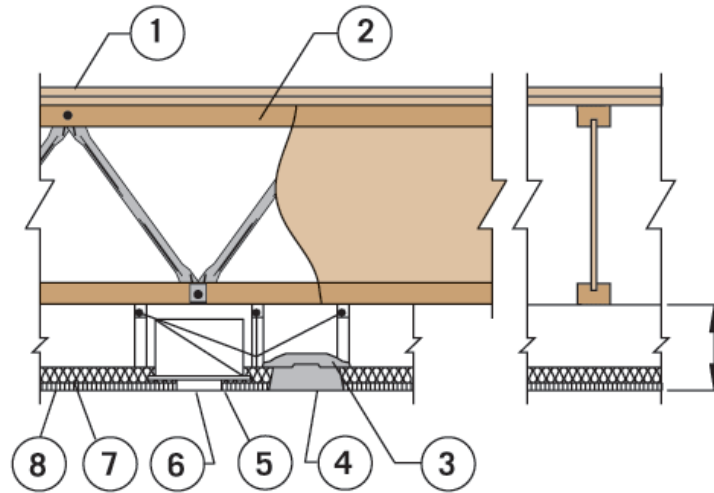


## RedBuilt Assembly A (1 Hour Fire Rated Assembly)

The following fire resistant designs are listed in accordance with ASTM-E119 and CAN/ULC-S101



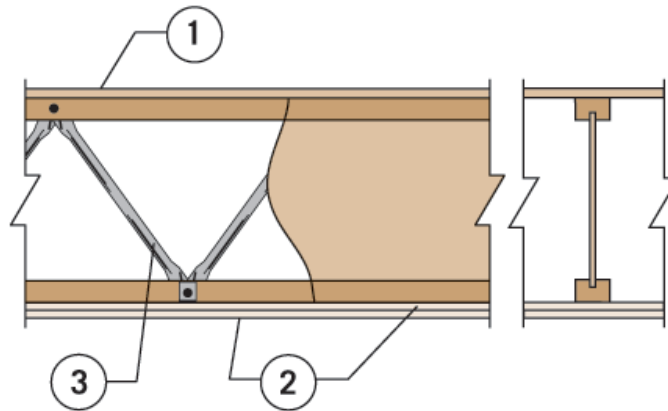
1. **Finished Flooring:** A double wood floor consisting of a subfloor of n nominally 1-inch-thick (25.4 mm), tongue-and-groove wood-based, structural-use or 32/16 span-rated wood-based, structural-use (Exposure 1); and a second layer of nominally 1-inch-thick (25.4 mm), tongue-and-groove finish sawn lumber flooring. Alternatively, the finish flooring is permitted to be 40/20 span-rated wood-based, structural-use (Exposure 1). All butt joints of the sheathing must be located over framing members.

When use is as a roof-ceiling assembly, a single layer of square-edge span-rated wood-based, structural-use (Exposure 1), complying with the code, is permitted to be used for roof sheathing.

