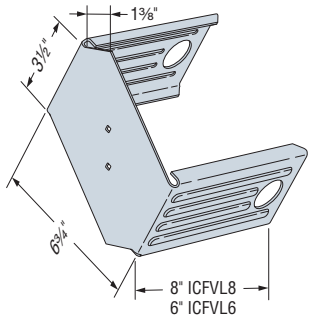
ICFVL Ledger Connector System

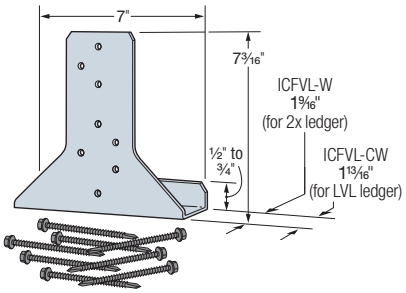
The ICFVL Ledger Connector System is engineered to solve the challenges of mounting wood or steel ledgers to insulated concrete form (ICF) walls up to 4½" thick, as specified by the designer. The ICFVL6 connector's maximum ICF wall thickness is 3¼" and the new ICFVL8 can accommodate maximum ICF wall thickness of 4½". This is the only ledger attachment to ICF that provides both vertical download capacity and floor diaphragm load transfer all in one part. 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 and lateral in-plane 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. There are two models in the series. The ICFVL6 features 6" legs and the ICFVL8 has 8" legs to accommodate thicker foam.

See **strongtie.com** for additional information.



ICFVL
Patent pending



ICFVL-W and ICFVL-CW

Installation of ICFVL

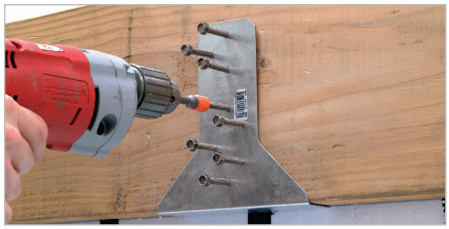



1. Snap a line for the bottom of the ledger and mark the on-center spacing
2. Use a template to mark the kerf locations in the ICF[1]
3. Cut the kerfs as marked
4. Insert the ICFVL flush to the face of the ICF
5. Place concrete (min. f'c = 2,500 psi/ 17.2 Mpa)

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

1. ICFVL template not offered with product. Dimensions for template can be found at **strongtie.com**.

Attachment of Wood Ledger



1. Slip the appropriate ledger connector underneath the wood ledger *(as shown).*
2. For denser wood species (specific gravity ≥ 0.50), predrilling may be necessary. Predrill ledger only with 5/32" drill bit.
3. Position the bottom of the ledger level to the chalk line and drive the screws through the wood and into the ICFVL.
4. All screws should be located at least ½" from the edge of the ICFVL.

