

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 www.strongtie.com for additional information.

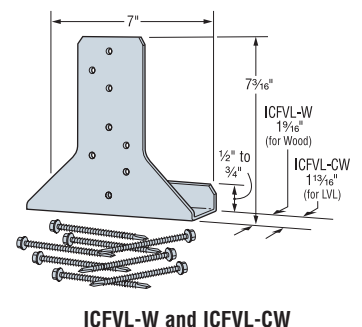
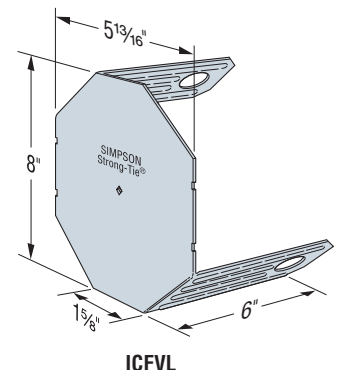
Installation of ICFVL



- Snap a line for the bottom of the ledger and mark the on center spacing
- Use the ICFVL to mark the kerf locations in the ICF
- Cut the kerfs as marked
- Insert the ICFVL flush to the face of the ICF
- Place concrete (min $f'_c = 2500$ psi [17.25 MPa])



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



Attachment of Wood Ledger



- Slip the appropriate ledger connector underneath the wood ledger (as shown)
- Install the eight ICF-D3.62 screws partially into the ledger
- Position the ledger level to the chalk line and drive the screws through the wood and into the ICFVL
- All screws should be located at least $\frac{1}{2}$ " from the edge of the ICFVL

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

Attachment of Steel Ledger



- Position the ledger level to the chalk line and drive the required number of screws through the steel ledger and into the ICFVL
- All screws should be located at least $\frac{1}{2}$ " from the edge of the ICFVL
- Space screws evenly



**LIMIT
STATES
DESIGN**

800-999-5099
www.strongtie.com

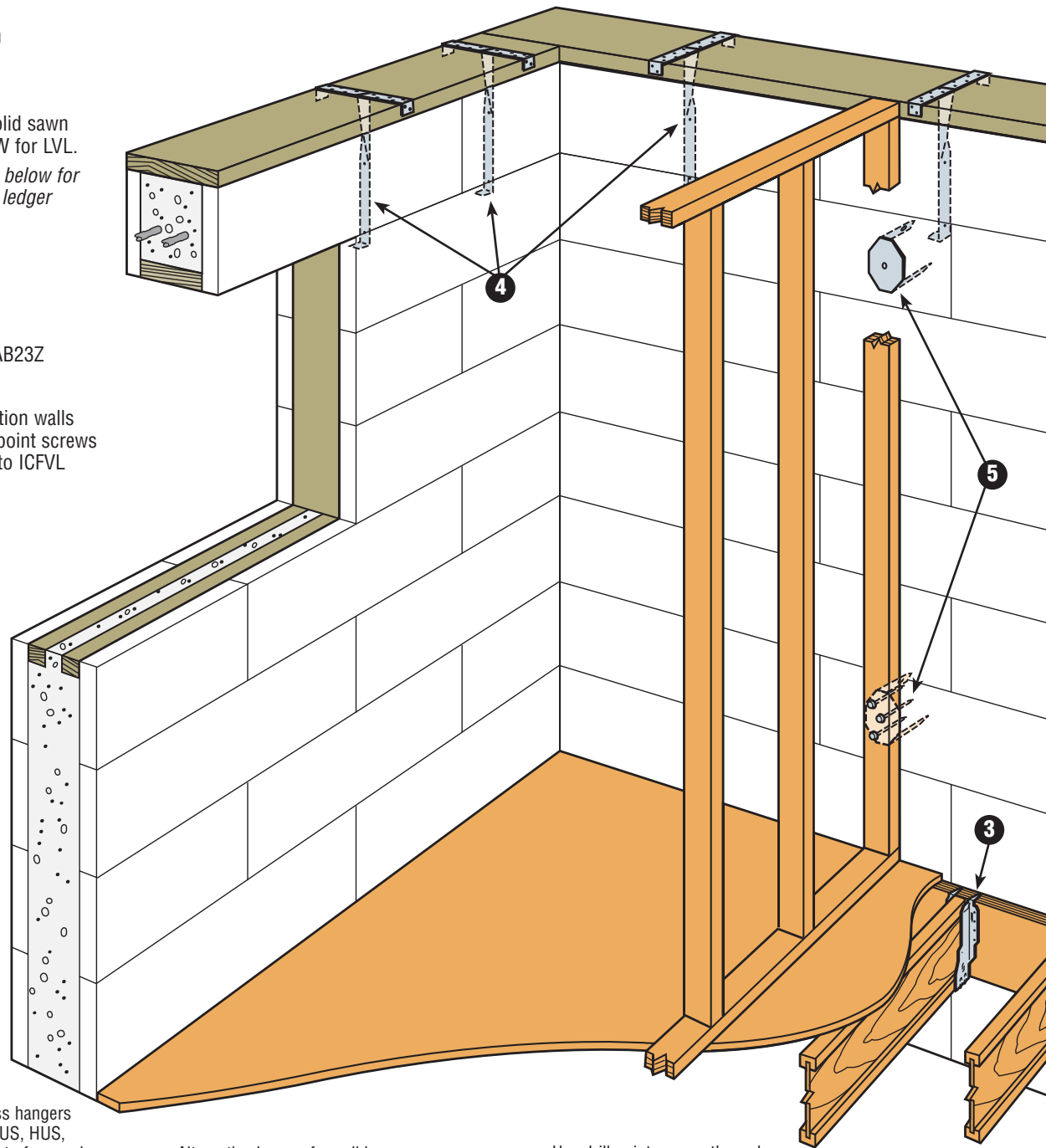
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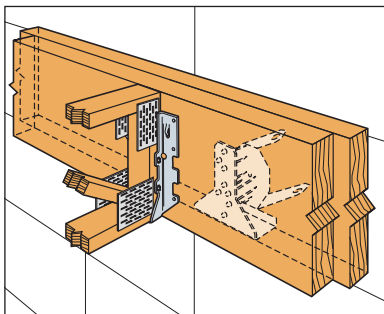
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ICF CONNECTORS

