Cavity Shaftwall Systems
**CAVITY SHAFTWALL SYSTEMS**

Gypsum drywall shaft construction has become the preferred alternative to traditional masonry shafts. One-inch Shaftliner board was developed as a lightweight, easy-to-install replacement for masonry in the interior core of buildings for shaftwalls, stairwells, other vertical chases and mechanical enclosures. Shaftliner board is also used as a component of 2" solid partitions, and area separation walls with a layer of 1/2" Regular or Fire-Shield Gypsum Board attached to each side.

Historically, heavy masonry weighing 20 to 45 lbs. per square foot was used for shaftwall construction. With the use of Shaftliner, shaftwall assemblies weigh in at a remarkably low 10 to 13 lbs. per square foot. The benefits of gypsum drywall shaft systems go far beyond the difference in weight alone. The core wall of a shaft can be installed from the exterior of the shaft and requires no scaffolding. Erection is speedy and clean. Shaftliner also provides excellent sound control and can achieve the fire ratings necessary for today’s building construction. Best of all, gypsum shaftwall systems are more economical than masonry shaft construction.

National Gypsum produces Shaftliner board with green moisture/mold/mildew resistant paper or purple moisture/mold/mildew resistant paper on both sides with a beveled edge configuration allowing for simple installation into the Shaftwall System framing. Cavity Shaftwall systems are a non-load-bearing drywall partition made up of two basic components, gypsum board and metal framing. Gypsum board includes 1” Fire-Shield Shaftliner or 1/2” Fire-Shield Shaftliner XP panels, 1/2” Fire-Shield Gypsum Board, and 5/8” Fire-Shield Gypsum Board face panels, 1/2” XP Fire-Shield C or 5/8” XP Fire-Shield Gypsum Board face panels may be utilized for extra protection against mold and mildew. The framing includes I-Studs, C-T Studs and C-H studs with integral tabs/flange which hold the panels in place and J Track for runners at top and bottom, as well as vertically at partition ends and to frame openings.

The Cavity Shaftwall Systems were developed to enclose elevator shafts 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. National Gypsum Company Cavity Shaftwall Systems may be constructed with C-T, C-H or I-Stud shaftwall framing.

**FUNCTION AND UTILITY**

**Loading Performance.** Although the cavity shaftwall systems are non-load-bearing, this System has been designed and tested to withstand positive and negative air pressure forces exerted by high-speed, high-rise elevators.

**Fire Resistance.** The cavity shaftwall systems have been fire tested and have achieved fire resistance ratings of 1 and 2 hours. All components are noncombustible. Refer to pages 19 and 20. 25 GA (.020” minimum steel thickness) J Track exceeded 2,000,000 lateral load oscillation cycles in a test conducted to duplicate the positive and negative pressures created as elevator cabs rise and descend in a shaft.

**TECHNICAL DATA**

**Sound Transmission.** STC ratings of 40 to 51 have been achieved in tests conducted in accordance with ASTM E 90. Refer to pages 19 and 20.

**LIMITATIONS**

1. Non-load-bearing.
2. The cavity shaftwall systems should not be used where exposed to constant dampness or conditions under which free water can be formed.
3. This System should not be exposed to temperatures over 125°F for extended periods of time.
4. Where reference is made to nominal gauges, 25 gauge relates to minimum base steel of .020” and 20 gauge to .0329”.

**I-STUD SECTION PROPERTIES ABOUT X-X AXIS**

\[\begin{array}{|c|c|c|c|c|c|}
\hline
\text{Stud Size} & \text{Min. Base Steel} & \text{A} & \text{Y} & \text{I} & \text{S} \\
\hline
2 1/2” (63.5 mm) & 0.020” & 0.133 & 1.366 & 0.151 & 0.110 \\
2 1/2” (63.5 mm) & 0.0329” & 0.253 & 1.262 & 0.288 & 0.228 \\
4” (102 mm) & 0.020” & 0.163 & 2.152 & 0.421 & 0.196 \\
4” (102 mm) & 0.0329” & 0.307 & 2.016 & 0.822 & 0.408 \\
6” (152 mm) & 0.0329” & 0.342 & 3.020 & 1.860 & 0.616 \\
\hline
\end{array}\]

Above properties are in accordance with AISI “Specifications For the Design of Cold-Formed Steel Structural Members.”