2. **Structural Members:** Red-I joists with a minimum flange depth of 1-1/2 inches (38 mm) or OpenWeb trusses must be installed in accordance with ICC ESR-2994/1774 at a maximum spacing of 48 inches (1219 mm) on center.
3. **Fixture Protection:** The fixtures are protected as follows [using, for illustration, a 2-foot-by-4-foot (610 mm by 1219 mm) fixture]: A 2-1/4-inch-by-48-inch (57 mm by 1219 mm), minimum 1-1/4-inch-thick (31.8 mm) piece of minimum 4 pcf (64 kg/m<sup>3</sup>) Thermafiber<sup>®</sup> rigid mineral fiber board or Fibrex<sup>®</sup>-FBX 1240 Industrial Board or Fibrex<sup>®</sup>-IF 1240 Flex Batt light fixture protection, is laid along the long sides of the fixture, and against adjacent suspension members; two pieces of the same insulation, measuring 19-1/2-inch-by-48-inch (495 mm by 1219 mm), are laid over the top of the fixture, and a 4-1/2-inch-by-24-inch (114 mm by 610 mm) piece of the same insulation is laid at each end and tied at the corners of the fixture, to the top pieces using No. 18 SWG steel wire.
4. **Light Fixtures:** Maximum size 2 feet by 4 feet (610 mm by 1219 mm) are permitted to be installed in the ceiling, provided the aggregate area of fixtures does not exceed 12 square feet per 100 square feet (1.1 m<sup>2</sup> per 9.3 m<sup>2</sup>) of ceiling area.
5. **Cold-rolled Channels.**
6. **Air Diffusers:** Ceiling opening for air diffusers, up to a maximum of 12-inches (305 mm) in diameter, are permitted, provided opening are protected with approved fire dampers and the aggregate areas do not exceed 113-square-inches (72 900 mm<sup>2</sup>) per 100-square-feet (9.3 m<sup>2</sup>) of ceiling area.
7. **Insulation:** Installed over the acoustical board are minimum 1-inch-thick (25.4 mm), 4 pcf (64 kg/m<sup>3</sup>), Thermafiber<sup>®</sup> Sound Attenuation Fire Blankets, Fibrex<sup>®</sup>-FBX 1240 Industrial Boards, Fibrex<sup>®</sup>-IF 1240 Flex Batts, IIG MinWool<sup>®</sup>-1240 Industrial Board or IIG MinWool<sup>®</sup>-1240 Flexible Batt.
8. **Ceiling:** The suspended ceiling must consist of 5/8-inch-thick (15.9 mm), 2-foot-by-2-foot (610 mm by 610 mm), USG FIRECODE AURATONE lay-in acoustical board supported by an approved, exposed fire-resistance-rated suspension system attached to the joist or truss bottom flange / chord or to cold-rolled channels spaced no more than 48 inches (1219 mm) on center. For OpenWeb trusses 2'-by-4-foot (610 mm by 1220 mm) ceiling panels are allowed. When Red-I joists or OpenWeb trusses are spaced more than 24 inches (610 mm) on center, framing perpendicular to the joists or trusses must be installed at 24 inches (610 mm) on center to support the ceiling. The distance from the bottom of the Red-I joists or OpenWeb trusses to the soffit of the ceiling must be a minimum of 10 inches (254 mm).

## RedBuilt Assembly B (1 Hour Fire Rated Assembly)

The following fire resistant designs are listed in accordance with ASTM-E119 and CAN/ULC-S101



1. **Finished Flooring:** The flooring must consist of a single layer of 48/24 span-rated, tongue-and-groove, wood-based, structural-use (Exposure 1). When used as a roof-ceiling assembly, the decking is permitted to be any wood deck recognized in the code. All butt joints of the sheathing must be located over framing members.
2. **Ceiling:** The ceiling membrane must consist of two layers of ½-inch-thick (12.7 mm) Type X gypsum board complying with ASTM C 36, attached to the Red-I joist or OpenWeb bottom flange / chord. The first layer of gypsum board must be installed perpendicular to the Red-I joists or OpenWeb trusses and attached using 1-5/8-inch-long (41 mm), Type S screws spaced 12 inches (305 mm) on center. The second layer must be installed with the joints staggered from the first layer. The second layer must be fastened to the Red-I joists or OpenWeb trusses with 2-inch-long (51 mm), Type S screws spaced 12 inches (305 mm) on center in the field and 8 inches (203 mm) on center at the butt joints.

Type G screws, 1-1/2 inches (38 mm) long, must be spaced 8 inches (203 mm) on center and 6 inches (152 mm) from each side of the transverse joints of the second layer. The second layer must be finished with joint tape and compound.

