

# I-STUD CAVITY SHAFTWALL SYSTEM

## MANUFACTURER

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## DESCRIPTION

The I-Stud Cavity Shaftwall System is a nonload-bearing drywall partition system and is made up of two basic components: gypsum board and metal framing. Gypsum board includes Gold Bond® BRAND 1" Fire-Shield® Shaftliner panels, Gold Bond® BRAND 1/2" Fire-Shield C and Gold Bond® BRAND 5/8" Fire-Shield gypsum board face panels. The metal framing includes I-Studs with integral tabs which hold the 1" Shaftliner panels in place and J-Track for runners at top and bottom, as well as vertically at partition ends and to frame openings.

## BASIC USES

The I-Stud Shaftwall System was developed to enclose elevator shafts, stairwells and other vertical chases in buildings where it is advantageous to erect these walls from one side only and where fire resistance and resistance to air pressures are required.

## ADVANTAGES

- Although the I-Stud Shaftwall System is nonload-bearing, this system has been designed and tested to withstand positive and negative air pressure forces exerted by high-speed, high-rise elevators.
- The I-Stud Shaftwall System has been fire tested and has achieved fire resistance ratings of 1 and 2 hours. All components are noncombustible.

- The I-Stud Shaftwall System is very lightweight compared to conventional shaftwalls, weighing approximately 10 pounds per square foot of wall when finished with two layers of 1/2" Fire-Shield C wallboard.

- Shafts can be quickly enclosed with I-Studs and Shaftliner under most conditions in which installers can work well before temperature limitations for finish wallboard applications are necessary.

- 1" Shaftliner is encased with light green moisture-resistant paper front and back for protection against weather during installation.

## LIMITATIONS

- Nonload-bearing
- This system should not be used where exposed to constant dampness or conditions under which free water can be formed.
- This system should not be exposed to temperatures over 125°F (52°C) for extended periods of time.

## MATERIALS AND SIZES

1" x 24" x length, up to 14' (1" less than ceiling height) Fire-Shield Shaftliner.

1/2" Fire-Shield C, 5/8" Fire-Shield X (48" width, length up to 16'), (MR Board) (wallboard) (Kal-Kore).

I-Stud (2-1/2") (4") (6") (0.020") (0.0329") (length 1/2" less than ceiling height).

2-1/4" leg J-Track (2-1/2") (4") (6") (0.020") (0.0329") 10' long.

3" leg J-Track (2-1/2") (4") (6") 0.0329" thick, 10' long.

2" x 2" x 20 gauge angle.

All commercial I-Studs and J-Track are fabricated from steel with a minimum yield strength of 40,000 psi.

## ACCESSORIES

- E-Z Strip control joint
- Wallboard cornerbead
- Joint compound
- Joint tape
- Resilient furring channels
- Acoustical sealant – resilient, non-hardening
- Grout (plaster) (joint compound)
- Mineral wool or glass fiber insulation

Type S-12 bugle head screws, 1", 1-5/8", 2-3/8", 2-5/8"  
Type S bugle head screws, 1", 1-5/8", 2-1/4", 2-5/8"  
Pan head screws, 3/8" Type S, 5/8", 1/2" Type S-12

## APPLICABLE STANDARDS

ASTM C 36/1396 – Type X Fire-Shield and Fire-Shield C Gypsum Wallboard

Federal Specification SS-L-30D Type III Grade X

ASTM C 442/1396 type X – 1" Fire-Shield Shaftliner

Federal Specification SS-L-30D Type IV Grade X

ASTM C 645 – I-Studs and J-Track

BOCA Evaluation Services, Inc. Research Report No. 89-35

ICBO Evaluation Service, Inc. Evaluation Report No. 3579

SBCCI PST & ESI Compliance Report No. 9525B

(Continued next page)

Job Name \_\_\_\_\_

Contractor \_\_\_\_\_ Date \_\_\_\_\_

Submittal Approvals: (Stamps or Signatures)

## INSTALLATION

### APPLICABLE STANDARDS AND REFERENCES

National Gypsum Co. Gypsum  
Construction Guide

### RECOMMENDATIONS

Installation of I-Stud Cavity Shaftwall components shall be consistent with methods and provisions described in the noted reference, by test reports or fire-rated assemblies, by code evaluation reports and as indicated below.

