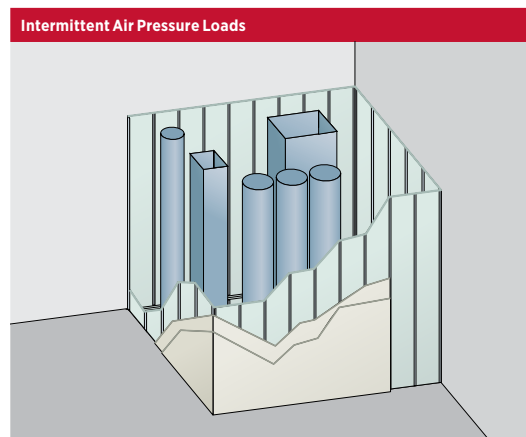
WALLS



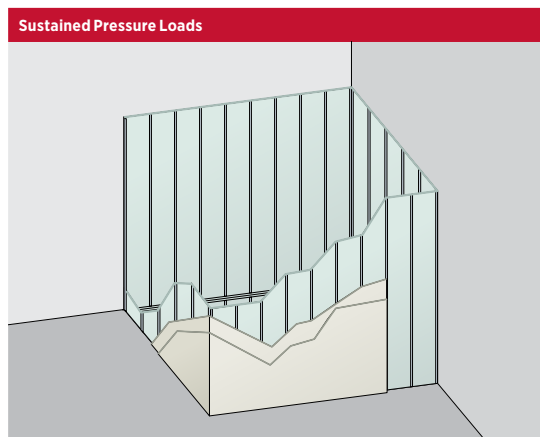
Elevator shafts
Ideal for elevator shafts since the walls can be constructed from one side, leaving the shaft free of scaffolding. This allows elevator equipment to be installed simultaneously.



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 CGC Sheetrock® Brand Mold Tough® AR Firecode® X, CGC Sheetrock® Brand Mold Tough® VHI Firecode® X or CGC Fiberock® Aqua Tough™ Interior Panels.



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

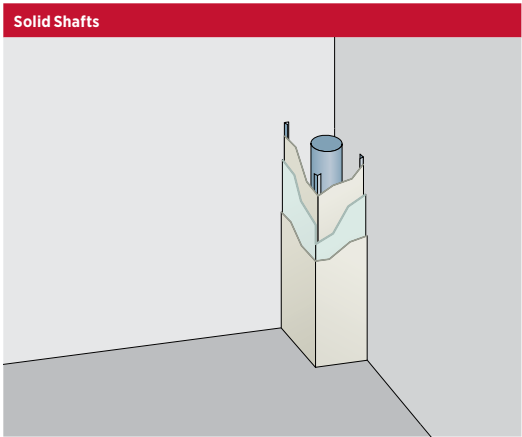


Air shafts (unlined)
The system can also be used for vertical air shafts within the building. Shafts can be unlined when specific conditions are met. Unlined shaft walls can accommodate sustained air pressure up to 0.48 kPa (10 psf). See page 20 for more information.

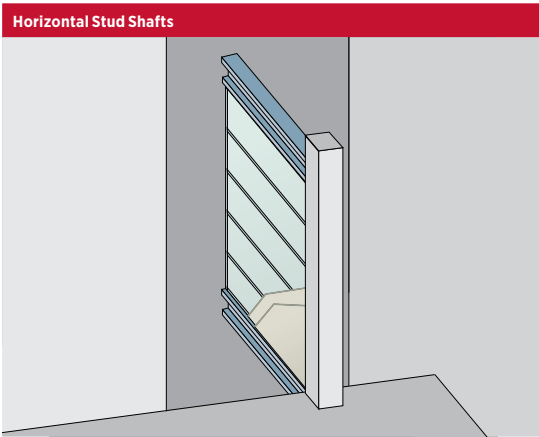
APPLICATIONS

Use CGC 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

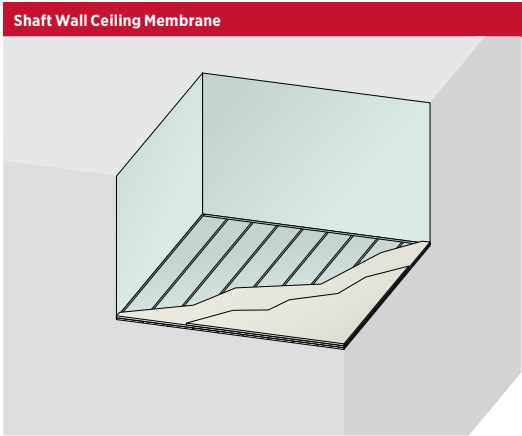


Solid shafts are normally used to construct mechanical or duct enclosures, or in areas where a small section of shaft wall is needed for a single vertical pipe penetration. See page 21 for more information.



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



The two-hour horizontal membrane (also used in two-hour duct enclosures), and the membranes used as the ceiling of one- and two-hour egress corridors, are shown on page 22.

COMPONENTS

CGC 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 CGC. Refer to the appropriate product Safety Data Sheet for complete health and safety information.

GYPSUM LINER PANELS

CGC Sheetrock® Brand Glass-Mat Liner Panels (UL Type SLX)

- High-performance panel has a noncombustible and moisture- and mould-resistant gypsum core enclosed in a moisture- and mould-resistant glass mat on both sides
 - Can be left exposed for up to 12 months
 - UL/ULC Classification as to fire resistance, surface burning characteristics and noncombustibility
 - Panel is 25.4 mm (1") thick and 610 mm (24") wide with beveled edges
 - Refer to product data sheet EWB2483 for more information
-

GYPSUM PANELS AND CEMENT BOARD

CGC Sheetrock® Brand Firecode® X Panels (UL Type SCX)

- All of the advantages of regular panel with additional resistance to fire
- UL/ULC Classification as to fire resistance, surface burning characteristics and noncombustibility
- Available in 15.9 mm (5/8") thickness, 1220 mm (4') width
- Refer to product data sheet EWB2100 for more information

CGC Sheetrock® Brand UltraLight Panels Firecode® X (UL Type ULX and ULIX)

- All of the advantages of CGC Sheetrock® Brand Firecode® X Gypsum Panels
- Lighter weight makes it easier to transport, handle and install
- UL/ULC Classification as to fire resistance, surface burning characteristics and noncombustibility
- Available in 15.9 mm (5/8") thickness, 1220 mm (4') width
- Refer to product data sheet EWB2598 for more information

CGC Sheetrock® Brand Firecode® C Panels (UL Type C)

- Provide improved fire resistance over standard CGC Sheetrock® Brand Firecode® X Panels because of additives that enhance integrity of the core under fire exposure
- UL/ULC Classification as to fire resistance, surface burning characteristics and noncombustibility
- Available in 15.9 mm (5/8") and 12.7 mm (1/2") thicknesses, 1220 mm (4') width
- Refer to product data sheet EWB2100 for more information

CGC Sheetrock® Brand Mold Tough® Firecode® X Panels (UL Type SCX)

- Panel has a noncombustible, moisture- and mould-resistant gypsum core encased in a moisture- and mould-resistant, 100% recycled green face and brown back paper
- Tapered long edges for easy finishing
- UL/ULC Classification as to fire resistance, surface burning characteristics and noncombustibility
- Available in 15.9 mm (5/8") thickness, 1220 mm (4') width
- Refer to product data sheet EWB2390 for more information

CGC Sheetrock® Brand Mold Tough® AR Firecode® X Panels (UL Type AR)

- Panel has a noncombustible, moisture- and mould-resistant gypsum core encased in a moisture- and mould-resistant, 100% recycled green face and brown back paper
- Manufactured for greater abuse resistance than standard 15.9 mm (5/8") gypsum panels
- Meet ASTM C1629 Level 2 for soft-body impact and surface abrasion and Level 1 for indentation resistance
- Tapered long edges for easy finishing
- UL/ULC Classification as to fire resistance, surface burning characteristics and noncombustibility
- Available in 15.9 mm (5/8") thickness, 1220 mm (4') width
- Refer to product data sheet EWB2391 for more information

COMPONENTS

CGC Sheetrock® Brand Mold Tough® VHI Firecode® X Panels (UL Type AR)

- Panel has a noncombustible, moisture- and mould-resistant gypsum core encased in a moisture- and mould-resistant, 100% recycled green face and brown back paper
- Core is reinforced with a high-strength mesh for heavy-duty impact resistance
- Meet ASTM C1629 Level 3 for soft- and hard-body impact resistance
- Tapered long edges for easy finishing
- UL/ULC Classification as to fire resistance, surface burning characteristics and noncombustibility
- Available in 15.9 mm (5/8") thickness, 1220 mm (4') width
- Refer to product data sheet EWB2529 for more information

CGC Sheetrock® Brand Glass-Mat Panels Mold Tough® Firecode® X (UL Type SGX)

- Panel has a noncombustible, moisture- and mould-resistant gypsum core encased in a moisture- and mould-resistant fiberglass mat
- Suitable for use in pre-dry-in (fast track) and similar applications of wallboard installed before the building envelope is fully enclosed
- Can be exposed to weather up to 12 months
- Tapered long edges for easy finishing
- UL/ULC Classification as to fire resistance, surface burning characteristics and noncombustibility
- Available in 15.9 mm (5/8") thickness, 1220 mm (4') width
- Refer to product data sheet EWB2560 for more information

CGC Sheetrock® Brand Glass-Mat Panels Mold Tough® AR (UL Type AR)

- Panel has a noncombustible, moisture- and mould-resistant gypsum core encased in a moisture- and mould-resistant fiberglass mat
- Provide greater abuse resistance compared to standard drywall
- Meet ASTM C1629 Level 3 for abrasion and soft-body resistance
- Suitable for use in pre-dry-in (fast track) and similar applications of wallboard installed before the building envelope is fully enclosed
- Can be exposed to weather up to 12 months
- Tapered long edges for easy finishing
- UL/ULC Classification as to fire resistance, surface burning characteristics and noncombustibility
- Available in 15.9 mm (5/8") thickness, 1220 mm (4') width
- Refer to product data sheet EWB2750 for more information

CGC Sheetrock® Brand Glass-Mat Panels Mold Tough® VHI (UL Type AR)

- Panel has a noncombustible, moisture- and mould-resistant gypsum core encased in a moisture- and mould-resistant fiberglass mat
- Provide superior impact resistance and is an upgrade to abuse-resistant panels
- Meet ASTM C1629 Level 3 for hard- and soft-body impact resistance
- Suitable for use in pre-dry-in (fast track) and similar applications of wallboard installed before the building envelope is fully enclosed
- Can be exposed to weather up to 12 months
- Tapered long edges for easy finishing
- UL/ULC Classification as to fire resistance, surface burning characteristics and noncombustibility
- Available in 15.9 mm (5/8") thickness, 1220 mm (4') width
- Refer to product submittal sheet EWB2749 for more information

CGC Sheetrock® Brand Ultracode® Core Panels (UL Type ULTRACODE)

- 19.1 mm (3/4") thick panel can achieve a two-hour fire rating with single-layer construction when used with mineral wool insulation in steel framed walls
- UL/ULC Classification as to fire resistance, surface burning characteristics and noncombustibility
- Available in 1220 mm (4') width
- Refer to product submittal sheet EWB2167 and WB2167B for more information

COMPONENTS

CGC Durock® Brand Cement Board (UL Type DCB)

- Water-durable, mould-resistant substrate for high-moisture areas
- Available in 12.7 mm (1/2") and 15.9 mm (5/8") thickness, 1220 mm (4') width
- Refer to product submittal sheet EDROD18 for more information

CGC Fiberock® Aqua-Tough™ Interior Panels (UL Type FRX-G)

- Used only for wall designs
- Increased resistance to abrasion, indentation and penetration
- Made from 95% recycled materials
- Available in 12.7 mm (1/2") and 15.9 mm (5/8") thickness, 1220 mm (4') width
- Refer to product submittal sheet F134 for more information

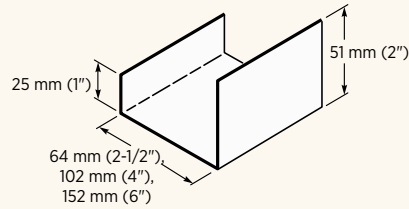
CGC Grand Prix® Brand Veneer Plaster Base Firecode® X (UL Type IP-X1)

- Panels offered in a range of sizes, rigid base for fire-rated gypsum veneer plaster systems
- Designed for direct or resilient attachment to wood or steel framing core composition
- Multilayered face paper to control water absorption and resist sag
- Available in 12.7 mm (1/2") and 15.9 mm (5/8") thickness, 1220 mm (4') width
- Refer to product submittal sheet EP790 for more information

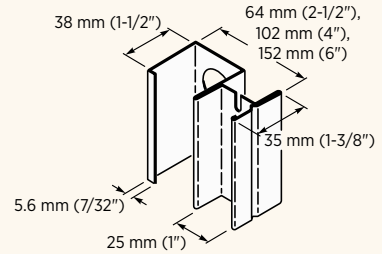
COMPONENTS

STEEL FRAMING

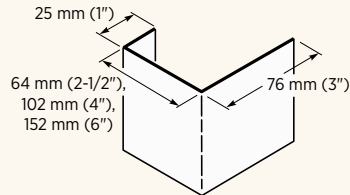
CGC Steel J-Runner (JR)



