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ICC-ES Evaluation Report

ESR-3516

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Issued 11/2018
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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
SECTION: 06 17 00—SHOP-FABRICATED STRUCTURAL WOOD

REPORT HOLDER:

DT BUILDING COMPONENTS

EVALUATION SUBJECT:

DT HEADERS, DT CHANNELS, AND DT OS CORNERS



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Section: 06 17 00—Shop-Fabricated Structural Wood

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1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2015 and 2012 *International Building Code*® (IBC)
- 2015 and 2012 *International Residential Code*® (IRC)

Property evaluated:

- Structural

2.0 USES

The DT Headers, DT Channels, and DT OS Corners in this evaluation report are alternatives to sawn lumber framing for use, respectively, as headers and load-bearing- and non-load-bearing wall studs in Type V-B construction.

3.0 DESCRIPTION

3.1 General:

The DT Headers, DT Channels, and DT OS Corners are factory-fabricated, box-shape structural elements, with or without foam plastic insulation, and have dimension sawn lumber top and bottom flanges and a double web as specified in the quality documentation that contains the manufacturing standards. The top and bottom flanges are parallel, creating constant-depth. Web sections are a continuous web. The web-to-flange connection is a proprietary grooved connection, also conforming to the quality documentation. The webs are glued to flanges using structural, wet-use adhesives.

The DT Headers, DT Channels, and DT OS Corners are available in lengths, depths, and configurations shown in Tables 1, 2 and 3. The DT Headers are allowed to be field-cut to the design lengths.

3.2 Material:

3.2.1 Flanges: Flange materials are nominal 2 by 4 or 2 by 6 dimension sawn lumber that complies with U.S. Voluntary Product Standard PS 20 and the approved quality documentation.

3.2.2 Web: Web material is oriented strand board (OSB) that complies with U.S. Voluntary Product Standard PS 2 for Performance Category 23/32, Exposure 1, 48/24 rated sheathing and the approved quality documentation.

3.2.3 Adhesive: Adhesives used in the fabrication of DT Headers, DT Channels, and DT OS Corners are exterior-type, heat durable adhesives complying with ASTM D2559 and ASTM D7247 and are specified in the approved quality documentation.

3.2.4 Foam Plastic Insulation: The foam plastic core is a nominal density of 2 pound-per-cubic-foot, poured-in-place, two-component polymeric MDI based system, complying the specifications in the approved quality documentation. The foam plastic core, when tested in accordance with ASTM E84, has a flame spread index of 25 or less and a smoke developed index of 450 or less.

4.0 DESIGN AND INSTALLATION

Design of the DT Headers, DT Channels, and DT Corners described in this evaluation report is governed by the *ANSI/AWC National Design Specification*® (NDS) for *Wood Construction*, and the applicable code. Additionally, the design and installation of the DT Headers, DT Channels, and DT Corners must comply with Sections 4.1 through 4.5, Tables 1 through 5, Figures 1 through 3, and the manufacturer's published installation instructions.

4.1 Reference Design Values:

The reference design moment (M_r), bending stiffness (EI), vertical shear (V_r), end reaction (R_r), and flange bearing capacities for DT Headers are given in Table 4. The reference uniform loads for DT Headers are given in Table 5. The reference design values in Tables 4 and 5 are for DT Headers installed as single span beams. Adjustment to the reference design values, except for EI in Table 4, must be made in accordance with Sections 4.1.1 through 4.1.3, as applicable.

4.1.1 Duration of Load: Tabulated reference design values and uniform loads in Tables 4 and 5 are for normal load duration. Adjustments for other duration of load must be in accordance with Section 7.3.2 of the NDS, as for prefabricated wood I-joists. Reference design reaction values are permitted to be adjusted for other load durations in accordance with the NDS, provided the Flange Compression Perpendicular-to-Grain values, as given in Table 4, are not exceeded. Tabulated Flange Compression Perpendicular-to-grain Values must not be increased by a load duration factor, C_D .

