LEGACY REPORT

NER-413

Reissued July 1, 1998

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www.icc-es.org

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Legacy report on the BOCA *National Building Code*/1996, the 1997 *Standard Building Code*, the 1997 *Uniform Building Code*, and the 1995 CABO One and Two Family Dwelling Code

DIVISION 06—WOOD AND PLASTICS
Section 06090—Wood and Plastic Fastenings

SIMPSON STRONG-TIE® CONNECTORS

SIMPSON STRONG-TIE COMPANY, INC.
4637 CHABOT DRIVE
SUITE 200
PLEASANTON, CALIFORNIA 94588

1.0 SUBJECT

Simpson Strong-Tie Connectors:

1.1 A34/A35, A35F Framing Anchors
1.2 DS Drywall Stops
1.3 FC Framing Clips
1.4 HH Header Hangers
1.5 J and JP Floor Jacks
1.6 L-30, L-50, L-70, and L-90 Reinforcing Angles
1.7 NCA Nailess Metal Bridging
1.8 NBA Nail-Type Metal Bridging
1.9 SA and HSA Strap Anchors
1.10 ST, FHA, MST, MSTI, CMST and HST Strap Ties
1.11 TB Tension Bridging
1.12 TC Truss Connector
1.13 VB and VBP-Knee Brace
1.14 THMA Truss Hanger Multiple
1.15 LTS/MTS Twist Strap
1.16 CS16, 18, 20, 22 Coiled Strap
1.17 WB Wall Bracing
1.18 HGUS Hanger

2.0 PROPERTY FOR WHICH EVALUATION IS SOUGHT

Structural connection for wood construction

3.0 DESCRIPTION

3.1 A34/A35, A35F:

The connectors are die-formed from No. 18 gage galvanized steel conforming to ASTM A 653 LFQ specifications with a minimum yield strength of 33,000 psi (227,500 kPa) and a minimum tensile strength of 45,000 psi (310,300 kPa). The connectors are predrilled for No. 10-1/4 gage 8d nails having a length of 1-1/2 inches (38 mm). The connectors have cutouts on each leg and a prong to aid in installation. See Figures 1, 2, and 3 of this report.

A34 - This connector is an angular section 2-1/2 inches (64 mm) long with 1-7/16 inch (37 mm) long irregular-shaped projecting legs. See Figure 1 of this report.

A35 - This connector is an angular section 4-1/2 inches (114 mm) long with 1-7/16 inch (37 mm) long irregular-shaped projecting legs. One end of the connector is slotted for a distance of 1-1/2 inches (38 mm) to allow field adjustment. See Figure 2 of this report.

A35F - This connector is a flat version of the A35 connector described above. See Figure 3 of this report.

3.2 DS Drywall Stops:

The DS Drywall Stops are designed to support and provide end backing of gypsum wallboard at wall corners and wall ceiling intersections. The drywall stops replace conventional backup studs or blocking. They are formed from No. 20 gage galvanized steel having an embossed body 1-1/4 inches (32 mm) wide by 2-1/4 inches (57 mm) long with a centered leg outstanding 1 inch by 1 inch (25.4 mm by 25.4 mm). Attachment is by two prongs and one 8d common nail in the outstanding leg or a No. 6 sheet metal screw when attaching to metal studs. The DS Drywall Stop is installed to the corner of the stud or plate, such that the outstanding leg is attached to the short dimension. The steel that forms the DS Drywall Stop conforms to ASTM A 653 LFQ specifications with no minimum tensile or ultimate tensile strength required.

One half of the base body rests upon the wide dimension and the other half of the base body provides the support for the gypsum wallboard. The device is to be installed at a maximum spacing of 16 inches (406 mm) on center. The DS Drywall Stop has not been evaluated as a component in fire resistant rated construction. For conventional wood frame construction, lateral resistance shall not be assumed to be provided by assemblies using DS Drywall Stops. See Figures 4 and 5 of this report.

3.3 FC Framing Clips:

The FC Framing Clips are alternatives to cripple studs. The clips have a 1-1/4 inch (32 mm) deep bearing seat for window sill members at studs or mullions and to fasten posts to sill plates for gravity loads. The clips are manufactured from No. 16 gage galvanized steel for 3-9/16 inch (90 mm) (FC4), 5-1/2

inch (140 mm) (FC6), and 7-1/2 inch (191 mm) (FC8) wide members. The steel that forms the FC Framing Clips conforms to ASTM A 653 LFQ specifications with a minimum yield strength of 28,000 psi (193,100 kPa) and a minimum tensile strength of 38,000 psi (262,000 kPa). See Figures 6 and 7 of this report.

3.4 HH Header Hangers:

The HH Header Hangers are alternatives to cripple studs at wood headers. The hangers are fabricated from No. 16 gage galvanized steel for post mullion widths of 3-5/8 inches (92 mm) (HH4) and 5-1/2 (140 mm) (HH6) inches. The hangers provide a 2 inch (51 mm) deep saddle seat for the header fastened to both sides of the header and post and the post face under the header with 16d nails. The steel that forms the HH Header Hangers conforms to ASTM A 653 LFQ specifications with a minimum yield strength of 28,000 psi (193,100 kPa) and a minimum tensile strength of 38,000 psi (262,000 kPa). See Figures 8, 9, and 10 of this report.

3.5 J and JP44 Floor Jacks:

The JP44 floor jack is intended for use in combination with a 4 inch by 4 inch (102 mm by 102 mm) wood post as an adjustable pier support for floor beams. The floor jack consists of a U-shaped retainer element of No. 12 gage steel with provisions for four 16d common nails into the posts. A 3/4 inch (19.1 mm) diameter by 4-3/4 inch (121 mm) long threaded rod is welded to the seat with a 1/8 inch (3.2 mm) fillet weld. A similar U-shaped No. 12 gage support is provided with a centered hole for passage of the threaded rod. A 3/4 inch (19.1 mm) nut, washer, keeper and plastic shim provide means of attachment and adjustment. The device shall be installed with a predrilled hole into either the beam or the post end to provide a sleeve for the threaded rod.

The J floor jack has been evaluated for use as an adjustable beam support pier. It is identical to the JP44 jack pier except that 4 inch (102 mm) (J57) or 8 inch (203 mm) (J813) long threaded rod lengths are provided, received by 1-1/16 inch (27 mm) outside diameter by 3/4 inch (19.1 mm) inside diameter Schedule 40 steel pipe in lengths from 5 inches (127 mm) to 21 inches (533 mm). The pipe is welded with 1/8 inch (3.2 mm) fillet welds to a No. 12 gage steel base plate 3-1/4 inches (83 mm) by 3-1/2 inches (89 mm) with provisions for four 16d common nails.

The steel that forms the J and JP44 Floor Jacks conforms to ASTM A 570 specifications with a minimum yield strength of 33,000 psi (227,500 kPa) and a minimum tensile strength of 52,000 psi (358,500 kPa). See Figures 11, 12, and 13 of this report.

3.6 L-30, L-50, L-70, and L-90 Framing Connectors:

These connectors are fabricated from No. 16 gage galvanized steel and are prepunched for 10d common nails. The connectors are right angle sections measuring 2-3/8 inches (60 mm) by 1-3/8 inches (35 mm) by 3 inches (76 mm) (L30), 5 inches (127 mm) (L50), 7 inches (178 mm) (L70), or 9 inches (229 mm) (L90). The connectors have cutouts on each leg and a prong to aid in installation. The steel that forms the connectors conforms to ASTM A 653 LFQ specifications with a minimum yield strength of 28,000 psi (193,100 kPa) and a minimum tensile strength of 38,000 psi (262,000 kPa). See Figure No. 14 of this report.

3.7 NCA Nailess Metal Bridging:

This bridging is an alternative to cross bridging. It has not been evaluated as bracing for seismic, wind, or bearing locations. The bridging is supplied in various lengths for joist sizes ranging from 2 inches (51 mm) by 8 inches (203 mm) to 2 inches (51 mm) by 16 inches (406 mm) and for joist spacing of 12, 16, and 24 inches (305, 406, and 610 mm) on center. The nailess metal bridging is formed into a right angled section with 1/2 inch (12.7 mm) long legs. One end of the bridging is formed to provide an angular prong projection 1/2 inch (12.7 mm) long on each side of a shoulder 5/16 inch (7.9 mm) wide. The prongs penetrate the wood to the shoulder upon driving of the bridging with hammer blows applied at the opposite end. The opposite end has a right angle bend from which three angular-shaped teeth protrude 3/8 inch (9.5 mm) and are spaced at 7/16 inch (11.1 mm) on center. When the shoulder rests against the joist, the prongs are driven into the wood with hammer blows. The bridging is installed either from the top or bottom and before or after the sheathing is installed. The bridging is formed from No. 16, 18, and 20 gage galvanized steel conforming to ASTM A 653 LFQ, with a minimum yield strength of 28,000 psi (193,100 kPa) and a minimum tensile strength of 38,000 psi (262,000 kPa). See Figure 15 of this report.

3.8 NBA Nail-Type Metal Bridging:

This bridging is an alternative to cross bridging. It has not been evaluated as bracing for seismic, wind, or bearing locations. The nail-type bridging is identical to the nailess bridging described above, except the ends are flattened to provide a 1-1/4 inch (32 mm) long section for attachment with two No. 10-1/4 gage 1-1/2 inch (38 mm) long nails at each end. Joist sizes, spacings, and bridging identification are identical to the nailess bridging. The bridging is installed either from the top or bottom by locating the bend line approximately 1-3/8 inch (35 mm) from the joist corner and before or after sheathing is installed. The bridging is formed from 16, 18, and 20 gage steel conforming to ASTM A 653 LFQ specifications with a minimum yield strength of 28,000 psi (193,100 kPa) and a minimum tensile strength of 38,000 psi (262,000). See Figure 16 of this report.

3.9 SA and HSA Strap Anchors:

As indicated in Figures 18 and 19 of this report, the SA and HSA strap anchors are designed to provide horizontal tension ties across intervening members. As indicated in Figure 17 of this report, the SA 36 strap anchor is punched to provide for installation of two 1/2 inch (12.7 mm) diameter bolts or eleven 16d common nails at each end. The SA 36 strap anchor is formed from No. 12 gage galvanized steel conforming to ASTM A 653 CQ with a minimum yield strength of 28,000 psi (193,100 kPa) and a minimum tensile strength of 38,000 psi (262,000). The HSA heavy strap anchors are similar to the SA strap anchors, except they are formed from No. 3 gage painted uncoated steel conforming to ASTM A 570 with a minimum yield strength of 33,000 psi (227,500) and a minimum tensile strength of 52,000 psi (358,500). See Table 8 of this report for the available sizes of the HSA anchors.

