

ICC-ES Evaluation Report

ESR-5050

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<p>DIVISION: 05 00 00—METALS</p> <p>Section: 05 40 00—Cold-Formed Metal Framing</p> <p>DIVISION: 09 00 00—FINISHES</p> <p>Section: 09 22 16.13—Non-Structural Metal Stud Framing</p>	<p>REPORT HOLDER: CLARKDIETRICH®</p> <p>ADDITIONAL LISTEES: CERTAINTEED GYPSUM GEORGIA-PACIFIC GYPSUM LLC NATIONAL GYPSUM COMPANY UNITED STATES GYPSUM COMPANY</p>	<p>EVALUATION SUBJECT: CLARKDIETRICH SHAFTWALL, STAIRWALL AND CORRIDOR CEILING SYSTEMS</p>	
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1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015 and 2012 [International Building Code® \(IBC\)](#)

Properties evaluated:

- Structural
- Fire resistance
- Sound transmission

2.0 USES

The ClarkDietrich Shaftwall and Stairwall systems are nonload-bearing cold-formed steel wall used for framing of interior nonload-bearing walls. The wall systems may be used in fire-resistance-rated construction when installed in accordance with Section 4.3 of this report.

The ClarkDietrich Corridor Ceiling system is used for framing interior corridor ceiling applications not designed to carry any loads. The ceiling system may be used in fire-resistance-rated construction when installed in accordance with Section 4.4 of this report.

3.0 DESCRIPTION

3.1 Shaftwall and Stairwall Systems:

The shaftwall and stairwall systems are constructed from the cold-formed steel C-T studs and J-Tabbed Track (J-runner) tracks which are available in 2½, 4 and 6- inches (63, 102 and 152 mm) depths and come in 22, 33 and 43 mils thick. See [Table 3.1](#) for additional framing thickness details. See [Figures 1](#) and [2](#) for typical details of cold-formed steel studs and tracks used in shaftwalls and stairwalls applications.

Table 3.1-Stud and Track Steel Thickness

Mils, Thousandths of an inch	Design Thickness, inch	Minimum base steel thickness, inch
22	0.0231	0.0219
33	0.0346	0.0329
43	0.0451	0.0428

For SI: 1 inch=25.4 mm.

3.2 Corridor Ceiling System:

The corridor ceiling system is constructed from the cold-formed steel C-T studs and J-Tabbed Track/J-runners tracks which are available in 2½, 4 and 6-inches (63, 102 and 152 mm) depths and come in 22, 33 and 43 mils thick. See [Table 3.1](#) for additional framing thickness information. See [Figures 3](#) and [4](#) for typical details of cold-formed steel studs and tracks used in corridor ceiling system.

3.3 Material:

3.3.1 Cold-Formed Steel: The studs and tracks are formed from coils of steel complying with ASTM A1003, or other steel complying with AISI Specifications having a minimum yield strength of 33,000 or 50,000 psi (227.5 or 344.7 Mpa). The coating on the steel is a metallic coating conforming to ASTM A653/A653M with a minimum G40 (Z120) coating or shall provide equivalent corrosion protection in accordance with Section A4 of AISI S220.

3.3.2 Gypsum Wallboard: Gypsum wallboard must be a minimum of ½-inch-thick (12.7 mm) Type C or 5/8-inch-thick (15.9 mm) Type X, complying with ASTM C1396. Gypsum board must be listed for fire rating by an approved accreditation body.

3.3.3 Gypsum Shaft Liner Panels: The liner panels must be 1-inch-thick (25.4 mm) by 24 inches (610 mm) wide by 8 foot to 14 foot long (2.44 to 4.27 m). Any butt joints must be factory edge to edge with pieces pushed tight together. Gypsum shaft liner panels must be listed for fire rating by an approved accreditation body.