4.1.2 Wet Service Factor: The DT Headers, DT Channels, and DT Corners are limited to uses in covered; dry service conditions, where in-service moisture content

of lumber does not exceed 16 percent. The wet service factor, C_M , is 1.0 when the requirements of this section are met.

4.1.3 Temperature Factor: Adjustments for sustained exposure to elevated temperatures between 100°F and 150°F must be in accordance with Section 7.3.4 of the NDS.

4.1.4 Lateral Support:

The DT header ends must be restrained to prevent rotation by attaching headers to wall studs through the end nailing with 2 16d common nails and 3 16d common nails, respectively, into top and bottom flanges of the 2x4 and 2x6 headers. See Figure 3 for an illustration of the typical installation of the DT headers.

4.2 Fasteners:

The design of fasteners driven into the flanges of DT Headers, DT Channels, and DT OS Corners must comply with the applicable code. The nail spacing and end and edge distances for nails into the narrow face of the channel and corner flanges must comply with applicable code for dimension sawn lumber.

4.3 Member Span:

The design span for DT Headers must be taken as the clear distance between the interior face-to interior face of supports, plus ½ the required bearing length at each end. Shear calculations must include all loads within the design span.

4.4 Deflection:

Total deflection of DT Headers must be calculated by using the formula as follows:

For example, for a simply supported DT Header with uniformly distributed loads:

$$\Delta = \frac{22.5 W L^4}{E I}$$

For a simply supported DT Header with a concentrated load at mid-span:

$$\Delta = \frac{36 P L^3}{E I}$$

where:

W is the uniform load, in pounds per lineal foot.

L is the design span, in feet.

$E I$ is the apparent flexural stiffness provided in Table 4.

P is the concentrated load, in pounds.

Δ is the deflection, in inches.

4.5 Shear Walls:

The DT Channels and DT OS Corners are allowed to be used as direct substitutions of the dimension sawn lumber framing and installed in shear wall assemblies specified in the applicable code.

5.0 CONDITIONS OF USE

The DT Headers, DT Channels, and DT OS Corners described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in

Section 1.0 of this report, subject to the following conditions:

5.1 DT Headers, DT Channels, and DT OS Corners must be installed in accordance with this evaluation report and the manufacturer's installation instructions.

5.2 Drawings and design details verifying compliance with this evaluation report must be submitted to the code official when requested. The drawings and calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.3 Cutting or notching of flanges of DT Channels, and DT OS Corners is beyond the scope of this evaluation report. Notching or drilling holes in DT Headers is not allowed.

5.4 DT Headers, DT Channels and DT OS Corners are manufactured by DT Building Components at its plant located in Yankton, South Dakota, under an approved quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 Report of flexural tests in accordance with ASTM D5055.

6.2 Report of shear and end reaction tests in accordance with ASTM D5055.

6.3 Report of rack shear wall assembly tests in accordance with ASTM E72.

6.4 Report of adhesive tests conducted in accordance with ASTM D2559.

6.5 Report of adhesive tests conducted in accordance with ASTM D7247.

6.6 Reports of fire tests conducted in accordance with ASTM E84.

6.7 Sealed engineering analysis to establish the reference design values.

6.8 Quality documentation in accordance with the ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated June 2014.

7.0 IDENTIFICATION

7.1 DT Headers, DT Channels, and DT OS Corners are identified with the DT Building Components manufacturer name; the product code number; the date of fabrication, and the evaluation report number (ESR-3516).

