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# ICC-ES Report

# ESR-3558

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Reissued 06/2015
This report is subject to renewal 06/2017.

**DIVISION: 05 00 00—METALS**
**SECTION: 05 05 23—METAL FASTENINGS**
**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**
**SECTION: 06 05 23—WOOD, PLASTIC, AND COMPOSITE FASTENINGS**
**DIVISION: 09 00 00—FINISHES**
**SECTION: 09 22 16.23—FASTENERS**

**REPORT HOLDER:**

## SENCO BRANDS INC.

**4270 IVY POINTE BOULEVARD**
**CINCINNATI, OHIO 45245**

**EVALUATION SUBJECT:**

## SENCO SELF-DRILLING AND SELF-PIERCING SCREWS

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# ICC-ES Evaluation Report

**ESR-3558**

*Reissued June 2015*

*This report is subject to renewal June 2017.*

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**DIVISION: 05 00 00—METALS**
**Section: 05 05 23—Metal Fastenings**

**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**
**Section: 06 05 23—Wood, Plastic, and Composite Fastenings**

**DIVISION: 09 00 00—FINISHES**
**Section: 09 22 16.23—Fasteners**

**REPORT HOLDER:**

**SENCO BRANDS INC.**
**4270 IVY POINTE BOULEVARD**
**CINCINNATI, OHIO 45245**
**(513) 388-2000**
**www.senco.com**

**EVALUATION SUBJECT:**

**SENCO SELF-DRILLING AND SELF-PIERCING SCREWS**

## 1.0 EVALUATION SCOPE

**Compliance with the following codes:**

- 2012 and 2009 *International Building Code*® (IBC)
- 2012 and 2009 *International Residential Code*® (IRC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)†

†The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

**Property evaluated:**

Structural

## 2.0 USES

The Senco self-drilling and self-piercing screws are used to connect cold-formed steel members together and to connect gypsum wall board, wood or other building materials to cold-formed steel. The screws are used in engineered connections of cold-formed steel and connections prescribed by the code for cold-formed steel framing and for sheathing to steel connections.

## 3.0 DESCRIPTION

### 3.1 General:

The Senco self-drilling and self-piercing screws are tapping screws, case-hardened from carbon steel conforming to ASTM A510, Grade 1022. Tables 1A through 1D provide screw designations, model numbers, descriptions including screw nominal size, threads per inch (tpi), length, screw diameter, drive recess, head style, head diameter, point style, drilling/piercing ranges, length of load-bearing area and coatings. Screws are supplied in boxes or tubs of individual screws or in collated screw strips. See Figures 1 through 8 for depictions of the screws described in Sections 3.2 through 3.6.

### 3.2 PBH Self-drilling Screws:

The #6 and #8 PBH self-drilling screws comply with ASTM C954, with a type "BSD" thread design. The screws have a Phillips bugle head (PBH) style and have a clear zinc coating, a gray phosphate coating or an exterior coating, as indicated in Table 1A. See Figure 1.

### 3.3 PBH Self-piercing Screws:

The #6 PBH self-piercing screws comply with ASTM C1002, Type S, with a fine thread design. The screws have a Phillips bugle head (PBH) and have a clear zinc coating, a gray phosphate coating or an exterior coating, as indicated in Table 1B. See Figure 2.

### 3.4 PWH Self-drilling Screws:

The #8 PWH self-drilling screws comply with ASTM C1513, with a coarse thread design. The screws have a Phillips reduced wafer head (PWH) style, and have a clear zinc coating, as indicated in Table 1C. See Figure 3.

### 3.5 PMTH Self-piercing Screws:

The #8 PMTH self-piercing screws comply with ASTM C1513, with a coarse thread design. The screws have a Phillips modified truss head (PMTH) style, and have a clear zinc coating, as indicated in Table 1D. See Figure 4.

### 3.6 PMTH, SPWH, PWH, SPFH and RPFH Self-drilling Screws:

The #8 PMTH, #8 SPWH, #10 PWH, #10 SPFH and #10 and #12 RPFH self-drilling screws comply with ASTM C1513. The screws have a type "BSD" thread design. The screws have a Phillips modified truss head (PMTH) style, square pan with washer head (SPWH) style, Phillips reduced wafer head (PWH) style, square pan framing head (SPFH) style, and Rex pan framing head (RPFH) style, respectively, and have a clear zinc coating or a yellow zinc coating, as indicated in Table 1D. See Figures 5, 6, 3, 7 and 8, for PMTH, SPWH, PWH, SPFH and RPFH screws, respectively.