1" Shaftliner panels shall be handled with care to prevent fracturing or deformation of edges.

**Framing and Shaftliner cavity shaftwall:** Locate and lay out partition floor and ceiling lines to assure plumb partition.

Position top and bottom J-Track with long leg toward the shaft along ceiling, floor and vertically at column and/or wall where erection of shaft-wall will begin. Attach with power-driven fasteners 24" o.c. max.

Install first Shaftliner panel by placing outside vertical edge against long leg of vertical track, plumb and attach with Type S 1-5/8" screws 24" o.c.

Place I-Studs within flanges of floor and ceiling track; rotate into place. Slide stud tabs snugly over edge of Shaftliner previously installed.

Install next Shaftliner panel between tabs of I-Studs. Continue in this manner until end of partition run. Occasionally check spacing of I-Studs to maintain 24" module.

At end of run, cut vertical J-Track at least 2" short of partition height. Cut Shaftliner 1/4" less than remaining width of partition and 2" short of full

height. Lay piece of Shaftliner 2" wide x length of opening in floor track as support for last Shaftliner panel. Fit cut edge of Shaftliner into vertical track and, holding Shaftliner and track together, slide paper-bound edge of Shaftliner into I-Stud. Align last panel and fasten the vertical track with appropriate fasteners 24" o.c. max. Fasten Shaftliner to vertical track with 1-5/8" Type S or S-12 screws 24" o.c.

**Note:** Where Shaftwall exceeds 14 ft. in height, locate Shaftliner end joints within upper and lower third points of wall. Stagger joints from top to bottom in adjacent panels by a minimum of 24" to avoid continuous horizontal joint. Shaftliner panels shall be of sufficient length to engage a minimum of 2 I-Stud tabs along each edge.

**Wallboard:** Apply first layer of 1/2" Fire-Shield C (5/8" Fire-Shield) Gypsum Wallboard horizontally to face of I-Studs with screws spaced 24" o.c. Apply second layer vertically with screws spaced 12" o.c. (Use 1" Type S screws on first layer, 1-5/8" Type S screws on second layer for 25 ga. nominal studs). (Use 1" Type S-12 screws on first layer, 1-5/8" Type S-12 screws on second layer for 20 ga. nominal studs). Stagger all vertical and horizontal joints. For proper joint treatment, maintain uniform room temperature between 50°F (10°C) and 70°F (21°C) during cold weather. Treat joints of face layer with tape and joint compound.

**Caulking:** Caulk I-Stud Cavity Shaftwall with acoustical sealant wherever the wall is enclosing shafts where positive or negative air pressure exists. Caulk perimeter of wall and at any other place where voids create the possibility of moving air causing dust accumulation, noise or smoke leakage.

Caulking shall be done in compliance with details specified by the architect/designer.

**Framing for openings:** Frame doors, borrowed lights and duct openings with J-Track. Use adequate structural support for openings over 48" wide. For openings up to 48" wide, use vertical J-Track on either side of openings. For head and sill of openings, place J-Track horizontally across openings. Cut J-Track about 12" longer than openings. Then cut flanges and fold back to rest over vertical J-Track and fasten webs or flanges with two 3/8" Type S or 1/2" Type S-12 pan head screws per connection. When nesting J-Track to J-Track, cut off short flange of horizontal J-Track so it will fit over vertical J-Track.

**Call boxes and position indicators:** Protect call boxes, position indicators and fireman's switches.

**Chases:** When possible, locate all vertical rise, conduit, stair hangers, etc., within wall cavity. If the cavity in the 2-1/2" stud wall is not of sufficient width, the 4" and 6" studs can be used for chases or erect chase walls.

