

# Fire Rated Wood Floor/Ceiling and Wall Assemblies



for LP<sup>®</sup> I-Joists and Rim Board

*Document Ref. No. 00303-003  
Rev. 9/19/05*

**LP**<sup>®</sup>  
BUILDING PRODUCTS



I.	History and Certifications	3
II.	30 Minute Floor/Ceiling Assembly	
	a. 30 Minute Single Layer	4
III.	45 Minute Floor/Ceiling Assembly	
	a. 45 Minute Single Layer	5
IV.	One Hour Floor/Ceiling Assemblies	
	a. One Hour Single Layer	6
	b. One Hour Double Layer	11
V.	Two Hour Floor/Ceiling Assembly	
	a. Two Hour Triple Layer	15
VI.	Allowable Substitutions on Floor/Ceiling Assemblies	16
VII.	One Hour Rim Board Assemblies	17
VIII.	Two Hour Rim Board Assemblies	25

## I. History and Certifications

### ***History of LP Fire Endurance Test Reports***

This document covers Test Numbers LP 30 Min., LP/FCA 45-01, LP/FCA 60-02(a) (FC-380), LP/FCA 60-01 (FC-477), LP/FCA 60-02(b) (FC-458), and the LP Rim Board fire assemblies. Report number FC-380, was originally produced for Gang-Nail Systems, Inc. of Miami FL. Gang-Nail Systems, Inc. was then acquired by Mitek Wood Products, Inc. Report number FC-380 became owned by Mitek at this time. Mitek further had report FC-458 prepared. LP Corp (Louisiana-Pacific) acquired Mitek Wood Products, Inc. At this time both FC-380 and FC-458 became the property of LP Corp. LP Corp added to these Fire Endurance Test reports with FC-477. All three test reports were third party certified by PFS Corporation.

### ***PFS Corporation***

FC-380, FC-477, and FC-458 evaluated per ASTM E 119 *Standard Test Methods for Fire Tests of Building Construction & Materials* and were witnessed by PFS Corporation (IAS #AA-652).

### ***Intertek Testing Services***

LP 30 min., LP/FCA 45-01, LP/FCA 60-01, LP/FCA 60-02(a), LP/FCA 60-02(b), and LP/FCA 120-01 evaluated per CAN/ULC-S101-M89 *Standard Methods of Fire Endurance Tests of Building Construction and Materials*, and were prepared by Intertek Testing Services (IAS #AA-647).

Test number 3033544, Assemblies A, B, C and D were evaluated per CAN/ULC-S101-M89, ASTM E 119 and were witnessed by Intertek Testing Services (IAS #AA-647).

Test number 3024852, Design No. 1,2,3,4,5 and 6 were evaluated per CAN/ULC-S101-M89, ASTM E 119 and were witnessed by Intertek Testing Services (IAS #AA-647).

### ***NU Laboratories***

NU Laboratories performed Sound Transmission Loss Tests and Impact Sound Transmission tests under the Third Party Inspection and certification of PFS Corporation (IAS #AA-652).

Sound Transmission Loss tests were measured in accordance with ASTM E 413, *Standard Classification for Determination of Sound Transmission Class*.

Impact Sound Transmission tests were measured in accordance with ASTM E 492, *Standard Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies using the Tapping Machine*.

## II.a. 30 Minute Single Layer

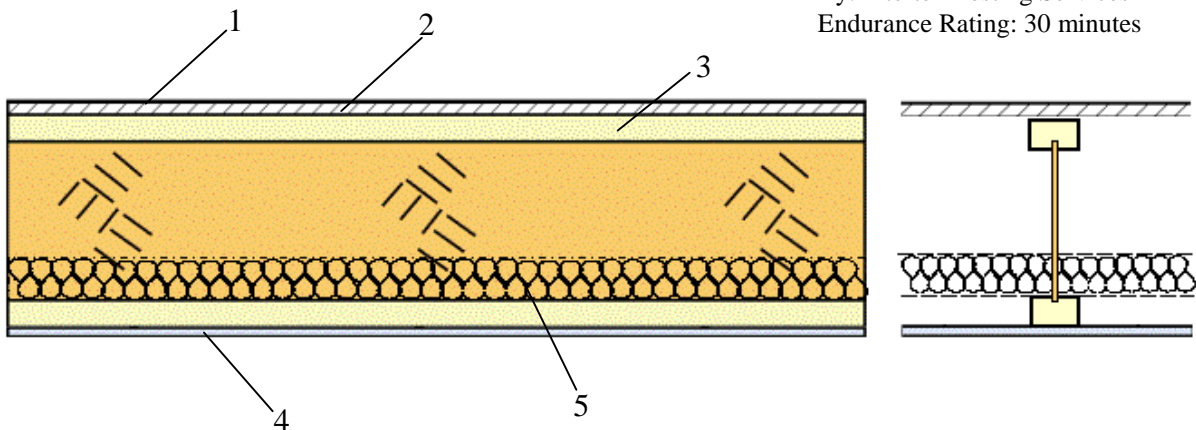
### Overview of Floor/Ceiling Assembly LP 30 Min. 2003

Date: 6/16/03

Design Number: LP 30 Min. 2003

By: Intertek Testing Services

Endurance Rating: 30 minutes



- 1. Floor Topping (optional):** Gypsum concrete, lightweight or normal concrete topping.
- 2. Floor Sheathing:** Minimum 3/4" thick tongue-and-groove plywood or OSB, installed perpendicular to joists, with end joints staggered, and fastened in accordance with Code requirements.
- 3. Structural Members:** Minimum of 9-1/2" deep LPI wood I-joist with minimum of 1-1/2" x 1-3/4" flanges. The I-joist web is minimum 3/8" oriented strand board (OSB). Joists are spaced a maximum of 24" on center.
- 4. Gypsum Board:** One layer of 5/8" Type X gypsum wallboard installed perpendicular to joists with end joints staggered 48". Boards to be fastened to joist with minimum 1-5/8" screws located 8" on center in the field areas of boards, and 6" on center along board edges. Screws shall be minimum 1-1/2" from board edges and 3/4" from board ends. Gypsum wallboard shall be taped and filled. Screw heads shall be filled with gypsum joint compound.
- 5. Insulation (optional):** 3-1/2" in thickness, friction fit between flanges.

### III.a. 45 Minute Single Layer

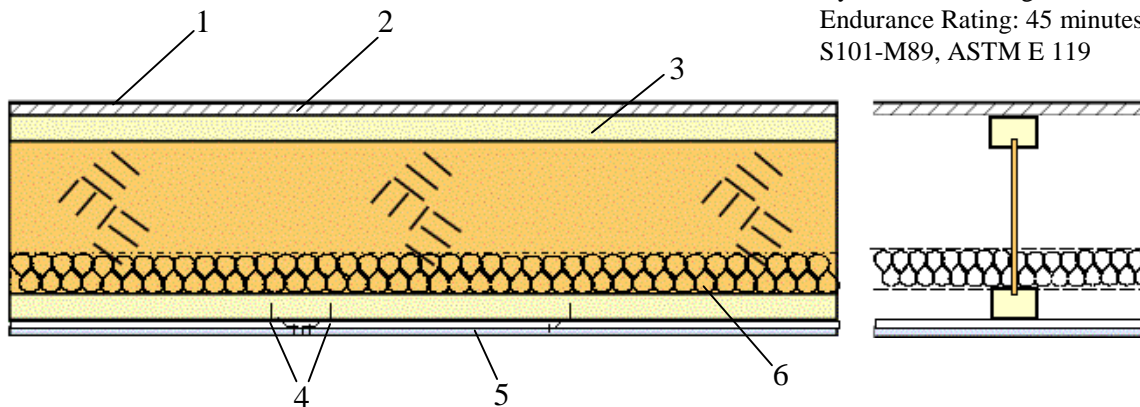
#### Overview of Floor/Ceiling Assembly LP/FCA 45-01

Date: 6/9/03

Design Number: LP/FCA 45-01

By: Intertek Testing Services

Endurance Rating: 45 minutes, CAN/ULC-S101-M89, ASTM E 119



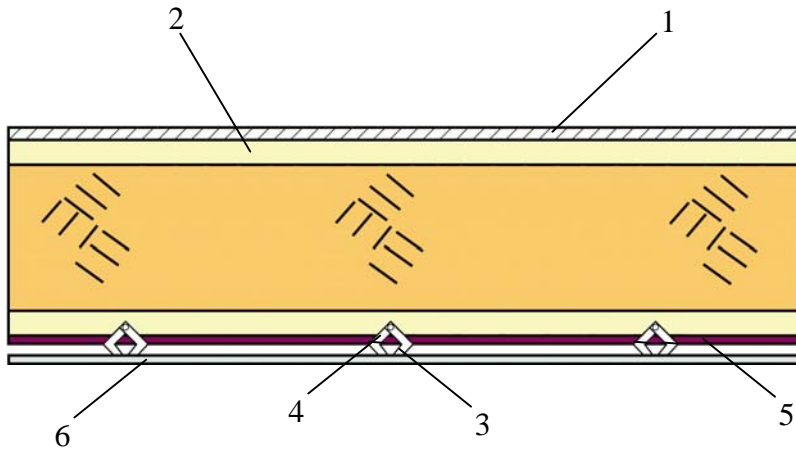
- 1. Floor Topping (optional):** Gypsum concrete, lightweight or normal concrete topping.
- 2. Floor Sheathing:** Minimum 3/4" thick tongue-and-groove plywood or OSB, installed perpendicular to joists, with end joints staggered, and fastened in accordance with Code requirements. Floor sheathing may be reduced to 19/32" thick when joist spacing is 16" or 19.2" on center.
- 3. Structural Members:** Minimum of 9-1/2" deep LPI wood I-joist with minimum of 1-1/2" x 1-3/4" flanges. The I-joist web is minimum 3/8" oriented strand board (OSB). Joists are spaced a maximum of 24" on center.
- 4. Resilient Channels:** Nominal 1/2" offset, 24 gauge galvanized steel channels installed perpendicular to joists and spaced 16" on center maximum. Additional channels required at gypsum board end joints such that each board end rests on its own channel. These additional channels shall extend to the next joist on each side of the board edges. Channels fastened with 1-1/2" Type S screws at each joist intersection.
- 5. Gypsum Board:** One layer of 5/8" Type X gypsum wallboard installed perpendicular to channels with end joints staggered 48". Boards to be fastened to channels with minimum 1" screws located 8" on center in the field areas of boards, and 6" on center along board edges. Screws shall be minimum 1-1/2" from board edges and 3/4" from board ends. Gypsum wallboard shall be taped and filled. Screw heads shall be filled with gypsum joint compound.
- 6. Insulation (optional):** 3-1/2" in thickness, friction fit between flanges.