3.3.4 Fasteners: Fasteners attaching the gypsum wallboard to the studs and tracks must be No. 6, Type S, fine thread drywall bugle head screws conforming to ASTM C1002.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The allowable values and tabulated limiting heights for shaftwall and stairwall framing systems must be in accordance with [Table 1](#).

4.2 Installation:

Installation of the shaftwall, stairwall and corridor ceiling systems must be in accordance with the applicable code, the approved construction documents, and this report. If there is a conflict between this report and the documents submitted for approval, this report governs. The approved plans must be available on the jobsite at all times during installations.

4.3 Fire-resistance-rated Construction:

4.3.1 Two-hour Shaftwall and Stairwall Systems (Nonload Bearing): The shaftwall and stairwall assemblies must be minimum 22 mils thick, 2½-inches-deep C-T studs spaced 24 inches (610 mm) on center and centered between the top and bottom J-runner track with a minimum ½-inch (12.7 mm) clearance from the web of the J-runner track. Two layers of ½-inch (12.7 mm) Type C or 5/8-inch (15.9 mm) Type X gypsum wallboard, one layer per side. The face layers should be installed parallel to each face of the framing members with No. 6 x 1-inch (25.4 mm) long Type S drywall screws at 12 inches (305 mm) on center (Note: Use Type S-12 screws for 33 mils thick steel framing), 1 inch (25.4 mm) from gypsum board ends at joints and a minimum of 3/8-inch (9.5 mm) from gypsum board edges. All edge and end joints should be offset from the base layer a minimum of 6 inches (152 mm). One-inch-thick (25.4 mm) Type X fire-rated gypsum liner panels should be cut 1 inch (25.4 mm) less than the opening height. The ends of the liner panel may be retained by bending the J-runner tables 90 degrees. If the J-runners are used at end walls, bend the J-runner tabs 90 degrees, or the 1-inch-thick (25.4 mm) liner panels need to be fastened at the ends with 1½-inch (41 mm) long Type S screws at 12 inches (305 mm) on center. For more details refer to [Figures 1](#) and [2](#) or ClarkDietrich published installation instructions.

4.3.2 Two-hour Corridor Ceiling System (Not Designed to Carry Any Loads): The corridor ceiling assembly must be constructed as described above for the shaftwall assembly described in Section 4.3.1 of this report. See [Table 3](#) for stud size, steel thickness and maximum spans. See [Figures 3](#) and [4](#) for assembly details and specifications. For additional details and construction methods refer to the ClarkDietrich installation instructions.

5.0 CONDITIONS OF USE:

The ClarkDietrich shaftwall, stairwall and corridor ceiling systems described in this report complies with, or is a suitable alternative to what is specified in those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The ClarkDietrich shaftwall, stairwall steel framing systems, and corridor ceilings are manufactured, identified, and installed in accordance with this report, the approved plans, and the manufacturer's published installation instructions.
- 5.2 The shaftwall and stairwall systems are limited to interior nonload-bearing applications where the superimposed vertical load is zero pounds (zero newtons).
- 5.3 The corridor ceiling system is not designed to carry any loads where the superimposed vertical load is zero pounds (zero newtons).
- 5.4 Design of the attachment of the wall to the surrounding structure is outside the scope of this report.
- 5.5 Calculations and drawings demonstrating compliance with this report must be submitted to the code official for each project. The calculations and construction documents must be prepared and sealed by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.6 Installation of the gypsum wallboard must meet the requirements of ASTM C840 or GA-216.
- 5.7 The wall assemblies must be installed in accordance with AISI S220 specifications, unless more stringent requirements are established by registered design professional.
- 5.8 The assemblies must not be installed in areas which will be adjacent to occupancies of unusually high moisture conditions.
- 5.9 To prevent air movement, the partition perimeters, as well as all penetrations, should be effectively sealed with non-hardening sealant.
- 5.10 Applications that require the use of joint treatment must follow the manufacturer's usage instructions to ensure the finishing of the joint layers is done within the temperature requirements of the products. See IBC Section 715 for additional requirements.
- 5.11 The assemblies described in this report are not recommended for use as unlined HVAC supply shafts or ducts.
- 5.12 Firestopping of the assemblies at each floor must comply with IBC Section 718.
- 5.13 Control joints must be located in a way that limits the maximum continuous partition length to 30 feet (9.14 m). The partition control joints must coincide with the building structure where possible.
- 5.14 Where wall heights exceed the available length of the gypsum panels, the panels may be cut and stacked with horizontal joints occurring within the top and bottom third of the wall. Horizontal Joints in adjacent panels must be staggered alternating from top and bottom to avoid a continuous horizontal joint along length of wall. The gypsum panels must engage a minimum of two tabs.
- 5.15 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.
- 5.16 Openings and penetrations require structural support by other structural elements designed by registered design professional.
- 5.17 Studs and tracks are manufactured at the facilities listed in [Table 1](#).

