

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

REPORT HOLDER:

GRK FASTENERS, A DIVISION OF ILLINOIS TOOL WORKS, INC.

EVALUATION SUBJECT:

R4™ MULTI-PURPOSE SCREW, FIN/TRIM™ SCREW, KAMELEON™ SCREW, RT COMPOSITE™ SCREW AND CLIMATEK™ COATING

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2015, 2012, 2009 and 2006 *International Building Code*® (IBC)
- 2015, 2012, 2009 and 2006 *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.

Properties evaluated:

- Structural
- Corrosion resistance

2.0 USES

The R4™ Multi-Purpose Screw, Fin/Trim™ Screw, Kameleon™ Screw and RT Composite™ Screw fasteners are used in wood-to-wood connections that are designed in accordance with the IBC. For structures regulated under the IRC, the fasteners may be used where an engineered design is submitted in accordance with IRC Section R301.1.3. Climatek™ coated screws are intended for use in the Exposure Conditions shown in Table 6. PHEinox™ screws may be used where stainless steel fasteners are prescribed in the code.

3.0 DESCRIPTION

3.1 Fasteners:

3.1.1 General: The fasteners described in this report are self-tapping screws which have star shaped driving recesses in the heads. The carbon steel fasteners are made from steel wire, hardened after forming and then

coated with a proprietary coating (Climatek™). PHEinox™ fasteners are formed from Grade 305 stainless steel wire. See Tables 1A and 1B and Figure 1 for fastener dimensions and descriptions.

3.1.2 R4™ Multi-Purpose Screw: The R4™ Multi-Purpose Screw fasteners are partially threaded screws. The screws have a countersunk head with cutting pockets and teeth on the underside of the head. The screws have a CEE-Thread™ rolled threads, rolled W-Cut™ threads at the point end of the fastener and a Type 17 point (Zip-Tip™). Carbon steel and PHEinox™ versions of the R4 screws have been evaluated.

3.1.3 Fin/Trim™ Screw: The Fin/Trim™ Screw fasteners are partially threaded screws. The screws have a finish head, rolled threads, rolled W-Cut™ threads at the point end of the fastener and a Type 17 point (Zip-Tip™). Carbon steel and PHEinox™ versions of the Fin/Trim™ screws have been evaluated.

3.1.4 RT Composite™ Screw: The RT Composite™ Screw fasteners are the same as the Fin/Trim™ screws described in Section 3.1.3, except they have a reversed thread beneath the head. Only the PHEinox™ version of the RT Composite screw has been evaluated.

3.1.5 Kameleon™ Screw: The Kameleon™ Screw fasteners are fully threaded screws. The screws have a pan framer head with saw-blade-like cutting teeth under the head. The screw shank has ring style deformations with three indented fiber traps on each ring, a CEE-Thread™, standard threads, W-Cut™ threads at the point end of the fastener and a Type 17 point (Zip-Tip™). Only the carbon steel version of the Kameleon™ Screw has been evaluated.

3.2 Coating:

The proprietary Climatek™ coating consists of multiple layers of various materials, including layers of zinc and polymer.

3.3 Wood Members:

Wood members must be solid-sawn lumber having an assigned specific gravity of 0.42 or greater. Assigned specific gravity for solid-sawn lumber must be determined in accordance with Table 12.3.3A of the 2015 ANSI/AWC National Design Specification (NDS) for Wood Construction (Table 11.3.3A of NDS-12 for the 2012 IBC; Table 11.3.2A of NDS-05 for the 2009 and 2006 IBC). The thickness of the wood main member must be equal to or greater than the screw length less the thickness of the side member.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: Reference lateral, withdrawal and pull-through design values given in this report are for allowable stress design. The reference values must be multiplied by all adjustment factors, as applicable to wood screws, in accordance with the NDS, to determine adjusted design values. When the capacity of a connection is controlled by the fastener strength, the allowable fastener strength must not be increased by the adjustment factors specified in the NDS.