### 3.7 Cold-formed Steel:

Cold-formed steel material must comply with Section A2 of AISI S100.

## 4.0 DESIGN AND INSTALLATION

### 4.1 Design:

**4.1.1 General:** Screw thread length and point style must be selected on the basis of thickness of the fastened material and thickness of the supporting steel, respectively,

based on the length of load-bearing area (see Figure 9) and drilling/piercing capacity given in Table 1.

When tested for corrosion resistance in accordance with ASTM B117, the screws met the minimum requirement listed in ASTM F1941, as required by ASTM C1513, with no white corrosion after three hours and no red rust after 12 hours.

**4.1.2 Prescriptive Design:**

**4.1.2.1 Senco PBH Self-drilling Screws (Section 3.2):** These screws are recognized for use in fastening gypsum board to cold-formed steel framing 0.033 inch to 0.112 inch (0.8 to 2.8 mm) thick, in accordance with IBC Section 2506 and IRC Section R702.3.6. They are also recognized for use in attaching gypsum board sheathing to cold-formed steel framing as prescribed in Section C2.2.3 of AISI S213, which is referenced in 2012 IBC Section 2211.6 (2009 IBC Section 2210.6).

**4.1.2.2 Senco PBH Self-piercing Screws (Section 3.3):** These screws are recognized for use in fastening gypsum board to cold-formed steel framing less than 0.033 inch (0.84 mm) thick, in accordance with IBC Section 2506 and IRC Section R702.3.6.

**4.1.2.3 Senco PWH Self-drilling Screws (Section 3.4):** The screws described in Section 3.4 are recognized for use where ASTM C1513 screws of the same size and head style/dimension are prescribed in the IRC and in the AISI standards referenced in 2012 IBC Section 2211 (2009 IBC Section 2210).

**4.1.3 Engineered Design:** The PMTH self-piercing screws described in Section 3.5, and the PMTH, SPWH, PWH, SPFH and RPFH self-drilling screws described in Section 3.6, are recognized for use in engineered connections of cold-formed steel light-framed construction.

For the self-drilling and self-piercing screws, design of the connections must comply with Section E4 of AISI S100, using the nominal and allowable fastener tension and shear strengths for the screws shown in Table 5. Allowable connection strengths for use in Allowable Strength Design (ASD) for pull-out, pullover, and shear (bearing) capacity for common sheet steel thicknesses are provided in Tables 2, 3 and 4, respectively, based upon laboratory testing in accordance with AISI S905.

Instructions on how to calculate connection design strengths for use in Load and Resistance Factor Design (LRFD) are found in the footnotes of Tables 2, 3 and 4. For connections subject to tension, the least of the allowable pull-out, pullover, and tension fastener strength of screws found in Tables 2, 3, and 5, respectively, must be used for design. For connections subject to shear, the lesser of the allowable shear (bearing) and fastener strength found in Tables 4 and 5, respectively, must be used for design. Connections subject to combined tension and shear loading must be designed in accordance with Section E4.5 of AISI S100.

The values in Tables 2, 3 and 4 are based on a minimum spacing between the centers of fasteners of three times the diameter of the screw, and a minimum distance from the center of a fastener to the edge of any connected part of 1.5 times the diameter of the screw. Minimum edge distance when connecting cold-formed framing members must be three times the diameter of the screw, in accordance with Section D1.5 of AISI S200. Under the 2009 IBC, when the distance to the end of the connected part is parallel to the line of the applied force, the allowable connection shear strength determined in accordance with Section E4.3.2 of Appendix A of AISI S100 must be considered. Connected members must be checked for rupture in accordance with Section E5 of AISI S100-07/S2-10.

**4.2 Installation:**

Installation of the Senco self-drilling and self-piercing screws must be in accordance with the manufacturer's published installation instructions and this report. The manufacturer's published installation instructions must be available at the jobsite at all times during installation.

The screws must be installed perpendicular to the work surface using a variable speed screw driving tool set to not exceed 2,500 rpm. The screw must penetrate through the supporting steel with a minimum of three threads protruding past the back side of the supporting steel.

