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DIVISION: 03—CONCRETE
Section: 03151—Concrete Anchoring

DIVISION: 05—METALS
Section: 05090—Metal Fastening

DIVISION: 06—WOOD AND PLASTICS
Section: 06090—Wood and Plastic Fastening

DIVISION: 09—FINISHES
Section: 09051—Fasteners

REPORT HOLDER:

DESA SPECIALTY, LLC
2901 INDUSTRIAL DRIVE
BOWLING GREEN, KENTUCKY 42101
www.desaint.com

EVALUATION SUBJECT:

REMINGTON LOW-VELOCITY POWER-DRIVEN FASTENERS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 2006 *International Residential Code*® (IRC)
- 1997 *Uniform Building Code*™ (UBC)
- BOCA® *National Building Code*/1999 (NBBC)
- 1999 *Standard Building Code*® (SBC)

Properties evaluated:

Structural

2.0 USES

The Remington low-velocity power-driven fasteners are used for general fastening of building components to uncracked concrete, including anchorage of wood sill plates; tracks for light-gage steel framing; and supporting hardware for suspended ceiling systems. The fasteners are alternatives to cast-in-place anchors described in Sections 1912 and 2107 of the IBC, Sections 1923.1 and 2107.1.5 of the UBC, and Sections 1914 and 2103.1 of the SBC. The fasteners may also be used where an engineered design is submitted in accordance with Section R301.1.3 of the IRC.

3.0 DESCRIPTION

3.1 General:

The three types of Remington low-velocity power-driven fasteners recognized in this report are drive-pin fasteners, threaded-stud fasteners, and angle-clip fasteners. See Figure 1 of this report for illustrations. The fasteners are manufactured from SAE J403 No. 1055-1065 modified steel wire, and are austempered to a Rockwell C hardness of 53-56. The fasteners are zinc-coated (mechanical deposit) to a minimum thickness conforming to ASTM B 695-00, Class 8 [315 micro-inches (8 micrometers)]. Fasteners used to attach preservative-treated wood foundation sill plates to concrete in accordance with IBC Section 2304.9.5 are mechanically galvanized to a minimum zinc coating weight of 1 ounce per square foot (0.305 gram per square meter) conforming to ASTM A 153-03, or ASTM B 695-00, Class 55 [0.002 inch (0.053 mm)] (see Table 5).

Assemblies include premounted flutes, and round or square washers, or angle clips. Flutes are formed from flexible vinyl. Washers are produced from No. 16 gage [0.060 inch thick (1.5 mm)] steel and are zinc-plated (mechanical deposit) in accordance with ASTM B 695-00, Class 8 [315 micro-inches (8 micrometers)]. Washers used with fasteners which attach preservative-treated wood foundation sill plates to concrete in accordance with IBC Section 2304.9.5 are zinc-plated (mechanical deposit) in accordance with ASTM B 695-00, Class 55 [0.002 inch (0.053 mm)], or ASTM A 153-03 [1 ounce per square foot (0.305 gram per square meter)]. Washers are factory-installed for SPW, SPWS, ACQ SPW and ACQ SPWS series. Angle clips are produced from 0.075-inch-thick (1.9 mm) steel having a minimum 0.00015-inch-thick (0.0038 mm) zinc plating. The steel complies with ASTM A 366, and has a Rockwell B hardness from 50 to 70. Typical assemblies are illustrated in Figure 1 of this report. Fasteners with factory-installed washers are illustrated in Figure 1.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 Concrete or Steel Base Material: The allowable shear and tension (pullout) values in Tables 1 through 4 of this report are for use in allowable stress design, and are for fasteners driven into normal-weight concrete or ASTM A 36 steel. No stress increases or load reductions are allowed for wind loads acting alone or when combined with vertical loads. No adjustment is allowed for vertical loads acting alone. Earthquake load resistance is outside the scope of this report, except as permitted in Section 4.1.3 of this report. Allowable loads for fasteners subjected to combined shear and tension loads shall be calculated using the following equation:

$$\left(\frac{P_s}{P_t}\right) + \left(\frac{V_s}{V_t}\right) \leq 1$$

where:

- P_s = Applied service tension load, pounds (N).
- P_t = Allowable service tension load, pounds (N).
- V_s = Applied service shear load, pounds (N).
- V_t = Allowable service shear load, pounds (N).

