# Evaluation Report CCMC 13287-R
# ALMCAN Joist Hangers, Hurricane Tie and Rafter Tie

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## 1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that "ALMCAN Joist Hangers, Hurricane Tie and Rafter Tie," when used as joist hangers or framing connectors in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code (NBC) of Canada 2015:

- Clause 1.2.1.1.(1)(a) of Division A, using the following acceptable solutions from Division B:
  - Article 4.3.1.1., Design Basis for Wood (CSA O86-09, "Engineering Design in Wood")
  - Clause 9.23.9.2.(2)(a), Joists Supported by Beams
  - Article 9.23.9.7., Support of Tail and Header Joists

- Clause 1.2.1.1.(1)(b) of Division A, as an alternative solution that achieves at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the following applicable acceptable solutions:
  - Article 4.3.1.1., Design Basis for Wood (CSA O86-09, "Engineering Design in Wood")
  - Article 9.23.3.4., Nailing of Framing
  - Clause 9.23.9.2.(2)(b), Joists Supported by Beams

This opinion is based on CCMC's evaluation of the technical evidence in Section 4 provided by the Report Holder.

## 2. Description

The joist hangers identified in Table 4.1.1 are used to transfer the loads from the supported member to the supporting member. They are face-mount hangers that are fabricated in cold-form with light steel gauge. The steel gauge of the hangers is indicated in Table 4.1.1. A typical drawing of the hanger model series is shown in Figure 1.

The hurricane tie and rafter tie identified in Table 4.1.2 are used where additional protection is required against wind uplift from seismic and wind loads. They are fabricated in cold-form with light steel gauge. The steel gauge of the connectors is indicated in Table 4.1.2. A typical drawing of the connector model is shown in Figure 2.

The steel of the hangers with model No. 452 to 462 is coated with a corrosion protection of G153 designation from the standard ASTM A 653/A 653M-04, "Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process." The steel of the other hangers and connectors is coated with a corrosion protection of G60.