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with ASTM E72.
- 6.2 Data in accordance with ASTM E119 and supportive engineering analysis.
- 6.3 Structural calculations in accordance with AISI S220
- 6.4 Data in accordance with ASTM C1396.

7.0 IDENTIFICATION

7.1 Each ClarkDietrich stud and track described in this report must have a legible label or stamp, at a maximum spacing of 96 inches (2413 mm) on center, indicating the product code; manufacturer’s name or initials; the minimum base steel thickness; the minimum yield strength; and the evaluation report number (ESR-5050).

7.2 The report holder’s contact information is:

CLARKDIETRICH®
9050 CENTRE POINTE DRIVE, SUITE 400
WEST CHESTER, OHIO 45069
(513) 870-1100
www.clarkdietrich.com

7.3 The Additional Listees’ contact information is the following:

CERTAINTEED GYPSUM
20 MOORES ROAD
MALVERN, PENNSYLVANIA 19335
(484) 402-0031
www.certainteed.com

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2861 MILLER ROAD
DECATUR, GEORGIA 30035
(404) 652-7437
www.buildgyp.com

NATIONAL GYPSUM COMPANY
2001 REXFORD ROAD
CHARLOTTE, NORTH CAROLINA 28211
(704) 365-7506
www.nationalgypsum.com

UNITED STATES GYPSUM COMPANY
550 WEST ADAMS STREET
CHICAGO, ILLINOIS 60661
(847) 970-5281
www.usg.com

TABLE 1—MANUFACTURING LOCATIONS

ClarkDietrich® -Baltimore 4601 North Point Blvd. Baltimore, Maryland 21219	ClarkDietrich® -Vienna 1455 Ridge Road Vienna Township, OH 44473
ClarkDietrich® -Bristol 780 James P, Casey Road Bristol, Connecticut 06010	ClarkDietrich® -Dallas 10340 Denton Drive Dallas, Texas 75220
ClarkDietrich® -Riverside 6510 General Drive Riverside, California 92509	