In roof-ceiling assemblies in which the Red-I joists or OpenWeb trusses are spaced more than 24 inches (610 mm) on center, the ceiling, including the resilient channels, must be applied to stripping spaced 24 inches (610 mm) on center. The attachment of the ceiling membrane to the stripping members must be similar to the attachment of the ceiling membrane to the Red-I joists or OpenWeb trusses. The stripping must be a minimum of nominally 2-by-4 construction-grade Douglas fir lumber for spans up to 5 feet (15524 mm) , and must be attached to the joist or truss bottom flange / chord using a minimum of two 10d box nails. Stripping materials of equivalent strength and attachment are permitted with approved by the code official.

3. **Structural Members:** Red-I joists or OpenWeb trusses must be installed in accordance with ICC ESR-2994/1774, with a maximum spacing of 24 inches (610 mm) on center for floor-ceiling assemblies. When used in roof-ceiling assemblies, the joists or trusses are permitted to be spaced a maximum of 48 inches (1219 mm) on center.

### Optional:

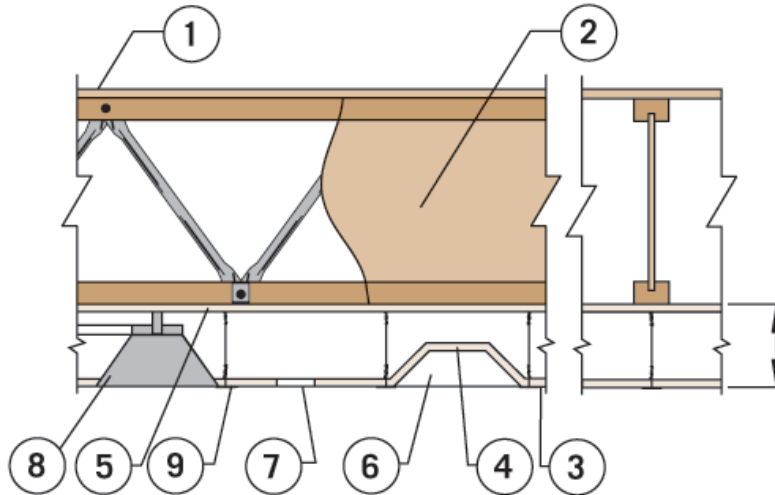
**Resilient Channels (RC-1):** Are permitted to be used as part of the ceiling attachment system, provided they are spaced 16 inches (406 mm) on center [24 inches (610 mm) on center if the joists or trusses are spaced 16 inches (406 mm) on center] and fastened perpendicular to the Red-I joists or OpenWeb trusses using 1-inch-long (25.4 mm), Type S screws. When resilient channels are used, the first layer of the ceiling membrane must be installed perpendicular to the channels and attached to the resilient channels using 1-inch-long (25.4 mm), Type S screws spaced 12 inches (305 mm) on center. The second layer must be installed with the joints staggered from the first layer and attached using 1-5/8-inch-long (41 mm), Type S screws. The screw spacing for the second layer of gypsum board must be a maximum of 12 inches (305 mm) on center in the field and 8 inches (203 mm) on center at the butt joints.

Type G screws, 1-1/2 inches (38 mm) long, must be spaced 8 inches (203 mm) on center and 6 inches (152 mm) from each side of the transverse joints of the second layer. The second layer must be finished with joint tape and compound.

**Insulation:** Minimum 3-1/2-inch-thick (89 mm) glass fiber insulation rated R-30 or less may be installed in the joist or truss plenum when resilient channels are used. The insulation must be placed above the resilient channels between the joist or truss bottom flanges / chords.