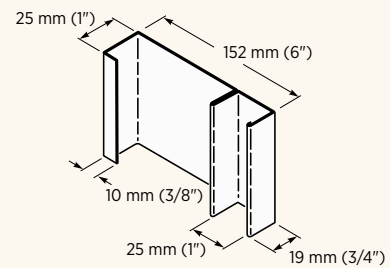
CGC Steel C-H Stud (CH)



CGC Steel Jamb-Strut (JS)



CGC Steel E-Stud (ES)



Thickness-Steel Framing^(a) Components

Style	Design Thickness ^(b)		Minimum Thickness		
	mm	in.	mm	in.	ga.
CH, ES	0.478	0.0188	0.455	0.0179	25
JR	0.607	0.0239	0.577	0.0227	24
CH, ES, JR, JS	0.912	0.0359	0.866	0.0341	20

Structural Properties-Steel Framing Components

Component and Size	Product Identification	Average Weight kg/m (lb./lin. ft.)	Area cm ² (sq. in.)	I _x cm ⁴ (in. ⁴)	S _x ^(c) cm ³ (cu. in.)	Allowance Design Stress MPa (ksi)
64 mm (2-1/2") C-H Stud	212CH-18	0.772 (0.519)	0.983 (0.152)	5.369 (0.129)	1.524 (0.093)	136.52 (19.8)
	212CH-34	1.485 (0.998)	1.877 (0.291)	9.947 (0.239)	2.852 (0.174)	165.47 (24.0)
102 mm (4") C-H Stud	400CH-18	0.911 (0.612)	1.160 (0.180)	15.940 (0.383)	2.655 (0.162)	136.52 (19.8)
	400CH-34	1.850 (1.243)	2.215 (0.343)	30.383 (0.730)	5.212 (0.318)	165.47 (24.0)
152 mm (6") C-H Stud	600CH-34	2.033 (1.366)	2.727 (0.423)	83.157 (1.998)	9.326 (0.569)	165.47 (24.0)
Double 152 mm (6") E-Stud	600ES-18	2.301 (1.546)	2.569 (0.398)	83.406 (2.004)	10.293 (0.628)	137.90 (20.0)
	600ES-34	3.530 (2.372)	4.106 (0.636)	141.506 (3.400)	17.931 (1.094)	137.90 (20.0)
64 mm (2-1/2") J-Runner	212JR-23	0.667 (0.448)	0.868 (0.135)	4.870 (0.117)	1.393 (0.085)	20.68 (3.0)
	212JR-34	0.997 (0.670)	1.315 (0.204)	7.991 (0.192)	2.131 (0.130)	34.20 (4.96)
102 mm (4") J-Runner	400JR-23	0.853 (0.573)	1.100 (0.171)	14.609 (0.351)	2.672 (0.163)	20.68 (3.0)
	400JR-34	1.275 (0.857)	1.663 (0.258)	23.890 (0.574)	4.114 (0.251)	34.20 (4.96)
152 mm (6") J-Runner	600JR-23	1.101 (0.740)	1.408 (0.218)	38.998 (0.937)	4.835 (0.295)	20.68 (3.0)
	600JR-34	1.647 (1.107)	2.126 (0.330)	63.387 (1.523)	7.490 (0.457)	34.20 (4.96)
64 mm (2-1/2") Jamb Strut	212JS-34	1.217 (0.818)	1.547 (0.240)	9.401 (0.226)	2.344 (0.143)	20.68 (3.0)
102 mm (4") Jamb Strut	400JS-34	1.497 (1.006)	1.894 (0.294)	26.928 (0.647)	4.425 (0.270)	20.68 (3.0)
152 mm (6") Jamb Strut	600JS-34	1.869 (1.256)	2.357 (0.365)	69.630 (1.673)	7.949 (0.485)	20.68 (3.0)

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

CGC Sheetrock® Brand First Coat™ Primer

- 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 data sheet EJC1095 for more information

CGC Sheetrock® and CGC Synko® 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

CGC Sheetrock® and CGC Synko® Brand Lightweight All Purpose Joint Compound

- Weighs 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

CGC 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 data sheet EJC0156 for more information

CGC Sheetrock® or CGC Beadex® Brand Paper-Faced Metal Corner Bead and Trim

- Cost-effective, problem-free, beautiful corners
- Superior solution to edge cracking and chipping

PERFORMANCE TESTING

CGC Shaft Wall Systems provide superior safety and performance for an important building component.

PERFORMANCE TESTS

CGC 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 four-hour fire resistance and sound ratings up to 58 Sound Transmission Class (STC), and resist both sustained and intermittent lateral loads and fatigue under cyclic lateral loading.

TESTING METHODS

All CGC products and systems undergo exhaustive testing to ensure that they meet exacting standards. CGC products are classified as to fire resistance and fire-hazard properties. As part of this protocol, 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 0.24, 0.36, 0.48 and 0.72 kPa (5, 7-1/2, 10 and 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, CGC Shaft Wall Systems have been tested for fire endurance.

The primary attribute of CGC Shaft Wall Systems and their 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/ULC Classification of all gypsum panel components
- UL/ULC fire resistance Classifications for one- to four-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 CGC Shaft Wall Systems in attenuating sound. When properly designed and installed, CGC 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 25 mm (1") sound insulation within the partition cavity, and 52 STC with single-layer 19.1 mm (3/4") CGC Sheetrock® Brand Ultracode® Core Panels and 76 mm (3") sound insulation.

PERFORMANCE TESTING

TESTING RESULTS

Impact Resistant for Durability: Performance utilizing abuse-resistant and impact-resistant gypsum panels like CGC Sheetrock® Brand Mold Tough® AR or VHI Firecode® X Panels. CGC Shaft Wall Systems are tested to meet ASTM C1629 requirements.

Moisture/Mould: The best way to minimize damage from moisture and mould 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.

CGC Sheetrock® Brand Mold Tough® Gypsum Panels and CGC Sheetrock® Brand Glass-Mat Liner Panels have moisture- and mould-resistant facings and a water-resistant core.

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

New York City Department of Health

nyc.gov/html/doh/html/environmental/mold.shtml

Search for mold resources.

United States Environmental Protection Agency

epa.gov

Search for mold resources.

Responsible Solutions to Mold Coalition

responsiblemoldsolutions.org

Search for mold resources.

PERFORMANCE SELECTOR

ALTERNATIVE MATERIALS AND SPECIAL REQUIREMENTS

The following notes offer alternative methods of construction:

1. Where insulation by composition 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-resistant 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 CGC Durock® Brand Cement Board. Refer to *CGC Durock® Brand Cement Board* submittal (EDROD18), for more information on application and related products.
5. 15.9 mm (5/8") CGC Grand Prix® Brand Veneer Plaster Base Firecode® core, 15.9 mm (5/8") CGC Sheetrock® Brand Mold Tough® Firecode® X Panels or 15.9 mm (5/8") CGC Fiberock® Aqua-Tough™ Interior Panels may be substituted for 15.9 mm (5/8") CGC Sheetrock® Brand Firecode® X Panels.
6. Use 20 ga. minimum framing with CGC Sheetrock® Brand Mold Tough® AR and VHI Firecode®, CGC Sheetrock® Brand Glass-Mat Panels Mold Tough® AR and VHI, CGC Durock® Brand Cement Board or CGC Fiberock® Aqua Tough™ Panels.
7. For more information about performance-rated shaft wall systems and for complete list of CGC's fire-rated designs, visit CGC Design Studio at cgcdesignstudio.com.
8. For detailed information regarding UL and ULC designs shown in the Performance Selector, please refer to the UL and ULC Fire Resistance Directory at ul.com and ulc.ca.

PERFORMANCE SELECTOR

All details, specifications and data contained in this literature are intended as a general guide. These products must not be used in a design or construction of any given structure without complete and detailed evaluation by a qualified structural engineer or architect to verify suitability of a particular product for use in the structure.



ONE-HOUR FIRE-RATED CONSTRUCTION

TWO-HOUR FIRE-RATED CONSTRUCTION

Construction Detail	Non-loadbearing Description	Test Number	Acoustical Performance		Reference	
			STC	Test Number	ARL	Index
wt. 12 kg/m (8 lbs./ft.) 	<ul style="list-style-type: none"> 15.9 mm (5/8") CGC Sheetrock® Brand Firecode® X Panels, joints finished 64 mm (2-1/2") CGC C-H studs 25 gauge 610 mm (24") o.c. 25.4 mm (1") CGC Sheetrock® Brand Glass-Mat Liner Panels 	ULC W452 System A/ UL Design U415, System A or U469	39	USG-040901 Based on 102 mm (4") C-H studs 25 gauge	SA926	1
wt. 13.4 kg/m (9 lbs./ft.) 	<ul style="list-style-type: none"> 12.7 mm (1/2") CGC Sheetrock® Brand Firecode® C Panels, face layer joints finished 64 mm (2-1/2") CGC C-H studs 25 gauge 610 mm (24") o.c. 25.4 mm (1") CGC Sheetrock® Brand Glass-Mat Liner Panels 	ULC W452 System B/W506, W507 UL Design U415, System B or U438	38	USG-040917	SA926	2
			43	USG-040917 Based on 102 mm (4") C-H studs 25 gauge		
			48	RAL-OT-04-022 Based on 25 mm (1") sound batts in cavity		
			50	RAL-OT-04-019 Based on 102 mm (4") C-H studs 25 gauge with 76 mm (3") mineral fiber insulation		
wt. 12 kg/m (8 lbs./ft.) 	<ul style="list-style-type: none"> 19.1 mm (3/4") CGC Sheetrock® Brand Ultracode® Core Panels, joints finished 102 mm (4") CGC C-H studs 25 gauge 610 mm (24") o.c. 76 mm (3") Thermafiber® SAFB 25.4 mm (1") CGC Sheetrock® Brand Glass-Mat Liner Panels 	ULC W452 System C/ UL Design U415, System C	51	RAL-OT-04-020 Based on 102 mm (4") C-H studs with 76 mm (3") Thermafiber® SAFB insulation	SA926	3
wt. 14.9 kg/m (10 lbs./ft.) 	<ul style="list-style-type: none"> 12.7 mm (1/2") CGC Durock® Brand Cement Board 15.9 mm (5/8") CGC Sheetrock® Brand Firecode® X Panels 64 mm (2-1/2") CGC C-H studs 20 gauge 610 mm (24") o.c. 38 mm (1-1/2") Thermafiber® SAFB 25.4 mm (1") CGC Sheetrock® Brand Glass-Mat Liner Panels CGC Durock® Brand Cement Board, screw attached and laminated to gypsum panel with four vertical strip ceramic tile mastic centered between studs 	ULC W452 System D/ UL Design U415, System D			SA926	4
wt. 13.4 kg/m (9 lbs./ft.) 	<ul style="list-style-type: none"> 12.7 mm (1/2") CGC Sheetrock® Brand Firecode® C Panels 64 mm (2-1/2") CGC C-H studs 25 gauge 610 mm (24") o.c. 25.4 mm (1") CGC Sheetrock® Brand Glass-Mat Liner Panels Joints finished both sides 	ULC W452 System E/ UL Design U415, System E or U467	44	USG-040911 Based on 102 mm (4") C-H studs 25 gauge	SA926	5
wt. 14.9 kg/m (10 lbs./ft.) 	<ul style="list-style-type: none"> 12.7 mm (1/2") CGC Sheetrock® Brand Firecode® C Panels applied vertically, face layer joints finished RC-1 resilient channel or equivalent 610 mm (24") o.c. 64 mm (2-1/2") CGC C-H studs 25 gauge 610 mm (24") o.c. 25.4 mm (1") CGC Sheetrock® Brand Glass-Mat Liner Panels 	ULC W452 System F/ UL Design U415, System F	53	USG-040909 Based on 102 mm (4") C-H studs 25 gauge with 76 mm (3") mineral fiber insulation	SA926	6
			58	USG-040910 Based on 102 mm (4") C-H studs 25 gauge with additional layer on liner panel side and 76 mm (3") mineral fiber insulation		
wt. 12 kg/m (8 lbs./ft.) 	<ul style="list-style-type: none"> 25 mm (1") x 51 mm (2") perimeter angles 25 gauge 25.4 mm (1") CGC Sheetrock® Brand Glass-Mat Liner Panels, fastened to angles 12.7 mm (1/2") CGC Sheetrock® Brand Firecode® C Panels, joints finished 	UL Design U529			SA926	7

PERFORMANCE SELECTOR



TWO-HOUR FIRE-RATED CONSTRUCTION

Construction Detail	Non-loadbearing		Acoustical Performance		Reference	
	Description	Test Number	STC	Test Number	ARL	Index
wt. 14.9 kg/m (10 lbs./ft.) 	<ul style="list-style-type: none"> 15.9 mm (5/8") CGC Sheetrock® Brand Firecode® X Panels, face layer joints finished 102 mm (4") CGC C-H studs 20 gauge 610 mm (24") o.c. run horizontally and attached to vertical CGC J-runners, 20 gauge 25.4 mm (1") CGC Sheetrock® Brand Glass-Mat Liner Panels 	UL Design U437		USG-040901 Based on 102 mm (4") C-H studs 25 gauge	SA926	8
wt. 19.3 kg/m (13 lbs./ft.) 	<ul style="list-style-type: none"> 15.9 mm (5/8") CGC Sheetrock® Brand Firecode® C Panels, face layer joints finished 64 mm (2-1/2") CGC C-H studs 25 gauge 610 mm (24") o.c. 25.4 mm (1") CGC Sheetrock® Brand Glass-Mat Liner Panels 	ULC W452 System G UL Design U415, System G			SA926	9
wt. 19.3 kg/m (13 lbs./ft.) 	<ul style="list-style-type: none"> 15.9 mm (5/8") CGC Sheetrock® Brand Firecode® C Panels, face layer joints finished 64 mm (2-1/2") CGC C-H studs 25 gauge 610 mm (24") o.c. 25.4 mm (1") CGC Sheetrock® Brand Glass-Mat Liner Panels 15.9 mm (5/8") CGC Sheetrock® Brand Firecode® C Panels, joints finished 	ULC W452 System H UL Design U415, System H	49	USG-040902 Based on 102 mm (4") C-H studs	SA926	10
wt. 26.8 kg/m (18 lbs./ft.) 	<ul style="list-style-type: none"> 19.1 mm (3/4") CGC Sheetrock® Brand Ultracode® Core Panels, on furring channel 610 mm (24") o.c., over two layers, face layer joints finished 64 mm (2-1/2") CGC C-H studs 25 gauge 610 mm (24") o.c. 25.4 mm (1") CGC Sheetrock® Brand Glass-Mat Liner Panels Base layer over furring channel applied vertically 	ULC W452 System I UL Design U415, System I			SA926	11

Note
Stud size and gauge shown are minimums. Possible panel substitutions.

