

ICC-ES Evaluation Report


ESR-4613

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| <p>DIVISION: 06 00 00 - WOOD, PLASTICS, AND COMPOSITES</p> <p>Section: 06 05 23— Wood, Plastic, and Composite Fastenings</p> | <p>REPORT HOLDER:</p> <p>CONQUEST FASTENERS, A DIVISION OF CLICKSTOP INC.</p> | <p>EVALUATION SUBJECT:</p> <p>CONQUEST STRUCTURAL SCREWS</p> |  |
|--|---|--|---|

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015 and 2012 [International Building Code® \(IBC\)](#)
- 2021, 2018, 2015 and 2012 [International Residential Code® \(IRC\)](#)

Property evaluated:

- Structural
- Corrosion resistance

2.0 USES

The Conquest Structural Screws are used for wood-to-wood connections that are designed in accordance with the IBC. For structures regulated under the IRC, the screws may be used where an engineered design is submitted in accordance with IRC Section R301.1.3. The screws are intended for use in the Exposure Conditions shown in [Table 5](#).

3.0 DESCRIPTION

3.1 Conquest Structural Screws:

The Conquest Structural Screws are formed from carbon steel and then hardened. They are partially-threaded screws which have a star shaped driving recess in the head. The screws have a flat head with ribs under the head, serrated threads towards the screw tip and a Type 17 point. Screws longer than 3 inches (76 mm) have a reamer knurl between the smooth shank and the threads. The screws have a proprietary finish that is silver in color. See [Table 1](#) for screw dimensions and [Figure 1](#) for a depiction of the screw.

3.2 Wood Members:

For purposes of connection design, sawn lumber members must have an assigned specific gravity (ASG) as indicated in the tables in this report. Assigned specific gravity for sawn lumber must be determined in accordance with Table 12.3.3A of the ANSI/AWC National Design Specification for Wood Construction® (NDS) (Table 11.3.3A of the NDS for the 2012 IBC). Unless otherwise noted, the design values in this report are applicable to screws installed in sawn lumber members with moisture content of 19 percent or less.

For the purposes of connection design, structural glued laminated timber (GL) must have a Specific Gravity for Fastener Design (addressed in Tables 5A through 5D of the NDS Supplement), as indicated in the tables in this report. Unless otherwise noted, the design values in this report are applicable to screws installed in GL with moisture content of less than 16 percent.

When designing connections with screws installed into the face of cross-laminated timber (CLT) panels fabricated with sawn lumber laminations, all of the laminations must have a minimum assigned specific gravity in accordance with the NDS as indicated in the tables in this report. Design values in this report are applicable to screws installed in CLT with moisture content less than 16 percent.

Use of the screws in engineered wood products (EWP) other than those addressed above is outside the scope of this report.

For wood-to-wood connections, the tabulated side member thickness is an absolute value (not a minimum or maximum value). The thickness of the wood main member must be equal to or greater than

4.0 DESIGN AND INSTALLATION

4.1 Design:

The design values in this report are intended to aid the designer in meeting the requirements of IBC Section 1604.2. For connections not completely described in this report, determination of the suitability of the Conquest Structural Screws for the specific application is the responsibility of the designer and is outside the scope of this report. The designer is responsible for determining the available strengths for the connection, considering all applicable limit states, and for considering serviceability issues.

4.1.1 Screw Strength: The allowable screw tension strength (ASD), design screw tension strength (LRFD) and average measured minimum specified bending yield strength for the screws are shown in [Table 1](#).

4.1.2 Reference Withdrawal and Pull-through Design Values: Reference withdrawal (W_{90}) design values in pounds per inch of thread penetration for screws installed perpendicular to the face of the wood member are shown in [Table 2](#). The total reference withdrawal design load value, W_L , must be determined by multiplying W_{90} by the embedded thread length, but must not exceed the tension strength of the screw. Reference head pull-through (W_H) design values have not been qualified and are outside the scope of this report.

4.1.3 Reference Lateral Design Values: Reference lateral design values for two-member wood-to-wood connections are shown in [Table 3](#).