3.10 ST, FHA, MST, MSTI, CMST, and HST Tie Straps:

The tie straps are designed to act as tension ties between two butting wood members. The ST and MST tie straps are punched to receive 16d common nails. As an alternative to nails, the MST straps are also punched to receive 1/2 inch (12.7 mm) diameter bolts spaced 5-1/4 inches (133 mm) on center parallel to the strap. The FHA tie straps are punched to receive four 16d common nails each end. The MSTI tie straps are punched to receive 10d common nails. The CMST Strap is supplied in 40 foot (12.2 m) long coils to allow members separated by long distances to be joined to transfer tension between them. The CMST is cut to length for applications less than 40 feet (12.2 m). The strap is punched for 16d common nails. The HST tie straps are punched to receive either 5/8 inch (15.9 mm) or 3/4 inch (19.1 mm) diameter machine bolts in one or two rows at each end with bolt holes arranged about the center of the strap length to provide the required bolt spacings and end distances. See Tables No. 9A and 9B of this report for the available sizes and material specifications of the straps and Figure 20 of this report for the tie strap configurations.

3.11 TB Tension Bridging:

The TB tension bridging has a right angled section with flattened ends 1 inch (25.4 mm) wide. The tension bridging is available in several lengths from 20 inches (508 mm) to 60 inches (1524 mm) with nail holes at each end. Two 10d common nails are required at each end to provide the normal tension load capacity of 235 pounds (107 kg). The tension bridging is formed from No. 20 gage galvanized steel conforming to ASTM A 653 LFQ with a minimum yield strength of 28,000 psi (193,100 kPa) and a minimum tensile strength of 38,000 psi (262,000 kPa). See Figure 21 of this report.

3.12 TC Truss Connector:

The TC truss connectors are die formed from No. 16 gauge galvanized steel. The TC connectors are designed to attach roof framing to a top plate or floor framing to a mudsill to resist uplift forces. The TC connectors have slotted nail holes to allow for up to 1-1/4 inches (32 mm) of horizontal movement. The TC24 has 4 slotted nail holes while the TC26 has five slotted nail holes. The steel that forms the TC truss connectors conforms to ASTM A 653 LFQ specifications with a minimum yield strength of 28,000 psi (193,100 kPa) and a minimum tensile strength of 38,000 psi (262,000 kPa). See Figure 22 of this report.

3.13 VB and VBP-Knee Braces:

The braces are twisted through a 90 degree angle to lie flat against the bottom of the beam and against purlins framing perpendicular to the braced beam as shown in Figure 23 of this report. The VB brace has six N54A nails (1/4 inch (6.4 mm) diameter) at the top of each leg and two into the bottom and one into each vertical tab at the bottom of the braced beam. The VBP is a two piece knee brace which is required to be installed in pairs. The VBP braces have six N54A nails [1/4 inch (6.4 mm) diameter] at the top of each leg and two into the bottom and one into the vertical tab near the bottom of the braced beam. The VB and VBP knee braces are available in five models as follows: VB-5 and VBP-5 [10 inch to 15 inch (254 mm to 381 mm) beam depth], VB-7 and VBP-7 [15 inch to 22-1/2 inch (381 mm to 572 mm) beam depth], VB-8 and VBP-8 [22-1/2 inch to 28-1/2 inch (572 mm to 724 mm) beam depth], VB-10 [28-1/2 inch to 36 inch (572 mm to 914 mm) depth], and VB-12 [36 inch to 42 inch (914 mm to 1,067 mm) beam depth]. The braces are to be installed at an approximate 45 degree angle with a minimum 1-3/8 inch (35 mm) edge distance for nails.

The knee braces are designed to laterally support the bottom side of the beam and are not designed for use as a seismic tie. Allowable lateral resistance at the bottom of the beams furnished by the knee brace with legs at 45 degrees is 990 pounds (449 kg) (tension in the strap) for normal duration loads and 1240 pounds (563 kg) for short-term duration wind loads. When brace legs are installed at 30 degrees or 60 degrees, the allowable loads are 700 pounds (318 kg) (tension in the strap) and 875 pounds (397 kg), respectively, for long and short term loads. Straight line interpolation between maximum and minimum values is permitted. The braces are fabricated from No. 12 gage galvanized steel conforming to ASTM A 653 CQ specifications with a minimum yield strength of 28,000 psi (193,100 kPa) and a minimum tensile strength of 38,000 psi (262,000 kPa). See Figure 23 of this report.

3.14 THMA and THMA-2 Truss Hanger Multiple:

The THMA and THMA-2 hangers are designed to carry multiple truss members. The THMA is designed to carry a single ply jack and two single ply hip members. The THMA-2 is designed to carry a single ply jack and two two-ply hip members. Both the THMA and THMA-2 are fabricated from 12 GA galvanized steel. To maintain the required bolt end spacing, the bottom chord of the carrying truss shall not be greater than a 2 inch by 6 inch (51 mm by 152 mm) member when the THMA is used, and a 2 inch by 8 inch (51 by 203 mm) member when the THMA-2 is used. The steel which forms the hangers conforms to ASTM A 653 SQ Grade 33 specifications with a minimum yield strength of 33,000 psi (227,500 kPa) and a minimum tensile strength of 45,000 psi (310,300 kPa). See Figures 24 and 25 of this report.

3.15 LTS and MTS Twist Strap:

The LTS Light Twist Strap is 1-1/4 inches (32 mm) wide and is formed from 18 gage galvanized steel. The MTS Twist Strap is formed from 16 gage galvanized steel and is 1-1/4 inches (32 mm) wide. The steel that forms both straps meets ASTM A527 specifications with a minimum yield strength of 28,000 psi (193,100 kPa) and a minimum tensile strength of 38,000 psi (262,000 kPa). The straps are available in sizes as indicated in Table No. 13 of this report. See Figure 26 of this report.

3.16 CS16, 18, 20, 22 Coiled Strap:

The CS16, 18, 20, 22 Coiled Straps are 16, 18, 20, and 22 gage galvanized steel respectively. All CS straps are 1-1/4 inches (32 mm) wide punched with 9/64 inch (3.6 mm) holes spaced 1 inch (25.4 mm) on center. All CS straps are available coiled in cartons and are cut to length as required. The steel that forms the CS straps meets ASTM A 653 LFQ specifications with a minimum yield strength of 33,000 psi (227,500 kPa) and a minimum tensile strength of 45,000 psi (310,300 kPa). See Figures 27 and 28 of this report.

3.17 WB Wall Brace:

The WB Wall Bracing is intended to square the wall during construction. The WB Wall Bracing strap is installed on a stud wall constructed of 2x4 Douglas Fir spaced 16 inches (406 mm) on center with double top plates and single bottom plates. The strap is installed at a 60° angle from the horizontal with 2-16d nails in the top plate, 2-16d nails in the bottom plate, and 1-8d nail at each stud. The WB is supplied flat or coiled, in three sizes, and is formed from 16 gage galvanized steel. The steel that forms the WB brace meets ASTM A 653 SQ Grade 33 specifications with a minimum yield strength of 33,000 psi (227,500 kPa) and a minimum tensile strength of 45,000 psi (310,300 kPa). See Table No. 15, and Figures 29 and 30 of this report for available sizes and installation configurations.

3.18 HGUS Hanger:

The HGUS Hangers are formed from 12 gage galvanized steel. The hangers have a U shaped configuration and uses the slant nail in which the nail is driven at an angle through the joist and into the header. The product is supplied in two widths and three heights for a total of six sizes. The steel that forms the hangers meets ASTM A 653 SQ Grade 33 specifications with a minimum yield strength 33,000 psi (227,500 kPa) and a minimum tensile strength of 45,000 psi (310,300 kPa). See Tables No. 16A and 16B and Figure 31 of this report for available sizes of the HGUS Hangers.

3.19 Materials:

Galvanized connectors conform to ASTM A 525, G 60. J and JP Floor Jacks and HSA Strap Anchor connectors have a painted coating, rather than being galvanized.

3.20 Nails:

Nails used with the Simpson Strong-Tie products described in this report shall comply with Federal Specification FF-N-105B and have the following minimum bending yield strength, F_{yb}:

Nail Penny Weight Common-Type	Nominal Nail Diameter (inch)	Minimum F_{yb1} (psi)
8d	0.131	100,000
10d	0.148	90,000
12d	0.148	90,000
16d	0.162	90,000

Notes:
1. 1 inch equals 25.4 mm.
2. 1psi equals 6.895 kPa.

N54A nails are 1/4" x 2-1/2" long annular ring shank, F_{yb} = 70,000 psi.

4.0 DESIGN AND INSTALLATION

See Tables 1 though 16B of this report for the allowable loads of the Simpson Strong-Tie Connectors contained in this report. Load capacities are based on wood having a specific gravity of 0.5 or greater as defined in the *1991 National Design Specification for Wood Construction (NDS).* Values in this report are for connections in wood seasoned to a moisture content of 19 percent or less used under continuously dry conditions and where sustained exposure to temperatures of 100°F or less is experienced.

The design of the connected wood members shall be submitted to and approved by the local building official. Tabulated design loads for the connectors are based on the lowest load obtained from comparing:

- least test load that causes 1/8 inch (3.2 mm) deflection.
- lowest ultimate test load with a safety factor of 3.
- allowable fasteners and compression perpendicular-to-grain values in accordance with the **1991 AFPA National Design Specification® for Wood Construction**, based on wood with a specific gravity of 0.50.
- rational analysis for non-gravity resisting fasteners, which are not load tested.

The manufacturer's installation instructions shall be adhered to and a copy of these instructions shall be available at all times on the job site during installation.

5.0 IDENTIFICATION

Each of the connectors described in this report shall be stamped with the words “Simpson Strong-Tie”, the connector's model number, and this NER Report Number for field identification.

6.0 EVIDENCE SUBMITTED

6.1 Load tests performed by TEI Consulting Engineers.

Reports signed and sealed by Rostam Estandiari, P.E.

ITEM	WORK NO.	DATE
A35F	87005-29	7-09-87
A35(F_2)	89008-104	11-15-89
A35(F_1)	89008-39	8-01-89
A35(D)	87005-101	1-15-88
A35(A_2)	87005-103	1-15-88
A35(E)	87005-104	1-15-88
A35(A_1)	87005-100	1-15-88
A34(F_2)	87005-79	12-15-87
A34(F_1)	87005-87	12-18-87
HH6(F)	87005-105	1-15-88
HH4(F_3)	87005-78	11-02-87
HH4(F_2)	87005-77	11-02-87
L90(F_2)	87005-98	12-28-87
L90(F_1)	87005-97	12-28-87
L50(F_2)	87005-88	12-18-87
L50(F_1)	87005-89	11-20-87
L30(F_2)	87005-80	12-15-87
L30(F_1)	87005-81	12-18-87
SP1	87005-7	5-14-87
TC26	87005-38	8-28-87
TC24	87005-37	8-28-87
THM	87005-90	12-29-87
THM	87005-74	10-27-87
LTS12	89008-61	8-24-89
HGUS28-2 (Down)	89008-73	9-18-89
HGUS28-2 (Uplift)	89008-75	9-18-89
HGUS	89008-83	10-10-89
HGUS	89008-84	10-10-89
LUS210 (Torsion)	90111-108	2-08-91
A35F	92002.136	11-23-92
VBA	92002.265	6-30-93
THM	92002.106	10-20-92
THM	92002.117	10-14-92
THM-2	92002.114	10-14-92

ITEM	FILE	LAB	DATE
HSA	01329	M3034	3-26-86
HSA41	01329	M3034	3-26-86
HSA59	01329	M3051	3-28-86
HSA68	01329	M3051	3-28-86

Reports signed and sealed by David B. Jankowski, P.E.

