Code Compliance Research Report
CCRR-0502

Issue Date: 09-18-2023
Revised Date: 09-13-2024
Renewal Date: 09-30-2025

DIVISION: 09 00 00 – FINISHES
Section: 09 21 16.23 – Gypsum Board Shaft Wall Assemblies

REPORT HOLDER:
USG Corporation
550 West Adams St.
Chicago, IL 60661
www.usg.com

REPORT SUBJECT:
USG Shaft Wall, Stair Wall, Horizontal Shaft Wall Ceiling, and Corridor Ceiling and Underside of Stairway Systems

1.0 SCOPE OF EVALUATION

1.1 This Research Report addresses compliance with the following Codes:

- 2024, 2021, 2018, 2015, 2012, 2009 *International Building Code®* (IBC)

NOTE: This report references the most recent Code edition noted. Section numbers in earlier editions may differ.

1.2 The USG Shaft Wall, Stair Wall, Horizontal Shaft Wall Ceiling, and Corridor Ceiling and Underside of Stairway Systems recognized in this report have been evaluated for the following properties (see Table 1):

- Fire resistance
- Structural
- Abuse resistance

1.3 The non-loadbearing USG Shaft Wall, Stair Wall, Horizontal Shaft Wall Ceiling, and Corridor Ceiling and Underside of Stairway Systems have been evaluated for the following uses:

- Non-loadbearing shaft walls and stair walls complying with IBC Sections 403, 707, 708, 713, 2506, 2508, and 2509
- Horizontal shaft wall ceiling complying with IBC Sections 711 and 713
- Corridor ceilings complying with IBC Sections 708 and 1020 and underside of stairways complying with IBC Section 1011.7.3.

2.0 STATEMENT OF COMPLIANCE

The USG Shaft Wall, Stair Wall, Horizontal Shaft Wall Ceiling, and Corridor Ceiling and Underside of Stairway Systems comply with the Codes listed in Section 1.1, for the properties stated in Section 1.2, and uses stated in Section 1.3, when installed as described in this report, including the Conditions of Use stated in Section 6.0.

3.0 DESCRIPTION

3.1 USG Shaft Wall, Stair Wall, Horizontal Shaft Wall Ceiling, and Corridor Ceiling and Underside of Stairway Systems: The wall and ceiling assemblies are constructed of cold formed steel studs and runners/tracks, and sheathing materials as described in this report.

This report describes assemblies that comply with ICC-ES AC86 for limiting heights and spans of gypsum wall and ceiling assemblies, and for fire-resistance in accordance with ASTM E119, for use in shaft walls, stair walls, horizontal shaft wall ceiling, and corridor ceiling and underside of stairway systems. Intertek has not evaluated the individual components for compliance with the product specifications noted in this report.

3.2 Steel Framing: Studs and track must be formed from steel complying with ASTM A1003, Grade 33 for 24 and 25 ga steel or Grade 40 for 20 ga steel, having a minimum G40 galvanized coating complying with ASTM A653.

C-H Studs and J-Runners have dimensions shown in Table 6 and Figure 1.

3.3 Panels: This Report covers 1-in. Gypsum Liner Panels and the various other panels approved for use on the face of the wall or ceiling assembly. These face panels are further divided into gypsum paper-faced board, gypsum glass-mat

panels, fiber reinforced gypsum panels and cementitious boards. See Table 3.

3.3.1 Gypsum Liner Panels: The panels are comprised of a noncombustible core complying with ASTM E136, covered with a water-resistant face and back paper or glass mat facing, and must comply with the physical property requirements of ASTM C1396 or ASTM C1658.

3.3.2 Paper-faced or Glass-Mat Gypsum Panels: The panels are comprised of a noncombustible core complying with ASTM E136, covered with a face and back paper or glass mat facing, and must comply with physical property requirements of ASTM C1396, ASTM C1658, ASTM C1177 or ASTM C1178.

3.3.3 Fiber-reinforced Gypsum Panels: The panels are comprised of a gypsum-fiber-reinforced core without face or back paper and must comply with physical property requirements of ASTM C1278.

3.3.4 Cementitious Boards: The panels are comprised of a cementitious core with glass-fiber mesh and must comply with the physical property requirements of ASTM C1325.

4.0 PERFORMANCE CHARACTERISTICS

4.1 Allowable Spans: Limiting wall heights for interior non-loadbearing walls are shown in Assemblies 1 through 6, corridor ceiling and underside of stairway spans are shown in Assemblies 7 and 8, and spans for horizontal shaft wall ceilings are shown in Assembly 9.

4.2 Fire-resistance-Rated Assemblies: Fire-resistance-rated assemblies are described in Assemblies 1 through 9 in this report. Other fire resistive assemblies for ceiling membranes may be found in UL Design Nos. I506 and I512.

4.3 Abuse Resistant Assemblies: The products described in Tables 4 and 5 of this report have been evaluated in accordance with ASTM C1629. See IBC Section 403.2.2 for guidance.

5.0 INSTALLATION

5.1 General: The shaft wall, stair wall, horizontal shaft wall ceiling, and corridor ceiling and underside of stairway systems must be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and this Research Report. A copy of the manufacturer's instructions must be available on the jobsite during installation.

J-runners are positioned at floor and ceiling with the 1-in. leg towards the finished side of the wall. Attachment to the structure shall be per design. C-H Studs must be 1/2-in. shorter than the floor-to-ceiling height.

Where wall height exceeds gypsum liner panel length, gypsum liner panel may be butted together in moderate contact to extend to the full height of the wall. Horizontal joints need not be backed by steel framing. The horizontal butt joints shall occur within the top and bottom third of the wall and must be staggered in adjacent sections.

Openings and penetrations in fire-resistance-rated construction are outside the scope of this report and must comply with the applicable provisions in IBC Chapter 7.

Gypsum panels are not recommended to be used as unlined air supply ducts.

Finishing of the gypsum panels must be in accordance with ASTM C840 or GA-216. Common installation details are provided in the Supplement attached to this report.

6.0 CONDITIONS OF USE

6.1 Installation must comply with this Research Report, the manufacturer's published installation instructions, and the applicable Code. In the event of a conflict, this report governs.

6.2 The shaft walls and stair walls are limited to non-loadbearing applications with no superimposed vertical load.

6.3 The horizontal shaft wall ceiling and corridor ceiling and underside of stairway system may not carry any superimposed loads beside its own weight.

6.4 Design of the attachment of the wall or systems to the surrounding structure is outside the scope of this report.

6.5 When requested, information must be provided to the Building Official demonstrating the components identified

in the assemblies described in this report comply with the applicable specifications.

7.0 SUPPORTING EVIDENCE

7.1 Reports of tests in accordance with ASTM E119 and ASTM C1629. (See Table 2 for a list of standards referenced in this report.)

7.2 Data in accordance with ICC-ES Acceptance Criteria for Cold-formed Steel Framing Members – Interior Non-loadbearing Wall Assemblies (AC86), dated June 2019 (editorially revised October 2021.)

7.3 Intertek Listing Report "USG Shaft Wall, Stair Wall, Horizontal Shaft Wall Ceilings and Corridor Ceiling and Underside of Stairway Systems", on the Intertek Directory of Building Products.

8.0 IDENTIFICATION

Steel framing: Bundles of framing must be labeled with the following:

- Manufacturer's identification
- Minimum steel thickness, exclusive of protective coating
- Minimum yield strength

Gypsum panels: The panels must be identified with by the manufacturer's name (USG Corporation), the product name and UL listing information.

9.0 OTHER CODES

This section is not applicable.

10.0 CODE COMPLIANCE RESEARCH REPORT USE

10.1 Approval of building products and/or materials can only be granted by a building official having legal authority in the specific jurisdiction where approval is sought.

10.2 Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by Intertek.

10.3 Reference to the https://bpdirectory.intertek.com is recommended to ascertain the current version and status of this report.

TABLE 1 – PROPERTIES EVALUATED

PROPERTY	2024 IBC SECTION
Lateral Loads	2206
Fire Resistance	703
Abuse Resistant Materials	403.2.2

Section numbers in earlier versions of the code may differ.