PERFORMANCE SELECTOR

WALL SYSTEMS—LIMITING HEIGHTS

CGC 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

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, CGC Shaft Wall Systems were subjected to over 1 million full oscillation cycles to model wall performance through the life of the building. These tests showed that a 0.455 mm (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 0.577 mm (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, CGC design data consider several additional factors in determining limiting partition heights:

- A. Bending stress—the unit force exerted that 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 USG tests conducted in three high-rise buildings ranging in height from 17 to 100 stories.

Recommended Elevator Shaft Pressure Load		
Elevator velocity m/sec (ft./min.)	One or two elevators per shaft	Three or more elevators per shaft
0 to 0.9 (0 to 180)	0.24 kPa (5.0 psf)	0.24 kPa (5.0 psf)
0.9 to 3.6 (180 to 700)	0.36 kPa (7.5 psf)	0.24 kPa (5.0 psf)
3.6 to 8.1 (700 to 1600)	0.48 kPa (10.0 psf)	0.36 kPa (7.5 psf)
8.1 to 10.2 (1600 to 2000)	0.72 kPa (15.0 psf) ^(a)	0.36 kPa (7.5 psf)



Note



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

PERFORMANCE SELECTOR

WALL SYSTEMS—LIMITING HEIGHTS TABLE



INTERMITTENT AIR PRESSURE LOAD (WIND LOAD)—kPa^(a)(PSF)^(a)



Stud Type and Size	Designation	Allowable Deflection	One-Hour Shaft Wall / Stairwell ULC W452 System A ^(b) (U415 System A) ^(b)				Two-Hour Shaft Wall ULC W452 System C ^(b) (U415 System C) ^(b)			
			0.24 (5)	0.36 (7.5)	0.48 (10)	0.72 (15)	0.24 (5)	0.36 (7.5)	0.48 (10)	0.72 (15)
64 mm (2-1/2") C-H Studs 	212CH-18	L/120	3.480 m (11' 5")	3.048 m (10' 0")	2.769 m (9' 1") ^(d)	2.413 m (7' 11") ^(d)	—	—	—	—
		L/240	3.226 m (10' 7")	2.819 m (9' 3")	2.540 m (8' 4") ^(d)	2.235 m (7' 4") ^(d)	—	—	—	—
		L/360	2.845 m (9' 4")	2.489 m (8' 2")	2.261 m (7' 5")	1.981 m (6' 6")	—	—	—	—
	212CH-34	L/120	4.089 m (13' 5")	3.356 m (11' 8")	3.251 m (10' 8")	2.819 m (9' 3")	—	—	—	—
		L/240	3.734 m (12' 3")	3.277 m (10' 9")	2.972 m (9' 9")	2.591 m (8' 6")	—	—	—	—
		L/360	3.302 m (10' 10")	2.896 m (9' 6")	2.616 m (8' 7")	2.286 m (7' 6")	—	—	—	—
102 mm (4") C-H Studs 	400CH-18	L/120	4.623 m (15' 2")	3.785 m (12' 5")	3.277 m (10' 9") ^(d)	2.667 m (8' 9") ^(d)	4.623 m (15' 2")	3.785 m (12' 5")	3.277 m (10' 9") ^(d)	2.667 m (8' 9") ^(d)
		L/240	4.394 m (14' 5")	3.785 m (12' 5")	3.277 m (10' 9") ^(d)	2.667 m (8' 9") ^(d)	4.394 m (14' 5")	3.785 m (12' 5")	3.277 m (10' 9") ^(d)	2.667 m (8' 9") ^(d)
		L/360	3.886 m (12' 9")	3.404 m (11' 2")	3.073 m (10' 1") ^(d)	2.667 m (8' 9") ^(d)	3.886 m (12' 9")	3.404 m (11' 2")	3.073 m (10' 1") ^(d)	2.667 m (8' 9") ^(d)
	400CH-34	L/120	6.223 m (20' 5")	5.436 m (17' 10")	4.928 m (16' 2") ^(d)	4.064 m (13' 4") ^(d)	6.223 m (20' 5")	5.436 m (17' 10")	4.928 m (16' 2") ^(d)	4.064 m (13' 4") ^(d)
		L/240	5.334 m (17' 6")	4.648 m (15' 3")	4.216 m (13' 10")	3.683 m (12' 1") ^(d)	5.334 m (17' 6")	4.648 m (15' 3")	4.216 m (13' 10")	3.683 m (12' 1") ^(d)
		L/360	4.648 m (15' 3")	4.064 m (13' 4")	3.683 m (12' 1")	3.226 m (10' 7") ^(d)	4.648 m (15' 3")	4.064 m (13' 4")	3.683 m (12' 1")	3.226 m (10' 7") ^(d)
152 mm (6") C-H Studs	600CH-34	L/120	8.001 m (26' 3")	6.528 m (21' 5") ^(d)	5.664 m (18' 7") ^(d)	4.623 m (15' 2") ^(d)	8.001 m (26' 3")	6.528 m (21' 5") ^(d)	5.664 m (18' 7") ^(d)	4.623 m (15' 2") ^(d)
		L/240	7.315 m (24' 0")	6.401 m (21' 0") ^(d)	5.664 m (18' 7") ^(d)	4.623 m (15' 2") ^(d)	7.315 m (24' 0")	6.401 m (21' 0") ^(d)	5.664 m (18' 7") ^(d)	4.623 m (15' 2") ^(d)
		L/360	6.426 m (21' 1")	5.613 m (18' 5")	5.105 m (16' 9") ^(d)	4.470 m (14' 8") ^(d)	6.426 m (21' 1")	5.613 m (18' 5")	5.105 m (16' 9") ^(d)	4.470 m (14' 8") ^(d)
Double 152 mm (6") E-Studs ^(e)	600ES-34	L/120	8.534 m (28' 0")	8.534 m (28' 0") ^(d)	8.534 m (28' 0") ^(d)	6.096 m (20' 0") ^(d)	8.534 m (28' 0")	8.534 m (28' 0") ^(d)	8.534 m (28' 0") ^(d)	6.096 m (20' 0") ^(d)
		L/240	8.534 m (28' 0")	7.544 m (24' 9")	6.858 m (22' 6") ^(d)	6.096 m (20' 0") ^(d)	8.534 m (28' 0")	7.544 m (24' 9")	6.858 m (22' 6") ^(d)	6.096 m (20' 0") ^(d)
		L/360	7.696 m (25' 3")	6.629 m (21' 9")	5.944 m (19' 6")	5.258 m (17' 3") ^(d)	7.696 m (25' 3")	6.629 m (21' 9")	5.944 m (19' 6")	5.258 m (17' 3") ^(d)

Stud Type and Size	Designation	Allowable Deflection	Two-Hour Shaft Wall ULC W452 System B, D, F (U415 System B, D, F)				Two-Hour Stairwell ULC W452 System E ^(c) (U415 System E) ^(c)			
			0.24 (5)	0.36 (7.5)	0.48 (10)	0.72 (15)	0.24 (5)	0.36 (7.5)	0.48 (10)	0.72 (15)
64 mm (2-1/2") C-H Studs 	212CH-18	L/120	3.759 m (12' 4")	3.302 m (10' 10")	2.997 m (9' 10") ^(d)	2.616 m (8' 7")	3.708 m (12' 2")	3.251 m (10' 8")	2.946 m (9' 8") ^(d)	2.565 m (8' 5")
		L/240	3.454 m (11' 4")	3.023 m (9' 11")	2.743 m (8' 12") ^(d)	2.388 m (7' 10")	3.404 m (11' 2")	2.972 m (9' 9")	2.692 m (8' 10") ^(d)	2.362 m (7' 9")
		L/360	3.150 m (10' 4")	2.769 m (9' 1")	2.515 m (8' 3")	2.184 m (7' 2")	2.997 m (9' 10")	2.616 m (8' 7")	2.388 m (7' 10")	2.083 m (6' 10")
	212CH-34	L/120	4.343 m (14' 3")	3.785 m (12' 5")	3.454 m (11' 4")	3.023 m (9' 11")	4.318 m (14' 2")	3.785 m (12' 5")	3.429 m (11' 3")	2.997 m (9' 10")
		L/240	3.912 m (12' 10")	3.429 m (11' 3")	3.099 m (10' 2")	2.718 m (8' 11")	3.962 m (13' 0")	3.480 m (11' 5")	3.150 m (10' 4")	2.769 m (9' 1")
		L/360	3.531 m (11' 7")	3.073 m (10' 1")	2.794 m (9' 2")	2.438 m (8' 0")	3.505 m (11' 6")	3.048 m (10' 0")	2.769 m (9' 1")	2.438 m (7' 12")
102 mm (4") C-H Studs 	400CH-18	L/120	5.410 m (17' 9")	4.420 m (14' 6")	3.385 m (12' 7")	3.124 m (10' 3") ^(d)	4.978 m (16' 4")	4.343 m (14' 3") ^(d)	3.937 m (12' 11") ^(d)	3.226 m (10' 7") ^(d)
		L/240	4.750 m (15' 7")	4.166 m (13' 8")	3.785 m (12' 5")	3.124 m (10' 3") ^(d)	4.623 m (15' 2")	4.039 m (13' 3") ^(d)	3.658 m (12' 0") ^(d)	3.200 m (10' 6") ^(d)
		L/360	4.242 m (13' 11")	3.708 m (12' 2")	3.378 m (11' 1")	2.946 m (9' 8") ^(d)	4.064 m (13' 4")	3.556 m (11' 8")	3.226 m (10' 7")	2.819 m (9' 3") ^(d)
	400CH-34	L/120	6.071 m (19' 11")	5.283 m (17' 4")	4.801 m (15' 9")	4.216 m (13' 10") ^(d)	5.944 m (19' 6")	5.207 m (17' 1")	4.724 m (15' 6")	4.140 m (13' 7") ^(d)
		L/240	5.512 m (18' 1")	4.801 m (15' 9")	4.369 m (14' 4")	3.810 m (12' 6")	5.461 m (17' 11")	4.775 m (15' 8")	4.343 m (14' 3")	3.785 m (12' 5")
		L/360	4.928 m (16' 2")	4.293 m (14' 1")	3.912 m (12' 10")	3.429 m (11' 3")	4.826 m (15' 10")	4.216 m (13' 10")	3.835 m (12' 7")	3.353 m (10' 12")
152 mm (6") C-H Studs	600CH-34	L/120	7.722 m (25' 4")	6.756 m (22' 2")	5.994 m (19' 8") ^(d)	4.902 m (16' 1") ^(d)	8.534 m (28' 0")	7.645 m (25' 1") ^(d)	6.629 m (21' 9") ^(d)	5.410 m (17' 9") ^(d)
		L/240	6.629 m (21' 9")	5.791 m (19' 0")	5.283 m (17' 4")	4.597 m (15' 1") ^(d)	7.569 m (24' 10")	6.629 m (21' 9") ^(d)	6.020 m (19' 9")	5.258 m (17' 3") ^(d)
		L/360	6.096 m (20' 0")	5.334 m (17' 6")	4.851 m (15' 11")	4.242 m (13' 11")	6.680 m (21' 11")	5.842 m (19' 2")	5.309 m (17' 5")	4.623 m (15' 2")
Double 152 mm (6") E-Studs ^(e)	600ES-34	L/120	8.534 m (28' 0")	8.534 m (28' 0") ^(d)	8.534 m (28' 0") ^(d)	6.096 m (20' 0") ^(d)	8.534 m (28' 0")	8.534 m (28' 0") ^(d)	8.534 m (28' 0") ^(d)	6.096 m (20' 0") ^(d)
		L/240	8.534 m (28' 0")	8.001 m (26' 3") ^(d)	7.315 m (24' 0") ^(d)	6.096 m (20' 0") ^(d)	8.534 m (28' 0")	7.925 m (26' 0") ^(d)	7.163 m (23' 6") ^(d)	6.096 m (20' 0") ^(d)
		L/360	8.001 m (26' 3")	7.010 m (23' 0")	6.401 m (21' 0") ^(d)	5.563 m (18' 3") ^(d)	7.696 m (25' 3")	6.934 m (22' 9")	6.248 m (20' 6")	5.486 m (18' 0") ^(d)