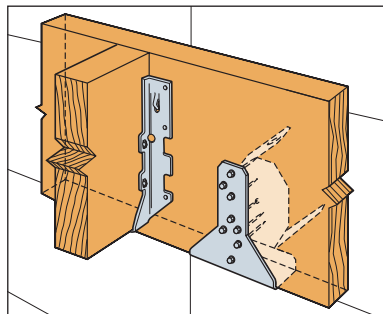
- 1 Use ICFVL to attach ledger to ICF
- 2 Use ICFVL-W for solid sawn lumber or ICFVL-CW for LVL.
NOTE: See drawing below for detail on double 2x ledger
- 3 Use IUS hanger for I-joist floor system
- 4 Use MAB15Z or MAB23Z
- 5 Attach interior partition walls with 1/4-14 #3 drill point screws (sold separately) 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 drill point screws through wood cabinets and into ICFVL

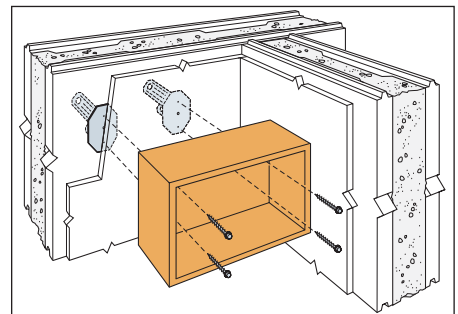
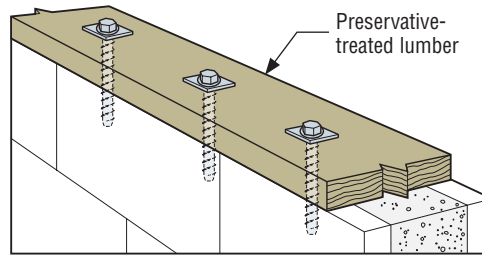
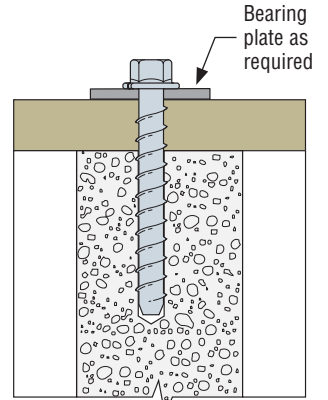