ITEM	WORK NO.	DATE
A35(C_1)	85286	2-14-86
A35(C_2)	85286	2-14-86
A35(F)	85286	2-14-86

ITEM	FILE	LAB	DATE
SA36	01329	MD050	1-06-86

Report signed by R. C. Helminiak

ITEM	FILE	LAB	DATE
JP & J	060033	810136	10-27-78

Report signed by D. L. Olson

ITEM	FILE	LAB	DATE
FC-4	424	OL11-171	1-28-69

Reports signed and sealed by Ahmed M. Rashed, Ph.D., P.E.

ITEM	FILE	DATE
A34(F1)	94010.037	3-08-94
A35(F1)	94010.030	3-08-94
L30(F1)	94010.031	3-08-94
L50(F1)	94010.032	3-08-94
L90(F1)	94010.033	3-08-94
HGUS26-2	94010.065	4-11-94
HGUS(Uplift)	94010.038	3-17-94
HGUS(Uplift)	94010.039	3-17-94
HGUS210-2	94010.036	3-08-94

Report signed and sealed by Roger S. Tansley, P.E.

ITEM	FILE	DATE
HGUS28-2	94010.068	4-18-94
DS	95001.016	2-15-95
WB106	95001.062	4-17-95

Report signed and sealed by Paul E. Cox, P.E.

ITEM	FILE	DATE
MTS 30	97002.55	10-29-97

6.2 Structural calculations prepared by Simpson Strong-Tie Company, Inc.

Signed and sealed by Karen W. (Littleton) Colonias, P.E.

ITEM	DATE
TB	5-13-85
HST	7-14-86/rev. 9/14/93
MST	12-10-87/rev. 9/14/93
FHA	12-10-87
ST	12-10-87/rev. 9/14/97
TC	12-10-87
THM	2-02-88/ rev. 1-11-91
A34/35	12-10-87
FC	12-10-87
HH	12-10-87
L	12-10-87
NB & NC	12-10-87
SA	5-13-85
HSA	5-13-85
SP	12-10-87
A35/A35F	5-31-90
WB106/WB126	8-17-88
LTS	5-31-90
CS150	5-31-90
WBC	8-17-88
HGU	5-02-90/rev. 1/11/91
A35(F_2)	5-31-90
HGUS	4-15-91
A34,A35	9-14-93/rev. 6/21/94
A35F	5-17-93
FC	4-1-93/rev. 6/21/94
HH	9-14-93/rev. 6/21/94
L	9-14-93/rev. 6/21/94
NB/NC	9-14-93
NB/NC	9-15-93
SA/HSA	9-14-93/rev. 6/21/94
CMST12	9-14-93/rev. 6/21/94
ST	9-14-93/rev. 6/21/94
TB	9-14-93/rev. 6/21/94
TC	9-14-93/rev. 6/21/94
VB	9-14-93/rev. 6/21/94
VBP	9-14-93/rev. 6/21/94
THMA	9-2-93/rev. 6/21/94
THMA-2	9-2-93/rev. 6/21/94
TS,LTS	3-30-93/rev. 6/21/94
CS	9-14-93/rev. 6/21/94
WB/WBC	9-14-93/rev. 6/21/94
HGUS	9-14-93
WB/WBC	2-23-95

Signed and sealed by Evon M. C. Ballash, P.E.

ITEM	DATE
CMST14	8-16-94/rev. 10/19/95

Signed and sealed by Daphne N. Schoner, P.E.

ITEM	DATE
MTS30	3/16/98

6.3 Structural calculations for Nail-less Metal Bridging, prepared by Alan R. McKay and Associates, signed by Alan R. McKay, P.E., dated February 27, 1963.

6.4 Structural calculations prepared by Kenneth D. Smetts, Structural Engineer, signed and sealed by Kenneth D. Smetts, P.E.

ITEM	DATE
VB Knee Brace	4-06-76
JP & J Jack Piers	10-30-78

6.5 Structural calculations for 1991 NDS, sample nail and bolt calculations, 6/15/94, signed and sealed by Karen W. Colonias, P.E.

7.0 CONDITIONS OF USE

The National Evaluation Service Committee finds that Simpson Strong-Tie Company, Inc.'s connectors described in this report comply with the BOCA *National Building Code*/1996, the 1997 *Standard Building Code*, the 1997 *Uniform Building Code*, and the 1995 CABO One and Two Family Dwelling Code, subject to the following conditions:

7.1 Connector loads shall be determined in accordance with the applicable code. The allowable loads shall not exceed those shown in the tables of this report. Loads in the tables are based on the use of fasteners indicated in the tables, and limited to wood with a minimum specific gravity of 0.50 and a moisture content less than 19 percent. The scope of this evaluation report is limited to use of these connectors with lumber that has not been pressure treated with chemicals such as those for fire-retardant treatment and preservative treatment, or with metal studs as indicated in Section 3.2 of this report.

7.2 Allowable loads in the attached tables are for connectors only. All framing members shall be designed in accordance with the requirements of their appropriate design specifications as referenced in the applicable Model Code.

7.3 Loads designated as 100% are permitted to be adjusted for duration of load in accordance with the **1991 AFPA National Design Specification® for Wood Construction**.

7.4 Beams or headers supporting joists shall have the following minimum widths based on nail sizes attaching the hangers to the beams or headers:

NAIL SIZE	BEAM OR HEADER WIDTH
8d	1.57 inches (39.9 mm)
10d	1.78 inches (45.2 mm)
16d	1.94 inches (49.3 mm)

7.5 NC, NB, and TB Bridging shall be installed in pairs with spacing and location in accordance with the applicable code.

7.6 Where NC and NB Bridging is used on 16 inch (406 mm) deep joists, the joist spacing shall not exceed 16 inches (406 mm) on center.

7.7 The Simpson DS Drywall Stops have not been evaluated for use as a component of a fire-resistance rated assembly, or a horizontal diaphram.

7.8 Calculations shall be submitted at time of permit application. Calculations shall be signed and sealed by a registered professional engineer or architect when required by the adopted code.

7.9 This report is subject to re-examination on a periodic basis. For information on the current status of this report, contact the ICC-ES.

TABLE 1

A35F FRAMING ANCHOR			
TYPE OF CONNECTION	DIRECTION OF LOAD	ALLOWABLE LOADS	
		FLOOR (100)	ROOF (125)
See A35F Illustration	G	500	500
	J	265	265
	H	440	440

TABLE 2

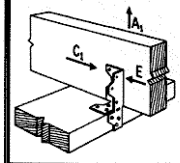
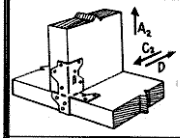
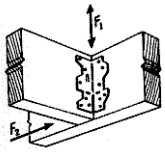
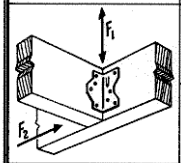
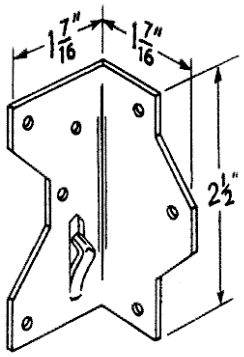
A35 FRAMING ANCHOR			
TYPE OF CONNECTION	DIRECTION OF LOAD	ALLOWABLE LOADS	
		FLOOR (100)	ROOF (125)
	A_1 E	260	320
	C_1	170	170
	A_2	260	320
	C_2	260	315
	D	150	150
	F_1	450	450
	F_2	515	645

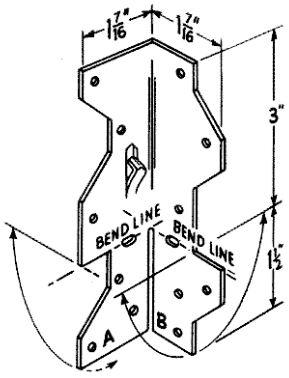
TABLE 3

A34 FRAMING ANCHOR			
TYPE OF CONNECTION	DIRECTION OF LOAD	ALLOWABLE LOADS	
		FLOOR (100)	ROOF (125)
	F_1	345	365
	F_2	280	280

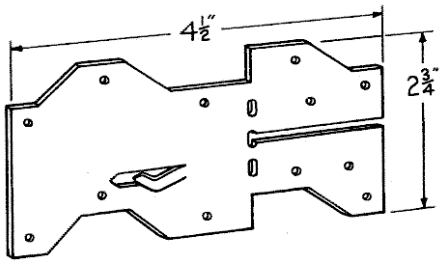
1. A34: Use (8) 8d x 1½" nails. A35/A35F: Use (12) 8d x 1½" nails



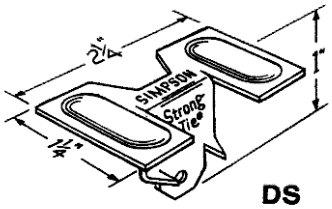
A34
Figure 1



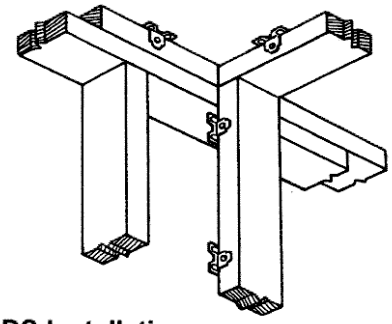
A35
Figure 2



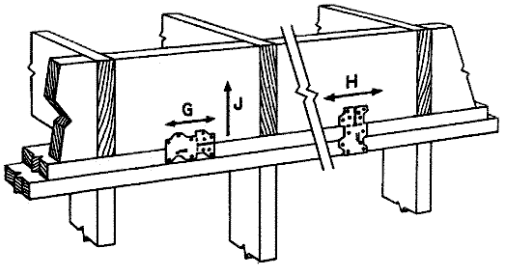
A35F
Figure 3



DS
Figure 4



Typical DS Installation



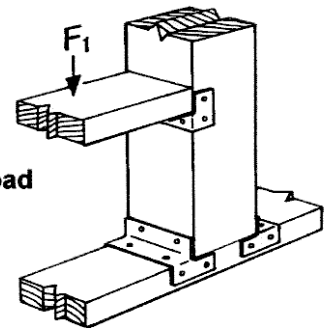
Typical A35F Installations to Transfer Shear Forces

