ICF Connectors

The ICF Ledger Connector System is engineered to solve the challenges of mounting wood or steel ledgers to insulated concrete forms (ICF) walls. This flier provides information on the various products we have to serve the ICF market.

The ICFVL is a 14-gauge galvanized steel connector designed to provide both vertical load support and lateral in-plane shear resistance. The embedded legs are embossed for additional stiffness and the holes allow for concrete to flow through and around the connector. The exposed flange on the face of the ICF provides a structural surface for mounting either a wood or steel ledger.

See the current Simpson Strong-Tie® Wood Construction Connectors catalogue or strongtie.com for additional information.

Installation of ICFVL

1. Snap a line for the bottom of the ledger and mark the on-center spacing
2. Use the ICFVL to mark the kerf locations in the ICF
3. Cut the kerfs as marked
4. Insert the ICFVL flush to the face of the ICF
5. Place concrete (min. \( f'_{c} = 2500 \) psi (17.25 MPa))

**Installation tip:** Use a screw through diamond hole in the face of the ICFVL and into web to hold the ICFVL in place during concrete pour (remove prior to ledger installation).

<table>
<thead>
<tr>
<th>Attachment of Wood Ledger</th>
<th>Attachment of Steel Ledger</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Slip the appropriate ledger connector underneath the wood ledger (as shown).</td>
<td>1. Position the ledger level to the chalk line and drive the required number of screws through the steel ledger and into the ICFVL.</td>
</tr>
<tr>
<td>2. Install the eight ICF-D3.25 screws partially into the ledger. For denser wood species (specific gravity ( \geq 0.50 )) such as LVL and other EWP products, predrilling may be necessary. Predrill the wood ledger only with ( \frac{5}{32} )&quot; drill bit.</td>
<td>2. All screws (#14 x ( \frac{3}{8} )&quot; drill point — not provided) should be located at least ( \frac{1}{2} )&quot; from the edge of the ICFVL.</td>
</tr>
<tr>
<td>3. Position the ledger level to the chalk line and drive the screws through the wood and into the ICFVL.</td>
<td>3. Space screws evenly</td>
</tr>
<tr>
<td>4. All screws should be located at least ( \frac{1}{2} )&quot; from the edge of the ICFVL.</td>
<td><strong>Note:</strong> Do not splice the ledger at the ICFVL-W or ICFVL-CW’s location.</td>
</tr>
</tbody>
</table>
ICF Connectors

1. Use ICFVL to attach ledger to ICF

2. Use ICFVL-W for solid sawn lumber or ICFVL-CW for LVL.
   NOTE: See drawing below for detail on double 2x ledger

3. Use IUS hanger for I-joist floor system

4. Use MAB15Z

5. Attach interior partition walls with ¼–14 #3 drill point screws (sold separately) into ICFVL where needed

Typical face-mount, floor-truss hangers include, but not limited to, LUS, HUS, HGUS and HHUS. Attachment of second ledger to be designed by others.

Alternative hanger for solid sawn floor joist using LUS.

Use wood-to-steel drill point screws through wood cabinets and into ICFVL.
### TRUSS CONNECTIONS

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Ga.</th>
<th>Fasteners (in.)</th>
<th>Factored Resistance ($K_0 = 1.15$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>To Rafters/Truss</td>
<td>To Plates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Uplift Lateral</td>
<td>Uplift Lateral</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F1   F2</td>
<td>F1   F2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>lb.  lb.</td>
<td>lb.  lb.</td>
</tr>
<tr>
<td>H3</td>
<td>18</td>
<td>(4) 0.131 x 2(\frac{1}{2})</td>
<td>740 180 265 615 125 190</td>
</tr>
</tbody>
</table>

1. Factored resistances have been increased 15% for short-term loading. No further increase is allowed.
2. Factored resistances are for one anchor. A minimum rafter thickness of 2\(\frac{1}{2}\)" must be used when framing anchors are installed on the same side of the plate.
3. When cross-grain bending or cross-grain tension cannot be avoided, mechanical reinforcement to resist such forces should be considered.
4. Hurricane ties are shown installed on the outside of the wall for clarity. Installation on the inside of the wall is acceptable. For a continuous load path, connections must be on the same side of the wall.