PERFORMANCE SELECTOR

WALL SYSTEMS—LIMITING HEIGHTS TABLE

Stud Type and Size	Designation	Allowable Deflection	Three-Hour Shaft Wall ULC W452 System G (U415 System G)				Three-Hour Stairwell ULC W452 System H ^(c) (U415 System H) ^(c)			
			0.24 (5)	0.36 (7.5)	0.48 (10)	0.72 (15)	0.24 (5)	0.36 (7.5)	0.48 (10)	0.72 (15)
64 mm (2-1/2") C-H Studs 	212CH-18	L/120	3.759 m (12' 4")	3.302 m (10' 10")	2.997 m (9' 10")	2.616 m (8' 7")	3.708 m (12' 2")	3.251 m (10' 8")	2.946 m (9' 8")	2.565 m (8' 5")
		L/240	3.454 m (11' 4")	3.023 m (9' 11")	2.743 m (8' 12")	2.388 m (7' 10")	3.404 m (11' 2")	2.972 m (9' 9")	2.692 m (8' 10")	2.362 m (7' 9")
		L/360	3.150 m (10' 4")	2.769 m (9' 1")	2.515 m (8' 3")	2.184 m (7' 2")	2.997 m (9' 10")	2.616 m (8' 7")	2.388 m (7' 10")	2.083 m (6' 10")
	212CH-34	L/120	4.343 m (14' 3")	3.785 m (12' 5")	3.454 m (11' 4")	3.023 m (9' 11")	4.318 m (14' 2")	3.785 m (12' 5")	3.429 m (11' 3")	2.997 m (9' 10")
		L/240	3.912 m (12' 10")	3.429 m (11' 3")	3.099 m (10' 2")	2.718 m (8' 11")	3.962 m (13' 0")	3.480 m (11' 5")	3.150 m (10' 4")	2.769 m (9' 1")
		L/360	3.531 m (11' 7")	3.073 m (10' 1")	2.794 m (9' 2")	2.438 m (8' 0")	3.505 m (11' 6")	3.048 m (10' 0")	2.769 m (9' 1")	2.438 m (7' 12")
102 mm (4") C-H Studs 	400CH-18	L/120	5.410 m (17' 9")	4.420 m (14' 6")	3.385 m (12' 7")	3.124 m (10' 3") ^(d)	4.978 m (16' 4")	4.343 m (14' 3") ^(d)	3.937 m (12' 11") ^(d)	3.226 m (10' 7") ^(d)
		L/240	4.750 m (15' 7")	4.166 m (13' 8")	3.785 m (12' 5")	3.124 m (10' 3") ^(d)	4.623 m (15' 2")	4.039 m (13' 3") ^(d)	3.658 m (12' 0") ^(d)	3.200 m (10' 6") ^(d)
		L/360	4.242 m (13' 11")	3.708 m (12' 2")	3.378 m (11' 1")	2.946 m (9' 8") ^(d)	4.064 m (13' 4")	3.556 m (11' 8")	3.226 m (10' 7")	2.819 m (9' 3") ^(d)
	400CH-34	L/120	6.071 m (19' 11")	5.283 m (17' 4")	4.801 m (15' 9")	4.216 m (13' 10") ^(d)	5.944 m (19' 6")	5.207 m (17' 1")	4.724 m (15' 6")	4.140 m (13' 7") ^(d)
		L/240	5.512 m (18' 1")	4.801 m (15' 9")	4.369 m (14' 4")	3.810 m (12' 6")	5.461 m (17' 11")	4.775 m (15' 8")	4.343 m (14' 3")	3.785 m (12' 5")
		L/360	4.928 m (16' 2")	4.293 m (14' 1")	3.912 m (12' 10")	3.429 m (11' 3")	4.826 m (15' 10")	4.216 m (13' 10")	3.835 m (12' 7")	3.353 m (10' 12")
152 mm (6") C-H Studs	600CH-34	L/120	7.724 m (25' 4")	6.756 m (22' 2")	5.994 m (19' 8") ^(d)	4.902 m (16' 1") ^(d)	8.534 m (28' 0")	7.645 m (25' 1") ^(d)	6.629 m (21' 9") ^(d)	5.410 m (17' 9") ^(d)
		L/240	6.629 m (21' 9")	5.791 m (19' 0")	5.283 m (17' 4")	4.597 m (15' 1") ^(d)	7.569 m (24' 10")	6.629 m (21' 9") ^(d)	6.020 m (19' 9")	5.258 m (17' 3") ^(d)
		L/360	6.096 m (20' 0")	5.334 m (17' 6")	4.851 m (15' 11")	4.242 m (13' 11")	6.680 m (21' 11")	5.842 m (19' 2")	5.309 m (17' 5")	4.623 m (15' 2")
Double 152 mm (6") E-Studs ^(e)	600ES-34	L/120	8.534 m (28' 0")	8.534 m (28' 0") ^(d)	8.534 m (28' 0") ^(d)	6.096 m (20' 0") ^(d)	8.534 m (28' 0")	8.534 m (28' 0") ^(d)	8.534 m (28' 0") ^(d)	6.096 m (20' 0") ^(d)
		L/240	8.534 m (28' 0")	8.001 m (26' 3") ^(d)	7.315 m (24' 0") ^(d)	6.096 m (20' 0") ^(d)	8.534 m (28' 0")	7.925 m (26' 0") ^(d)	7.163 m (23' 6") ^(d)	6.096 m (20' 0") ^(d)
		L/360	8.001 m (26' 3")	7.010 m (23' 0")	6.401 m (21' 0") ^(d)	5.563 m (18' 3") ^(d)	8.001 m (26' 3")	6.934 m (22' 9")	6.248 m (20' 6")	5.486 m (18' 0") ^(d)

Stud Type and Size	Designation	Allowable Deflection	Four-Hour Shaft Wall ULC W452 System I (U415 System I)			
			0.24 (5)	0.36 (7.5)	0.48 (10)	0.72 (15)
64 mm (2-1/2") C-H Studs 	212CH-18	L/120	3.759 m (12' 4")	3.302 m (10' 10")	2.997 m (9' 10") ^(d)	2.616 m (8' 7")
		L/240	3.454 m (11' 4")	3.023 m (9' 11")	2.743 m (8' 12") ^(d)	2.388 m (7' 10")
		L/360	3.150 m (10' 4")	2.769 m (9' 1")	2.515 m (8' 3")	2.184 m (7' 2")
	212CH-34	L/120	4.343 m (14' 3")	3.785 m (12' 5")	3.454 m (11' 4")	3.023 m (9' 11")
		L/240	3.912 m (12' 10")	3.429 m (11' 3")	3.099 m (10' 2")	2.718 m (8' 11")
		L/360	3.531 m (11' 7")	3.073 m (10' 1")	2.794 m (9' 2")	2.438 m (8' 0")
102 mm (4") C-H Studs 	400CH-18	L/120	5.410 m (17' 9")	4.420 m (14' 6")	3.385 m (12' 7")	3.124 m (10' 3") ^(d)
		L/240	4.750 m (15' 7")	4.166 m (13' 8")	3.785 m (12' 5")	3.124 m (10' 3") ^(d)
		L/360	4.242 m (13' 11")	3.708 m (12' 2")	3.378 m (11' 1")	2.946 m (9' 8") ^(d)
	400CH-34	L/120	6.071 m (19' 11")	5.283 m (17' 4")	4.801 m (15' 9")	4.216 m (13' 10") ^(d)
		L/240	5.512 m (18' 1")	4.801 m (15' 9")	4.369 m (14' 4")	3.810 m (12' 6")
		L/360	4.928 m (16' 2")	4.293 m (14' 1")	3.912 m (12' 10")	3.429 m (11' 3")
152 mm (6") C-H Studs	600CH-34	L/120	7.724 m (25' 4")	6.756 m (22' 2")	5.994 m (19' 8") ^(d)	4.902 m (16' 1") ^(d)
		L/240	6.629 m (21' 9")	5.791 m (19' 0")	5.283 m (17' 4")	4.597 m (15' 1") ^(d)
		L/360	6.096 m (20' 0")	5.334 m (17' 6")	4.851 m (15' 11")	4.242 m (13' 11")
Double 152 mm (6") E-Studs ^(e)	600ES-34	L/120	8.534 m (28' 0")	8.534 m (28' 0") ^(d)	8.534 m (28' 0") ^(d)	6.096 m (20' 0") ^(d)
		L/240	8.534 m (28' 0")	8.001 m (26' 3") ^(d)	7.315 m (24' 0") ^(d)	6.096 m (20' 0") ^(d)
		L/360	8.001 m (26' 3")	7.010 m (23' 0")	6.401 m (21' 0") ^(d)	5.563 m (18' 3") ^(d)

Notes

- See the Performance Selector for system references and rated assembly details.
- Runner fasteners should withstand 858 N (193 lb.) single shear and 890 N (200 lb.) bearing force; attachment spacing should not exceed 610 mm (24").
- L/180 deflection information available upon request from CGC.
- (a) Stud spacing of 610 mm (24") o.c.
- (b) For assembly single-layer board attached to studs.

- (c) For assembly with single-layer board attached to both sides of studs.
- (d) Limiting criteria - deflection.
- (e) Attachment of CGC steel double 152 mm (6") E-Stud for CGC Shaft Wall Systems. The studs are to be attached back-to-back (web-to-web) with pairs of 13 mm (1/2") long 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 152 mm (6") of each end of the studs. They shall then be spaced at a maximum of 305 mm (12") o.c.

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 52°C (125°F).
2. Separate approved liners should be installed in areas subject to continuous moisture overspray, condensation or air stream temperature over 52°C (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 0.48 kPa (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 - kPa (PSF)

Stud Type and Size	Designation	Stud Spacing	Allowable Deflection	Two-Hour Fire-Rated System		One-Hour Fire-Rated System	
				0.24 (5)	0.48 (10)	0.24 (5)	0.48 (10)
64 mm (2-1/2") C-H Studs 	212CH-18	610 mm (24")	L/120	3.302 m (10' 10")	2.616 m (8' 7")	3.048 m (10' 0")	2.413 m (7' 11")
			L/240	3.023 m (9' 11")	2.388 m (7' 10")	2.819 m (9' 3")	2.235 m (7' 4")
			L/360	2.769 m (9' 1")	2.184 m (7' 2")	2.489 m (8' 2")	1.981 m (6' 6")
	212CH-34	610 mm (24")	L/120	3.785 m (12' 5")	3.023 m (9' 11")	3.356 m (11' 8")	2.819 m (9' 3")
			L/240	3.429 m (11' 3")	2.718 m (8' 11")	3.277 m (10' 9")	2.591 m (8' 6")
			L/360	3.073 m (10' 1")	2.438 m (8' 0")	2.896 m (9' 6")	2.286 m (7' 6")
102 mm (4") C-H Studs 	400CH-18	610 mm (24")	L/120	4.420 m (14' 6")	3.124 m (10' 3")	3.785 m (12' 5")	2.667 m (8' 9")
			L/240	4.166 m (13' 8")	3.124 m (10' 3")	3.785 m (12' 5")	2.667 m (8' 9")
			L/360	3.708 m (12' 2")	2.946 m (9' 8")	3.404 m (11' 2")	2.667 m (8' 9")
	400CH-34	610 mm (24")	L/120	5.283 m (17' 4")	4.216 m (13' 10")	5.436 m (17' 10")	4.064 m (13' 4")
			L/240	4.801 m (15' 9")	3.810 m (12' 6")	4.648 m (15' 3")	3.683 m (12' 1")
			L/360	4.293 m (14' 1")	3.429 m (11' 3")	4.064 m (13' 4")	3.226 m (10' 7")
152 mm (6") C-H Studs	600CH-34	610 mm (24")	L/120	6.756 m (22' 2")	4.902 m (16' 1")	6.528 m (21' 5")	4.623 m (15' 2")
			L/240	5.791 m (19' 0")	4.597 m (15' 1")	6.401 m (20' 12")	4.623 m (15' 2")
			L/360	5.334 m (17' 6")	4.242 m (13' 11")	5.613 m (18' 5")	4.470 m (14' 8")

For more information, consult Progressive Engineering Report AER-09038 at p-e-i.com