**7. Sound and Impact Ratings:**

Floor Assembly	LP/FCA 45-01	
	STC	IIC
With lightweight concrete	57	-
Without lightweight concrete	50	45

Please refer to page 16 for substitutions of flange size and material, gypsum board and sheathing type.

## IV.a. One Hour Single Layer



### Overview of Floor/Ceiling Assembly LP/FCA 60-02(b) (FC-458)

Test Date: 6/15/88

Test Number: LP/FCA 60-01 (FC-458)

Witness By: Intertek Testing Services, ,  
PFS Corporation

Official Report Number: 88-55

Endurance Rating: 1 Hour, CAN/ULC-  
S101-M89, ASTM E 119

#### 1. Plywood Sub-floor:

23/32" tongue and groove plywood sheathing panels (conform to PS1-95) installed perpendicular to I-Joists and fastened with 8d box nails 12" on center at all locations. For floors, apply AFG-01 construction adhesive in a 3/8" bead to the top surface of the I-joists and grooved edges of the sheathing.

#### 2. Wood I-Joist:

Minimum of 11-1/4" deep LPI wood I-joist with minimum of 1-1/2" x 1-1/2" flanges of LP laminated veneer lumber (LVL). The I-Joist web is minimum 3/8" oriented strand board (OSB). Joists are spaced a maximum of 24" on center.

#### 3. Furring Channels:

Resilient furring channels formed from No. 26 MSG galvanized steel sheet spaced 24" on center, perpendicular to the I-Joist, supported by Simpson CSC clips (4). At splices, channels overlapped 6" and tied with two double strands of No. 18 SWG galvanized steel wire at each end of overlap. At wallboard end joints, a second length of channel is installed adjacent to the first to provide one channel for each wallboard end. Second channel span from joist to joist outside the wallboard width to support the entire end of the wallboard.

#### 4. Hanger Clips:

Simpson Type CSC hangers for furring channels. One at each intersection of I-Joist and channel nailed with one 6d or 8d box nail.

#### 5. Insulation:

1" thick, 24" x 48" mineral wool batts with 9 pcf density. Insert between the bottom of the bottom flange and the top of the channels parallel to the joists length.

#### 6. Gypsum Wallboard:

5/8" thick US Gypsum Firecode C, Type X, install perpendicular to furring channels with 1" long Type S wallboard screws at 8" on center. End joints attached to double channels, long joints backed by sheet metal Tee-Sections, item (7). Edges of wallboard attached to Tee-Sections by 1" Type S wallboard screws 8" on center. with one screw at each Tee-Section channel intersection.

#### 7. Tee Section (not shown):

Made from No. 20 MSG galvanized steel installed perpendicular to furring channels at gypsum wallboard edge joints. Tee section is commercially available corner bracing or wind bracing having an overall width of 1-7/8" with a centered short leg being 7/16" long. Possible products for use as tee sections are: USP Connectors S365, S366 and S367. Splices are butt joints at double furring channels. Adjacent wallboard edges fastened to tee section with 1" long Type S wallboard screws 8" on center Tee section attached to channels with one Type S 1" long screw.

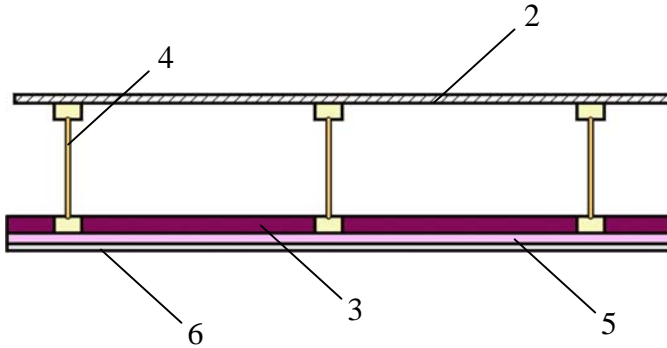
#### Sound and Impact Ratings

Floor Assembly	LP/FCA-458	
	STC	IIC
One Hour Single Layer system		
With 3/4" min. Gyp-crete		
With Resilient channel		
carpet and pad	50	73
vinyl	51	47
Without Gyp-crete		
With Resilient channel		
carpet and pad	46	68
vinyl	46	40

Please refer to page 16 for substitutions of flange size and material, gypsum board and sheathing type.

## IV.a. One Hour Single Layer

*Floor<sup>a</sup>/Ceiling – 100% Design Load – 1 Hour Rating – ASTM E 119/NFPA 251*



### WIJ-1.1

Test Date: 2/9/90

Test Number: WHI-651-0311.1

Witness By: Warnock Hersey International, Inc.

Official Report Number: WHI-651-0311.1

Endurance Rating: 1 Hour, ASTM E 119/NFPA 251

- 1. Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping.
- 2. Floor Sheathing:** Minimum 23/32" thick tongue-and-groove wood sheathing (Exposure 1). Installed per code requirements with minimum 8d common nails and glued to joist top flanges with AFG-01 construction adhesive.
- 3. Insulation:** Minimum 1-1/2" thick mineral fiber insulation batts – 2.5 pcf (nominal), supported by furring channels.
- 4. Structural Members:** Wood I-joists spaced a maximum of 24" on center.  
 Minimum I-joist flange depth: 1-1/2"                      Minimum I-joist flange area: 5.25"<sup>2</sup>  
 Minimum I-joist web thickness: 3/8"                      Minimum I-joist depth: 9-1/4"
- 5. Furring Channels:** Minimum 0.026" thick galvanized steel hat-shaped furring channels, attached perpendicular to I-joists using 1-5/8" long drywall screws. Furring channels spaced 16" on center and doubled at each wallboard end joint extending to the next joist.
- 6. Gypsum Wallboard:** Minimum 5/8" thick Type C gypsum wallboard installed with long dimension perpendicular to furring channels and fastened to each channel with minimum 1-1/8" long Type S drywall screws. Fasteners spaced 12" on center in the field of the wallboard, 8" on center at wallboard end joints, and 3/4" from panel edges and ends. End joints of wallboard staggered.
- 7. Finish System (not shown):** Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

*Fire Test conducted at Gold Bond Building Products Research Center*

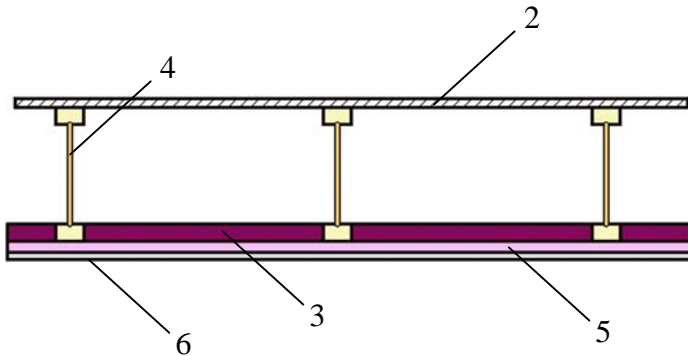
STC and IIC Sound Ratings for Listed Assembly							
Without Gypsum Concrete				With Gypsum Concrete			
Cushioned Vinyl		Carpet & Pad		Cushioned Vinyl		Carpet & Pad	
STC	IIC	STC	IIC	STC	IIC	STC	IIC
-	-	-	-	-	-	49 <sup>b</sup>	59 <sup>b</sup>

<sup>a</sup> This assembly may also be used in a fire-rated roof/ceiling application, but only when constructed exactly as described.

<sup>b</sup> STC and IIC values estimated by David L. Adams Associates, Inc.

## IV.a. One Hour Single Layer

*Floor<sup>a</sup>/Ceiling – 100% Design Load – 1 Hour Rating – ASTM E 119/NFPA 251*



### WIJ-1.2

Test Date: 6/19/84

Test Number: WHI-694-0159

Witness By: Warnock Hersey International, Inc.