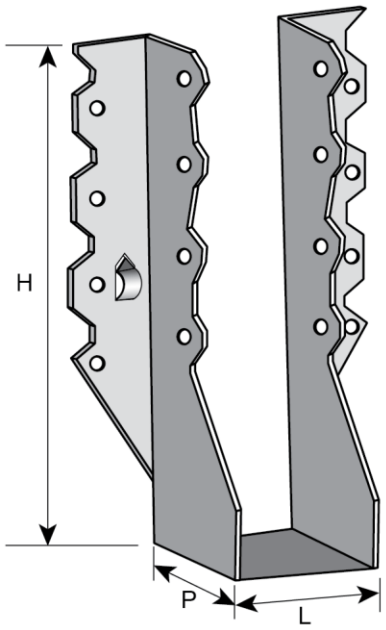


**Figure 1. Joist hanger**

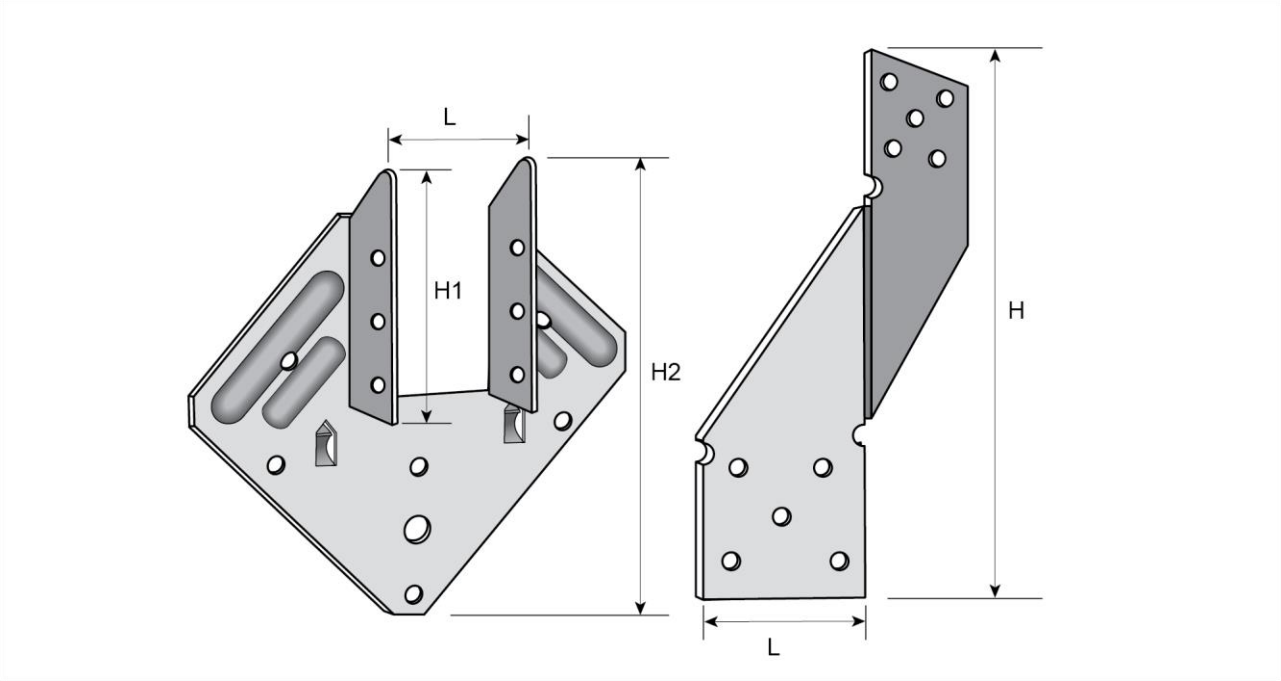


**Figure 2. Hurricane tie-down and rafter tie**

## 3. Conditions and Limitations

CCMC's compliance opinion in Section 1 is bound by the "ALMCAN Joist Hangers, Hurricane Tie and Rafter Tie" being used in accordance with the conditions and limitations set out below.

- The pre-engineered wood members assembled with the evaluated joist hangers must be designed in accordance with Part 4 of Division B of the NBC 2015 by a professional engineer licensed to practice under a provincial or territorial legislation.
- The joist hangers are used to support joists consisting of lumber, wood trusses, glued-laminated timber, prefabricated wood I-joists or structural composite lumber. The pre-engineered wood members must conform to the manufacturer's specifications and instructions (e.g., web stiffeners, filler blocks and backer blocks for I-joists).
- The design values (factored resistances) for joist hangers provided in this Report are valid for the wood species and the hanger models shown in Table 4.1.1. However, the design value (factored resistance) can be valid for other wood products provided that:

    - the relative density (or compressive strength perpendicular to grain, $f_{cp}$) of the proposed wood product is equal or superior to the actual wood product tested with the hanger; and
    - where structural composite lumber (SCL) products are intended to be used, only TimberStrand® (LSL), Parallam® (PSL) and laminated veneer lumber (LVL) of vertical veneer are acceptable. Southgate Manufacturing Inc. must confirm acceptance of the use of a SCL product with their hanger and provide installation instructions.
- Fastener specifications shown in Tables 4.1.1 and 4.1.2 must be used for the published values to be valid. The joist hanger must be fastened to both the supported member and supporting member. All fastener holes must be filled, or there must be a minimum number of nails as per the engineer's specifications.
- The hanger must not display any fracturing in either the protective coating or the base metal.
- When used in attics, at rim boards or in high humidity or corrosive environments, the user must consult the manufacturer to determine the appropriate level of corrosion protection for the intended use of the joist hanger and connector.
- The products must be installed by an informed and knowledgeable installer.
- The products listed in Tables 4.1.1 and 4.1.2 must be identified with the phrase "CCMC 13287-R."