Connections containing multiple screws must be designed in accordance with Sections 11.2.2 and 12.6 of the NDS-15 (Sections 10.2.2 and 11.6 of NDS-12 and NDS-05 for the 2012, 2009 and 2006 IBC). Where the screws are subjected to combined lateral and withdrawal loads, connections must be designed in accordance with Section 12.4.1 of NDS-15 (Section 11.4.1 of NDS-12 and NDS-05 for the 2012, 2009 and 2006 IBC).

When designing a connection, the structural members must be checked for load-carrying capacity in accordance with Section 11.1.2 of NDS-15 (Section 10.1.2 of NDS-12 and NDS-05 for the 2012, 2009 and 2006 IBC), and local stresses within the connection must be checked against Appendix E of the NDS to ensure the capacity of the connection and fastener group.

4.1.2 Withdrawal and Pull-through Design Values: Reference withdrawal (*W*) design values in pounds per inch of thread penetration into the side grain of the main member, are shown in Table 2A for the Climatek™ coated screws and Table 2B for the PHEinox™ screws. Reference pull-through design values are provided in Table 3A for the Climatek™ coated screws and Table 3B for the PHEinox™ screws. The allowable load for a single-screw connection in which the screw is subject to tension is the least of: (a) the reference withdrawal design value given in Table 2A or 2B, as applicable, multiplied by the thread length, and adjusted by all applicable adjustment factors; (b) the allowable screw tension strength given in Table 1; and (c) the reference pull-through design value given in Table 3A or 3B, as applicable.

4.1.3 Lateral Design Values: Reference lateral (*Z*) design values for single shear wood-to-wood connections loaded perpendicular and parallel to grain, are as shown in Table 4A for the Climatek™ coated screws and Table 4B for the PHEinox™ screws. The allowable lateral load for a single-screw connection is the lesser of: (a) the reference lateral design value (*Z*) given in Table 4A or 4B, as applicable, adjusted by all applicable adjustment factors; and (b) the allowable screw shear strength given in Table 1.

4.1.4 Corrosion Resistance: The Climatek™ coated screws may be used in treated lumber, as alternates to hot-dip galvanized fasteners prescribed in 2015 IBC Section 2304.10.5 (2012, 2009 and 2006 IBC Section 2304.9.5), when subject to the Exposure Conditions shown in Table 6. The Climatek™ coated screws are recognized for use in wood treated with waterborne alkaline copper quaternary (ACQ-D) preservatives with a maximum retention of 0.40 pcf (6.4kg/m³) or in wood treated with copper azole (CA-B) preservatives with a maximum retention of 0.40 pcf (6.4kg/m³).

The PHEinox™ stainless steel screws may be used in the applications described in 2015 IBC Section 2304.10.5; 2012, 2009 and 2006 IBC Section 2304.9.5 and IRC

Section R317.3 (2006 IRC Section R319.3) where stainless steel fasteners are prescribed.

4.2 Installation:

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 plane of the wood side member. The top of the screw head must be flush with the surface of the wood side member. Screws must not be overdriven. 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 5, whichever is more restrictive. Installation of the R4 screws may be performed without predrilling in wood species with assigned specific gravity of 0.58 or less. In all other cases, the screws must be installed with pilot holes that meet the requirements shown in the applicable load tables. The screws must be installed by turning with Star drive bits, not by driving with a hammer.

5.0 CONDITIONS OF USE

The R4™ Multi-Purpose Screw, Fin/Trim™ Screw, Kameleon™ Screw and RT Composite™ Screw fasteners 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 Installation must comply with this report, the report holder's published instructions and the applicable code. A copy of the report holder's published installation instructions must be available at the jobsite at all times during installation. In the event of a conflict between the published installation instructions and this report, this report governs.
- 5.2 When the capacity of the connection is controlled by the fastener metal strength, rather than wood strength, the metal strength must not be multiplied by the adjustment factors specified in the NDS.
- 5.3 Installation must be limited to connections between wood members used in dry service conditions where the wood moisture content does not exceed 19 percent.
- 5.4 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 Alternate Dowel-type Threaded Fasteners (AC233), dated April 2015 (editorially revised August 2015).
- 6.2 Data in accordance with the ICC-ES Acceptance Criteria for Corrosion-resistant Fasteners and Evaluation of Corrosion Effects of Wood Treatment Chemicals (AC257), dated October 2009 (editorially revised May 2015).

