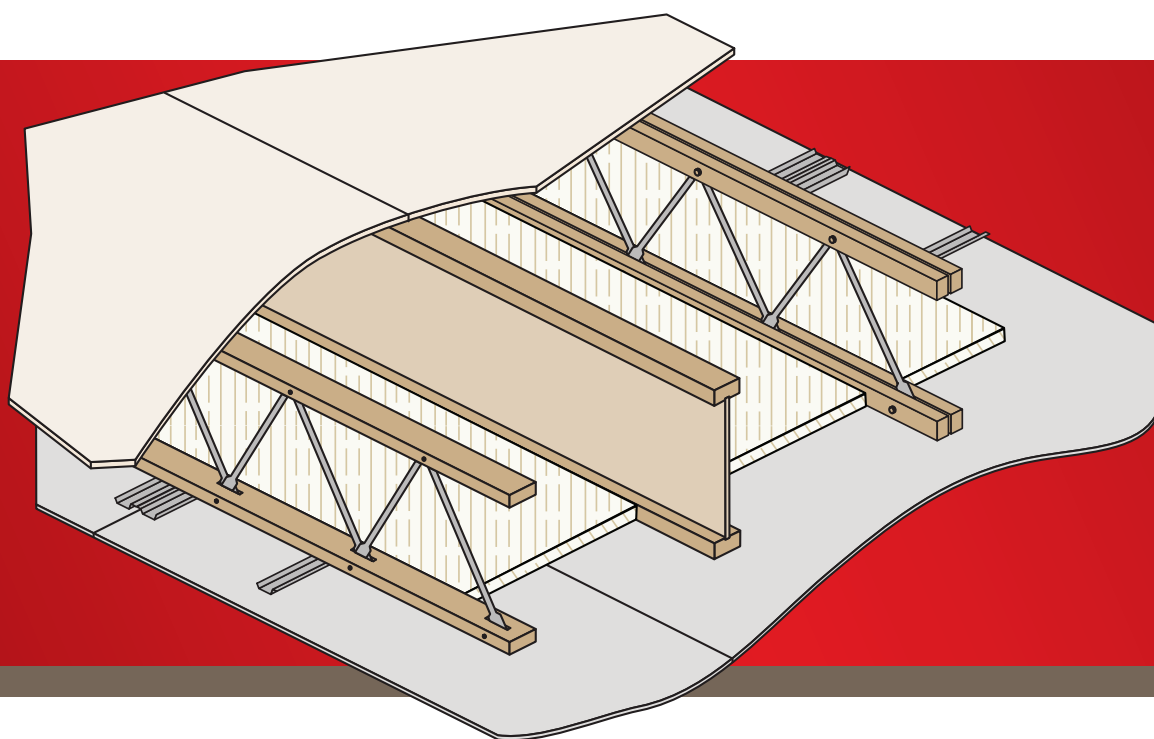




Fire Facts Guide



With Fire-Rated Assemblies For RedBuilt™ Engineered Wood Products

- Thorough Fire Testing
- Design and Construction Assistance
- Proven Fire Performance
- Long-Standing Research and Development
- Limited Product Warranty



About Fire-Safe Construction

Fire-safe construction and life safety are major concerns for everyone in the building materials and construction industry. The 2013 U.S. Fire Administration statistics (www.usfa.fema.gov/data/statistics) on residential and commercial fires in the U.S. alone include 3,468 fire fatalities and an estimated \$9 billion in property damage. These numbers underscore the seriousness of the issue and the need for fire-safe construction.

For over 40 years, prefabricated wood joists and other RedBuilt™ building products have established a record of safe and reliable performance in millions of structures. The following information is intended to help you specify and install RedBuilt™ products with fire safety in mind.

Fire-Resistance Categories

There are two fire-resistance categories: fire-resistance-rated construction and unrated construction.

Fire-resistance-rated construction requirements govern the following:

- Materials and assemblies used for structural fire resistance
- Fire-resistance-rated construction practices
- Requirements for the separation of adjacent spaces that safeguard against the spread of fire and smoke within a building, as well as the spread of fire between buildings

Unrated construction does not have a fire-resistance rating because it relies on other forms of protection, including the following:

- Smaller areas of habitable space
- Multiple paths of exit, such as doors and windows
- Spacing between buildings
- Active fire-suppression systems

Fire-Resistance-Rated Construction

Multi-family and commercial buildings usually require fire-resistance-rated construction and sprinklers because of the structure's square footage and height. Building codes also require that a structure be designed to provide occupants with sufficient means to exit the building during a fire. The building's construction must also maintain sufficient structural integrity and resist the spread of a fire.