Official Report Number: WHI-694-0159

Endurance Rating: 1 Hour, ASTM E 119/NFPA 251

- 1. Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping.
- 2. Floor Sheathing:** Minimum 23/32" thick tongue-and-groove wood sheathing (Exposure 1). Installed per code requirements with minimum 8d common nails and glued to joist top flanges with AFG-01 construction adhesive.
- 3. Insulation:** Minimum 1-1/2" thick mineral fiber insulation batts – 2.5 pcf (nominal), supported by resilient channels.
- 4. Structural Members:** Wood I-joists spaced a maximum of 24" on center.  
 Minimum I-joist flange depth: 1-1/2"                      Minimum I-joist flange area: 5.25"<sup>2</sup>  
 Minimum I-joist web thickness: 7/16"                      Minimum I-joist depth: 9-1/4"
- 5. Resilient Channels:** Minimum 0.019" thick galvanized steel resilient channels, attached perpendicular to I-joists using 1-5/8" long drywall screws. Resilient channels spaced 16" on center and doubled at each wallboard end joist extending to the next joist.
- 6. Gypsum Wallboard:** Minimum 5/8" thick Type C gypsum wallboard installed with long dimension perpendicular to resilient channels and fastened to each channel with minimum 1" long Type S drywall screws. Fasteners spaced 12" on center in the field of the wallboard, 8" on center at wallboard end joints, and 3/4" from panel edges and ends. End joints of wallboard staggered.
- 7. Finish System (not shown):** Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

*Fire Test conducted at Gold Bond Building Products Research Center*

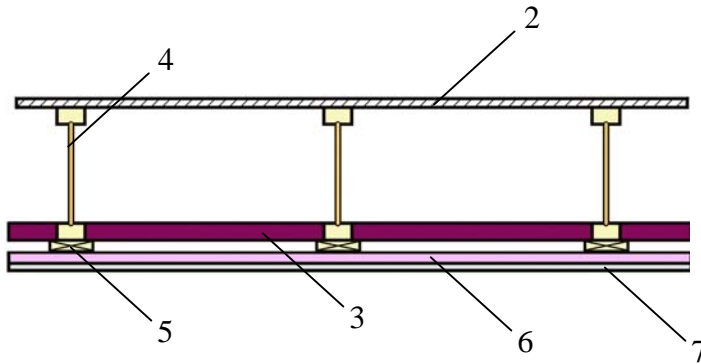
STC and IIC Sound Ratings for Listed Assembly							
Without Gypsum Concrete				With Gypsum Concrete			
Cushioned Vinyl		Carpet & Pad		Cushioned Vinyl		Carpet & Pad	
STC	IIC	STC	IIC	STC	IIC	STC	IIC
51 <sup>b</sup>	46 <sup>b</sup>	51 <sup>b</sup>	64 <sup>b</sup>	60 <sup>b</sup>	50 <sup>b</sup>	60 <sup>b</sup>	65 <sup>b</sup>

<sup>a</sup> This assembly may also be used in a fire-rated roof/ceiling application, but only when constructed exactly as described.

<sup>b</sup> STC and IIC values estimated by David L. Adams Associates, Inc.

## IV.a. One Hour Single Layer

*Floor<sup>a</sup>/Ceiling – 100% Design Load – 1 Hour Rating – ASTM E 119/NFPA 251*



### WIJ-1.3

Test Date: 9/28/01

Test Number: NC3369

Witness By: Underwriter's Laboratories, Inc.

Official Report Number: NC3369

Endurance Rating: 1 Hour, ASTM E 119/NFPA 251

1. **Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping.
2. **Floor Sheathing:** Minimum 23/32" thick tongue-and-groove wood sheathing (Exposure 1). Installed per code requirements
3. **Insulation:** Minimum 2" thick mineral fiber insulation batts – 3.5 pcf (nominal), supported by setting strip edges, friction-fitted between the sides of the I-joist flanges.
4. **Structural Members:** Wood I-joists spaced a maximum of 24" on center.  
 Minimum I-joist flange depth: 1-5/16"                      Minimum I-joist flange area: 2.25"<sup>2</sup>  
 Minimum I-joist web thickness: 3/8"                      Minimum I-joist depth: 9-1/4"
5. **Setting Strips:** Nominal 1x4 wood setting strips attached with 1-1/2" long drywall screws at 24" on center along the bottom flange of I-joist creating a ledge to support insulation.
6. **Resilient Channels:** Minimum 0.019" thick galvanized steel resilient channels, attached perpendicular to I-joists using 1-7/8" long drywall screws. Resilient channels spaced 16" on center and doubled at each wallboard end joint extending to the next joist.
7. **Gypsum Wallboard:** Minimum 5/8" thick Type C gypsum wallboard installed with long dimension perpendicular to resilient channels and fastened to each channel with minimum 1-1/8" long Type S drywall screws. Fasteners spaced 7" on center and 3/4" from panel edges and ends. End joints of wallboard staggered.
8. **Finish System (not shown):** Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

*Fire Test conducted at National Gypsum Testing Services, Inc.*

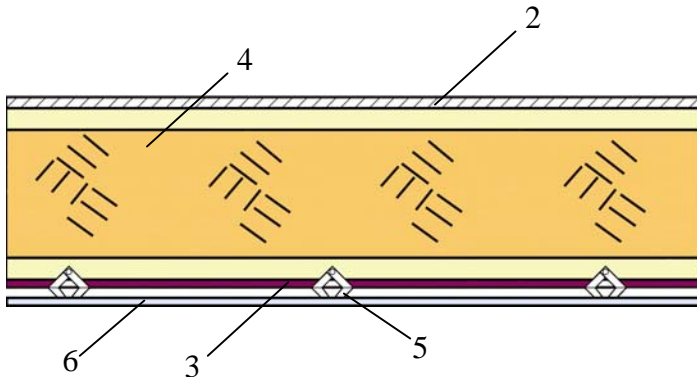
STC and IIC Sound Ratings for Listed Assembly							
Without Gypsum Concrete				With Gypsum Concrete			
Cushioned Vinyl		Carpet & Pad		Cushioned Vinyl		Carpet & Pad	
STC	IIC	STC	IIC	STC	IIC	STC	IIC
51 <sup>b</sup>	46 <sup>b</sup>	52	62	60 <sup>b</sup>	48 <sup>b</sup>	60 <sup>b</sup>	60 <sup>b</sup>

<sup>a</sup> This assembly may also be used in a fire-rated roof/ceiling application, but only when constructed exactly as described.

<sup>b</sup> STC and IIC values estimated by David L. Adams Associates, Inc.

## IV.a. One Hour Single Layer

*Floor<sup>a</sup>/Ceiling – 100% Design Load – 1 Hour Rating – ASTM E 119/NFPA 251*



### WIJ-1.4

Test Date: 5/11/83

Test Number: UL R14373

Witness By: Underwriter's Laboratories, Inc.

Official Report Number: UL R14373

Endurance Rating: 1 Hour, ASTM E 119/NFPA 251

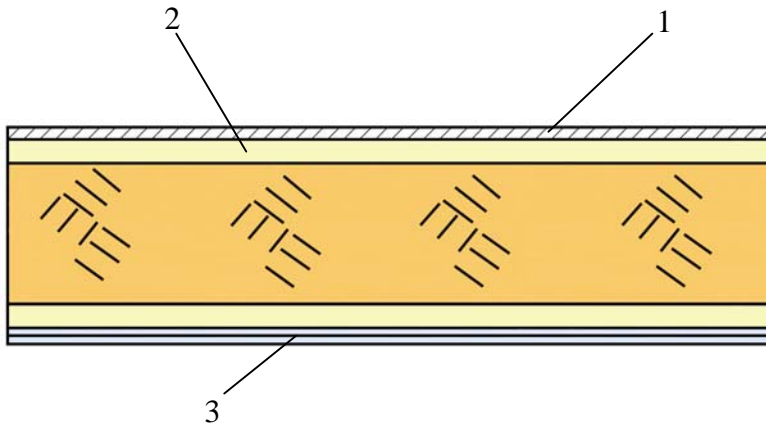
- 1. Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping.
- 2. Floor Sheathing:** Minimum 23/32" thick tongue-and-groove wood sheathing (Exposure 1). Installed per code requirements with minimum 8d common nails.
- 3. Insulation:** Minimum 1 inch thick mineral fiber insulation batts – 6 pcf (nominal) with width equal to the on-center spacing of the I-joists. Batt installed on top of furring channels and under bottom flange of I-joists with the sides butted against support clips. Abutted ends of batts centered over furring channels with batts tightly butted at all joints.
- 4. Structural Members:** Wood I-joists spaced a maximum of 24" on center.  
 Minimum I-joist flange depth: 1-1/2"                      Minimum I-joist flange area: 3.45"<sup>2</sup>  
 Minimum I-joist web thickness: 3/8"                      Minimum I-joist depth: 9-1/4"
- 5. Furring Channels:** Minimum 0.019" thick galvanized steel hat-shaped furring channels, attached perpendicular to I-joists spaced 24" on center. At channel splices, adjacent pieces overlapped a minimum of 6" and tied with a double strand of No. 18 gage galvanized steel wire at each end of the overlap. Channels secured to I-joists with Simpson Type CSC support clips at each intersection with the I-joists. Clips nailed to the side of I-joist bottom flange with one 1-1/2" long No. 11 gage nail. A row of furring channel located on each side of wallboard end joints and spaced 2.25" from the end joint (4.5" on center).
- 6. Gypsum Wallboard:** Minimum 1/2" thick Type C gypsum wallboard. Wallboard installed with long dimension perpendicular to furring channels and fastened to each channel with minimum 1 inch long Type S drywall screws. Fasteners shall be spaced 12" on center in the field of the wallboard, 6" on center at wallboard end joints, and 3/4" from panel edges and ends. End joints of wallboard continuous or staggered. For staggered wallboard end joints, furring channels extend a minimum of 6" beyond each end of the joint.
- 7. Finish System (not shown):** Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

*Fire Test conducted at Underwriters Laboratories, Inc.*

STC and IIC Sound Ratings for Listed Assembly							
Without Gypsum Concrete				With Gypsum Concrete			
Cushioned Vinyl		Carpet & Pad		Cushioned Vinyl		Carpet & Pad	
STC	IIC	STC	IIC	STC	IIC	STC	IIC
-	-	46	68	51	47	50	73

<sup>a</sup> This assembly may also be used in a fire-rated roof/ceiling application, but only when constructed exactly as described.

