



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:

- 2021, 2018, 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2021, 2018, 2015, 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.

Properties evaluated:

- Structural
- Corrosion resistance

2.0 USES

The R4™ Multi-Purpose Screw, Fin/Trim™ Screw, Kameleon™ Screw and RT Composite™ Screw are used in 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. 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 Screws:

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

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

3.1.2 R4™ Multi-Purpose Screw: The R4™ Multi-Purpose Screws are partially threaded and have a countersunk head with cutting pockets and teeth on the underside of the head. The screws have a CEE-Thread™ (reamer knurl) between the smooth portion of the shank and the threads, rolled threads, rolled W-Cut™ threads at the point end of the screw 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™ Screws are partially threaded. The screws have a finish head, rolled threads, rolled W-Cut™ threads at the point end of the screw 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™ Screws 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™ Screws 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™ (reamer knurl), standard™ threads, W-Cut™ threads at the point end of the screw and a Type 17 point (Zip-Tip™). Only the carbon steel version of the Kameleon™ Screw has been evaluated.

3.2 Climatek™ Coating:

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

3.3 Wood Members:

For purposes of connection design, sawn lumber members must have an assigned specific gravity 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 (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

IBC). Unless otherwise noted, sawn lumber members must have a 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, GL must have a 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. Moisture content must be 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 the screw length less the thickness of the side member.

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 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: Allowable screw shear and tension strengths (ASD) and measured bending yield strength for the screws are shown in Tables 1A and 1B.

4.1.2 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 and 2009 IBC), 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 and 2009 IBC), as applicable. When the capacity of a connection is controlled by the fastener strength, the allowable connection strength must not be increased by the adjustment factors specified in the NDS.

4.1.3 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 and 2009 IBC).

4.1.4 Combined Loading: Where the screws are subjected to combined lateral and withdrawal loads, connections must be designed in accordance with Section 12.4.1 of the NDS (Section 11.4.1 of the NDS for the 2012 and 2009 IBC).

4.1.5 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 and 2009 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.

4.1.6 Reference Withdrawal and Head Pull-through Design Values: Reference withdrawal (W) design values in pounds per inch of thread penetration for screws installed perpendicular to the wood member, are shown in Table 2. Reference head pull-through (W_H) design values are given in Table 3.

4.1.7 Governing Design Values: The allowable lateral load for a two-member, single-screw connection is the lesser of: (a) the reference lateral design value determined in accordance with Section 4.1.8 or 4.1.9, as applicable, adjusted by all applicable adjustment factors; and (b) the allowable screw shear strength given in Table 1A or 1B, as applicable.

The allowable load for a two-member, single-screw connection in which the screw is subject to tension is the least of: (a) the reference withdrawal design value given in Table 2, multiplied by the embedded thread length, and adjusted by all applicable adjustment factors; (b) the allowable screw tension strength given in Table 1A or 1B, as applicable; and (c) the reference pull-through design value given in Table 3.

4.1.8 Lateral Design Values Based on Testing: Reference lateral (Z) design values for single shear wood-to-wood connections loaded perpendicular and parallel to grain, based on testing, are shown in Table 4A for the Climatek™ coated screws and Table 4B for the PHEinox™ screws.

4.2 Corrosion Resistance:

The Climatek™ coated screws may be used in treated lumber, as alternates to hot-dip galvanized fasteners prescribed in IBC Section 2304.10.6 (2018 and 2015 IBC Section 2304.10.5, 2012 and 2009 IBC Section 2304.9.5), when subject to the Exposure Conditions shown in Table 6. The Climatek™ coated screws have been evaluated 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 IBC Section 2304.10.6 (2018 and 2015 IBC Section 2304.10.5, 2012 and 2009 IBC Section 2304.9.5) and IRC Section R317.3 where stainless steel fasteners are prescribed.

4.3 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 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 The screws have only been evaluated for use in dry service conditions. Use in wet service conditions is outside the scope of this report.
- 5.5 Use of Climatek coated 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 October 2020 (editorially revised December 2020).