## 5.0 CONDITIONS OF USE

The Senco self-drilling and self-piercing 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** Fasteners must be installed in accordance with the manufacturer's published installation instructions and this report. If there is a conflict between the manufacturer's published installation instructions and this report, this report governs.

**5.2** The allowable loads specified in Section 4.1.3 are not to be increased when the fasteners are used to resist wind or seismic forces.

**5.3** The utilization of the strength values contained in this evaluation report, for the design of cold-formed steel diaphragms, is outside the scope of this report. Diaphragms constructed using the Senco self-drilling or self-piercing screws must be recognized in a current ICC-ES evaluation report based upon the ICC-ES Acceptance Criteria for Steel Deck Roof and Floor Systems (AC43).

**5.4** Drawings and calculations verifying compliance with this report and the applicable code must be submitted to the code official for approval. The drawings and calculations are to be prepared by a registered design professional when required by the statutes of the jurisdiction in which the project is to be constructed.

## 6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Tapping Screw Fasteners (AC118), dated June 2012.

## 7.0 IDENTIFICATION

Senco self-drilling and self-piercing screws are marked with a "D" on the top of the heads, as shown in Figures 1 through 8. Packages of Senco self-drilling and self-piercing screws are labeled with the report holder's name (Senco Brands Inc.), the fastener brand name (Senco) and model number, and the evaluation report number (ESR-3558).

**TABLE 1A—SENCO SELF-DRILLING SCREWS (ASTM C954) FOR PRESCRIPTIVE CONNECTIONS OF GYPSUM BOARD PRODUCTS TO COLD-FORMED STEEL**

| DESIGNATION[1] (Nom. size – tpi x head type) (Head designation) | DESCRIPTION (Nom. size x length) | SENCO MODEL NUMBER[4] | DRIVE RECESS | HEAD DIAMETER (in.) | NOMINAL DIAMETER (in.) | DRILL POINT (Number) | DRILL CAPACITY (in.) | | LENGTH OF LOAD BEARING AREA[3] (in.) | COATING[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Min. | Max. | | |
| #6-20 x Bugle (PBH) | 6 x 1 | 06C100XY | Phillips | 0.324 | 0.138 | #2 | 0.035 | 0.090 | 0.697 | Clear Zinc, Grey Phosphate or Exterior |
| | 6 x $1^1/_4$ | 06C125XY | Phillips | 0.324 | 0.138 | #2 | 0.035 | 0.090 | 0.947 | |
| | 6 x $1^5/_8$ | 06C162XY | Phillips | 0.324 | 0.138 | #2 | 0.035 | 0.090 | 1.322 | |
| | 6 x 2 | 06C200XY | Phillips | 0.324 | 0.138 | #2 | 0.035 | 0.090 | 1.697 | |
| #8-18 x Bugle (PBH) | 8 x $2^1/_2$ | 08C250XY | Phillips | 0.324 | 0.163 | #2 | 0.035 | 0.090 | 2.197 | |

**TABLE 1B—SENCO SELF-PIERCING SCREWS (ASTM C1002) FOR PRESCRIPTIVE CONNECTIONS OF GYPSUM BOARD PRODUCTS TO COLD-FORMED STEEL**

| DESIGNATION[1] (Nom. size – tpi x head type) (Head designation) | DESCRIPTION (Nom. size x length) | SENCO MODEL NUMBER[4] | DRIVE RECESS | HEAD DIAMETER (in.) | NOMINAL DIAMETER (in.) | POINT | PIERCING CAPACITY (in.) | | LENGTH OF LOAD BEARING AREA[3](in.) | COATING[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Min. | Max. | | |
| #6-15 x Bugle (PBH) | 6 x $1^1/_4$ | 06B125XY | Phillips | 0.324 | 0.138 | Self-piercing | 0.021 | 0.036 | 0.814 | Clear Zinc, Grey Phosphate or Exterior |
| | 6 x $1^5/_8$ | 06B162XY | Phillips | 0.324 | 0.138 | Self-piercing | 0.021 | 0.036 | 1.189 | |
| | 6 x 2 | 06B200XY | Phillips | 0.324 | 0.138 | Self-piercing | 0.021 | 0.036 | 1.564 | |