Notes

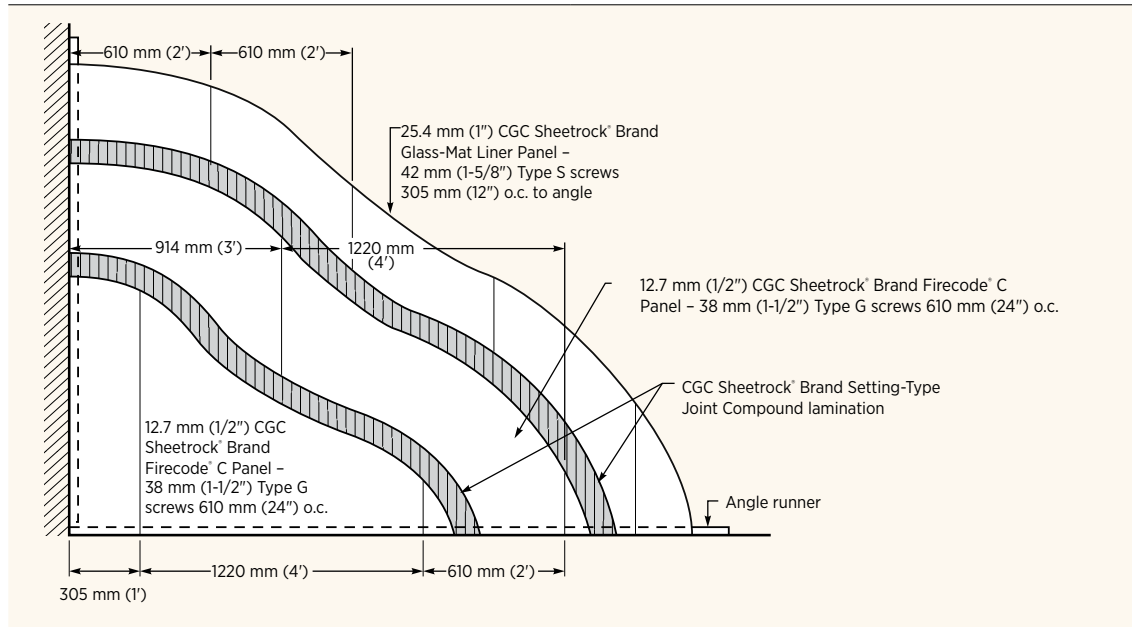
Runner fasteners should withstand 858 N (193 lb.) single shear and 890 N (200 lb.) bearing force; attachment spacing should not exceed 610 mm (24") o.c.

PERFORMANCE SELECTOR

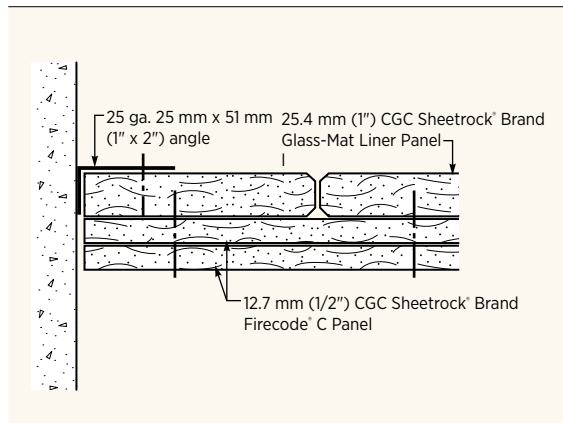
WALL SYSTEMS—SOLID SHAFT WALL

CGC Shaft Wall Systems can be used as a vent enclosure for vertical shafts with a two-hour 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.

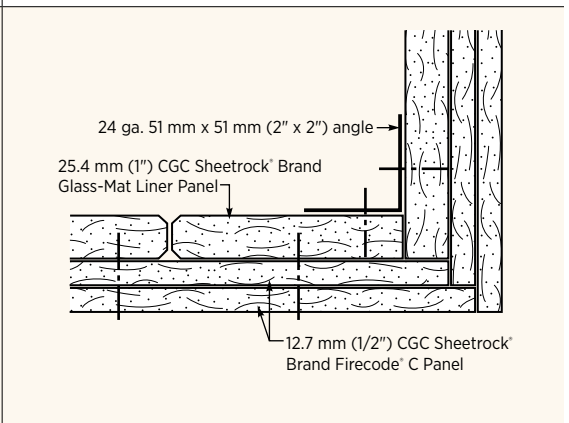
Vent Shaft Elevation



Wall Intersection



Corner



Note

Limiting height of system is 3.658 m (12' 0"). Install panels vertically and full height only.

PERFORMANCE SELECTOR

CEILING SYSTEM—LIMITING SPANS

HORIZONTAL ASSEMBLIES

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

Triple Layer: With 25.4 mm (1") liner panels inserted in CGC C-H studs 610 mm (24") o.c. and triple-layer 12.7 mm (1/2") CGC Sheetrock® Brand Firecode® C Panels screw-attached to studs, the system provides two-hour protection from fire. For larger spans, use the "Two-Hour Rated Duct Enclosure (UL Design K504 and K506)" detail as shown on page 24.

Double Layer: With double-layer 12.7 mm (1/2") CGC Sheetrock® Brand Firecode® C Panels screw-attached to studs, the assembly provides two-hour fire-resistive ceiling construction for corridors and stair soffits (see design details).

Single Layer: With single-layer 15.9 mm (5/8") CGC Sheetrock® Brand Firecode® X or C Panels screw-attached to studs, the assembly provides one-hour fire-resistive ceiling construction for corridors and stair soffits.

Limitations

1. CGC C-H studs are not designed to carry live loads or mechanical equipment or provide material storage area.
2. Maximum stud spacing is 610 mm (24") o.c.; maximum spans are shown in table below.

LIMITING SPANS— HORIZONTAL SHAFT WALLS

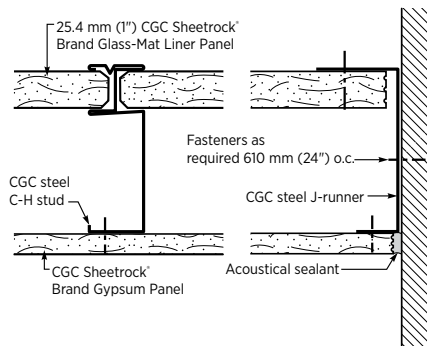
One-Hour Exit Corridor Ceiling and Stair Soffits		Two-Hour Exit Corridor Ceiling and Stair Soffits	
Single-Layer 15.9 mm (5/8") Gypsum Panels ^(a)	Maximum Span m (ft.)	Double-Layer 12.7 mm (1/2") Gypsum Panels ^(a)	Maximum Span m (ft.)
212CH25-18	2.591 m (8' 6")	212CH25-18	2.388 m (7' 10")
212CH20-34	3.150 m (10' 4")	212CH20-34	2.946 m (9' 8")
400CH25-18	2.819 m (9' 3")	400CH25-18	2.311 m (7' 7")
400CH20-34	4.547 m (14' 11")	400CH20-34	4.267 m (14' 0")
600CH20-34	6.350 m (20' 10")	600CH20-34	5.969 m (19' 7")

For more information, consult Progressive Engineering Report AER-09038 at p-e-i.com

Notes

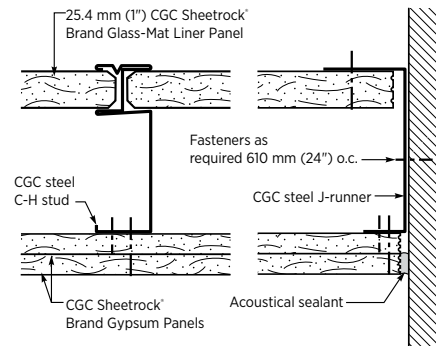
(a) Allowable steel stress reduced 50%.

Ceiling Membrane of One-Hour Egress Corridors and Stair Soffits (see AER-09038)



Refer to span table above.

Ceiling Membrane of Two-Hour Egress Corridors and Stair Soffits (see AER-09038)

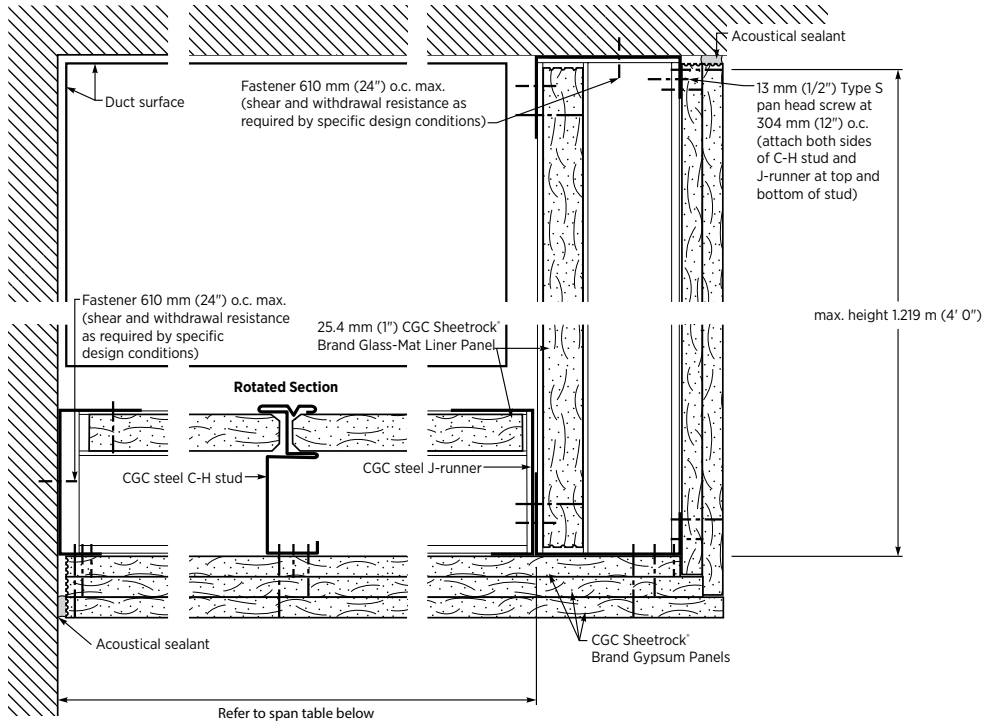


Refer to span table above.

DESIGN DETAILS

CEILING MEMBRANE

Two-Hour Rated Assembly – Horizontal Membrane or Metal Duct Enclosure



For larger spans see UL Design K504 and K506, per details on page 24.

LIMITING SPANS— HORIZONTAL SHAFT WALLS

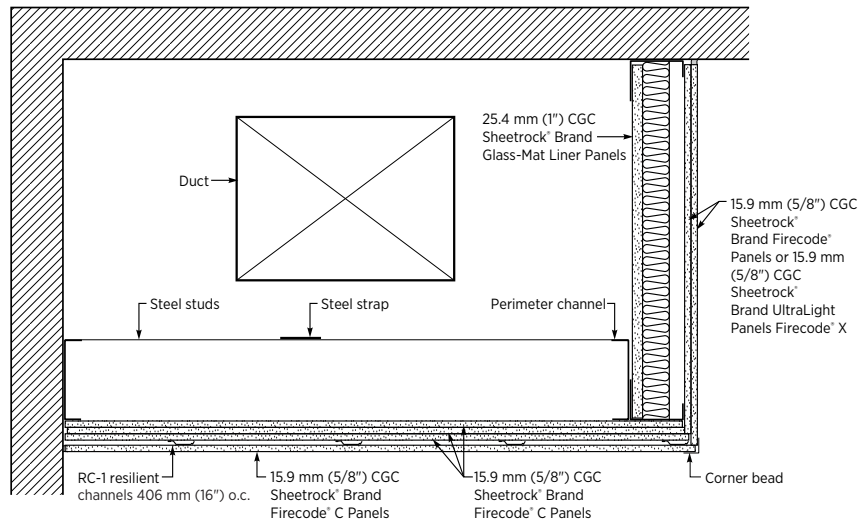
Two-Hour Horizontal Membrane or Metal Duct Enclosure	
Triple-Layer 12.7 mm (1/2") Gypsum Panels	Maximum Span m (ft.)
212CH25-18	1.956 m (6' 5")
212CH20-34	2.515 m (8' 3")
400CH25-18	2.591 m (8' 5")
400CH20-34	3.658 m (12' 0")
600CH20-34	4.165 m (13' 8")

DESIGN DETAILS

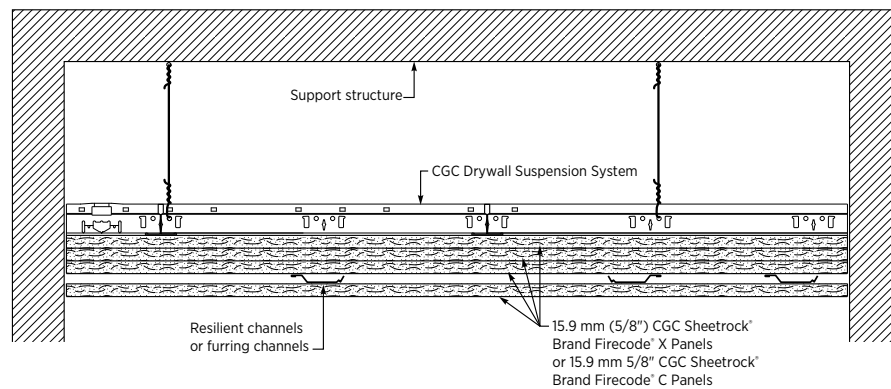
CEILING MEMBRANE

Two-Hour Duct Enclosure (UL Design K506)

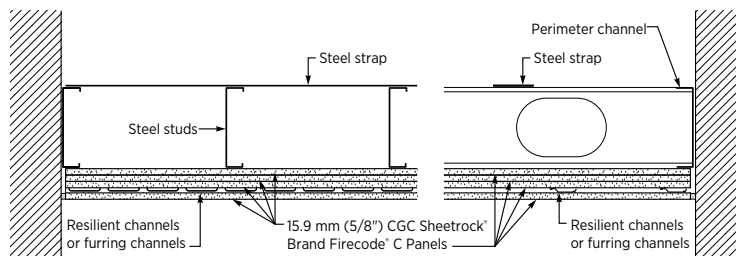
Vertical assembly shown is ULC W452 (UL U415) System B.