## 4. Technical Evidence

The Report Holder has submitted technical documentation for CCMC's evaluation. Testing was conducted at laboratories recognized by CCMC. The corresponding technical evidence for this product is summarized below.

### 4.1 Performance Requirements

**Table 4.1.1 Results of Testing of Factored Resistances(1) of the Hanger Series**

| Model No. | Mat. (ga.) | Hanger Dimensions (mm) | | | Wood Members Tested | | Fastener Schedule | | Factored Resistance (kN) |
|---|---|---|---|---|---|---|---|---|---|
| | | W | H | D | Header | Joist | Header | Joist | |
| **210** | 22 | 39.7 | 127 | 44.5 | 1 – 38 × 140 S-P-F | 1 – 38 × 140 S-P-F | 6 – 10d × 1.5 in. | 4 – 10d × 1.5 in. | 4.09 |
| **210** | 22 | 39.7 | 127 | 44.5 | 1 – 38 × 184 S-P-F | 1 – 38 × 184 S-P-F | 6 – 10d × 1.5 in. | 4 – 10d × 1.5 in. | 3.94 |
| **212** | 22 | 77.8 | 127 | 44.5 | 1 – 38 × 140 S-P-F | 2 – 38 × 140 S-P-F | 6 – 10d × 1.5 in. | 6 – 10d × 1.5 in. | 4.38 |
| **216** | 22 | 39.7 | 171.5 | 44.5 | 1 – 38 × 184 S-P-F | 1 – 38 × 184 S-P-F | 8 – 10d × 1.5 in. | 8 – 10d × 1.5 in. | 5.45 |
| **216** | 22 | 39.7 | 171.5 | 44.5 | 1 – 38 × 235 S-P-F | 1 – 38 × 235 S-P-F | 8 – 10d × 1.5 in. | 8 – 10d × 1.5 in. | 5.83 |
| **218** | 22 | 77.8 | 171.5 | 44.5 | 1 – 38 × 184 S-P-F | 2 – 38 × 184 S-P-F | 10 – 10d × 1.5 in. | 10 – 10d × 1.5 in. | 6.61 |
| **220** | 22 | 39.7 | 203.2 | 44.5 | 1 – 38 × 235 S-P-F | 1 – 38 × 235 S-P-F | 10 – 10d × 1.5 in. | 10 – 10d × 1.5 in. | 7.78 |
| **222** | 22 | 77.8 | 203.2 | 44.5 | 1 – 38 × 235 S-P-F | 2 – 38 × 235 S-P-F | 12 – 10d × 1.5 in. | 10 – 10d × 1.5 in. | 8.32 |
| **228** | 20 | 117.5 | 171.5 | 44.5 | 1 – 38 × 184 S-P-F | 3 – 38 × 184 S-P-F | 12 – 10d × 1.5 in. | 12 – 10d × 1.5 in. | 9.01 |
| **228** | 20 | 117.5 | 171.5 | 44.5 | 1 – 38 × 235 S-P-F | 3 – 38 × 235 S-P-F | 12 – 10d × 1.5 in. | 12 – 10d × 1.5 in. | 9.75 |
| **452-3** | 18 | 39.7 | 127 | 44.5 | 1 – 38 × 140 S-P-F | 1 – 38 × 140 S-P-F | 6 – 10d × 1.5 in. | 4 – 10d × 1.5 in. | 4.99 |
| **452-3** | 18 | 39.7 | 127 | 44.5 | 1 – 38 × 184 S-P-F | 1 – 38 × 184 S-P-F | 6 – 10d × 1.5 in. | 4 – 10d × 1.5 in. | 4.22 |
| **454-3** | 18 | 77.8 | 127 | 44.5 | 1 – 38 × 140 S-P-F | 2 – 38 × 140 S-P-F | 6 – 10d × 1.5 in. | 6 – 10d × 1.5 in. | 5.42 |
| **456-3** | 18 | 39.7 | 171.5 | 44.5 | 1 – 38 × 184 S-P-F | 1 – 38 × 184 S-P-F | 8 – 10d × 1.5 in. | 8 – 10d × 1.5 in. | 5.91 |
| **456-3** | 18 | 39.7 | 171.5 | 44.5 | 1 – 38 × 235 S-P-F | 1 – 38 × 235 S-P-F | 8 – 10d × 1.5 in. | 8 – 10d × 1.5 in. | 6.99 |
| **458-3** | 18 | 77.8 | 171.5 | 44.5 | 1 – 38 × 184 S-P-F | 2 – 38 × 184 S-P-F | 10 – 10d × 1.5 in. | 10 – 10d × 1.5 in. | 6.84 |
| **460-3** | 18 | 39.7 | 203.2 | 44.5 | 1 – 38 × 235 S-P-F | 1 – 38 × 235 S-P-F | 10 – 10d × 1.5 in. | 10 – 10d × 1.5 in. | 7.47 |
| **462-3** | 18 | 77.8 | 203.2 | 44.5 | 1 – 38 × 235 S-P-F | 2 – 38 × 235 S-P-F | 12 – 10d × 1.5 in. | 12 – 10d × 1.5 in. | 10.98 |