**TABLE 1C—SENCO SELF-DRILLING SCREWS (ASTM C1513) FOR PRESCRIPTIVE CONNECTIONS OF WOOD-BASED SHEATHING TO COLD-FORMED STEEL**

| DESIGNATION[1] (Nom. size – tpi x head type) (Head designation) | DESCRIPTION (Nom. size x length) | SENCO MODEL NUMBER | DRIVE RECESS | HEAD DIAMETER (in.) | NOMINAL DIAMETER (in.) | DRILL POINT (Number) | DRILL CAPACITY (in.) | | LENGTH OF LOAD BEARING AREA[3] (in.) | COATING[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Min. | Max. | | |
| #8-18 x Reduced Wafer (PWH) | 8 x 1 | 08G100C KNFDP | Phillips | 0.324 | 0.164 | #2 | 0.035 | 0.100 | 0.644 | Clear Zinc |

**TABLE 1D—SENCO SELF-DRILLING AND SELF-PIERCING SCREWS (ASTM C1513) FOR ENGINEERED STEEL-TO-STEEL CONNECTIONS**

| DESIGNATION[1] (Nom. size – tpi x head type) (Head designation) | DESCRIPTION (Nom. size x length) | SENCO MODEL NUMBER | DRIVE RECESS | HEAD DIAMETER (in.) | NOMINAL DIAMETER (in.) | DRILL POINT (Number) | DRILL CAPACITY (in.) | | LENGTH OF LOAD BEARING AREA[3] (in.) | COATING[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Min. | Max. | | |
| #8-15 x Modified Truss (PMTH) | 8 x 1/2 | 08M050CTRFSP | Phillips | 0.350 | 0.164 | Self-piercing | 0.021 | 0.036 | 0.123 | Clear Zinc |
| #8-18 x Modified Truss (PMTH) | 8 x 1/2 | 08M050CTRFDP | Phillips | 0.350 | 0.164 | #2 | 0.035 | 0.100 | 0.144 | Clear Zinc |
| #8-18 x Pan with Washer (SPWH) | 8 x 2 | 08X200CKADDS | Square | 0.352 | 0.164 | #2 | 0.035 | 0.100 | 1.621 | Clear Zinc |
| | 8 x 1 1/4 | 08X125CKADDS | Square | 0.352 | 0.164 | #2 | 0.035 | 0.100 | 0.871 | Clear Zinc |
| #10-16 x Reduced Wafer (PWH) | 10 x 3/4 | 10M075CKNFDP | Phillips | 0.324 | 0.190 | #2 | 0.035 | 0.110 | 0.355 | Clear Zinc |
| #10-16 x Pan Framing (SPFH or RPFH) | 10 x 3/4 | 10M075CTMFDS | Square | 0.348 | 0.190 | #2 | 0.035 | 0.110 | 0.290 | Clear Zinc |
| | 10 x 1 | 10M100CKMFDS | Square | 0.348 | 0.190 | #2 | 0.035 | 0.110 | 0.540 | Clear Zinc |
| | 10 x 5/8 | 10M062CBFFDX | Rex | 0.348 | 0.190 | #2 | 0.035 | 0.110 | 0.165 | Clear Zinc |
| | 10 x 3/4 | 10M075YTFFDX | Rex | 0.348 | 0.190 | #2 | 0.035 | 0.110 | 0.290 | Yellow Zinc |
| #10-22 x Pan Framing (RPFH) | 10 x 3/4 | 10M075YLFT4X | Rex | 0.350 | 0.190 | #4 | 0.175 | 0.312 | 0.276 | Yellow Zinc |
| | 10 x 3/4 | 10M075YKFT4X | Rex | 0.350 | 0.190 | #4 | 0.175 | 0.312 | 0.276 | Yellow Zinc |
| #12-18 x Pan Framing (RPFH) | 12 x 7/8 | 12M087YKFF4X | Rex | 0.348 | 0.216 | #4 | 0.175 | 0.312 | 0.370 | Yellow Zinc |
| #12-14 x Pan Framing (RPFH) | 12 x 1 | 12M100YKFF3X | Rex | 0.348 | 0.216 | #3 | 0.110 | 0.210 | 0.513 | Yellow Zinc |
| | 12 x 1 1/2 | 12M150CTFFDX | Rex | 0.348 | 0.216 | #2 | 0.035 | 0.110 | 1.013 | Clear Zinc |

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

[1]Refer to Section 3.0 and Figures 1 through 8 for head configuration abbreviations.
[2]For coating abbreviations, Clear Zinc = Fe/Zn 3A per ASTM F1941; Yellow Zinc = Fe/Zn 3C per ASTM F1941; Exterior = Fe/Zn 8AS per ASTM F1941; Grey Phosphate = Grade C coating per ASTM F1137.
[3]Refer to Figure 9 for nominal screw length (L) and length of load bearing area (LLBA) description.
[4]The letter in the X position (7th digit) denotes the coating: C = Clear Zinc, P = Grey Phosphate, W = Exterior. The letter(s) in the Y position (8th digit) denote the type of packaging: B = 4000 pcs box, K = 1000 pcs box, no letter = 1000 pcs tub.