4.1.4 Adjustments to Reference Design Values: The reference design values must be adjusted in accordance with the requirements for dowel-type fasteners in Section 11.3 of the NDS (Section 10.3 of the NDS for the 2012 IBC), including the wet service factor, C_M , to determine allowable loads for use with ASD and/or design loads for use with LRFD. The reference design values must also be adjusted in accordance with Section 12.5 of the NDS (Section 11.5 of the NDS for the 2012 IBC), as applicable. When the capacity of a connection is controlled by the screw strength, the allowable connection strength must not be increased by the adjustment factors specified in the NDS.

4.1.5 Connections with Multiple Screws: Connections made with multiple screws must be designed in accordance with Sections 11.2.2 and 12.6 of the NDS (Sections 10.2.2 and 11.6 of the NDS for the 2012 IBC).

4.1.6 Combined Loading: Where the screws are subjected to combined lateral and withdrawal loads, connections shall be designed in accordance with Section 12.4.1 of the NDS (Section 11.4.1 of the NDS for the 2012 IBC).

4.1.7 Capacity Requirements for Wood Members: When designing a connection, the structural members must be checked for load-carrying capacity in accordance with Section 11.1.2 of the NDS (Section 10.1.2 of the NDS for the 2012 IBC), and local stresses within multiple-fastener connections must be checked against Appendix E of the NDS to ensure the capacity of the connection and fastener group.

4.2 Corrosion Resistance:

The Conquest Structural Screws may be used in wood treated with waterborne alkaline copper quaternary (ACQ-D) preservatives with a maximum retention of 0.40 pcf (6.4 kg/m³), as alternates to hot-dip galvanized fasteners prescribed in IBC Section 2304.10.6 (2018 and 2015 IBC Section 2304.10.5; 2012 IBC Section 2304.9.5), when subject to the Exposure Conditions shown in [Table 5](#).

4.3 Installation:

Conquest Structural Screws must be installed in accordance with the report holder's published installation instructions and this report. The screws must be installed perpendicular to the face of the wood member. Screws must be installed with the minimum spacing, end distances, and edge distances needed to prevent splitting of the wood or as noted in [Table 4](#), whichever is more restrictive. The underside of the head must be flush with the surface of the wood side member. Screws must not be overdriven. Installation must be performed without predrilling. The screws must be installed by turning with Star Drive (T30) bits, not by driving with a hammer.

5.0 CONDITIONS OF USE:

The Conquest Structural Screws 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 The screws must be installed in accordance with the report holder's published installation instructions and this report. In the case of a conflict between this report and the report holder's instructions, this report governs.
- 5.2 Design loads for the screws must not exceed the available strengths described in Section 4.1.
- 5.3 Calculations and details demonstrating compliance with this report must be submitted to the code official. The calculations and details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.4 Use of the screws in lateral connections designed in accordance with the NDS is outside the scope of this report.
- 5.5 Use of screws in locations exposed to saltwater or saltwater spray is outside the scope of this evaluation report.
- 5.6 The screws are manufactured under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with the [ICC-ES Acceptance Criteria for Dowel-type Threaded Fasteners Used in Wood \(AC233\)](#), dated February 2022.
- 6.2 Data in accordance with the [ICC-ES Acceptance Criteria for Corrosion-resistant Fasteners and Evaluation of Corrosion Effects of Wood Treatments \(AC257\)](#), dated October 2009 (editorially revised January 2021).

7.0 IDENTIFICATION

- 7.1 The Conquest Structural Screws are identified by a shield shape on the head of each screw, along with the diameter and length in inches, as shown in [Figure 1](#). Packages of Conquest screws are labeled with the report holder name (Conquest Fasteners) and address, the screw diameter and length, and the evaluation report number (ESR-4613).
- 7.2 The report holder's contact information is the following:

CONQUEST FASTENERS, A DIVISION OF CLICKSTOP INC.
202 BLUE CREEK DRIVE
URBANA, IOWA 52345
(844) 567-2809
www.conquestfastener.com
customerservice@conquestfastener.com