## RedBuilt Assembly C (1 Hour Fire Rated Assembly)

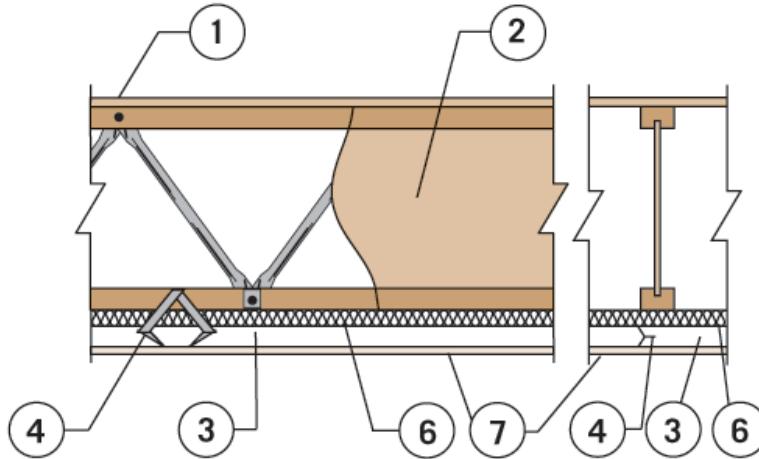
The following fire resistant designs are listed in accordance with ASTM-E119 and CAN/ULC-S101



1. Finished Flooring: single layer of 48/24 span-rated, tongue-and-groove wood-based, structural-use (Exposure 1). When use is as a roof-ceiling assembly, a single layer of square-edge span-rated wood-based, structural-use (exposure 1), complying with the code, is permitted to be used for roof sheathing. All butt joints of the sheathing must be located over framing members.
2. Structural Members: Red-I joists or OpenWeb trusses must be installed in accordance with ICC ESR-2994/1774, with a maximum spacing of 24 inches (610 mm) on center for floor-ceiling assemblies. When use is in roof-ceiling assemblies, the joists or trusses are permitted to be spaced a maximum of 48 inches (1219 mm) on center. When the joist or truss spacing exceeds 24 inches (610 mm) on center, framing perpendicular to the joists or trusses must be installed at 24 inches (610 mm) on center to support the ceiling.
3. Ceiling: An approved, exposed, fire-resistance-rated, suspended-ceiling system must be installed beneath the gypsum board ceiling; membrane. The minimum distance between the suspended ceiling and the gypsum board ceiling membrane must be 12 inches (305 mm). Ceiling panels must be 5/8-inch-thick (15.9 mm), USG FIRECODE AURATONE. Glass fiber batt insulation rated R-30 or less is permitted to be installed above the gypsum board, in the cavity between the joists or trusses.
4. Fixture Protection: Must consist of 6-inch-wide (152 mm) pieces of ceiling grid panels that are 48 inches (1219 mm) long for the sides, and 24 inches (610 mm) long for the ends, with a full grid panel placed on top.
5. Ceiling Membrane: The ceiling membrane must be installed perpendicular to the Red-I joists or OpenWeb trusses or stripping, and must consist of a single layer of 1/2-inch-thick (12.7 mm), Type X gypsum board complying with ASTM C 36, and attached to the joists or trusses, or to stripping spaced 24 inches (610 mm) on center. The gypsum board must be fastened using 1-5/8-inch-long (41 mm), Type S screws located 6 inches (152 mm) on center at end joints and 8 inches (203 mm) on center in the field.
6. Light Fixtures: Maximum size 2 feet by 4 feet (610 mm by 1219 mm) are permitted to be installed in the ceiling, provided the aggregate area of fixtures does not exceed 12 square feet per 100 square feet (1.1 m<sup>2</sup> per 9.3 m<sup>2</sup>) of ceiling area.
7. Return Air Duct: Maximum 6-inch-by-12-inch (152 mm by 305 mm) return air opening.
8. Air Diffusers: A galvanized steel duct is permitted for each 200 square feet (18.6 m<sup>2</sup>) of ceiling, provided the duct has a maximum 12-inch-diameter (305 mm) steel diffuser opening without a damper.
9. Steel Suspension Grid: The grid system must be suspended with No. 12 SWG galvanized steel wire fastened to the stripping or joists or trusses using 3-inch-long (76 mm) flathead hanger screws.