7.0 IDENTIFICATION

- 7.1 Individual fasteners are identified with a mark indicating the manufacturer. Some R4 fasteners are identified by the letters "GRK" on the head. Package labels for the screws include the report holder name (GRK) and address, evaluation report number (ESR-3201), fastener designation (R4™ Multi-Purpose Screw, Fin/Trim™ Screw, Kameleon™ Screw or RT Composite™ Screw), fastener size and length, material/coating designation (PHEinox™ or Climatek™), production date and lot number and a

reference to this report for the compatible treated wood types, where applicable. For R4 screws shown in Table 1 to have differing thread lengths available, the screws with the new, shorter thread lengths are identified by the letters "GRK" on the head and by a round, white sticker on the packaging which reads, "NEW Design Values Check ESR-3201".

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

GRK FASTENERS, A DIVISION OF ILLINOIS TOOL WORKS, INC.

**1452 BREWSTER CREEK BOULEVARD
BARTLETT, ILLINOIS 60103**

(877) 489-2726

www.grkfasteners.com

grk@grkfasteners.com

TABLE 1A—CARBON STEEL FASTENER SPECIFICATIONS

FASTENER DESIGNATION	OVERALL LENGTH ¹ (inches)	THREAD LENGTH ² (inches)	HEAD DIAMETER (inch)	HEAD RECESS	ROOT DIAMETER (inch)	SHANK DIAMETER (inch)	OUTSIDE THREAD DIAMETER (inch)	BENDING YIELD STRENGTH ³ F _{yb} (psi)	ALLOWABLE STEEL STRENGTH		
									Tensile (lbf)	Shear (lbf)	
R4	9x2"	2	1 ¹ / ₄	0.329	Star drive T-25	0.112	0.128	0.173	158,800	627	428
	9x2 ¹ / ₂ "	2 ³ / ₈	1 ⁵ / ₈								
	9x2 ³ / ₄ "	2 ³ / ₄	1 ⁷ / ₈								
	9x3 ¹ / ₈ "	3 ¹ / ₈	1 ⁵ / ₈ (2 ¹ / ₈)								
	10x2 ¹ / ₂ "	2 ³ / ₈	1 ⁵ / ₈	0.368	Star drive T-25	0.124	0.142	0.193	143,590	846	542
	10x2 ³ / ₄ "	2 ³ / ₄	1 ⁷ / ₈								
	10x3 ¹ / ₈ "	3 ¹ / ₈	1 ⁵ / ₈ (2 ¹ / ₈)								
	10x3 ¹ / ₂ "	3 ¹ / ₂	2 (2 ³ / ₈)								
	10x4"	3 ⁷ / ₈	2 ⁵ / ₈								
	10x4 ³ / ₄ "	4 ⁵ / ₈	3	0.439	Star drive T-25	0.148	0.171	0.234	134,280	1134	655
12x4 ³ / ₄ "	4 ⁵ / ₈	3									
12x5 ⁵ / ₈ "	5 ¹ / ₂	3									
12x6 ³ / ₈ "	6 ¹ / ₄	3									
12x7 ¹ / ₄ "	7	3									
12x8"	7 ⁷ / ₈	3									
12x10"	9 ³ / ₄	3									
12x12"	11 ³ / ₄	3									
FIN/TRIM	8x2 ¹ / ₂ "	2 ³ / ₈	1 ⁵ / ₈	0.197	Star drive T-10	0.100	0.111	0.156	148,410	499	360
	8x2 ³ / ₄ "	2 ³ / ₄	1 ⁷ / ₈								
	8x3 ¹ / ₈ "	3 ¹ / ₈	2 ¹ / ₈								
	9x2 ¹ / ₂ "	2 ³ / ₈	1 ⁵ / ₈	0.230	Star drive T-15	0.112	0.128	0.175	147,280	576	425
	9x2 ³ / ₄ "	2 ³ / ₄	1 ⁷ / ₈								
9x3 ¹ / ₈ "	3 ¹ / ₈	2 ¹ / ₈									
KAMELEON	9x2 ¹ / ₂ "	2 ³ / ₈	1 ⁵ / ₈	0.258	Star drive T-20	0.112	0.134	0.173	160,210	634	437
	9x2 ³ / ₄ "	2 ³ / ₄	1 ³ / ₄								
	9x3"	3	1 ³ / ₄								