TABLE 2 – REFERENCED STANDARDS

STANDARD	TITLE
ASTM C1177	Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C1178	Coated Glass Mat Water-Resistant Gypsum Backing Panel
ASTM C1278	Fiber-Reinforced Gypsum Panel
ASTM C1325	Fiber-Mat Reinforced Cementitious Backer Units
ASTM C1396	Gypsum Board
ASTM C1629	Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels
ASTM C1658	Glass Mat Gypsum Panels
ASTM E119	Fire Tests of Building Construction and Materials

TABLE 3 – USG PANEL PRODUCTS

UL Type	Product Name	ASTM Standard Specification
AR	5/8 in. Sheetrock® Brand Mold Tough® AR Firecode® X Panels	C1396
	5/8 in. Sheetrock® Brand Glass-Mat Panels Mold Tough® AR Firecode® X	C1658
	5/8 in. Sheetrock® Brand Mold Tough® VHI Firecode® X Panels	C1396
	5/8 in. Sheetrock® Brand Glass-Mat Panels Mold Tough® VHI Firecode® X	C1658
C	1/2 in. Sheetrock® Brand Firecode® C Panels	C1396
	1/2 in. Sheetrock® Brand Mold Tough® Firecode® C Panels	C1396
DCB	1/2 in. Durock® Brand Cement Board with EdgeGuard™	C1325
	5/8 in. Durock® Brand Cement Board with EdgeGuard™	C1325
FRX-G	5/8 in. Fiberock® Brand Tile Backerboard	C1278
	5/8 in. Fiberock® Brand Aqua-Tough™ AR Interior Panels	C1278
	5/8 in. Fiberock® Brand AR Interior Panels	C1278
IP-X1	5/8 in. Sheetrock® Brand Gypsum Base Imperial® Firecode® X	C1396
SCX	5/8 in. Sheetrock® Brand Firecode® X Panels	C1396
	5/8 in. Sheetrock® Brand Mold Tough® Firecode® X Panels	C1396
SGX	5/8 in. Sheetrock® Brand Glass-Mat Panels Mold Tough® Firecode® X	C1658
	5/8 in. Durock™ Brand Glass-Mat Tile Backerboard	C1178
SLX	1 in. Sheetrock® Brand Mold Tough® Gypsum Liner Panels	C1396
	1 in. Sheetrock® Brand Glass-Mat Liner Panels Mold Tough®	C1658
ULIX	5/8 in. Sheetrock® Brand EcoSmart Panels Firecode® X	C1396
	5/8 in. Sheetrock® Brand EcoSmart Panels Mold Tough® Firecode® X	C1396
ULTRACODE	3/4 in. Sheetrock® Brand Mold Tough® Ultracode® Core Panels	C1396
USGX	5/8 in. Securock® Brand UltraLight Glass-Mat Sheathing Firecode® X	C1177

TABLE 4 – ABUSE RESISTANT PANEL CLASSIFICATION

Panel Type	Soft Body Impact Classification	Hard Body Impact Classification	Abrasion Resistance Classification*	Indentation Resistance Classification
5/8 in. Sheetrock® Brand Mold Tough® AR Firecode® X Panels	2	1	2	1
5/8 in. Sheetrock® Brand Mold Tough® VHI Firecode® X Panels	3	3	2	2
5/8 in. Sheetrock® Brand Glass-Mat Panels Mold Tough® AR Firecode® X	3	1	2	2
5/8 in. Sheetrock® Brand Glass-Mat Panels Mold Tough® VHI Firecode® X	3	2	2	1
5/8 in. Fiberock® Brand Aqua-Tough™ AR Interior Panels	2	1	1	1
5/8 in. Fiberock® Brand AR Interior Panels (Type X)	2	1	1	1

* When painted with one coat of primer and two coats of latex paint, the abrasion resistance increases to Level 3.

TABLE 5 – ABUSE RESISTANT PANELS – COMPLIANCE WITH IBC 403.2.2.2 AND 2-HR FIRE-RESISTANCE

AR and VHI Panel Type	Soft Body Impact Classification	Hard Body Impact Classification	Number of Layers to Meet IBC 403.2.2.2	Additional Layers Needed for Two-hour Rating*
5/8 in. Sheetrock® Brand Mold Tough® AR Firecode® X Panels	2	1	3-layers per 403.2.2.2, Option 3	None
5/8 in. Sheetrock® Brand Mold Tough® VHI Firecode® X Panels	3	3	1-layer per 403.2.2.2, Option 2	One layer of Type X as required for fire rating
5/8 in. Sheetrock® Brand Glass-Mat Panels Mold Tough® AR Firecode® X	3	1	3-layers per 403.2.2.2, Option 3	None
5/8 in. Sheetrock® Brand Glass-Mat Panels Mold Tough® VHI Firecode® X	3	2	2-layers per 403.2.2.2, Option 1	None

*See Assemblies described below for two-hour-rated constructions.

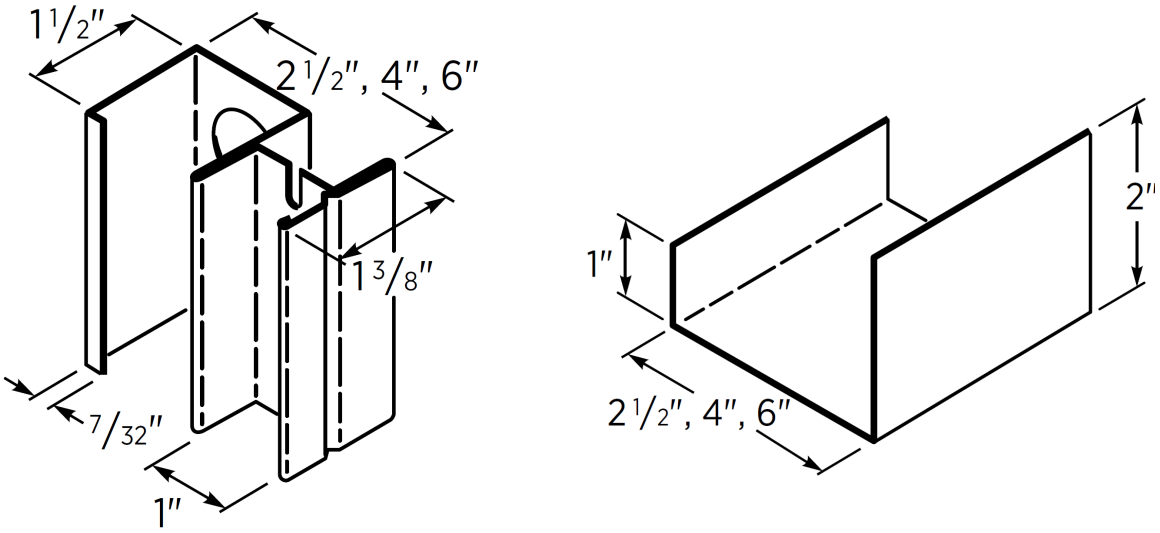


FIGURE 1 – C-H STUDS AND J-RUNNERS

TABLE 6 – DESIGN PROPERTIES OF STUDS AND J-RUNNERS

Component		Design Thickness (in)	Fy (ksi)	Gauge	Ix (in^4)	Sx (in^3)
C-H Studs	212CH -18	0.0188	33	25	0.129	0.093
	212CH-34	0.0359	40	20	0.239	0.1741
	400CH-18	0.0188	33	25	0.383	0.162
	400CH-34	0.0359	40	20	0.73	0.318
	600CH-34	0.0359	40	20	1.998	0.569
J-Runner	212JR-23	0.0239	33	24	0.117	0.085
	212JR-34	0.0359	40	20	0.192	0.13
	400JR-23	0.0239	33	24	0.351	0.163
	400JR-34	0.0359	40	20	0.574	0.251
	600JR-34	0.0359	40	20	1.523	0.457

LIMITING HEIGHTS AND FIRE-RESISTANCE RATINGS

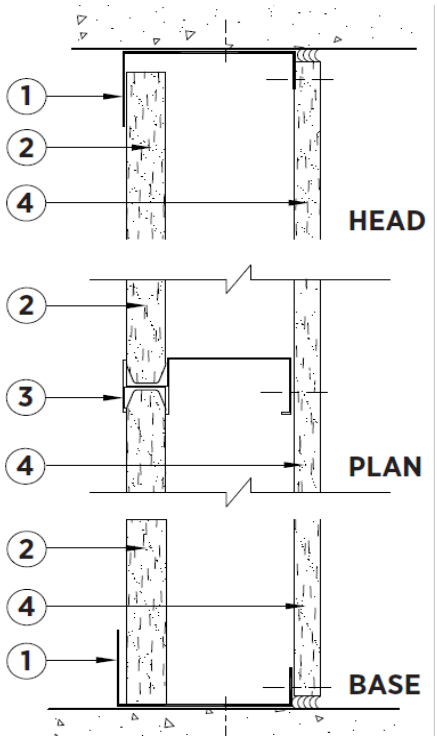
Assembly 1 – One-Hour Shaft Wall:

1. Minimum 2-1/2-in. deep, 24-gauge floor and ceiling J-runners, attached to structure. Install vertical J-runner at start/end of the wall.
2. Gypsum Liner Panel - UL Type SLX. Attach the gypsum liner to the first J-runner with 1-5/8-in long Type S screws spaced 12-in. o.c. or with an approved alternative securement method.
3. Minimum 2-1/2-in. deep C-H Studs 25 gauge 24-in. o.c., with the H-section of C-H stud towards the long leg of the J-runner. Gypsum liner panels are friction-fitted in the H-section of C-H studs.
4. One layer of 5/8-in. gypsum panel, UL Type ULIX, SCX, AR, USGX, IP-X1, SGX, or FRX-G installed vertically or horizontally with 1-in. long Type S screws spaced 12-in. o.c. in field and on edges when installed vertically or spaced 8-in. o.c. when installed horizontally.