## RedBuilt Assembly D (1 Hour Fire Rated Assembly)

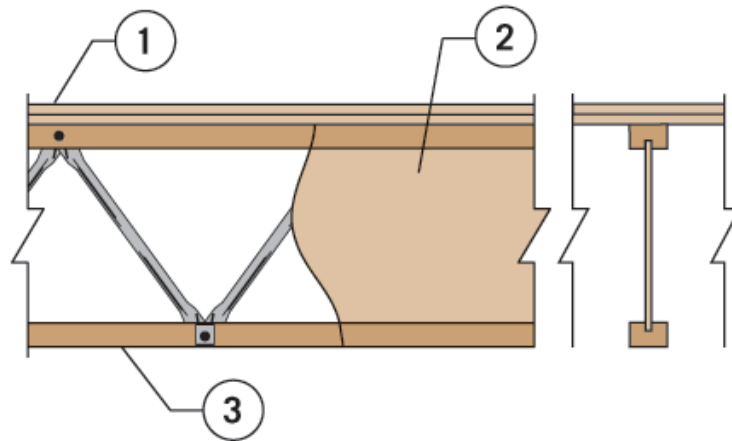
The following fire resistant designs are listed in accordance with ASTM-E119 and CAN/ULC-S101



1. Finished Flooring: The flooring must consist of a single layer of 48/24 span-rated, tongue-and-groove, wood-based, structural-use (Exposure 1). When used as a roof-ceiling assembly, a single layer of square-edge, span-rated wood-based, structural-use (Exposure 1), complying with the code, is permitted to be used for roof sheathing. All butt joints of the sheathing must be located over framing members.
2. Structural Members: Red-I joists with a minimum flange depth of 1-3/8 inches (35 mm) or OpenWeb trusses and be installed in accordance with ICC ESR-2994/1774 at a maximum spacing of 24 inches (610 mm) on center.
3. Steel Furring Channel: Must be spaced 24 inches (610 mm) on center and are attached and suspended from the joist or truss using Support Clips.
4. Support Clips: No. 24 gage proprietary attachment clips designated "Simpson Strong-Tie CSC Support Clips." A CSC support clip must be located at each joist or truss, to support the furring channel.
5. Stabilizer Strap (not shown): At channel splices, adjacent pieces are overlapped a minimum of 6 inches (152 mm), and are tied with double-strand No. 18 SWG galvanized steel wire at each end of the overlap.
6. Insulation: A layer of 1-inch-thick (25.4 mm), 6 pcf (96 kg/m<sup>3</sup>), Thermafiber® Type CW 90 mineral-wool blanket, Fibrex®-FBX 1280 Industrial Boards, Fibrex®-IF 1280 Flex Batt, IIG MinWool®-1260 Industrial Board or IIG MinWool®-1260 Flexible Batt must be placed below the bottom flanges / chords of the joists or trusses and on top of the furring channels. Alternatively, a layer of 2-inch-thick (51 mm), Thermafiber® mineral-wool blanket, having a density of 8 pcf (128 kg/m<sup>3</sup>), is permitted to be used.
7. Ceiling: The ceiling membrane must consist of a single layer of 1/2-inch-thick (12.7 mm) USG FIRECODE® Type C gypsum board or ProRoc® Type C gypsum board screw-attached to steel furring channels placed perpendicular to joists or trusses.

## RedBuilt Assembly E (1 Hour Fire Rated Assembly)

The following fire resistant designs are listed in accordance with ASTM-E119 and CAN/ULC-S101



1. Finished Flooring: A double wood floor consisting of a subfloor of a nominally 1-inch-thick (25.4 mm), tongue-and-groove wood-based, structural-use or 32/16 span-rated wood-based, structural-use (Exposure 1); and a second layer of nominally 1-inch-thick (25.4 mm), tongue-and-groove finish flooring. Alternatively, the finish flooring is permitted to be 40/20 span-rated wood-based, structural-use (Exposure 1), or Type I, Grade 1, particleboard not less than 5/8 inch (15.9 mm) thick.