**Elevator doors:** Elevator door frames must be braced and supported independently of the shaft wall. However, the shaft wall must be tied into elevator door frames by being attached to jamb anchor clips with pan head screws. The 3" leg, nominal 20 gauge J-Track should be used at the juncture of the elevator door frame and the I-Stud System. All elevator door frames should be spot grouted at jamb anchor clips with joint compound or plaster after J-Track and gypsum Shaftliner are in place.

### MAXIMUM HORIZONTAL SPANS FOR I-STUD ASSEMBLIES

Stud Size in. (mm)	Minimum Steel Thickness in. (mm)	Corridor Ceilings And Stair Soffits		Horizontal Membrane And Duct Protection
		1-Hour Fire Resistive Rating	2-Hour Fire Resistive Rating	2-Hour Fire Resistive Rating
2-1/2" (63.5 mm)	0.020 (.508)	7'-8" (2337 mm)	7'-8" (2337 mm)	7'-2" (2184 mm)
2-1/2" (63.5 mm)	0.0329 (.836)	8'-8" (2642 mm)	9'-4" (2845 mm)	8'-8" (2642 mm)
4" (102 mm)	0.020 (.508)	10'-3" (3124 mm)	10'-9" (3277 mm)	10'-0" (3048 mm)
4" (102 mm)	0.0329 (.836)	11'-9" (3581 mm)	12'-1" (3683 mm)	11'-3" (3429 mm)
6" (152 mm)	0.0329 (.836)	14'-10" (4521 mm)	14'-10" (4521 mm)	13'-10" (4216 mm)

Note: Spans based on L/240 deflection and twice the dead load weight, and 24" o.c. stud spacing.

**TECHNICAL DATA**

**FIRE ENDURANCE RATINGS (Test Method ASTM E 119)**

Construction	Endurance	Test No.	Laboratory
ELEVATOR SHAFT 2-1/2" (63.5 mm), 4" (101.6 mm) or 6" (152.4 mm) I-Studs 24" (610 mm) o.c., 1" (25.4 mm) Fire-Shield Shaftliner and 2 layers of 1/2" (12.7 mm) Fire-Shield C Gypsum Wallboard, 1/2" (12.7 mm) Fire-Shield C Kal-Kore veneer plaster base, or 1/2" (12.7 mm) Fire-Shield C MR Board on corridor side only, base layer horizontal, face layer vertical. Fire tested both sides.	2 hrs.	(WP-636) U497	Factory Mutual UL
ELEVATOR SHAFT Same as above except 2 layers 1/2" (12.7 mm) Fire-Shield C Wallboard applied horizontally on corridor side.	2 hrs.	651-0500.5 U497	Warnock Hersey UL
ELEVATOR SHAFT Same as above except 2 layers 5/8" (15.9 mm) Fire-Shield Wallboard on corridor side. Base layer horizontal, face layer vertical. Fire tested both sides.	2 hrs.	75-17 ES 7408	U. of Cal.
ELEVATOR SHAFT 2-1/2" (63.5 mm), 4" (101.6 mm), 6" (152.4 mm) I-Studs 24" (610 mm) o.c. 1" (25.4 mm) Fire-Shield Shaftliner and 3 layers 5/8" (15.9 mm) Fire-Shield C Wallboard one side, alternating vertical and horizontal. Erected from one side. Fire tested both sides. (Estimated)	est. 3 hrs.	Based on 75-17 ES 740	U. of Cal.
STAIRWELL 2-1/2" (63.5 mm), 4" (101.6 mm) or 6" (152.4 mm) I-Studs 24" (610 mm) o.c., 1" (25.4 mm) Fire-Shield Shaftliner and 1 layer of 1/2" (12.7 mm) Fire-Shield C Gypsum Wallboard, 1/2" (12.7 mm) Fire-Shield C Kal-Kore veneer plaster base, or 1/2" (12.7 mm) Fire-Shield C MR Board on each side, face layer vertical. Fire tested both sides.	2 hrs.	(WP-545) U498	Factory Mutual UL
STAIRWELL Same as above except 5/8" (15.9 mm) Fire-Shield Gypsum Wallboard as face layers. Fire tested both sides.	2 hrs.	75-19 ES 7407	U. of Cal.
ONE HOUR ASSEMBLY Same as above except 1 layer of 5/8" (15.9 mm) Fire-Shield Gypsum Wallboard applied horizontally on side opposite Shaftliner. Fire tested both sides.	1 hr.	(WP-755) U499	Factory Mutual UL
ELEVATOR CONTROL BOXES 4" (101.6 mm) or 6" (152.4 mm) I-Studs 24" (610 mm) o.c. 1" (25.4 mm) Fire-Shield Shaftliner and 2 layers 1/2" (12.7 mm) Fire-Shield C Gypsum Wallboard on corridor side only, base layer horizontal, face layer vertical. Control boxes and conduit penetrations backed by 1" (25.4 mm) Fire-Shield Shaftliner panels. Fire tested both sides.	2 hrs.	(WP-621)	Factory Mutual