- 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 Product labeling shall include, the name of the report holder or listee, and the ICC-ES mark of conformity. The listing or evaluation report number (ICC-ES ESR-3201) may be used in lieu of the mark of conformity. Individual screws are identified with a mark indicating the manufacturer. Some R4 screws are identified by the letters "GRK" on the head. Packages of screws are identified with the report holder name (GRK) and address, evaluation report number (ESR-3201), screw 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.

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TABLE 1A—CARBON STEEL SCREW SPECIFICATIONS

SCREW DESIGNATION	OVERALL LENGTH ¹ (inches)	THREAD LENGTH ² (inches)	HEAD DIAMETER (inch)	HEAD RECESS	ROOT DIAMETER (inch)	SHANK DIAMETER (inch)	OUTSIDE THREAD DIAMETER (inch)	MEASURED 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	564	385
	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	761	488
	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								
	12x4 ³ / ₄ "	4 ⁵ / ₈	3								
	12x5 ⁵ / ₈ "	5 ¹ / ₂	3	0.439	Star drive T-25	0.148	0.171	0.234	134,280	1021	590
	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	449	324
	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	518	383
	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								

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

¹Overall length of the screw 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 screw 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 1B—PHEINOX™ SCREW SPECIFICATIONS

SCREW DESIGNATION		OVERALL LENGTH ¹ (inches)	THREAD LENGTH ² (inches)	HEAD DIAMETER (inch)	DRIVER SIZE	ROOT DIAMETER (inch)	SHANK DIAMETER (inch)	OUTSIDE THREAD DIAMETER (inch)	MEASURED 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 the screw 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 screw 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 2—REFERENCE WITHDRAWAL DESIGN VALUES (*W*) FOR CLIMATEK AND PHEINOX SCREWS
INSTALLED INTO THE FACE OF THE WOOD MEMBER^{1,2,3}**

SCREW SIZE	MINIMUM EMBEDDED THREAD LENGTH ⁴ (inches)	REFERENCE WITHDRAWAL DESIGN VALUE, <i>W</i> , (lbf/in.)			
		SG ≥ 0.67 ⁵	0.58 ≥ SG ≥ 0.55	0.55 > SG ≥ 0.49	0.49 > SG ≥ 0.42
R4					
9	1 ¹ / ₄	213	218	176	125
10	1 ⁵ / ₈	249	234	174	139
12	3	255	217	209	141
FIN/TRIM, RT COMPOSITE					
8	1 ⁵ / ₈	175	–	–	–
9	1 ⁵ / ₈	221	–	–	–
KAMELEON					
9	1 ⁵ / ₈	186	–	–	–

For **SI**: 1 inch = 25.4 mm, 1 lbf/in = 175N/m; 1 lbf = 4.45 N.

¹ Tabulated values must be multiplied by all adjustment factors included in the NDS for dowel-type fasteners to determine allowable loads for use with ASD and/or design loads for use with LRFD.

² Tabulated values are applicable to screws installed perpendicular to the faces of the wood members.

³ The tabulated reference withdrawal design value is in pounds-force per inch of thread embedment into the main member.

⁴ Embedded thread length is that portion of the screw held in the main member including the screw tip.

⁵ Pilot 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 3—REFERENCE PULL-THROUGH DESIGN VALUES (W_H) FOR CLIMATEK AND PHEINOX SCREWS^{1,2}

SCREW SIZE	SIDE MEMBER THICKNESS (inch)	REFERENCE PULL-THROUGH DESIGN VALUE, W_H (lbf)			
		$SG \geq 0.67^3$	$0.58 \geq SG \geq 0.55$	$0.55 > SG \geq 0.49$	$0.49 > SG \geq 0.42$
R4					
#9	3/4	184	119	107	83
#10	3/4	220	140	126	103
#12	3/4	407	176	171	126
FIN/TRIM					
#8	3/4	61	—	—	—
#9	3/4	124	—	—	—
KAMELEON					
#9	3/4	143	—	—	—

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

¹ Tabulated values must be multiplied by all adjustment factors included in the NDS for dowel-type fasteners to determine allowable loads for use with ASD and/or design loads for use with LRFD.

² Tabulated values are applicable to screws installed perpendicular to the faces of the wood members.