7.2 The report holder's contact information is the following:

DT BUILDING COMPONENTS
POST OFFICE BOX 246
3704 EAST HIGHWAY 50
YANKTON, SOUTH DAKOTA 57078
(605) 689-0357
dennis@dtbuildingcomponents.com

TABLE 1—DT CHANEL CONFIGURATIONS AND DIMENSIONS

PRODUCT CODE #	PRODUCT DESCRIPTION	WIDTH (in.)	DEPTH (in.)	LENGTH (in.)
2 x 4 Channels				
249258CH24	2 x 4 x 92 ⁵ / ₈ Wall Channel w/2 x 4 Intersecting Wall Non-insulated	3 ¹ / ₂	6 ¹ / ₂	92 ⁵ / ₈
2410458CH24	2 x 4 x 104 ⁵ / ₈ Wall Channel w/2 x 4 Intersecting Wall Non-insulated	3 ¹ / ₂	6 ¹ / ₂	104 ⁵ / ₈
24120CH24	2 x 4 x 120 Wall Channel w/2 x 4 Intersecting Wall Non-insulated	3 ¹ / ₂	6 ¹ / ₂	120
24144CH24	2 x 4 x 144 Wall Channel w/2 x 4 Intersecting Wall Non-insulated	3 ¹ / ₂	6 ¹ / ₂	144
249258CH24INS				
249258CH24INS	2 x 4 x 92 ⁵ / ₈ Wall Channel w/2 x 4 Intersecting Wall Insulated	3 ¹ / ₂	6 ¹ / ₂	92 ⁵ / ₈
2410458CH24INS	2 x 4 x 104 ⁵ / ₈ Wall Channel w/2 x 4 Intersecting Wall Insulated	3 ¹ / ₂	6 ¹ / ₂	104 ⁵ / ₈
24120CH24INS	2 x 4 x 120 Wall Channel w/2 x 4 Intersecting Wall Insulated	3 ¹ / ₂	6 ¹ / ₂	120
24144CH24INS	2 x 4 x 144 Wall Channel w/2 x 4 Intersecting Wall Insulated	3 ¹ / ₂	6 ¹ / ₂	144
249258CH26				
249258CH26	2 x 4 x 92 ⁵ / ₈ Wall Channel w/2 x 6 Intersecting Wall Non-insulated	3 ¹ / ₂	8 ¹ / ₂	92 ⁵ / ₈
2410458CH26	2 x 4 x 104 ⁵ / ₈ Wall Channel w/2 x 6 Intersecting Wall Non-insulated	3 ¹ / ₂	8 ¹ / ₂	104 ⁵ / ₈
24120CH26	2 x 4 x 120 Wall Channel w/2 x 6 Intersecting Wall Non-insulated	3 ¹ / ₂	8 ¹ / ₂	120
24144CH26	2 x 4 x 144 Wall Channel w/2 x 6 Intersecting Wall Non-insulated	3 ¹ / ₂	8 ¹ / ₂	144
249258CH26INS				
249258CH26INS	2 x 4 x 92 ⁵ / ₈ Wall Channel w/2 x 6 Intersecting Wall Insulated	3 ¹ / ₂	8 ¹ / ₂	92 ⁵ / ₈
2410458CH26INS	2 x 4 x 104 ⁵ / ₈ Wall Channel w/2 x 6 Intersecting Wall Insulated	3 ¹ / ₂	8 ¹ / ₂	104 ⁵ / ₈