**SOUND TRANSMISSION DATA (Test Method ASTM E 90)**

Construction	Test No.	STC
25 ga. nominal, 2-1/2" (63.5 mm) I-Studs 24" (610 mm) o.c. 1" (25.4 mm) Fire-Shield Shaftliner, 2 layers 1/2" (12.7 mm) Fire-Shield C Gypsum Wallboard corridor side only.	NGC 2615	40
Same as above with 1-1/2" (38.1 mm) mineral wool or glass fiber in cavity.	NGC 2616	47
25 ga. nominal, 2-1/2" (63.5 mm) I-Studs 24" (610 mm) o.c. 1" (25.4 mm) Fire-Shield Shaftliner, 1 layer 1/2" (12.7 mm) Fire-Shield C Gypsum Wallboard on each side.	NGC 2618	40
Same as above with 1-1/2" (38.1 mm) mineral wool or glass fiber in cavity.	NGC 2617	45
25 ga. nominal, 2-1/2" (63.5 mm) I-Studs 24" (610 mm) o.c. 1" (25.4 mm) Fire-Shield Shaftliner, Resilient Furring Channels 24" (610 mm) o.c. on corridor side and 2 layers 1/2" (12.7 mm) Fire-Shield C Gypsum Wallboard on channels, 1-1/2" (38.1 mm) mineral wool or glass fiber in stud cavity.	BBN*-NGC 2609	51
25 ga. nominal, 2-1/2" (63.5 mm) I-Studs 24" (610 mm) o.c. 1" (25.4 mm) Fire-Shield Shaftliner, Resilient Furring Channels 24" (610 mm) o.c. on corridor side and 1 layer 1/2" (12.7 mm) Fire-Shield C Gypsum Wallboard on each side, 1-1/2" (38.1 mm) mineral wool or glass fiber in stud cavity.	BBN*-NGC 2610	50

\* Bolt Beranek and Newman, Inc.

Note: 4" (101.6 mm) and 6" (152.4 mm) I-Studs may be substituted with no reduction in fire or sound ratings.

**SECTION PROPERTIES ABOUT X-X AXIS**

A = Section Area, in.<sup>2</sup>  
 Y = Distance from neutral axis to extreme steel fiber, inches  
 I = Moment of Inertia, in.<sup>4</sup>  
 S = Section Modulus, in.<sup>3</sup>  
 Section properties based on steel w/o galvanizing

Stud Size	Min. Base Steel	A	Y	I	S
2-1/2" (63.5 mm)	0.020"	0.133	1.366	0.151	0.110
2-1/2" (63.5 mm)	0.0329"	0.253	1.262	0.288	0.228
4" (102 mm)	0.020"	0.163	2.152	0.421	0.196
4" (102 mm)	0.0329"	0.307	2.016	0.822	0.408
6" (152 mm)	0.0329"	0.342	3.020	1.860	0.616

Above properties based on reduced sections in accordance with AISI "Specifications For the Design of Cold-Formed Steel Structural Members."

