

	GRADE MARKING	GRADE/ PROPERTY CLASS	SPECIFICATION	MATERIAL	SIZE RANGE (IN)	PROOF STRENGTH (PSI)	MINIMUM YIELD STRENGTH (PSI)	MINIMUM TENSILE STRENGTH (PSI)	CORE HARDNESS (ROCKWELL)
IMPERIAL CARBON STEEL		Grade 5	SAE J429	Medium carbon steel: quenched and tempered	1/4 - 1	85,000	92,000	120,000	C25 - C34
					1 1/8 - 1 1/2	74,000	81,000	105,000	C19 - C30
		Grade 8	SAE J429	Medium carbon alloy steel: quenched and tempered	1/4 - 1 1/2	120,000	130,000	150,000	C33 - C39
		B7	ASTM A193	Chromium-molybdenum alloy (4140, 4142, etc.) Used for high pressure, high temperature applications	2 1/2 & under	-	105,000	125,000	C35 (max)
					Over 2 1/2 - 4	-	95,000	115,000	C35 (max)
					Over 4 - 7	-	75,000	100,000	C35 (max)
		B16	ASTM A193	Chromium-molybdenum-vanadium alloy used for high-pressure, high-temperature service applications. Offers slightly higher temperature resistance than B7.	2 1/2 & under	-	105,000	125,000	C35 (max)
					Over 2 1/2 - 4	-	95,000	110,000	C35 (max)
					Over 4 - 8	-	85,000	100,000	C35 (max)
METRIC CARBON STEEL		8.8	ISO 898-1	Medium carbon steel: quenched and tempered	M1.6 - M16	84,122 (580 MPa)	92,824 (640 MPa)	116,030 (800 MPa)	C22 - C32
					M18 - M39	87,023 (600 MPa)	95,725 (660 MPa)	120,381 (830 MPa)	C23 - C34
		10.9	ISO 898-1	Alloy steel: quenched and tempered	M1.6 - M39	120,381 (830 MPa)	136,335 (940 MPa)	150,839 (1040 MPa)	C32 - C39
		12.9	ISO 898-1	Alloy steel: quenched and tempered	M1.6 - M39	140,687 (970 MPa)	159,542 (1100 MPa)	176,946 (1220 MPa)	C39 - C44
IMPERIAL STAINLESS STEEL		F593C	ASTM F593	304, 304L, 305, 384, 18-8, 18-9LW, 302HQ Stainless Steel (Condition CW)	1/4 - 5/8	-	65,000	100,000 - 150,000	B95 - C32
		F593D	ASTM F593	304, 304L, 305, 384, 18-8, 18-9LW, 302HQ Stainless Steel (Condition CW)	3/4 - 1 1/2	-	45,000	85,000 - 140,000	B80 - C32
		F593G	ASTM F593	316, 316L Stainless Steel (Condition CW)	1/4 - 5/8	-	65,000	100,000 - 150,000	B95 - C32
		F593H	ASTM F593	316, 316L Stainless Steel (Condition CW)	3/4 - 1 1/2	-	45,000	85,000 - 140,000	B80 - C32
		B8M Class 2	ASTM A193	316 Stainless Steel, carbide solution treated, strain-hardened.	3/4 & under	-	95,000	110,000	C35 (max)
					Over 3/4 to 1	-	80,000	100,000	C35 (max)
					Over 1 to 1 1/4	-	65,000	95,000	C35 (max)
					Over 1 1/4 to 1 1/2	-	50,000	90,000	C35 (max)
METRIC STAINLESS STEEL		A2-70	ISO 3506-1	18-8 Stainless Steel	≤ M39	-	65,267 (450 MPa)	101,526 (700 MPa)	-
		A2-80	ISO 3506-1	18-8 Stainless Steel	≤ M39	-	87,023 (600 MPa)	116,030 (800 MPa)	-
		A4-70	ISO 3506-1	316 Stainless Steel	≤ M39	-	65,267 (450 MPa)	101,526 (700 MPa)	-
		A4-80	ISO 3506-1	316 Stainless Steel: strain-hardened	≤ M39	-	87,023 (600 MPa)	116,030 (800 MPa)	-

ISO 5211 TABLE 1 FLANGE TORQUE IS BASED ON A METRIC CLASS 8.8 FASTENER. FOR THIS REASON, VANAIRE DOES NOT RECOMMEND USING FASTENERS SUCH AS THOSE LISTED BELOW DUE TO THEIR LOW YIELD STRENGTHS.

LOW STRENGTH CARBON STEEL		Grade 2	SAE J429	Low or medium carbon steel	1/4 - 3/4	-	57,000	74,000	B80 - B100
					7/8 - 1 1/2	-	36,000	60,000	B70 - B100
		4.6	ISO 898-1	Low or medium carbon steel	M1.6 - M39	32,634 (225 MPa)	34,809 (240 MPa)	58,015 (400 MPa)	B67 - B95
LOW STRENGTH STAINLESS STEEL		B8M Class 1	ASTM A193	316 Stainless Steel that has been carbide solution treated	1/4 & larger	-	30,000	75,000	B96 (max)
		Ungraded	N/A	304 Stainless Steel	-	-	Unknown	Unknown	-