OR, a single layer of 48/24 span-rated, tongue-and-groove wood-based, structural-use (Exposure 1) may be used. When a single layer floor is used, a construction adhesive conforming to ASTM D 3498 must be applied to the top of the joists or trusses prior to placing sheathing.

All butt joints of the sheathing must be located over framing members.

When use is as a roof-ceiling assembly, a single layer of square-edge span-rated wood-based, structural-use (Exposure 1), complying with the code, is permitted to be used for roof sheathing.

2. Structural Members: Red-I joists or OpenWeb trusses must be installed in accordance with ICC ESR-2994/1774, with a maximum spacing of 24 inches (610 mm) on center for floor-ceiling assemblies. When use is in roof-ceiling assemblies, the joists or trusses are permitted to be spaced a maximum of 48 inches (1219 mm) on center. When the flooring consists of a double wood floor, the joists or trusses may be spaced a maximum of 48 inches (1219 mm) on center.

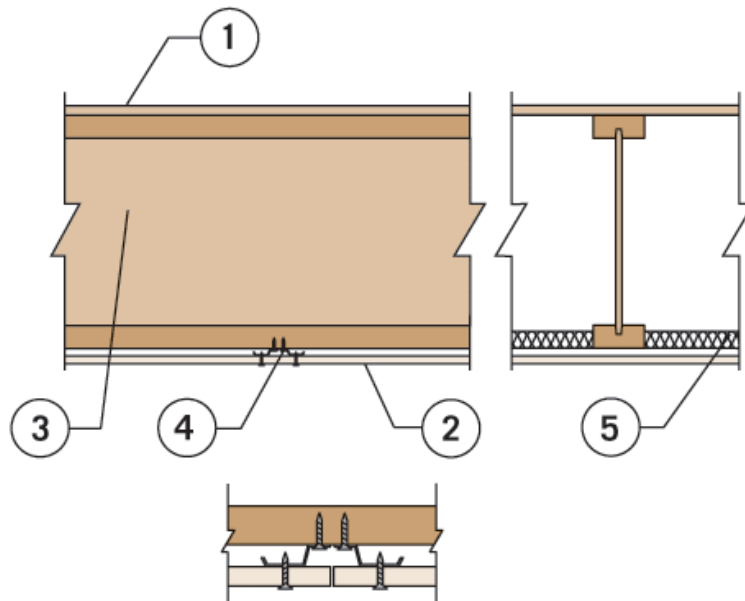
When the joist or truss spacing exceeds 24 inches (610 mm) on center, the ceiling, including the resilient channels, must be applied to stripping spaced 24 inches (610 mm) on center. The attachment of the ceiling membrane to the stripping must be similar to the attachment of the ceiling membrane to the Red-I joists or OpenWeb trusses. The stripping must be a minimum of nominally 2-by-4, construction-grade Douglas fir lumber for spans up to 5 feet (1524 mm), and must be attached to the joists or trusses bottom flange / chord using a minimum of two 10d box nails. Stripping materials of equivalent strength and attachment are permitted when specifically approved by the code official.

3. Ceiling: An approved ceiling membrane that provides a minimum 40-minute finish rating must be used. An example of an approved ceiling having a 40-minute finish rating is one that consists of two layers of 1/2-inch thick (12.7 mm), Type X gypsum board complying with ASTM C 36 or ASTM C 1396, a minimum of 4 feet (1219 mm) wide, installed perpendicular to the Red-I joists or OpenWeb trusses, as described in ASSEMBLY B Substantiating data, including a report of the fire-endurance testing conducted in accordance with UBC Standard 7-1 or ASTM E 199, must be furnished to the local code official, and must verify that a particular ceiling system meets the 40-minute finish rating requirements.