TABLE 1B—PHEINOX™ FASTENER SPECIFICATIONS

FASTENER DESIGNATION	OVERALL LENGTH ¹ (inches)	THREAD LENGTH ² (inches)	HEAD DIAMETER (inch)	DRIVER SIZE	ROOT DIAMETER (inch)	SHANK DIAMETER (inch)	OUTSIDE THREAD DIAMETER (inch)	BENDING YIELD STRENGTH ³ F _{yb} (psi)	ALLOWABLE STEEL STRENGTH		
									Tensile (lbf)	Shear (lbf)	
R4	9x2"	2	1 ¹ / ₄	0.329	Star drive T-25	0.112	0.128	0.173	113,340	467	334
	10x2 ¹ / ₂ "	2 ¹ / ₂	1 ⁵ / ₈	0.368	Star drive T-25	0.124	0.142	0.193	170,220	490	424
	10x2 ³ / ₄ "	2 ³ / ₄	1 ⁷ / ₈								
	10x3 ¹ / ₈ "	3 ¹ / ₈	1 ⁵ / ₈ (2 ¹ / ₈)								
	10x4"	3 ⁷ / ₈	2 ⁵ / ₈								
FIN/TRIM, RT COMPOSITE	8x2 ¹ / ₂ "	2 ¹ / ₂	1 ⁵ / ₈	0.197	Star drive T-10	0.100	0.111	0.156	117,540	350	267
	8x2 ³ / ₄ "	2 ³ / ₄	1 ⁷ / ₈								
	8x3 ¹ / ₈ "	3 ¹ / ₈	2 ¹ / ₈								
	9x2 ¹ / ₂ "	2 ¹ / ₂	1 ⁵ / ₈	0.230	Star drive T-15	0.112	0.128	0.175	66,340	394	319
	9x2 ³ / ₄ "	2 ³ / ₄	1 ⁷ / ₈								
	9x3 ¹ / ₈ "	3 ¹ / ₈	2 ¹ / ₈								

For SI: 1 inch = 25.4 mm; 1 psi = 6.9 kPa.

¹Overall length of fastener is measured from the top of the head to bottom of the tip. See Figure 1.

²Length of thread includes tip. Where two thread lengths are shown, the first refers to thread length of screws marked with "GRK" on the fastener head, and the one in parentheses refers to screws which do not have this marking on the head. See detailed illustrations in Figure 1.

³Bending yield strength determined in accordance with ASTM F1575 using the root diameter.