24120CH26INS	2 x 4 x 120 Wall Channel w/2 x 6 Intersecting Wall Insulated	3 ¹ / ₂	8 ¹ / ₂	120
24144CH26INS	2 x 4 x 144 Wall Channel w/2 x 6 Intersecting Wall Insulated	3 ¹ / ₂	8 ¹ / ₂	144
2 x 6 Channels				
269258CH24	2 x 6 x 92 ⁵ / ₈ Wall Channel w/2 x 4 Intersecting Wall Non-insulated	3 ¹ / ₂	6 ¹ / ₂	92 ⁵ / ₈
2610458CH24	2 x 6 x 104 ⁵ / ₈ Wall Channel w/2 x 4 Intersecting Wall Non-insulated	3 ¹ / ₂	6 ¹ / ₂	104 ⁵ / ₈
26120CH24	2 x 6 x 120 Wall Channel w/2 x 4 Intersecting Wall Non-insulated	3 ¹ / ₂	6 ¹ / ₂	120
26144CH24	2 x 6 x 144 Wall Channel w/2 x 4 Intersecting Wall Non-insulated	3 ¹ / ₂	6 ¹ / ₂	144
269258CH24INS				
269258CH24INS	2 x 6 x 92 ⁵ / ₈ Wall Channel w/2 x 4 Intersecting Wall Insulated	3 ¹ / ₂	6 ¹ / ₂	92 ⁵ / ₈
2610458CH24INS	2 x 6 x 104 ⁵ / ₈ Wall Channel w/2 x 4 Intersecting Wall Insulated	3 ¹ / ₂	6 ¹ / ₂	104 ⁵ / ₈
26120CH24INS	2 x 6 x 120 Wall Channel w/2 x 4 Intersecting Wall Insulated	3 ¹ / ₂	6 ¹ / ₂	120
26144CH24INS	2 x 6 x 144 Wall Channel w/2 x 4 Intersecting Wall Insulated	3 ¹ / ₂	6 ¹ / ₂	144
269258CH26				
269258CH26	2 x 6 x 92 ⁵ / ₈ Wall Channel w/2 x 6 Intersecting Wall Non-insulated	3 ¹ / ₂	8 ¹ / ₂	92 ⁵ / ₈
2610458CH26	2 x 6 x 104 ⁵ / ₈ Wall Channel w/2 x 6 Intersecting Wall Non-insulated	3 ¹ / ₂	8 ¹ / ₂	104 ⁵ / ₈
26120CH26	2 x 6 x 120 Wall Channel w/2 x 6 Intersecting Wall Non-insulated	3 ¹ / ₂	8 ¹ / ₂	120
26144CH26	2 x 6 x 144 Wall Channel w/2 x 6 Intersecting Wall Non-insulated	3 ¹ / ₂	8 ¹ / ₂	144
269258CH26INS				
269258CH26INS	2 x 6 x 92 ⁵ / ₈ Wall Channel w/2 x 6 Intersecting Wall Insulated	3 ¹ / ₂	8 ¹ / ₂	92 ⁵ / ₈
2610458CH26INS	2 x 6 x 104 ⁵ / ₈ Wall Channel w/2 x 6 Intersecting Wall Insulated	3 ¹ / ₂	8 ¹ / ₂	104 ⁵ / ₈
26120CH26INS	2 x 6 x 120 Wall Channel w/2x6 Intersecting Wall Insulated	3 ¹ / ₂	8 ¹ / ₂	120
26144CH26INS	2 x 6 x 144 Wall Channel w/2x6 Intersecting Wall Insulated	3 ¹ / ₂	8 ¹ / ₂	144