When the finish rating is to be determined, temperature performance of protective membranes must be in accordance with Section 47 of ASTM E 119 or Section 7.144 of UBC Standard 7-1. The finish rating is defined in Section 48 of ASTM E 119 or Section 7.145 of UBC Standard 7-1.

## RedBuilt Assembly F (1 Hour Fire Rated Assembly)

The following fire resistant designs are listed in accordance with ASTM-E119 and CAN/ULC-S101



1. **Finished Flooring:** The flooring must consist of a single layer of 48/24 span-rated, tongue-and-groove, wood-based, structural-use (Exposure 1). The flooring must be attached to the Red-I joist top flange with AFG-01 construction adhesive, and nailed using 8d common nails spaced a maximum of 6 inches (152 mm) on center along the boundary and edges and 12 inches (305 mm) on center in the field. When used as a roof-ceiling assembly, a single layer of square-edge, span-rated wood-based, structural-use (Exposure 1), complying with the code, is permitted to be used for roof sheathing. All butt joints of the sheathing must be located over framing members.

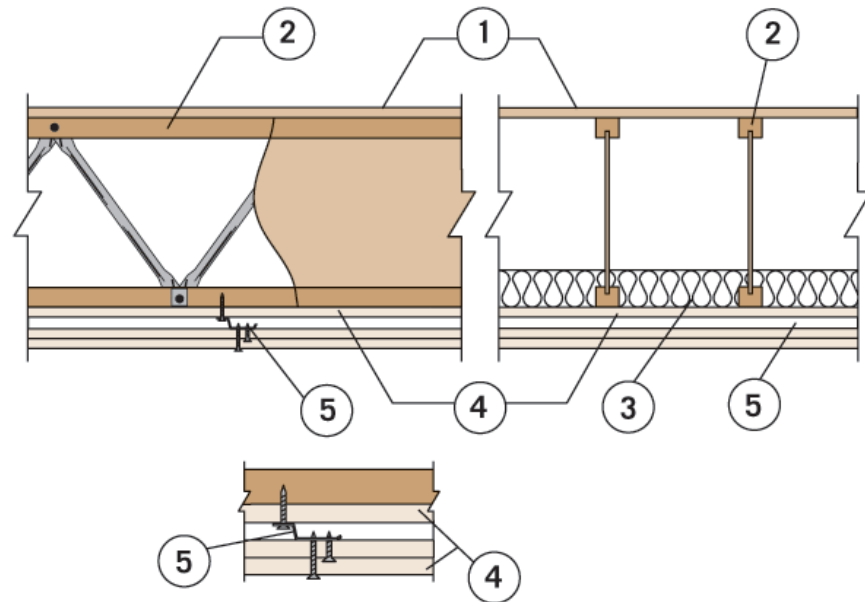
2. **Ceiling:** The ceiling membrane must consist of one layer of 5/8-inch-thick (15.9 mm) USG FIRECODE Type C gypsum board or ProRoc<sup>®</sup> Type C gypsum board, screw attached to resilient channels. The gypsum board must be fastened to the resilient channels with 1-inch-long (25.4 mm), Type S screws spaced 12 inches (305 mm) on center in the field and 8 inches (203 mm) on center at the butt joints.

In roof-ceiling assemblies in which the Red-I joist are spaced more than 24 inches (610 mm) on center, the ceiling, including the resilient channels, must be applied to stripping spaced 24 inches (610 mm) on center. The attachment of the ceiling membrane to the stripping members must be similar to the attachment of the ceiling membrane to the Red-I joists. The stripping must be a minimum of nominally 2-by-4 construction-grade Douglas fir lumber. The stripping must be attached to the joist bottom flange using a minimum of two 10d box nails. Stripping materials of equivalent strength and attachment are permitted with approved by the code official.

