

Axial Strength and Mating Screw Recommended Tightening Torque for PEM® Brand Self-clinching Nuts

PEM® Brand S™ Nuts - Unified							
PEM® Part Number	Min. Axial Strength w/180 ksi Screw, lb	Screw Strength Required to Develop Min. Axial, ksi	Mating Screw Recommended Tightening Torque, (in. lbs.) (Assuming K=0.20 - actual K value may vary)				
			Steel Grade 2	Stainless ASTM F593C	Steel Grade 5	Steel Grade 8	Steel 180 ksi
S-256-0ZI	665	180	2.6	2.9	4.1	5.8	7.1
S-256-1ZI	665	180	2.7	3.1	4.4	6.2	7.7
S-256-2ZI	665	180	2.7	3.1	4.4	6.2	7.7
S-348-0ZI	800	180	3.8	4.3	6.1	8.6	11
S-348-1ZI	875	180	4.1	4.7	6.6	9.4	12
S-348-2ZI	875	180	4.1	4.7	6.6	9.4	12
S-440-0ZI	988	180	5.3	6.0	8.5	12	15
S-440-1ZI	1086	180	5.8	6.6	9.3	13	16
S-440-2ZI	1086	180	5.8	6.6	9.3	13	16
S-440-3ZI	1086	180	5.8	6.6	9.3	13	16
S-632-0ZI	1265	180	8.3	9.5	13	19	23
S-632-1ZI	1413	180	9.3	11	15	21	26
S-632-2ZI	1635	180	11	12	17	24	30
S-632-3ZI	1635	180	11	12	17	24	30
S-832-0ZI	1971	180	15	18	25	35	41
S-832-1ZI	2157	180	17	19	27	38	45
S-832-2ZI	2522	180	20	22	32	45	53
S-832-3ZI	2622	180	20	22	32	45	56
SS-024-0ZI	2239	180	20	23	33	46	56
SS-024-1ZI	2455	180	22	25	36	51	62
SS-024-2ZI	2886	180	26	30	42	59	72
SS-024-3ZI	2879	180	26	30	42	59	74
SS-032-0ZI	2372	180	21	24	35	49	55
SS-032-1ZI	2598	180	23	27	38	53	60
SS-032-2ZI	3049	180	28	31	44	63	71
SS-032-3ZI	3124	180	28	32	46	64	77
S-1224-1ZI	4319	180	44	51	72	101	119
S-1224-2ZI	4349	180	45	51	72	102	127
S-1224-3ZI	4349	180	45	51	72	102	127
S-0420-0ZI	5728	180	68	78	110	155	193
S-0420-1ZI	5728	180	68	78	110	155	193
S-0420-2ZI	5728	180	68	78	110	155	193
S-0420-3ZI	5728	180	68	78	110	155	193
S-0428-1ZI	6547	180	78	89	125	177	221
S-0428-2ZI	6547	180	78	89	125	177	221
S-0428-3ZI	6547	180	78	89	125	177	221
S-0518-1ZI	9437	180	140	160	226	319	398
S-0518-2ZI	9437	180	140	160	226	319	398
S-0518-3ZI	9437	180	140	160	226	319	398
S-0524-1ZI	10452	180	155	177	250	354	441
S-0524-2ZI	10452	180	155	177	250	354	441
S-0524-3ZI	10452	180	155	177	250	354	441
S-0616-1ZI	13948	180	248	283	401	567	706
S-0616-2ZI	13948	180	248	283	401	567	706
S-0616-3ZI	13948	180	248	283	401	567	706
S-0624-1ZI	15809	180	282	321	455	642	791
S-0624-2ZI	15809	180	282	321	455	642	800
S-0624-3ZI	15809	180	282	321	455	642	800
S-0720-1ZI	21370	180	444	506	717	1013	1211
S-0813-1ZI	25542	180	607	692	979	1384	1724
S-0813-2ZI	25542	180	607	692	979	1384	1724
S-0820-1ZI	28792	180	684	780	1104	1560	1943
S-0820-2ZI	28792	180	684	780	1104	1560	1943

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Axial Strength and Mating Screw Recommended Tightening Torque for PEM® Brand Self-clinching Nuts