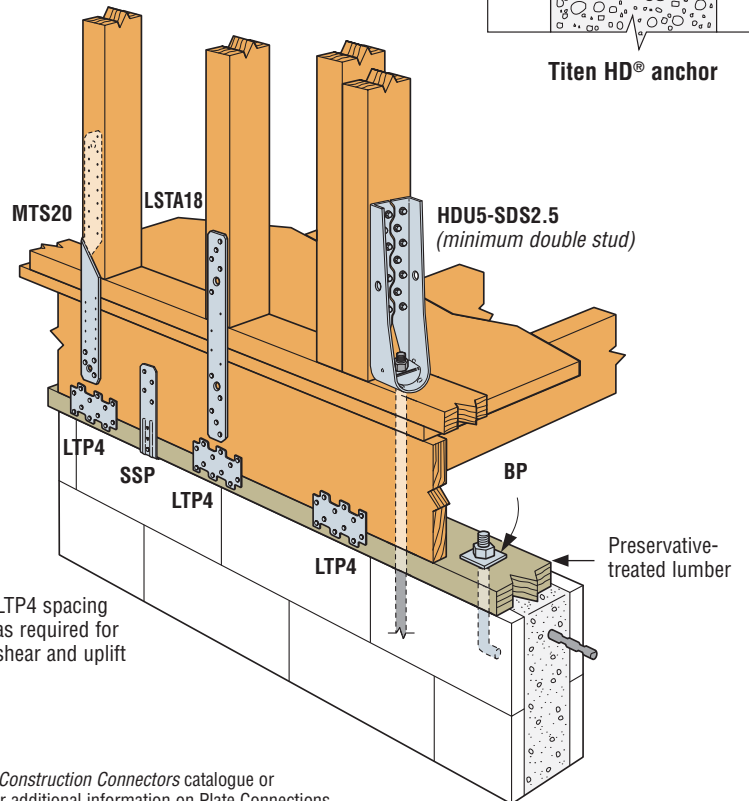
PLATE CONNECTIONS



Titen HD® installation into ICF



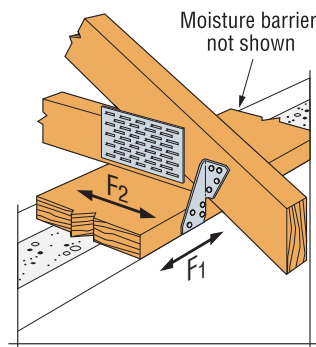
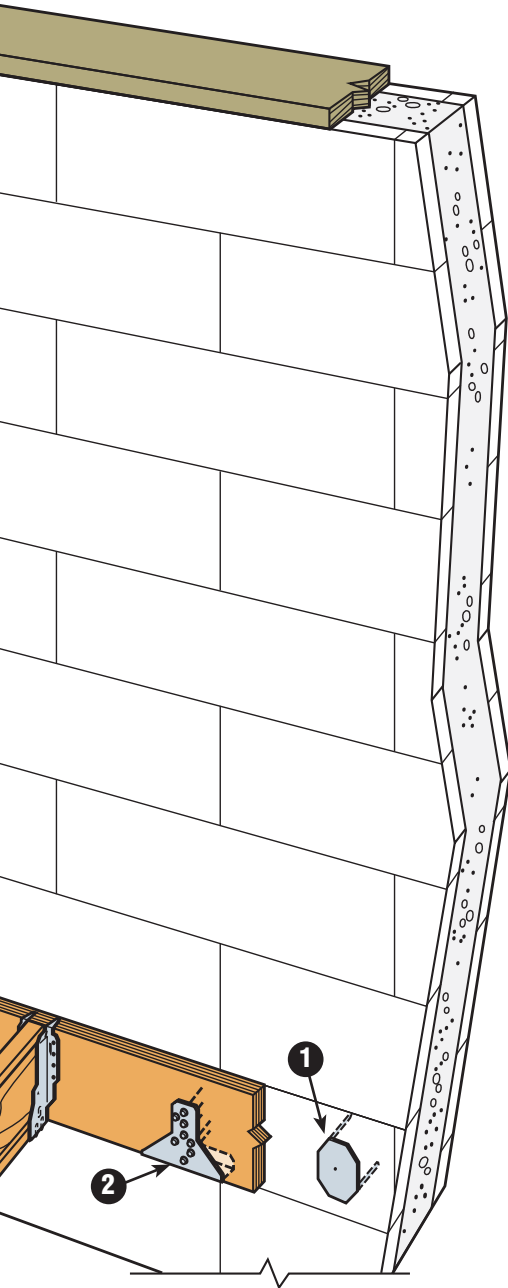
Titen HD® anchor



LTP4 spacing
as required for
shear and uplift

See the current *Wood Construction Connectors* catalogue or www.strongtie.com for additional information on Plate Connections.

