

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

PEM® Brand S™ Nuts - Metric									
PEM® Part Number	Min. Axial Strength w/PC12.9 Screw, kN	Screw Strength Required to Develop Min. Axial, MPa	Mating Screw Recommended Tightening Torque, (N·m) (Assuming K=0.20 - actual K value may vary)						
			Steel PC 4.6	Steel PC 5.6	Stainless A2-70	Steel PC 8.8	Steel PC 9.8	Steel PC 10.9	Steel PC 12.9
S-M2-0ZI	2.53	1220	0.15	0.19	0.28	0.40	0.45	0.59	0.61
S-M2-1ZI	2.53	1220	0.15	0.19	0.28	0.40	0.45	0.59	0.68
S-M2-2ZI	2.53	1220	0.15	0.19	0.28	0.40	0.45	0.59	0.68
S-M2.5-0ZI	3.81	1220	0.28	0.35	0.53	0.75	0.84	1.10	1.18
S-M2.5-1ZI	4.14	1220	0.31	0.38	0.57	0.81	0.92	1.20	1.32
S-M2.5-2ZI	4.14	1220	0.31	0.38	0.57	0.81	0.92	1.20	1.40
S-M3-0ZI	5.09	1220	0.45	0.56	0.85	1.20	1.35	1.77	1.88
S-M3-1ZI	5.65	1220	0.50	0.62	0.94	1.33	1.50	1.96	2.09
S-M3-2ZI	6.14	1220	0.54	0.68	1.02	1.45	1.63	2.13	2.49
S-M3.5-0ZI	5.63	1220	0.58	0.73	1.09	1.55	1.74	2.28	2.42
S-M3.5-1ZI	6.29	1220	0.65	0.81	1.22	1.73	1.95	2.54	2.71
S-M3.5-2ZI	7.61	1220	0.79	0.98	1.47	2.10	2.36	3.08	3.29
S-M4-0ZI	7.81	1220	0.92	1.15	1.73	2.46	2.76	3.61	3.88
S-M4-1ZI	8.58	1220	1.01	1.27	1.90	2.70	3.04	3.97	4.27
S-M4-2ZI	10.1	1220	1.20	1.49	2.24	3.19	3.59	4.68	5.05
SS-M5-0ZI	11.2	1220	1.65	2.06	3.09	4.40	4.95	6.46	6.95
SS-M5-1ZI	12.2	1220	1.80	2.25	3.37	4.79	5.39	7.04	7.57
SS-M5-2ZI	14.2	1220	2.09	2.62	3.92	5.58	6.28	8.20	8.82
S-M6-00ZI	23.7	1220	4.20	5.25	7.88	11.2	12.6	16.5	17.8
S-M6-0ZI	24.6	1220	4.35	5.43	8.15	11.6	13.0	17.0	18.9
S-M6-1ZI	24.6	1220	4.35	5.43	8.15	11.6	13.0	17.0	19.9
S-M6-2ZI	24.6	1220	4.35	5.43	8.15	11.6	13.0	17.0	19.9
S-M8-1ZI	44.7	1220	10.5	13.2	19.8	28.1	31.6	41.3	47.0
S-M8-2ZI	44.7	1220	10.5	13.2	19.8	28.1	31.6	41.3	48.3
S-M10-1ZI	70.7	1220	20.9	26.1	39.1	55.7	62.6	81.8	95.7
S-M10-2ZI	70.7	1220	20.9	26.1	39.1	55.7	62.6	81.8	95.7
S-M12-1ZI	102.8	1220	36.4	45.5	68.3	97.1	109	143	167

