Sprinkler Pipe Installation for APA Performance Rated I-Joists

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APA Performance Rated wood I-joists (PRI) are often used in conjunction with both steel and chlorinated polyvinyl chloride (CPVC) sprinkler systems. The purpose of this technical note is to provide some basic guidance on appropriate methods of attachment of steel and CPVC sprinkler systems to PRI joists. All designs should be checked by a design professional to assure the adequacy of not only the hangers and fasteners used but the capacity of the I-joists themselves. When CPVC sprinkler systems are used, it is the responsibility of the designer to ensure the pipe and fittings are listed by a listing agency for I-joist systems in accordance with NFPA 13. Design examples in this technical note are based on the assumptions outlined below.

Permitted Fasteners
Chapter 9 of the National Fire Protection Association (NFPA) 13, Standard for the Installation of Sprinkler Systems, lists the approved fasteners for use in wood and other materials.


NFPA 13D, Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes, requires only that pipes supported by structural members be supported by methods comparable to those required by local plumbing codes. Check local code.

Design Load Assumptions
The design information in Tables A-F is provided for the selection and sizing of structural members and connections for the support of the sprinkler system. The capacity information given in the figures, unless otherwise specified, is based on the 2009 Automatic Sprinkler Systems Handbook, NFPA 13, and is based on an assumed maximum span between pipe supports as shown in Table A for Schedule 40 steel pipe or Table B for Schedule 80 CPVC pipe permanently filled with water. An additional allowance is made for a short-term additional load of 250 pound attachments. See NFPA 13 for spans with other types and diameters of piping. A duration-of-load factor of 0.9 is used for permanent loads, and 1.6 is used for the short-term loads and for seismic loads in the bracing designs. For seismic loads...
on bracing, spacing of braces depends on pipe size and length of pipe runs and the seismic design category. I-joist flanges are assumed to be 1-1/2 inches thick. All filler blocking attached to webs is assumed to be nominal 2x No. 2 Spruce-Pine-Fir (SPF) or better.

**Design Fastener Capacities**
For installations in lumber or into I-joist flanges, lag screw, wood screw and bolt design assumptions are based on the use of AF&PA National Design Specification (NDS-2005) design methods and design capacities for Spruce-Pine-Fir No. 2 with a specific gravity (SG) of 0.42. Sheet metal screws are assumed to have the same bearing strength and withdrawal capacity per threaded inch as wood screws. Oriented strand board (OSB) webs are assumed to be 3/8 inch thick with a design specific gravity of 0.50 per Table 11.3.2B of NDS or APA Panel Design Specification, Form D510, available at www.apawood.org/publications. All filler blocking attached to webs is assumed to be nominal 2x SPF lumber.

**Joist Design**
Most wood I-joist design tables are based on an assumed uniform load. Joists and other supporting systems must be designed to carry the added weight of the sprinkler system. This may necessitate the use of deeper I-joists, joists with shorter spans, closer spacing and/or a different I-joist series with higher moment and stiffness capacities or a flange.

**Coach Screw Rods and Lag Screws**
NFPA 13 limits the use of coach screws. This precludes the direct attachment of coach screw rods to the flanges of most wood I-joists. Lag screws are permitted; however, the designer must remain aware that only the threaded portion is used for design and that the full length of the lag screw is not threaded (see NDS Table L2 for dimensions). While fastener penetration into the edges of the I-joist webs is permissible (through the flange face), it is recommended that web-edge penetration not be added to the withdrawal-from-flange-face value.
Sprinkler Pipe Installation for APA Performance Rated I-Joists (PRI)

**FIGURE 1**
**APA PERFORMANCE RATED I-JOIST – CEILING FLANGE HANGER**

- Ceiling flange minimum 2 screws
- Fastener centerline from web face 1/2’ maximum

*Install per NFPA 13 and manufacturer’s instructions.*
Steel sprinkler system pipe 4” maximum diameter or 500 pounds maximum point load