**TABLE 2—ALLOWABLE TENSILE PULL-OUT LOADS ($P_{NOT}/\Omega$), pounds-force[1,2,3,4]**

| SCREW DESIGNATION | NOMINAL DIAMETER (in.) | STEEL $F_U$=55 Ksi $\Omega$ = 3.0 | | STEEL $F_U$=65 Ksi $\Omega$ = 3.0 | | |
|---|---|---|---|---|---|---|
| | | Design Thickness of Member Not in Contact with the Screw Head (in.) | | | | |
| | | 0.041 | 0.050 | 0.062 | 0.075 | 0.104 |
| #8-15 x Modified Truss (PMTH) | 0.164 | 130 | 167 | - | - | - |
| #8-18 x Modified Truss (PMTH) | 0.164 | 85 | 100 | - | - | - |
| #8-18 x Pan with Washer (SPWH) | 0.164 | 91 | 128 | 183 | 237 | 382 |
| #10-16 x Reduced Wafer (PWH) | 0.190 | 90 | 105 | 198 | 232 | 341 |
| #10-16 x Pan Framing (SPFH or RPFH) | 0.190 | 99 | 126 | 191 | 267 | 371 |
| #10-22 x Pan Framing (RPFH) | 0.190 | 94 | 100 | 201 | 250 | 372 |
| #12-18 x Pan Framing (RPFH) | 0.216 | 96 | 125 | 195 | 240 | 368 |
| #12-14 x Pan Framing (RPFH) | 0.216 | 87 | 118 | 176 | 231 | 390 |

For **SI:** 1 inch = 25.4 mm, 1 pound-force = 4.4 N, 1 ksi = 6.89 MPa.

[1]For tension connections, the least of the allowable pull-out, pullover, and fastener tension strength of screw found in Tables 2, 3, and 5, respectively must be used for design.
[2]Nominal load values are based upon laboratory testing in accordance with AISI S905.
[3]The allowable pull-out capacity for intermediate member thicknesses can be determined by interpolating within the values in the table for the applicable steel tensile strength.
[4]To calculate LRFD values, multiply values in table by the ASD safety factor of 3.0 and multiply again with the LRFD Φ factor of 0.5.

**TABLE 3—ALLOWABLE TENSILE PULL-OVER LOADS ($P_{NOV}/\Omega$), pounds-force[1,2,3,4]**

| SCREW DESIGNATION | NOMINAL DIAMETER (in.) | HEAD OR INTEGRAL WASHER DIAMETER (in.) | STEEL $F_U$=55 Ksi $\Omega$ = 3.0 | | STEEL $F_U$=65 Ksi $\Omega$ = 3.0 | | |
|---|---|---|---|---|---|---|---|
| | | | Design Thickness of Member in Contact with the Screw Head (in.) | | | | |
| | | | 0.041 | 0.050 | 0.062 | 0.075 | 0.104 |
| #8-15 x Modified Truss (PMTH) | 0.164 | 0.350 | 359 | 367 | - | - | - |
| #8-18 x Modified Truss (PMTH) | 0.164 | 0.350 | 381 | 385 | 387 | 387 | - |
| #8-18 x Pan with Washer (SPWH) | 0.164 | 0.352 | 477 | 488 | 488 | 547 | 557 |
| #10-16 x Reduced Wafer (PWH) | 0.190 | 0.324 | 448 | 451 | 490 | 518 | 638 |
| #10-16 x Pan Framing (SPFH or RPFH) | 0.190 | 0.348 | 502 | 502 | 788 | 881 | 881 |
| #10-22 x Pan Framing (RPFH) | 0.190 | 0.350 | 480 | 534 | 785 | 785 | 785 |
| #12-18 x Pan Framing (RPFH) | 0.216 | 0.348 | 490 | 490 | 769 | 873 | 1011 |
| #12-14 x Pan Framing (RPFH) | 0.216 | 0.348 | 495 | 506 | 766 | 835 | 1030 |

For **SI:** 1 inch = 25.4 mm, 1 pound-force = 4.4 N, 1 ksi = 6.89 MPa.