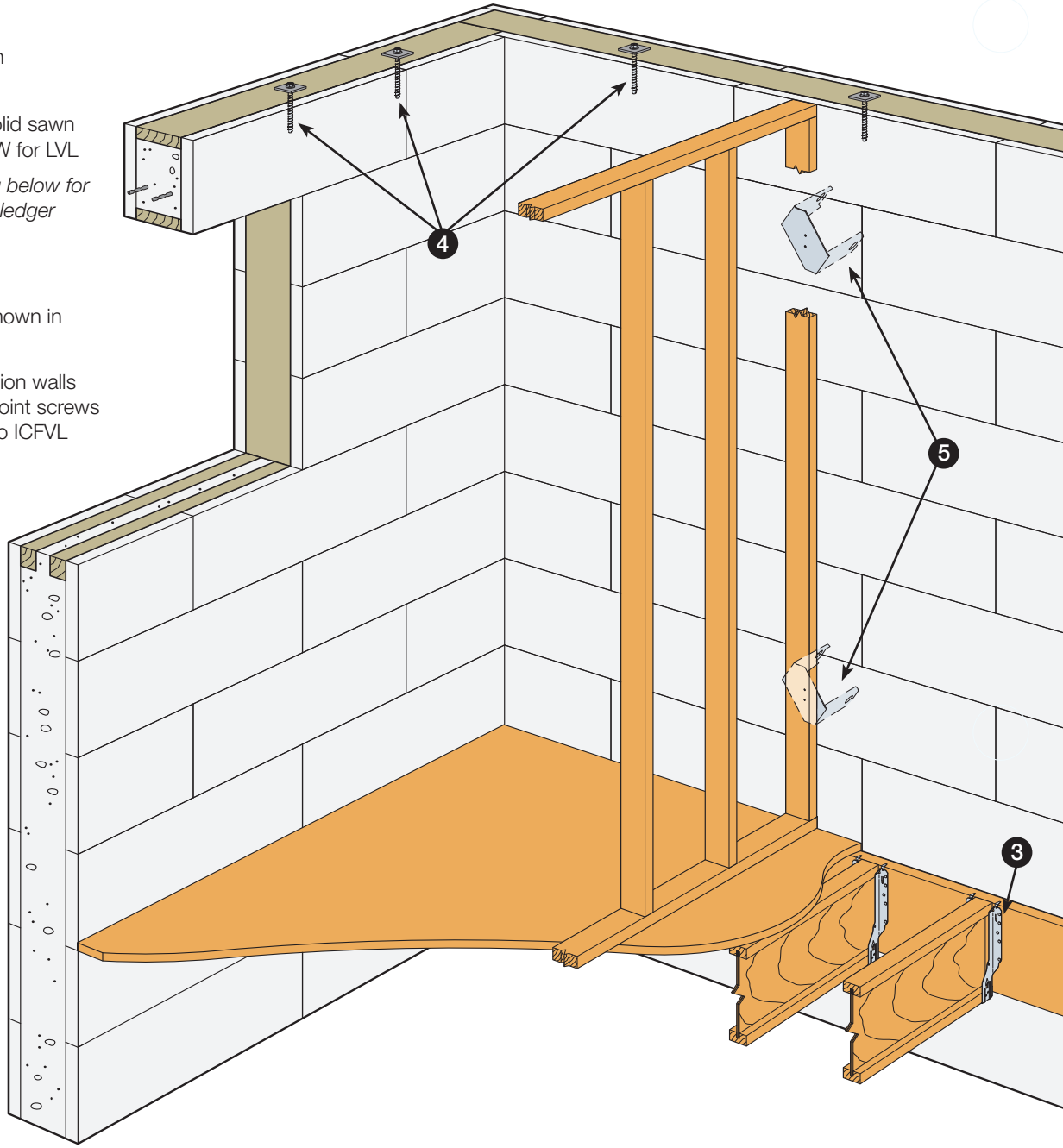
Note: Do not splice at the ICFVL-W or ICFVL-CW location.

Attachment of Steel Ledger

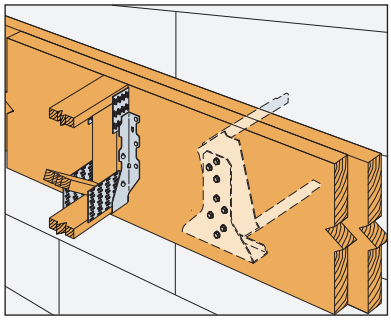
1. Position bottom of the ledger level to the chalk line and drive the required number of screws through the steel ledger and into the ICFVL
2. All screws (#14 x ¾" drill point — not provided) should be located at least ½" from the edge of the ICFVL
3. Space screws evenly

1. Use ICFVL to attach ledger to ICF
2. Use ICFVL-W for solid sawn lumber or ICFVL-CW for LVL

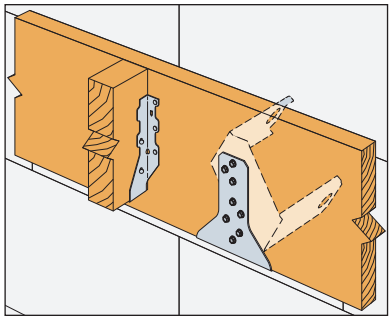
   NOTE: See drawing below for detail on double 2x ledger
3. Use IUS hanger for I-joist floor system
4. Use Titen HD®, as shown in illustration
5. Attach interior partition walls with ¼–14 #3 drill point screws *(sold separately)* into ICFVL where needed



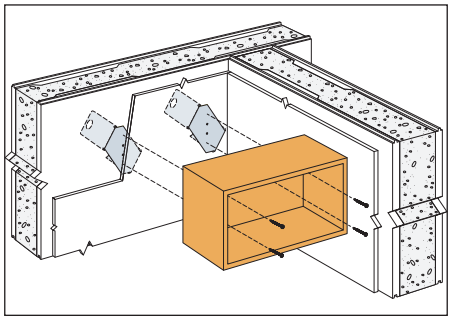
Typical face-mount, floor-truss hangers include, but not limited to, LUS, HUS, HGUS and HHUS. Attachment of second ledger to be designed by others.