TABLE 1—CONQUEST STRUCTURAL SCREW SPECIFICATIONS AND STRENGTHS

| SCREW DESIGNATION | OVERALL LENGTH ¹ , L (inches) | THREAD LENGTH, T ² (inches) | HEAD DIAMETER, D _H (inch) (DRIVE SIZE) | UNTHREADED SHANK DIAMETER, D _s (inch) | MINOR THREAD (ROOT) DIAMETER, D _r (inch) | OUTSIDE THREAD DIAMETER, D (inch) | BENDING YIELD STRENGTH ³ , F _{yb} (psi) | TENSION STRENGTH (lbf) | |
|-------------------|--|--|---|--|---|-----------------------------------|---|------------------------|---------------|
| | | | | | | | | Allowable (ASD) | Design (LRFD) |
| CSS-300 | 3 | 2 | 0.750 (T30) | 0.195 | 0.174 | 0.275 | 185,000 | 1,550 | 2,300 |
| CSS-312 | 3 ¹ / ₂ | 2 ¹ / ₂ | | | | | | | |
| CSS-400 | 4 | 2 ³ / ₄ | | | | | | | |
| CSS-412 | 4 ¹ / ₂ | 3 | | | | | | | |
| CSS-500 | 5 | 3 ¹ / ₂ | | | | | | | |
| CSS-600 | 6 | 4 | | | | | | | |
| CSS-800 | 8 | 4 ¹ / ₂ | | | | | | | |
| CSS-1000 | 10 | 5 | | | | | | | |
| CSS-1200 | 12 | 5 ⁷ / ₈ | | | | | | | |
| CSS-1400 | 14 | 5 ⁷ / ₈ | | | | | | | |

For SI: 1 inch = 25.4 mm; 1 psi =6.89 kPa; 1 lbf = 4.45 N.

¹The length of screws is measured from the underside of the head to bottom of the tip.

²Length of thread includes tip.

³Bending yield strength determined in accordance with ASTM F1575 using D_r.

TABLE 2—CONQUEST STRUCTURAL SCREW REFERENCE WITHDRAWAL (W₉₀) DESIGN VALUES¹

| MINIMUM EMBEDDED THREAD LENGTH ² (inches) | W ₉₀ , lbf/in. (ASG = 0.50) | WET SERVICE FACTOR, C _M |
|--|--|------------------------------------|
| 2 | 138 | 0.7 |

For SI: 1 inch = 25.4 mm, 1 lbf/in = 0.175 N/mm.

¹Tabulated values are applicable to screws installed perpendicular to the face of the wood member.

²Embedded thread length is the threaded portion of the screw held in the main member including the screw tip.

TABLE 3—CONQUEST STRUCTURAL SCREW REFERENCE LATERAL DESIGN VALUES FOR TWO-MEMBER WOOD-TO-WOOD CONNECTIONS^{1,2,3}

| SIDE MEMBER THICKNESS, t _{s,w} (inches) | MINIMUM OVERALL SCREW LENGTH, L (inches) | MINIMUM SCREW PENETRATION INTO MAIN MEMBER (inches) | REFERENCE LATERAL DESIGN VALUE, Z _l (lbf) | WET SERVICE FACTOR, C _M |
|--|--|---|--|------------------------------------|
| | | | ASG = 0.50 | |
| 3/4 | 3 | 2 ¹ / ₄ | 241 | 0.7 |
| 1 ¹ / ₂ | 3 ¹ / ₂ | 2 | 262 | |

For SI: 1 inch = 25.4 mm ; 1 lbf = 4.45 N.

¹Tabulated values are applicable to screws installed perpendicular to the faces of the wood members.

²The wood main member thickness must be equal to or greater than the screw length less the thickness of the wood side member.

³The tabulated lateral design values are based on both wood members having the same specific gravity.