For **SI**: 1 inch = 25.4 mm

TABLE 2—DT OS CORNER CONFIGURATIONS AND ACTUAL DIMENSIONS

PRODUCT CODE #	PRODUCT DESCRIPTION	WIDTH (in.)	DEPTH (in.)	LENGTH (in.)
2 x 4 OS Corners				
249258CR24	2 x 4 x 92 ⁵ / ₈ Outside Corner Non-insulated	3 ¹ / ₂	5	92 ⁵ / ₈
2410458CR24	2 x 4 x 104 ⁵ / ₈ Outside Corner Non-insulated	3 ¹ / ₂	5	104 ⁵ / ₈
24120CR24	2 x 4 x 120 Outside Corner Non-insulated	3 ¹ / ₂	5	120
24144CR24	2 x 4 x 144 Outside Corner Non-insulated	3 ¹ / ₂	5	144
249258CR24INS	2 x 4 x 92 ⁵ / ₈ Outside Corner Insulated	3 ¹ / ₂	5	92 ⁵ / ₈
2410458CR24INS	2 x 4 x 104 ⁵ / ₈ Outside Corner Insulated	3 ¹ / ₂	5	104 ⁵ / ₈
24120CR24INS	2 x 4 x 120 Outside Corner Insulated	3 ¹ / ₂	5	120
24144CR24INS	2 x 4 x 144 Outside Corner Insulated	3 ¹ / ₂	5	144
249258CR24	2 x 4 x 92 ⁵ / ₈ Outside Corner w/2 x 6 Corner Abutting Non-insulated	3 ¹ / ₂	7	92 ⁵ / ₈
2410458CR24	2 x 4 x 104 ⁵ / ₈ Outside Corner w/2 x 6 Corner Abutting Non-insulated	3 ¹ / ₂	7	104 ⁵ / ₈
24120CR24	2 x 4 x 120 Outside Corner w/2 x 6 Corner Abutting Non-insulated	3 ¹ / ₂	7	120
24144CR24	2 x 4 x 144 Outside Corner w/2 x 6 Corner Abutting Non-insulated	3 ¹ / ₂	7	144
249258CR24INS	2 x 4 x 92 ⁵ / ₈ Outside Corner w/2 x 6 Corner Abutting Insulated	3 ¹ / ₂	7	92 ⁵ / ₈
2410458CR24INS	2 x 4 x 104 ⁵ / ₈ Outside Corner w/2 x 6 Corner Abutting Insulated	3 ¹ / ₂	7	104 ⁵ / ₈
24120CR24INS	2 x 4 x 120 Outside Corner w/2 x 6 Corner Abutting Insulated	3 ¹ / ₂	7	120
24144CR24INS	2 x 4 x 144 Outside Corner w/2 x 6 Corner Abutting Insulated	3 ¹ / ₂	7	144
2 x 6 OS Corners				
269258CR26	2 x 6 x 92 ⁵ / ₈ Outside Corner Non-insulated	5 ¹ / ₂	7	92 ⁵ / ₈
2610458CR26	2 x 6 x 104 ⁵ / ₈ Outside Corner Non-insulated	5 ¹ / ₂	7	104 ⁵ / ₈
26120CR26	2 x 6 x 120 Outside Corner Non-insulated	5 ¹ / ₂	7	120
26144CR26	2 x 6 x 144 Outside Corner Non-insulated	5 ¹ / ₂	7	144
269258CR26INS	2 x 6 x 92 ⁵ / ₈ Outside Corner Insulated	5 ¹ / ₂	7	92 ⁵ / ₈
2610458CR26INS	2 x 6 x 104 ⁵ / ₈ Outside Corner Insulated	5 ¹ / ₂	7	104 ⁵ / ₈
26120CR26INS	2 x 6 x 120 Outside Corner Insulated	5 ¹ / ₂	7	120
26144CR26INS	2 x 6 x 144 Outside Corner Insulated	5 ¹ / ₂	7	144

For **SI**: 1 inch = 25.4 mm

TABLE 3—DT HEADER CONFIGURATIONS AND ACTUAL DIMENSIONS¹

PRODUCT CODE #	PRODUCT DESCRIPTION	WIDTH (in.)	DEPTH (in.)	LENGTH (in.)
2 x 4 Headers				
24714HRXX	2 x 4 x XX Non-insulated	3 ¹ / ₂	7 ¹ / ₄	XX
24714HRXXINS	2 x 4 x XX Insulated	3 ¹ / ₂	7 ¹ / ₄	XX
241114HRXX	2 x 4 x XX Non-insulated	3 ¹ / ₂	11 ¹ / ₄	XX
241114HRXXINS	2 x 4 x XX Insulated	3 ¹ / ₂	11 ¹ / ₄	XX
2 x 6 Headers				
26714HRXX	2 x 6 x XX Non-insulated	5 ¹ / ₂	7 ¹ / ₄	XX
26714HRXXINS	2 x 6 x XX Insulated	5 ¹ / ₂	7 ¹ / ₄	XX
261114HRXX	2 x 6 x XX Non-insulated	5 ¹ / ₂	11 ¹ / ₄	XX
261114HRXXINS	2 x 6 x XX Insulated	5 ¹ / ₂	11 ¹ / ₄	XX

For **SI**: 1 inch = 25.4 mm

¹XX = DT Header lengths of 60, 72, 84, or 96 inches.