For further details refer to UL Design No. U415 System A and the USG installation instructions.

Assembly 1 – Limiting Heights for Shaft Walls with Vertical Stud:
Orientation for One-hour Fire-resistance-rated Construction

		1-hr Shaft Wall / Stair Wall							
Stud Description	***Allowable Deflection***	***5psf design (ft - in)***		***7.5psf design (ft - in)***		***10psf design (ft - in)***		***15psf design (ft - in)***	
212CH25-18	L/120	13	10	9	4	7	0	4	8
	L/240	11	0	9	4	7	0	4	8
	L/360	9	7	8	4	7	0	4	8
212CH20-34	L/120	16	0	14	0	12	9	11	1
	L/240	12	9	11	1	10	1	8	8
	L/360	11	1	9	8	8	8	7	5
400CH25-18	L/120	10	6	7	0	5	3	3	6
	L/240	10	6	7	0	5	3	3	6
	L/360	10	6	7	0	5	3	3	6
400CH20-34	L/120	22	3	19	5	17	8	14	3
	L/240	17	8	15	5	14	0	12	3
	L/360	15	5	13	6	12	3	10	8
600CH20-34	L/120	30	11	21	5	16	1	10	8
	L/240	24	6	21	5	16	1	10	8
	L/360	21	5	18	8	16	1	10	8



ASSEMBLY 1 – ONE-HOUR SHAFT WALL

LIMITING HEIGHTS AND FIRE-RESISTANCE RATINGS

Assembly 2 – Two-Hour Shaft Walls:

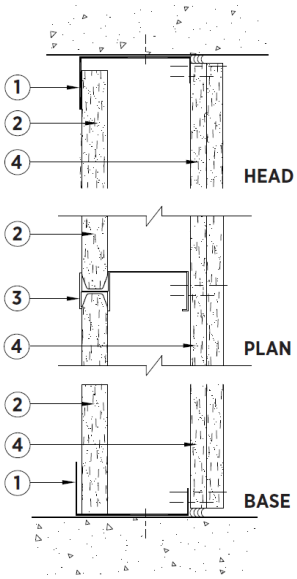
1. Minimum 2-1/2-in. deep, 24-gauge floor and ceiling J-runners, attached to structure. Install vertical J-runner at start/end of the wall.
2. Gypsum Liner Panel - UL Type SLX. Attach the gypsum liner to the first J-runner with 1-5/8-in. long Type S screws spaced 12-in. o.c. or with an approved alternative securement method.
3. Minimum 2-1/2-in. deep USG C-H studs, 25-gauge, 24-in. o.c., with the H-Section of C-H Stud towards the long leg of the J-runner. Gypsum liner panels are friction-fitted in the H-section of C-H studs.
4. Two layers of 1/2-in. gypsum panel, UL Type C or two layers of 5/8-in. gypsum panel, UL Type ULIX, SCX, AR, USGX, IP-X1, SGX, or FRX-G installed vertically or horizontally. Base layer attached with 1-in. long Type S screws spaced 24-in. o.c. when installed vertically or spaced 16-in. o.c. when installed horizontally. Face layer attached with 1-5/8-in. long Type S screws spaced 12-in. o.c. when installed vertically or spaced 8-in. o.c. when installed horizontally. Horizontal joints between adjacent layers shall be staggered a minimum of 12-in.

For further details, refer to UL Design No. U415, System B and the USG installation instructions. Alternate construction options for 2-hour fire-resistance-rated shaft walls are described in UL Design No. U415 Systems C, D and F.

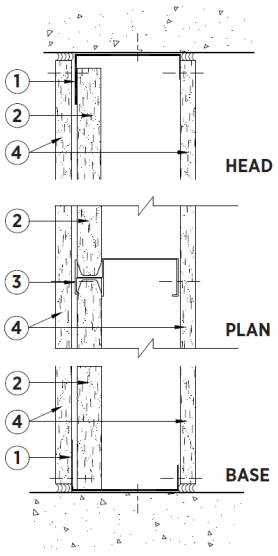
Assembly 3 – Two-Hour Stair Wall:

1. Minimum 2-1/2-in. deep, 24-gauge floor and ceiling J-runners, attached to structure. Install vertical J-runner at start/end of the wall.
2. Gypsum Liner Panel - UL Type SLX. Attach the gypsum liner to the first J-runner with 1-5/8-in. long Type S screws spaced 12-in. o.c. or with an approved alternative securement method.
3. Minimum 2-1/2-in. deep USG C-H Studs, 25-gauge, 24-in. o.c. with the H-Section of C-H Stud towards the long leg of the J-runner. Gypsum liner panels are friction-fitted in the H-section of C-H studs.
4. One layer of 1/2-in. gypsum panel, UL Type C or one layer of 5/8-in. gypsum panel, UL Type ULIX, SCX, AR, USGX, IP-X1, SGX, or FRX-G installed vertically or horizontally on both sides with 1-in. long Type S screws spaced 12-in. o.c. when installed vertically or spaced 8-in. o.c. when installed horizontally.

For further details, refer to UL Design No. U415, System E and the USG installation instructions.



ASSEMBLY 2 – TWO-HOUR SHAFT WALL



ASSEMBLY 3 – TWO-HOUR STAIR WALL

LIMITING HEIGHTS AND FIRE-RESISTANCE RATINGS

LIMITING HEIGHTS – TWO HOUR FIRE-RESISTANCE-RATED ASSEMBLIES (Assemblies 2 and 3)

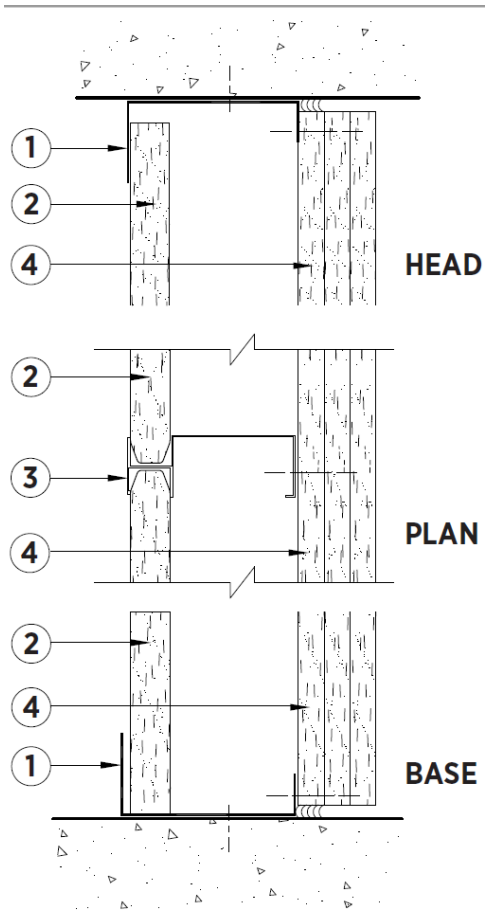
		2-hr Stair Wall								2-hr Shaft Wall							
Stud Description	Allowable Deflection	5psf design (ft - in)		7.5psf design (ft - in)		10psf design (ft - in)		15psf design (ft - in)		5psf design (ft - in)		7.5psf design (ft - in)		10psf design (ft - in)		15psf design (ft - in)	
212CH25-18	L/120	14	4	12	6	10	5	6	11	14	6	12	8	10	5	6	11
	L/240	11	4	9	11	9	0	6	11	11	6	10	0	9	1	6	11
	L/360	9	11	8	8	7	10	6	10	10	0	8	9	8	0	6	11
212CH20-34	L/120	19	0	16	7	14	7	12	3	17	1	14	11	13	6	11	10
	L/240	14	7	12	3	10	10	9	3	13	6	11	10	10	9	9	4
	L/360	12	3	10	4	9	3	7	10	11	10	10	4	9	4	7	10
400CH25-18	L/120	19	0	15	7	13	2	8	9	18	4	15	0	13	0	8	9
	L/240	17	4	14	7	12	11	8	9	16	1	14	1	12	9	8	9
	L/360	14	7	12	3	10	11	8	9	14	1	12	4	11	2	8	9
400CH20-34	L/120	23	0	23	0	21	0	17	4	23	0	21	0	19	1	16	5
	L/240	21	0	17	7	15	8	13	3	19	1	16	8	15	2	13	3
	L/360	17	7	14	11	13	3	11	3	16	8	14	7	13	3	11	7
600CH20-34	L/120	31	0	29	3	21	11	14	7	31	0	27	4	21	11	14	7
	L/240	28	0	23	10	21	4	14	7	25	8	22	5	20	5	14	7
	L/360	23	10	20	5	18	3	14	7	22	5	19	7	17	10	14	7