In fire-resistance-rated construction, building codes specify that floor/ceiling, roof/ceiling, and wall assemblies be rated using a standard fire-resistance test. ASTM E119 or CAN/ULC S101 standard tests were used to rate the assemblies listed in this guide. In order to maintain an assembly's fire rating, penetrations such as those for lights and vents must meet code requirements and be installed as required by the code or the manufacturer.

Unrated Construction

In unrated construction, structural elements can be made of any material permitted by the building code. For specific fire protection requirements in any building, the designer and builder must consult with local building officials or an authority who has jurisdiction in their area.

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The NFPA 550 *Guide to the Fire Safety Concepts Tree* states that fires can be managed by suppressing the fire or controlling the fire by construction (with membrane protection). Fire safety goals such as life safety, property protection and continuity of building operations help determine the strategy to manage fire.

Active Fire Suppression

Automatic fire sprinkler systems are commonly required by building codes in schools, office buildings, factories and other commercial buildings. Buildings designed with sprinkler systems are allowed to have larger areas and greater heights than buildings designed without sprinkler systems.

Fire service agencies such as the U.S. Fire Administration promote the use of sprinkler systems. These agencies cite benefits such as a safer environment and lower insurance rates for the owner. Using automatic fire sprinkler systems provides the following benefits:

- Early and unsupervised suppression
- Reduced fire and smoke development
- Potentially enhanced life safety for the occupant(s)

Passive Fire Protection

All floor framing materials—sawn lumber, wood I-joists, trusses and light-gauge steel—succumb quickly to fire if not protected. Applying a protective membrane, such as gypsum ceiling board, to all types of floor framing within the structure will provide uniform protection to the structural framing members. Passive fire protection can do the following:

- Delay fire growth involving structural elements
- Reduce the potential for significant property damage to structural elements
- Enhance the market value of the building

Concealed Space Protection

In addition to protecting the occupied space, building codes for rated construction require construction techniques and materials that restrict the movement of air or flames to other areas in the building through concealed spaces. Typical framing methods leave voids between structural members and between membranes within a floor or wall. During a fire, hot gases and flames can advance through these voids and carry the fire into ceiling spaces. Fire-blocking and draft-stopping in strategic locations help retard the advancement of a concealed-space fire while occupants safely exit the structure.

Examples of concealed-space protection include the following:

- Blocking between floor joists
- Blocking between the bottom and top plates of walls
- Framing around stairwell openings
- Sealing around penetrations for wiring or ventilation

Smoke Detectors

Smoke detectors are universally recognized as the most cost-effective life-saving devices. Although smoke detectors do not provide protection to the structure or its contents, they do alert occupants to potential fire hazards and allow them time to escape. Similarly, carbon monoxide detectors can also alert occupants to faulty heating appliances or air contamination in the early stages of a fire.

Char Rates

Rate of char is used to compare the rate of combustion between wood products. Although no ASTM or CAN/ULC test standards for char rate currently exist, most wood product testing laboratories burn the test specimen for a measured time period using a single radiant energy source, then extinguish the burn and measure the remaining section. The depth of char divided by the measured time period is the char rate. A lower char rate indicates a slower rate of burn.

Research conducted at the Forest Products Laboratory demonstrates the applicability of these fire-resistance calculation procedures for RedLam™ laminated veneer lumber (LVL). In a report dated February 2000, researcher Robert H. White concluded, "One-dimensional charring tests of structural composite lumber products including LVLs, PSLs and LSLs confirmed that charring of these products in the standard fire-endurance test may be

considered comparable with solid wood. Such results support the use of the fire-resistance calculation procedures for solid wood to estimate the ratings of composite lumber products." (*Charring Rate of Composite Timber Products*, Wood and Fire Safety: Proceedings of the 4th International Scientific Conference.)

Char Rate Comparison

Product or Wood Species	Char Rates ⁽¹⁾	
	Inches/Hour	mm/Min.
RedLam™ LVL ⁽²⁾	1.4	0.59
Red-I™ Joist Performance Plus® Web ⁽³⁾	1.5	0.62
OSB ⁽⁴⁾	1.5	0.64
Douglas Fir ⁽⁵⁾	1.6	0.68
Southern Pine ⁽⁵⁾	2.2	0.93
Hemlock (Eastern) ⁽⁵⁾	1.6	0.68
Sitka Spruce ⁽⁵⁾	1.7	0.72
Ponderosa Pine ⁽⁵⁾	2.1	0.89

(1) Nominal char rates, β_n (Linear char rate based on one-hour exposure.)