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

PEM® Brand CLS™ Nuts - Metric									
PEM® Part Number	Min. Axial Strength w/PC12.9 Screw, kN	Screw Strength Required to Develop Min. Axial, MPa	Mating Screw Recommended Tightening Torque, (N·m) (Assuming K=0.20 - actual K value may vary)						
			Steel PC 4.6	Steel PC 5.6	Stainless A2-70	Steel PC 8.8	Steel PC 9.8	Steel PC 10.9	Steel PC 12.9
CLS-M2-0	1.76	847	0.15	0.19	0.28	0.37	0.37	0.37	0.37
CLS-M2-1	2.00	966	0.15	0.19	0.28	0.40	0.42	0.42	0.42
CLS-M2-2	2.50	1204	0.15	0.19	0.28	0.40	0.45	0.52	0.52
CLS-M2.5-0	2.71	868	0.28	0.35	0.53	0.71	0.71	0.71	0.71
CLS-M2.5-1	3.03	895	0.31	0.38	0.57	0.80	0.80	0.80	0.80
CLS-M2.5-2	3.69	1087	0.31	0.38	0.57	0.81	0.92	0.97	0.97
CLS-M3-0	3.60	863	0.45	0.56	0.85	1.13	1.13	1.13	1.13
CLS-M3-1	4.00	864	0.50	0.63	0.94	1.26	1.26	1.26	1.26
CLS-M3-2	4.80	953	0.54	0.68	1.02	1.45	1.51	1.51	1.51
CLS-M3.5-0	3.98	862	0.58	0.73	1.09	1.46	1.46	1.46	1.46
CLS-M3.5-1	4.45	863	0.65	0.81	1.22	1.64	1.64	1.64	1.64
CLS-M3.5-2	5.40	866	0.79	0.98	1.47	1.98	1.98	1.98	1.98
CLS-M4-0	5.58	871	0.92	1.15	1.73	2.34	2.34	2.34	2.34
CLS-M4-1	6.13	872	1.01	1.27	1.90	2.58	2.58	2.58	2.58
CLS-M4-2	7.25	874	1.20	1.49	2.24	3.04	3.04	3.04	3.04
CLSS-M5-0	7.98	870	1.65	2.06	3.09	4.19	4.19	4.19	4.19
CLSS-M5-1	8.69	871	1.80	2.25	3.37	4.56	4.56	4.56	4.56
CLSS-M5-2	10.13	871	2.09	2.62	3.92	5.32	5.32	5.32	5.32
CLS-M6-00	17.0	876	4.20	5.25	7.88	10.7	10.7	10.7	10.7
CLS-M6-0	18.1	901	4.35	5.43	8.15	11.4	11.4	11.4	11.4
CLS-M6-1	19.1	950	4.35	5.43	8.15	11.6	12.0	12.0	12.0
CLS-M6-2	22.7	1130	4.35	5.43	8.15	11.6	13.0	13.0	14.3
CLS-M8-1	33.7	921	10.5	13.2	19.8	28.1	28.3	28.3	28.3
CLS-M8-2	38.7	1057	10.5	13.2	19.8	28.1	31.6	32.5	32.5
CLS-M10-1	66.5	1147	20.9	26.1	39.1	55.7	62.6	69.8	69.8
CLS-M10-2	70.7	1220	20.9	26.1	39.1	55.7	62.6	76.8	76.8
CLS-M12-1	87.1	1033	36.4	45.5	68.3	97.1	109	110	110

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

PEM® Brand SP™ Nuts - Metric									
PEM® Part Number	Min. Axial Strength w/PC12.9 Screw, kN	Screw Strength Required to Develop Min. Axial, MPa	Mating Screw Recommended Tightening Torque, (N·m) (Assuming K=0.20 - actual K value may vary)						
			Steel PC 4.6	Steel PC 5.6	Stainless A2-70	Steel PC 8.8	Steel PC 9.8	Steel PC 10.9	Steel PC 12.9
SP-M2-1	2.53	1220	0.15	0.19	0.28	0.40	0.45	0.59	0.68
SP-M2-2	2.53	1220	0.15	0.19	0.28	0.40	0.45	0.59	0.68
SP-M2.5-0	3.81	1220	0.28	0.35	0.53	0.75	0.84	1.10	1.29
SP-M2.5-1	4.14	1220	0.31	0.38	0.57	0.82	0.92	1.20	1.40
SP-M2.5-2	4.14	1220	0.31	0.38	0.57	0.82	0.92	1.20	1.40
SP-M3-0	5.09	1220	0.45	0.56	0.85	1.20	1.35	1.77	2.07
SP-M3-1	5.65	1220	0.50	0.63	0.94	1.33	1.50	1.96	2.29
SP-M3-2	6.14	1220	0.54	0.68	1.02	1.45	1.63	2.13	2.49
SP-M3.5-0	5.63	1220	0.58	0.73	1.09	1.55	1.74	2.28	2.66
SP-M3.5-1	6.29	1220	0.65	0.81	1.22	1.73	1.95	2.54	2.98
SP-M3.5-2	7.61	1220	0.79	0.98	1.47	2.10	2.36	3.08	3.60
SP-M4-0	7.81	1220	0.92	1.15	1.73	2.46	2.76	3.61	4.22
SP-M4-1	8.58	1220	1.01	1.27	1.90	2.70	3.04	3.97	4.64
SP-M4-2	10.1	1220	1.20	1.49	2.24	3.19	3.59	4.68	5.48
SP-M5-0	11.2	1220	1.65	2.06	3.09	4.40	4.95	6.46	7.56
SP-M5-1	12.2	1220	1.80	2.25	3.37	4.79	5.39	7.04	8.24
SP-M5-2	14.2	1220	2.09	2.62	3.92	5.58	6.28	8.20	9.59
SP-M6-1	24.6	1220	4.35	5.43	8.15	11.6	13.0	17.0	19.9
SP-M6-2	24.6	1220	4.35	5.43	8.15	11.6	13.0	17.0	19.9
SP-M8-1	44.7	1220	10.5	13.2	19.8	28.1	31.6	41.3	48.3
SP-M8-2	44.7	1220	10.5	13.2	19.8	28.1	31.6	41.3	48.3
SP-M10-1	70.7	1220	20.9	26.1	39.1	55.7	62.6	81.8	95.7