TABLE 2A— REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR CLIMATEK™ COATED FASTENERS^{1,2}

FASTENER DESIGNATION	THREAD LENGTH ³ (inches)	W (lbf/in.) FOR SPECIFIC GRAVITIES (SG) OF:			
		SG ≥ 0.67 ⁴	0.58 ≥ SG ≥ 0.55	0.55 > SG ≥ 0.49	0.49 > SG ≥ 0.42
R4	9x2"	179	221	172	124
	9x2 ¹ / ₂ "				
	9x2 ³ / ₄ "				
	9x3 ¹ / ₈ "				
	10x2 ¹ / ₂ "	249	228	155	133
	10x2 ³ / ₄ "				
	10x3 ¹ / ₈ "				
	10x3 ¹ / ₂ "				
	10x4"				
	10x4 ³ / ₄ "	255	217	209	141
	12x4 ³ / ₄ "				
	12x5 ⁵ / ₈ "				
	12x6 ³ / ₈ "				
	12x7 ¹ / ₄ "				
	12x8"				
12x10"					
12x12"					
FINTRIM	8x2 ¹ / ₂ "	175	n/a	n/a	n/a
	8x2 ³ / ₄ "				
	8x3 ¹ / ₈ "				
	9x2 ¹ / ₂ "	221	n/a	n/a	n/a
	9x2 ³ / ₄ "				
9x3 ¹ / ₈ "					
KAMELEON	9x2 ¹ / ₂ "	186	n/a	n/a	n/a
	9x2 ³ / ₄ "				
	9x3"				

For SI: 1 inch = 25.4 mm; 1 lbf/in = 175 N/m.

¹Tabulated reference withdrawal design values (W) are in pounds per inch of thread penetration into side grain of main member.

²Values must be multiplied by applicable adjustment factors, in accordance with the NDS, and must be multiplied by the length of thread penetration in the main member, including tip.

³Where two thread lengths are shown, the first refers to thread length of screws marked with "GRK" on the fastener head, and the second refers to screws which do not have this marking on the head.

⁴Pilot holes equal to 70% of the root diameter of the screw are required, and the tabulated values are applicable to connections subject to tension load only, due to differing pilot hole requirements for lateral connections.

TABLE 2B — REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR PHEINOX™ STAINLESS STEEL FASTENERS^{1,2}

FASTENER DESIGNATION		THREAD LENGTH ³ , (inches)	W (lbf/in.) FOR SPECIFIC GRAVITIES (SG) OF:			
			SG ≥ 0.67 ⁴	0.58 ≥ SG ≥ 0.55	0.55 > SG ≥ 0.49	0.49 > SG ≥ 0.42
R4	9x2"	1 ¹ / ₄	213	215	179	125
	10x2 ¹ / ₂ "	1 ⁵ / ₈	123	240	193	144
	10x2 ³ / ₄ "	1 ⁷ / ₈				
	10x3 ¹ / ₈ "	1 ⁵ / ₈ (2 ¹ / ₈)				
	10x4"	2 ⁵ / ₈				
FIN/TRIM RT COMPOSITE	8x2 ¹ / ₂ "	1 ⁵ / ₈	106	n/a	n/a	n/a
	8x2 ³ / ₄ "	1 ⁷ / ₈				
	8x3 ¹ / ₈ "	2 ¹ / ₈				
	9x2 ¹ / ₂ "	1 ⁵ / ₈	115	n/a	n/a	n/a
	9x2 ³ / ₄ "	1 ⁷ / ₈				
	9x3 ¹ / ₈ "	2 ¹ / ₈				

For SI: 1 inch = 25.4 mm; 1 lbf/in = 175 N/m.

¹Tabulated reference withdrawal design values (W) are in pounds per inch of thread penetration into side grain of main member.

²Values must be multiplied by applicable adjustment factors, in accordance with the NDS, and must be multiplied by the length of thread penetration in the main member, including tip.

³Where two thread lengths are shown, the first refers to thread length of screws marked with "GRK" on the fastener head, and the second refers to screws which do not have this marking on the head.

⁴Pilot holes equal to 70% of the root diameter of the screw are required, and the tabulated values are applicable to connections subject to tension load only, due to differing pilot hole requirements for lateral connections.