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**ALLOWABLE WALL HEIGHTS FOR 1-HOUR FIRE-RATED ASSEMBLIES**

Stud Size in. (mm)	Stud Spacing in. O.C. (mm)	Min. Steel Thickness in.	Allowable Deflection	Sustained Air Pressure Load PSF			
				5	7.5	10	15
2-1/2" (63.5 mm)	24" (610 mm)	0.020	L/120	13'-4" (4060 mm)	11'-7" (3531 mm)	10'-1" (3073 mm)	8'-3" (2515 mm)
			L/240	10'-7" (3226 mm)	9'-3" (2819 mm)	8'-5" (2565 mm)	7'-4" (2235 mm)
			L/360	9'-3" (2819 mm)	8'-1" (2464 mm)	7'-4" (2235 mm)	6'-5" (1956 mm)
2-1/2" (63.5 mm)	24" (610 mm)	0.0329	L/120	15'-2" (4623 mm)	13'-3" (4039 mm)	12'-1" (3683 mm)	10'-7" (3226 mm)
			L/240	12'-1" (3683 mm)	10'-7" (3226 mm)	9'-7" (2921 mm)	8'-4" (2540 mm)
			L/360	10'-7" (3226 mm)	9'-2" (2794 mm)	8'-4" (2540 mm)	7'-4" (2235 mm)
4" (102 mm)	24" (610 mm)	0.020	L/120	17'-11" (5461 mm)	14'-10" (4521 mm)	12'-10" (3912 mm)	9'-9" (2972 mm)
			L/240	14'-3" (4343 mm)	12'-5" (3785 mm)	11'-4" (3454 mm)	9'-5" (2870 mm)
			L/360	12'-5" (3785 mm)	10'-10" (3302 mm)	9'-5" (2870 mm)	8'-3" (2515 mm)
4" (102 mm)	24" (610 mm)	0.0329	L/120	20'-0" (6096 mm)	18'-2" (5537 mm)	16'-6" (5029 mm)	14'-3" (4343 mm)
			L/240	16'-6" (5029 mm)	14'-5" (4394 mm)	13'-1" (3988 mm)	11'-5" (3480 mm)
			L/360	14'-5" (4394 mm)	12'-7" (3835 mm)	11'-5" (3480 mm)	9'-4" (2845 mm)
6" (152 mm)	24" (610 mm)	0.0329	L/120	24'-0" (7315 mm)	22'-10" (6960 mm)	19'-9" (6020 mm)	16'-2" (4928 mm)
			L/240	20'-11" (6375 mm)	18'-4" (5588 mm)	16'-8" (5080 mm)	14'-6" (4420 mm)
			L/360	18'-4" (5588 mm)	16'-0" (4877 mm)	14'-6" (4420 mm)	10'-11" (3327 mm)

>Yield strength 40,000 psi  
Limiting heights are based on transverse load tests (in accordance with ASTM E 72) and calculated utilizing the loads indicated.