**FIGURE 2**
**APA PERFORMANCE RATED I-JOIST – COACH SCREW HANGER**

- No. 2 SPF or better filler block bearing on flange required when supporting steel pipe. Orient horizontal or vertical. Minimum 6’ length 2x4
- Coach Screw Rod 3/8” maximum diameter

*Install per NFPA 13.*
Steel sprinkler system pipe 4” maximum diameter or 500 pounds maximum point load

**FIGURE 3**
**APA PERFORMANCE RATED I-JOIST – JOIST CLAMP HANGER**

- Joist clamp hanger per manufacturer’s specifications re: dimension and capacity
- Eye rod

*Install per NFPA 13 and manufacturer’s instructions.*
Steel sprinkler system pipe 4” maximum diameter or 500 pounds maximum point load

**FIGURE 4**
**APA PERFORMANCE RATED I-JOIST – ANGLE BRACKET HANGER**

- No. 2 SPF or better filler block bearing on flange required when supporting steel pipe. Orient horizontal or vertical. Minimum 6” length 2x4
- Sheet metal screw: Two - #10 x 1-1/2”
- Nail option: Two - clinched 8d (0.113” x 2-1/2”)

*Install per NFPA 13.*
Steel sprinkler system pipe 4” maximum diameter or 500 pounds maximum point load
Sprinkler Pipe Installation for APA Performance Rated I-Joists (PRI)

**FIGURE 5**

APA PERFORMANCE RATED I-JOIST – OFFSET EYE-SOCKET HANGER

No. 2 SPF or better filler block bearing on flange required when supporting steel pipe. Orient horizontal or vertical. Minimum 6' length 2x4

Install per NFPA 13 and manufacturer’s instructions.

Steel sprinkler system pipe 4” maximum diameter or 500 pounds maximum point load

![Diagram of offset eye-socket hanger]

**FIGURE 6**

APA PERFORMANCE RATED I-JOIST – EYE ROD HANGER

No. 2 SPF or better filler block bearing on flange required when supporting steel pipe. Orient horizontal or vertical. Minimum 6' length 2x4

Install per NFPA 13 and manufacturer’s instructions.

Steel sprinkler system pipe 4” maximum diameter or 500 pounds maximum point load

![Diagram of eye rod hanger]

**FIGURE 7**

APA PERFORMANCE RATED I-JOIST – LOAD CARRIED BY FLANGES

No. 2 SPF or better hanger block bearing on flange required when supporting steel pipe.

Install - 48” maximum length 2x4 for 3” maximum diameter = 475 pounds maximum point load

Install - 48” maximum length 2x6 for 5” maximum diameter = 600 pounds maximum point load

Install per NFPA 13 and manufacturer’s instructions.

Steel sprinkler system pipe. See note to left.

![Diagram of load carried by flanges]
FIGURE 8
APA PERFORMANCE RATED I-JOIST – NFPA 13 STEEL ANGLE TRAPEZE WITH HANGER

Slave piece orient horizontal
12” min. length 2x4
Sheet metal screws:
Two - #14 x 2"

Install 48” maximum length NFPA 13 angle iron

Center hanger location not required

Option 1
Install per NFPA 13.
CPVC sprinkler system pipe
2-1/2” maximum diameter =
290 pounds maximum point
load (145 pounds per joist)

Sheet metal screw:
Four - #10 x 1-1/2”
Nail option:
Four - clinched 8d
0.113” x 2-1/2”

No. 2 SPF or better filler block
bearing on flange
ok, but not required.
Minimum 6” length 2x4

Option 2
Install per NFPA 13.
Steel sprinkler system pipe
4” maximum diameter =
500 pounds maximum point
load (250 pounds per joist)

Sheet metal screw
option: One - #14 x 3”
Centerline from web
face 1/2” maximum

Slave piece orient horizontal.
12” minimum length 2x4.
Sheet metal screws:
Two - #14 x 3”

FIGURE 9
APA PERFORMANCE RATED I-JOIST –
CPVC HANGER - SURFACE MOUNT

Option 1
Backings nuts

Install per NFPA 13 and
manufacturer’s instructions.
CPVC sprinkler system pipe
3” maximum diameter or 310
pounds maximum point load