TABLE 3A— REFERENCE PULL-THROUGH DESIGN VALUES (P) FOR CLIMATEK™ COATED FASTENERS¹

FASTENER DESIGNATION		MINIMUM SIDE MEMBER THICKNESS (inch)	P (lbf) FOR SPECIFIC GRAVITIES (SG) OF:			
			SG ≥ 0.67 ²	0.58 ≥ SG ≥ 0.55	0.55 > SG ≥ 0.49	0.49 > SG ≥ 0.42
R4	9x2"	3/4	162	119	107	83
	9x2 ¹ / ₂ "					
	9x2 ³ / ₄ "					
	9x3 ¹ / ₈ "					
	10x2 ¹ / ₂ "	3/4	275	140	126	103
	10x2 ³ / ₄ "					
	10x3 ¹ / ₈ "					
	10x3 ¹ / ₂ "					
	10x4"	3/4	407	176	171	126
	10x4 ³ / ₄ "					
	12x4 ³ / ₄ "					
	12x5 ⁵ / ₈ "					
	12x6 ³ / ₈ "	3/4	407	176	171	126
	12x7 ¹ / ₄ "					
	12x8"					
12x10"						
12x12"	3/4	61	n/a	n/a	n/a	
8x2 ¹ / ₂ "						
8x2 ³ / ₄ "						
8x3 ¹ / ₈ "						
FINTRIM	9x2 ¹ / ₂ "	3/4	94	n/a	n/a	n/a
	9x2 ³ / ₄ "					
	9x3 ¹ / ₈ "					
KAMELEON	9x2 ¹ / ₂ "	3/4	143	n/a	n/a	n/a
	9x2 ³ / ₄ "					
	9x3"					

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

¹Values must be multiplied by applicable adjustment factors, in accordance with the NDS.

²Pilot holes equal to 90% of the root diameter of the screw are required, and the tabulated values are applicable to connections subject to tension load only.

TABLE 3B— REFERENCE PULL-THROUGH DESIGN VALUES (P) FOR PHEINOX™ STAINLESS STEEL FASTENERS¹

FASTENER DESIGNATION		MINIMUM SIDE MEMBER THICKNESS (inch)	P (lbf) FOR SPECIFIC GRAVITIES (SG) OF:			
			SG ≥ 0.67 ²	0.58 ≥ SG ≥ 0.55	0.55 > SG ≥ 0.49	0.49 > SG ≥ 0.42
R4	9x2"	3/4	184	119	107	83
	10x2 ¹ / ₂ "					
	10x2 ³ / ₄ "	3/4	220	140	126	103
	10x3 ¹ / ₈ "					
	10x4"					
FINTRIM RT COMPOSITE	8x2 ¹ / ₂ "	3/4	70	n/a	n/a	n/a
	8x2 ³ / ₄ "					
	8x3 ¹ / ₈ "					
	9x2 ¹ / ₂ "	3/4	124	n/a	n/a	n/a
	9x2 ³ / ₄ "					
9x3 ¹ / ₈ "						

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

¹Values must be multiplied by applicable adjustment factors, in accordance with the NDS.

²Pilot holes equal to 90% of the root diameter of the screw are required, and the tabulated values are applicable to connections subject to tension load only.

TABLE 4A— REFERENCE LATERAL DESIGN VALUES (Z) FOR WOOD-TO-WOOD CONNECTIONS USING CLIMATEK™ COATED FASTENERS¹

FASTENER DESIGNATION		SIDE MEMBER THICKNESS (inch)	MINIMUM MAIN MEMBER PENETRATION (inches)	Z (lbf) FOR SPECIFIC GRAVITIES (SG) OF:			
				SG ≥ 0.67 ²	0.58 ≥ SG ≥ 0.55	0.55 > SG ≥ 0.49	0.49 > SG ≥ 0.42
R4	9x2"	3/4	1 1/4	175	103	89	75
	9x2 1/2"						
	9x2 3/4"						
	9x3 1/8"						
	10x2 1/2"	3/4	1 3/4	203	121	97	95
	10x2 3/4"						
	10x3 1/8"						
	10x3 1/2"						
	10x4"	3/4	4	242	122	119	110
	10x4 3/4"						
	12x4 3/4"						
	12x5 5/8"						
	12x6 3/8"	3/4	4	242	122	119	110
	12x7 1/4"						
12x8"							
12x10"							
12x12"	3/4	1 3/4	84	—	—	—	
8x2 1/2"							
8x2 3/4"							
8x3 1/8"							
FIN/TRIM	9x2 1/2"	3/4	1 3/4	104	—	—	—
	9x2 3/4"						
	9x3 1/8"						
KAMELEON	9x2 1/2"	3/4	1 3/4	159	—	—	—
	9x2 3/4"						
	9x3"						