[1]For tension connections, the least of the allowable pull-out, pullover, and fastener tension strength of screw found in Tables 2, 3, and 5, respectively must be used for design.
[2]Nominal load values are based upon laboratory testing in accordance with AISI S905.
[3]The allowable pullover capacity for intermediate member thicknesses can be determined by interpolating within the values in the table for the applicable steel tensile strength.
[4]To calculate LRFD values, multiply values in table by the ASD safety factor of 3.0 and multiply again with the LRFD Φ factor of 0.5.

**TABLE 4—ALLOWABLE SHEAR (BEARING) CAPACITY ($P_{NS}/\Omega$) OF STEEL-TO-STEEL CONNECTIONS, pounds-force[1,2,3,4]**

| SCREW DESIGNATION | NOMINAL DIAMETER (in.) | STEEL $F_U$=55 Ksi $\Omega$ = 3.0 | | STEEL $F_U$=65 Ksi $\Omega$ = 3.0 | | |
|---|---|---|---|---|---|---|
| | | Design Thickness of Both Connected Members (in.) | | | | |
| | | 0.041 | 0.050 | 0.062 | 0.075 | 0.104 |
| #8-15 x Modified Truss (PMTH) | 0.164 | 294 | 334 | - | - | - |
| #8-18 x Modified Truss (PMTH) | 0.164 | 223 | 268 | 412 | 428 | - |
| #8-18 x Pan with Washer (SPWH) | 0.164 | 211 | 271 | 425 | 425 | 425 |
| #10-16 x Reduced Wafer (PWH) | 0.190 | 232 | 277 | 446 | 485 | 511 |
| #10-16 x Pan Framing (SPFH or RPFH) | 0.190 | 232 | 279 | 512 | 517 | 517 |
| #10-22 x Pan Framing (RPFH) | 0.190 | 240 | 263 | 470 | 550 | 550 |
| #12-18 x Pan Framing (RPFH) | 0.216 | 245 | 292 | 573 | 573 | 573 |
| #12-14 x Pan Framing (RPFH) | 0.216 | 261 | 309 | 544 | 577 | 606 |

For **SI:** 1 inch = 25.4 mm, 1 pound-force = 4.4 N, 1 ksi = 6.89 MPa.

[1]The lower of the allowable shear (bearing) and the allowable fastener shear strength found in Tables 4 and 5, respectively must be used for design.
[2]Nominal load values are based on laboratory testing in accordance with AISI S905.
[3]The allowable bearing capacity for other member thicknesses can be determined by interpolating within the values in the table for the applicable steel tensile strength.
[4]To calculate LRFD values, multiply values in table by the ASD safety factor of 3.0 and multiply again with the LRFD Φ factor of 0.5.

**TABLE 5—SCREW FASTENER STRENGTH[1,2,3,4]**

| SCREW DESIGNATION | NOMINAL DIAMETER (in.) | NOMINAL FASTENER STRENGTH DETERMINED BY TESTING | | ALLOWABLE FASTENER STRENGTH | |
|---|---|---|---|---|---|
| | | Tension, $P_{ts}$ (lbf) | Shear, $P_{ss}$ (lbf) | Tension ($P_{ts}/\Omega$)[1] (lbf) | Shear ($P_{ss}/\Omega$)[1] (lbf) |
| #8-15 x Modified Truss (PMTH) | 0.164 | 1423 | 1132 | 475 | 377 |
| #8-18 x Modified Truss (PMTH) | 0.164 | 2280 | 1351 | 760 | 450 |
| #8-18 x Pan with Washer (SPWH) | 0.164 | 1927 | 1377 | 642 | 459 |
| #10-16 x Reduced Wafer (PWH) | 0.190 | 2426 | 1736 | 809 | 579 |
| #10-16 x Pan Framing (SPFH or RPFH) | 0.190 | 3175 | 1779 | 1058 | 593 |
| #10-22 x Pan Framing (RPFH) | 0.190 | 2318 | 1795 | 773 | 598 |
| #12-18 x Pan Framing (RPFH) | 0.216 | 3585 | 2132 | 1195 | 711 |
| #12-14 x Pan Framing (RPFH) | 0.216 | 2826 | 2076 | 942 | 692 |

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.4 N, 1 ksi = 6.89 MPa.