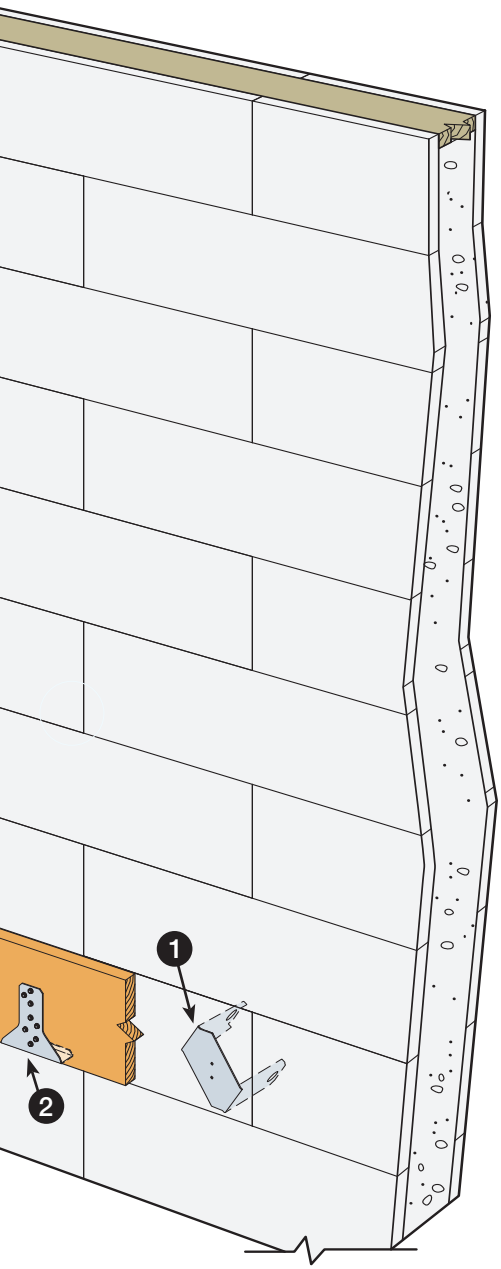


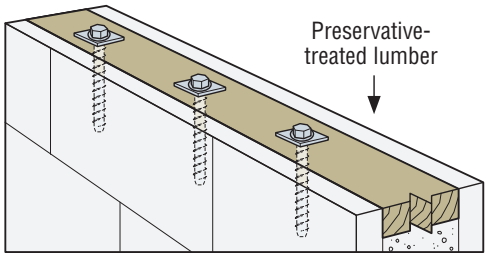
Alternative hanger for solid sawn floor joist using LUS.



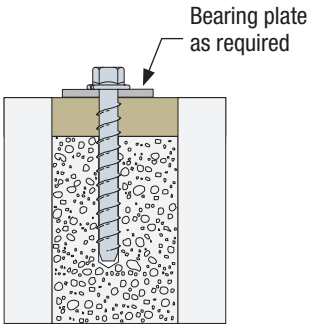
Use wood-to-steel drill point screws through wood cabinets and into ICFVL.