(2) TRADA International, *Project No. RRESF91013*.

(3) Weyerhaeuser Research & Development Report No. 991-1763.

(4) Forest Products Laboratory Report FPL-RP-610. *Fire Resistance of Engineered Wood Rim Board Products*, May 2003.

(5) *Wood Handbook* USDA, *FS Agriculture Handbook 72*, p. 15-3.

Flame Spread

A flame spread test is used to evaluate the surface flammability of a material or product. Test standards are defined by ASTM E84 in the United States and CAN/ULC-S102 in Canada. The Flame Spread Index is used by the model building codes to classify building content and surface finishes. A low rating means slow flame spread.

Flame Spread Comparison

Product or Wood Species	Flame Spread Index (Range)	Flame Spread Class
RedLam™ LVL ⁽¹⁾	50 ⁽²⁾	II or B
OSB ⁽³⁾	131 ⁽⁴⁾ (74–172)	III or C
Douglas Fir ⁽⁵⁾	(70–100)	III or C
Southern Pine ⁽⁵⁾	(130–195)	III or C
Hemlock (Western) ⁽⁵⁾	(60–75)	II or B
Sitka Spruce ⁽⁵⁾	100 ⁽²⁾	III or C
Ponderosa Pine ⁽⁵⁾	(105–230) ⁽⁶⁾	III or C

(1) Warnock Hersey, Fire Laboratory Division, *Report No. 3815*.

(2) Single test.

(3) *Design for Code Acceptance 1*, American Wood Council.

(4) Average of 14 tests.

(5) *Wood Handbook* USDA, *FS Agriculture Handbook 72*, rev. 2010 p. 18–4.

(6) Footnote of UL: In 18 tests of Ponderosa pine, three had values over 200 and the average of all tests was 154.



Char rate and flame spread classes reveal that RedBuilt™ engineered wood products, OSB, and sawn lumber have equivalent fire performance characteristics because RedBuilt™ products are composed of approximately 95% wood fiber.

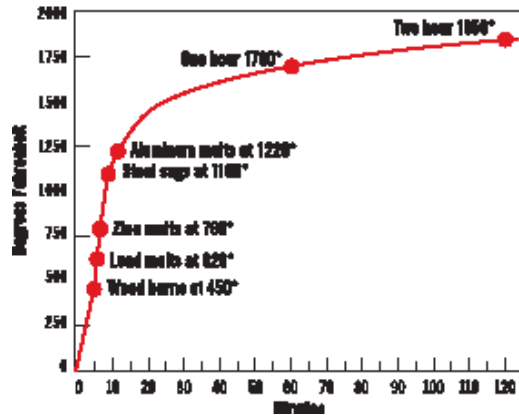
Standards for Determining Fire Resistance of Construction and Building Materials

In the United States and Canada, the model building codes rely on test standards to establish the relative fire resistance of different wall and floor or roof/ceiling assemblies. These standards include the test methods ASTM E119, ANSI/UL 263, CAN/ULC S101 and NFPA 251. All of these tests specify the standardized fire time-temperature curve shown at right.

This time-temperature curve provides a standardized exposure for evaluating structural components and systems. This standardized exposure has been used for many decades by agencies and by building codes to assess fire resistance. While this temperature curve may not reflect a real world fire, it does provide a relative measure of fire resistance.

With this in mind, the floor/ceiling and roof/ceiling assemblies shown in this guide have been evaluated using this standard, and therefore can be specified for the resistance ratings stated in the assembly descriptions below.

Time-Temperature Curve (Used by ASTM, UL, ULC, and NFPA)



FLOOR/CEILING, ROOF/CEILING ASSEMBLIES

Lightweight concrete or approved gypsum concrete topping may be added to any of the assemblies shown in this guide.

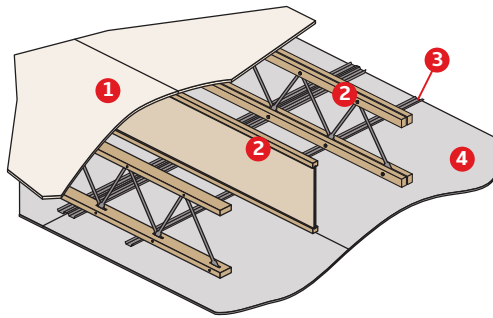
Design Number RBL/SFWT 45-01

45-Minute Assembly

RedBuilt™ Open-Web Truss and Red-I™ Joist Series

ASTM E119 and CAN/ULC S101

See reports for additional construction information.