³ Pilot 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 TWO-MEMBER WOOD-TO-WOOD CONNECTIONS USING CLIMATEK™ COATED SCREWS^{1,2,3,4}

SCREW SIZE	MINIMUM OVERALL LENGTH (inches)	SIDE MEMBER THICKNESS (inch)	MINIMUM MAIN MEMBER PENETRATION (inches)	Z (lbf) FOR SPECIFIC GRAVITIES (SG) OF:			
				$SG \geq 0.67^5$	$0.58 \geq SG \geq 0.55$	$0.55 > SG \geq 0.49$	$0.49 > SG \geq 0.42$
R4							
#9	2	3/4	1 1/4	175	103	89	75
#10	2 1/2	3/4	1 3/4	203	121	97	95
#12	4 3/4	3/4	4	242	122	119	110
FIN/TRIM							
#8	2 1/2	3/4	1 3/4	84	—	—	—
#9	2 1/2	3/4	1 3/4	104	—	—	—
KAMELEON							
#9	2 1/2	3/4	1 3/4	159	—	—	—

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

¹ Tabulated values must be multiplied by all adjustment factors included in the NDS for dowel-type fasteners to determine allowable loads for use with ASD and/or design loads for use with LRFD.

² Tabulated values are applicable to screws installed perpendicular to the faces of the wood members.

³ The wood main member thickness must be equal to or greater than the screw length less the thickness of the wood side member.

⁴ The tabulated lateral design values are based on both wood members having the same specific gravity.

⁵ Pilot 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 TWO-MEMBER WOOD-TO-WOOD CONNECTIONS USING PHEINOX™ STAINLESS STEEL SCREWS^{1,2,3,4}

SCREW SIZE	MINIMUM OVERALL LENGTH (inches)	SIDE MEMBER THICKNESS (inch)	MINIMUM MAIN MEMBER PENETRATION (inches)	Z (lbf) FOR SPECIFIC GRAVITIES (SG) OF:			
				SG ≥ 0.67 ⁽⁵⁾	0.58 ≥ SG ≥ 0.55	0.55 > SG ≥ 0.49	0.49 > SG ≥ 0.42
R4							
#9	2	3/4	1 1/4	212	128	110	87
#10	2 1/2	3/4	1 3/4	235	135	110	102
FIN/TRIM							
#8	2 1/2	3/4	1 3/4	78	—	—	—
#9	2 1/2	3/4	1 3/4	108	—	—	—
RT COMPOSITE							
#8	2 1/2	3/4	1 3/4	107	—	—	—
#9	2 1/2	3/4	1 3/4	151	—	—	—

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

¹ Tabulated values must be multiplied by all adjustment factors included in the NDS for dowel-type fasteners to determine allowable loads for use with ASD and/or design loads for use with LRFD.

² Tabulated values are applicable to screws installed perpendicular to the faces of the wood members.

³ The wood main member thickness must be equal to or greater than the screw length less the thickness of the wood side member.

⁴ The tabulated lateral design values are based on both wood members having the same specific gravity.

⁵ Pilot 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^{1,2,3}

CONDITION			REQUIRED DIMENSION	
			G < 0.50	0.50 ≤ G
End distance	Tension loading parallel to grain (fastener bearing toward end)		15D	20D
	Compression loading parallel to grain (fastener bearing away from end)		10D	15D
	Loading perpendicular to grain		10D	15D
	Axial loading (fastener withdrawal or pull-through)		10D	10D
Edge distance	Loading parallel to grain		5D	7D
	Loading perpendicular to grain	Load toward edge	10D	12D
		Load away from edge	5D	7D
	Axial Loading		4D	4D
Spacing between fasteners in a row (parallel to grain of main member)	Loading parallel to grain		15D	15D
	Loading perpendicular to grain		10D	10D
	Axial loading		7D	7D
Spacing between rows (perpendicular to grain of main member)	Lateral loading	In-line rows	5D	7D
		Staggered rows ⁴	2.5D	3D
	Axial loading		4D	4D

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.

³D refers to the outside thread diameter.