Titen HD Installation into ICF

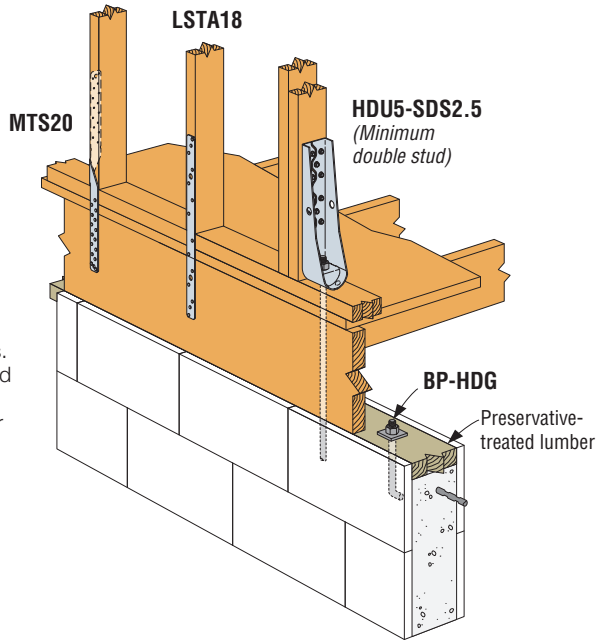


Titen HD Anchor

Cracked Concrete CODE LISTED

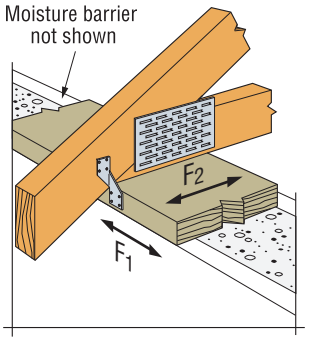
Titen HD® Anchor

The Titen HD Anchor may be used for sill plate applications. Use bearing plates as required by code. Refer to the code report (ICC-ES ESR-2713), or use Simpson Strong-Tie Anchor Designer™ software. Download at:
strongtie.com/software



See **strongtie.com** for additional information on plate connections.

Truss Connections

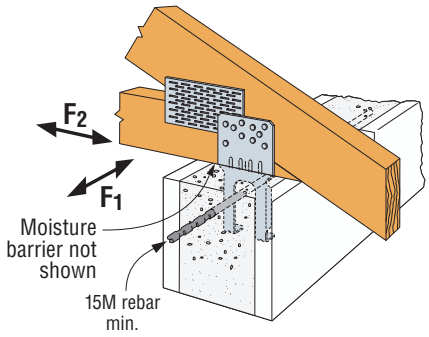


H3 for Single
Plate-to-Truss Connection

Model No.	Ga.	Fasteners (in.)		Factored Resistance (K_D = 1.15)					
				D.Fir-L			S-P-F		
				Uplift	Lateral		Uplift	Lateral	
		To Rafters/ Truss	To Plates		F_1	F_2		F_1	F_2
				lb.	lb.	lb.	lb.	lb.	lb.
H3	18	(4) 8d x 2½	(4) 8d x 2½	740	180	265	615	125	190

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 2½" 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.
5. Nails: 8d = 0.131" diameter x 2½" long.

See **strongtie.com** for additional information and other models of seismic and hurricane ties.

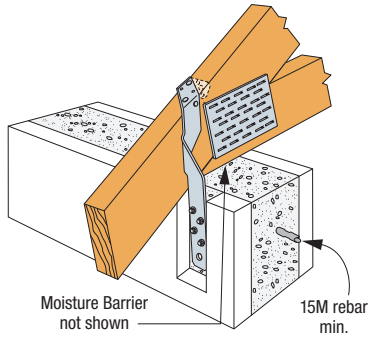


LTA2 Perpendicular to Wall Installation

Model No.	Fasteners	Installation	Factored Resistance (K_D = 1.15)					
			D.Fir-L			S-P-F		
			Uplift	F_1	F_2	Uplift	F_1	F_2
			lb.	lb.	lb.	lb.	lb.	lb.
LTA2	10d x 1½"	Perpendicular to Wall	1845	495	1330	1310	350	945
		Parallel to Wall	1825	1305	370	1295	930	265

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 1½" = 0.148" dia. x 1½" long.

See **strongtie.com** for additional information on lateral truss anchors.