## IV.b. One Hour Double Layer



### Overview of Floor/Ceiling Assembly LP/FCA 60-01 (FC-477)

Test Date: 4/10/91

Test Number: LP/FCA 60-03 (FC-477)

Witness By: Intertek Testing Services,  
PFS Corporation

Official Report Number: 91-14

Endurance Rating: 1 Hour, CAN/ULC-  
S101-M89, ASTM E 119

#### 1. Plywood Sub-floor:

23/32" tongue and groove plywood sheathing, panels to conform to PS 1-95, Exposure 1, interior type with exterior glue, tongue and groove on long edges. Install with long edges perpendicular to I-Joists. End joints staggered 48" with adjacent rows of plywood. Fastened with 8d common nails 6" on center on ends and 12" on center in the field. For floors, apply AFG-01 construction adhesive in a 3/8" bead to the top surface of the I-joists and grooved edges of the sheathing.

#### 2. Wood I-Joist:

Minimum of 9-1/2" deep LPI wood I-Joist with minimum of 1-1/2" x 2-1/2" flanges of sawn lumber. The I-Joist web is minimum 3/8" oriented strand board (OSB). Joist spacing is maximum of 24" on center.

#### 3. Gypsum Wallboard:

Install 1/2" US Gypsum Fire Code C, Type X gypsum wallboard. Long dimensions are perpendicular to the I-Joist. Stagger end joints of base layer on centerline of I-Joists. Directly secure to I-Joist with 1-5/8" long Type W wallboard screws 12" on center. Stagger joints of finish layer of wallboard at least 12" in both directions from those of the base layer. Attach to I-Joist with 2-1/4" long Type W wallboard screws. Place 1-1/2" long Type G screws between I-Joists at 16" on center. 3" back on each side of wallboard butt joints.

#### 4. Insulation (not shown):

Insulation, when present, shall be unfaced glass fiber batts or blankets, minimum 3-1/2" thick. Install between wood I-Joists with stay wires placed a maximum of 12" on center. Stay wire ends shall be 3/4" above the lower surface of the bottom flanges. Insulation shall be pulled down to completely cover the I-Joist web.

#### 5. Finish System:

Paper tape embedded in joint compound over joints with edges of compound feathered out, and exposed screw heads covered with compound. As an alternative, nominal 3/32" thick veneer plaster may be applied to the entire surface of the wallboard.

#### 6. Resilient Channels (not shown):

Resilient channels or furring channels for sound control may be installed 16" on center perpendicular to I-joists. Wallboard shall be applied with long joints perpendicular to channels.

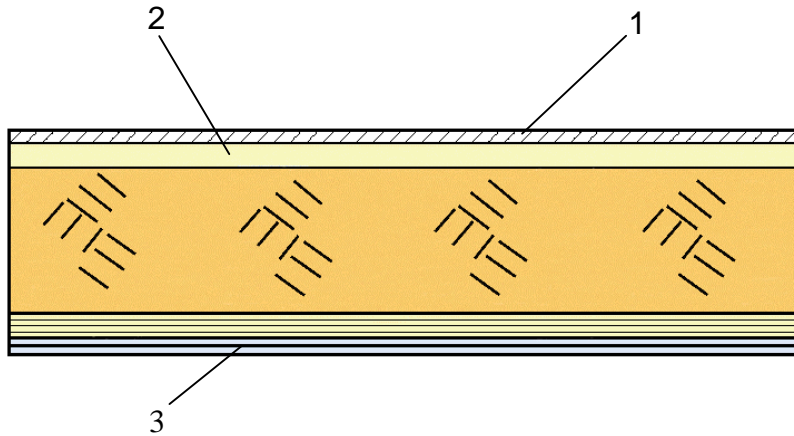
#### Sound and Impact Ratings

Floor Assembly	FC-477	
	STC	IIC
With 3/4" min. Gyp-crete		
Without Resilient channel		
carpet and pad	51	72
vinyl	52	43
Without Gyp-crete		
Without Resilient channel		
carpet and pad	47	68
vinyl	46	40
With 3/4" min. Gyp-crete		
With Resilient channel		
carpet and pad	51	77
vinyl	53	48
Without Gyp-crete		
With Resilient channel		
carpet and pad	49	73
vinyl	50	43

Note: Insulation is required for this detail to achieve sound and impact rating above.

Please refer to page 16 for substitutions of flange size and material, gypsum board and sheathing type.

## IV.b. One Hour Double Layer



### Overview of Floor/Ceiling Assembly LP/FCA 60-02(a) (FC-380)

Test Date: 10/22/85  
 Test Number: LP/FCA 60-02 (FC-380)  
 Witness By: Intertek Testing Services,  
 PFS Corporation  
 Official Report Number: 85-115  
 Endurance Rating: 1 Hour, CAN/ULC-  
 S101-M89, ASTM E 119

#### 1. Plywood Sub-floor:

19/32" tongue and groove plywood sheathing, panels to conform to PS 1-95, Exposure 1, interior type with exterior glue, tongue and groove on long edges. Install with long edges perpendicular to I-Joists. End joints staggered 48" with adjacent rows of plywood. Fastened with 8d common nails 6" on center at all locations. For floors, apply AFG-01 construction adhesive in a 3/8" bead to the top surface of the I-joists and grooved edges of the sheathing.

#### 2. Wood I-Joist:

Minimum of 11-1/4" deep LPI wood I-joist with minimum of 1-1/2" x 1-1/2" flanges of LP laminated veneer lumber (LVL). The I-Joist web is minimum 3/8" oriented strand board (OSB). Joists are spaced a maximum of 24" on center.

#### 3. Gypsum Wallboard:

1/2" Type FSW-G manufactured by National Gypsum. Two layers directly applied to the bottom chord of the I-Joist with long edge perpendicular to the I-Joist. Butt joints are staggered 24" from adjacent rows on face layer. Second layer is installed with its joints staggered 24" in each direction with joints from the first layer. First layer is fastened with 1-1/4" long Type S drywall screws spaced 24" on center. Second layer is fastened with 1-7/8" Type S drywall screws spaced 12" on center Type G drywall screws 1-1/2" long are used to bond the two layers of wallboard together 12" on center on a line 3" back from and on each side of the butt joints.

#### 4. Resilient Channels (not shown):

Resilient channels for sound control may be installed 24" on center perpendicular to I-joists. Wallboard shall be applied with long joints perpendicular to channels.

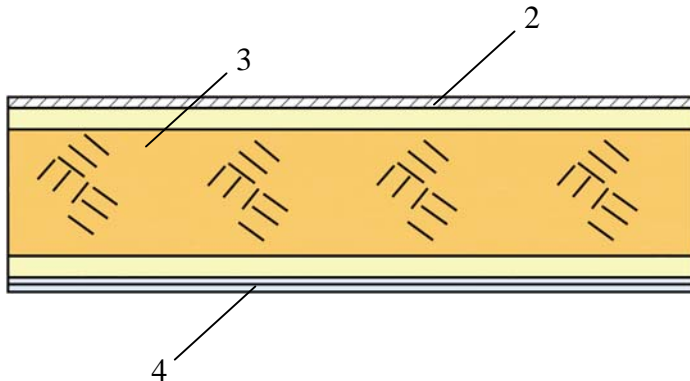
#### Sound and Impact Ratings

Floor Assembly	FC-380	
	STC	IIC
With 3/4" min. Gyp-crete		
With Resilient channel		
carpet and pad	59	71
vinyl	57	51
Without Gyp-crete		
With Resilient channel		
carpet and pad	48	71
vinyl	45	46

Please refer to page 16 for substitutions of flange size and material, gypsum board and sheathing type.

## IV.b. One Hour Double Layer

*Floor<sup>a</sup>/Ceiling – 100% Design Load – 1 Hour Rating – ASTM E 119/NFPA 251*



### WIJ-1.5

Test Date: 9/29/78

Test Number: FC-268

Witness By: Factory Mutual Research

Official Report Number: PFS Test Report # 86-09-1

Endurance Rating: 1 Hour, ASTM E 119/NFPA 251

- 1. Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping.
- 2. Floor Sheathing:** Minimum 23/32" thick tongue-and-groove wood sheathing (Exposure 1). Installed per code requirements with minimum 8d common nails.
- 3. Structural Members:** Wood I-joists spaced a maximum of 24" on center.  
 Minimum I-joist flange depth: 1-1/2"      Minimum I-joist flange area: 2.25"<sup>2</sup>  
 Minimum I-joist web thickness: 3/8"      Minimum I-joist depth: 9-1/4"
- 4. Gypsum Wallboard:** Two layers of minimum 1/2" Type X gypsum wallboard attached with the long dimension perpendicular to the I-joists as follows:
  - 4a. Wallboard Base Layer:** Base layer of wallboard attached to bottom flange of I-joists using 1-5/8" Type S drywall screws at 12" on center. End joints of wallboard centered on bottom flange of the I-joist and staggered.
  - 4b. Wallboard Face Layer:** Face layer of wallboard attached to bottom flange of I-joists through base layer using 2" Type S drywall screws spaced 12" on center on intermediate joists and 8" on center at end joints. Edge joints of wallboard face layer offset 24" from those of base layer. End joints centered on bottom flange of I-joists and offset a minimum of one joist spacing from those of base layer. Additionally, wallboard face layer attached to base layer with 1-1/2" Type G drywall screws spaced 8" on center., placed 6" from face layer end joints.
- 5. Finish System (not shown):** Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

*Fire Test conducted at Factory Mutual Research*

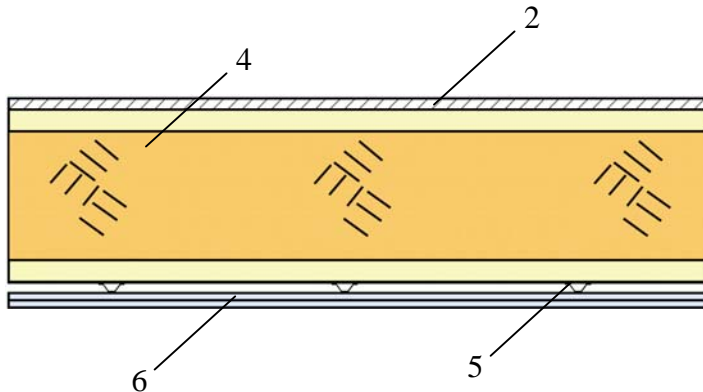
STC and IIC Sound Ratings for Listed Assembly							
Without Gypsum Concrete				With Gypsum Concrete			
Cushioned Vinyl		Carpet & Pad		Cushioned Vinyl		Carpet & Pad	
STC	IIC	STC	IIC	STC	IIC	STC	IIC
-	-	-	-	-	-	49 <sup>b</sup>	55 <sup>b</sup>

<sup>a</sup> This assembly may also be used in a fire-rated roof/ceiling application, but only when constructed exactly as described.