TRUSS CONNECTIONS



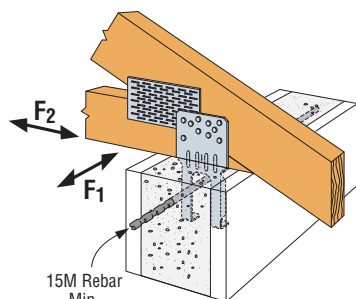
H4 for single plate to
truss connection

Model No.	Ga	Fasteners		Factored Resistance ($K_D = 1.15$)					
				D.Fir-L			S-P-F		
		To Rafters/ Truss	To Plates	Uplift lbs	Lateral F1 lbs	Lateral F2 lbs	Uplift lbs	Lateral F1 lbs	Lateral F2 lbs
H4	20	4-8d	4-8d	510	180	235	440	130	165

- Factored resistances have been increased 15% for short term loading. No further increase is allowed.
- 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.
- When cross-grain bending or cross-grain tension cannot be avoided, mechanical reinforcement to resist such forces should be considered.
- 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 www.strongtie.com for additional information on and other models of Seismic and Hurricane Ties.

TRUSS CONNECTIONS

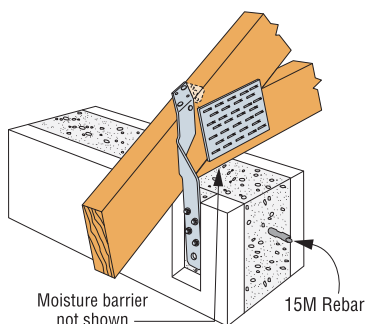


LTA2 Perpendicular to Wall Installation

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
			lbs	lbs	lbs	lbs	lbs	lbs
LTA2	10-10dx1½"	Perpendicular to Wall	1845	495	1330	1310	350	945
			8.21	2.20	5.92	5.83	1.56	4.20
		Parallel to Wall	1825	1305	370	1295	930	265
			8.12	5.81	1.65	5.76	4.14	1.18

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:** 10dx1½" = 0.148" dia. x 1½" long.

See the current *Wood Construction Connectors* catalogue or www.strongtie.com for additional information on Lateral Truss Anchors.

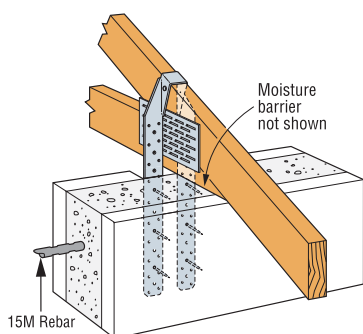


Typical MTSM20 installation into ICF

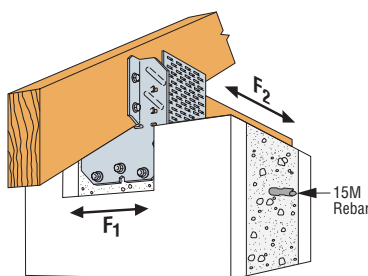
Model No.	L	Fasteners		Factored Uplift Resistance	
				D.Fir-L	S-P-F
		To Truss	To Concrete	($K_D = 1.15$)	($K_D = 1.15$)
				lbs	lbs
MTSM20	20	7-10d	4-¼x1¾ Titen	1240	880

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® screws is 1½".
4. Products shall be installed such that the Titen screws are not exposed to the weather.

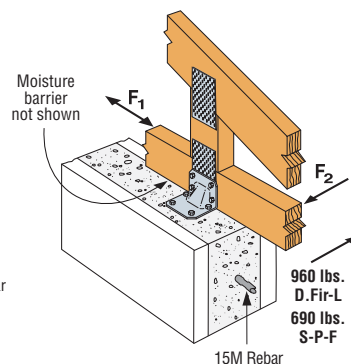
See the current *Wood Construction Connectors* catalogue or www.strongtie.com for additional information on and other models of Twist Straps.