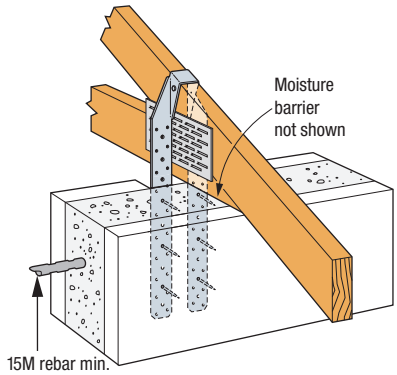


Typical MTSM20 Installation into ICF

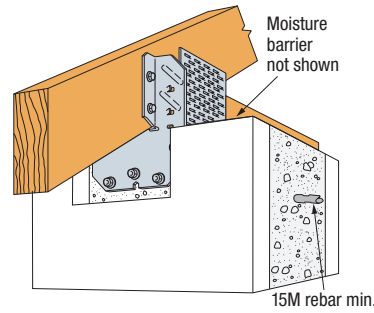
Model No.	L	Fasteners		Factored Uplift Resistance	
				D.Fir-L	S-P-F
		To Truss	To Concrete	(K_D = 1.15)	(K_D = 1.15)
				lb.	lb.
MTSM20	20	(7) 10d x 3"	(4) ¼ x 1¾ Titen Turbo™	1240	880

1. Factored resistances have been increased 15% for wind or earthquake loading; no further increase is allowed. Reduce table values where other loads govern as per code.
2. Twist straps do not have to be wrapped over the truss to achieve resistances shown.
3. Minimum edge distance for Titen Turbo screws is 1¾".
4. Products shall be installed such that the Titen Turbo screws are not exposed to the weather.
5. Nails: 10d = 0.148" dia. x 3" long.

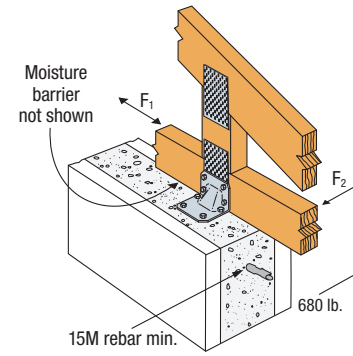
See **strongtie.com** for additional information on and other models of twist straps.



H16 Installation into ICF



HM9 Installation into ICF



HGAM10 Installation into ICF

Model No.	Ga.	Fasteners		Factored Resistance (K_D = 1.15)					
				D.Fir-L			S-P-F		
				Uplift	Lateral		Uplift	Lateral	
		To Rafters/ Truss	To Concrete		F_1	F_2		F_1	F_2
				lb.	lb.	lb.	lb.	lb.	lb.
H16	18	(2) 10d x 1½"	(6) ¼" x 1¾" Titen Turbo	2075	—	—	1470	—	—
HM9KT[3]	18	(4) SDS¼" x 1½"	(5) ¼" x 1¾" Titen Turbo	815	580	285	585	580	285
HGAM10KTA[3,5]	14	(4) SDS¼" x 1½"	(4) ¼" x 1¾" Titen Turbo	1470	1305	1495	1060	940	1310

See **strongtie.com** for additional information on plate connections.

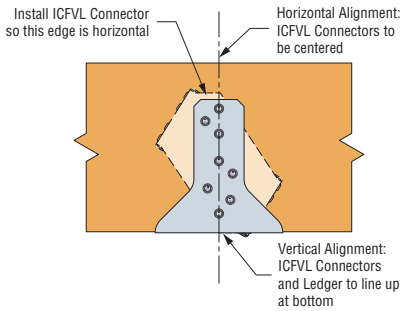
1. Factored resistances have been increased 15% for earthquake or wind loading with no further increase allowed.
2. Factored resistances are for one anchor. A minimum rafter thickness of 2½" must be used when framing anchors are installed on each side of the joist and on the same side of the plate.
3. 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 Turbo screws. (1¾" Titen Turbo 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 F_2 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.
6. Nails: 10d x 1½" = 0.148" dia. x 1½" long.

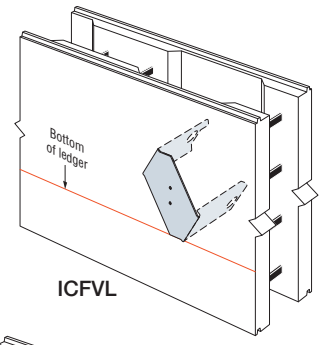
GENERAL NOTES:

- For denser wood species (specific gravity ≥ 0.50), predrilling may be necessary. Predrill ledger only with 5⁄32" drill bit.
- These products are not intended for use on preservative-treated lumber.
- Do not splice ledger at ICFVL location.
- Minimum concrete compressive strength (f'c) is 2500 psi (17.25 MPa).