Option 2
Sheet metal screw:
Four - #10 x 1-1/2”
Nail option:
Four - clinched 8d
(0.113” x 2-1/2”)

No. 2 SPF or better filler block
bearing on flange
ok, but not required.
Minimum 6” length 2x4

FIGURE 10
APA PERFORMANCE RATED I-JOIST –
CPVC HANGER - OFFSET

Option 1
Backings nuts

Install per NFPA 13 and
manufacturer’s instructions.
CPVC sprinkler system pipe
3” maximum diameter or 310
pounds maximum point load

Option 2
Sheet metal screw:
Four - #10 x 1-1/2”
Nail option:
Four - clinched 8d
(0.113” x 2-1/2”)

No. 2 SPF or better filler block
bearing on flange
ok, but not required.
Minimum 6” length 2x4
**FIGURE 11**

APA PERFORMANCE RATED I-JOIST – CPVC HANGER - SURFACE MOUNT

- No. 2 SPF or better filler block bearing on flange OK, but not required. Minimum 6" length 2x4
- Sheet metal screw: Four - #10 x 1-1/2"
- Nail option: Four - clinched 8d (0.113" x 2-1/2"

Install per NFPA 13 and manufacturer’s instructions. CPVC sprinkler system pipe 3” maximum diameter or 310 pounds maximum point load

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**FIGURE 12**

APA PERFORMANCE RATED I-JOIST – CPVC HANGER - DOUBLE OFFSET

- No. 2 SPF or better filler block bearing on flange OK, but not required. Minimum 6" length 2x4
- Sheet metal screw: Four - #10 x 1-1/2"
- Nail option: Four - clinched 8d (0.113" x 2-1/2"

Install per NFPA 13 and manufacturer’s instructions. CPVC sprinkler system pipe 3” maximum diameter or 310 pounds maximum point load

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**FIGURE 13**

APA PERFORMANCE RATED I-JOIST – CPVC HANGER - FACE MOUNT

**Option 1**
- No. 2 SPF or better filler block bearing on flange OK, but not required. Minimum 48" length 2x6
- Sheet metal screw: Four - #10 x 2"
- Nail option each end 1/2" stagger: Six - 10d (0.148" x 3"

**Option 2**
- 2x4 hanger block bearing on flange or bearing on secured 4" minimum length 2x4 block bearing on flange
- Sheet metal screw each end: Two - #10 x 1-1/2"
- Nail option each end: Two - 8d (0.113" x 2-1/2"

Install per NFPA 13 and manufacturer’s instructions. CPVC sprinkler system pipe 3” maximum diameter or 310 pounds maximum point load (155 pounds per joist)

Center hanger location not required
FIGURE 14

**APA PERFORMANCE RATED I-JOIST – SWAY BRACE BLOCKING FOR SEISMIC LOADS PARALLEL TO THE JOIST**

**Option 1**

- Blocking on one side of web
- No. 2 SPF or better filler and slave block bearing on flange OK, but not required.
- Install both sides minimum 12" long 2x6
- Sheet metal screw through web into block: Eight - #10 x 1-1/2"
- Lag option through web into block: Eight - 1/4" x 1-1/2" (0.128" x 3"
- Nail option through web into block: Ten - clinched 10d

**Option 2**

- Blocking on both sides of web
- No. 2 SPF or better filler and slave block bearing on flange OK, but not required.
- Install both sides minimum 12" long 2x6
- Sheet metal screw each side: Eight - #14 x 3"
- Lag option each side: Eight - 1/4" x 3" (0.128" x 3-1/4"
- Nail option each side: Ten - clinched 12d (0.128" x 3-1/4")

Install per NFPA 13 and manufacturer’s instructions.
Maximum horizontal load = 650 pounds includes a 1.33 duration of load adjustment

FIGURE 15

**APA PERFORMANCE RATED I-JOIST – SWAY BRACE BLOCKING FOR SEISMIC LOADS PERPENDICULAR TO THE JOIST**

- Lag screw: Three - 1/4" x 2"
- Install sway brace bolt at minimum 4D from any edge
- No. 2 SPF or better brace blocking install one - 48" maximum length 4x6 against webs and under upper flanges
- Sheet metal screw through side: Three - 1/4" x 3"