Figure 5

TABLE 4 - FC FRAMING CLIPS

MODEL NO.	W	FASTENERS	MAXIMUM ALLOWABLE LOADS
			F_1
FC4	3 9/16	8-16d	800
FC6	5 1/2	10-16d	920
FC8	7 1/2	12-16d	920

1. Minimum lumber thickness shall be 2½" to achieve the table load value.



Typical FC Load Direction

Figure 6

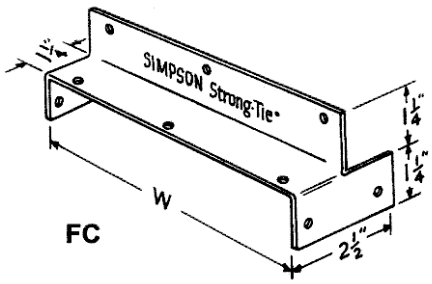
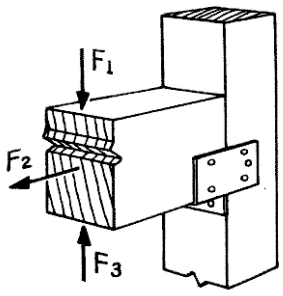


Figure 7

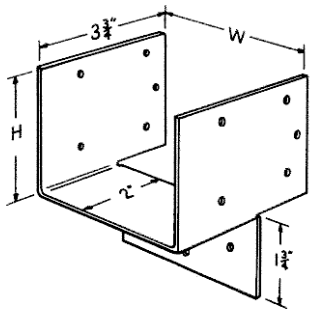
TABLE 5 - HH HEADER HANGERS

MODEL NO.	W	H	FASTENERS		ALLOWABLE LOADS		
			STUD	HEADER	F_1	F_2	F_3
HH4	3 9/16	2 7/8	9-16d	4-16d	1195	530	530
HH6	5 1/2	5 1/4	12-16d	6-16d	1595	800	800

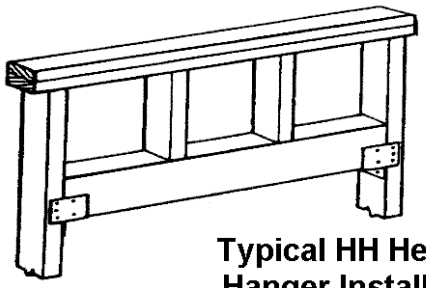
1. Minimum Lumber thickness shall be 2½ " to achieve table load values.
2. Loads provided above are at 100% duration. Increases not to exceed 25% shall be permitted according to code.



HH Load Directions
Figure 8



HH4
Figure 9



Typical HH Header Hanger Installtion

Figure 10

TABLE 6 - J AND JP FLOOR JACKS

MODEL NO.	DIMENSIONS		MAXIMUM ALLOWABLE BEARING LOADS
	H (MIN-MAX)	THREADED ROD LENGTH	
JP44	2 - 4	4¾	4440
J57	5 - 7	4	4380
J813	8 - 13	8	4380

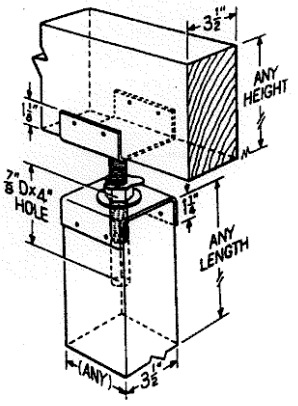


Figure 11

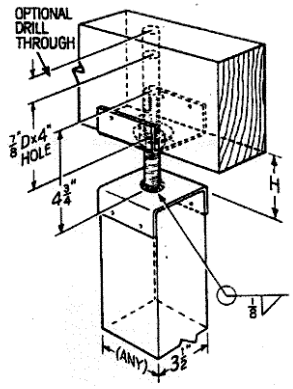


Figure 12

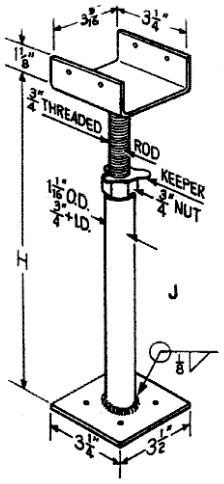
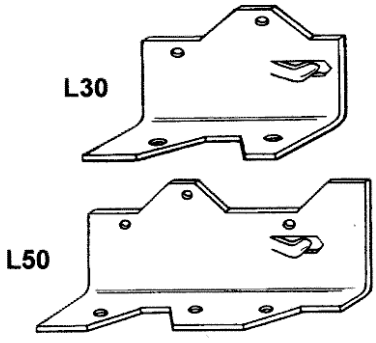


Figure 13

TABLE 7 - L REINFORCING ANGLES

MODEL NO.	LENGTH	TOTAL NUMBER OF FASTENERS	ALLOWABLE LOADS			
			F_1		F_2	
			100%	125%	100%	125%
L30	3	4-10d	220	240	220	280
L50	5	6-10d	335	415	335	415
L70	7	8-10d	445	555	445	555
L90	9	10-10d	555	695	555	695

1. Minimum lumber thickness shall be 2½ " to achieve the table load values. Reduce table values by 10% for 1½" member thickness.



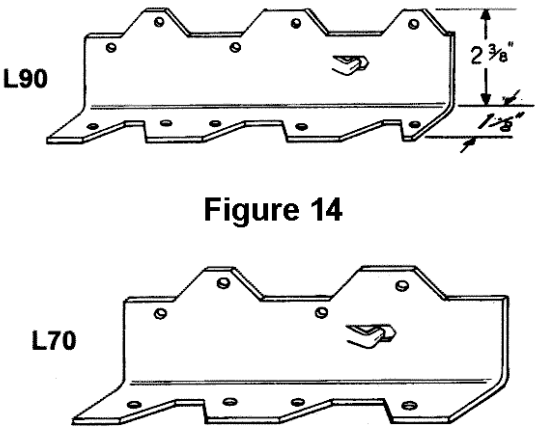
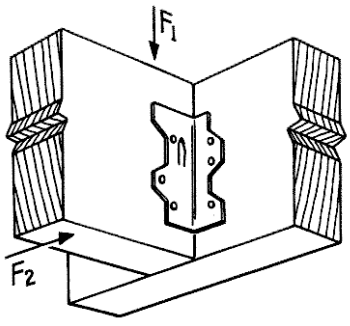
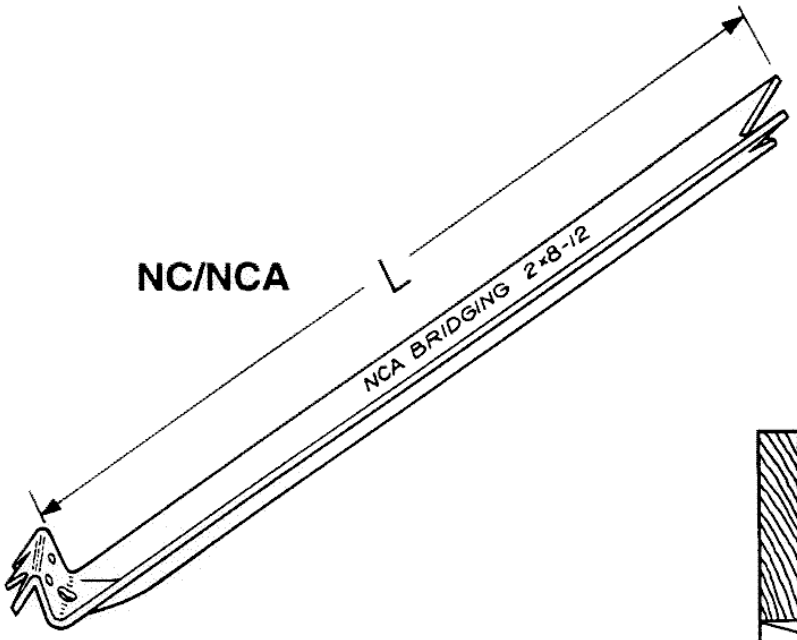
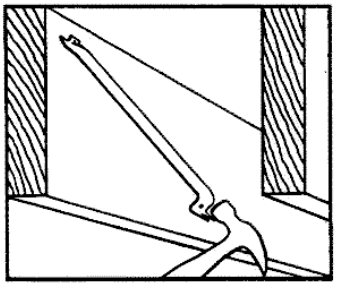


Figure 14



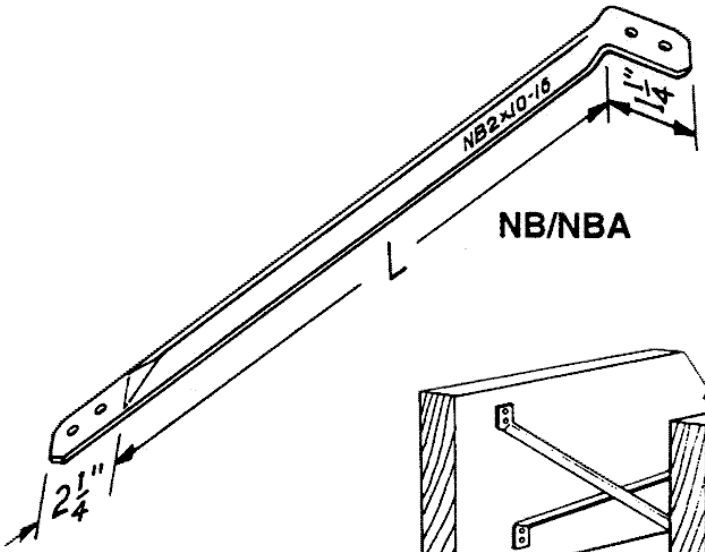
Typical L50 Installation





Install from below as shown, or from above. Drive upper end into joist approximately 1" from top.

Figure 15



Typical NBA installation. Space adjacent pieces of bridging apart to avoid contact noises.