**CAULK WHERE REQUIRED**

Note: In addition to National Gypsum systems, 1/2” Fire-Shield C, 5/8” Fire-Shield and 1” Fire-Shield Shaftliner panels are listed in Dietrich Industries ICC ES Legacy Report NER-506, Shaftwall and Stairwell Fire-Resistive (C-T stud) Assemblies. 

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1/2” FIRE-SHIELD GYPSUM BOARD

J TRACK

1” FIRE-SHIELD SHAFTLINER

J TRACK

CAULK WHERE REQUIRED
### Allowing Wall Heights for 1-Hour Fire-Rated I-Stud Assemblies

<table>
<thead>
<tr>
<th>Stud Size (in.)</th>
<th>Stud Spacing O.C. (mm)</th>
<th>Min. Steel Thickness (mm)</th>
<th>Allowable Deflection</th>
<th>Sustained Air Pressure Load PSF</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 1/2&quot; (63.5 mm)</td>
<td>24&quot; (610 mm)</td>
<td>0.020</td>
<td>L/120</td>
<td>5 - 10 - 15</td>
</tr>
<tr>
<td>2 1/2&quot; (63.5 mm)</td>
<td>24&quot; (610 mm)</td>
<td>0.0329</td>
<td>L/120</td>
<td>5 - 10 - 15</td>
</tr>
<tr>
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<td>24&quot; (610 mm)</td>
<td>0.0329</td>
<td>L/120</td>
<td>5 - 10 - 15</td>
</tr>
</tbody>
</table>

*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.

### Allowing Wall Heights for 2-Hour Fire-Rated I-Stud Assemblies

<table>
<thead>
<tr>
<th>Stud Size (in.)</th>
<th>Stud Spacing O.C. (mm)</th>
<th>Min. Steel Thickness (mm)</th>
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</tr>
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*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 I-Stud Assemblies

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<th>Stud Size in. (mm)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>2 1/2 (63.5 mm)</td>
<td>24 (610 mm)</td>
<td>0.020</td>
<td>L/120</td>
<td>13'- 11&quot; (4242 mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L/240</td>
<td>10'- 9&quot; (3353 mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L/360</td>
<td>8'- 8&quot; (2566 mm)</td>
</tr>
<tr>
<td>2 1/2 (63.5 mm)</td>
<td>24 (610 mm)</td>
<td>0.0329</td>
<td>L/120</td>
<td>16'- 7&quot; (5055 mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L/240</td>
<td>13'- 2&quot; (4013 mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L/360</td>
<td>11'- 6&quot; (3505 mm)</td>
</tr>
<tr>
<td>4 * (102 mm)</td>
<td>24 (610 mm)</td>
<td>0.020</td>
<td>L/120</td>
<td>20'- 2&quot; (6147 mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L/240</td>
<td>16'- 0&quot; (4877 mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L/360</td>
<td>11'- 11&quot; (3632 mm)</td>
</tr>
<tr>
<td>4 * (102 mm)</td>
<td>24 (610 mm)</td>
<td>0.0329</td>
<td>L/120</td>
<td>22'- 3&quot; (6782 mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L/240</td>
<td>17'- 8&quot; (5385 mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L/360</td>
<td>15'- 6&quot; (4724 mm)</td>
</tr>
<tr>
<td>6 * (152 mm)</td>
<td>24 (610 mm)</td>
<td>0.0329</td>
<td>L/120</td>
<td>28'- 0&quot; (8534 mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L/240</td>
<td>22'- 7&quot; (6883 mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L/360</td>
<td>19'- 9&quot; (6620 mm)</td>
</tr>
</tbody>
</table>

- 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 I-Stud Assemblies Stairwells

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<thead>
<tr>
<th>Stud Size in. (mm)</th>
<th>Stud Spacing in. O.C. (mm)</th>
<th>Min. Steel Thickness in.</th>
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<td>8'- 8&quot; (2566 mm)</td>
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<td>2 1/2 (63.5 mm)</td>
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<td>0.0329</td>
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<td>16'- 7&quot; (5055 mm)</td>
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- 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.
SHAFTWALL STUD
Used with J Track for framing Cavity Shaftwalls. Tabs retain 1” shaftliner. Galvanized steel.