1. Minimum 5/8" thick wood sheathing. When used as a roof assembly, minimum 1/2" thick wood sheathing may be used.
2. Red-I™ joist or open-web truss. Maximum spacing of 24" o.c.
3. Resilient channels spaced 16" o.c.; additional channels required at gypsum board end joints.
4. Minimum 5/8" Type X gypsum wallboard.

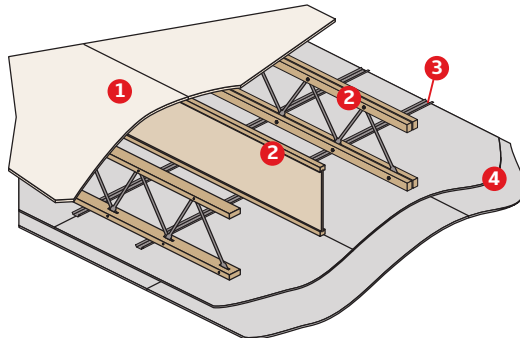
Design Number RBL/SFWT 60-01

One-Hour Assembly

RedBuilt™ Open-Web Truss and Red-I™ Joist Series

ASTM E119 and CAN/ULC S101

See reports for additional construction information.



1. Minimum 5/8" thick wood sheathing. When used as a roof assembly, minimum 1/2" thick wood sheathing may be used.
2. Red-I™ joist or open-web truss. Maximum spacing of 24" o.c.; spacing may be increased to 48" o.c. when stripping is used.
3. Resilient channels (optional) spaced 16" o.c.
4. Two layers of minimum 1/2" Type X gypsum wallboard.

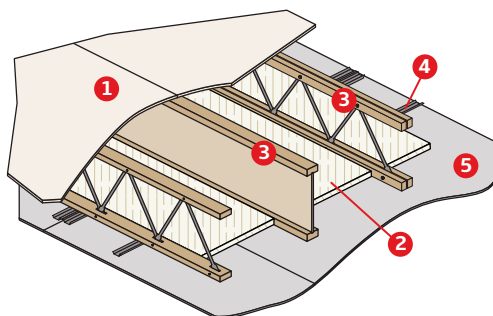
Design Number RBL/SFWT 60-02

One-Hour Assembly

RedBuilt™ Open-Web Truss and Red-I™ Joist Series

ASTM E119 and CAN/ULC S101

See reports for additional construction information.



1. Minimum 5/8" thick wood sheathing. When used as a roof assembly, minimum 1/2" thick wood sheathing may be used.
2. Minimum 1 1/2" thick mineral wool insulation batts, 2.5 pcf (minimum), friction fitted between bottom flanges of the joists and supported by resilient channels.
3. Red-I™ joist (Red-I90™, Red-I90H™, and Red-I90HS™ only) or open-web truss (Red-L™, Red-W™, Red-M™, and Red-H™ only). Maximum spacing of 24" o.c.; spacing may be increased to 48" o.c. when stripping is used.
4. Resilient channels spaced 16" o.c.; additional channels required at gypsum board end joints.
5. Minimum 5/8" Type C gypsum wallboard.

Lightweight concrete or approved gypsum concrete topping may be added to any of the assemblies shown in this guide.

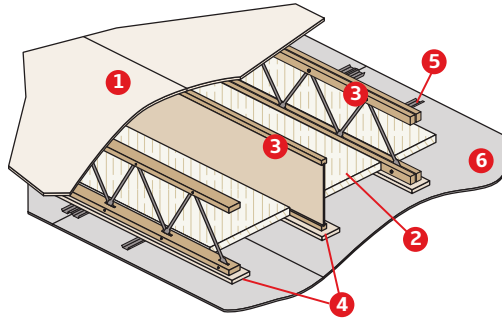
Design Number RBL/SFWT 60-03

One-Hour Assembly

RedBuilt™ Open-Web Truss and Red-I™ Joist Series

ASTM E119 and CAN/ULC S101

See reports for additional construction information.