**ALLOWABLE WALL HEIGHTS FOR 2-HOUR FIRE-RATED ASSEMBLIES**

Stud Size in. (mm)	Stud Spacing in. O.C. (mm)	Min. Steel Thickness in.	Allowable Deflection	Intermittent Air Pressure Load PSF			
				5	7.5	10	15
2-1/2" (63.5 mm)	24" (610 mm)	0.020	L/120	15'-3" (4648 mm)	12'-6" (3810 mm)	10'-9" (3277 mm)	8'-10" (2692 mm)
			L/240	12'-6" (3810 mm)	11'-0" (3352 mm)	10'-0" (3048 mm)	8'-9" (2667 mm)
			L/360	11'-0" (3352 mm)	9'-6" (2895 mm)	8'-8" (2641 mm)	7'-7" (2311 mm)
2-1/2" (63.5 mm)	24" (610 mm)	0.0329	L/120	17'-10" (5435 mm)	15'-8" (4775 mm)	14'-2" (4318 mm)	12'-5" (3784 mm)
			L/240	14'-2" (4318 mm)	12'-5" (3784 mm)	11'-4" (3454 mm)	9'-10" (2997 mm)
			L/360	12'-5" (3784 mm)	10'-11" (3327 mm)	9'-10" (2997 mm)	8'-7" (2616 mm)
4" (102 mm)	24" (610 mm)	0.020	L/120	20'-4" (6197 mm)	16'-8" (5080 mm)	14'-5" (4394 mm)	11'-10" (3606 mm)
			L/240	16'-1" (4902 mm)	14'-1" (4292 mm)	12'-10" (3911 mm)	11'-2" (3403 mm)
			L/360	14'-1" (4292 mm)	12'-4" (3759 mm)	11'-2" (3403 mm)	9'-10" (2997 mm)
4" (102 mm)	24" (610 mm)	0.0329	L/120	21'-10" (4114 mm)	19'-1" (5816 mm)	17'-4" (5283 mm)	15'-1" (4597 mm)
			L/240	17'-4" (5283 mm)	15'-1" (4597 mm)	13'-10" (4216 mm)	12'-0" (3657 mm)
			L/360	15'-1" (4597 mm)	13'-2" (4013 mm)	12'-0" (3657 mm)	10'-6" (3200 mm)
6" (152 mm)	24" (610 mm)	0.0329	L/120	25'-4" (7721 mm)	22'-1" (6731 mm)	20'-1" (6121 mm)	17'-6" (5334 mm)
			L/240	20'-1" (6121 mm)	17'-6" (5334 mm)	15'-11" (4851 mm)	13'-11" (4241 mm)
			L/360	17'-6" (5334 mm)	15'-4" (4673 mm)	13'-11" (4241 mm)	12'-2" (3708 mm)

>Yield strength 40,000 psi  
Limiting heights are based on transverse load tests (in accordance with ASTM E 72) and calculated utilizing the loads indicated.

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**ALLOWABLE WALL HEIGHTS FOR 2-HOUR FIRE-RATED ASSEMBLIES STAIRWELLS**

Stud Size in. (mm)	Stud Spacing in. O.C. (mm)	Min. Steel Thickness in.	Allowable Deflection	Sustained Air Pressure Load PSF			
				5	7.5	10	15
2-1/2" (63.5 mm)	24" (610 mm)	0.020	L/120	13'-11" (4242 mm)	12'-2" (3708 mm)	11'-0" (3353 mm)	9'-8" (2946 mm)
			L/240	11'-0" (3353 mm)	9'-8" (2946 mm)	8'-9" (2667 mm)	7'-8" (2337 mm)
			L/360	8'-9" (2667 mm)	8'-5" (2565 mm)	7'-8" (2337 mm)	6'-8" (2032 mm)
2-1/2" (63.5 mm)	24" (610 mm)	0.0329	L/120	16'-7" (5055 mm)	14'-6" (4420 mm)	13'-2" (4013 mm)	11'-6" (3505 mm)
			L/240	13'-2" (4013 mm)	11'-6" (3505 mm)	9'-10" (2897 mm)	8'-7" (2616 mm)
			L/360	11'-6" (3505 mm)	10'-0" (3048 mm)	8'-7" (2616 mm)	7'-6" (2286 mm)
4" (102 mm)	24" (610 mm)	0.020	L/120	20'-2" (6147 mm)	17'-8" (5385 mm)	16'-0" (4877 mm)	11'-11" (3632 mm)
			L/240	16'-0" (4877 mm)	11'-11" (3632 mm)	10'-10" (3302 mm)	9'-5" (2870 mm)
			L/360	11'-11" (3632 mm)	10'-6" (3175 mm)	9'-5" (2870 mm)	8'-3" (2515 mm)
4" (102 mm)	24" (610 mm)	0.0329	L/120	22'-3" (6782 mm)	19'-6" (5944 mm)	17'-8" (5385 mm)	15'-6" (4724 mm)
			L/240	17'-8" (5385 mm)	15'-6" (4724 mm)	14'-1" (4293 mm)	10'-8" (3251 mm)
			L/360	15'-6" (4724 mm)	11'-9" (3581 mm)	10'-8" (3251 mm)	9'-4" (2845 mm)
6" (152 mm)	24" (610 mm)	0.0329	L/120	28'-0" (8534 mm)	24'-10" (7569 mm)	22'-7" (6883 mm)	19'-9" (6020 mm)
			L/240	22'-7" (6883 mm)	19'-9" (6020 mm)	17'-11" (5461 mm)	12'-3" (3734 mm)
			L/360	19'-9" (6020 mm)	13'-6" (4115 mm)	12'-3" (3734 mm)	10'-9" (3277 mm)