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

¹Values must be multiplied by applicable adjustment factors, in accordance with the NDS.

²Pilot holes equal to 90% of the root diameter of the screw are required, and the tabulated values are applicable to connections subject to lateral load only, due to differing pilot hole requirements for tension connections.

TABLE 4B— REFERENCE LATERAL DESIGN VALUES (Z) FOR WOOD-TO-WOOD CONNECTIONS USING PHEINOX™ STAINLESS STEEL FASTENERS¹

FASTENER DESIGNATION		SIDE MEMBER THICKNESS (inch)	MINIMUM MAIN MEMBER PENETRATION (inches)	Z (lbf) FOR SPECIFIC GRAVITIES (SG) OF:			
				SG ≥ 0.67 ²	0.67 > SG ≥ 0.55	0.55 > SG ≥ 0.49	0.49 > SG ≥ 0.42
R4	9x2"	3/4	1 1/4	212	128	110	87
	10x2 1/2"						
	10x2 3/4"						
	10x3 1/8"						
	10x4"						
FIN/TRIM	8x2 1/2"	3/4	1 3/4	78	—	—	—
	8x2 3/4"						
	8x3 1/8"						
	9x2 1/2"						
	9x2 3/4"						
	9x3 1/8"						
RT COMPOSITE	8x2 1/2"	3/4	1 3/4	107	—	—	—
	8x2 3/4"						
	8x3 1/8"						
	9x2 1/2"						
	9x2 3/4"						
	9x3 1/8"						

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

¹Values must be multiplied by applicable adjustment factors, in accordance with the NDS.

²Pilot holes equal to 90% of the root diameter of the screw are required, and the tabulated values are applicable to connections subject to lateral load only, due to differing pilot hole requirements for tension connections.

TABLE 5—CONNECTION GEOMETRY REQUIREMENTS^{1,2}

CONDITION		MINIMUM DISTANCE OR SPACING (inches)			
		D = 0.111"	D = 0.128-0.134"	D = 0.142"	D = 0.171"
End distance	Loading toward end	2	2	2 1/8	2 5/8
	Loading away from end	1 1/8	1 1/4	1 3/8	1 3/4
	Loading perpendicular to grain	NA ³	NA ³	NA ³	NA ³
Edge distance	Loading parallel to grain	1	1	1 1/8	1 3/8
	Loading perpendicular to grain	NA ³	NA ³	NA ³	NA ³
Spacing between fasteners in a row	Loading parallel to grain	1 3/4	2	2 1/8	2 5/8
	Loading perpendicular to grain	NA ³	NA ³	NA ³	NA ³
Spacing between rows	In-line rows	5/8	5/8	3/4	7/8
	Staggered rows ⁴	1/4	3/8	3/8	3/8

For SI: 1 inch = 25.4 mm.

¹End distances, edge distances and screw spacing must be sufficient to prevent splitting of the wood, or as required by this table, whichever is the more restrictive. See Section 4.2.

²The term *D* is the shank diameter, as specified in Table 1.

³Loading perpendicular to grain is outside the scope of this evaluation report.

⁴Values for spacing between staggered rows apply where screws in adjacent rows are offset by half of the spacing between screws in a row.