<sup>b</sup> STC and IIC values estimated by David L. Adams Associates, Inc.

## IV.b. One Hour Double Layer

*Floor<sup>a</sup>/Ceiling – 100% Design Load – 1 Hour Rating – ASTM E 119/NFPA 251*



### WIJ-1.6

Test Date: 6/24/97

Test Number: A-4440.1

Witness By: National Research Council of Canada

Official Report Number: A-4440.1

Endurance Rating: 1 Hour, ASTM E 119/NFPA 251

- 1. Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping.
- 2. Floor Sheathing:** Minimum 23/32" thick tongue-and-groove wood sheathing (Exposure 1). Installed per code requirements with minimum 8d common nails.
- 3. Insulation (optional, not shown):** Insulation fitted between I-joists supported by the resilient channels.
- 4. Structural Members:** Wood I-joists spaced a maximum of 24" on center.  
 Minimum I-joist flange depth: 1-5/16"                      Minimum I-joist flange area: 1.95"<sup>2</sup>  
 Minimum I-joist web thickness: 3/8"                      Minimum I-joist depth: 9-1/2"
- 5. Resilient Channels<sup>b</sup>:** Minimum 0.019" thick galvanized steel resilient channel attached perpendicular to the bottom flange of the I-joists with one 1-1/4" drywall screw. Channels spaced a maximum of 16" on center (24" to center when I-joists are spaced a maximum of 16" on center).
- 6. Gypsum Wallboard:** Two layers of minimum 1/2" Type X gypsum wallboard attached with the long dimension perpendicular to the resilient channels as follows:
  - 6a. Wallboard Base Layer:** Base layer of wallboard attached to resilient channels using 1-1/4" Type S drywall screws at 12" on center.
  - 6b. Wallboard Face Layer:** Face layer of wallboard attached to resilient channels through base layer using 1-5/8" Type S drywall screws spaced 12" on center. Edge joints of wallboard face layer offset 24" from those of base layer. Additionally, wallboard face layer attached to base layer with 1-1/2" Type G drywall screws spaced 8" on center, placed 6" from face layer end joints.
- 7. Finish System (not shown):** Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

*Fire Test conducted at National Research Council of Canada*

STC and IIC Sound Ratings for Listed Assembly								
	Without Gypsum Concrete				With Gypsum Concrete			
	Cushioned Vinyl		Carpet & Pad		Cushioned Vinyl		Carpet & Pad	
	STC	IIC	STC	IIC	STC	IIC	STC	IIC
<b>With Insulation</b>	<b>59</b>	<b>50</b>	<b>55<sup>c</sup></b>	<b>68<sup>c</sup></b>	<b>65</b>	<b>51</b>	<b>63<sup>c</sup></b>	<b>65<sup>c</sup></b>
<b>Without Insulation</b>	-	-	<b>54</b>	<b>68</b>	-	-	<b>58<sup>c</sup></b>	<b>55<sup>c</sup></b>

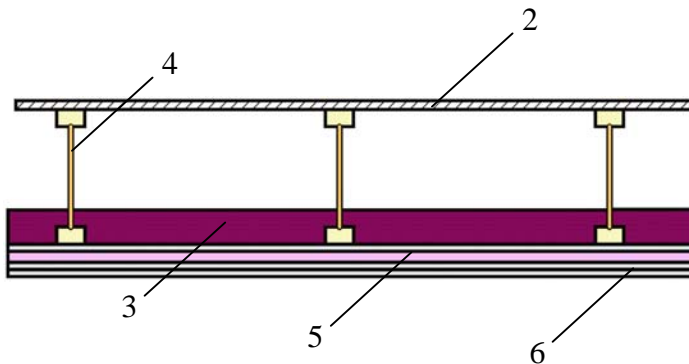
<sup>a</sup> This assembly may also be used in a fire-rated roof/ceiling application, but only when constructed exactly as described.

<sup>b</sup> Direct attachment of gypsum wallboard in lieu of attachment to resilient channels is typically deemed acceptable. When gypsum wallboard is directly attached to the I-joists, the wallboard should be installed with long dimension perpendicular to the I-joists and insulation should not be supported by wallboard.

<sup>c</sup> STC and IIC values estimated by David L. Adams Associates, Inc.

## V.a. Two Hour Triple Layer

*Floor<sup>a</sup>/Ceiling – 100% Design Load – 2 Hour Rating – ASTM E 119/NFPA 251*



### WIJ-2.1

Test Date: 12/16/92

Test Number: LP/FCA 120-01 (FC-493)

Witness By: Intertek Testing Services,  
PFS Corporation

Official Report Number: 92-56

Endurance Rating: 2 Hour, CAN/ULC- S101-M89,  
ASTM E 119/NFPA 251

- 1. Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping.
- 2. Floor Sheathing:** Minimum 23/32" thick tongue-and-groove wood sheathing (Exposure 1). Installed per code requirements.
- 3. Insulation:** Minimum 3-1/2" thick unfaced fiberglass insulation fitted between I-joists supported by stay wires spaced 12 inches on center.
- 4. Structural Members:** Wood I-joists spaced a maximum of 24" on center.  
 Minimum I-joist flange depth: 1-1/2"      Minimum I-joist flange area: 2.25"<sup>2</sup>  
 Minimum I-joist web thickness: 3/8"      Minimum I-joist depth: 9-1/4"
- 5. Furring Channels:** Minimum 0.0179" thick galvanized steel hat-shaped furring channels, attached perpendicular to I-joists using 1-5/8" long drywall screws. Furring channels spaced 16" on center (furring channels used to support the second and third layers of gypsum wallboard).
- 6. Gypsum Wallboard:** Three layers of minimum 5/8" Type C gypsum wallboard attached as follows:
  - 6a. Wallboard Base Layer:** Base layer of wallboard attached to bottom flange of I-joists using 1-5/8" Type S drywall screws at 12" on center with the long dimension of wallboard perpendicular to I-joist. End joints of wallboard centered on bottom flange of the I-joist and staggered from end joints in adjacent sheets.
  - 6b. Wallboard Middle Layer:** Middle layer of wallboard attached to furring channels using 1" Type S drywall screws spaced 12" on center with the long dimension of wallboard perpendicular to furring channels. End joints staggered from end joints in adjacent sheets.
  - 6c. Wallboard Face Layer:** Face layer of wallboard attached to furring channels through middle layer using 1-5/8" Type S drywall screws spaced 8" on center. Edge joints of face layer of wallboard offset 24" from those of middle layer. End joints of face layer of wallboard staggered with respect to the middle layer.
- 7. Finish System (not shown):** Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

*Fire Test conducted at Gold Bond Building Products Research Center*

STC and IIC Sound Ratings for Listed Assembly							
Without Gypsum Concrete				With Gypsum Concrete			
Cushioned Vinyl		Carpet & Pad		Cushioned Vinyl		Carpet & Pad	
STC	IIC	STC	IIC	STC	IIC	STC	IIC
-	-	49 <sup>b</sup>	54 <sup>b</sup>	52 <sup>b</sup>	46 <sup>b</sup>	52 <sup>b</sup>	60 <sup>b</sup>

<sup>a</sup> This assembly may also be used in a fire-rated roof/ceiling application, but only when constructed exactly as described.

<sup>b</sup> STC and IIC values estimated by David L. Adams Associates, Inc.

## VI. Allowable Substitutions on Floor/Ceiling Assemblies

### **1. Roof/Ceiling Assemblies:**

If a roof/ceiling assembly, 15/32 edge panels may be substituted for specified sub-floor sheathing.

### **2. Sheathing Material:**

PS2-92 rated OSB may be substituted for PS1-95 rated Plywood in all assemblies provided that equivalent thickness is used respectively.

### **3. Glued and Nailed Sheathing:**

It is assumed that all sheathing to flange connections shall be glued with AFG-01 adhesive or equivalent. Screws of the appropriate size and length may be substituted for the required sub-floor nails.