TABLE 4—CONNECTION GEOMETRY FOR CONQUEST STRUCTURAL SCREWS^{1,2,3}

| CONDITION | | REQUIRED DIMENSIONS (inches) |
|---|---|-------------------------------|
| End distance | Tension loading parallel to grain (fastener bearing toward end), $a_{3,t}$ | 5 ¹ / ₂ |
| | Compression loading parallel to grain (fastener bearing away from end), $a_{3,c}$ | 4 ¹ / ₈ |
| | Loading perpendicular to grain, $a_{3,c}$ | 4 ¹ / ₈ |
| | Axial loading (fastener withdrawal or pull-through), $a_{3,a}$ | 2 ³ / ₄ |
| Edge distance | Loading parallel to grain or away from edge, $a_{4,c}$ | 2 |
| | Loading toward edge, $a_{4,t}$ | 3 ³ / ₈ |
| | Axial Loading, $a_{4,a}$ | 1 ¹ / ₈ |
| Spacing between fasteners parallel to grain, a_1 | Loading parallel to grain | 4 ¹ / ₈ |
| | Loading perpendicular to grain | 2 ³ / ₄ |
| | Axial loading | 2 |
| Spacing between fasteners perpendicular to grain, a_2 | Lateral loading | 2 |
| | Axial loading | 1 ¹ / ₈ |

For SI: 1 inch = 25.4 mm.

¹End distances, edge distances and fastener spacing must be sufficient to prevent splitting of the wood, or as required by this table, whichever is the more restrictive.

²Wood member stresses must be checked in accordance with Section 11.1.2 and Appendix E of the NDS, and end distances, edge distances and fastener spacing may need to be increased accordingly.

³Refer to [Figure 2](#) for end distance, edge distance, and spacing definitions.

TABLE 5—EXPOSURE CONDITIONS FOR CONQUEST STRUCTURAL SCREWS WITH INTENDED USE AND LIMITATIONS

| EXPOSURE CONDITION | TYPICAL APPLICATIONS | LIMITATIONS |
|--|--------------------------------------|--|
| Corrosion Resistance of Fasteners | | |
| 1 | Treated wood in dry use applications | Limited to use where equilibrium moisture content of the chemically treated wood meets the dry service conditions as described in the NDS. |
| 3 | General construction | Limited to freshwater and chemically treated wood exposure, e.g., no saltwater exposure. |