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

PEM® Brand CLA™ Nuts - Metric								
PEM® Part Number	Min. Axial Strength w/PC12.9 Screw, kN	Screw Strength Required to Develop Min. Axial, MPa	Mating Screw Recommended Tightening Torque, (N·m) (Assuming K=0.20 - actual K value may vary)					
			Aluminum 2024-T4	Steel PC 5.6	Stainless A2-70	Steel PC 8.8	Steel PC 10.9	Steel PC 12.9
CLA-M2-1	0.969	639	0.141	0.136	0.205	0.211	0.211	0.211
CLA-M2-2	1.309	632	0.193	0.187	0.280	0.285	0.285	0.285
CLA-M3-1	2.428	651	0.521	0.503	0.755	0.793	0.793	0.793
CLA-M3-2	2.977	642	0.647	0.626	0.939	0.972	0.972	0.972
CLA-M3.5-1	2.831	669	0.690	0.667	1.00	1.08	1.08	1.08
CLA-M3.5-2	3.485	656	0.866	0.837	1.26	1.33	1.33	1.33
CLA-M4-1	4.195	660	1.47	1.42	2.13	2.26	2.26	2.26
CLA-M4-2	5.965	679	1.63	1.58	2.37	2.60	2.60	2.60
CLA-M5-1	8.502	654	3.02	2.92	4.39	4.63	4.63	4.63
CLA-M5-2	9.492	669	3.30	3.19	4.79	5.17	5.17	5.17
CLA-M6-1	10.55	674	4.37	4.23	6.34	6.89	6.89	6.89
CLA-M6-2	13.05	659	5.52	5.34	8.01	8.52	8.52	8.52

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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 - Metric									
PEM® Part Number	Min. Axial Strength w/PC12.9 Screw, kN	Screw Strength Required to Develop Min. Axial, MPa	Mating Screw Recommended Tightening Torque, (N·m) (Assuming K=0.20 - actual K value may vary)						
			Steel PC 4.6	Steel PC 5.6	Stainless A2-70	Steel PC 8.8	Steel PC 9.8	Steel PC 10.9	Steel PC 12.9
SH-M6-1X	24.6	1220	4.35	5.43	8.15	11.6	13.0	17.0	19.9
SH-M6-2X	24.6	1220	4.35	5.43	8.15	11.6	13.0	17.0	19.9
SH-M8-1X	44.7	1220	10.5	13.2	19.8	28.1	31.6	41.3	48.3
SH-M8-2X	44.7	1220	10.5	13.2	19.8	28.1	31.6	41.3	48.3
SH-M10-1X	70.7	1220	20.9	26.1	39.1	55.7	62.6	81.8	95.7
HNL-M6-LZ	16.7	877	4.1	5.1	7.7	10.5	10.5	10.5	10.5
HNL-M8-LZ	31.1	862	10	13	19	26	26	26	26
HNL-M10-LZ	51.3	884	21	26	39	54	54	54	54
H-M10-ZI	70.7	1220	21	26	39	56	63	82	89