LIMITING HEIGHTS AND FIRE-RESISTANCE RATINGS

Assembly 4 – Three-Hour Shaft Wall:

1. Minimum 2-1/2-in. deep, 24-gauge floor and ceiling J-runners, attached to structure. Install vertical J-runner at start/end of the wall.
2. Gypsum Liner Panel - UL Type SLX. Attach the gypsum liner to the vertical J-runners with 1-5/8-in. long Type S screws spaced 12-in. o.c. or with an approved alternative securement method.
3. Minimum 2-1/2-in deep USG C-H Studs, 25-gauge, 24-in. o.c., with the H-section of C-H Stud towards the long leg of the J-runner. Gypsum liner panels are friction-fitted in the H-section of C-H studs.
4. Three layers of 5/8-in. gypsum panel, UL Type ULIX, installed vertically or horizontally. Base layer attached with 1-in. long Type S screws spaced 24-in. o.c. when installed vertically or spaced 16-in. o.c. when installed horizontally. Middle layer attached with 1-5/8-in. long Type S screws spaced 24-in. o.c. when applied vertically or spaced 16-in. o.c. when applied horizontally. Face layer attached with 2-1/4-in. long Type S screws spaced 16-in. o.c. when applied vertically and spaced 12-in. o.c. when applied horizontally. Horizontal joints between adjacent layers must be staggered a minimum of 12-in.

For further details, refer to UL Design No. U415 System G and the USG installations instructions.



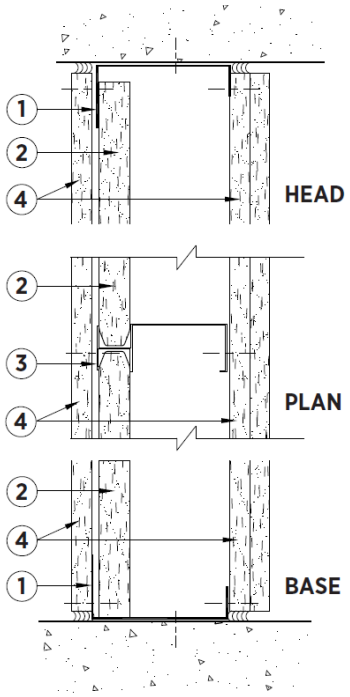
ASSEMBLY 4 – THREE-HOUR SHAFT WALL

LIMITING HEIGHTS AND FIRE-RESISTANCE RATINGS

Assembly 5 – Three-Hour Stair Wall:

1. Minimum 2-1/2-in. deep, 24-gauge floor and ceiling J-runners, attached to structure. Install vertical J-runner at start/end of the wall.
2. Gypsum Liner Panel - UL Type SLX. Attach the gypsum liner to the vertical J-runners with 1-5/8-in long Type S screws spaced 12-in. o.c. or with an approved alternative securement method.
3. Minimum 2-1/2-in. deep USG C-H studs, 25-gauge, 24-in. o.c., with the H-Section of C-H Stud towards the long leg of the J-runner. Gypsum liner panels are friction-fitted in the H-section of C-H studs.
4. One layer of 5/8-in. gypsum panel, UL Type ULIX, installed vertically or horizontally on the flange of the H-section and attached with 1-in. long Type S screws spaced 12-in. o.c. when installed vertically, or spaced 8-in. o.c. when installed horizontally. Two layers of 5/8-in. gypsum panel, UL Type ULIX, installed horizontally or vertically, on the flange of the C-section of the studs. Base layer attached to studs with 1-in. long Type S steel screws spaced 24-in. o.c. when installed vertically or spaced 16-in. o.c. when installed horizontally. Face layer attached to studs with 1-5/8-in long Type S steel screws spaced 16-in. o.c. when installed vertically or spaced 12-in. o.c. when installed horizontally. Screws offset 6-in. from layer below. Horizontal joints on adjacent layers staggered a minimum of 12-in. Vertical joints centered over studs and staggered 24-in. on adjacent layers.

For further details, refer to UL Design No. U415, System H and the USG installation instructions.



ASSEMBLY 5 – THREE-HOUR STAIR WALL

LIMITING HEIGHTS AND FIRE-RESISTANCE RATINGS

LIMITING HEIGHTS FOR THREE-HOUR FIRE-RESISTANCE-RATED ASSEMBLIES (Assemblies 4 and 5)

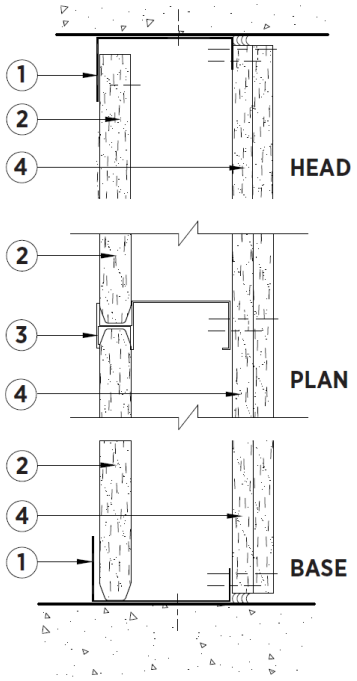
		3-hr Stair Wall								3-hr Shaft Wall							
Stud Description	Allowable Deflection	5psf design (ft - in)		7.5psf design (ft - in)		10psf design (ft -in)		15psf design (ft - in)		5psf design (ft - in)		7.5psf design (ft - in)		10psf design (ft - in)		15psf design (ft - in)	
212CH25-18	L/120	14	4	12	6	10	5	6	11	14	6	12	8	10	5	6	11
	L/240	11	4	9	11	9	0	6	11	11	6	10	0	9	1	6	11
	L/360	9	11	8	8	7	10	6	10	10	0	8	9	8	0	6	11
212CH20-34	L/120	19	0	16	7	14	7	12	3	17	1	14	11	13	6	11	10
	L/240	14	7	12	3	10	10	9	3	13	6	11	10	10	9	9	4
	L/360	12	3	10	4	9	3	7	10	11	10	10	4	9	4	7	10
400CH25-18	L/120	19	0	15	7	13	2	8	9	18	4	15	0	13	0	8	9
	L/240	17	4	14	7	12	11	8	9	16	1	14	1	12	9	8	9
	L/360	14	7	12	3	10	11	8	9	14	1	12	4	11	2	8	9
400CH20-34	L/120	23	0	23	0	21	0	17	4	23	0	21	0	19	1	16	5
	L/240	21	0	17	7	15	8	13	3	19	1	16	8	15	2	13	3
	L/360	17	7	14	11	13	3	11	3	16	8	14	7	13	3	11	7
600CH20-34	L/120	31	0	29	3	21	11	14	7	31	0	27	4	21	11	14	7
	L/240	28	0	23	10	21	4	14	7	25	8	22	5	20	5	14	7
	L/360	23	10	20	5	18	3	14	7	22	5	19	7	17	10	14	7

LIMITING HEIGHTS AND FIRE-RESISTANCE RATINGS

Assembly 6 – Two-Hour Horizontal Stud Shaft Wall:
Width of wall is limited to length of the liner panel or length of C-H Stud.

1. Minimum 4-in. deep, 20-gauge J-runners and attached to structural support. Install vertical J-runners at the start/end of the wall.
2. Gypsum Liner Panel - UL Type SLX. Attach the gypsum liner to the top and bottom J-runner with 1-5/8-in. long Type S screws spaced 12-in. o.c. or with an approved alternative securement method.
3. Minimum 4-in. deep C-H studs, 20-gauge, 24-in. o.c., installed horizontally with the C-section of the studs facing down. Studs cut to length to allow a 3/8-in. to 1/2-in. maximum gap at each end of the wall. The C-H studs may be screw attached to the side J-Runners with four 1/2-in. long pan head Type S screws, one at each end of the stud on each end of the wall. Gypsum liner panels are friction-fitted in the H-section of C-H studs.
4. Two layers of 5/8-in. gypsum panels - UL Type SCX, ULIX, AR or FRX-G, installed vertically. The base layer is attached with 1-in. long Type S screws spaced 12-in. o.c. The face layer is attached with 1-5/8-in. long Type S screws spaced 8-in. o.c. All joints must be staggered a minimum of 12-in. from the adjacent layers.