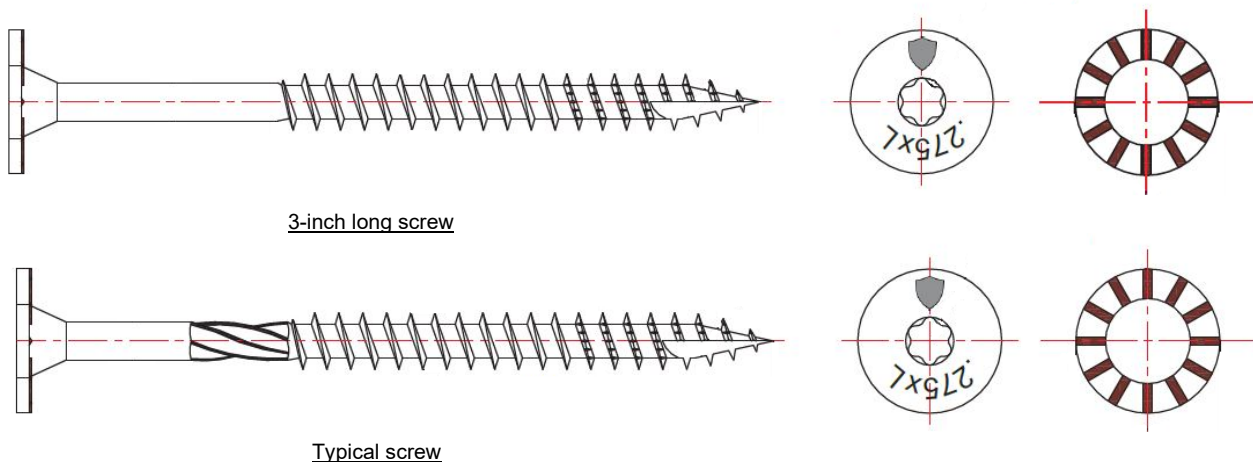


FIGURE 1—CONQUEST STRUCTURAL SCREWS

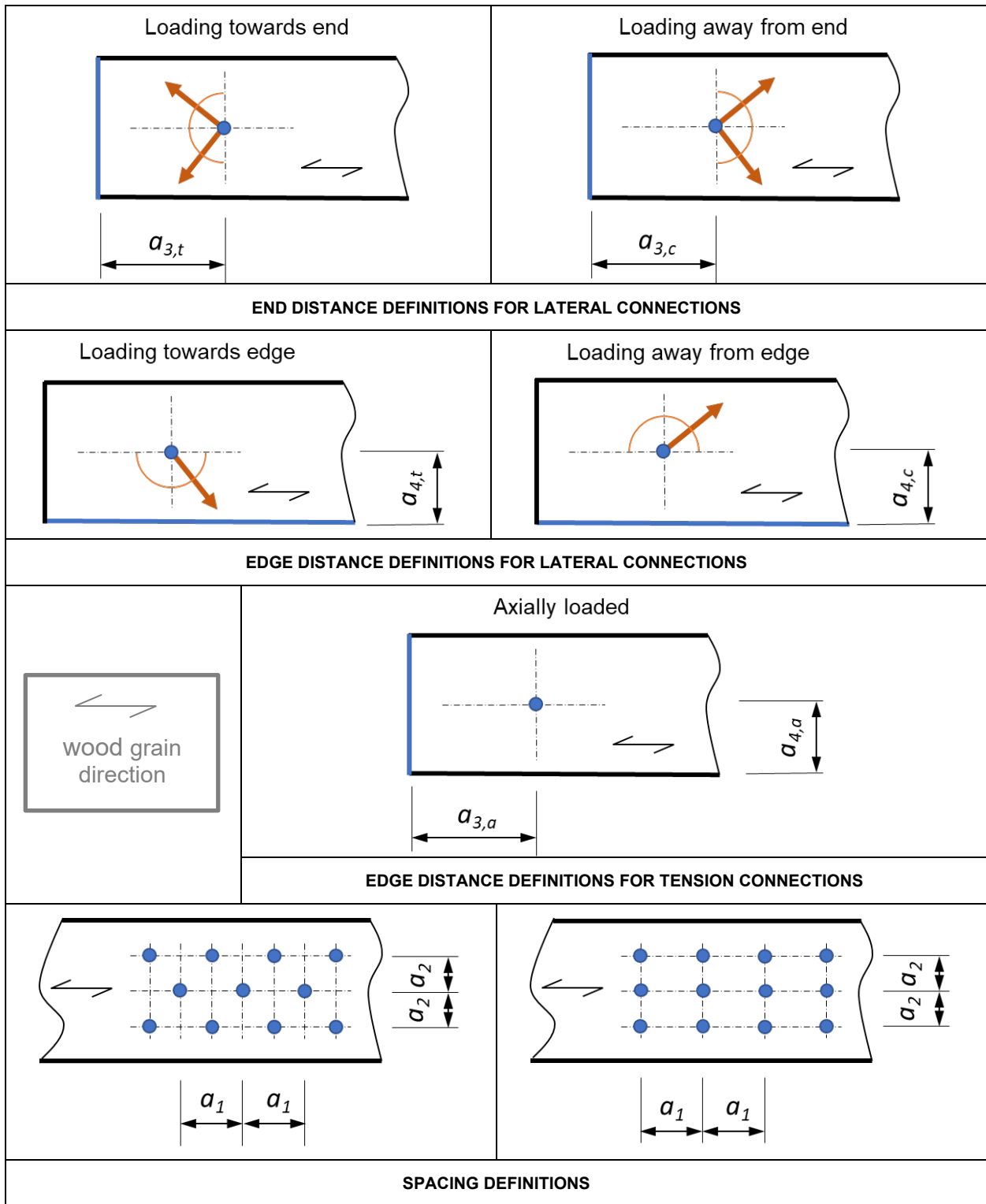


FIGURE 2—CONNECTION GEOMETRY DEFINITIONS