3. **Structural Members:** Red-I joists must have nominally 2-by-4 lumber flanges and must be installed in accordance with ICC ESR-2994. When use is in a floor-ceiling assembly, the joist spacing must not exceed 24 inches (610 mm) on center. When use is in a roof-ceiling assembly, the Red-I joist spacing is permitted to exceed 24 inches (610 mm) on center.
4. **Resilient Channels:** RC-1 resilient channels must be attached with 1-5/8-inch-long (41.3 mm), Type S screws at each joist. Two channels must be provided at each gypsum board butt joint, and extend to the next joist beyond the longitudinal joints.
5. **Insulation:** A layer of 1-1/2-inch-thick (38 mm), 2-1/2 pcf (40 kg/m<sup>3</sup>), Thermafiber<sup>®</sup> Sound Attenuation Fire Blankets, Fibrex<sup>®</sup>-SAFB (sound Attenuation Fire Batts), or IIG MinWool<sup>®</sup>-1200 Sound Attenuation Fire Batts, must be placed between the bottom flanges of the joists on the top of the resilient channels. The insulation material must be friction-fitted into place and supported by the resilient channels.

## RedBuilt Assembly G (2 Hour Fire Rated Assembly)

The following fire resistant designs are listed in accordance with ASTM-E119 and CAN/ULC-S101



When use is as a floor-ceiling assembly over unusable crawl spaces, the ceiling membrane is permitted to be omitted. Additionally, flooring is permitted to be omitted where unusable attic space occurs above the system, provided the requirements of lateral support for compression edges are met.

1. **Finished Flooring:** The floor sheathing must consist of a single layer of 48/24 span-rated, tongue-and-groove, wood-based, structural-use (Exposure 1). All butt joints of the sheathing must be located over framing members.

When used as a roof-ceiling assembly, a single layer of square-edge, span-rated wood-based, structural-use (Exposure 1), complying with the code, is permitted to be used for roof sheathing.

2. **Structural Members:** Red-I joists or OpenWeb trusses must be installed in accordance with ICC ESR-2994/1774, with a maximum spacing of 24 inches (610 mm) on center for floor-ceiling assemblies. Minimum Red-I joist or OpenWeb truss depth is 9-1/4 inches (235 mm).
3. **Insulation:** (OPTIONAL). When insulation is used, it must consist of glass-fiber insulation with unfaced batts that are 24 inches (610 mm) wide by 48 inches (1219 mm) long by 3-1/2 inches (89 mm) thick. The insulation must be placed in the plenum and supported by stay wires spaced at 12 inches (305 mm) along the joist or truss bottom flange / chord.
4. **Ceiling:** The ceiling membrane must consist of three layers of 5/8-inch-thick (15.9 mm) Gold Bond Fire Shield C, Type X gypsum board. The base layer must be applied perpendicular to the joists or trusses, with end joints staggered, and must be attached directly to the bottom flange / chord using 1-5/8-inch-long (41 mm), Type S screws spaced 12 inches (305 mm) on center along each joist or truss. The middle layer of gypsum board must be installed perpendicular to the resilient channels, with end joints staggered, and attached to the resilient channels with 1-inch-long (25.4 mm), Type S screws spaced 12 inches (305 mm) on center. The finish layer of gypsum board must be installed with edges and end joints staggered from the middle layer, and must be fastened to the resilient channels using 1-5/8-inch-long (41 mm), Type S screws spaced 8 inches (203 mm) on center. Joints of the finish layer of gypsum board must be covered with joint compound and paper tape, and exposed screw heads must be covered with joint compound.
5. **Resilient Channels:** A minimum of No. 28 gage [0.016-inch (0.41 mm)], must be applied under the first layer of gypsum board, perpendicular to the joists or trusses and spaced a maximum of 16 inches (406 mm) on center. The channels must be attached to the bottom flange / chord of each joist or truss, respectively, with 1-5/8-inch-long (41 mm), Type S screws.