### **4. Flange Size:**

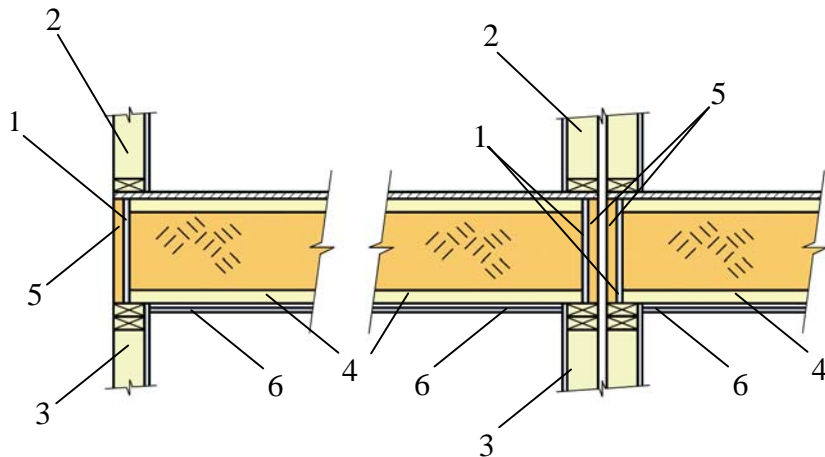
Per Char Rate studies conducted on lumber through the American Forest & Paper Association (AF&PA) and Char Rate studies conducted on laminated veneer lumber by the U.S. Forest Products Laboratory, substitution of either solid sawn lumber or laminated veneer lumber for I-joist flange material is permissible as long as the minimum flange size requirement for the assembly chosen is met.

### **5. Gypsum Wallboard**

The following gypsum wallboards may be substituted for the specified type provided the same quantity and thickness are used:

US Gypsum Fire Code C, Type X  
Celotex FI-Rok Plus  
GP Fire Stop C  
Gold Bond Fire Shield FWS-G

## VII. One Hour Rim Board Assemblies



### Assembly A

Test Date: 10/30/02

Test Number: 3033544

Witness By: Intertek Testing Services

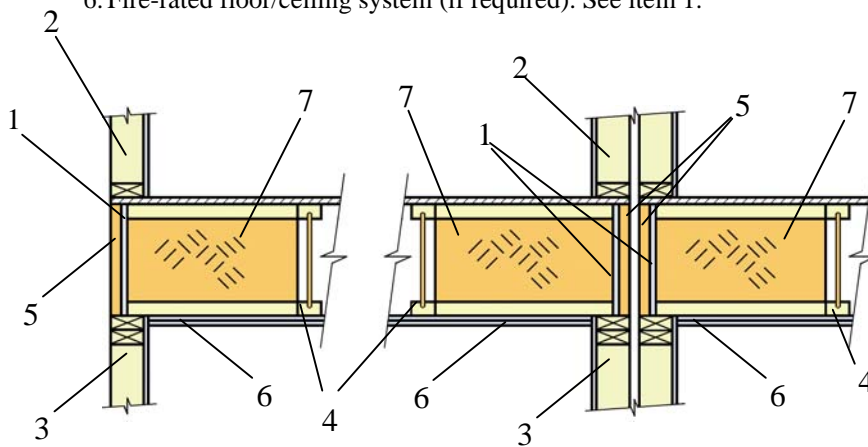
Official Report Number: 3033544

Endurance Rating: 1 Hour, CAN/ULC-S101-M89, ASTM E 119

*I-Joist Perpendicular to Rim Board*

#### Description

1. Continuous 5/8" Type X gypsum board fastened to rim board. Gypsum board may be eliminated if rated floor/ceiling assembly is 1 hour rated.
2. 2 x 4 minimum studs, framing for 1 hour rated wall.
3. 2 x 4 or 2 x 6 minimum studs, framing for 1 hour rated wall.
4. LP I-Joists.
5. Rim board continuous 1" or 1-1/8" LP Solid Start OSB or 1-1/4" LP LVL rim board.
6. Fire-rated floor/ceiling system (if required). See item 1.



### Assembly B

Test Date: 10/30/02

Text Number: 3033544

Witness By: Intertek Testing Services

Official Report Number: 3033544

Endurance Rating: 1 Hour, CAN/ULC-S101-M89, ASTM E 119

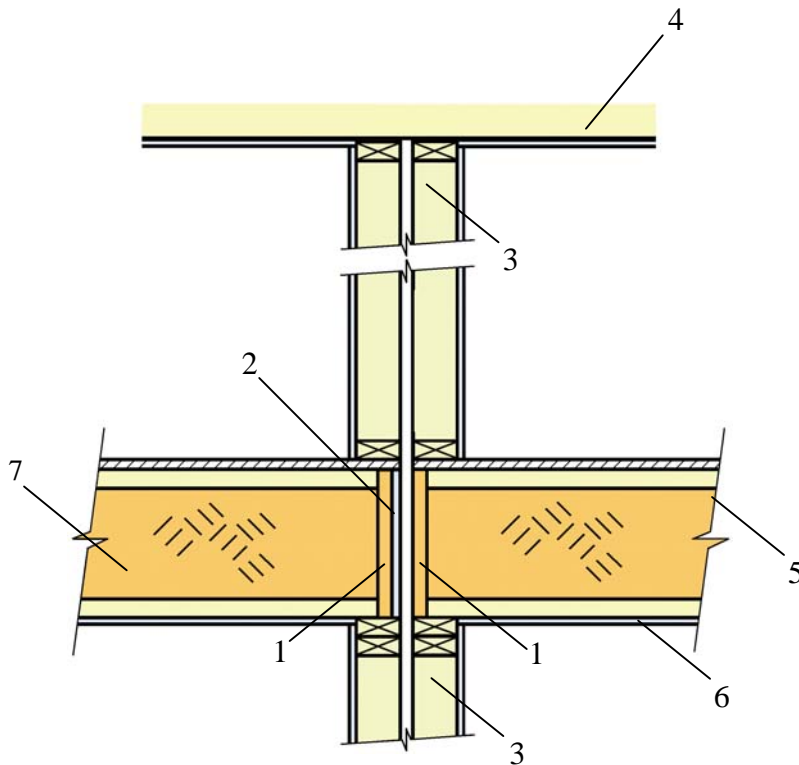
*I-Joist Parallel to Rim Board*

#### Description

1. Continuous 5/8" Type X gypsum board fastened to rim board. Gypsum board may be eliminated if rated floor/ceiling assembly is 1 hour rated.
2. 2 x 4 minimum studs, framing for 1 hour rated wall.
3. 2 x 4 or 2 x 6 minimum studs, framing for 1 hour rated wall.
4. LP I-Joists.
5. Rim board continuous 1" or 1-1/8" LP Solid Start OSB or 1-1/4" LP LVL rim board.
6. Fire-rated floor/ceiling system (if required). See item 1.
7. LPI Blocking panels required for full rim board capacity.

## VII. One Hour Rim Board Assembly

### *Design No. 1: Fire Resistance Rating – 60 Minutes*



Test Date: 5/22/02  
Test Number: 3024852  
Witness By: Intertek Testing Services  
Official Report Number: 3024852  
Endurance Rating: 1 Hour, CAN/ULC-S101-M89, ASTM E 119

### *I-Joist Perpendicular to Rim Board*

#### **Application:**

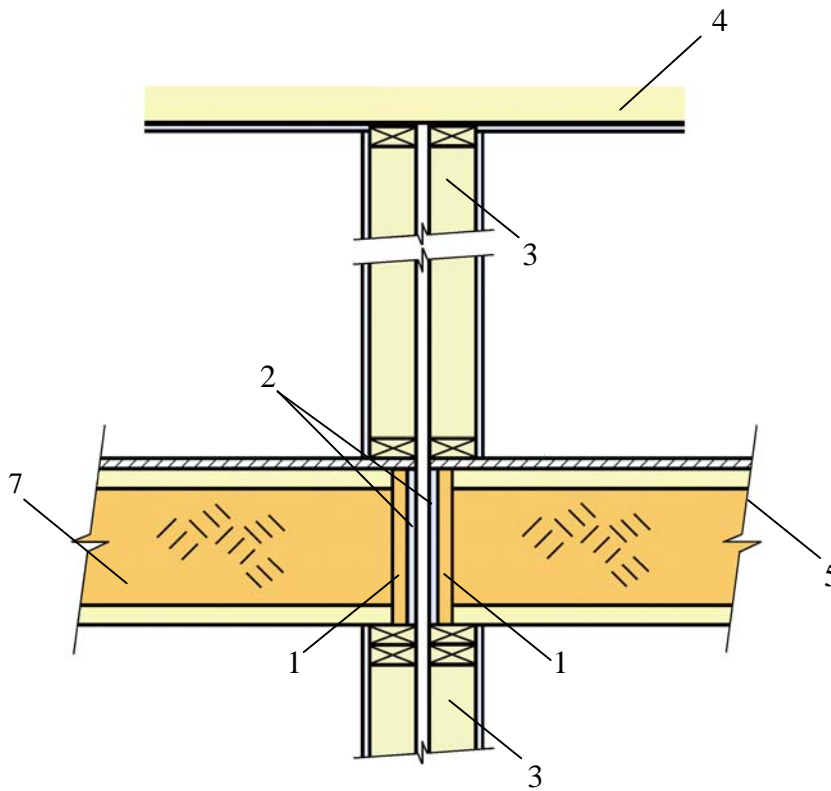
Two-story load on rim joist applied evenly to both walls, such that the load is transferred when load support is lost on fire exposed rim joist.

#### **Description:**

1. Rim board continuous 1" or 1-1/8" LP Solid Start OSB or 1-1/4" LP LP LVL rim board.
2. Gypsum wallboard protection: Continuous 1/2" Type X gypsum wallboard applied to inner side of rim board material, on one side and fastened with 1-1/2" Type W screws 12" on center
3. One hour rated wall construction.
4. Roof/ceiling assembly
5. Un-rated floor/ceiling assembly.
6. Gypsum board ceiling, taped and filled.
7. LPI joist.