Install per NFPA 13 and manufacturer’s instructions.
Maximum load = 585 pounds includes a 1.33 duration of load adjustment (243 pounds per joist)

FIGURE 16

**APA PERFORMANCE RATED I-JOIST – SWAY BRACE BLOCKING FOR SEISMIC LOADS PERPENDICULAR TO THE JOIST**

- Cross member lag screws:
  - Four - 1/4" x 3" each end
  - Sheet metal screw:
  - Four - #14 x 3" each end
  - Nail option: Six - 12d (0.128" x 3-1/4") each end
- Web blocking lag screws:
  - Four - 1/4" x 2" each end
  - Sheet metal screws:
  - Four - #14 x 1-1/2" each end
- Install sway brace bolt at minimum 4D from any edge
- No. 2 SPF or better brace blocking install one - full length vertical 2x4 flat on each web between top and bottom flanges
- Install one - 48" maximum length horizontal 2x6 against webs and under upper flanges

Install per NFPA 13 and manufacturer’s instructions.
Maximum load = 515 pounds includes a 1.33 duration of load adjustment (258 pounds per joist)
FIGURE 17

**APA PERFORMANCE RATED I-JOIST – SWAY BRACE BLOCKING FOR SEISMIC LOADS PERPENDICULAR TO THE JOIST**

- Install sway brace bolt at minimum 4D from any edge
- No. 2 SPF or better brace blocking
- Install one - full length vertical 2x4 flat on each web between top and bottom flanges
- Install one - 24" maximum length horizontal 2x6 against webs and above or on lower flanges

Sheet metal screw: Four - #14 x 2"
Nail option: Five - clinched 8d (0.113" x 2-1/2")
Panel nail pattern 3" on center typical 8d common (0.131" x 2-1/2")

3/8" minimum 24/0 Span
Rating wood structure panel
Nail option: 8d common (0.131" x 2 1/2") spaced 3" on center into web blocking

Sheet metal screw:
Two - #14 x 3"

Install per NFPA 13 and manufacturer's instructions.
Maximum load = 515 pounds includes a 1.33 duration of load adjustment (258 pounds per joist)

FIGURE 18

**APA PERFORMANCE RATED I-JOIST – CPVC HANGER IN WEB BORE**

Install per NFPA 13 and manufacturer’s instructions.
CPVC Sprinkler system pipe 3" maximum diameter or 310 pounds maximum point load

FIGURE 19

**END AND EDGE DISTANCES, LOADED AND UNLOADED**

Main member – the last member/members penetrated by the fastener.
Side member – the first member penetrated by the fastener
TABLE A

STEEL SCHEDULE 40 PIPE SIZES, SPANS AND WEIGHTS FOR STRUCTURAL DESIGN

<table>
<thead>
<tr>
<th>Nominal Size (in.)</th>
<th>Max. Dist. Between Hangers(^{(a)}) (ft)</th>
<th>Hanger Load at Max. Spacing: 1x (Pipe(^{(b)}) Plus Water) x 1.15 (lb/hanger)</th>
<th>Conc. Load Requirement per Hanger for Design(^{(c)}) (lb)</th>
<th>Short-term Design Load(^{(d)}) (lb per hanger)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>27</td>
<td>250</td>
<td>277</td>
</tr>
<tr>
<td>1-1/4</td>
<td>12</td>
<td>49</td>
<td>250</td>
<td>299</td>
</tr>
<tr>
<td>1-1/2</td>
<td>15</td>
<td>60</td>
<td>250</td>
<td>310</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>85</td>
<td>250</td>
<td>335</td>
</tr>
<tr>
<td>2-1/2</td>
<td>15</td>
<td>132</td>
<td>250</td>
<td>382</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>180</td>
<td>250</td>
<td>430</td>
</tr>
<tr>
<td>3-1/2</td>
<td>15</td>
<td>231</td>
<td>250</td>
<td>481</td>
</tr>
<tr>
<td>4</td>
<td>15</td>
<td>281</td>
<td>250</td>
<td>531</td>
</tr>
<tr>
<td>5</td>
<td>15</td>
<td>402</td>
<td>250</td>
<td>652</td>
</tr>
<tr>
<td>6</td>
<td>15</td>
<td>544</td>
<td>250</td>
<td>794</td>
</tr>
<tr>
<td>8(^{(d)})</td>
<td>15</td>
<td>866</td>
<td>250</td>
<td>1116</td>
</tr>
</tbody>
</table>