For further details, refer to UL Design No. U437 and the USG installation instructions. One hour fire-resistance-rated wall option is available as a part of UL Design No. U437.



ASSEMBLY 6 – TWO-HOUR HORIZONTAL STUD SHAFT WALL ASSEMBLY

LIMITING SPANS AND FIRE-RESISTANCE RATINGS

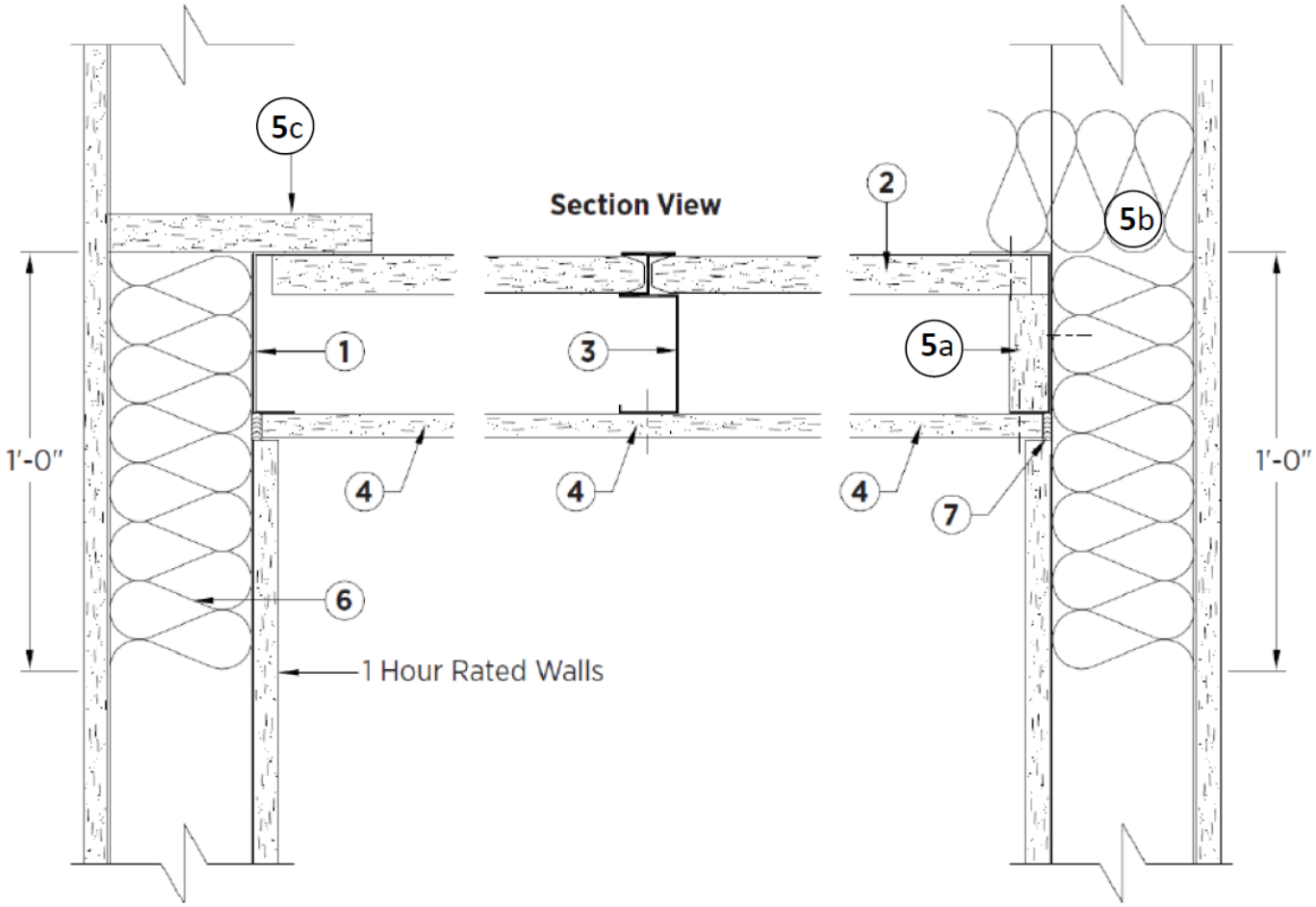
Assembly 7 – One-Hour Corridor Ceiling and Underside of Stairway:

1. Minimum 2-1/2-in.-deep, 24-gauge J-runner attached horizontally to perimeter or boundary walls with appropriate fasteners. See notes in the Span table below.
2. Gypsum Liner Panel – UL Type SLX. Friction-fitted in the H-section of C-H studs and screw attached to the 2-in. leg of the J-runner with 1-5/8-in. Type S screws spaced 12-in. o.c. or with an approved alternative securement method.
3. Minimum 2-1/2-in. C-H studs installed perpendicular to the J-runner spaced 24-in. o.c. with the C-section of the C-H stud facing downward with two 1/2-in. long Type S screws one on each side. Gypsum liner panels are friction-fitted in the H-section of C-H studs.
4. One layer of 5/8-in.-thick gypsum panel, UL Type ULIX, SCX, AR, SGX, USGX, IP-X1, or FRX-G, applied to the underside of the C-H stud and the perimeter J-runners attached with 1-in. long Type S screws spaced 12-in. o.c.
5. Ripper Board is used:
   a. Where the liner panel is cut short, gaps must be covered by using a strip of 1-in. thick Gypsum Liner Panel – UL Type SLX. -or-
   b. As an alternative, mineral wool insulation shall be used to prevent exposure to the top leg of the J-runner that forms the ceiling. -or-
   c. Where the wall section extends above the ceiling, a rip of board must be used to cap the opening between studs and a strip of mineral wool insulation as described in item 6 must be used.
6. To prevent the passage of heat and gases, a minimum 12-in long strip of mineral wool insulation must be used to fill the stud cavity of the walls.
7. USG Sheetrock® Brand Firecode® Smoke-Sound Sealant, USG Sheetrock® Brand Acoustical Sealant (UL Type AS) or equivalent.

Maximum Spans for One-Hour Corridor Ceiling and Underside of Stairway (Assembly 7)	
Single-layer 5/8-in. Gypsum Panels	**Max Span Between Studs**
212CH25-18 (see note 2)	8-ft. – 6-in.
212CH20-34 (see note 3)	10-ft. – 4-in.
400CH25-18 (see note 2)	9-ft. – 3-in.
400CH20-34 (see note 3)	14-ft. – 11-in.
600CH20-34 (see note 3)	20-ft. – 10-in.

Notes:
1. Based on L/240 allowable deflection, full-length studs only at 24-in. o.c. max. spacing and J-runner. Calculated allowing for gypsum panel and framing weight only.
2. J-runner connection to wall/building must meet or exceed 189 lbs. capacity at every stud location (24-in. o.c.).
3. J-runner connection to wall/building must meet or exceed 386 lbs. capacity at every stud location (24-in. o.c.).
4. C-H studs are not designed to carry live loads, mechanical equipment or provide material storage area. See USG SA926 for additional information.

LIMITING SPANS AND FIRE-RESISTANCE RATINGS



ASSEMBLY 7 – ONE-HOUR CORRIDOR CEILING AND UNDERSIDE OF STAIRWAY

LIMITING SPANS AND FIRE-RESISTANCE RATINGS

Assembly 8 – Two-Hour Corridor Ceiling and Underside of Stairway:

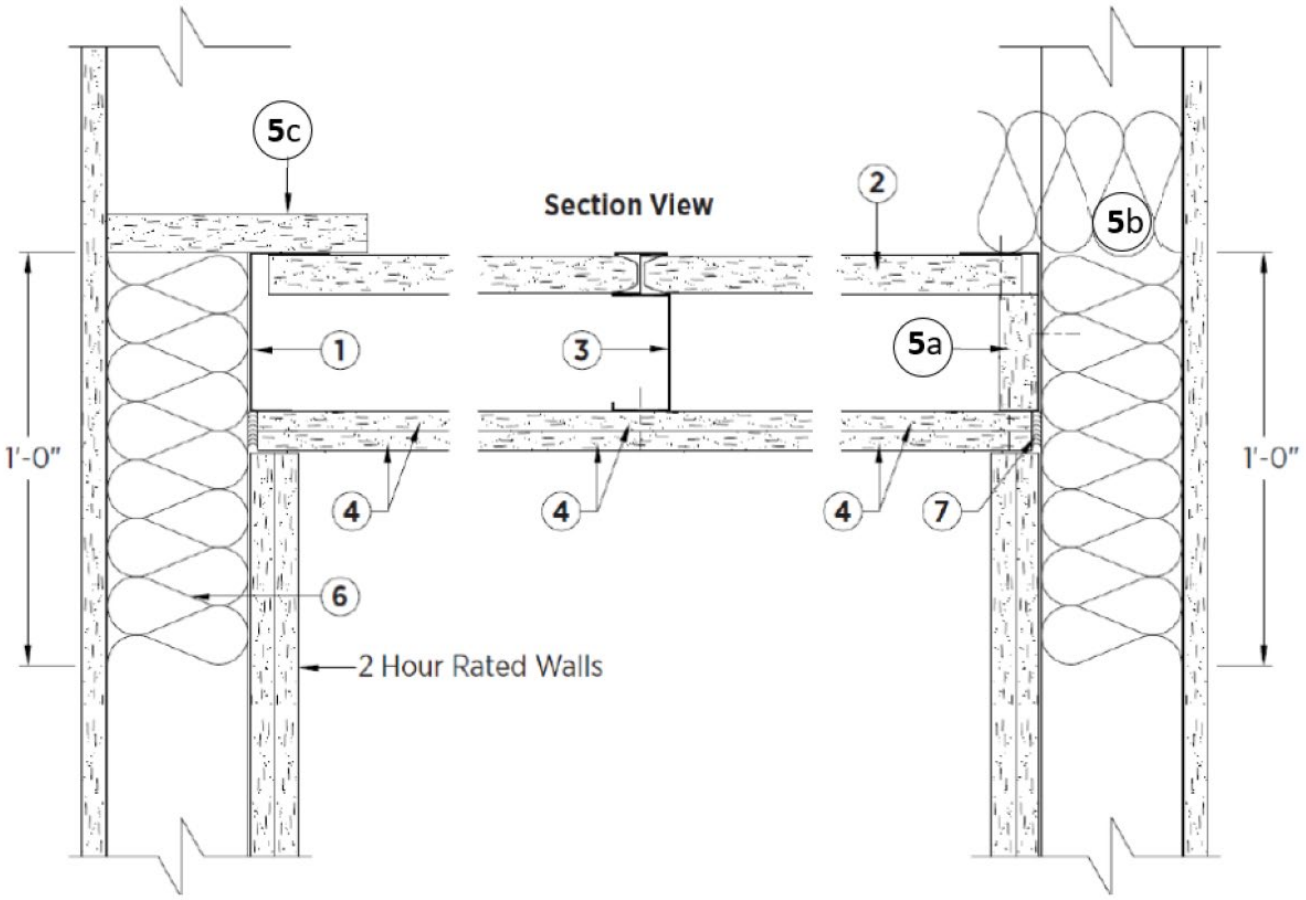
1. A minimum 2-1/2-in. deep 24-gauge J-runner attached horizontally to perimeter or boundary walls with appropriate fasteners. See notes in span table below.
2. Gypsum Liner Panel - UL Type SLX. Friction-fitted in the H-section of C-H studs and screw attached to the 2-in. leg of the J-runner with 1-5/8-in. Type S screw spaced 12-in. o.c. or with an approved alternative securement method.
3. Install the C-H studs perpendicular to the J-runner spaced 24-in. o.c. with the C-section of the C-H stud facing downward and secure with two 1/2-in. long Type S-12 screws, one on each side.
4. Gypsum Panel: For a two-hour assembly: Two layers of minimum 1/2-in. thick gypsum panel, UL Type C or two layers of 5/8-in. gypsum panel, UL Type ULIX, SCX, AR, USGX, IP-X1, SGX, or FRX-G to the underside of the C-section of the C-H stud and the perimeter J-runner for the base layer, use a 1-in. long Type S screw that is spaced 24-in. o.c. The face layer shall be applied with a 1-5/8-in. long Type S screws spaced 12-in. o.c. All joints must be staggered a minimum of 24-in. o.c. from the adjacent layer.
5. Ripper Board is used:
   a. Where the liner panel is cut short, the gaps must be filled by using a strip of 1-in. thick Gypsum Liner Panel, UL Type SLX. -or-
   b. As an alternative, mineral wool insulation shall be used to prevent exposure to the top leg of the J-runner that forms the ceiling. -or-
   c. Where the wall section extends above the ceiling, a rip of board must be used to cap the opening between studs and a strip of mineral wool insulation as described in item 6 must be used.
6. To prevent the passage of heat and gases, a 12-in. minimum long strip of mineral wool insulation must be used to fill in the stud cavity of the walls.
7. USG Sheetrock® Brand Firecode® Smoke-Sound Sealant, USG Sheetrock® Brand Acoustical Sealant (UL Type AS) or equivalent.

Maximum Spans for Two-Hour Corridor Ceiling and Underside of Stairway (Assembly 8)	
Double-layer 1/2- or 5/8-in. Gypsum Panels	**Max Span Between Studs**
212CH25-18 (see note 2)	7-ft. – 10-in.
212CH20-34 (see note 3)	9-ft. – 8-in.
400CH25-18 (see note 2)	7-ft. – 7-in.
400CH20-34 (see note 3)	14-ft. – 0-in.
600CH20-34 (see note 3)	19-ft. – 7-in.

Notes:

1. Based on L/240 allowable deflection, full-length studs only at 24-in. o.c. max. spacing and J-runner. Calculated allowing for gypsum panel and framing weight only.
2. J-runner connection to wall/building must meet or exceed 189 lbs. capacity at every stud location (24-in. o.c.).
3. J-runner connection to wall/building must meet or exceed 386 lbs. capacity at every stud location (24-in. o.c.).
4. C-H studs are not designed to carry live loads, mechanical equipment or provide material storage area. See USG SA926 for additional details.

LIMITING SPANS AND FIRE-RESISTANCE RATINGS



ASSEMBLY 8 – TWO-HOUR CORRIDOR CEILING AND UNDERSIDE OF STAIRWAY

LIMITING SPANS AND FIRE-RESISTANCE RATINGS

Assembly 9 – Two-Hour Horizontal Gypsum Duct Enclosure:

1. A minimum 2-1/2-in deep 24-gauge J-runners attached to the perimeter or boundary wall, with appropriate fasteners. Connection of the vertical C-H stud to the top J-runner and connection of the top J-runner to the structure shall be capable of carrying the weight of the duct enclosure and verified by a registered design professional.
2. Gypsum Liner Panel - Friction-fitted in the H-section of C-H studs and screw attached to the 2-in. leg of the J-runner with 1-5/8-in. Type S screws spaced 12-in. o.c. or with an approved alternative securement method.
3. Install the C-H studs perpendicular to the J-runners, spaced 24-in. o.c., with two #8 -1/2-in. long Type S-12 screws, one on each end. A 2-1/2-in. wide, 30-gauge flat metal strap is attached perpendicular and at the mid-span to the H-section of the C-H stud on the shaft side with 1/2-in. long Type S-12 screws, one at each C-H stud and one screw to the 2-in. long leg of J-runner at each end.
4. Three layers of 1/2-in. gypsum panels, UL Type C, to the C-section side of the assembly. The base layer is attached parallel to the C-H studs with 1-in. long Type S screws spaced 24-in o.c. The second layer is attached parallel to the C-H studs with 1-5/8-in. long Type S screws spaced 12-in. o.c., with all the joints staggered 24-in. o.c. from the base layer. The face layer is applied perpendicular to the C-H studs and attached with 2-in. long Type S screws spaced 12-in. o.c., starting 1-in. and 6-in. from the paper edge with the butt joints located mid-span between the C-H studs and attached with 1-1/2-in. long Type G screws spaced 8-in. o.c. and spaced 3-in. on each side of butt joint. Butt joints in the face layer shall be staggered a minimum of 24-in.