Table 2– Shaftwall and Stairwall C-T Stud Limiting Height^{1,2,3,4,5}

Framing Depth (inches)	Steel Design Thickness & Yield Strength	Limiting Height(feet - inches)					
		Design Deflection Limit	Allowable Design Pressure (psf)				
			5	7.5	10	15	
2 1/2	0.0231" 33,000psi	L/120	16 - 10	13 - 8	11 - 10 *	8 - 6 *	
		L/180	13 - 8	11 - 3	9 - 10	8 - 3	
		L/240	11 - 10	9 - 10	8 - 8	7 - 3	
		L/360	9 - 10	8 - 3	7 - 3	6 - 2	
	0.0346" 33,000psi	L/120	16 - 10	14 - 4	12 - 11	11 - 1	
		L/180	14 - 4	12 - 4	11 - 1	9 - 6	
		L/240	12 - 11	11 - 1	9 - 11	8 - 7	
		L/360	11 - 1	9 - 6	8 - 7	7 - 5	
	0.0451" 50,000psi	L/120	17 - 11	15 - 10	14 - 6	12 - 10	
		L/180	15 - 10	14 - 0	12 - 10	---	
		L/240	14 - 6	12 - 10	---	---	
		L/360	12 - 10	---	---	---	
4	0.0231" 33,000psi	L/120	21 - 8	16 - 6 *	12 - 5 *	8 - 3 *	
		L/180	18 - 1	15 - 3	12 - 5 *	8 - 3 *	
		L/240	16 - 0	13 - 7	12 - 1	8 - 3 *	
		L/360	13 - 7	11 - 6	10 - 4	8 - 3 *	
	0.0346" 33,000psi	L/120	23 - 0	21 - 0	18 - 7	15 - 5 **	
		L/180	21 - 0	17 - 9	15 - 10	13 - 6	
		L/240	18 - 7	15 - 10	14 - 1	12 - 1	
		L/360	15 - 10	13 - 6	12 - 1	10 - 4	
	0.0451" 50,000psi	L/120	25 - 7	22 - 2	20 - 0	17 - 4	
		L/180	22 - 2	19 - 2	17 - 4	15 - 1	
		L/240	20 - 0	17 - 4	15 - 8	13 - 7	
		L/360	17 - 4	15 - 1	13 - 7	11 - 10	
6	0.0346" 33,000psi	L/120	30 - 3 **	24 - 9 **	20 - 6 *	13 - 8 *	
		L/180	30 - 3	24 - 9 **	20 - 6 *	13 - 8 *	
		L/240	26 - 6	22 - 2	19 - 7	13 - 8 *	
		L/360	22 - 2	18 - 8	16 - 7	13 - 8 *	
	0.0451" 50,000psi	L/120	36 - 5	30 - 8	27 - 3	23 - 2	
		L/180	30 - 8	26 - 0	23 - 2	19 - 9	
		L/240	27 - 3	23 - 2	20 - 8	17 - 8	
		L/360	23 - 2	19 - 9	17 - 8	---	

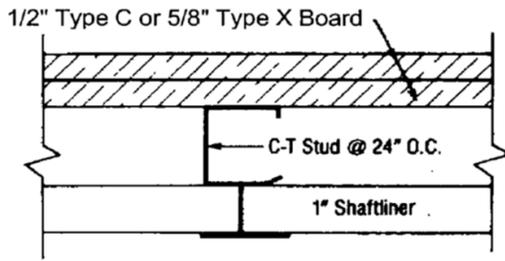
For SI: 1 inch= 25.4 mm, 1 psi= 6.89 kPa, 1 foot = 305 mm, 1 psf= 47.88 Pa.

Notes:

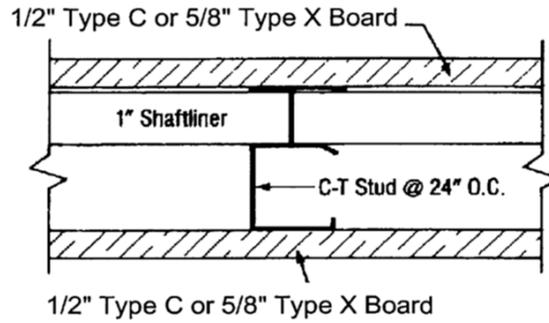
* Reduced for End Reaction capacity

** Reduced for Flexural Strength Capacity

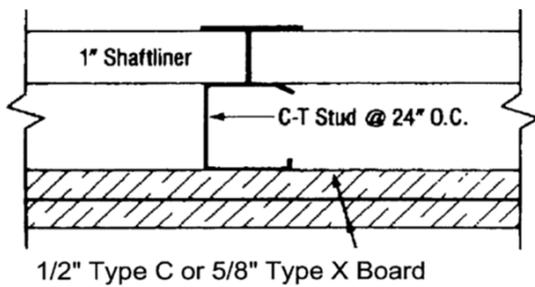
- The values in this table are based on testing ASTM E72 and represent the limiting height capacity for strength using a 1.5 Safety Factor.
- See [Table 3.1](#) for steel mil thickness and base steel thickness information.
- Limiting Height values shown, were assessed from the **lowest** Flexural Strength value of Gypsum tested.
- Limiting height values shown, are based on nonload-bearing wall assemblies installed in accordance with Section 4.3 of this report.
- C-T studs must be full length and must not be spliced. J-runners when not attached to the structure must not be spliced. Do not attach J-runners to C-T studs unless noted otherwise by the manufacturer’s installation instructions.