\(^{(a)}\) Maximum distance between hangers: NFPA 13.
\(^{(b)}\) Pipe weights: NFPA 13 per Automatic Sprinkler System Handbook.
\(^{(c)}\) For design-capacity requirements: NFPA 13, (1 x weight of water-filled pipe PLUS 250 lb).
\(^{(d)}\) Schedule 30 pipe.

TABLE B

CPVC SCHEDULE 80 PIPE SIZES, SPANS AND WEIGHTS FOR STRUCTURAL DESIGN

<table>
<thead>
<tr>
<th>Nominal Size (in.)</th>
<th>Max. Dist. Between Hangers(^{(a)}) (ft)</th>
<th>Hanger Load at Max. Spacing: 1x (Pipe Plus Water) (lb/hanger)</th>
<th>Conc. Load Requirement per Hanger for Design(^{(b)}) (lb)</th>
<th>Short-term Design Load(^{(b)}) (lb per hanger)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4</td>
<td>5-1/2</td>
<td>15</td>
<td>250</td>
<td>265</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>26</td>
<td>250</td>
<td>276</td>
</tr>
<tr>
<td>1-1/4</td>
<td>6-1/2</td>
<td>44</td>
<td>250</td>
<td>294</td>
</tr>
<tr>
<td>1-1/2</td>
<td>7</td>
<td>250</td>
<td>250</td>
<td>311</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>106</td>
<td>250</td>
<td>356</td>
</tr>
<tr>
<td>2-1/2</td>
<td>9</td>
<td>176</td>
<td>250</td>
<td>426</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>285</td>
<td>250</td>
<td>535</td>
</tr>
</tbody>
</table>

\(^{(a)}\) Maximum distance between hangers: NFPA 13.
\(^{(b)}\) For design-capacity requirements: NFPA 13 (1 x weight of water-filled pipe PLUS 250 lb).

TABLE C

MINIMUM EDGE DISTANCE: LAG SCREWS AND BOLTS IN 1-1/2" LUMBER\(^{(b)}\)

<table>
<thead>
<tr>
<th>Lag Screw and Bolt Diameter(^{(b)}) (in.)</th>
<th>Minimum End Distance Parallel to Grain Unloaded Edge (in.) 4D</th>
<th>Minimum End Distance Parallel to Grain Loaded Edge (in.) 7D</th>
<th>Minimum End Distance Perpendicular to Grain: Loaded Edge (in.) 4D</th>
<th>Minimum End Distance Perpendicular to Grain: Unloaded Edge (in.) 1.5D</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8</td>
<td>1-1/2</td>
<td>2-5/8</td>
<td>1-1/2</td>
<td>5/8</td>
</tr>
<tr>
<td>1/2</td>
<td>2</td>
<td>3-1/2</td>
<td>2</td>
<td>3/4</td>
</tr>
</tbody>
</table>

\(^{(a)}\) NDS, Section 11.5.
\(^{(b)}\) Reducing distance to ends and edges is permissible provided that the geometry factor, \(C_{\text{g}}\), is applied to calculated design capacity (NDS 11.5).
### TABLE D