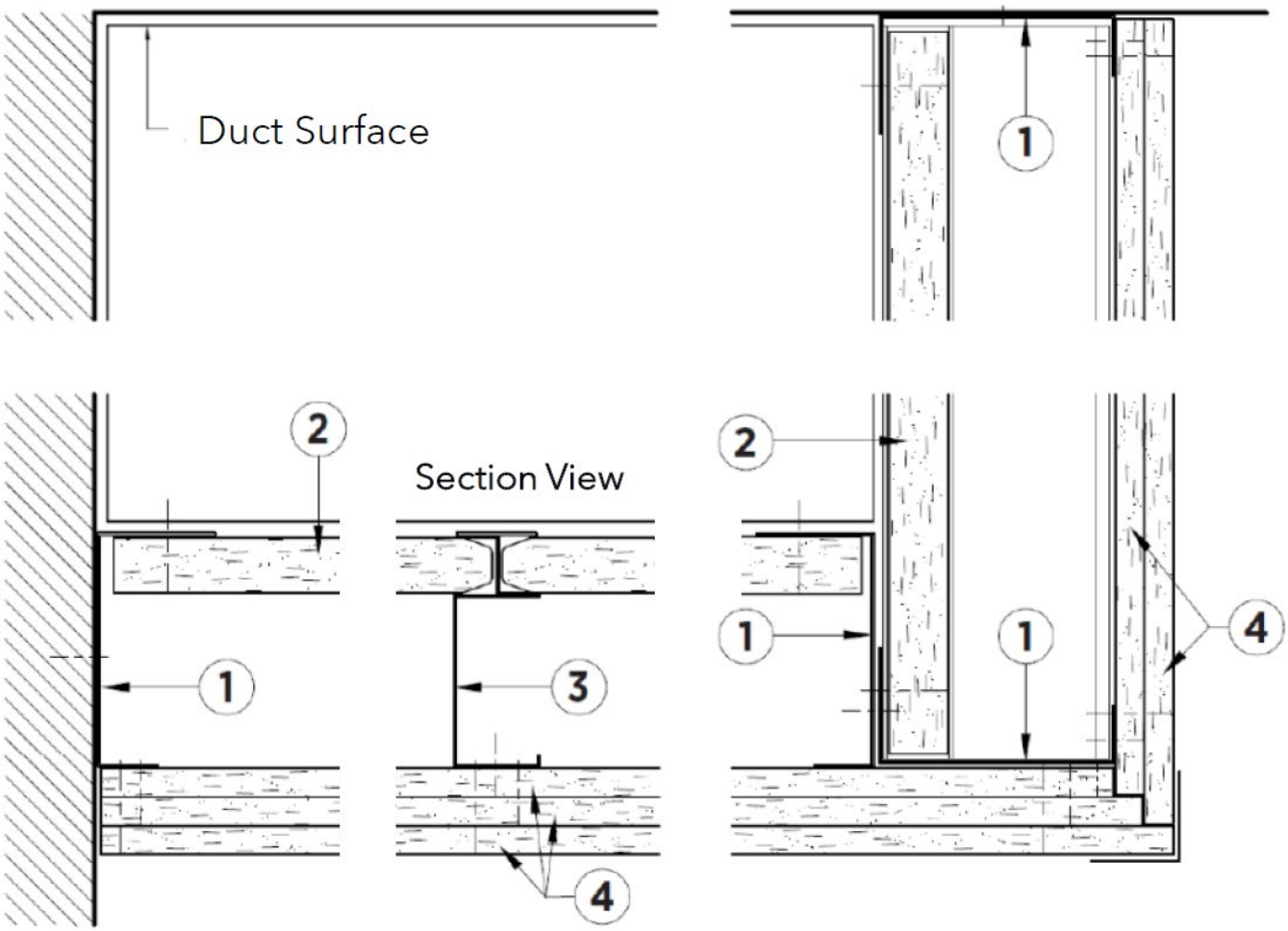
Install the vertical portion of the assembly in accordance with the "Two-Hour Shaft wall" as shown in Assembly 2. Install 1-5/8-in. Type S screws spaced 24-in. o.c. through the liner panel at the corner and abutments.

For more details on construction methods, including fasteners, the USG installation instructions shall be followed.

Maximum Spans for 2-Hour Horizontal Membrane or Metal Duct Enclosure (Assembly 9)	
Three Layers of 1/2-in. Gypsum Panels	**Maximum Span**
212CH-18	5-ft. - 4-in.
212CH-34	6-ft. - 6-in.
400CH-18	7-ft. - 3-in.
400CH-34	9-ft. - 4-in.
600CH-34	13-ft. - 1-in.

See section 4.2 for alternative systems.

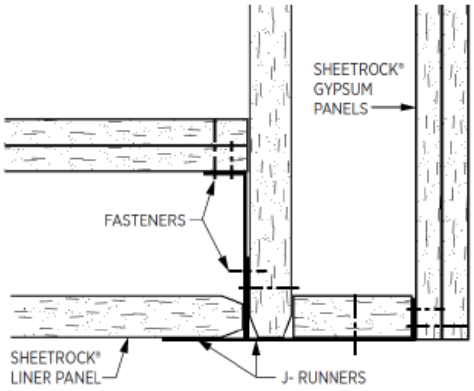
LIMITING SPANS AND FIRE-RESISTANCE RATINGS



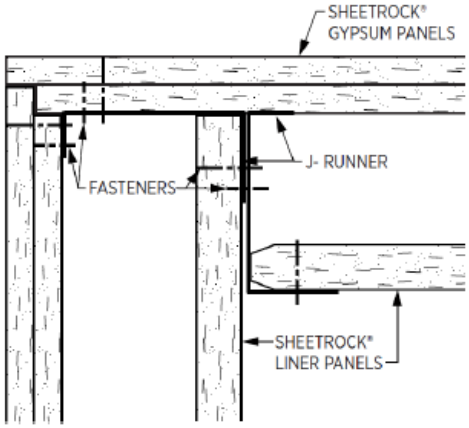
ASSEMBLY 9 – TWO-HOUR HORIZONTAL GYPSUM DUCT ENCLOSURE AND CEILING MEMBRANE

Report Supplement – USG Typical Installation Details

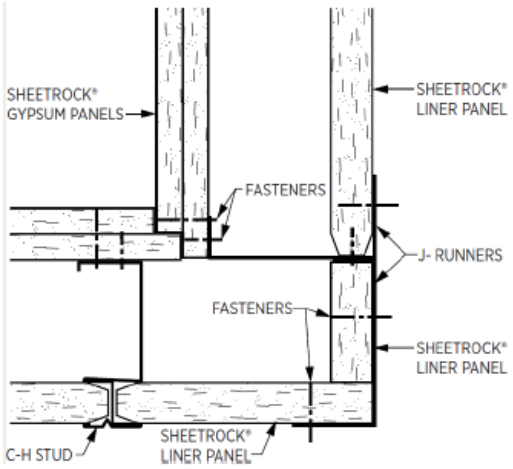
These details, which have been developed and provided by the manufacturer, are from engineering analysis based on a comparison of building element, component or assemblies designs having fire-resistance ratings as determined by the test procedures set forth in ASTM E119 or UL 263.