4.1.2 Wood to Steel or Concrete: Lateral design values determined in accordance with the applicable code are permitted with Remington fasteners of equal or greater diameters. The wood element is the side member. The fastener bending yield strength shall be the value noted in the applicable code, based on fastener diameter.

4.1.3 Sill Plate to Foundation Connections:

4.1.3.1 General: Attachment of wood sill plates to the perimeter of concrete is allowed under the following conditions:

1. No cold joint exists, between the slab and foundation, below the sill plate.
2. The sill plate is not installed on slabs supported by concrete-block foundation walls.

4.1.3.2 IBC: Fasteners used in these sill-plate connections provide equivalence to $1/2$ -inch-diameter (12.7 mm) bolts described in IBC Section 2308.6. Usage is limited to Seismic Design Categories A and B and areas with maximum basic wind speeds (3-second gust) of 100 mph (161 km/h). The allowable fastener spacings for attachment of wood plates to concrete footings or slabs are set forth in Table 5 of this report. For use in areas subject to basic wind speeds (3-second gust) greater than 100 mph (161 km/h), an engineering analysis, using allowable loads described in Tables 1 and 2 of this report, shall be required in accordance with Section 5.3 of this report.

4.1.3.3 IRC: Fasteners used in these sill-plate connections provide equivalence to $1/2$ -inch-diameter (12.7 mm) bolts described in IRC Section R403.1.6. Usage is limited to Seismic Design Categories A and B and areas with maximum basic wind speeds (3-second gust) of 100 mph (161 km/h). The allowable fastener spacings for attachment of wood plates to concrete footings or slabs are set forth in Table 5 of this report. For use in areas subject to basic wind speeds (3-second gust) greater than 100 mph (161 km/h), an engineering analysis, using allowable loads described in Tables 1 and 2 of this report, shall be required in accordance with Section 5.3 of this report.

4.1.3.4 UBC: Fasteners used in these sill-plate connections provide equivalence to $1/2$ -inch-diameter (12.7 mm) bolts described in UBC Section 1806.6. Usage is limited to Seismic Zones 0, 1, 2 and 3, and areas with maximum basic wind speeds (fastest mile) of 80 mph (129 km/h). The allowable fastener spacings for attachment of wood plates to concrete footings or slabs are set forth in Table 5 of this report. For use in areas subject to basic wind speeds (fastest mile) greater than 80 mph (129 km/h), an engineering analysis, using allowable loads described in Tables 1 and 2 of this report, shall be required in accordance with Section 5.3 of this report.

4.1.3.5 BNBC/SBC: Fasteners used in these sill-plate connections provide equivalence to $1/2$ -inch-diameter (12.7 mm) bolts described in BNBC Section 2305.17 and SBC Section 2307.1. Usage is limited to Seismic Performance Categories A, B, C or D, and areas with maximum basic wind speeds (fastest mile) of 80 mph (129 km/h). The allowable fastener spacings for attachment of wood plates to concrete

footings or slabs are set forth in Table 5 of this report. For use in areas subject to basic wind speeds (fastest mile) greater than 90 mph (145 km/h), an engineering analysis, using allowable loads described in Tables 1 and 2 of this report, shall be required in accordance with Section 5.3 of this report.

4.2 Installation:

A Remington low-velocity power-driven fastening tool shall be used to install fasteners into normal-weight concrete or ASTM A 36 steel. The fastening procedures shall comply with the manufacturer's published installation instructions. Installation is limited to dry, interior environments. For wood sill plate connections, the ACQ SP 300, ACQ SPW 300 or ACQ SPWS 300 fastener, as shown in Figure 1, shall be used. (See also Table 5 of this report.)