J TRACK
2 1/4” Leg.

DETAILS

OUTSIDE CORNER
09260C
Scale: 2 1/4” = 1’-0”

INSIDE CORNER
09260D
Scale: 2 1/4” = 1’-0”

Note: Type S screws for .020” studs, S-12 screws for .0329”.

Pan Head Screws (Track to Track)
1/2” Fire-Shield C Gypsum Board

1 1/8” Type S or S-12 Screws, 12” O.C.
1/4” Type S or S-12 Screws, 24” O.C.
1” Fire-Shield Shaftliner

2” x 2” x 20 GA. Angle each angle fastened to J Track with two 3/8” Type S-12 screws at ceiling and two at floor.
Elevator Door Frames Over 7'
NOTE: These assemblies tested Factory Mutual Design WP 621 and Factory Mutual WP 612
CAULK WHERE REQUIRED

NOTE: Cant strips generally required to prevent edges more than 2" wide.

SHAFT CANTS

SCALE: 3" = 1'-0"

SHAFTWALL AT SUSPENDED CEILING

SHAFTWALL STUD

FURRING CHANNEL CLIP OR WIRE TIE

HANGER WIRE

2" x 2" x 20 GA. ANGLE RUNNER

Tape and joint compound

SHAFTWALL AT SUSPENDED CEILING

(Restrained) 09260N

1/2" FIRE-SHIELD C

GYPSUM BOARD CEILING

FURRING CHANNEL CLIP

SHAFTWALL STUD

1" FIRE-SHIELD SHAFTLINER

CANTS SCREWED TO SHAFTWALL STUDS

1-1/2" C.R. CHANNEL

1-5/8" TYPE S OR S-12 SCREWS

FURRING CHANNEL

2 5/8" TYPE S OR S-12 SCREWS 12" O.C.

1 5/8" TYPE S OR S-12 SCREWS 36" O.C.

J TRACK

MAIL CHUTE

092600

Scale: 3" = 1'-0"

1/2" FIRE-SHIELD C

GYPSUM BOARD

FURRING CHANNEL

CANTS SCREWED TO SHAFTWALL STUDS

1" FIRE-SHIELD SHAFTLINER

CAULK WHERE REQUIRED

NOTE: Cant strips generally required to prevent edges more than 2" wide.

SHAFT CANTS

09260P

Scale: 3" = 1'-0"

SHAFTWALL AT SUSPENDED CEILING

(UNRESTRAINED) 09260N

1" FIRE-SHIELD SHAFTLINER

CANTS SCREWED TO SHAFTWALL STUDS

75°

1/2" FIRE-SHIELD C

GYPSUM BOARD

FURRING CHANNEL

CANTS SCREWED TO SHAFTWALL STUDS

1" FIRE-SHIELD SHAFTLINER

2 5/8" TYPE S OR S-12 SCREWS 12" O.C.

1 5/8" TYPE S OR S-12 SCREWS 36" O.C.

J TRACK

MAIL CHUTE

092600

Scale: 3" = 1'-0"
HANDRAIL SUPPORT DETAILS


HANDRAIL SUPPORT DETAILS

CROSS SECTION

ELECTRICAL OUTLET SUPPORT

HANDRAIL SUPPORT DETAILS

HANDRAIL SUPPORT DETAILS
Note: Maintain 24" module Shaftwall Stud spacing regardless of duct location.
Shaftliner panels should be handled with care to prevent fracturing or deformation of edges.