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

TABLE 6—EVALUATED EXPOSURE CONDITIONS AND LIMITATIONS FOR CLIMATEK COATED SCREWS

EXPOSURE CONDITION	TYPICAL APPLICATIONS	LIMITATIONS
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.

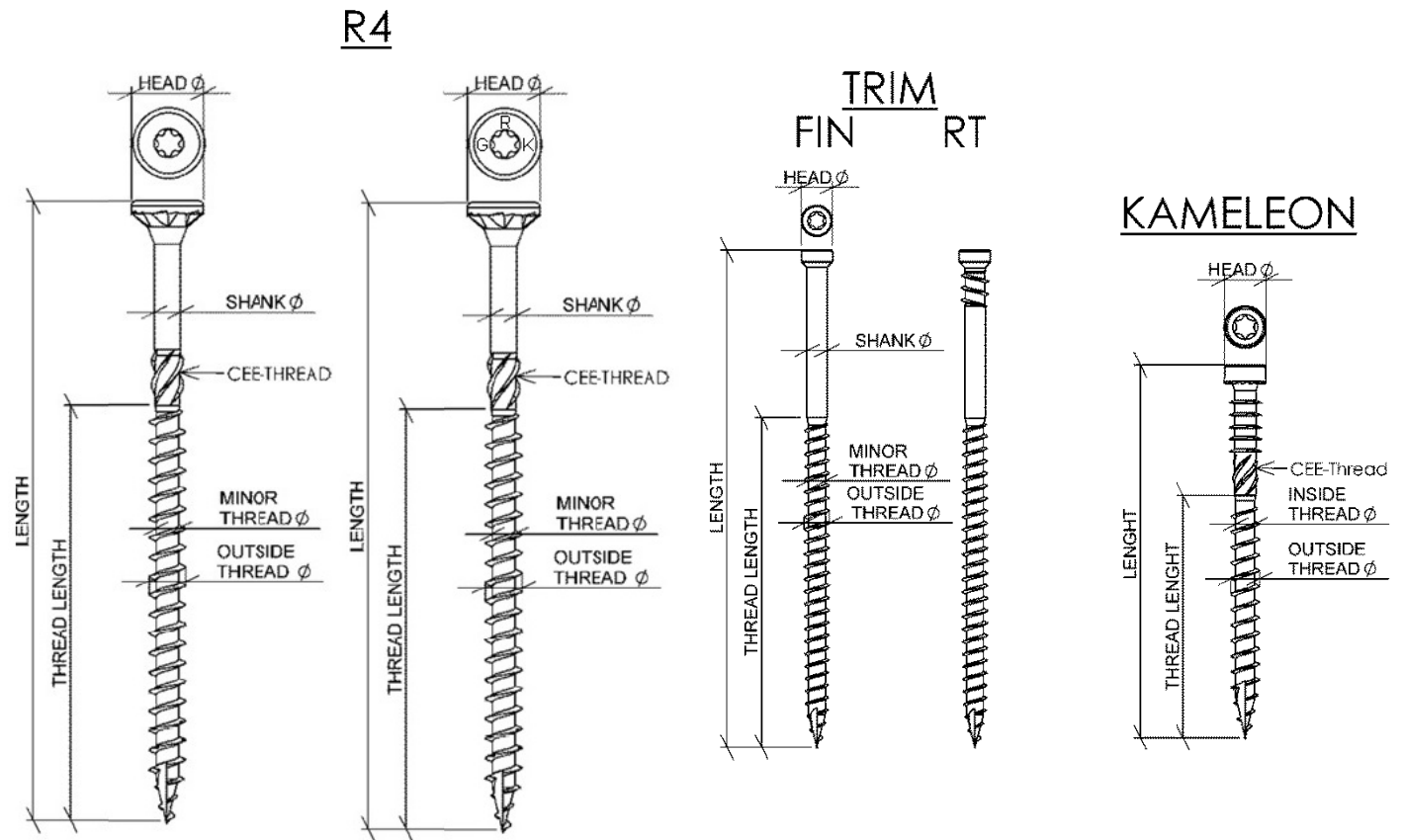


FIGURE 1—GRK SCREWS