See the current Wood Construction Connectors catalogue or [strongtie.com](http://strongtie.com) for additional information and other models of seismic and hurricane ties.
Truss Connections

### H16S Installation into ICF

- **Model No.**: LTA2
- **Fasteners**: (10) 0.148" x 1 1/2"
- **Installation**: Perpendicular to Wall
- **Factored Resistance (K₀ = 1.15)**
  - **D.Fir-L**: Uplift 1845 lb., F1 495 lb., F2 1330 lb., Lateral 1310 lb., F1 350 lb., F2 945 lb.
  - **S-P-F**: Uplift 1825 lb., F1 1305 lb., F2 370 lb., Lateral 1295 lb., F1 930 lb., F2 265 lb.

1. Factored resistances are based on a minimum concrete strength of 2500 psi (17.25 MPa) with one 15M horizontal rebar in the shear cone.
2. Factored uplift resistances have been increased 15% for wind loading with no further increase allowed.
3. **Nails**: 10d x 1 1/2" = 0.148" dia. x 1 1/2" long.

See the current Wood Construction Connectors catalogue or strongtie.com for additional information on lateral truss anchors.

### Typical MTSM20 Installation into ICF

- **Model No.**: MTSM20
- **Fasteners**: (7) 0.148" x 3" Titen 2
- **Fasteners**: (4) SDS 1/4" x 1 1/2" x 1 1/2" Titen 2
- **Factored Resistance (K₀ = 1.15)**
  - **S-P-F**: Uplift 880 lb., Lateral 580 lb., F1 285 lb., F2 1305 lb.

1. Factored resistances are based on a minimum concrete strength of 2500 psi (17.25 MPa) with one 15M horizontal rebar in the shear cone.
2. Factored uplift resistances have been increased 15% for wind loading with no further increase allowed.
3. Minimum edge distance for Titen 2 screws is 1 3/4".
4. Products shall be installed such that the Titen screws are not exposed to the weather.

See the current Wood Construction Connectors catalogue or strongtie.com for additional information on and other models of twist straps.

### Model No. | Factored Resistance (K₀ = 1.15)
--- | --- | ---
**To Rafters/To Truss** | **To Concrete** |
**Factored Resistance** | **D.Fir-L** | **S-P-F** |
**Uplift** | **Lateral** | **Uplift** | **Lateral** |
--- | --- | --- | --- |
H16S | 18 | (2) 0.148" x 1 1/2" | (6) 1/4" x 1 1/4" Titen 2 | 2075 lb. | — | 1470 lb. | — |
HM9KT | 18 | (4) SDS 1/4" x 1 1/2" | (5) 1/4" x 1 1/4" Titen 2 | 815 lb. | 580 lb. | 285 lb. | 580 lb. |
HGAM10KTA | 14 | (4) SDS 1/4" x 1 1/2" | (4) 1/4" x 1 1/4" Titen 2 | 1470 lb. | 1305 lb. | 1495 lb. | 940 lb. |

1. Factored resistances are based on a minimum concrete strength of 2500 psi (17.25 MPa) with one 15M horizontal rebar in the shear cone.
2. Factored resistances have been increased 15% for earthquake or wind loading with no further increase allowed.
3. The HM9KT and the HGAM10KTA are kits with (20) HM9 or (10) HGAM connectors packaged with Simpson Strong-Tie® Strong Drive® SDS Heavy-Duty Connector and Titen 2 screws. (1/4" Titen 2 screws for concrete are sold separately.)
4. When cross-grain bending or cross-grain tension cannot be avoided, mechanical reinforcement to resist such forces should be considered.
5. Factored F₁ resistances shown are for loading applied into the connector. For loading applied away from the connector, the factored resistances are 960 lb. for D.Fir-L and 690 lb. for S-P-F.
ICF Connectors

GENERAL NOTES:
- For denser wood species (specific gravity \(\geq 0.50\)) such as LVL and other EWP products, predrilling may be necessary. Predrill the wood ledger only with \(\frac{5}{32}\)" drill bit.
- These products are not intended for use on preservative-treated lumber.
- Do not splice ledger at ICFVL location.
- No load duration increase is allowed.
- Minimum concrete compressive strength \(f'c\) is 2500 psi (17.25 MPa).

Warning: Industry studies show that hardened fasteners can experience performance problems in wet environments. Accordingly, use this product in dry, interior applications only.