## VII. One Hour Rim Board Assembly

### *Design No. 2: Fire Resistance Rating – 60 Minutes*



Test Date: 5/22/02  
Test Number: 3024852  
Witness By: Intertek Testing Services  
Official Report Number: 3024852  
Endurance Rating: 1 Hour, CAN/ULC-S101-M89, ASTM E 119

*I-Joist Perpendicular to Rim Board*

#### **Application:**

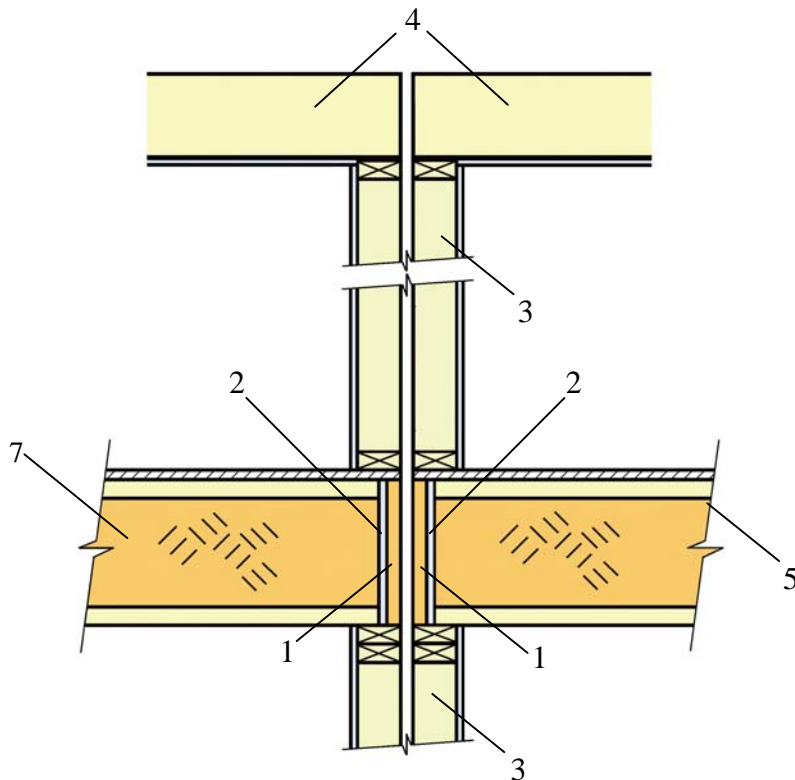
Two-story load on rim joist applied evenly to both walls, such that the load is transferred to non-fire exposed side wall when load support is lost on fire exposed rim joist.

#### **Description:**

1. Rim board continuous 1" or 1-1/8" LP Solid Start OSB or 1-1/4" LP LP LVL rim board.
2. Gypsum wallboard protection: Continuous 1/2" conventional gypsum wallboard applied to either the inner or outer side of each rim board and fastened with 1-1/2" Type W screws 12" on center
3. One hour rated wall construction.
4. Roof/ceiling assembly
5. Un-rated floor/ceiling assembly (no ceiling membrane).
6. Not used in this detail.
7. LPI joist.

## VII. One Hour Rim Board Assembly

### *Design No. 3: Fire Resistance Rating – 60 Minutes*



Test Date: 5/22/02

Test Number: 3024852

Witness By: Intertek Testing Services

Official Report Number: 3024852

Endurance Rating: 1 Hour, CAN/ULC-S101-M89, ASTM E 119

***I-Joist Perpendicular to Rim Board***

#### ***Application:***

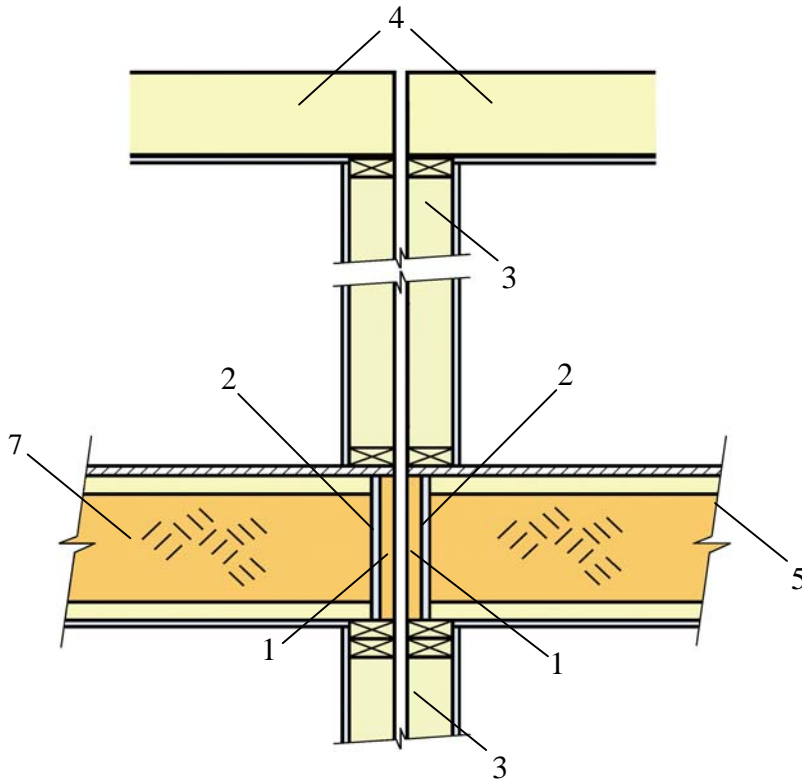
Multi-story load on rim joist applied individually to each wall, such that the load is not transferred when support on one side is lost.

#### ***Description:***

1. Rim board continuous 1" or 1-1/8" LP Solid Start OSB or 1-1/4" LP LP LVL rim board.
2. Gypsum wallboard protection: Continuous 5/8" Type X gypsum wallboard applied to each rim board on the occupancy side and fastened with 1-1/2" Type W screws 12" on center
3. One hour rated wall construction.
4. Roof/ceiling or floor/ceiling assembly
5. Un-rated floor/ceiling assembly
6. Not used in this detail.
7. LP I-joist.

## VII. One Hour Rim Board Assembly

### *Design No. 4: Fire Resistance Rating – 60 Minutes*



Test Date: 5/22/02  
Test Number: 3024852  
Witness By: Intertek Testing Services  
Official Report Number: 3024852  
Endurance Rating: 1 Hour, CAN/ULC-S101-M89, ASTM E 119

### *I-Joist Perpendicular to Rim Board*

#### **Application:**

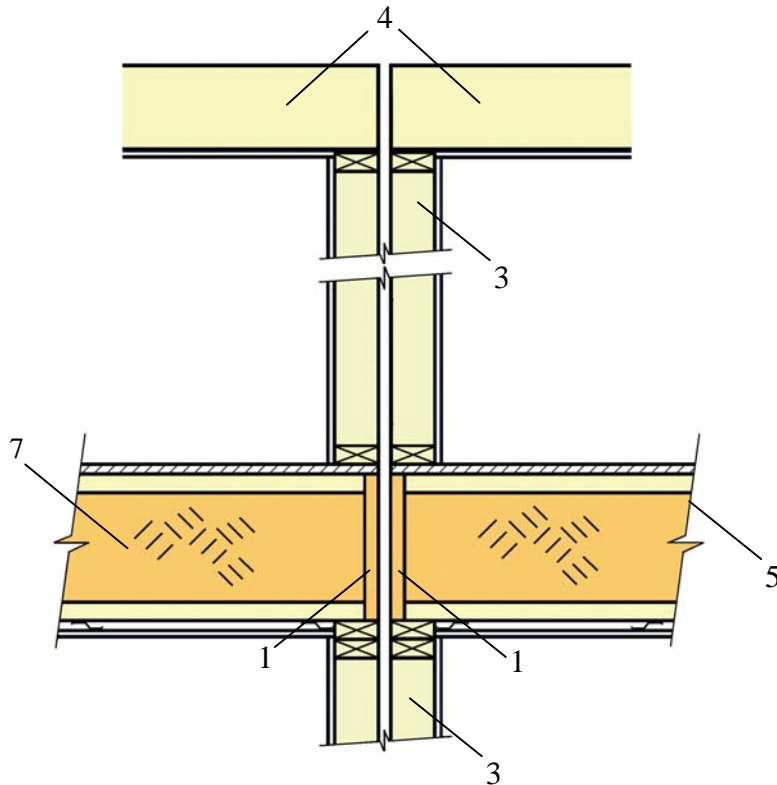
45 minute fire rated floor/ceiling assembly, multi-story with wall designed such that each side of the wall supports load independently. Since the floor/ceiling assembly is rated for 45 minutes, while the walls are rated for 60 minutes, the rim joist will be expected to provide 15 minutes of fire resistance after loss of the floor/ceiling assembly before failure of load support of the wall occurs.

#### **Description:**

1. Rim board continuous 1" or 1-1/8" LP Solid Start OSB or 1-1/4" LP LP LVL rim board.
2. Gypsum wallboard protection: Continuous 1/2" conventional gypsum wallboard applied to each rim board on the occupancy side and fastened with 1-1/2" Type W screws 12" on center
3. One hour rated wall construction.
4. Roof/ceiling or floor/ceiling assembly.
5. Forty-five minute rated floor/ceiling assembly.
6. Not used in this detail.
7. LPI joist.