PEM® Brand CLS™ Nuts - Unified							
PEM® Part Number	Min. Axial Strength w/180 ksi Screw, lb	Screw Strength Required to Develop Min. Axial, ksi	Mating Screw Recommended Tightening Torque, (in. lbs.) (Assuming K=0.20 - actual K value may vary)				
			Steel Grade 2	Stainless ASTM F593C	Steel Grade 5	Steel Grade 8	Steel 180 ksi
CLS-256-0	477	129	2.6	2.9	4.1	4.3	4.3
CLS-256-1	544	147	2.7	3.1	4.4	4.9	4.9
CLS-256-2	665	180	2.7	3.1	4.4	6.1	6.0
CLS-348-0	617	127	3.8	4.3	6.1	6.4	6.4
CLS-348-1	695	143	4.1	4.7	6.6	7.2	7.2
CLS-348-2	852	175	4.1	4.7	6.6	8.9	8.9
CLS-440-0	758	126	5.3	6.0	8.5	8.9	8.9
CLS-440-1	849	141	5.8	6.6	9.3	10	10
CLS-440-2	1030	171	5.8	6.6	9.3	12	12
CLS-440-3	1086	180	5.8	6.6	9.3	13	13
CLS-632-0	958	105	8.3	9.5	13	14	14
CLS-632-1	1073	118	9.3	11	15	16	16
CLS-632-2	1304	144	11	12	17	19	19
CLS-632-3	1444	159	11	12	17	21	21
CLS-832-0	1434	102	15	18	25	25	25
CLS-832-1	1571	112	17	19	27	27	27
CLS-832-2	1845	132	20	22	32	32	32
CLS-832-3	2027	145	20	22	32	35	35
CLSS-024-0	1697	97	20	23	33	34	34
CLSS-024-1	1861	106	22	25	36	37	37
CLSS-024-2	2191	125	26	30	42	44	44
CLSS-024-3	2379	136	26	30	42	47	47
CLSS-032-0	1667	83	21	24	33	33	33
CLSS-032-1	1826	91	23	27	36	36	36
CLSS-032-2	2145	107	28	31	43	43	43
CLSS-032-3	2338	117	28	32	46	47	47
CLS-1224-1	3177	131	44	51	72	72	72
CLS-1224-2	3553	147	45	51	72	81	81
CLS-1224-3	4079	169	45	51	72	93	93
CLS-0420-0	5012	157	68	78	110	132	132
CLS-0420-1	5261	165	68	78	110	138	138
CLS-0420-2	5728	180	68	78	110	155	162
CLS-0420-3	5728	180	68	78	110	155	183
CLS-0428-1	5121	141	78	89	125	134	134
CLS-0428-2	5976	164	78	89	125	157	157
CLS-0428-3	6522	179	78	89	125	171	171
CLS-0518-1	8081	154	140	160	226	265	265
CLS-0518-2	9204	176	140	160	226	302	302
CLS-0518-3	9435	180	140	160	226	310	310
CLS-0524-1	9817	169	155	177	250	322	322
CLS-0524-2	10452	180	155	177	250	343	343
CLS-0524-3	9510	164	155	177	250	312	312
CLS-0616-1	12437	160	248	283	401	490	490
CLS-0616-2	13796	178	248	283	401	543	543
CLS-0616-3	13948	180	248	283	401	567	700
CLS-0624-1	12115	138	282	321	455	477	477
CLS-0624-2	13428	153	282	321	455	529	529
CLS-0624-3	15809	180	282	321	455	622	682
CLS-0813-1	22758	160	607	692	979	1195	1195
CLS-0813-2	25542	180	607	692	979	1384	1545
CLS-0820-1	22404	140	684	780	1104	1176	1176
CLS-0820-2	28792	180	684	780	1104	1512	1512

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Axial Strength and Mating Screw Recommended Tightening Torque for PEM® Brand Self-clinching Nuts

PEM® Brand SP™ Nuts - Unified							
PEM® Part Number	Min. Axial Strength w/180 ksi Screw, lb	Screw Strength Required to Develop Min. Axial, ksi	Mating Screw Recommended Tightening Torque, (in. lbs.) (Assuming K=0.20 - actual K value may vary)				
			Steel Grade 2	Stainless ASTM F593C	Steel Grade 5	Steel Grade 8	Steel 180 ksi
SP-256-0	625	180	2.6	2.9	4.1	5.8	7.3
SP-256-1	665	180	2.7	3.1	4.4	6.2	7.7
SP-256-2	665	180	2.7	3.1	4.4	6.2	7.7
SP-440-0	988	180	5.3	6.0	8.5	12	15
SP-440-1	1086	180	5.8	6.6	9.3	13	16
SP-440-2	1086	180	5.8	6.6	9.3	13	16
SP-632-0	1265	180	8.3	9.5	13	19	24
SP-632-1	1413	180	9.3	11	15	21	26
SP-632-2	1635	180	11	12	17	24	30
SP-832-0	1971	180	15	18	25	35	44
SP-832-1	2157	180	17	19	27	38	48
SP-832-2	2528	180	20	22	32	45	56
SP-024-0	2239	180	20	23	33	46	57
SP-024-1	2455	180	22	25	36	51	63
SP-024-2	2886	180	26	30	42	59	74
SP-032-0	2372	180	21	24	35	49	61
SP-032-1	2598	180	23	27	38	53	67
SP-032-2	3049	180	28	31	44	63	78
SP-0420-0	5728	180	68	78	110	155	193
SP-0420-1	5728	180	68	78	110	155	193
SP-0420-2	5728	180	68	78	110	155	193
SP-0518-1	9437	180	140	160	226	319	398
SP-0518-2	9437	180	140	160	226	319	398
SP-0524-1	10452	180	155	177	250	354	441
SP-0524-2	10452	180	155	177	250	354	441
SP-0616-1	13948	180	248	283	401	567	706
SP-0616-2	13948	180	248	283	401	567	706
SP-0624-1	15809	180	282	321	455	642	800
SP-0624-2	15809	180	282	321	455	642	800