TABLE 4—REFERENCE DESIGN VALUES FOR DT HEADERS^{1,2,3}

PRODUCT CODE #	WIDTH (in.)	DEPTH (in.)	MOMENT, M _r (lb-ft)	EI (x10 ⁶ lbf-in ²)	SHEAR ⁴ , V _r (lbf)	END ⁵ REACTION, R (lbf)	FLANGE COMPRESSION PERP-TO-GRAIN (psi)
24714HR95	3 ¹ / ₂	7 ¹ / ₄	2,200	121.4	1,085	950	425
241114HR95	3 ¹ / ₂	11 ¹ / ₄	3,735	279.1	1,085	1,010 ⁶	425
26714HR95	5 ¹ / ₂	7 ¹ / ₄	3,685	155.5	1,370	945	425
261114HR95	5 ¹ / ₂	11 ¹ / ₄	4,610	313.2	1,370	800 ⁶	425

For **SI**: 1 inch = 25.4 mm, 1lbf = 4.448 N, 1 lbf-ft = 1.356 N-m, 1 lbf-in² = 2,870 N-mm², 1 psi = 6,895 Pa.

¹The tabulated reference design values are for dry use conditions only. Dry use applies to products installed in dry, covered and well ventilated interior conditions, in which the in-service moisture content of lumber does not exceed 16%.

²The tabulated reference design values are for normal load duration and are allowed to be adjusted in accordance with Sections 4.1.1 through 4.1.3 of this evaluation report.

³The tabulated design values are applicable for both non-insulated and insulated DT Headers, installed as a simply supported, simple span beam condition.

⁴The tabulated reference design shear values are for bearing length of 3.0 inches.

⁵The tabulated reference design end reaction values are for end bearing length of 1.5 inches.

⁶The tabulated reference design end reaction values can be increased to 1,085 lbf and 1,370 lbf, respectively, for minimum bearing length of 3 inches.

TABLE 5—REFERENCE UNIFORM LOAD FOR DT HEADERS^{1,2,3,4,5}

SPAN		MINIMUM BEARING LENGTH (in.)	ALLOWABLE UNIFORM LOAD (plf.)			
Center-to-Center (in.)	Clear (in.)		24714HR95	241114HR95	26714HR95	261114HR95
25.5	24	1.5	897	950	890	752
31.5	30	1.5	726	769	720	609
37.5	36	1.5	610	646	605	512
43.5	42	1.5	526	557	522	441
49.5	48	3	462	489	458	388
55.5	54	3	412	436	409	346
61.5	60	3	372	394	369	312
69	66	3	377	377	477	477
75	72	3	347	347	438	438
81	78	3	322	322	406	406
87	84	3	299	299	378	378
92	89	3	283	283	357	357

For **SI**: 1 inch = 25.4 mm, 1 plf. = 14.6 N/m

¹The tabulated reference uniform loads are for dry use conditions only. Dry use applies to products installed in dry, covered and well ventilated interior conditions, in which the in-service moisture content of lumber does not exceed 16%.

²The tabulated reference uniform loads are for normal load duration and are allowed to be adjusted in accordance with Sections 4.1.1 through 4.1.3 of this evaluation report.

³The tabulated reference uniform loads are based on the lower of the tested capacities at the minimum bearing lengths noted in the table and the deflection limit of L/240, where L is the center-to-center span.

⁴The tabulated reference uniform loads are for both non-insulated and insulated DT Headers, installed as a simply supported, simple span beam condition

⁵Adjusted design reactions, determined based on the tabulated reference uniform loads, must not exceed the flange bearing capacity determined use the flange compression perpendicular-to-grain and must not exceed the reference design reactions in Table 4.