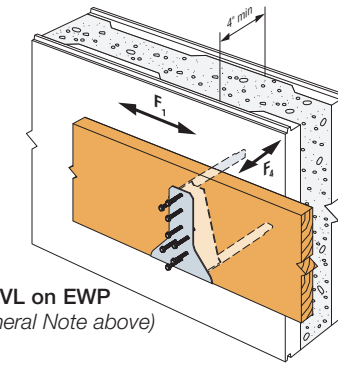
Warning: Industry studies show that hardened fasteners can experience performance problems in wet environments. Accordingly, use this product in dry, interior applications only.

Wood Ledgers



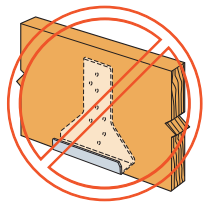


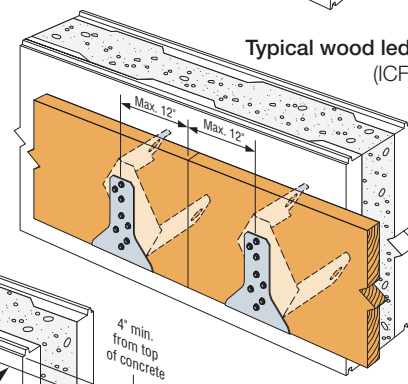
ICFVL



ICFVL on EWP
(see General Note above)

Typical wood ledger installation with ICFVL and ICFVL-W
(ICFVL-CW for LVL ledger similar)

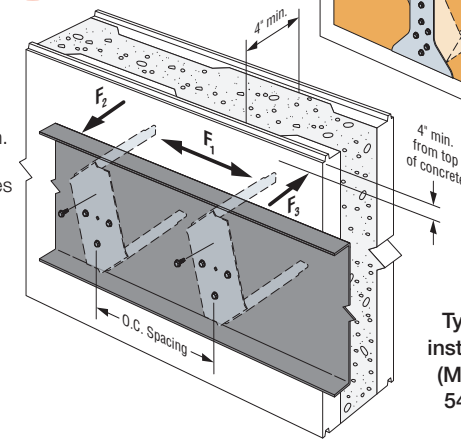




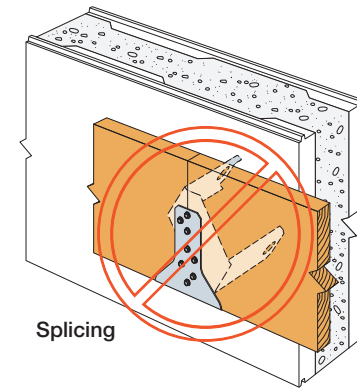
Recommended splicing installation

Requires 4 screws at each location.

Table provides on center spacing.



Typical steel ledger installation with ICFVL (Minimum 16 gauge, 54 mil steel ledger)



Splicing

Ledger Type	Model No.	Fasteners	Factored Resistance				
			Vertical		Lateral (F_1)	Tension (F_2)	Compression (F_3)
			D.Fir–L	S-P-F			
			lb.	lb.	lb.	lb.	lb.
			kN	kN	kN	kN	kN
2x Lumber	ICFVL6 or ICFVL8 with ICFVL-W	(8) ICF-D3.25	2865	2655	1765	1055	7555
			12.74	11.81	7.85	4.69	33.61
1¾" SCL	ICFVL6 or ICFVL8 with ICFVL-CW	(8) ICF-D3.25	3110	2865	1765	1055	7555
			13.83	12.74	7.85	4.69	33.61
Steel	ICFVL6 or ICFVL8	(4) #14 x ¾"	2630	2630	1610	1055	7555
			11.70	11.70	9.88	4.69	33.61