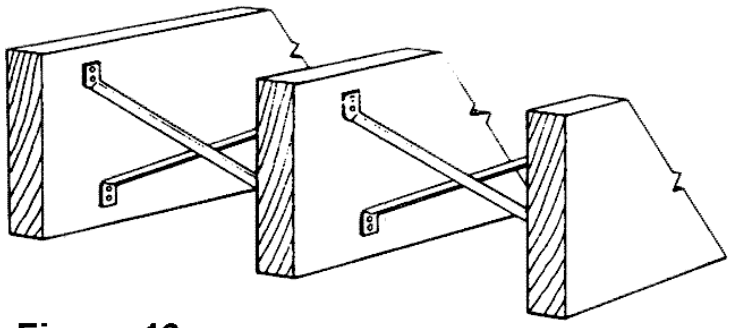
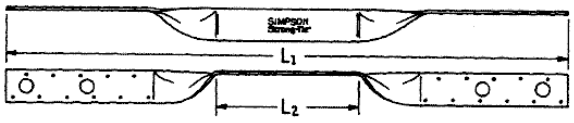


Figure 16

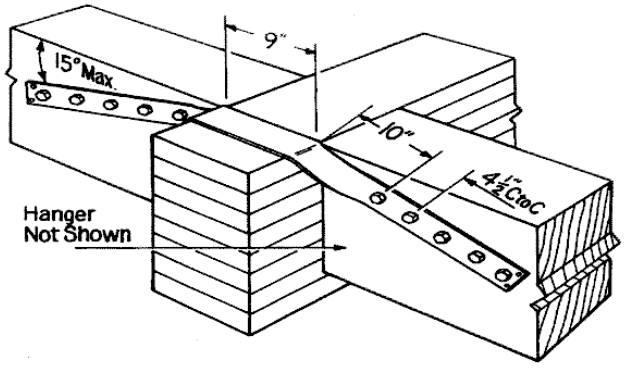
TABLE 8 - SA AND HSA STRAP ANCHORS

MODEL NO.	STRAP SECTION	DIMENSIONS		FASTENERS (TOTAL)		MAX. ALLOWABLE HORIZONTAL LOADS	
		L_1	L_2	NAILS	BOLTS	NAILS	BOLTS
SA36	12 ga. × 2-1/16	36	9	22 - 16d	4 - 1/2	1900	1605
HSA32	3 ga. × 3	32	9	—	2 - 3/4	—	1910
HSA41	3 ga. × 3	41	9	—	4 - 3/4	—	3770
HSA50	3 ga. × 3	50	9	—	6 - 3/4	—	5470
HSA59	3 ga. × 3	59	9	—	8 - 3/4	—	6940
HSA68	3 ga. × 3-1/2	68	9	—	10 - 3/4	—	8350

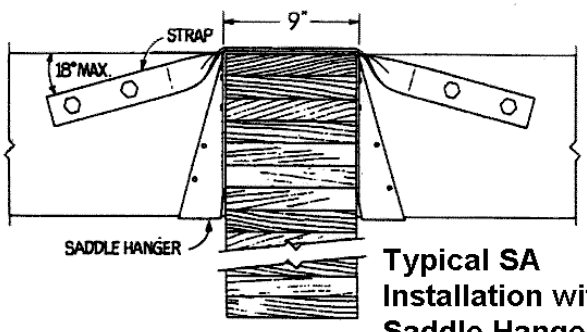
1. Allowable loads have been increased 33% for earthquake or wind loading with no further increase allowed.



SA Strap Connector
Figure 17



Typical HSA Installation
Figure 18



Typical SA Installation with Saddle Hanger

Figure 19

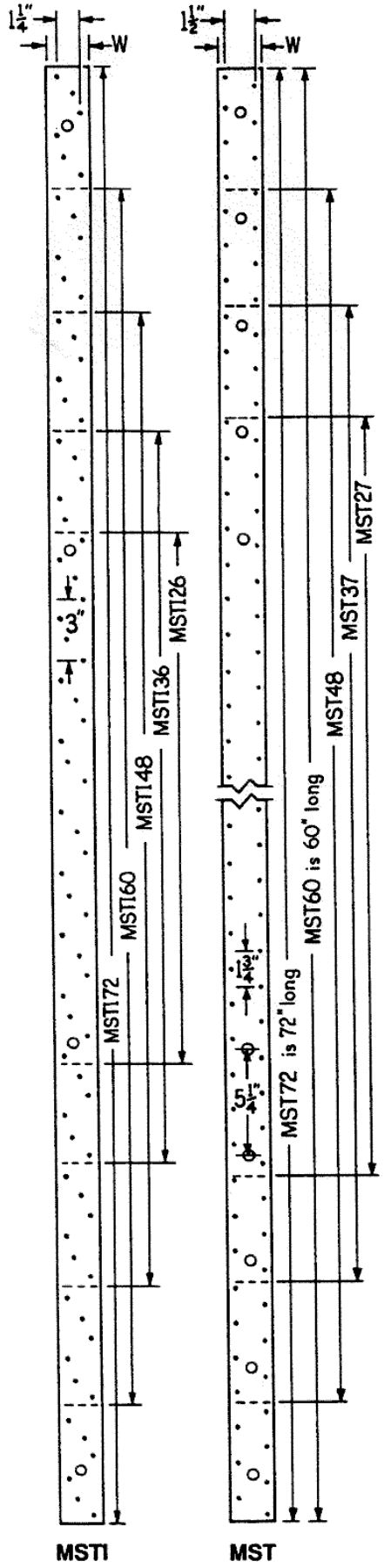
TABLE 9A - CMST/ST/FHA/MSTI/MST/HST STRAP TIES

MODEL NO.	MATL	DIMENSIONS		FASTENERS		ALLOWABLE LOADS	
		W	L	NAILS	BOLTS	NAILS	BOLTS
ST292	20 ga.	2 1/16	9 5/16	12 - 16d	---	790	---
ST2122	20 ga.	2 1/16	12 13/16	16 - 16d	---	1070	---
ST2115	20 ga.	3/4	16 5/16	10 - 16d	---	450	---
ST2215	20 ga.	2 1/16	16 5/16	20 - 16d	---	1270	---
ST6215	16 ga.	2 1/16	16 5/16	20 - 16d	---	1330	---
ST6224	16 ga.	2 1/16	23 5/16	28 - 16d	---	1890	---
ST6236	14 ga.	2 1/16	33 13/16	40 - 16d	---	2575	---
ST9	16 ga.	1 1/4	9	8 - 16d	---	530	---
ST12	16 ga.	1 1/4	11 5/8	10 - 16d	---	665	---
ST18	16 ga.	1 1/4	17 3/4	14 - 16d	---	900	---
ST22	16 ga.	1 1/4	21 5/8	18 - 16d	---	1025	---
FHA6	12 ga.	1 7/16	6 3/8	8 - 16d	---	550	---
FHA9	12 ga.	1 7/16	9	8 - 16d	---	550	---
FHA12	12 ga.	1 7/16	11 5/8	8 - 16d	---	550	---
FHA18	12 ga.	1 7/16	17 3/4	8 - 16d	---	550	---
FHA24	12 ga.	1 7/16	23 7/8	8 - 16d	---	550	---
FHA30	12 ga.	1 7/16	30	8 - 16d	---	550	---
MSTI26	12 ga.	2 1/16	26	26 - 10d x 1 1/2	---	1130	---
MSTI36	12 ga.	2 1/16	36	36 - 10d x 1 1/2	---	1565	---
MSTI48	12 ga.	2 1/16	48	48 - 10d x 1 1/2	---	2135	---
MSTI60	12 ga.	2 1/16	60	60 - 10d x 1 1/2	---	2760	---
MST27	12 ga.	2 1/16	27	30 - 16d	4 - 1/2	2070	1295
MST37	12 ga.	2 1/16	37 1/2	42 - 16d	6 - 1/2	2860	1825
MST48	12 ga.	2 1/16	48	46 - 16d	8 - 1/2	3345	2225
MST60	10 ga.	2 1/16	60	56 - 16d	10 - 1/2	4350	2670
HST2	7 ga.	2 1/2	21 1/4	---	6 - 5/8	---	3130
HST5	7 ga.	5	21 1/4	---	12 - 5/8	---	6380
HST3	3 ga.	3	25 1/2	---	6 - 3/4	---	4645
HST6	3 ga.	6	25 1/2	---	12 - 3/4	---	9350
CMST12	12 ga.	3	40'	118 - 10d	---	7230	---
CMST12	12 ga.	3	40'	100 - 16d	---	7230	---
CMST14	14 ga.	3	52 1/2 '	88 - 10d	---	5095	---
CMST14	14 ga.	3	52 1/2 '	74 - 16d	---	5095	---
MST72	12 ga.	2 1/16	72	56 - 16d	10 - 1/2	4350	2670
MSTI72	12 ga.	2 1/16	72	72 - 10d x 1 1/2	---	3310	---

1. Loads provided above are at 100% duration. Increases not to exceed 33% shall be permitted if in accordance with the code.

TABLE 9B - STRAP TIE MATERIAL SPECIFICATIONS

MODEL NO.	ASTM DESIGNATION	YIELD STRENGTH (KPSI)	TENSILE STRENGTH (KPSI)
ST292	A-653 CQ	24	32
ST2122	A-653 LFQ	32	43
ST2115	A-653 LFQ	36	48
ST2215	A-653 LFQ	36	48
ST6215	A-653 LFQ	28	38
ST6224	A-653 LFQ	34	46
ST6236	A-653 LFQ	36	48
ST9	A-653 LFQ	28	38
ST12	A-653 LFQ	28	38
ST18	A-653 LFQ	28	38
ST22	A-653 LFQ	32	43
FHA6	A-653 CQ	28	38
FHA9	A-653 CQ	28	38
FHA12	A-653 CQ	28	38
FHA18	A-653 CQ	28	38
FHA24	A-653 CQ	28	38
FHA30	A-653 CQ	28	38
MSTI26	A-653 CQ	20	27
MSTI36	A-653 CQ	20	27
MSTI48	A-653 CQ	24	32
MSTI60	A-653 CQ	30	40
MSTI72	A-653 CQ	30	40
MST27	A-653 CQ	28	38
MST37	A-653 CQ	36	48
MST48	A653 SQ GRADE 40 SPECIAL	42	56
MST60	A653 SQ GRADE 40 SPECIAL	42	56
MST72	A653 SQ GRADE 40 SPECIAL	42	56
HST2	A570 GRADE 33	33	52
HST5	A570 GRADE 33	33	52
HST3	A570 GRADE 33	33	52
HST6	A570 GRADE 33	33	52
CMST12	A653 SQ GRADE 40 SPECIAL	42	56
CMST14	A653 SQ GRADE 33	42	56
MST72	A653 SQ GRADE 40 SPECIAL	42	56
MSTI72	A653 CQ	30	40


1¼"
W
MSTI72
MSTI60
MSTI48
MSTI36
MSTI26
3"
MSTI
1½"
W
MST72 is 72" long
MST60 is 60" long
MST48
MST37
MST27
MST