1. Minimum $\frac{5}{8}$ " thick wood sheathing. When used as a roof assembly, minimum $\frac{1}{2}$ " thick wood sheathing may be used.
2. Minimum 2" thick mineral wool insulation batts, 3.5 pcf (minimum), friction fitted between bottom flanges of the joists and supported by setting strips.
3. Red-I™ joist or open-web truss. Maximum spacing of 24" o.c.
4. Minimum 1x4 wood setting strips creating ledge to support insulation.
5. Resilient channels spaced 16" o.c.; additional channels required at gypsum board end joints.
6. Minimum $\frac{5}{8}$ " Type C gypsum wallboard.

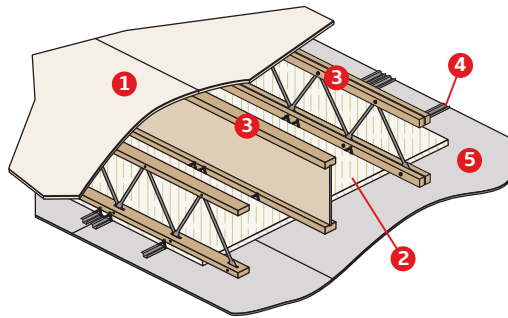
Design Number RBL/SFWT 60-04

One-Hour Assembly

RedBuilt™ Open-Web Truss and Red-I™ Joist Series

ASTM E119 and CAN/ULC S101

See reports for additional construction information.



1. Minimum $\frac{3}{32}$ " thick tongue-and-groove wood sheathing. When used as a roof assembly, minimum $\frac{1}{2}$ " thick wood sheathing may be used.
2. Minimum 1" thick mineral wool insulation batts, 6 pcf (minimum), installed on top of furring channels and under bottom flange of joists with the sides butted against support clips.
3. Red-I™ joist (Red-I65™, Red-I90™, Red-I90H™, and Red-I90HS™ only) or open-web truss (Red-L™, Red-W™, Red-M™, and Red-H™ only). Maximum spacing of 24" o.c.
4. Furring channels spaced 24" o.c.
5. Minimum $\frac{1}{2}$ " Type C gypsum wallboard.

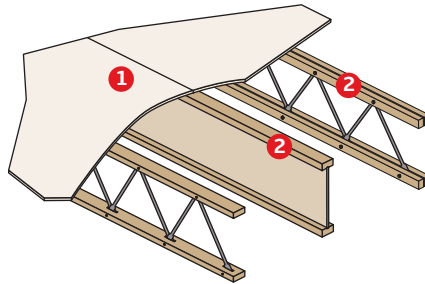
Design Number RBL/SFWT 60-05

One-Hour Assembly

RedBuilt™ Open-Web Truss and Red-I™ Joist Series

ASTM E119 and CAN/ULC S101

See reports for additional construction information.



1. Minimum $\frac{5}{8}$ " thick wood sheathing. When used as a roof assembly, minimum $\frac{1}{2}$ " thick wood sheathing may be used.
2. Red-I™ joist or open-web truss. Maximum spacing of 24" o.c.; spacing may be increased to 48" o.c. when stripping is used.
3. Minimum 40-minute finish rated ceiling membrane (*not shown*) must be used. An example of an approved ceiling having a 40-minute finish rating is one that consists of two layers of $\frac{1}{2}$ " thick Type X gypsum board complying with ASTM C36 or ASTM C1396.

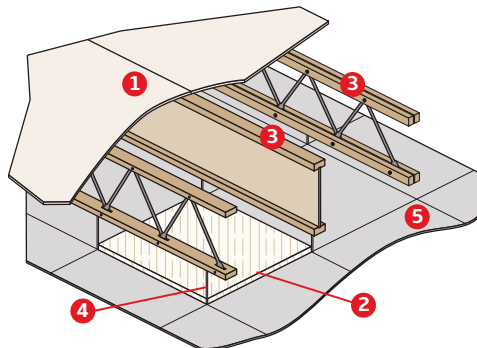
Design Number RBL/SFWT 60-06

One-Hour Assembly

RedBuilt™ Open-Web Truss and Red-I™ Joist Series

ASTM E119 and CAN/ULC S101

See reports for additional construction information.