5.0 CONDITIONS OF USE

The Remington Low-velocity Power-driven 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** The fasteners shall be manufactured and identified in accordance with this report.
- 5.2** Fasteners shall be installed in accordance with this report and DESA Specialty, LLC, instructions. In the event of a conflict between this report and the DESA Specialty, LLC, instructions, this report shall govern.
- 5.3** Allowable loads shall be in accordance with Section 4.1 of this report. Calculations proving that the applied loads are less than the maximum allowable loads described in this report shall be submitted to the code official for approval. The calculations shall be prepared by a registered design professional where required by the statutes of the jurisdiction where the project is to be constructed.
- 5.4** Fastener attachment of wood sill plates to foundations shall comply with Section 4.1.3 of this report.
- 5.5** For use of the fasteners with preservative-treated wood, the preservative-treated wood shall be as described in Section 2303.1.8 of the IBC.
- 5.6** The minimum concrete thickness shall be three times the fastener embedment in concrete.
- 5.7** Earthquake load resistance is outside the scope of this report.

Exceptions:

- a. Fasteners used with architectural, electrical and mechanical components as described in the exceptions to Section 13.1.4 of ASCE/SEI 7-05 (IBC and IRC).
 - b. Foundation sill plate applications complying with Section 4.1.3 of this report.
- 5.8** Use shall be limited to uncracked concrete. Cracking occurs when $f_t > f_r$ due to service loads or deformations.

6.0 EVIDENCE SUBMITTED

- 6.1** Data in accordance with the ICC-ES Acceptance Criteria for Fasteners Power-driven into Concrete, Steel and Masonry Elements (AC70), dated October 2006.
- 6.2** A quality control manual.

7.0 IDENTIFICATION

The fasteners are labeled with the DESA Specialty, LLC, name and address; the product name; the evaluation report number (ESR-1011); the manufacturing date; and the lot number.

TABLE 1—ALLOWABLE SERVICE TENSION AND SHEAR VALUES FOR REMINGTON LOW-VELOCITY DRIVE-PIN FASTENERS INSTALLED IN NORMAL-WEIGHT CONCRETE (pounds)^{1,2,3,4,5}

CATALOG NUMBER	SHANK DIAMETER (inch)	EMBED-MENT DEPTH (inches)	$f'_c = 2,000$ psi		$f'_c = 2,500$ psi		$f'_c = 3,000$ psi		$f'_c = 3,500$ psi		$f'_c = 4,000$ psi	
			Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear
SP 125—SP 300	0.144	1	75	160	90	150	105	160	125	165	140	165
RDN32—RDN72; MTC64	0.144	1 ¹ / ₄	215	185	225	185	235	190	245	195	255	195

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

¹The fasteners shall not be driven until the concrete has reached the designated minimum compressive strength. Minimum concrete thickness is three times the fastener embedment into the concrete.

²The allowable shear and tension values are for the fastener only. Wood or steel members connected to the fastener shall be investigated separately in accordance with accepted design criteria.

³Stress increases or load reductions are not allowed for wind loads acting alone or when combined with vertical loads. No adjustment is allowed for vertical loads acting alone.

⁴The minimum spacing is 4 inches center-to-center, and the minimum edge and end distances are 3 inches.

⁵Earthquake load resistance is outside the scope of this report, except as permitted in Section 4.1.3.

TABLE 2—ALLOWABLE SERVICE TENSION AND SHEAR VALUES FOR REMINGTON LOW-VELOCITY THREADED-STUD FASTENERS INSTALLED IN NORMAL-WEIGHT CONCRETE (pounds)

CATALOG NUMBER	SHANK DIAMETER (inch)	EMBED-MENT DEPTH (inches)	$f'_c = 2,000$ psi		$f'_c = 2,500$ psi		$f'_c = 3,000$ psi		$f'_c = 3,500$ psi		$f'_c = 4,000$ psi	
			Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear
TSC 375	0.205	1 ¹ / ₄	200	250	260	315	315	380	375	445	435	510

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

¹The fasteners shall not be driven until the concrete has reached the designated minimum compressive strength. Minimum concrete thickness is three times the fastener embedment into the concrete.