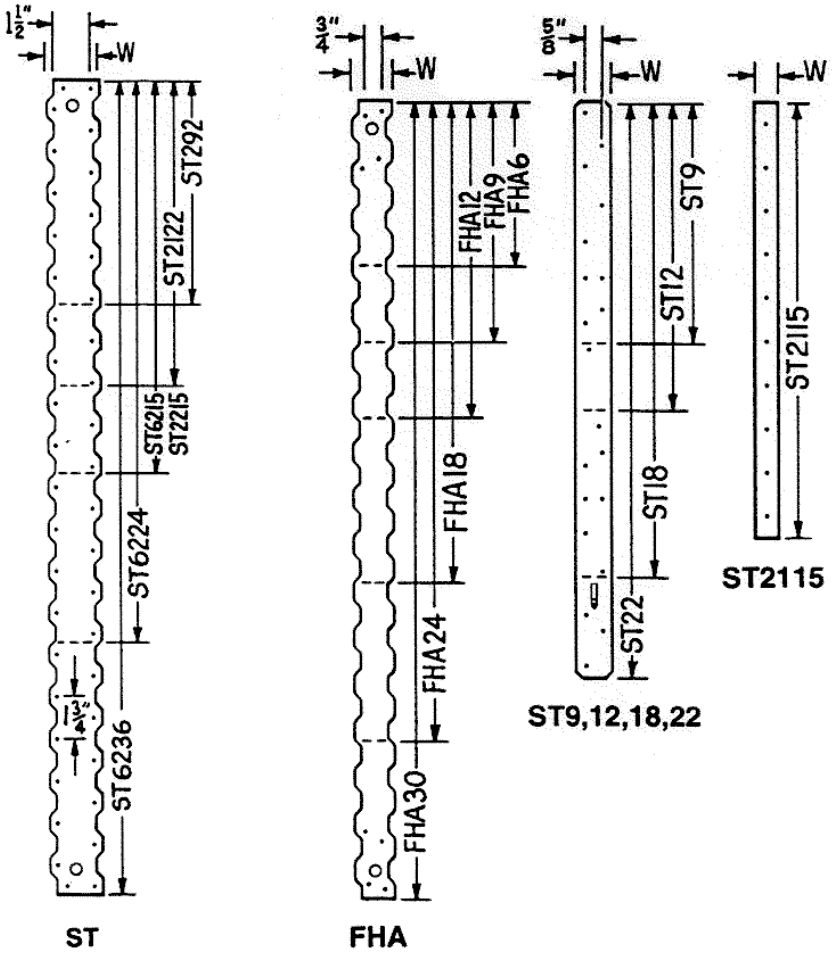
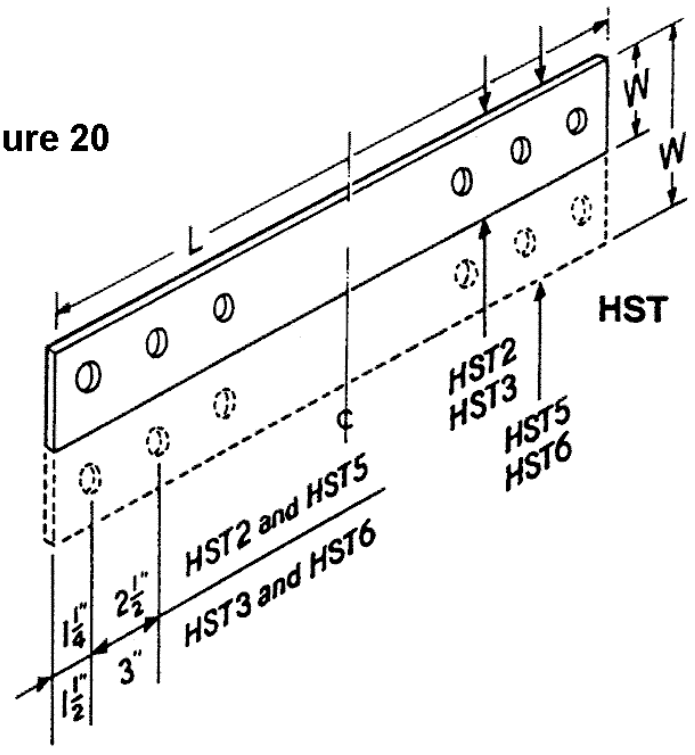

1½"
W
ST292
ST2122
ST6215
ST2215
ST6224
ST6236
3"
ST
¾"
W
FHA12
FHA9
FHA6
FHA18
FHA24
FHA30
FHA
5"
8"
W
ST9
ST12
ST18
ST22
ST9,12,18,22
W
ST2115
ST2115

Figure 20


W
W
L
HST
HST2
HST3
HST5
HST6
HST2 and HST5
HST3 and HST6
2½"
1¼"
3"
1½"

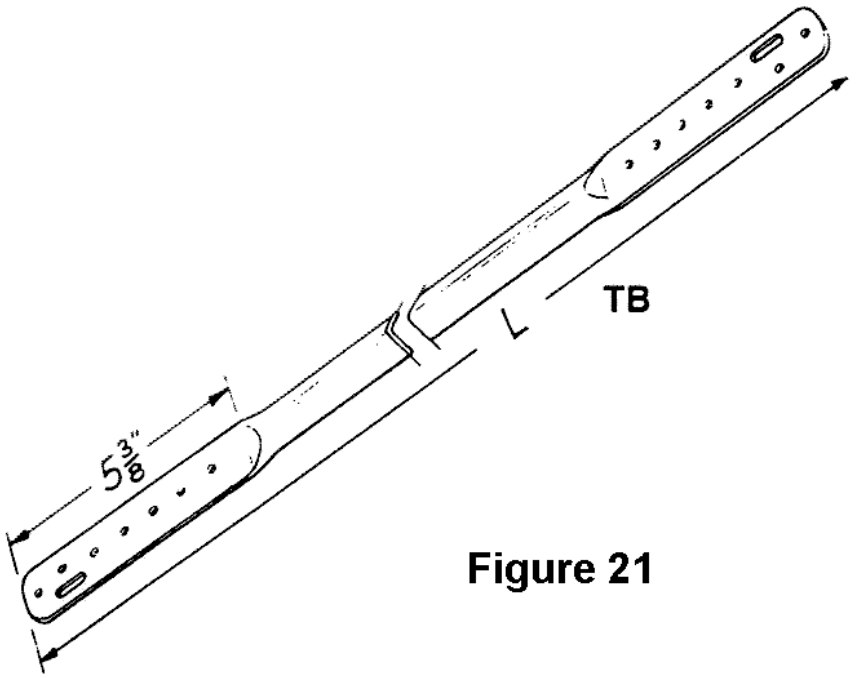


Figure 21

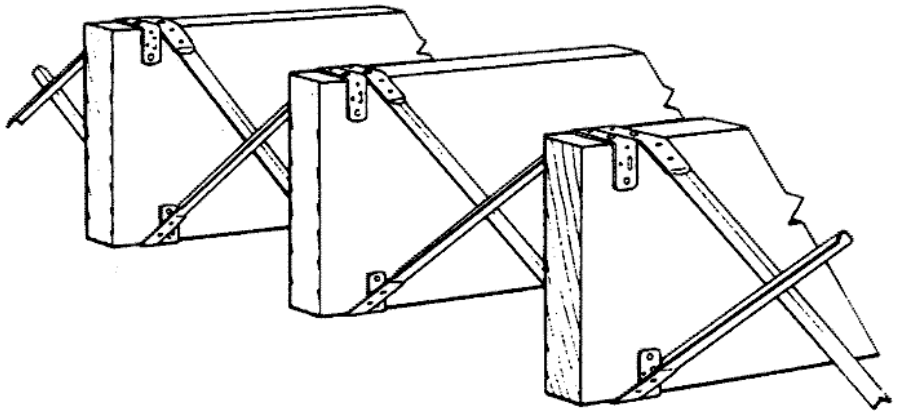


TABLE 10 — TC TRUSS CONNECTORS

MODEL NO.	FASTENERS		MAXIMUM ALLOWABLE LOADS	
	TRUSS	PLATE	UPLIFT	LATERAL [1]
TC24	4 - 10d	4 -10d	500	165
TC26	5 - 10d	6 - 10d	625	265

1. The lateral load is parallel to the top plate.

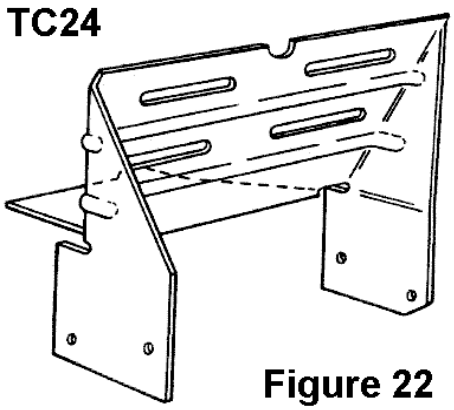


Figure 22

TABLE 11 — VBP AND VP KNEE BRACE

MODEL NO.	H (BEAM DEPTH)	L	FASTENERS (TOTAL)	ALLOWABLE TENSION LOADS [1]	
				FLOOR (100)	MAXIMUM (133)
VB-5	10" - 15"	5'	16 - N54A	990	1240
VB-7	15" - 22-1/2"	7'	16 - N54A	990	1240
VB-8	22-1/2" - 28-1/2"	8'	16 - N54A	990	1240
VB-10	28-1/2" - 36"	10'	16 - N54A	990	1240
VB-12	36" - 42"	12'	16 - N54A	990	1240
VBP-5	10" - 15"	41"	18 - N54A	990	1240
VBP-7	15" - 22-1/2"	53"	18 - N54A	990	1240
VBP-8	22-1/2" - 28-1/2"	59"	18 - N54A	990	1240
VBP-10	28-1/2" - 36"	71"	18 - N54A	990	1240
VBP-12	36" - 42"	83"	18 - N54A	990	1240

1. Values shown are for tension only, for either leg when installed with N54A fasteners. Use of the VBP and VB Knee Brace to resist compression load, is beyond the scope of this report.