1. Double wood floor consisting of minimum 1" thick wood sheathing subfloor and $\frac{5}{8}$ " thick wood sheathing finish floor. When used as a roof assembly, minimum $\frac{1}{2}$ " thick wood sheathing may be used.
2. Minimum 1" thick 4 pcf Thermafiber® Sound Attenuation Fire Blankets installed over the ceiling panels. Additional insulation options provided in the Intertek report.
3. Red-I™ joist (Red-I45™, Red-I65™, Red-I90™, Red-I90H™, and Red-I90HS™ only) or open-web truss. Maximum spacing of 24" o.c.
4. Fire-resistance-rated suspension system with ceiling suspended a minimum of 10" from bottom of joists.
5. Minimum $\frac{5}{8}$ " thick USG FIRECODE AURATONE lay-in acoustical board suspended ceiling panels.

FLOOR/CEILING, ROOF/CEILING ASSEMBLIES, *continued*

Lightweight concrete or approved gypsum concrete topping may be added to any of the assemblies shown in this guide.

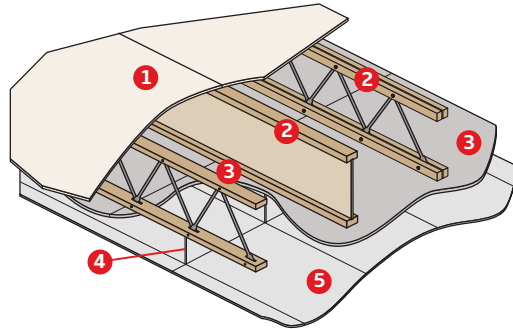
Design Number RBL/SFWT 60-07

One-Hour Assembly

RedBuilt™ Open-Web Truss and Red-I™ Joist Series

ASTM E119 and CAN/ULC S101

See reports for additional construction information.



1. Minimum 5/8" thick wood sheathing. When used as a roof assembly, minimum 1/2" thick wood sheathing may be used.
2. Red-I™ joist or open-web truss. Maximum spacing of 24" o.c.; spacing may be increased to 48" o.c. when stripping is used.
3. Minimum 1/2" thick Type X gypsum wallboard attached directly to joists.
4. Fire-resistance-rated suspension system with ceiling suspended a minimum of 12" from bottom of joists.
5. Minimum 5/8" thick USG FIRECODE AURATONE lay-in acoustical board suspended ceiling panels.

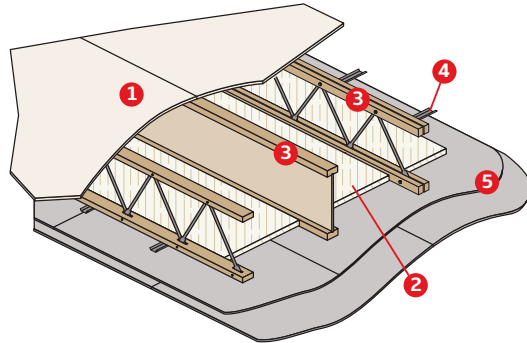
Design Number RBL/SFWT 90-01

90-Minute Assembly

RedBuilt™ Open-Web Truss and Red-I™ Joist Series

ASTM E119 and CAN/ULC S101

See reports for additional construction information.



1. Minimum 5/8" thick wood sheathing. When used as a roof assembly, minimum 1/2" thick wood sheathing may be used.
2. Minimum 1 1/2" thick mineral wool insulation batts, 2.5 pcf (minimum), installed on top of resilient channels with the sides butted against sides of the joists.
3. Red-I™ joist (Red-I65™ Red-I90™ Red-I90H™ and Red-I90HS™ only) or open-web truss. Maximum spacing of 24" o.c.
4. Resilient channels spaced 12" o.c.
5. Two layers minimum 5/8" thick Type C gypsum wallboard.

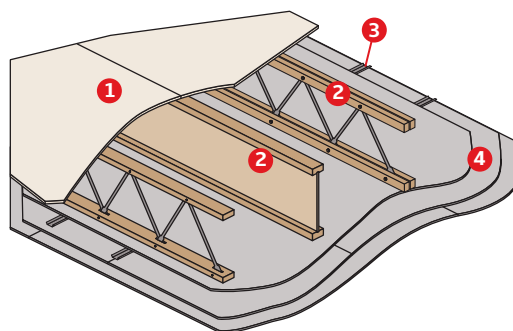
Design Number RBL/SFWT 120-01

Two-Hour Assembly

RedBuilt™ Open-Web Truss and Red-I™ Joist Series

ASTM E119 and CAN/ULC S101

See reports for additional construction information.



1. Minimum 5/8" thick wood sheathing. When used as a roof assembly, minimum 1/2" thick wood sheathing may be used.
2. Red-I™ joist or open-web truss. Maximum spacing of 24" o.c.
3. Resilient channels spaced 16" o.c. located between first and second layers of gypsum board.
4. Three layers of minimum 5/8" Type C gypsum wallboard.