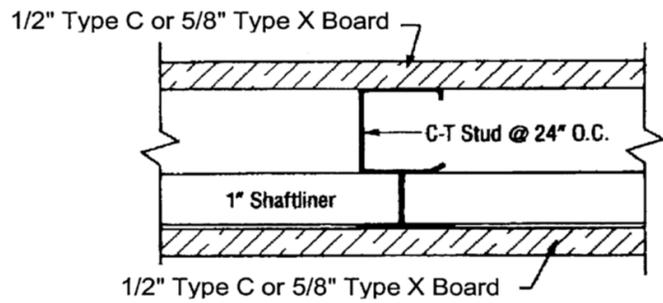
2 HR Shaftwall Assembly
-
Non-Load Bearing (Shaft Side)



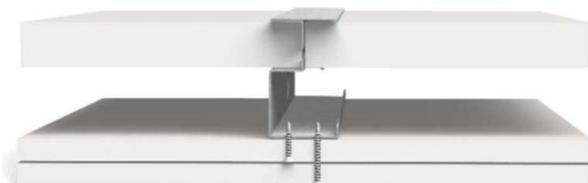
2 HR Stairwall Assembly -
Non Load Bearing (Room side)



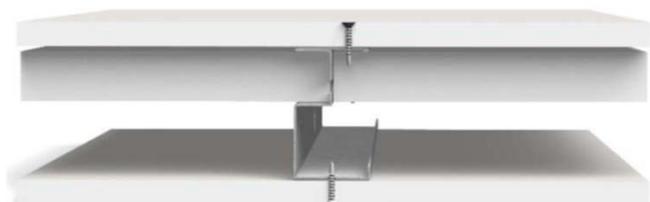
2 HR Shaftwall Assembly -
Non Load Bearing (Corridor side)



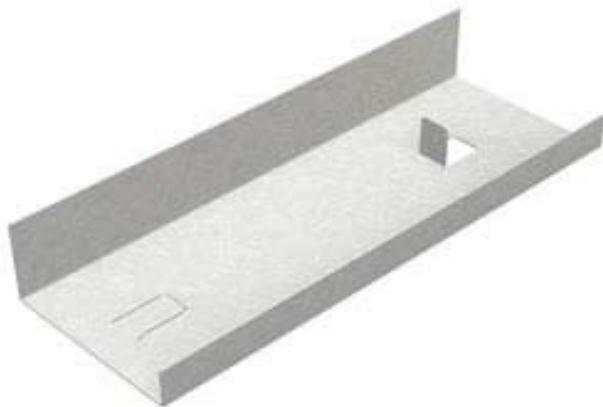
2 HR Stairwall Assembly -
Non Load Bearing (Stair Liner side)



Shaftwall



Stairwall



J-Tabbed Track (J-Runner)