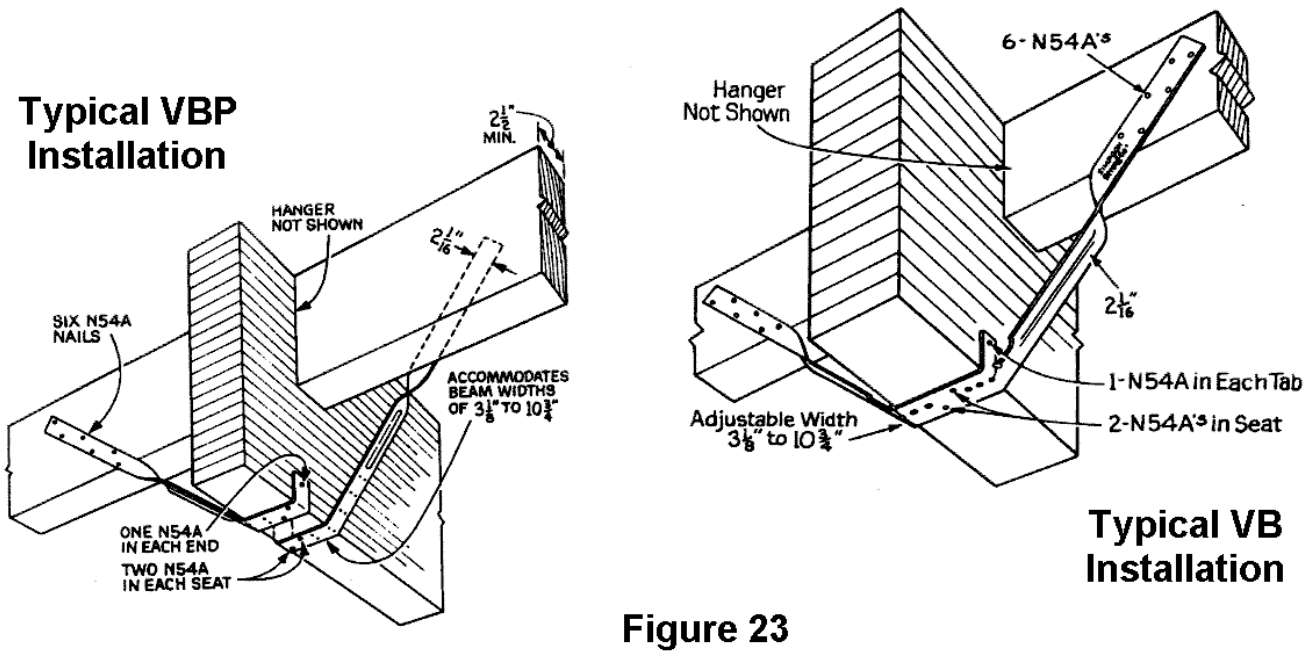
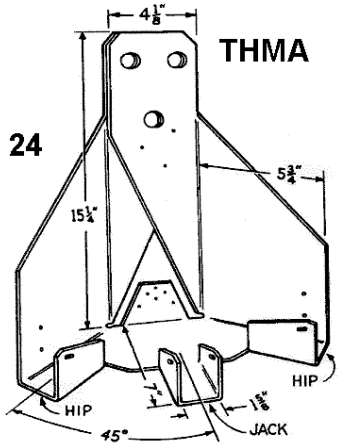
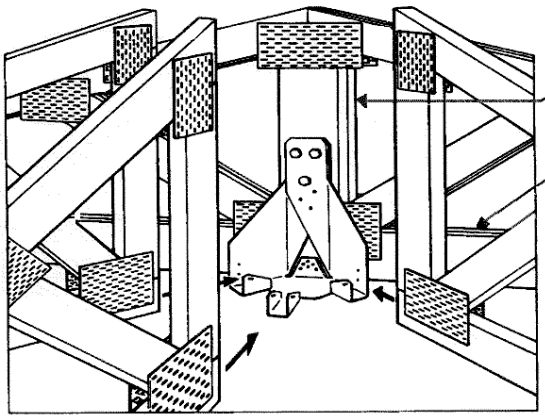


Figure 23

Figure 24



Typical THMA Installation



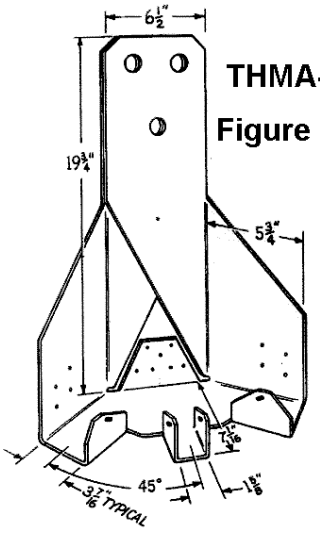


Figure 25

MODEL NO.	FASTENERS			
	CARRYING MEMBER		CARRIED MEMBER	
	BOLTS	NAILS	HIP	JACK
THMA	3 - ¾	9 - 16d	3 - 10d X 1½	2 - 10d X 1½

TABLE 12A

MODEL NO.	DOUG FIR-LARCH & SO. PINE ALLOWABLE LOADS[5]											
	UPLIFT		LENGTH OF BOLT IN CARRYING MEMBER	FLOOR (100)		ROOF						
						SNOW (115)		CONST (125)		WIND (133)		
	HIP	JACK		HIP	JACK	HIP	JACK	HIP	JACK	HIP	JACK
THMA	185	185	1½	865	435	995	500	1085	540	1155	575
			3	1680	840	1935	965	2100	1050	2240	1120
			4½	1825	915	2100	1050	2280	1140	2435	1215
			6	1825	915	2100	1050	2280	1140	2435	1215

MODEL NO.	FASTENERS			
	CARRYING MEMBER		CARRIED MEMBER	
	BOLTS	NAILS	HIP	JACK
THMA-2	3 - 1	9 - 16d	5 - 10d X 1½	2 - 10d X 1½

TABLE 12B

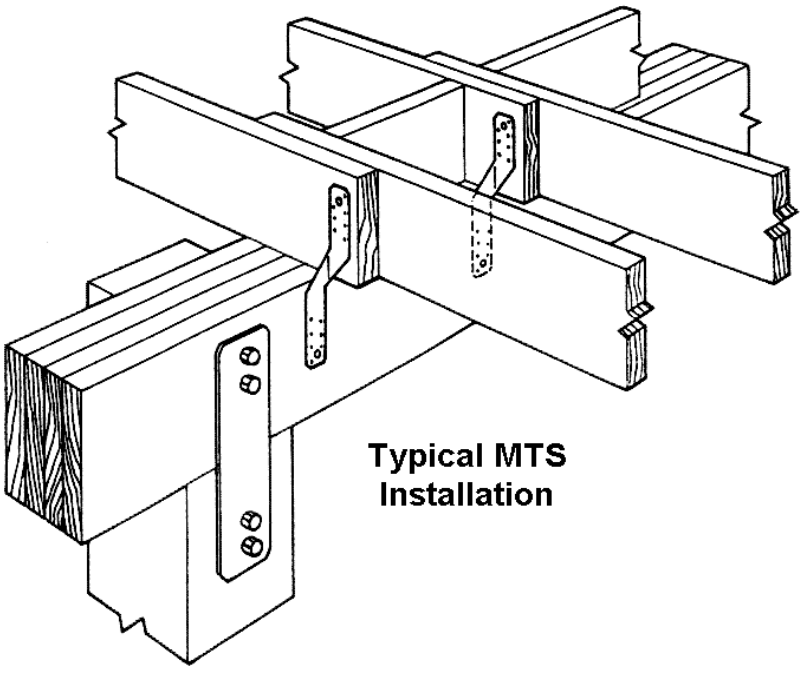
MODEL NO.	DOUG FIR-LARCH & SO. PINE ALLOWABLE LOADS[5]											
	UPLIFT		LENGTH OF BOLT IN CARRYING MEMBER	FLOOR (100)		ROOF						
						SNOW (115)		CONST (125)		WIND (133)		
	HIP	JACK		HIP	JACK	HIP	JACK	HIP	JACK	HIP	JACK
THMA-2	520	250	1½	1155	575	1330	665	1445	720	1535	770
			3	2240	1120	2580	1290	2800	1400	2980	1490
			4½	3240	1620	3730	1865	3880	1940	3880	1940
			6	3240	1620	3730	1865	3880	1940	3880	1940

1. Allowable loads are per member.
2. Snow, construction and wind loads are 115%, 125%, and 133% of floor live load, respectively, unless limited by other criteria.
3. Uplift loads include a 33% increase for wind or earthquake loading with no further increase allowed. Reduce the uplift by 33% for normal loading criteria such as cantilever construction.
4. Minimum lumber specific gravity is G = .50.
5. The hip members are the diagonal members as indicated in Figure 24.

TABLE 13 — LIGHT TWISTS STRAP

MODEL NO.	DIMENSIONS L	FASTENERS [2] (TOTAL)	MAX. ALLOWABLE [3, 4] LOADS
LTS12	12	12 - 10d	775
LTS16	16	12 - 10d	775
LTS18	18	12 - 10d	775
LTS20	20	12 - 10d	775
MTS12	12	14 - 10d	1000
MTS16	16	14 - 10d	1000
MTS18	18	14 - 10d	1000
MTS20	20	14 - 10d	1000
MTS30	30	14 - 10d	995

1. LTS12 through LTS20 and MTS12 through MTS20 have additional nail holes.
2. Install half of the fasteners on each end of the strap to achieve the full load.
3. Fasteners are common nails.
4. Multiply the maximum allowable load by 0.92 if 10d × 1-1/2" nails are used instead of 10d commons.
5. A load duration adjustment of 33% has already been applied.



Typical MTS Installation

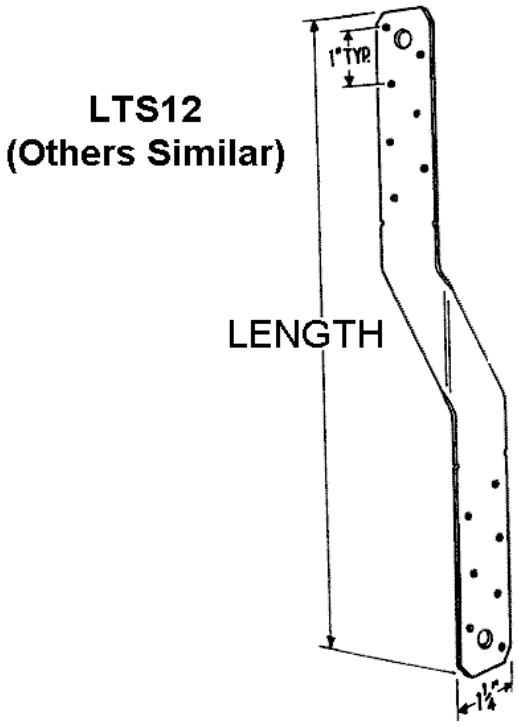


Figure 26

TABLE 14 — CS COILED STRAP

DOUGLAS FIR-LARCH and SOUTHERN PINE [3]					
MODEL NO.	FASTENERS TOTAL	END LENGTH	CUT LENGTH	ALLOWABLE LOADS 100% [2]	ALLOWABLE LOADS 133%
CS16	28 - 8d	15	Clear Span + 30	1235	1650
	22 - 10d	12	Clear Span + 24	1235	1650
CS18	22 - 8d	12	Clear Span + 24	950	1270
	18 - 10d	10	Clear Span + 20	950	1270
CS20	18 - 8d	10	Clear Span + 20	750	1005
	14 - 10d	8	Clear Span + 16	750	1005
CS22	14 - 8d	8	Clear Span + 16	620	825
	12 - 10d	6-1/2	Clear Span + 13	620	825
SPRUCE-PINE FIR [3]					
MODEL NO.	FASTENERS TOTAL	END LENGTH	CUT LENGTH	ALLOWABLE LOADS 100% [2]	ALLOWABLE LOADS 133%
CS16	32 - 8d	15-3/4	Clear Span + 31-1/2	1235	1650
	26 - 10d	13-1/4	Clear Span + 26-1/2	1235	1650
CS18	24 - 8d	11-3/4	Clear Span + 23-1/2	950	1270
	20 - 10d	9-3/4	Clea Span + 19-1/2	950	1270
CS20	20 - 8d	9-3/4	Clear Span + 19-1/2	750	1005
	16 - 10d	7-3/4	Clear Span + 15-1/2	750	1005
CS22	16 - 8d	7-3/4	Clear Span + 15-1/2	620	825
	14 - 10d	7-1/4	Clear Span + 14-1/2	620	825

1. When applicable LB/NAIL 100% value shall be increased for load duration according to the code.
2. ALLOWABLE LOADS 100% value is the maximum steel capacity and shall not be increased for duration of load except as otherwise indicated.
3. Minimum lumber specific gravity is G = .50 for Douglas Fir-Larch and Southern Pine lumber and G = .42 for Spruce-Pine Fir lumber.