FIRE Q&A

FIRE RATINGS

If a fire-rated assembly has a one-hour rating, does that mean it will last one hour during a real fire?

Not necessarily. Every fire is different, so it would be impractical to design a test that fits all possible scenarios. The fire-resistance rating is strictly for comparing alternative materials and assemblies against one another. The one-hour rating represents a 60-minute resistance using the standard time-temperature curve.

How realistic is the comparison between the time-temperature curve developed for standard fire-resistance tests and the conditions in a real fire?

Variations in fuel load, ventilation and ignition source make every fire different. These disparities make it difficult to produce a time-temperature curve that reflects general fire conditions modeled for fires of similar duration and intensity. Tests of simulated room fires conducted by the National Bureau of Standards⁽¹⁾

and the Forest Products Laboratory have produced time-temperature curves that differ noticeably from the standard curve shown on page 4. Although the standard time-temperature curve may not match any one real-world fire, it provides a widely accepted standard for evaluating the relative performance of different assemblies.

For further reference to the time-temperature curve test, see *Fire Development and Wall Endurance in Sandwich and Wood-Frame Structures*, by the USDA, FS, Forest Products Laboratory⁽²⁾, or *Fire Development in Residential Basement Rooms*, by the National Bureau of Standards⁽³⁾.

How does insulation affect the performance of fire-rated assemblies?

Generally, if an assembly meets fire-rating requirements without insulation, it will meet the requirements with insulation—provided that an air gap is maintained between the insulation and the gypsum board.

Testing by the National Research Council of Canada (NRCC) has shown that, when properly attached, two layers of 1/2" thick Type X gypsum board will provide a minimum one-hour rating regardless of whether insulation is used.

What is the difference between a “finish rating” and an “assembly rating”?

A finish rating is an indication of how effective the ceiling or membrane is at protecting the wood structure. It represents the time required for the structural wood closest to the fire (typically the bottom of a joist) to reach one of the following: a temperature increase of 325°F at a single location, or an average temperature increase of 250°F at several locations. An assembly rating is the fire-endurance rating for the entire assembly or system.

What are the requirements for rim board in wall separations?

Wall and roof assemblies are tested for fire endurance using ASTM E119 and CAN/ULC S101 test protocols and do not consider the role that rim board plays in wall separations. Requirements for rim board within a rated assembly vary depending upon the authority having jurisdiction. In some cases, gypsum board may be attached to rim board to meet the rating requirements.

Does this guide include all fire-resistant assemblies evaluated for use with RedBuilt™ products?

No. Only the most common applications are included in this guide. Additional assemblies and more information on fire testing may be found at:

www.apawood.org	APA – The Engineered Wood Association (See publications W305Y and D350A)
www.awc.org	American Wood Council (See DCA No. 3, <i>Fire Rated Wood Floor and Wall Assemblies</i>) or 2012 ASD/LRFD Manual for Engineered Wood Construction, chapter M16.
www.gypsum.org	Gypsum Association (See <i>Gypsum Fire Resistance Design Manual</i> , 21 st Edition GA-600-2015)

REDBUILT™ PRODUCTS**Can RedLam™ LVL be substituted for sawn lumber or glue-laminated beams in heavy timber construction or fire-rated assemblies?**

Yes, with the approval of local building officials. Char-rate tests on RedLam™ LVL have determined it to be at least equivalent to any of the sawn lumber species from which it is made. Flame spread tests yield lower flame spread indices for RedLam™ LVL than for the source species; however, no specific heavy timber or assembly testing has been conducted using RedLam™ LVL. Therefore, local building officials grant individual approval based on char-rate and flame-spread-rate data. In the U.S., RedLam™ LVL is specifically approved for heavy timber construction when minimum dimensional requirements are met, while approval in Canada hinges on equal or larger-size substitution in fire-rated assemblies.

Can RedBuilt™ products be used as fire blocking?

Yes. RedBuilt uses 1½" thick structural composite lumber for rim board (and fire blocking). ICC ESR-2993, Section 4.2.4 states that RedLam™ LVL may be used in lieu of sawn lumber for fire blocking. The 2012 IBC, Section 718.2.1 provides additional information on fire blocking.

Can Red-I™ joist assemblies in both floor and roof applications maintain their fire-endurance rating when holes are cut through the web for plumbing, electrical or duct work?