Two-Hour Rated Ceiling Membrane Assembly (UL Design K504)



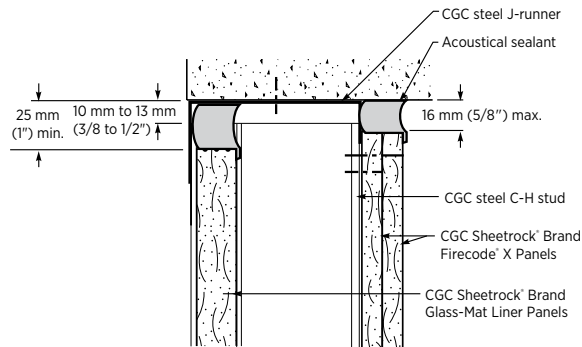
Two-Hour Rated Ceiling Assembly (UL Design K506)



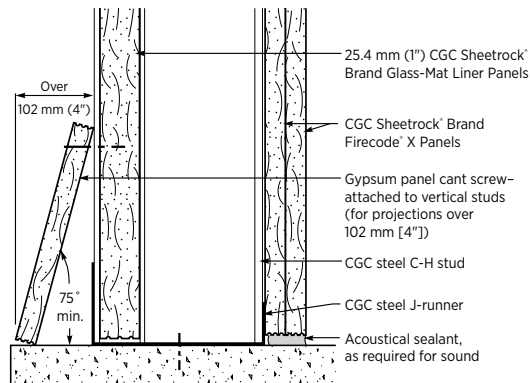
DESIGN DETAILS

BASIC INTERFACES—SYSTEM B

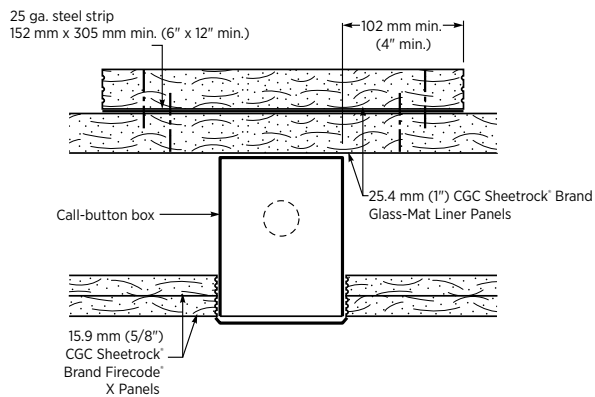
Head Section (UL System HW-D-0603)



Base Section (UL System BW-S-0016)



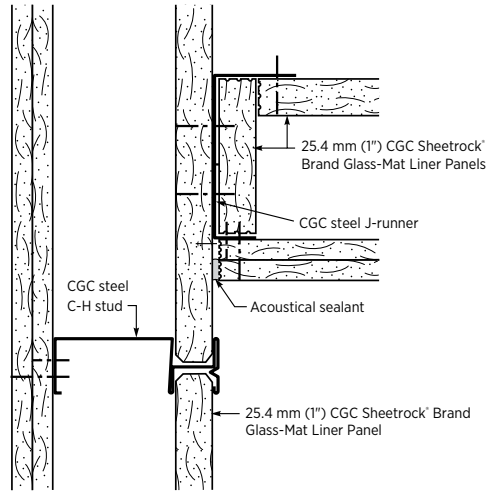
Call-Button Box



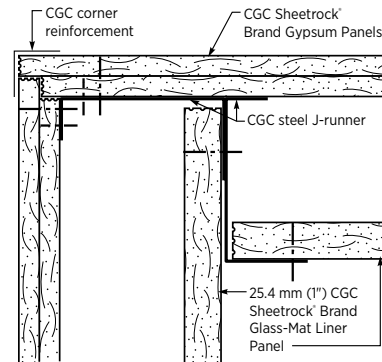
DESIGN DETAILS

BASIC INTERFACES—SYSTEM B

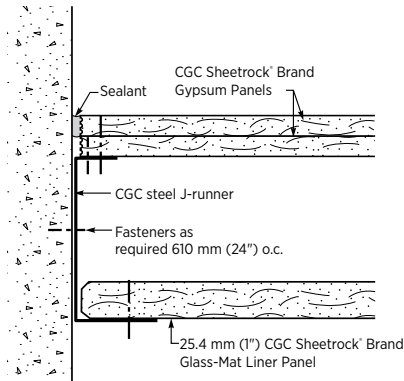
Wall Junction



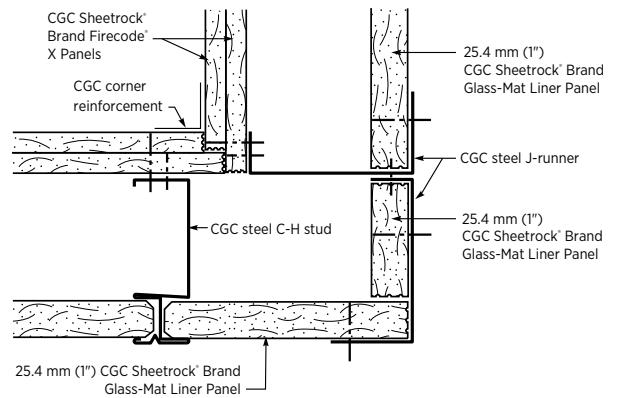
Outside Corner



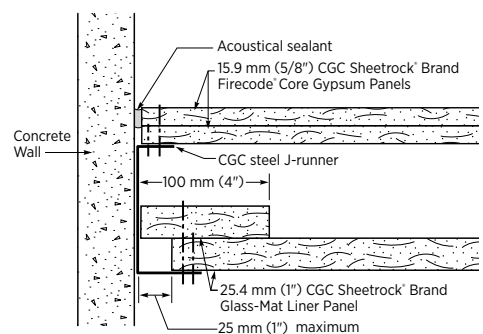
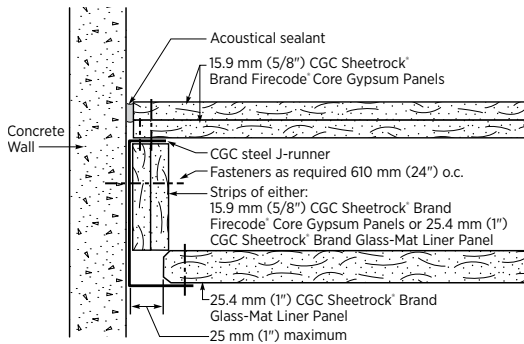
Wall Intersection



Inside Corner



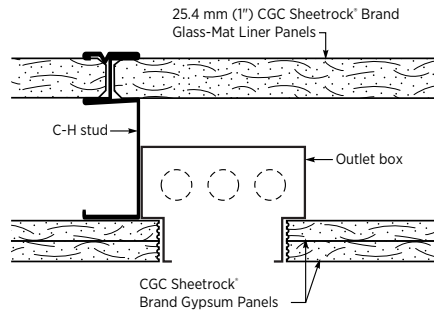
Alternate End Terminations



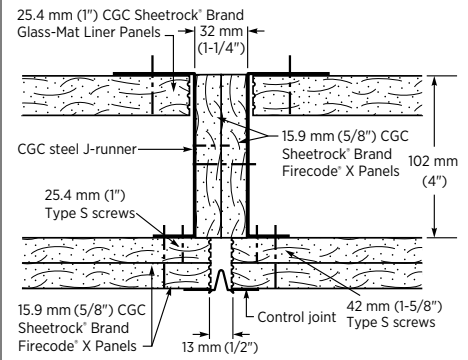
DESIGN DETAILS

BASIC INTERFACES—SYSTEM B

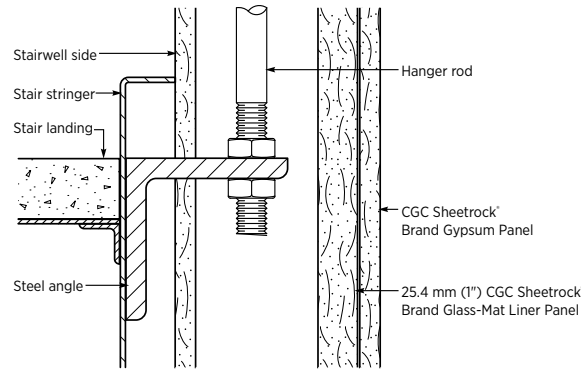
Outlet/Switch Box



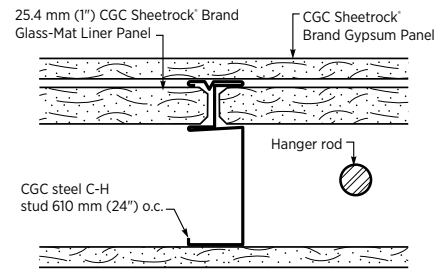
Control Joint in Two-Hour Shaft Walls



Stair Hanger and Rod Application



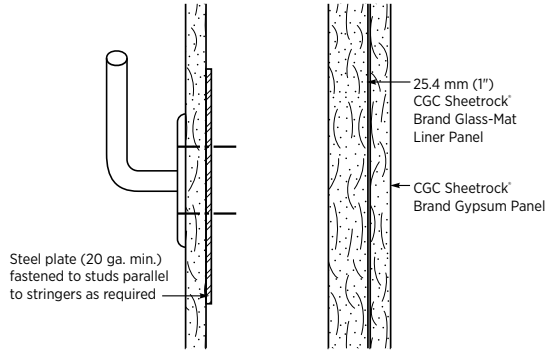
Cross-Section at Stair Hanger



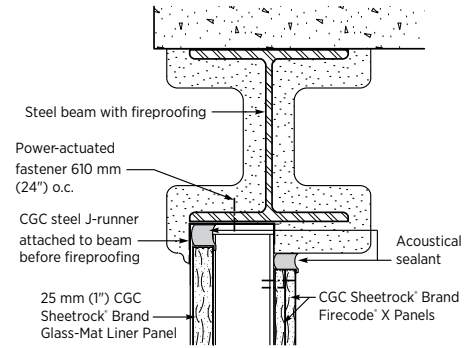
DESIGN DETAILS

BASIC INTERFACES—SYSTEM B

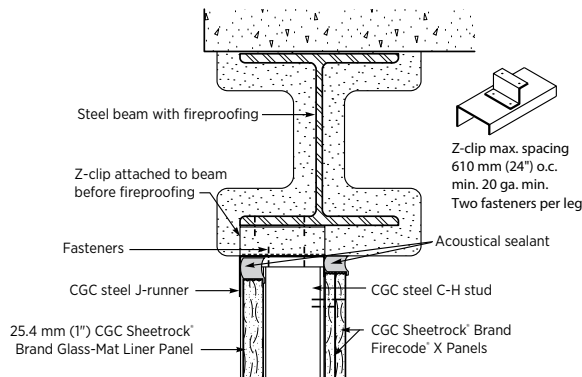
Handrail Application



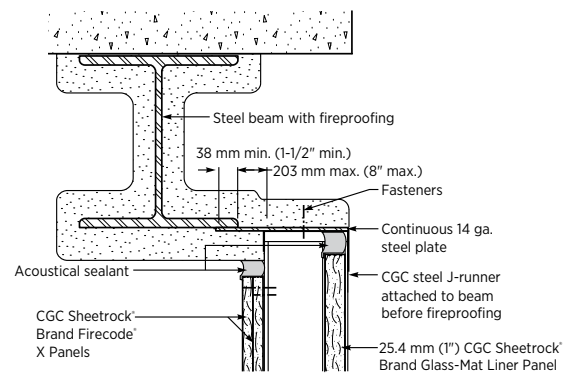
Steel Beam (UL System HW-D-0610)



Steel Beam with Z-Clip (UL System HW-D-0609)