²The allowable shear and tension values are for the fastener only. Wood or steel members connected to the fastener shall be investigated separately in accordance with accepted design criteria.

³Stress increases or load reductions are not allowed for wind loads acting alone or when combined with vertical loads. No adjustment is allowed for vertical loads acting alone.

⁴The minimum spacing is 4 inches center-to-center, and the minimum edge and end distances are 3 inches.

⁵Earthquake load resistance is outside the scope of this report, except as permitted in Section 4.1.3.

TABLE 3—ALLOWABLE VERTICAL TENSION AND OBLIQUE TENSION VALUES FOR REMINGTON LOW-VELOCITY ANGLE-CLIP FASTENERS INSTALLED IN NORMAL-WEIGHT CONCRETE (pounds)^{1,2,3,4,5,6}

CATALOG NUMBER	SHANK DIAMETER (inch)	EMBEDMENT DEPTH (inch)	$f'_c = 2,000$ psi	
			Vertical Tension	Oblique Tension
ACC 125; ACCDN32	0.144	1	105	100

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

¹The fasteners shall not be driven until the concrete has reached the designated minimum compressive strength. Minimum concrete thickness is three times the fastener embedment into the concrete.

²The allowable tension values are for the fastener only. Wood or steel members connected to the fastener shall be investigated separately in accordance with accepted design criteria.

³Stress increases or load reductions are not allowed for wind loads acting alone or when combined with vertical loads. No adjustment is allowed for vertical loads acting alone.

⁴The minimum spacing is 4 inches center-to-center, and the minimum edge and end distances are 3 inches.

⁵Earthquake load resistance is outside the scope of this report, except as permitted in Section 4.1.3.

⁶The vertical tension load shall be applied at a 90-degree angle; the oblique tension load shall be applied at a 45-degree angle.

TABLE 4—ALLOWABLE SERVICE TENSION AND SHEAR VALUES FOR REMINGTON LOW-VELOCITY FASTENERS INSTALLED IN ASTM A 36 STEEL (pounds)^{1,2,3,4,5}

CATALOG NUMBER	SHANK DIAMETER (inch)	EMBEDMENT DEPTH (inch)	STEEL THICKNESS (inch)	TENSION	SHEAR
SP50—SP300	0.144	$\frac{1}{2}$	$\frac{3}{16}$	330	680
RDN16—RDN72; MTC72	0.144	$\frac{1}{2}$	$\frac{1}{4}$	400	680

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

¹To obtain the tabulated values, the entire pointed portion of the fastener shall penetrate the steel.

²The allowable shear and tension values are for the fastener only. Wood or steel members connected to the fastener shall be investigated separately in accordance with accepted design criteria.

³Stress increases or load reductions are not allowed for wind loads acting alone or when combined with vertical loads. No adjustment is allowed for vertical loads acting alone.

⁴The minimum spacing is $\frac{1}{2}$ inches center-to-center, and the minimum edge and end distances are $\frac{1}{2}$ inch for installations in ASTM A 36 steel.

⁵Earthquake load resistance is outside the scope of this report, except as permitted in Section 4.1.3.

TABLE 5—SPACING REQUIREMENTS FOR SILL PLATE ANCHORAGE

CATALOG NUMBER	FASTENER LENGTH (inches)	FASTENER SPACINGS (ft.) ^{1,4,5}		
		Interior Shear Walls ^{3,5}	Interior Nonshear Walls ²	Exterior Shear Walls ^{3,5}
ACQ SP 300 ⁷ , ACQ SPW 300, ACQ SPWS 300	3	$1\frac{1}{2}$	3	$1\frac{1}{2}$

For **SI**: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 plf = 74.6 N/m, 1 psi = 6.89 kPa.

¹Spacings are based on the attachment through the center of 2-inch nominal thickness wood with specific gravity of 0.5 or greater to concrete floor slabs or footings in accordance with IBC Section 2308.6, IRC Section R403.1.6 (for maximum two-story buildings), UBC Section 1806.6, BNBC Section 2305.17, or SBC Section 2307.1, as applicable. For other species of lumber, the required spacings of fasteners require special calculations complying with IBC Section 2306; UBC Chapter 23, Division III; BNBC Section 2303.1.1; or ANSI/AF&PA NDS-05, as applicable.