Yes. Holes of allowed sizes, drilled or cut through the joist webs to accommodate utilities, are considered when fire ratings are granted.

What is the impact of flange size used to manufacture Red-I™ joists?

Flange size does have an effect on the fire-rated assembly. The Red-I™ joists listed in this guide are appropriate for the assemblies in which they are referenced. Thin flange joists (less than 1⅜" thick) from other manufacturers may require additional protection.

FLAMMABILITY**Are the flame spread ratings similar for sawn lumber joists and Red-I™ joists?**

Yes. Sawn lumber joists, Red-I™ joists and other wood-based products (such as plywood and OSB) are all ranked in the Class C flame spread rating category.

Flame spread ratings are approximate ratings of surface flammability, which affects fire propagation rate and available escape time. Model building codes require a low flame-spread rate in critical safety zones such as exit locations. A low index number signifies slower flame spread, whereas a higher number indicates

quicker flame spread. The Flame Spread Index (FSI) ranges from 0–25 for Class A (Level I) materials, 26–75 for Class B (Level II) materials, and 76–200 for Class C (Level III) materials, which include sawn lumber joists and Red-I™ joists.

Flame spread ratings are primarily used to govern building contents and wall finishes. Because sawn lumber joists and Red-I™ joists are used as structural supports and are typically covered with other materials, this rating does not become an issue.

What about flame spread ratings for RedLam™ LVL?

The **Flame Spread Comparison** table on page 3 shows that the flame spread rating for RedLam™ LVL is equal to or lower than that of equivalent sawn lumber species.

Can RedBuilt™ engineered wood products be treated with a fire retardant?

Currently, RedBuilt does not pressure treat their products to achieve fire-retardant-treated status. RedBuilt has not evaluated any of the currently available pressure-based fire retardant treatments, or spray-on fire retardants or intumescent; therefore, these treatments are not approved for use with RedBuilt™ products. For more information, see RedBuilt's Technical Bulletin #300, "Secondary Treatment of RedBuilt Products".

SAFETY IN A REAL FIRE**Do the adhesives used in RedBuilt™ engineered wood products increase smoke toxicity compared to ordinary wood?**

No. The leading cause of death in fires is smoke inhalation. Testing shows that there is no significant difference between the smoke toxicity of ordinary wood and that of engineered lumber products of the same species.

Do adhesives contribute to early structural collapse compared to the performance of ordinary wood?

No. Adhesives used in RedBuilt™ products do not trigger an early structural collapse. The wood material—not the adhesive—controls fire resistance. See the next two questions regarding adhesives used in engineered wood products and also refer to the **Char Rate Comparison** and **Flame Spread Comparison** tables on page 3.

What adhesives are used to assemble Red-I™ joists?

Red-I™ joists use only phenol resorcinol waterproof adhesives that are thermosetting, which means they do not soften at elevated temperatures.

Do adhesives promote the spread of fire?

No. For strand products, such as OSB, standardized flame spread tests show that the progression of flame along the product surface does not change within the current classification (class C) due to the presence of the adhesive. The adhesive is a small percentage of the overall product and the impact on fire spread is negligible. The adhesive used to assemble other products (such as Red-I™ joist flanges or RedLam™ LVL) is located inside the product, away from the surface, and does not impact flame spread.

Where can I find additional information on fire-resistant testing and fire-safe construction?

See the following websites for more information:

www.awc.org	American Wood Council
www.cwc.ca	Canadian Wood Council
www.iccsafe.org	International Code Council
www.icc-es.org	International Code Council Evaluation Service
www.nfpa.org	National Fire Protection Association

(1) National Bureau of Standards is now known as the National Institute of Standards and Technology.

(2) USDA, FS, Forest Products Laboratory, Research Paper FPL 364, March 1980.

(3) National Bureau of Standards, NBSIR, 80-2120.



SERVICE AND SUPPORT YOU CAN COUNT ON.

RedBuilt is committed to creating superior structural solutions. How? By offering efficient structural building products supported by a broad range of services.

- Our team of RedBuilt representatives—one of the industry's largest—isn't afraid to get its hands dirty. We can help with technical information, installation questions or code compliance.
- At RedBuilt, our goal is to help you build solid and durable structures. A limited warranty for our products is in effect for the expected life of the building.
- Call us with a problem that you believe may be caused by our products, and our representative will contact you within one business day to evaluate the problem and help solve it—**GUARANTEED**.



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