H16S 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		
		To Rafters/Truss	To Concrete	Uplift	Lateral		Uplift	Lateral	
				lbs	F ₁	F ₂	lbs	F ₁	F ₂
H16S	18	2-10dx1½"	6-¼x1¾ Titen	2075	—	—	1470	—	—
HM9KT ³	18	4-SDS¼"x1½"	5-¼x1¾ Titen	815	580	285	585	580	285
HGAM10KTA ^{3,5}	14	4-SDS¼"x1½"	4-¼x1¾ Titen	1470	1305	1495	1060	940	1310

See the current *Wood Construction Connectors* catalogue or www.strongtie.com for additional dimensional, installation and loading information.

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) and Titen® screws. (1¾" Titen 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 F₂ resistances shown are for loading applied into the connector. For loading applied away from the connector, the factored resistances are 960 lbs for D.Fir-L and 690 lbs for S-P-F.

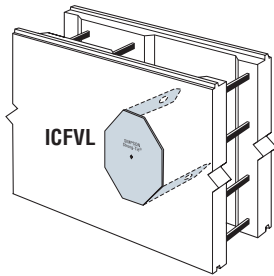
ICF CONNECTORS

GENERAL NOTES:

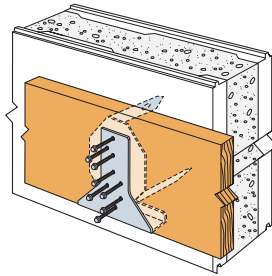
1. These products are not intended for use on preservative-treated lumber.
2. Do not splice ledger at ICFVL location.
3. No load duration increase is allowed.
4. Minimum concrete compressive strength (f'_c) is 2500 psi (17.25 Mpa).

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

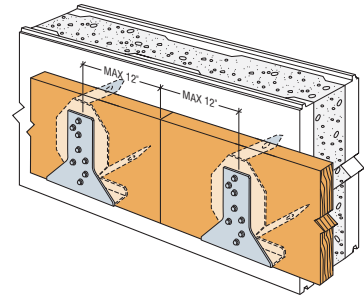
Wood and Steel Ledgers



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

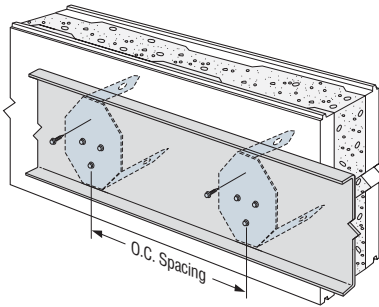


MISINSTALLATION

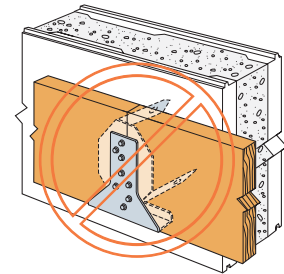


Recommended splicing installation

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
MISINSTALLATION

Ledger Type	Model No.	Factored Resistance	
		Vertical lbs	Lateral lbs
2x D.Fir-L/S-P-F	ICFVL w/ICFVL-W	2820	3075
1¾" SCL	ICFVL w/ICFVL-CW	2820	3075
Steel	ICFVL	2590	2470

1. Minimum steel ledger specification is $F_y = 33$ ksi (230 Mpa) and $F_u = 45$ ksi (310 Mpa) in accordance with CSA S136-07.
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 3¼" or less. Contact Simpson Strong-Tie for values with thicker foam.
6. When combining vertical and lateral loads designer shall evaluate as follows:
Vertical Load/Vertical Resistance + Lateral Load/Lateral Resistance ≤ 1.0 .
7. The ICFVL must be installed no closer than 4" below 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 0.94.