C-T Stud

FIGURE 1- SHAFTWALL AND STAIRWALL ASSEMBLY

FIRE-RESISTANCE-RATED CONSTRUCTION DETAILS

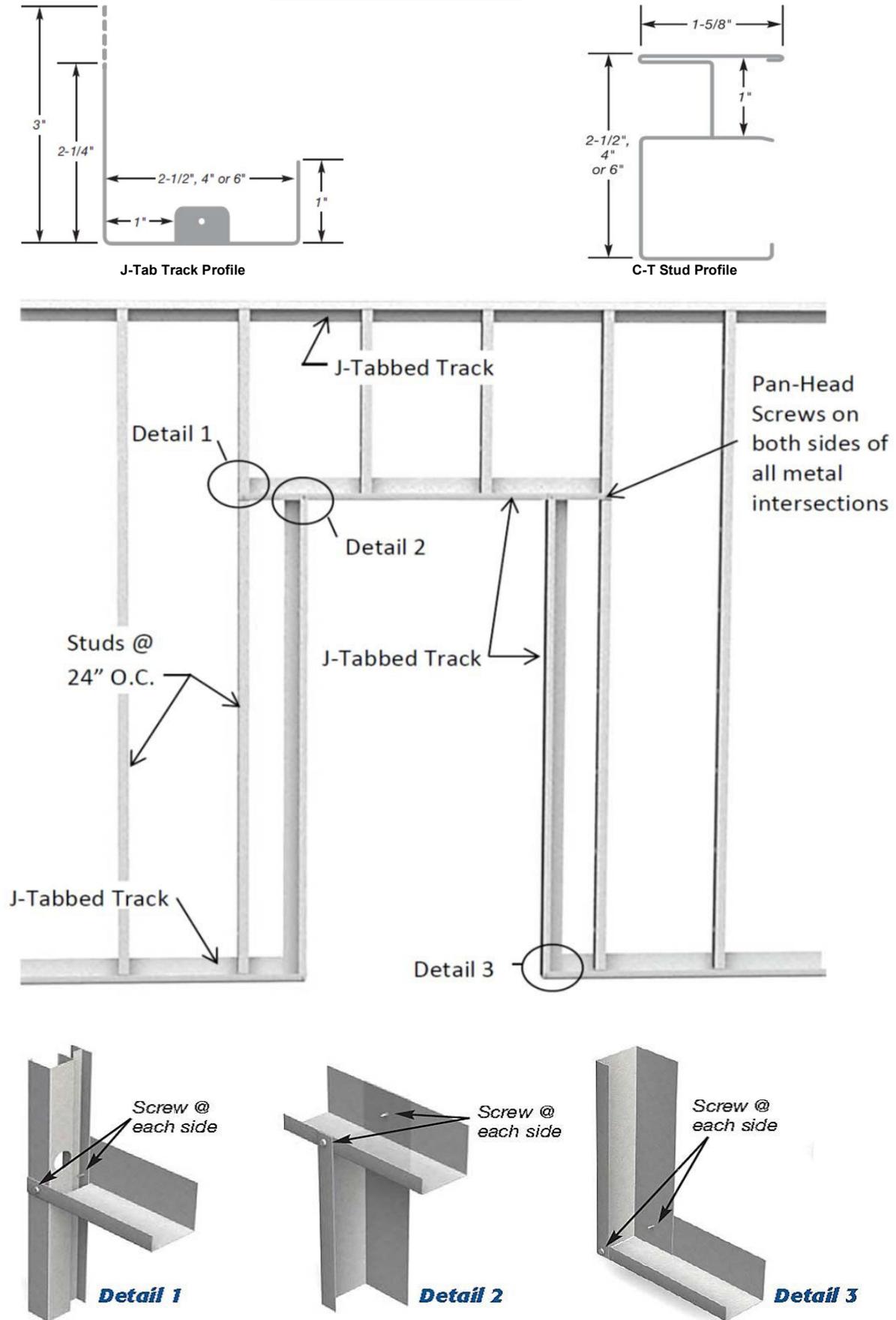


FIGURE 2- CONSTRUCTION DETAIL FRAMING

Table 3 - Maximum Horizontal Spans for Fire-resistance-rated Corridor Ceilings^{1,2,3,4,5,6}