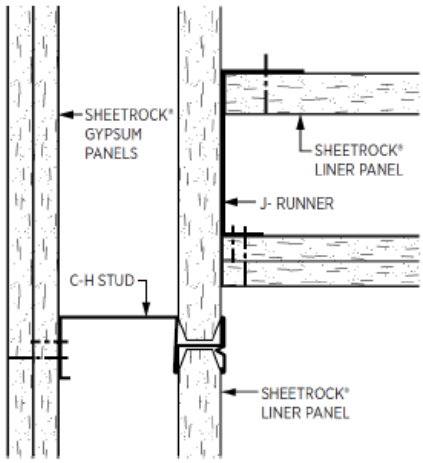
DETAIL 1
CORNER
PLAN



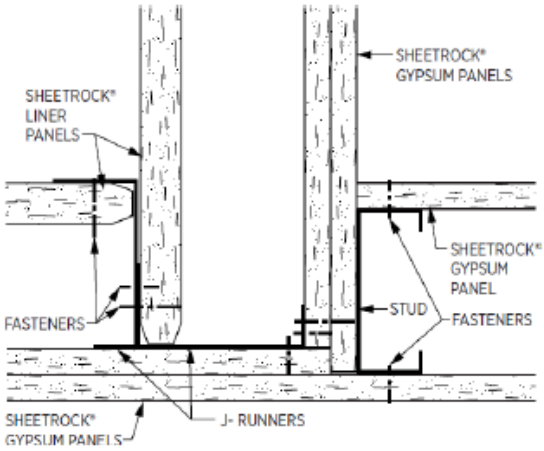
DETAIL 2
CORNER
PLAN



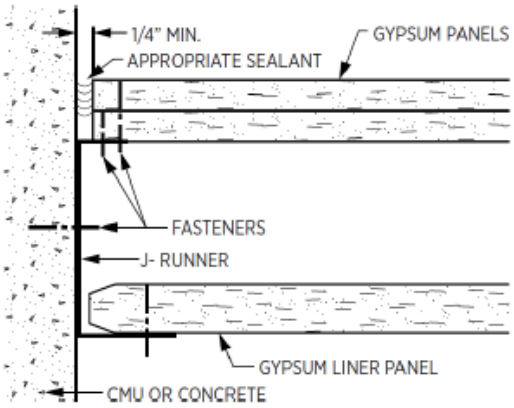
DETAIL 3
CORNER
PLAN



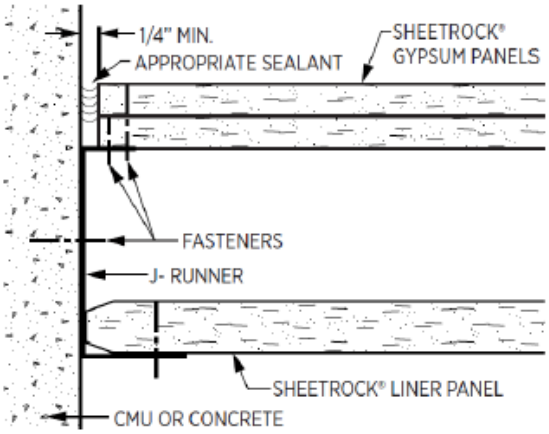
DETAIL 4
WALL INTERSECTION
PLAN



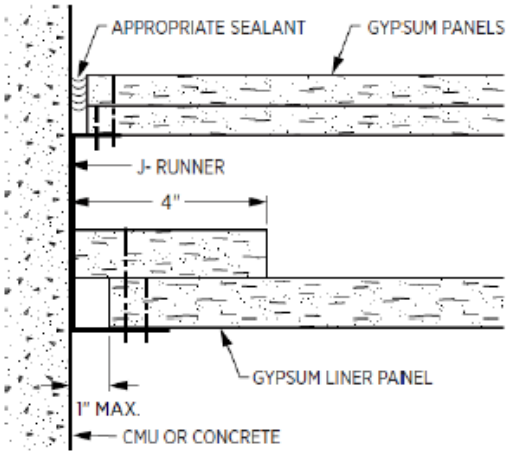
DETAIL 5
WALL INTERSECTION PLAN



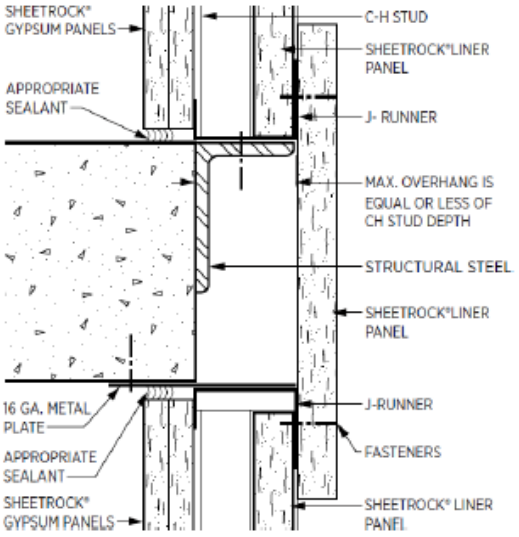
DETAIL 6
WALL INTERSECTION PLAN



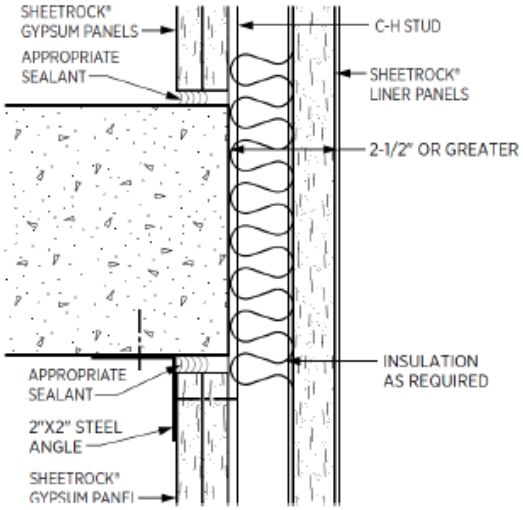
DETAIL 7
WALL INTERSECTION PLAN



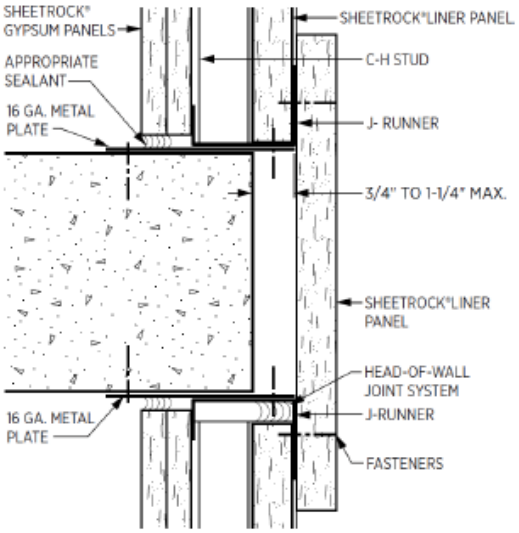
DETAIL 8
WALL INTERSECTION PLAN



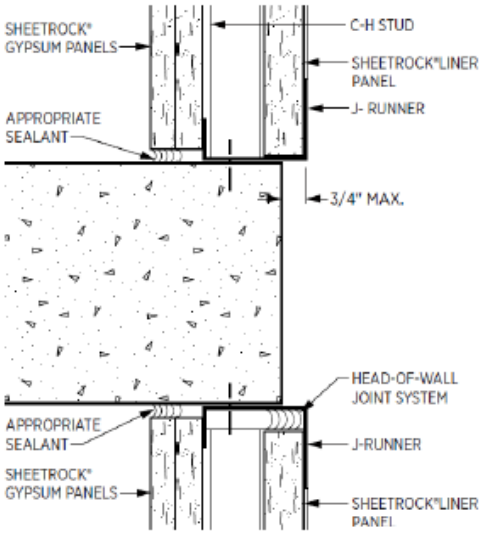
DETAIL 9
WALL OVERHANG SECTION



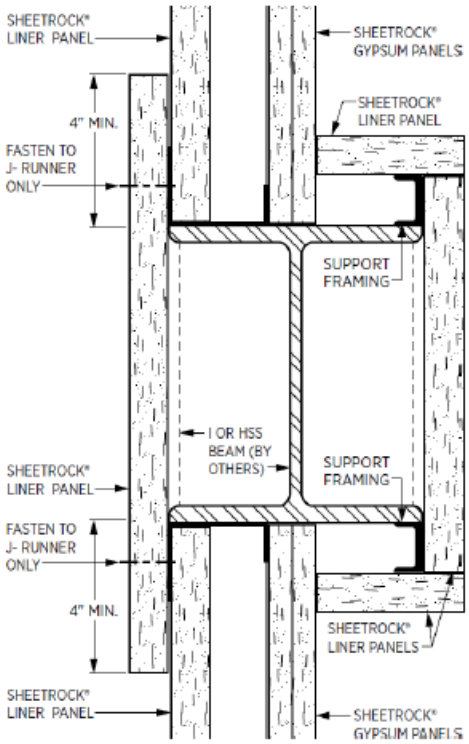
DETAIL 10
WALL OVERHANG SECTION



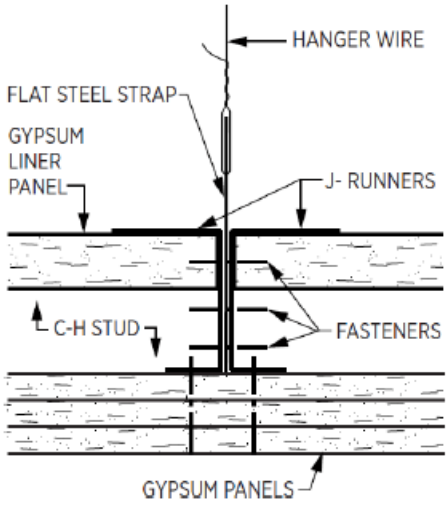
DETAIL 11
WALL OVERHANG SECTION



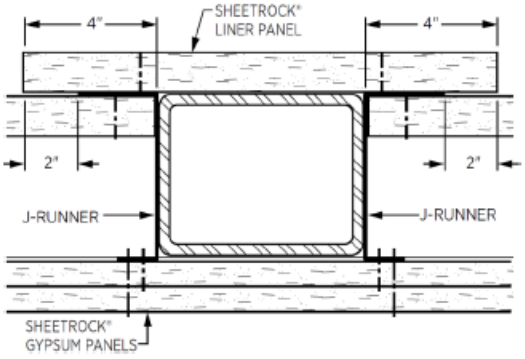
DETAIL 12
WALL OVERHANG SECTION



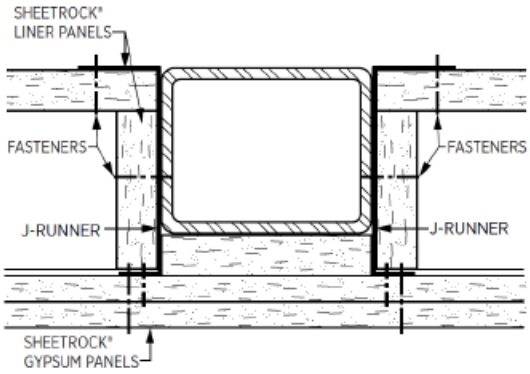
DETAIL 13
BEAM BYPASS
SECTION



DETAIL 14
CEILING MEMBRANE
SECTION



DETAIL 15
COLUMN BYPASS
PLAN



DETAIL 16
COLUMN BYPASS
PLAN