Wood and Steel Ledgers

<table>
<thead>
<tr>
<th>Ledger Type</th>
<th>Model No.</th>
<th>Factored Resistance</th>
<th>Wood Ledgers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x D.Fir-L/S-P-F</td>
<td>ICFVL w/ICFVL-W</td>
<td>2820</td>
<td>3075</td>
</tr>
<tr>
<td>1 1⁄4&quot; SCL</td>
<td>ICFVL w/ICFVL-CW</td>
<td>2820</td>
<td>3075</td>
</tr>
<tr>
<td>Steel</td>
<td>ICFVL</td>
<td>2590</td>
<td>2470</td>
</tr>
</tbody>
</table>

1. Minimum steel ledger specification is \(F_y = 33\) ksi (230 Mpa) and \(F_u = 45\) ksi (310 Mpa).
2. No load duration increase is allowed.
3. Minimum concrete compressive strength \(f'c\) = 2500 psi (17.25 MPa).
4. Connector spacing to be determined by the design professional up to a maximum of 4'-0".
5. Values shown apply to ICF foam thickness of 3 1⁄4" or less.
6. When combining vertical and lateral loads, designer shall evaluate as follows:
   - Vertical Load / Vertical Resistance + Lateral Load / Lateral Resistance ≤ 1.0.
7. The top of the ICFVL must be installed not less than 4" from the top of the wall to achieve the tabulated resistances shown. For installations where the ICFVL is installed less than 4" from the top of the wall (including flush applications), multiply the factored resistances by 0.84.
8. Factored out-of-plane resistances are 4250 lb. in the compressive direction (i.e., into the wall) and 750 lb. in the tensile direction (i.e., away from the wall).
ICF Connectors

The following spacing tables are an alternative to the ICFVL spacing to replace the building code–prescribed anchor bolt spacing for vertical loads only. They provide the recommended spacing of the ICFVL Ledger Connectors based on the Factored Vertical Resistance of the connector, the load on the floor and the span of the joist. The Designer must determine the design load, the ledger design and the joist design. This table is useful if the Designer already has loads and spans, but not necessarily anchor bolt spacing.

ICFVL SPACING FOR WOOD LEDGER (in.)

<table>
<thead>
<tr>
<th>Specified Load (psf)</th>
<th>Joist Span (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live:</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

ICFVL SPACING FOR STEEL LEDGER (in.)

<table>
<thead>
<tr>
<th>Specified Load (psf)</th>
<th>Joist Span (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live:</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

See notes below.

1. Values shown are maximum spacing distances (inches) based on two-span ledger and simple supported joists. It does not consider concentrated loads. The Engineer of Record can modify the spacing accordingly for other conditions.
2. Joist and ledger are to be designed by others.
3. Spacing tables address vertical load applications only. If the connection is designed to resist simultaneous lateral loads, spacing may decrease. Contact Simpson Strong-Tie for additional information.
4. The ICFVL must be installed no closer than 4" below the top of wall to achieve the connector spacing.
5. The maximum distance between the end of the ledger and the first ICFVL is 12" as per the recommended splicing installation.
6. Tables above assume Principal Loads only with Importance Factor = 1.00. For other cases adjust spacing accordingly.

Alternative Retrofit Solution for Direct Attachment of Joist to Wall

The HU and HUC hangers are heavy-duty, face-mount joist hangers made from 14-gauge galvanized steel. These hangers can be directly attached to a concrete wall using 1/4" x 1 3/4" Simpson Strong-Tie® Titen® 2 hex head screws. See strongtie.com for more information on installation and use.

Simpson Strong-Tie offers many retrofit products for attaching wood or steel framing members to concrete. For expanded details, contact us at (800) 999-5099 and request the current Simpson Strong-Tie Anchoring, Fastening and Restoration Systems for Concrete and Masonry catalogue, or visit the Simpson Strong-Tie website at strongtie.com.

This flier is effective until June 30, 2021, and reflects information available as of May 1, 2019. This information is updated periodically and should not be relied upon after June 30, 2021. Contact Simpson Strong-Tie for current information and limited warranty or see strongtie.com.

© 2019 Simpson Strong-Tie Company Inc. • P.O. Box 10789, Pleasanton, CA 94588

P.O. Box 10789, Pleasanton, CA 94588