Stud Depth (inches)	Steel Mil Thickness, thousandths of inch	Minimum Yield Strength (psi)	Design Thickness (in)	2 Hour (2) 1/2-inch Type C + (1) 1-in Shaft Liner				2 Hour (2) 5/8-inch Type X + (1) 1-in Shaft Liner			
				L / 120	L / 180	L / 240	L / 360	L / 120	L / 180	L / 240	L / 360
2½	22	33,000	0.0231	8' -8"	8' -8"	8' -6"	7' -5"	8' -2"	8' -2"	8' -2"	7' -2"
	33	33,000	0.0346	10' -6"	10' -6"	9' -10"	8' -7"	9' -11"	9' -11"	9' -6"	8' -3"
4	22	33,000	0.0231	11' -8"	11' -8"	11' -8"	10' -8"	11' -0"	11' -0"	11' -0"	10' -3"
	33	33,000	0.0346	14' -3"	14' -3"	14' -1"	12' -4"	13' -6"	13' -6"	13' -6"	11' -10"
	43	50,000	0.0451	19' -1"	16' -8"	15' -2"	13' -3"	18' -5"	16' -1"	14' -7"	12' -9"
6	33	33,000	0.0346	18' -9"	18' -9"	18' -9"	16' -10"	17' -9"	17' -9"	17' -9"	16' -3"
	43	50,000	0.0451	22' -9"	22' -9"	20' -9"	18' -2"	20' -5"	20' -5"	20' -0"	17' -6"

For SI: 1 inch= 25.4 mm, 1 psi= 6.89 kPa, 1 foot = 305 mm, 1 psf= 47.88 Pa.

Notes:

1. Dead Load of assembly ONLY is considered.
2. Not designed to carry any Live Loads, Mechanical equipment, Storage Loads or Lighting.
3. Studs must be one piece, full span.
4. See [Table 3.1](#) for steel mil thickness and base steel thickness
5. Verify details of construction for specific assembly to achieve required fire resistance rating and code requirements.
6. Horizontal corridor use permitted per IBC section 708.4 Continuity, Exception 3.

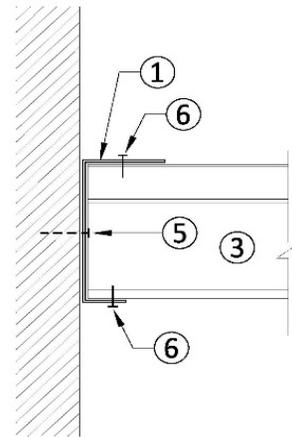
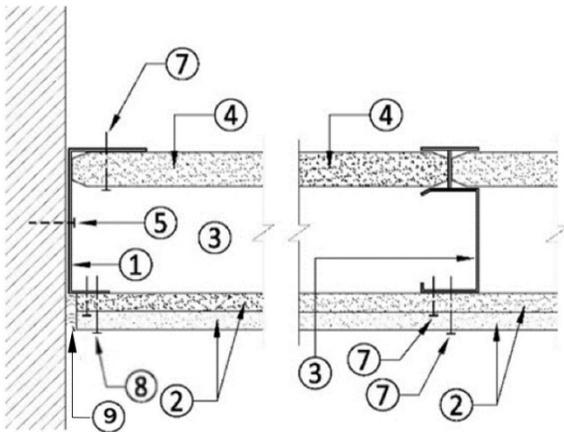


FIGURE 3- TWO-HOUR CORRIDOR CEILING ASSEMBLY

FIGURE 4- C-T STUD TO J-RUNNER CONNECTION

Figure 3 and 4 descriptions

1. J-Track
2. Corridor Side Gypsum
3. C-T Stud (full span length)- See [Table 2](#) above.
4. Liner Panel on top side. One seam only per stud bay allowed.
5. Fastener thru J-Track into wall at 24"o.c. maximum spacing.
6. Fastener must provide a minimum of 200 Lbs. of shear value per C-T Stud
7. Framing fastener thru J-Track top & bottom legs into C-T Stud.
8. Gypsum fasteners thru gypsum into framing.
9. Fire-resistant rated or listed joint sealant system.
10. See ClarkDietrich Horizontal Shaftwall Assembly Instructions for more details.