## VII. One Hour Rim Board Assembly

### *Design No. 5: Fire Resistance Rating – 60 Minutes*



Test Date: 5/22/02  
Test Number: 3024852  
Witness By: Intertek Testing Services  
Official Report Number: 3024852  
Endurance Rating: 1 Hour, CAN/ULC-S101-M89, ASTM E 119

*I-Joist Perpendicular to Rim Board*

#### **Application:**

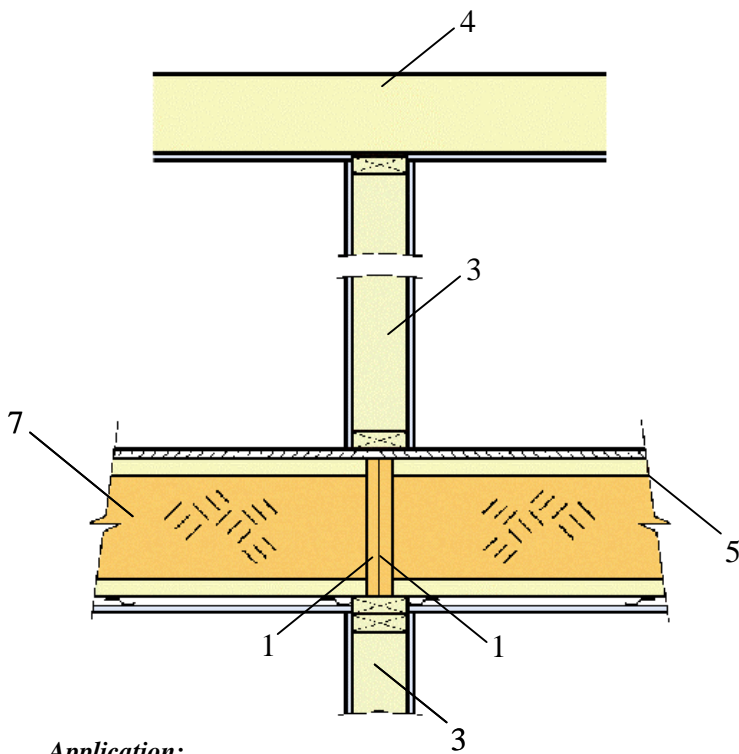
60 minute fire rated floor/ceiling assembly, multi-story with wall designed such that each side of the wall supports load independently.

#### **Description:**

1. Rim board continuous 1" or 1-1/8" LP Solid Start OSB or 1-1/4" LP LP LVL rim board.
2. Not used in this detail.
3. One hour rated wall construction
4. Roof/ceiling or floor/ceiling assembly.
5. Sixty minute rated floor/ceiling assembly.
6. Not used in this detail.
7. LPI joist.

## VII. One Hour Rim Board Assembly

### *Design No. 6: Fire Resistance Rating – 60 Minutes*



Test Date: 5/22/02  
Test Number: 3024852  
Witness By: Intertek Testing Services  
Official Report Number: 3024852  
Endurance Rating: 1 Hour, CAN/ULC-S101-M89, ASTM E 119

*I-Joist Perpendicular to Rim Board*

#### **Application:**

60 minute fire rated floor/ceiling assembly, with single one hour rated partition.

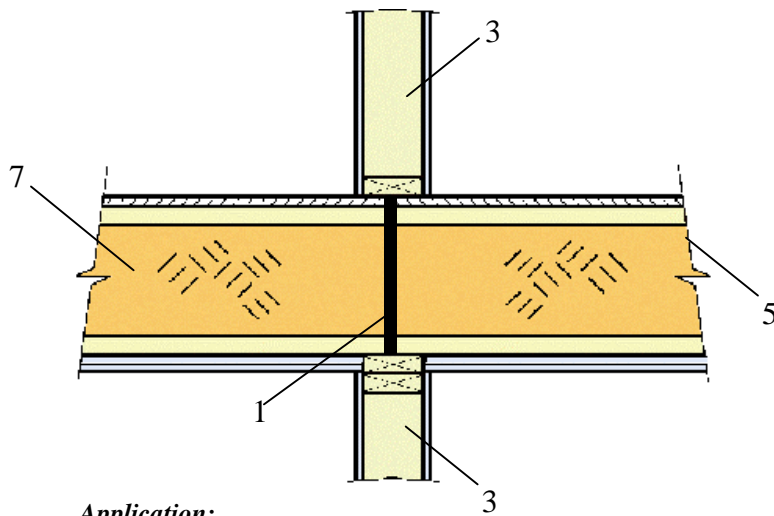
#### **Description:**

1. Rim board continuous 1" or 1-1/8" LP Solid Start OSB or 1-1/4" LP LVL rim board.
2. Not used in this detail.
3. One hour rated 2 x 6 wall assembly.
4. Roof/ceiling assembly.
5. 60 minute rated floor/ceiling assembly.
6. Not used in this detail.
7. LP I-Joist.

## VII. One Hour Rim Board Assembly

Test Date: 6/6/05

Witness By: Intertek Testing Services  
Endurance Rating: 1 Hour, CAN/ULC-  
S101-M89, ASTM E 119



*I-Joist Perpendicular to Rim Board*

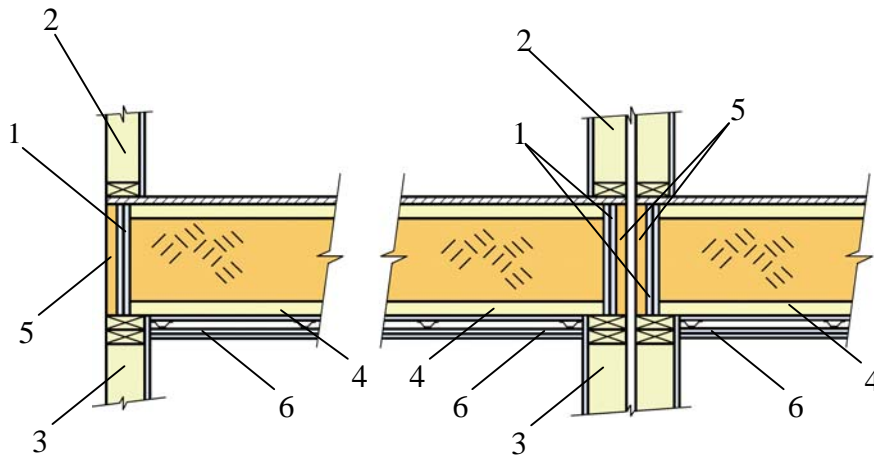
**Application:**

45 or 60 minute fire rated floor/ceiling assembly, with single one hour rated partition.

**Description:**

1. Rim board continuous 1-1/8" LP Solid Start OSB or 1-1/4" LP LVL rim board.
2. Not used in this detail.
3. One hour rated 2 x 6 bearing wall or 2 x 4 staggered on 2 x 6 plates.
4. Not used in this detail.
5. 45 or 60 minute rated floor/ceiling assembly.
6. Not used in this detail.
7. LP I-Joist.

## VIII. Two Hour Rim Board Assemblies



### Assembly C

Test Date: 10/30/02

Test Number: 3033544

Witness By: Intertek Testing Services

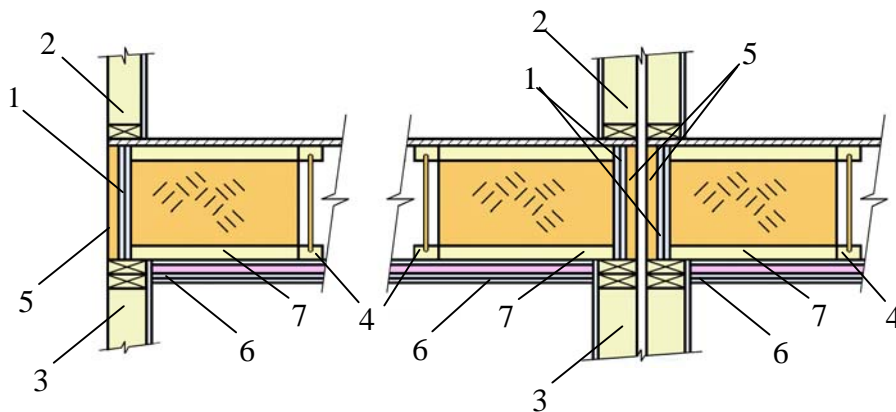
Official Report Number: 3033544

Endurance Rating: 2 Hour, CAN/ULC-S101-M89, ASTM E 119

#### *I-Joist Perpendicular to Rim Board*

#### **Description**

1. Two layers continuous 1/2" or 5/8" Type X gypsum board fastened to rim board. May be reduced to one layer 5/8" Type X when floor/ceiling assembly is 2 hour rated.
2. 2 x 4 minimum studs, framing for 2 hour rated wall.
3. 2 x 4 or 2 x 6 minimum studs, framing for 2 hour rated wall.
4. LP I-Joists.
5. Rim board continuous 1" or 1-1/8" LP Solid Start OSB or 1-1/4" LP LVL rim board.
6. Fire Rated floor/ceiling system (if required). See item 1.



### Assembly D

Test Date: 10/30/02

Text Number: 3033544

Witness By: Intertek Testing Services

Official Report Number: 3033544

Endurance Rating: 2 Hour, CAN/ULC-S101-M89, ASTM E 119

#### *I-Joist Parallel to Rim Board*

#### **Description**

1. Two layers continuous 1/2" or 5/8" Type X gypsum board fastened to rim board. May be reduced to one layer 5/8" Type X when floor/ceiling assembly is 2 hour rated.
2. 2 x 4 minimum studs, framing for 2 hour rated wall.
3. 2 x 4 or 2 x 6 minimum studs, framing for 2 hour rated wall.
4. LP I-Joists.
5. Rim board continuous 1" or 1-1/8" LP Solid Start OSB or 1-1/4" LP LVL rim board.
6. Fire rated floor/ceiling system (if required). See item 1.
7. LPI blocking required for full rim board capacity. LP LVL