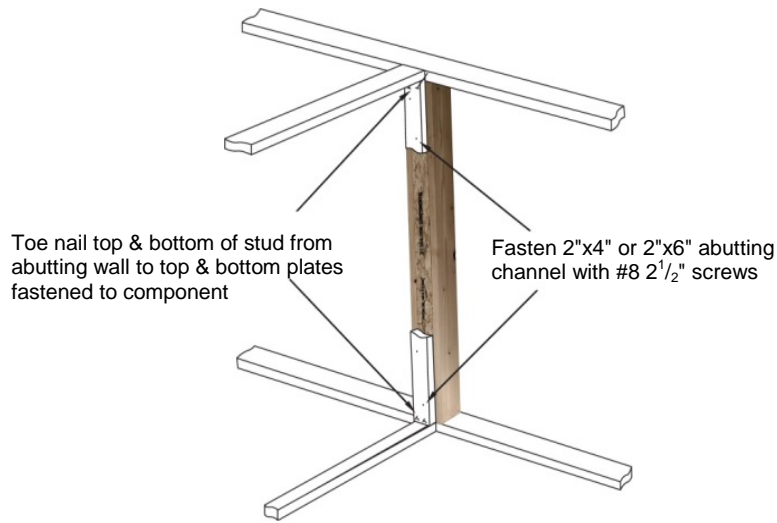


FIGURE 1—DT CHANNELS AND TYPICAL INSTALLATION

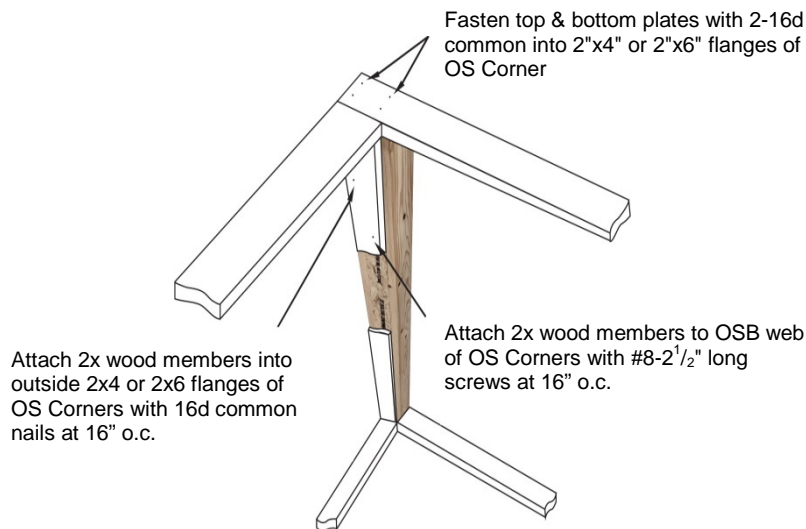


FIGURE 2—DT OS CORNERS AND TYPICAL INSTALLATION

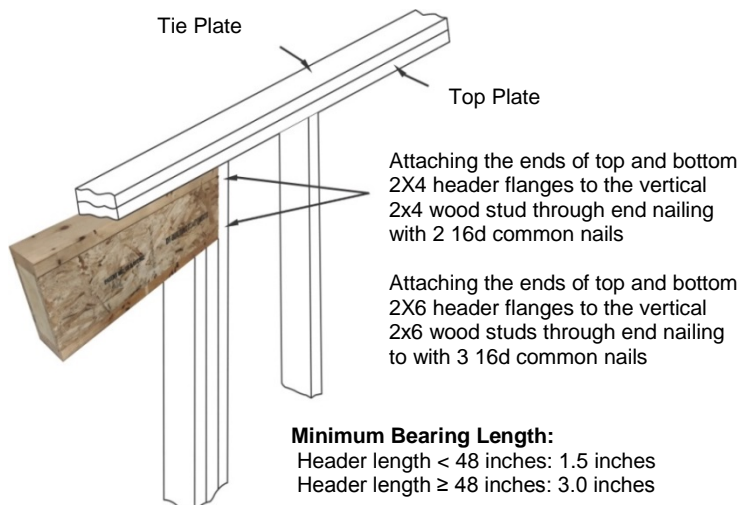


FIGURE 3—DT HEADERS AND TYPICAL INSTALLATION