²Walls shall have fasteners placed at 6 inches from ends of sill plates with maximum spacing, as shown in this table.

³Walls shall have two pins placed 6 inches and 10 inches, respectively, from each end of sill plates with maximum spacing, as shown in this table.

⁴Fasteners shall not be driven until the concrete has reached a minimum concrete compressive strength of 2,000 psi.

⁵Bearing walls shall have bracing in accordance with IBC Section 2308.9.3, IRC Section R602.10, UBC Section 2320.11.3, BNBC Section 2305.9 or SBC Section 2308.2, as applicable. Interior and nonbearing partitions are not assumed to be braced.

⁶Fasteners shall not be used to attach shear walls having a unit shear exceeding 100 pounds per foot to other building elements.

⁷The ACQ SP 300 fastener shall be installed with a minimum $\frac{3}{4}$ -inch-diameter (0.44-in²), No. 16 gage (0.06-inch-thick), corrosion-resistant washer as defined in Section 3.1.

TABLE 6—ALLOWABLE SHEAR LOADS FOR ATTACHMENT OF DRYWALL CHANNEL TO NORMAL-WEIGHT CONCRETE FOOTING OR SLAB^{1,2}

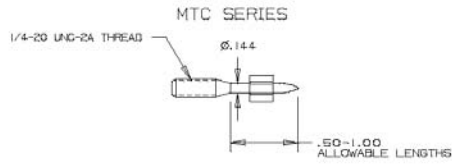
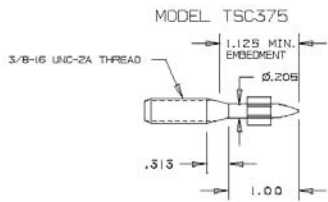
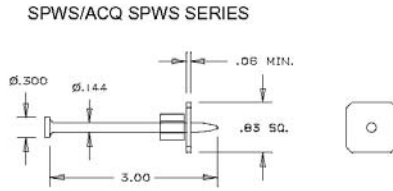
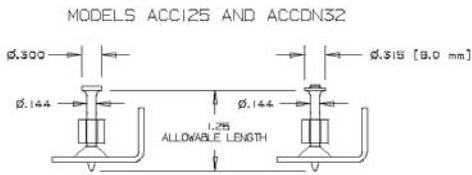
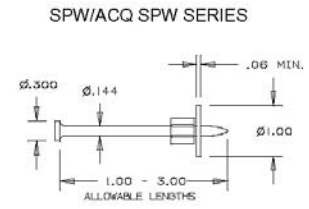
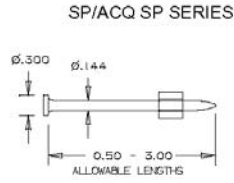
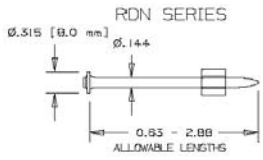
CATALOG NUMBER	SHANK DIAMETER (inch)	MINIMUM PENETRATION (inch)	ATTACHED ITEM	CONCRETE COMPRESSIVE STRENGTH, f_c	ALLOWABLE LOAD (pounds)
SP75	0.144	$\frac{5}{8}$	No. 25 gage steel channel	2,000	80
RDN19	0.144	$\frac{5}{8}$	No. 20 gage steel channel	2,000	75

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

¹The fasteners shall not be driven until the concrete has reached the designated minimum compressive strength.

²The No. 20 and No. 25 gage steel channels shall have minimum base-metal thicknesses of 0.035 inch and 0.020 inch, respectively, and shall be formed from ASTM A 653 SS Grade 33 steel having a minimum specified yield strength of 33 ksi.

³Minimum fastener spacing and minimum edge distance of fastener to concrete shall be 4 inches and 3 inches, respectively. Minimum edge distance of fastener to the end of the steel channel is $1\frac{3}{4}$ inches in the loading direction.



For SI: 1 inch = 25.4 mm.

FIGURE 1