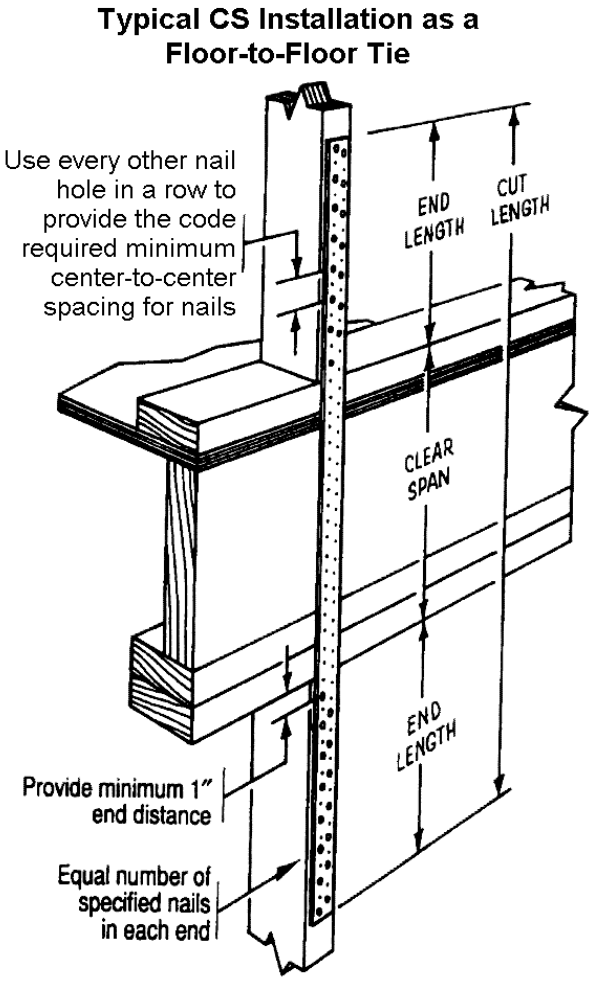
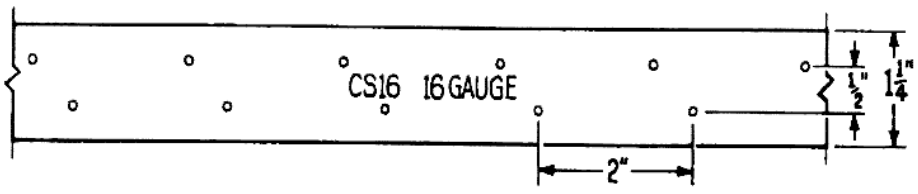


Figure 27



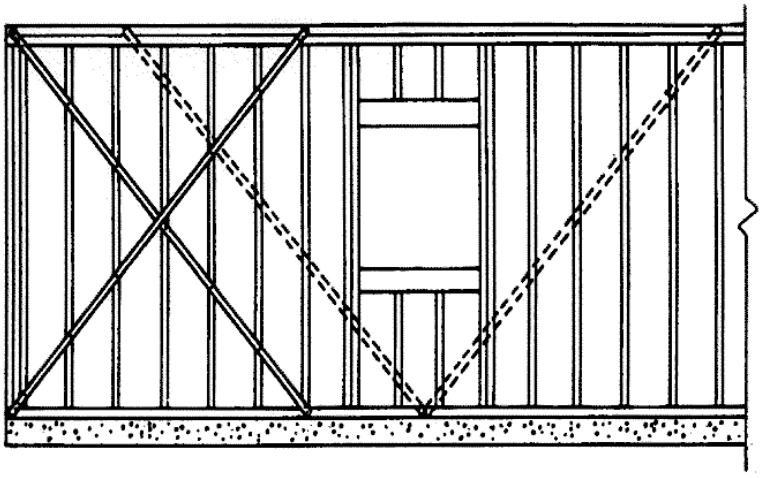
CS16 Hole Pattern
(all other CS straps similiar)

Figure 28

TABLE 15 — WB WALL BRACING

MODEL NO.	DIMENSIONS		PARTS PER CARTON	ANGLE AND WALL SIZE	FASTENERS	
	PART LENGTH	WIDTH			PLATES	STUDS
WB106C	9' - 6"	1¼	15	8' @ 60"	3 - 16d	1 - 8d
WB126C	11' - 4¾"	1¼	12	8' @ 45"	3 - 16d	1 - 8d
WB143C	14" - 3"	1¼	10	10' @ 45"	3 - 16d	1 - 8d

1. The WB shall be installed in pairs.
2. The WB is designed to resist wall racking during construction. It is not designed to replace a shear wall.
3. The WB is 1¼ inches wide with nails spaced 1 inch on center along the strap and ½ inch apart.
4. The product can be ordered flat (WB) or coiled (WBC).
5. Maximum load capacity is 180 lbs.



WB Wall Bracing "X" and "V" Applications

Figure 29

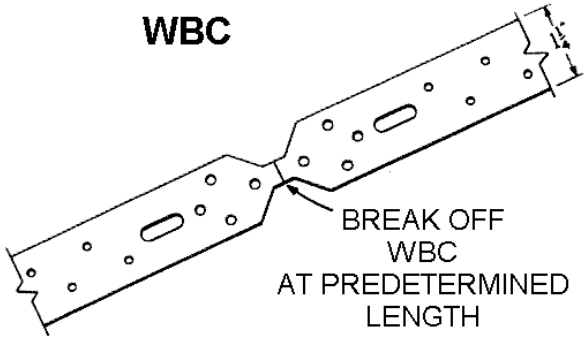


Figure 30

TABLE 16A — HGUS HANGERS

SOUTHERN YELLOW PINE [4]										
	DIMENSIONS			FASTENERS			ALLOWABLE LOADS			
MODEL NO.	W	H	B	JOIST [2]	HEADER	UPLIFT [1]	100%	115%	125%	133%
HGUS26-2	3-7/16	4-1/2	4	8-16d	20 -16d	2000	3985	4580	4835	4835
HGUS28-2	3-7/16	6-1/2	4	10 -16d	36 -16d	2650	6605	6665	6665	6665
HGUS210-2	3-7/16	8-1/2	4	12 -16d	46 -16d	3665	7165	7165	7165	7165
HGUS46	3-9/16	4-7/16	4	8 - 16d	20 - 16d	2000	3985	4580	4835	4835
HGUS48	3-9/16	6-7/16	4	10 - 16d	36 - 16d	2650	6605	6665	6665	6665
HGUS410	3-9/16	8-7/16	4	12 - 16d	46 - 16d	3665	7165	7165	7165	7165

TABLE 16B

DOUGLAS FIR [4]										
	DIMENSIONS			FASTENERS			ALLOWABLE LOADS			
MODEL NO.	W	H	B	JOIST [2]	HEADER	UPLIFT [1]	100%	115%	125%	133%
HGUS26-2	3-7/16	4-1/2	4	8-16d	20 -16d	2000	3695	4250	4620	4835
HGUS28-2	3-7/16	6-1/2	4	10 -16d	36 -16d	2650	6140	6665	6665	6665
HGUS210-2	3-7/16	8-1/2	4	12 -16d	46 -16d	3385	7165	7165	7165	7165
HGUS46	3-9/16	4-7/16	4	8 - 16d	20 - 16d	2000	3695	4250	4620	4835
HGUS48	3-9/16	6-7/16	4	10 - 16d	36 - 16d	2650	6140	6665	6665	6665
HGUS410	3-9/16	8-7/16	4	12 - 16d	46 - 16d	3385	7165	7165	7165	7165

1. Uplift loads have been increased 33% for wind or earthquake loading, no further increase allowed.
2. Nails driven into the joist are driven at an angle through the joist into the header.
3. The connectors provide a torsional resistance up to a maximum joist depth of 44".
4. Minimum lumber specific gravity is G = .50 for Douglas Fir and G = .55 for Southern Yellow Pine.

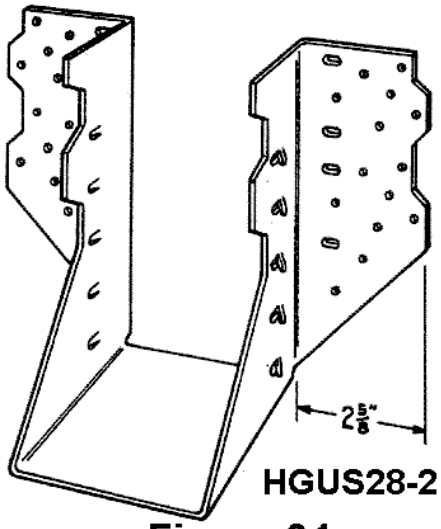


Figure 31

GENERAL NOTES

1. The allowable loads shown in Tables No. 1 through No. 16 are in pounds. Dimensions in inches.

2. Allowable loads are based on Douglas Fir Larch, specific Gravity G = 0.50 unless noted otherwise. If the connectors are used on lesser grades or other types of wood than those specified in this report, load capacities shall be verified by tests or calculations by a registered professional engineer.

3. The bolts are ASTM A 307 and the bolt design values are based on the 1991 edition of the National Design Specifications.

4. Unless noted, no load duration increases are allowed.

5. Unless otherwise noted, uplift loads have been increased 1.33 for wind or earthquake loading with no further increase allowed.

6. All multiple members shall be fastened together to act as a single unit.

7. Allowable loads noted in the design tables are for fasteners only. All framing members shall be designed in accordance with the requirements of their appropriate design specifications as referenced in the adopted Building Code.

8. The connectors have not been evaluated for simultaneous loading conditions. Allowable loads shown in the tables for uplift and lateral load shall not be combined. When designing using metal connectors, the connectors shall be assumed to resist loads in one direction only.

9. 1lbf = 4.45 N 1 in = 25.4 mm