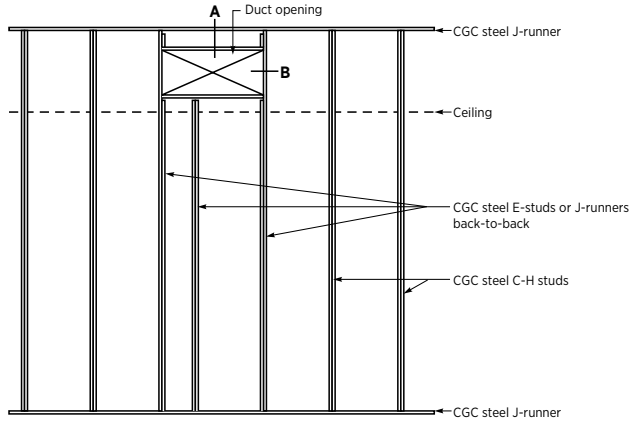
Steel Beam with Offset (UL System HW-D-0611)



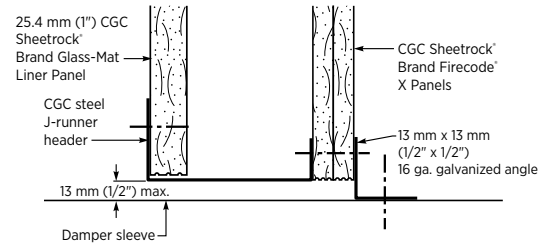
DESIGN DETAILS

FIRE DAMPER

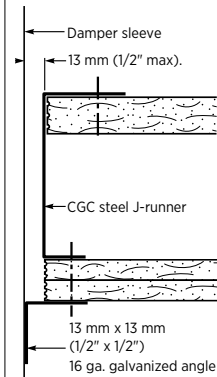
Typical Duct Opening Penetration (See Damper and Duct Manufacturer Installation Instructions for Further Details)



Section A: Fire Damper Installation (See Damper and Duct Manufacturer Installation Instructions for Further Details)



Section B: Fire Damper Installation (See Damper and Duct Manufacturer Installation Instructions for Further Details)

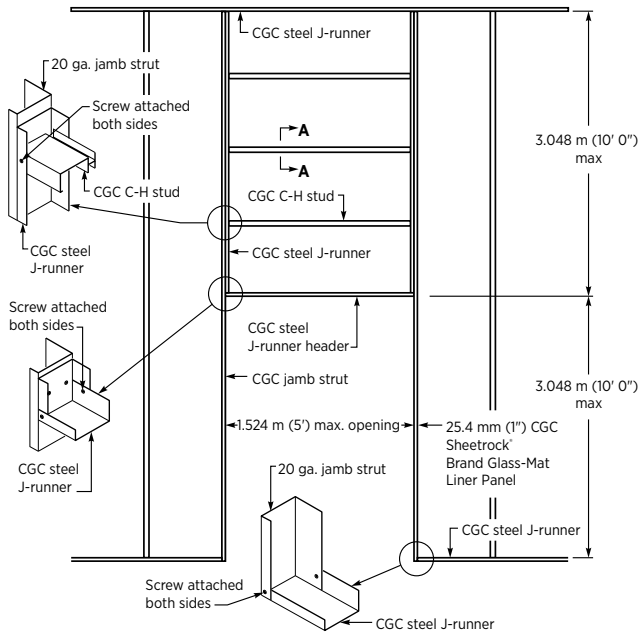


DESIGN DETAILS

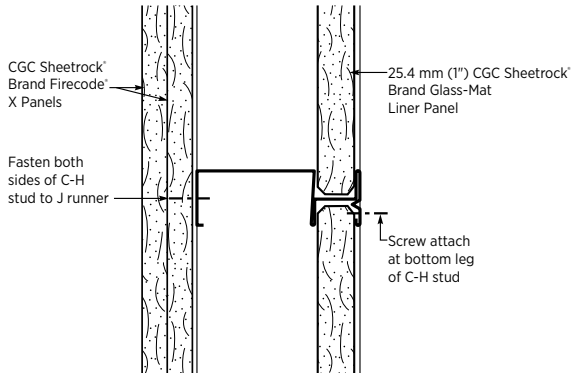
ELEVATOR DOOR FRAMING

ELEVATOR DOOR FRAMING

Elevator Door Rough Opening



Section A-A Detail



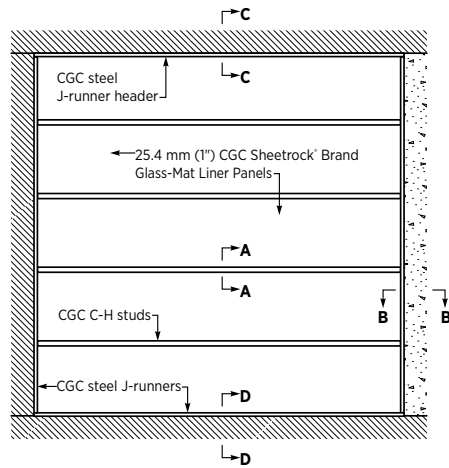
Notes

1. Framing at elevator door shall be a minimum 102 mm (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 continuously braced by screw connections to the liner and face panels 305 mm (12") o.c.
4. For doors greater than 1.524 m (5') wide and or transom heights greater than 1.219 m (4'), reinforce the 400JS-34 with a nested 400ES-34.

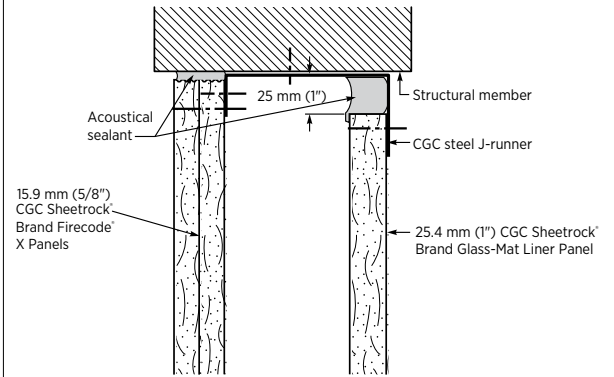
DESIGN DETAILS

WALL SYSTEMS—C-H STUDS AND LINER PANELS INSTALLED HORIZONTALLY

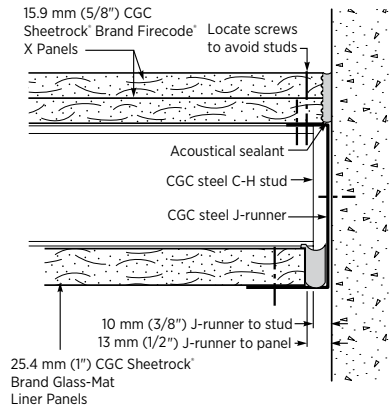
Horizontal Stud Shaftwall



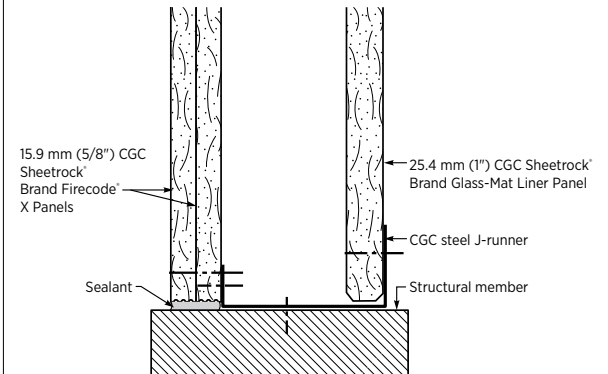
Section C-C Head Section



Section B-B Wall Intersection



Section D-D Base Section



Note

Horizontal framing shall be a minimum 102 mm (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 CGC Shaft Wall Systems.

This section is an overview of good design, application, installation and safety considerations that should be addressed when CGC 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 *The Gypsum Construction Handbook*.

1 SYSTEM PERFORMANCE

CGC 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 CGC.

Standards

The following standards apply:

ASTM C1396: Standard Specification for Gypsum Board

ASTM C1658: Standard Specification for Glass-Mat Gypsum Panels

ASTM C1325: Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units

ASTM C1278: Standard Specification for Fiber-Reinforced Gypsum Panel

ASTM C840: Standard Specification for Application and Finishing 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 C645: Standard Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board

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

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

ASTM D3273: Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

2 FIRE RESISTANCE

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

For assemblies tested at 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/ULC 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., 64 mm [2-1/2"] C-H stud 25 gauge to 102 mm [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 14-16.

GOOD DESIGN PRACTICES

3 STRUCTURAL CRITERIA

Building structure supporting CGC Shaft Wall System must be capable of withstanding the loads applied by shaft wall assemblies.

Interior non-bearing partitions such as CGC Shaft Wall are not designed to carry axial loads. Limiting heights are based on stress or deflection limits for lateral loads specified in the Performance Selector of this guide. 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 of the studs are specified in the 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 9 m (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 0.72 kPa (15 psf) are expected, 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 0.48 kPa (10 psf). When air pressure exceeds 0.48 kPa (10 psf), air handling should be contained with a metal duct. See pages 18-19 for information about air handling and vent shaft enclosures.

GOOD DESIGN PRACTICES

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 1220 mm (48") wide require supplemental support for the shaft wall at the opening. Where there are access panels or large duct penetrations, 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 *Acoustical Assemblies* (SA200) for acoustical performance.

Sound control refers to the ability to attenuate sound passing through a partition. The 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 CGC Shaft Wall Systems.

Sound tests are conducted under ideal laboratory conditions per ASTM procedures. CGC 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 6 mm (1/4") min. round bead of acoustical sealant. Seal around all penetrations.

9 MOISTURE AND MOULD

Understanding water and mould and its impact on the construction process and building materials are integral to good design and construction practices. CGC 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 mould in a building environment. If you have additional questions, please contact those sources or CGC.

The best way to address mould 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/Mould 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 VAPOUR RETARDERS

Water vapour control must always be considered in the design of exterior wall systems. Humidity and temperature conditions may require the installation of a vapour retarder to prevent moisture condensation within the wall and the resulting damage. To determine the necessity and location of vapour retarders, a water vapour 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 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 job site against rusting caused by moisture. In marine areas where chloride and sea salt are present in combination with excessively high humidity, use of components that offer increased protection against corrosion is recommended.

13 APPLICATION

Call-Button Floor Indicator and Electric Boxes: Shaft walls shall accommodate outlet boxes with depths up to the stud width. See page 25 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.

CGC Sheetrock® Brand Glass-Mat Liner Panel Application—Butt Joints: When an installation of CGC 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. Horizontal joints need not be backed by steel framing to maintain the fire rating of the assembly.

14 PAINTING SYSTEMS

Painting products and systems should be used that comply with recommendations and requirements in appendices 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 CGC Sheetrock® Brand First Coat™ Primer 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 (eggshell, semigloss 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. CGC Sheetrock® Brand Tuff-Hide™ Primer-Surfacer skims and primes in a single application.

15 SCREWS

CGC Durock™ Brand Fasteners for Steel Framing:

CGC Durock™ Brand Tile Backer Screws for steel framing screws; 32 mm (1-1/4"), 42 mm (1-5/8").

CGC Fiberock® Panel Fasteners for Steel Framing:

Use corrosion-resistant Type S-12 buglehead screws for 20-12 ga. steel framing. When using 20 ga. steel framing, fasteners should be spaced no greater than 200 mm (8") o.c. Fasteners must be of sufficient length to ensure a minimum of 10 mm (3/8") penetration into steel framing.

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 2.4 mm (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.

CGC 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 CGC Shaft Wall Systems. If you have additional questions or would like more information regarding this or other CGC products and systems, please contact CGC at 800-387-2690 or visit cgcdesignstudio.com

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. CGC System Folder SA926—CGC Shaft Wall Systems.