TABLE 6—EXPOSURE CONDITIONS FOR FASTENERS WITH INTENDED USE AND LIMITATIONS OF RECOGNITION

EXPOSURE CONDITION	TYPICAL APPLICATIONS	RECOGNITION 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, i.e., no saltwater exposure.

R4

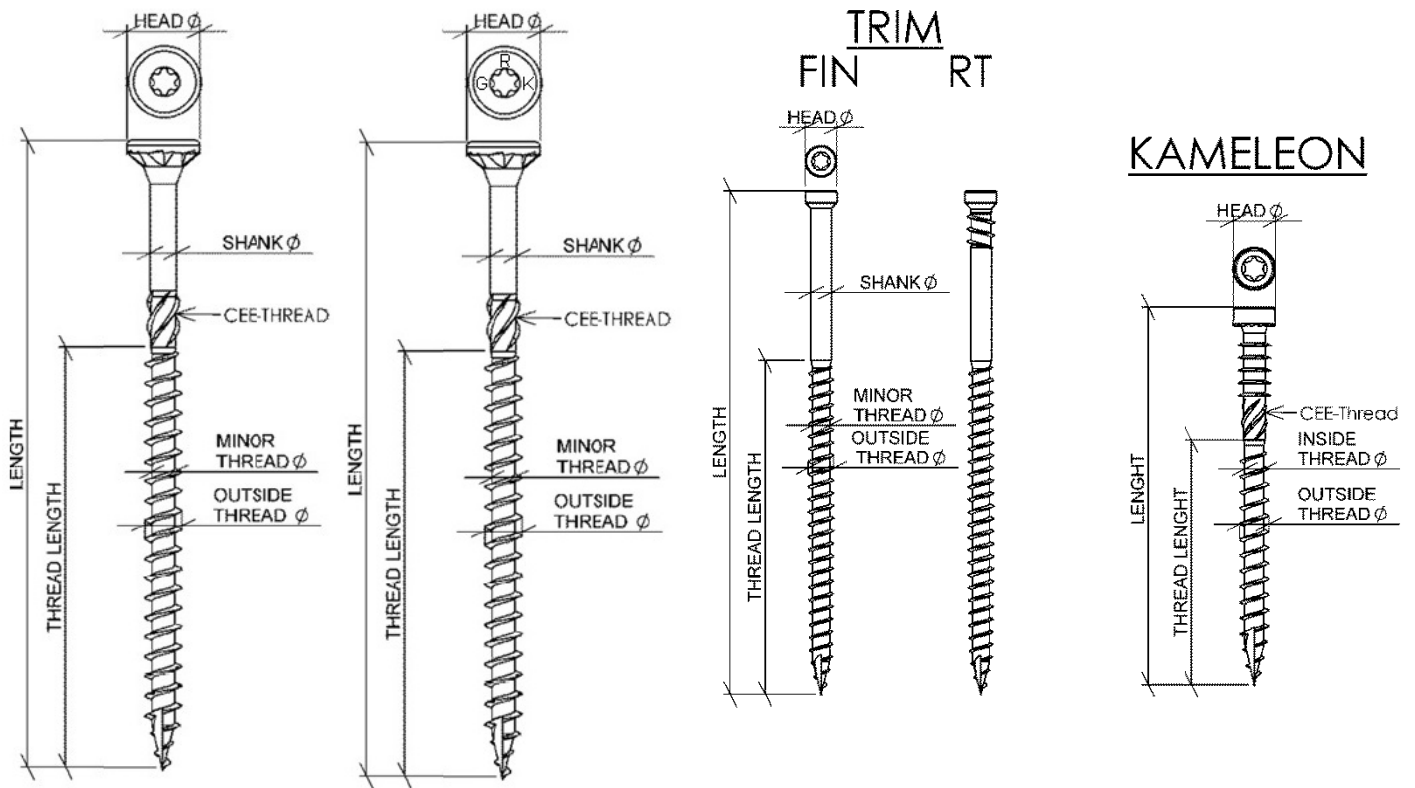


FIGURE 1—GRK SCREWS