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Axial Strength and Mating Screw Recommended Tightening Torque for PEM® Brand Self-clinching Nuts

PEM® Brand CLA™ Nuts - Unified								
PEM® Part Number	Min. Axial Strength w/180 ksi Screw, lb	Screw Strength Required to Develop Min. Axial, ksi	Mating Screw Recommended Tightening Torque, (in. lbs.) (Assuming K=0.20 - actual K value may vary)					
			Aluminum 2024-T4	Steel Grade 2	Stainless ASTM F593C	Steel Grade 5	Steel Grade 8	Steel 180 ksi
CLA-256-1	334	90	1.9	2.4	2.7	3.1	3.1	3.1
CLA-256-2	425	115	2.1	2.7	3.1	4.0	4.0	4.0
CLA-440-1	617	102	4.5	5.6	6.4	7.5	7.5	7.5
CLA-440-2	742	123	4.6	5.8	6.6	9.0	9.0	9.0
CLA-632-1	786	87	6.8	8.6	9.8	12	12	12
CLA-632-2	945	104	8.3	11	12	14	14	14
CLA-832-1	1281	91	14	18	20	23	23	23
CLA-832-2	1470	105	16	20	22	26	26	26
CLA-024-1	1972	112	22	28	32	41	41	41
CLA-024-2	2199	125	22	28	32	45	45	45
CLA-032-1	1937	97	26	32	37	40	40	40
CLA-032-2	2157	108	26	32	37	45	45	45
CLA-0420-1	2793	88	44	56	64	76	76	76
CLA-0420-2	3421	108	54	68	78	93	93	93
CLA-0420-3	4050	127	54	68	78	110	110	110

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Axial Strength and Mating Screw Recommended Tightening Torque for PEM® Brand Self-clinching Nuts

PEM® Brand SH™, HNL™ and H™ Nuts - Unified							
PEM® Part Number	Min. Axial Strength w/180 ksi Screw, lb	Screw Strength Required to Develop Min. Axial, ksi	Mating Screw Recommended Tightening Torque, (in. lbs.) (Assuming K=0.20 - actual K value may vary)				
			Steel Grade 2	Stainless ASTM F593C	Steel Grade 5	Steel Grade 8	Steel 180 ksi
SH-0420-1X	5728	180	68	78	110	155	193
SH-0420-2X	5728	180	68	78	110	155	193
SH-0518-1X	9437	180	140	160	226	319	398
SH-0518-2X	9437	180	140	160	226	319	398
SH-0616-1X	13948	180	248	283	401	567	706
HNL-0420-LZ	4055	127	65	74	105	106	106
HNL-0518-LZ	6646	127	140	160	218	218	218
HNL-0616-LZ	10598	137	248	283	401	417	417
H-0616-ZI	13948	180	248	283	401	567	691

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Axial Strength and Mating Screw Recommended Tightening Torque for PEM® Brand Self-clinching Nuts

PEM® Brand SMP™ Nuts - Unified							
PEM® Part Number	Min. Axial Strength w/180 ksi Screw, lb	Screw Strength Required to Develop Min. Axial, ksi	Mating Screw Recommended Tightening Torque, (in. lbs.) (Assuming K=0.20 - actual K value may vary)				
			Steel Grade 2	Stainless ASTM F593C	Steel Grade 5	Steel Grade 8	Steel 180 ksi
SMPS-256	436	118	2.3	2.7	3.8	3.9	3.9
SMPP-256	636	180	2.6	3.0	4.2	5.9	7.4
SMPS-440	695	115	4.8	5.5	7.8	8.2	8.2
SMPP-440	895	180	4.8	5.4	7.7	11	14
SMPS-632	857	94	7.4	8.5	12	12	12
SMPP-632	1118	180	7.3	8.4	12	17	21

Axial Strength and Mating Screw Recommended Tightening Torque for PEM® Brand Weld Nuts