**LOAD CAPACITY: FASTENERS WITH 3/8" OSB SIDE MEMBERS**

<table>
<thead>
<tr>
<th>Lag Screw Diameter (in.)</th>
<th>Penetration into Side Grain of Main Member</th>
<th>Lateral Load Capacity (lb)</th>
<th>Withdrawal Capacity (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4 x 2</td>
<td></td>
<td>75</td>
<td>211</td>
</tr>
<tr>
<td>5/16 x 2</td>
<td></td>
<td>91</td>
<td>243</td>
</tr>
<tr>
<td>3/8 x 2</td>
<td></td>
<td>77</td>
<td>271</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bolt Diameter (in.)</th>
<th>Main Member Thickness</th>
<th>Single Shear</th>
<th>Double Shear</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4</td>
<td>1-1/2&quot;, Side 3/8&quot;</td>
<td>86</td>
<td>109</td>
</tr>
<tr>
<td>5/16</td>
<td></td>
<td>109</td>
<td>136</td>
</tr>
<tr>
<td>3/8</td>
<td></td>
<td>127</td>
<td>163</td>
</tr>
<tr>
<td>1/2</td>
<td></td>
<td>149</td>
<td>218</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Screw Size No.</th>
<th>Lateral Load Capacity (lb)</th>
<th>Wood Screw Withdrawal Capacity (lb)</th>
<th>Sheet Metal Screw Withdrawal Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 x 2&quot;</td>
<td>63</td>
<td>60</td>
<td>124</td>
</tr>
<tr>
<td>10 x 2&quot;</td>
<td>78</td>
<td>69</td>
<td>143</td>
</tr>
<tr>
<td>12 x 2&quot;</td>
<td>97</td>
<td>79</td>
<td>98</td>
</tr>
<tr>
<td>14 x 2&quot;</td>
<td>106</td>
<td>88</td>
<td>109</td>
</tr>
</tbody>
</table>

(a) NDS Section 11.3.1. See Figure 20.
(b) Side Member 3/8" OSB (SG = 0.50); Main Member 1-1/2" SPF lumber (SG = 0.42); DOL = 1.0; Load Perpendicular to Grain; Single Shear.
(c) Multiply tabulated capacity by \( C_{eg} = 0.67 \), when fastener is in end grain.
(d) Full length of lag screws and wood screws is not thread.
(e) OSB main member in double shear.

### TABLE E

**LOAD CAPACITY: FASTENERS WITH 1/8" STEEL SIDE MEMBER**

<table>
<thead>
<tr>
<th>Lag Screw Diameter (in.)</th>
<th>Main Member Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4</td>
<td>112</td>
</tr>
<tr>
<td>3/8</td>
<td>97</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bolt Diameter (in.)</th>
<th>1-1/2&quot; (2&quot; Lag)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4</td>
<td>124</td>
</tr>
<tr>
<td>5/16</td>
<td>140</td>
</tr>
<tr>
<td>3/8</td>
<td>155</td>
</tr>
<tr>
<td>1/2</td>
<td>183</td>
</tr>
<tr>
<td>5/8</td>
<td>207</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wood Screw Size No.</th>
<th>1-1/2&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 x 2</td>
<td>96 (1&quot;)</td>
</tr>
<tr>
<td>10 x 2</td>
<td>118 (1&quot;)</td>
</tr>
<tr>
<td>12 x 2</td>
<td>142</td>
</tr>
<tr>
<td>14 x 2</td>
<td>154</td>
</tr>
</tbody>
</table>

(a) NDS Section 11.3.1.
(b) Side Member 1/8" ASTM 436 Steel; SG Main Member = 0.42; DOL = 1.0; Load Perpendicular to Grain; Single Shear.
(c) Multiply tabulated capacity by \( C_{eg} = 0.67 \), when fastener is in end grain.
Minimum penetration required for lag screws is 4 times bolt diameter.
For additional information on installing and designing with I-joists, including information on span ratings, installation details, cantilever designs, architectural specifications and engineering design properties for APA Performance Rated I-Joists, refer to the following APA publications available for download from the APA web site:

- **APA Performance Rated I-Joists, Form Z725**
- **I-Joist Construction Details – Performance Rated I-Joists in Floor and Roof Framing, Form D710**