1.2 SCOPE

Specify the appropriate CGC 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 CGC Shaft Wall Systems
 1. Vertical shaft enclosures
 2. Stair enclosures
 3. Horizontal assemblies
 4. Vent shaft enclosures
 - B. Related Sections:
 1. Division 9 CGC Sheetrock® Brand Gypsum Panels and assemblies
 2. Division 9 CGC Grand Prix® Brand Gypsum 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/ULC Listed for fire resistance.
 - B. System fire-resistance testing with elevator door manufacturer at UL/ULC.
 - C. Fire resistance tested penetration details for call-button boxes and position indicators.
 - D. Oscillation tested to 1 million cycles to ensure performance of the life of the building.
 - E. UL/ULC Listed fire damper application.
 - F. **Air Pressure Loads**—Select based on project requirements. See details in this brochure for CGC Shaft Wall System data.
 - G. **Deflection Limit**—Select based on project requirements. See details in this brochure for CGC Shaft Wall System data.
 - H. **STC Rating**—Select based on project requirements.
 - I. **Hardened Shafts**—Where required by code, for buildings classified as high-rise buildings, special provisions may be required.
-

1.6 SUBMITTALS

- A. Product and System Data—Submit CGC System Folder SA926, which can be downloaded at cgcinc.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 CGC 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 *The Gypsum Construction Handbook*.
-

1.9 QUALITY ASSURANCE

- A. Protect CGC Shaft Wall System and components from moisture before, during and after installation. Eliminate sources of moisture immediately.
 - B. Fire-Resistance-Rated Assemblies: Provide UL/ULC Design Number (e.g., U415, W452) 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 CGC Shaft Wall System assemblies.
-

PART 2: PRODUCTS

2.1 MANUFACTURER

- A. Supply materials manufactured by or for the CGC Inc. that comply with requirements of fire resistance-rated assemblies indicated in CGC System Folder SA926.
 - B. **Basis of Design**—CGC Shaft Wall System
-

2.2 MATERIALS

- A. **CGC Sheetrock® Brand Glass-Mat Liner Panels**—ASTM C1658, 25.4 mm (1") CGC Sheetrock® Brand Glass-Mat Liner Panels, moisture- and mould-resistant gypsum core encased in a moisture- and mould-resistant glass mat on both sides, 610 mm (24") wide, lengths as required. Stamped with UL or ULC Classification label documenting UL or ULC Classifications for fire resistance, surface burning characteristics and noncombustibility. Panels should also be identified with the following language: "CGC Sheetrock® Brand Glass-Mat Liner Panel, a Component of CGC Inc. Fire-Rated Systems."
- B. **Gypsum Wallboard**—ASTM C1396, (12.7 mm [1/2"]) (15.9 mm [5/8"]) (19.1 mm [3/4"]) (select thickness), 1220 mm (4') wide, tapered edge, CGC Sheetrock® Brand Gypsum Panels, (Firecode® X) (Firecode® C) (Ultracode® Core) (UltraLight Firecode® X) (Mold Tough® Firecode® X), ASTM C1278 (CGC Fiberock® Aqua-Tough™ Interior Panels) (select core type), lengths as required. Identified with UL or ULC Classification label.
- C. **Gypsum Base for Gypsum Veneer Plaster**—ASTM C1396, 12.7 mm (1/2") 15.9 mm (5/8") (select thickness), 1220 mm (4') wide, (CGC Grand Prix® Brand Veneer Plaster Base Firecode® X) (select core type), lengths as required.
- D. **Cement Board**—ASTM C1325, CGC Durock® Brand Cement Board, 12.7 mm (1/2") and 15.9 mm (5/8") thickness, 1220 mm (48") width x 2440 mm (96") length.
- E. **Gypsum Wallboard and Gypsum Base Joint Treatment Materials**—Select a CGC/Synko® Interior Finishing System
- F. **Fasteners**—ASTM C1002, Screws: 10 mm (3/8") 13 mm (1/2") Type (S) (S-12) pan head; 16 mm (5/8") Type S-12 low profile head; 25 mm (1") 42 mm (1-5/8") 56 mm (2-1/4") Type S bugle head. CGC Durock™ Brand Tile Backer Screws for steel framing: 42 mm (1-5/8"). Type G screws: 38 mm (1-1/2").
- G. **Metal Trim**—ASTM C1047, No. (200A) (200B) (401) (402) (701B) (801B).

APPLICATION GUIDE

SPECIFICATIONS

2.2 MATERIALS CONT.

- H. CGC Sheetrock® and Beadex® Brand Paper-Faced Metal Corner Bead and Trim.
- I. Steel furring channels.
- J. RC-1 resilient channels or equivalent.
- K. CGC steel C-H studs, (212CH-18) (212CH-34) (400CH-18) (400CH-34) (600CH-34) hot-dipped galvanized, lengths as required (select from tables).
- L. CGC steel E-studs, (400ES-34) (600ES-34) hot-dipped galvanized, lengths as required (select from tables).
- M. CGC steel J-runners, (212JR-23) (400JR-23) (600JR-23) (212JR-34) (400JR-34) (600JR-34) hot-dipped galvanized.
- N. Steel angle clips 20 gauge, (51 mm x 51 mm x 51 mm [2" x 2" x 2"]) (51 mm x 51 mm x 102 mm [2" x 2" x 4"]) (horizontal shaft wall only).
- O. CGC steel jamb struts, (212JS-34) (400JS-34) (600JS-34) hot-dipped galvanized.
- P. 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).
- Q. Acoustical sealant.
- R. Sound batts— (25 mm [1"]) (38 mm [1-1/2"]) (76 mm [3"]).
- S. 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 CGC Shaft Wall System
 - CGC Sheetrock® Brand Glass-Mat Liner Panels
 - CGC Sheetrock® Brand UltraLight Firecode® X Panels
 - CGC Sheetrock® Brand Firecode® X, Firecode® C, Ultracode® Core Panels
 - CGC Sheetrock® Brand Mold Tough® Firecode® X Panels
 - CGC Durock® Brand Cement Board
 - CGC Fiberock® Aqua-Tough™ Interior Panels
 - CGC Grand Prix® Brand Veneer Plaster Base Firecode®, Gypsum Base, Firecode® X
 - CGC steel framing components (C-H studs, J-runner, E-studs, jamb struts)
- B. Other fire-resistive elements/materials: Coordinate installation of CGC Shaft Wall assembly with sprayed fire-resistive materials and other fire-resistive elements so both elements remain complete and undamaged.

APPLICATION GUIDE

SPECIFICATIONS

3.3 SHAFT WALL INSTALLATION

A. CGC Steel Framing and CGC Sheetrock® Brand Glass-Mat 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. 610 mm (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 25 mm (1") less than floor-to-ceiling height and erect vertically between J-runners.
7. Where shaft wall height shaft exceeds 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 4.877 m (16').
8. Cut C-H studs 10 mm (3/8") to not more than 13 mm (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 10 mm (3/8") Type S-12 pan head screws. Attach strut-studs to jamb anchors with 13 mm (1/2") Type S-12 screws. Over steel doors, install a cut-to-length section of J-Runner and attach to strut-studs with 10 mm (3/8") Type S-12 screws.

B. Resilient Channels

1. Install resilient channels (RC-1 or equivalent) horizontally to face of studs, within 152 mm (6") of floor and ceiling.
2. Apply resilient channels a maximum of 610 mm (24") o.c. vertically (with open face up).
3. Attach resilient channels to studs with 10 mm (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 13 mm x 76 mm (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 25 mm (1") Type S screws 305 mm (12") o.c. Apply face layer vertically with joints staggered; attach to channels with 42 mm (1-5/8") Type S screws 305 mm (12") o.c.

C. CGC 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 14-16.

APPLICATION GUIDE SPECIFICATIONS

3.3 SHAFT WALL INSTALLATION (CONT.)

Per UL and ULC Designs U415, U469 and W452, CGC 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 and W452, one-hour fire-resistance rating. Apply one layer 15.9 mm (5/8") CGC Sheetrock® Brand Firecode® X Panels to studs and runners with 25 mm (1") Type S or S-12 (typical) screws. Fastener spacing – Space screws 305 mm (12") o.c. for vertical panel application, 203 mm (8") o.c. for horizontal panel application.

System B—U415 or U438 and W452 or W506, two-hour fire-resistance rating. Apply two layers of 12.7 mm (1/2") CGC Sheetrock® Brand Firecode® C Panels. Apply base layer to studs with 25 mm (1") Type S or S-12 (typical) screws. Space screws 610 mm (24") o.c. along edges and in the field of the panels for vertical application, 406 mm (16") o.c. for horizontal application. Apply face layer to studs and J-runners with 42 mm (1-5/8") Type S or S-12 (typical) screws. Space screws 305 mm (12") along the edges and in the field when applied vertically, 203 mm (8") o.c. when applied horizontally. Stagger all joints between base and face layers.

System D—U415 or U459 and W452, two-hour fire-resistance rating. Install 38 mm (1-1/2") Thermafiber® SAFB mineral wool batts in stud cavity. Apply base layer of 15.9 mm (5/8") CGC Sheetrock® Brand Firecode® C Panels using 25 mm (1") Type S or S-12 (typical) screws spaced 610 mm (24") o.c. when board is applied vertically. Space screws 406 mm (16") o.c. when board is applied horizontally. Apply face layer of 12.7 mm (1/2") CGC Durock® Brand Cement Board to C-H studs with 42 mm (1-5/8") CGC Durock™ Tile Backer Screws spaced 203 mm (8") o.c.

System E—U415 or U467 and W452, two-hour fire-resistance rating. Apply one layer 12.7 mm (1/2") CGC Sheetrock® Brand Firecode® C Panels to both sides of C-H studs. Fasten with 25 mm (1") Type S or S-12 (typical) screws. Space screws 305 mm (12") o.c. along the edges and in the field for vertical panel application, 203 mm (8") o.c. for horizontal.

System F—U415, two-hour fire-resistance rating. Apply base layer 12.7 mm (1/2") CGC Sheetrock® Brand Firecode® C Panels to resilient channels with 25 mm (1") Type S or S-12 (typical) screws spaced 610 mm (24") o.c. Stagger end joints. Apply face layer 12.7 mm (1/2") CGC Sheetrock® Brand Firecode® C Panels with 42 mm (1-5/8") Type S or S-12 (typical) screws spaced 305 mm (12") o.c.

System G—U415 and W452, three-hour fire-resistance rating. Apply two layers of 15.9 mm (5/8") CGC Sheetrock® Brand Firecode® C Panels using Type S or S-12 (typical) screws spaced 305 mm (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 610 mm (24"). When panels are applied horizontally, stagger joints a minimum 305 mm (12"). Apply third layer of 15.9 mm (5/8") CGC Sheetrock® Brand Firecode® C Panels vertically or horizontally over room side of steel C-H studs using 56 mm (2-1/4") Type S or S-12 (typical) screws. Space screws 406 mm (16") o.c. when board is applied vertically, 305 mm (12") o.c. when board is applied horizontally.

System H—U415 and W425, three-hour fire-resistance rating. Alternate to System G above. Apply third layer of 15.9 mm (5/8") CGC Sheetrock® Brand Firecode® C Panels to other side of steel C-H studs.

Horizontal (Ceiling) Assemblies—Two-hour fire-resistance rating. Install three layers of 12.7 mm (1/2") CGC Sheetrock® Brand Firecode® C Panels to horizontally installed C-H and/or E-studs. Apply the base layer with 25 mm (1") Type S or S-12 (typical) screws spaced 610 mm (24") o.c. Apply the mid-layer in the same manner with joints offset 610 mm (24") and attached with 42 mm (1-5/8") Type S or S-12 (typical) screws spaced 305 mm (12") o.c. Apply the face layer attached with 56 mm (2-1/4") Type S or S-12 (typical) screws spaced 305 mm (12") o.c. Place face layer end joints between studs and secure with 38 mm (1-1/2") Type G screws 203 mm (8") o.c.

Horizontal Stud Shaft Wall (Walls with studs placed horizontally) UL Design U437

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 51 mm (2") from ends and spaced no more than 610 mm (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 25 mm (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 25 mm (1") less than the wall height to clear the 25 mm (1") leg of the top J-runner.

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SPECIFICATIONS

3.3 SHAFT WALL INSTALLATION (CONT.)

4. Free edge of the uppermost and lower liner panels attached to the long leg of the top and bottom J-runners with 42 mm (1-5/8") long Type S or S-12 steel screws spaced no greater than 305 mm (12") on centers.
 5. Cut C-H studs to maintain a 6 mm (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 610 mm (24") o.c.
 7. Steel angles should be minimum 0.8 mm (20 gauge), 51 mm x 51 mm x 51 mm (2" x 2" x 2") for 102 mm (4") C-H studs, and 51 mm x 51 mm x 102 mm (2" x 2" x 4") for 152 mm (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 13 mm (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 13 mm (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. CGC Sheetrock® Brand Gypsum Panels (for vertical and horizontal shaft walls) Vent Shaft Enclosure—U529**, two-hour fire-resistance rating. Install 25 mm x 51 mm x 0.5 mm (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 610 mm (24") o.c. max. Install 12.7 mm (1/2") CGC Sheetrock® Brand Firecode® C Panels vertically. Fasten to angles with 25.4 mm (1") Type S or S-12 (typical) screws spaced 305 mm (12") o.c. Apply CGC Sheetrock® Brand or CGC Durabond® Brand Setting-Type compound on back side of liner panel and sheet-laminate to shaft-side board with vertical joints offset 305 mm (12") from inner board joints. Also screw to shaft-side board with 38 mm (1-1/2") long Type G screws spaced 610 mm (24") o.c. in both directions. Laminate face board to liner panels in similar manner. Install face boards vertically with joints offset 305 mm (12") from liner panel joints. Apply pressure when placing boards to ensure good adhesive bond and fasten to liner panel with 38 mm (1-1/2") Type G screws, spaced 610 mm (24") o.c.

3.4 ACCESSORY APPLICATION

- A. Gypsum Panel Joints**—Finish all face layer joints and internal angles with a CGC/Synko® Brand interior finishing system installed according to manufacturer's directions.
- B. Corner Bead**—Reinforce all vertical and horizontal exterior corners with CGC Sheetrock®/Beadex Brand Paper-Faced Metal Corner Bead.
- C. Metal Trim**—Where shaft wall terminates against masonry or other dissimilar material, apply CGC Sheetrock®/Beadex® Brand Paper-Faced Metal Corner Bead and Trim over face layer edge.

PRODUCT INFORMATION

See cgcinc.com for the most up-to-date product information.

NOTE

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Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protective equipment. Read Safety Data Sheets and literature before specification and installation.



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