PEM® Brand WN™ and WNS™ Weld Nuts - Unified							
PEM® Part Number	Min. Axial Strength w/180 ksi Screw, lb	Screw Strength Required to Develop Min. Axial, ksi	Mating Screw Recommended Tightening Torque, (in. lbs.) (Assuming K=0.20 - actual K value may vary)				
			Steel Grade 2	Stainless ASTM F593C	Steel Grade 5	Steel Grade 8	Steel 180 ksi
WN-440-0CU	379	63	3.8	4.1	4.1	4.1	4.1
WN-632-0CU	723	80	8.9	9.7	10	10	10
WN-832-0CU	1236	88	20	20	20	20	20
WN-024-0CU	1898	108	28	32	35	35	35
WN-032-0CU	1855	93	32	34	34	34	34
WN-0420-0CU	3376	106	68	78	82	82	82
WNS-440-0	568	94	3.8	4.3	6	7	7
WNS-632-0	1084	119	8.9	10	14	16	16
WNS-832-0	1854	132	20	22	32	32	32
WNS-024-0	2848	162	28	32	46	57	57
WNS-032-0	2783	139	32	37	52	56	56
WNS-0240-0	5064	159	68	78	110	133	133

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Axial Strength and Mating Screw Recommended Tightening Torque for PEM® Brand Self-clinching Nuts

PEM® Brand KF2™ Nuts - Unified							
PEM® Part Number	Min. Axial Strength w/180 ksi Screw, lb	Screw Strength Required to Develop Min. Axial, ksi	Mating Screw Recommended Tightening Torque, (in. lbs.) (Assuming K=0.20 - actual K value may vary)				
			Steel Grade 2	Stainless ASTM F593C	Steel Grade 5	Steel Grade 8	Steel 180 ksi
KF2-256	606	164	2.7	3.1	4.4	6.1	6.1
KF2-440	781	130	5.8	6.6	9.3	10	10
KF2-632	994	109	11	12	16	16	16
KF2-832	1541	110	20	22	30	30	30
KF2-032	2291	115	32	37	51	51	51
KFS2-256	665	180	2.7	3.1	4.4	6.2	7.3
KFS2-440	1083	179	5.8	6.6	9.3	12	12
KFS2-632	1378	152	11	12	17	19	19
KFS2-832	2135	152	20	22	32	35	35
KFS2-032	3175	159	32	37	52	61	61

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Table I
Material Properties for Selected Strength Levels of Mating Screws

	Industry Standard	Designation	Unified Units Material Strength, ksi		Yield/Tensile Ratio	Metric Units Material Strength, MPa	
			Ultimate	Yield		Ultimate	Yield
UNIFIED	SAE J429	Grade 2	74	57	0.770	510.2	393.0
	ASTM 593	Grade C	100	65	0.650	689.5	448.2
	SAE J429	Grade 5	120	92	0.767	527.4	634.3
	SAE J429	Grade 8	150	130	0.867	1034	896.3
	ASTM A574	(see note 3)	180	162	0.900	1241	1117
METRIC	ISO 898-1	Property Class 4.6	58.0	34.8	0.600	400	240
	ISO 898-1	Property Class 5.6	72.5	43.5	0.600	500	300
	ISO 3506	A2 - 70	101.5	65.3	0.643	700	450
	ISO 898-1	Property Class 8.8	116.0	92.8	0.800	800	640
	ISO 898-1	Property Class 9.8	130.5	104.4	0.800	900	720
	ISO 898-1	Property Class 10.9	150.8	136.3	0.904	1040	940
	ISO 898-1	Property Class 12.9	176.9	159.5	0.902	1220	1100

Table II
Material Properties for PEM® Brand Nuts

Nut Material Type	PEM® Brand Nut Types Using This Material		Unified Units Material Strength, ksi		Yield/Tensile Ratio	Metric Units Material Strength, MPa	
			Ultimate	Yield		Ultimate	Yield
Steel	WN	Not Heat Treated	60	39	0.650	413.7	268.9
	KF2	Not Heat Treated	70	55	0.786	482.6	379.2
	HNL	Not Heat Treated	90	63	0.800	620.5	434.4
	S, SS, and H	Standard Heat Treat	130.5	104.4	0.800	899.8	719.8
	SH	Special Heat Treat	195	175.5	0.900	1344	1210
Stainless Steel	CLS, SMPS, WNS	300 Series Forged	90	63	0.700	620.5	434.4
	KFS2	300 Series Machined	97	65	0.670	668.8	448.2
	SP and SMPP	A286 Age Hardened	145	116	0.800	1000	800
Aluminum	CLA	2024-T4	62	45	0.726	427.5	310.3

Notes:

- 1) Other industry standards exist which define the same or similar strength levels.
- 2) Values in blue are conversions using 1 MPa=145.04 psi.
- 3) Minimum yield adjusted up to 162 ksi (90% of 180 ksi) from the 153 ksi required by ASTM A574.