[1]For tension connections, the least of the allowable pull-out, pullover, and fastener tension strength of screw found in Tables 2, 3, and 5, respectively, must be used for design.
[2]For shear connections, the lower of the allowable shear (bearing) and the allowable fastener shear strength found in Tables 4 and 5, respectively, must be used for design.
[3]See Section 4.1.3 for fastener spacing and end distance requirements.
[4]To calculate LRFD values; multiply the nominal fastener strengths by the LRFD Φ factor of 0.5.

**FIGURE 1—PHILLIPS BUGLE HEAD (PBH) SELF-DRILLING SCREW (SECTION 3.2)**

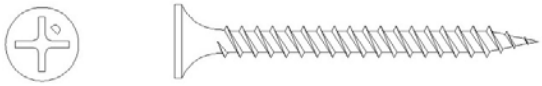

**FIGURE 2—PHILLIPS BUGLE HEAD (PBH) SELF-PIERCING SCREW (SECTION 3.3)**

**FIGURE 3—PHILLIPS REDUCED WAFER HEAD (PWH) SELF-DRILLING SCREW (SECTIONS 3.4 AND 3.6)**

**FIGURE 4—PHILLIPS MODIFIED TRUSS HEAD (PMTH) SELF-PIERCING SCREW (SECTION 3.5)**

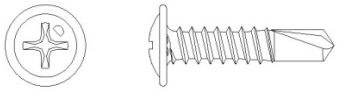

**FIGURE 5—PHILLIPS MODIFIED TRUSS HEAD (PMTH) SELF-DRILLING SCREW (SECTION 3.6)**

**FIGURE 6—SQUARE PAN WITH WASHER HEAD (SPWH) SELF-DRILLING SCREW (SECTION 3.6)**

**FIGURE 7—SQUARE PAN FRAMING HEAD (SPFH) SELF-DRILLING SCREW (SECTION 3.6)**

**FIGURE 8—REX PAN FRAMING HEAD (RPFH) SELF-DRILLING SCREW (SECTION 3.6)**

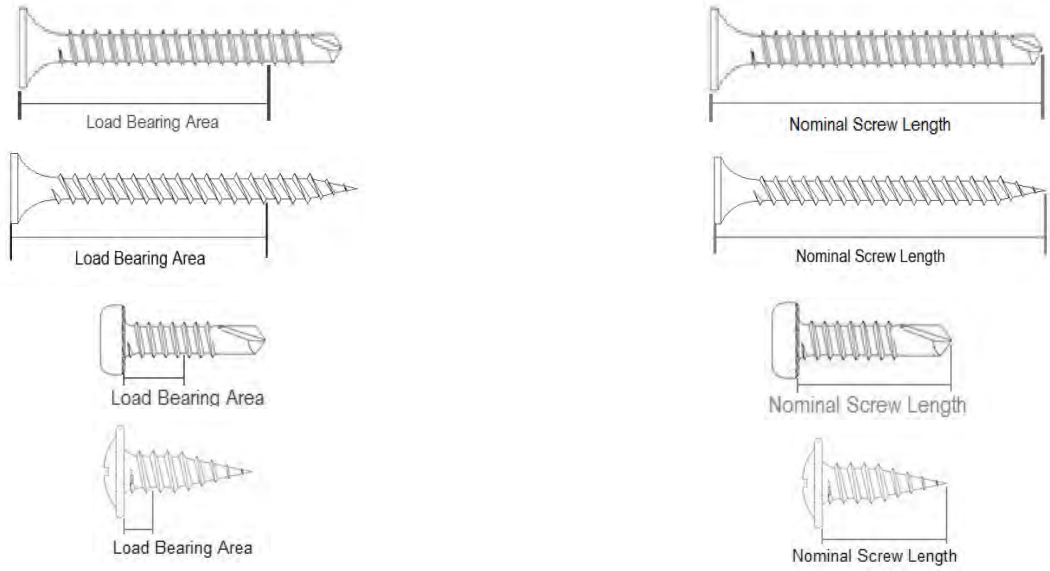


**FIGURE 9—DESCRIPTION OF LENGTH OF LOAD-BEARING AREA (LLBA) AND NOMINAL SCREW LENGTH (L)**