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**TABLE F**

**LATERAL CAPACITY OF 2-INCH NOMINAL LUMBER FILLER BLOCK (SG = 0.42) ON 3/8" I-JOIST WEB**

<table>
<thead>
<tr>
<th>Size: Bolt with Nut and Washer</th>
<th>Number of Bolts (maintain specified edge and end distances)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1/4&quot;</td>
<td>86</td>
</tr>
<tr>
<td>5/16&quot;</td>
<td>109</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>127</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nail Size</th>
<th>Number of Nails</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6d box (0.099&quot;)</td>
<td>40</td>
</tr>
<tr>
<td>8d box (0.113&quot;)</td>
<td>50</td>
</tr>
<tr>
<td>10d box (0.128&quot;)</td>
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</tr>
<tr>
<td>16d box (0.135&quot;)</td>
<td>69</td>
</tr>
<tr>
<td>6d common (0.113&quot;)</td>
<td>50</td>
</tr>
<tr>
<td>8d common (0.131&quot;)</td>
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</tr>
<tr>
<td>10d common (0.148&quot;)</td>
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<tr>
<td>16d common (0.162&quot;)</td>
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</table>

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<tr>
<th>Screw Size</th>
<th>Number of Screws</th>
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<td>No. 8 (0.164&quot;)</td>
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<td>No. 10 (0.190&quot;)</td>
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<td>No. 12 (0.216&quot;)</td>
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</tr>
<tr>
<td>No. 14 (0.242&quot;)</td>
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</tbody>
</table>

(a) Lateral capacity of 2" nominal lumber filler block (SG = 0.42) on 3/8" I-joist web (lb).
Definitions

**Backer block** – Also known as a slave piece by the sprinkler industry, a backer block is a supplemental piece of framing or wood structural panel required to augment the thickness of the material anchoring the end of the screw or nail. The composite of the original piece and the backer block is required to provide sufficient embedment of the fastener in order to develop its required capacity.

**Beam Clamp** – An NFPA-13-approved mechanical device that wraps around the flange of the I-joist and permits support of pipe hangers via eye-rods or other similar devices.

**Coach screw** – An NFPA-13-approved rod-type hanger used to support sprinkler piping through machine threaded portion at the lower end of the hanger via attachment to a pipe hanger. At the upper end of the hanger is threaded to permit it to be attached directly to the framing above without the use of straps or clamps.

**Eye rod** – An NFPA-13-approved rod-type hanger used to support sprinkler piping through a loop at the lower end of the hanger to which the pipe hanger is attached. At the upper end of the hanger is machine-screw threaded to facilitate attachment to the I-joist via number of approved straps or clamps using nuts and washers. The threaded end may be bent at a 90 degree bend to facilitate numerous strap or clamp geometries.

**Filler block** – Lumber blocking required to reinforce the web of the I-joist to permit the use of bolts or screws to facilitate the attachment of hardware to the web of the I-joist.

**Flange** – The outermost components of an engineered I-joist, constructed of sawn or structural composite lumber.

**I-Joist** – An “I”-shaped engineered wood structural member designed for use as rafters or joists in floors and roof construction. This product is prefabricated using sawn or structural composite lumber flanges and wood structural panel webs, bonded together with exterior-type adhesive.


**SPF** – The abbreviation for Spruce-Pine-Fir, a lumber grouping of similar species with a Specific Gravity of 0.42. This grouping of species is considered to have the lowest strength properties of framing materials normally used in construction today.

**Trapeze** – A sprinkler pipe support system that is attached to two framing members. From this support member – normally a short piece of pipe or angle iron – the sprinkler pipe is attached. Conventional support systems are used to support the sprinkler piping from the trapeze and can also be used to support the ends of the trapeze.

**Web** – The wood structural panel component of an engineered wood I-joist, which connects the two flanges together. Normally the web is made of oriented strand board with a minimum thickness of 3/8”.

Acknowledgement

Details provided in consultation with Kraig Kirschner, Principle Technical Committee Member NFPA 13, Hanging and Bracing. See Supplement, Sprinkler Pipe Installation Details, Form J745SUP.
Sprinkler Pipe Installation for APA Performance Rated I-Joists

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