1. Factored resistances shown in the vertical direction for 2x Lumber and 1¾" SCL are for standard term loading (K_D = 1.00). Values may be increased to a maximum of 3145 lb. (13.99 kN) for short-term loading (K_D = 1.15). Reduce where other load durations govern.
2. Steel ledger shall have a minimum design thickness of 16 ga. (0.0538"/1.519 mm) with minimum steel properties of f_y = 33 ksi (230 MPa) and f_u = 45 ksi (310 MPa) in accordance with CSA S136-16.
3. Minimum concrete compressive strength shall be 15 MPa.
4. Values shown require a minimum embedment depth into the concrete wall of 2¾" for ICFVL6 and 3½" for ICFVL8. Connector spacing shall be determined by the design professional up to a maximum of 48" (1.22 m) on centre.
5. Values shown apply to ICF foam thicknesses up to 3¼" (83 mm) for ICFVL6 and 4½" (114 mm) for ICFVL8.
6. When combining simultaneous loads in multiple directions, the following interaction equation shall be checked: Vertical Load/Vertical Resistance + Lateral Load/Lateral Resistance + Tension Load/Tension Resistance + Compression Load/Compression Resistance ≤ 1.0.
7. The ICFVL shall be installed no closer than 4" (102 mm) from the top of the wall.
8. Screws shall be located no closer than ½" from the edge of the ICFVL.
9. **Fasteners:** ICF-D3.25 = ¼"-20 x 3¼" Simpson Ledger Connector screw; #14 x ¾" = #14 x ¾" #3 drill point self-tapping screw.

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 1¾" LVL or 2x D.Fir–L (in.)

Specified Load (psf)		Joist Span (ft.)											
Live	Dead	10	12	14	16	18	20	22	24	26	28	30	32
40	10	48	48	48	47	42	37	34	31	29	27	25	23
	15	48	48	48	43	38	34	31	29	26	24	23	21
	20	48	48	46	40	35	32	29	26	24	23	21	20
	25	48	48	43	37	33	30	27	25	23	21	20	18
	30	48	47	40	35	31	28	25	23	21	20	18	17
50	10	48	48	44	39	34	31	28	26	24	22	20	19
	20	48	45	39	34	30	27	25	22	21	19	18	17
	30	48	40	34	30	27	24	22	20	18	17	16	15
	40	44	36	31	27	24	22	20	18	16	15	14	13
100	10	33	28	24	21	18	16	15	14	13	—	—	—
	20	31	26	22	19	17	15	14	13	—	—	—	—
	30	29	24	20	18	16	14	13	12	—	—	—	—
	40	27	22	19	17	15	13	12	—	—	—	—	—

ICFVL Spacing for Steel Ledger or 2x S-P-F Ledger (in.)

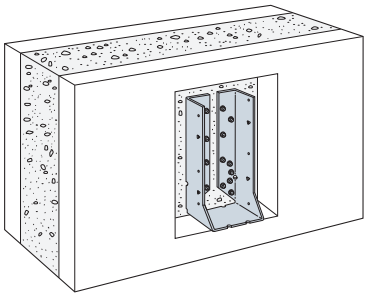
Specified Load (psf)		Joist Span (ft.)											
Live	Dead	10	12	14	16	18	20	22	24	26	28	30	32
40	10	48	48	48	43	38	34	31	29	26	24	23	21
	15	48	48	45	40	35	32	29	26	24	22	21	20
	20	48	48	42	37	33	29	27	24	22	21	19	18
	25	48	46	39	34	30	27	25	23	21	19	18	17
	30	48	43	36	32	28	25	23	21	19	18	17	16
50	10	48	48	41	36	32	28	26	24	22	20	19	18
	20	48	42	36	31	28	25	22	21	19	18	16	15
	30	44	37	32	28	24	22	20	18	17	16	14	14
	40	40	33	28	25	22	20	18	16	15	14	13	12
100	10	31	25	22	19	17	15	14	12	—	—	—	—
	20	28	24	20	18	16	14	13	—	—	—	—	—
	30	26	22	19	16	14	13	12	—	—	—	—	—
	40	25	21	18	15	14	12	—	—	—	—	—	—

Values in the cells highlighted in yellow represent the maximum allowable spacing of 48".

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. Tables address vertical loads only. If connection is designed to resist lateral loads, spacing will decrease. Contact Simpson Strong-Tie for current 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 ¼" x 1¾" Simpson Strong-Tie® Titen Turbo™ hex head screws. See **strongtie.com** for more information on installation and use.



HUC410 Installed on Face of Concrete in ICF

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**.

(800) 999-5099
strongtie.com