**FRAMING AND SHAFTLINER CAVITY SHAFTWALL**

1. Locate and lay out partition floor and ceiling lines to ensure plumb partition.
2. Insure accurate stud spacing to maintain gypsum board face layer module.
3. 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 shaftwall will begin. Attach with power driven fasteners 24" o.c. max.
4. Frame all openings cut into partitions for ducts, etc., with J Track as shown in accompanying details to protect cut gypsum core edges and to provide resistance to bending and other stresses.
5. Cut shaftliner panels 1" less than ceiling height and install first by placing outside vertical edge against long leg of vertical track, plumb and attach with Type S 1 5/8" Screws 24" o.c.
6. Place studs within flanges of floor and ceiling track and rotate into place. Slide stud tabs/flange snugly over edge of shaftliner previously installed.
7. Install next shaftliner panel between tabs/flange of studs. Continue in this manner until end of partition run. Occasionally check spacing of studs to maintain 24" module.
8. 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 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. See drawing on page 126 for alternate detail.
9. Locate shaftwall horizontal end joints within the upper and lower third points of wall. Stagger joints in adjacent panels to avoid continuous horizontal joint. Shaftliner horizontal end joints do not require taping, back blocking or framing. When using I-Studs the shaftliner panels shall be of sufficient length to engage a minimum of two I-Stud tabs along the edge.

**GYPSUM BOARD**

Apply first layer of 1/2" Fire-Shield C (5/8" Fire-Shield) Gypsum Board horizontally to face of 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 gauge nominal framing.) (Use 1 1/2" Type S-12 Screws on first layer, 1 5/8" Type S-12 Screws on second layer for 20 gauge or heavier framing.) Stagger all vertical and horizontal joints. For proper joint treatment, maintain uniform room temperature between 50°F and 70°F during cold weather. Treat joints of face layer with tape and joint compound.

**CAULKING**

Caulk Cavity Shaftwall system 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.

**AIR SHAFTS**

The System is not designed to serve as an unlined air supply duct. Caulking is recommended at penetrations and penetrations wherever the I-Stud System is used to enclose elevators or other shafts where positive or negative pressures will exist. The contractor installing this System shall caulk in compliance with details specified by the architect/designer. Proper caulking will seal perimeters and penetrations to minimize air noises and dust associated with air movement.

**FRAMING FOR OPENINGS**

Frame doors 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 nest 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 as shown in drawings on page 130.

**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" or 6" studs can be used for chases or erect chase walls as shown on page 134.

**ELEVATOR DOORS**

Elevator door frames must be braced and supported independently of the shaftwall. However, shaftwall must be tied into elevator door frames by being attached to jamb and anchor clips with pan head screws. The 3" leg, nominal 20 gauge J Track shall be used at the juncture of the elevator door frame and the Cavity Shaftwall System. See drawings on pages 128 and 129 for details.

Door frames (other than elevator door frames) should be formed from not less than 18 gauge steel, shop primed, with throat openings accurately formed to the nominal wall thickness plus 3/32". Frames must have trim returns not less than 7/16" in width to bear flush against the gypsum board surface. Floor anchor plates should be 14 gauge (min.) steel, firmly welded to frames and designed with not less than two anchor holes 3" o.c. minimum to prevent frame rotation. Anchor plates should be securely fastened to the floor with power driven fasteners having minimum dimensions of 3/16" diameter and 3/4" length. The type and size of fastener is dependent on job conditions, type of concrete or steel framing, etc., and must be sufficient to provide rigid, continuous anchorage to the frames. Jamb anchor clips should be formed from 18 gauge (min.) steel, and welded to jambs to provide adequate anchorage to jamb framing as shown on details. Elevator door frames must be fastened to and supported by the building structure, separately framed and independent of the partition. They shall be securely anchored to the sills and to the building structure or to the track supports. Anchors or fastenings to suit the wall construction are required and shall be not more than 2" apart. See details on pages 128 and 129 for connection of partition and elevator door frames.