This Table Addresses Vertical Load Applications only for ICF Foam Thickness Up To 3¼"

Ledger Type	Model No.	ICFVL SPACING TO REPLACE ANCHOR BOLTS (in) ^{1,2}															
		½" Dia. Anchors at				¾" Dia. Anchors at				(2) ¾" Dia. Anchors at				¾" Dia. Anchors at			
		12" o.c.	24" o.c.	36" o.c.	48" o.c.	12" o.c.	24" o.c.	36" o.c.	48" o.c.	12" o.c.	24" o.c.	36" o.c.	48" o.c.	12" o.c.	24" o.c.	36" o.c.	48" o.c.
WOOD LEDGERS																	
2x D.Fir-L/S-P-F	ICFVL w/ICFVL-W	48"	48"	48"	48"	38"	48"	48"	48"	19"	38"	48"	48"	34"	48"	48"	48"
1¾" SCL	ICFVL w/ICFVL-CW	48"	48"	48"	48"	34"	48"	48"	48"	17"	34"	48"	48"	28"	48"	48"	48"
STEEL LEDGERS																	
16 ga (0.060")	ICFVL	20"	40"	48"	48"	16"	32"	48"	48"	—	—	—	—	—	—	—	—
14 ga (0.075")	ICFVL	16"	32"	48"	48"	13"	26"	39"	48"	—	—	—	—	—	—	—	—

1. The Designer may specify different spacing based on the load requirements. It is recommended to space the components at multiples of the joist spacing to help reduce the chance of interference with joist hangers.
2. Spacings are based on perpendicular to grain capacity of bolt in wood ledger compared to tested value of ICFVL.
3. For steel ledgers, the 14 ga spacing is closer than the 16 ga ledger because the calculated resistance of a bolt is higher in a thicker piece of steel.
4. Steel ledger values are based on steel $F_u = 45$ ksi (310 Mpa).
5. The ICFVL must be installed no closer than 4" below the top of the wall to achieve the connector spacings shown. For installations where the ICFVL is installed less than 4" from the top of the wall (including flush applications) multiply the connector spacings by 0.94.

ICF CONNECTORS

The following spacing tables are an alternative to the ICFVL spacing to replace the building code prescribed anchor bolts 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)

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	46	41	37	33	31	28	26	24	23
	15	48	48	48	42	38	34	31	28	26	24	22	21
	20	48	48	45	39	35	31	28	26	24	22	21	19
	25	48	48	42	37	32	29	26	24	22	21	19	18
	30	48	46	39	34	30	27	25	23	21	19	18	17
50	10	48	48	44	38	34	30	28	25	23	22	20	19
	20	48	45	38	33	30	27	24	22	20	19	18	16
	30	48	40	34	30	26	24	21	20	18	17	16	15
	40	43	36	30	27	24	21	19	18	16	15	14	13
100	10	33	27	23	20	18	16	15	13	12	-	-	-
	20	30	25	22	19	17	15	14	12	-	-	-	-
	30	28	24	20	18	16	14	13	12	-	-	-	-
	40	27	22	19	16	15	13	12	-	-	-	-	-

See notes below.

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

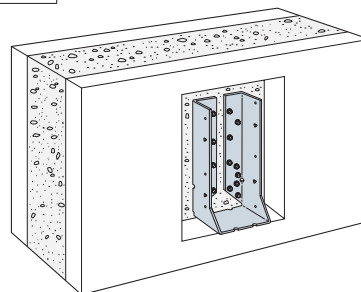
ICFVL SPACING FOR STEEL LEDGER (in)

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	42	38	34	31	28	26	24	22	21
	15	48	48	45	39	35	31	28	26	24	22	21	19
	20	48	48	41	36	32	29	26	24	22	20	19	18
	25	48	45	38	34	30	27	24	22	20	19	18	17
	30	48	42	36	31	28	25	23	21	19	18	17	15
50	10	48	47	40	35	31	28	25	23	21	20	18	17
	20	48	41	35	31	27	24	22	20	19	17	16	15
	30	44	36	31	27	24	22	20	18	17	15	14	13
	40	39	33	28	24	22	19	18	16	15	14	13	12
100	10	30	25	21	19	17	15	13	12	-	-	-	-
	20	28	23	20	17	15	14	12	-	-	-	-	-
	30	26	22	18	16	14	13	12	-	-	-	-	-
	40	24	20	17	15	13	12	-	-	-	-	-	-

1. Values shown are maximum spacing distances (inches) based on 2-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. Table above 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 concrete wall using ¼"x1¾" Simpson Strong-Tie® Titen® hex head screws. See www.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 and Fastening for Concrete and Masonry* catalogue, or visit the Simpson Strong-Tie website at www.strongtie.com.

This flier is effective until December 31, 2015, and reflects information available as of February 1, 2013. This information is updated periodically and should not be relied upon after December 31, 2015; contact Simpson Strong-Tie for current information and limited warranty or see www.strongtie.com.

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800-999-5099
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