**Note to Table 4.1.1:**

(1) Factored resistances of joist hangers are calculated in accordance with CSA O86-14, with standard load duration, dry service and no treatment.
- W = bearing width of the hanger, H = hanger height, and D = bearing depth of the hanger.
- S-P-F = Spruce-Pine-Fir lumber (No. 2 or better).
- S-P-F was tested and its density fell in the specified range of Table A.12.1 (Relative density values) of CSA O86-14.
- Hot-dip galvanized common nails were used for testing.
- A minimum specified ultimate tensile strength (Fu) of 369 MPa was used for Gauge 20 hanger calculations and 372 Mpa was used for Gauge 18 and 22 hanger.
- Nail specifications in metric are:
    - 10d × 1.5 in. = 3.76 mm × 38.1 mm

**Table 4.1.2 Results of Testing of Factored Resistances[1] of the Hurricane Tie and Rafter Tie**

| Model | Mat. (ga.) | Hanger Dimensions (mm) | | | Wood Members Tested | | Fastener Schedule | | Factored Uplift Resistance (kN) |
|---|---|---|---|---|---|---|---|---|---|
| | | W | H (H1 for Hurricane Tie) | D (H2 for Hurricane Tie) | Header (Connector)/Plate (Ties) | Joist (Connector)/Rafter (Ties) | Header | Joist | |
| **Hurricane Tie No. 244** | 18 | 39.7 | 76.2 | 133.4 | 2 – 38 × 89 S-P-F | 1 – 38 × 89 S-P-F | 4 – 10d × 1.5 in. | 6 – 10d × 1.5 in. | 1.76 |
| **Rafter Tie No. 245** | 18 | 38.1 | 136.5 | – | 2 – 38 × 89 S-P-F | 1 – 38 × 89 S-P-F | 5 – 8d × 1.5 in. | 5 – 8d × 1.5 in. | 3.94 |

**Note to Table 4.1.2:**

(1) Factored resistances of joist hangers are calculated in accordance with CSA O86-14, with standard load duration, dry service and no treatment.
- W = bearing width of the hanger, H = hanger height, and D = bearing depth of the hanger.
- S-P-F = Spruce-Pine-Fir lumber (No. 2 or better).
- S-P-F was tested and its density fell in the specified range of Table A.12.1 (Relative density values) of CSA O86-14.
- Hot-dip galvanized common nails were used for testing.
- A minimum specified ultimate tensile strength (Fu) of 372 MPa was used for Gauge 18 hanger calculations.
- Nail specifications in metric are:
  - 8d × 1.5 in. = 3.33 mm × 38.1 mm
  - 10d × 1.5 in. = 3.76 mm × 38.1 mm

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## Disclaimer



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