>Yield strength 40,000 psi  
Limiting heights are based on transverse load tests (in accordance with ASTM E 72)  
and calculated utilizing the loads indicated.

**ALLOWABLE WALL HEIGHTS FOR 2-HOUR FIRE-RATED ASSEMBLIES UNLINED RETURN AIR SHAFTS**

Stud Size in. (mm)	Stud Spacing in. O.C. (mm)	Min. Steel Thickness in.	Allowable Deflection	Sustained Air Pressure Load PSF			
				5	7.5	10	15
2-1/2" (63.5 mm)	24" (610 mm)	0.020	L/120	14'-7" (4445 mm)	12'-4" (3759 mm)	10'-9" (3277 mm)	8'-9" (2667 mm)
			L/240	11'-7" (3531 mm)	10'-1" (3073 mm)	9'-2" (2794 mm)	8'-0" (2438 mm)
			L/360	10'-1" (3073 mm)	8'-10" (2692 mm)	8'-0" (2438 mm)	7'-0" (2134 mm)
2-1/2" (63.5 mm)	24" (610 mm)	0.0329	L/120	17'-9" (5410 mm)	15'-6" (4724 mm)	14'-1" (4293 mm)	12'-4" (3759 mm)
			L/240	14'-1" (4293 mm)	12'-4" (3759 mm)	11'-2" (3404 mm)	8'-9" (2667 mm)
			L/360	12'-4" (3759 mm)	9'-8" (2946 mm)	8'-9" (2667 mm)	7'-8" (2337 mm)
4" (102 mm)	24" (610 mm)	0.020	L/120	19'-10" (6045 mm)	16'-3" (4953 mm)	14'-0" (4267 mm)	10'-2" (3099 mm)
			L/240	16'-2" (4928 mm)	14'-2" (4318 mm)	11'-6" (3505 mm)	10'-0" (3048 mm)
			L/360	14'-2" (4318 mm)	11'-0" (3353 mm)	10'-0" (3048 mm)	8'-9" (2667 mm)
4" (102 mm)	24" (610 mm)	0.0329	L/120	23'-2" (7061 mm)	20'-2" (6147 mm)	18'-1" (5512 mm)	14'-9" (4496 mm)
			L/240	18'-4" (5588 mm)	16'-1" (4902 mm)	14'-7" (4445 mm)	11'-1" (3378 mm)
			L/360	16'-1" (4902 mm)	14'-0" (4267 mm)	11'-1" (3378 mm)	9'-8" (2946 mm)
6" (152 mm)	24" (610 mm)	0.0329	L/120	28'-0" (8534 mm)	23'-11" (7290 mm)	20'-9" (6325 mm)	16'-11" (5156 mm)
			L/240	22'-9" (6934 mm)	19'-10" (6045 mm)	18'-0" (5486 mm)	12'-10" (3912 mm)
			L/360	19'-10" (6045 mm)	17'-4" (5283 mm)	12'-10" (3912 mm)	11'-2" (3404 mm)

>Yield strength 40,000 psi  
Limiting heights are based on transverse load tests (in accordance with ASTM E 72)  
and calculated utilizing the loads indicated.

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