



# Research Report

## Use of Resilient Channel or Hat Channel to Meet the Lateral Restraint/Bracing Requirements of the Bottom Chords of Metal Plate Connected Wood Truss Floor Systems

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Structural Building Components Association (SBCA)

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This research report is based on practical scientific research (literature review, testing, analysis, etc.), with the goal of supporting strategic needs for code and standards development and market expansion. This research report complies with the following sections of the building code:

- [IBC Section 104.11.1](#) and [Section 1703.4.2](#) – "**Research reports.** Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from *approved sources*."
- [IBC Section 202](#) – "**APPROVED SOURCE.** An independent person, firm or corporation, *approved* by the *building official*, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses."

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**Introduction:**

Minimum top and bottom chord permanent lateral restraint/bracing of structural roof or floor trusses is assumed to be adequate when using code-compliant roof and/or ceiling diaphragms. This lateral restraint/bracing is typically accomplished with code-compliant roof /floor sheathing and fastener spacing and/or code-compliant gypsum ceiling material and fastener spacing or purlins at a given on-center spacing. This information is customarily indicated on each truss design drawing.

However, when assemblies are specified for fire or sound rating, the assembly may call out either resilient channel, furring channel or hat channel at a given on-center spacing. If a single layer of gypsum is specified in the assembly, frequently the metal channel would be directly attached to the bottom chord of the truss and the gypsum is then attached to the metal channel. Where two or more layers are required, the base layer is typically attached to the bottom chord of the truss, so the bracing requirement is met.

The question addressed by this research report is how the lateral restraint/bracing requirements may be met when the gypsum sheathing is not directly attached to the bottom chord.

**Key Definitions:**

**Bottom Chord** – Horizontal or inclined (e.g., scissors truss) member that establishes the lower edge of a truss, usually carrying combined tension or compression and bending stresses. A member is defined as including all such chord members in that it may consist of shorter spliced pieces.

**Bracing** – Providing stability against unintended movement or motion.

**Furring Channel** – A structural metal channel, usually c-shaped, used to support gypsum board or suspended ceilings.

**Hat Channel** - A structural metal furring channel, typically hat-shaped, used to level walls or ceilings to support gypsum board or suspended ceilings.

**Lateral Restraint** – Also known as continuous lateral bracing. A structural member installed at right angles to a chord or Web member of a Truss to reduce the laterally unsupported length of the Truss member (See *BCSI-B1*, *BCSI-B2*, *BCSI-B3*, *BCSI-B7*, and *BCSI-B10*).

**Purlins** – Structural horizontal members attached perpendicular to the truss top chord used to provide lateral restraint to the top chord and to support and transfer roof loads to the trusses.

**Strongback Bridging** – (Strongbacking) Nominal 2x6 or greater stress-graded lumber attached perpendicular to floor trusses. [See TPI 1-14, Section 7.6.2.4]

**Top Chord** - Horizontal or inclined member that establishes the upper edge of the Truss. A Top Chord shall be permitted to consist of shorter spliced segments.

**Truss** – Individual metal plate connected wood component manufactured for the construction of a building.

**Truss Design Drawing (TDD)** – Written, graphic and pictorial depiction of an individual truss that includes the information required in TPI 1-14, Section 2.3.5.5.

**Resilient Channel** – A metal channel used for fastening gypsum board to studs or joists to reduce the transmission of vibrations.

**Background:**

Fire rated assemblies are tested to *ASTM E119* or *UL 263*. The standard requires that load bearing elements be tested for the load carrying ability of the test specimen during the test. However, they do not determine performance of assemblies constructed of other components or lengths than those tested. The testing also would not include performance under lateral loading. Therefore, one cannot assume that the fire assembly listing is adequate for lateral load resistance.

Truss design drawings indicate the specific requirements for lateral restraint/bracing; typically, code-compliant sheathing directly applied or some form of minimum on center restraint/bracing/purlins.

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### **Application:**

In situations where a fire or sound rated assembly is specified and the gypsum sheathing is not directly attached to the bottom chord, the following are allowable solutions:

1. If the metal channel specified in the fire rated assembly is **resilient channel**:
  - a. Where resilient channel<sup>1</sup> is spaced 12" o.c. or less with 5/8" gypsum fastened 12" o.c. or less, it is adequate to meet the lateral restraint/bracing requirements.
  - b. If the spacing requirement of the resilient channel in the rated assembly exceeds 12" o.c., add additional lateral restraint/bracing/purlins no less than the minimum required on the truss design drawing.
  - c. If the fire-rated assembly does not require 5/8" gypsum, provide lateral restraint/bracing as required on the TDD.
2. If the metal channel specified in the fire rated assembly is **furring channel or hat channel**:
  - a. If the spacing of the metal channel in the assembly is less than or equal to the minimum on center spacing required for lateral restraint/bracing on the truss design drawing, it is adequate to meet lateral restraint/bracing requirements.
  - b. If the spacing of the metal channel in the assembly is greater than the minimum on center spacing required for lateral restraint/bracing on the truss design drawing, additional lateral restraint/bracing is required. Lateral restraint/bracing requirements may be met by providing only the additional lateral restraint/bracing required.
3. Use the lateral restraint/bracing/purlins spacing as indicated on the truss design drawing disregarding the contribution of the metal channel required in the fire/sound rated assembly.
4. Have the lateral restraint/bracing/purlins spacing, specified by an engineer to submit to the building code official for approval.

If strongback bridging is required in the fire rated assembly, it contributes to the lateral restraint, and may be counted toward meeting the lateral restraint/bracing requirements.

### **Installation:**

Lateral restraint/bracing may be installed on either side of the chord (top or bottom) or both sides when adding bracing to meet minimum requirement.

Metal channel products must be installed as indicated in the fire rated test assembly and as indicated by the manufacturer's installation instructions.

### **Findings:**

Metal channel products listed in fire rated assemblies may or may not fulfill lateral restraint requirements. They do, however, contribute to lateral restraint and may be used with other bracing methods to meet restraint requirements.

[IBC Section 104.11](#) and [IRC Section R104.11](#) ([IFC Section 104.9](#) is similar) state:

**104.11 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. ... Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons why the alternative was not *approved*.<sup>2</sup>

This research report is subject to periodic review and revision. For the most recent version of this report, visit [sbcindustry.com](http://sbcindustry.com). For information on the current status of this report, contact SBCA.

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<sup>1</sup> #25 MSG Galvanized Steel, 2-3/8" x 1/2", fastened with 1-1/4" Type S Drywall screws.

<sup>2</sup> The last sentence is adopted language in the 2015 codes.

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### **References:**

*Building Component Safety Information (BCSI)*, [Structural Building Components Association](#) & [Truss Plate Institute](#)

*National Design Standard for Metal Plate Connected Wood Truss Construction (TPI-1)*, [Truss Plate Institute](#)  
*International Building Code (IBC)*, [International Code Council \(ICC\)](#)

*International Residential Code (IRC)*, [International Code Council \(ICC\)](#)

*Comparison of Lateral Performance of a Truss Assembly with Resilient Channel*, [Structural Building Components Association](#), 2013

*Fire Resistance Rated Truss Assemblies*, Truss Technology in Building series, [Structural Building Components Association](#). [see SRR Fire Rated Wood Truss Assemblies – 2015 draft]