PEM RT® Nuts - Metric									
PEM® Part Number	Min. Axial Strength w/PC12.9 Screw, kN	Screw Strength Required to Develop Min. Axial, MPa	Mating Screw Recommended Tightening Torque, (N·m) (Assuming k=0.25 - actual k value may vary) *						
			Steel PC 4.6	Steel PC 5.6	Stainless A2-70	Steel PC 8.8	Steel PC 9.8	Steel PC 10.9	Steel PC 12.9
S-RTM3-0ZI	3.17	1220	0.3	0.38	0.57	0.81	0.91	1.19	1.39
S-RTM3-1ZI	3.52	1220	0.34	0.43	0.64	0.91	1.03	1.34	1.49
S-RTM3-2ZI	6.14	1220	0.42	0.52	0.78	1.12	1.26	1.64	1.92
S-RTM4-0ZI	5.31	1220	0.65	0.81	1.22	1.73	1.95	2.54	2.98
S-RTM4-1ZI	5.83	1220	0.73	0.91	1.36	1.94	2.18	2.85	3.33
S-RTM4-2ZI	6.9	1220	0.88	1.1	1.65	2.35	2.65	3.45	4.04
S-RTM5-0ZI	5.9	1220	1.08	1.35	2.03	2.89	3.25	4.24	4.96
S-RTM5-1ZI	6.4	1220	1.18	1.48	2.21	3.15	3.54	4.62	5.41
S-RTM5-2ZI	7.4	1220	1.37	1.72	2.58	3.66	4.12	5.38	6.3
S-RTM6-00ZI	20	1220	4.42	5.52	8.28	11.8	13.3	17.3	19.5
S-RTM6-0ZI	24.6	1220	4.7	5.88	8.81	12.5	14.1	18.4	20.8
S-RTM6-1ZI	24.6	1220	4.96	6.2	9.29	13	14.9	19.4	21.9
S-RTM6-2ZI	24.6	1220	5.89	7.37	11.1	15.7	17.7	23.1	26.1
S-RTM8-1ZI	44.7	1220	11.5	14.4	21.6	30.8	34.6	45.2	47.9
S-RTM8-2ZI	44.7	1220	13.3	16.6	24	35.5	39.9	52.1	60.7

* The additional tightening torque for the PEM RT® nut is 25% more than a standard thread (RT Factor: 1.25)

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

PEM® Brand SMP™ Nuts - Metric									
PEM® Part Number	Min. Axial Strength w/PC12.9 Screw, kN	Screw Strength Required to Develop Min. Axial, MPa	Mating Screw Recommended Tightening Torque, (N·m) (Assuming K=0.20 - actual K value may vary)						
			Steel PC 4.6	Steel PC 5.6	Stainless A2-70	Steel PC 8.8	Steel PC 9.8	Steel PC 10.9	Steel PC 12.9
SMPS-M2.5	2.24	865	0.23	0.29	0.44	0.59	0.59	0.59	0.59
SMPP-M2.5	3.10	1220	0.23	0.29	0.43	0.61	0.69	0.90	1.05
SMPS-M3	2.63	858	0.33	0.41	0.62	0.83	0.83	0.83	0.83
SMPP-M3	3.68	1220	0.33	0.41	0.61	0.87	0.98	1.27	1.49
SMPS-M3.5	2.97	858	0.44	0.55	0.82	1.09	1.09	1.09	1.09
SMPP-M3.5	4.15	1220	0.43	0.54	0.80	1.14	1.28	1.68	1.96

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

PEM® Brand WN™ and WNS™ Weld Nuts - Metric									
PEM® Part Number	Min. Axial Strength w/PC12.9 Screw, kN	Screw Strength Required to Develop Min. Axial, MPa	Mating Screw Recommended Tightening Torque, (N·m) (Assuming K=0.20 - actual K value may vary)						
			Steel PC 4.6	Steel PC 5.6	Stainless A2-70	Steel PC 8.8	Steel PC 9.8	Steel PC 10.9	Steel PC 12.9
WN-M3-0CU	1.73	597	0.31	0.39	0.51	0.51	0.51	0.51	0.51
WN-M4-0CU	4.73	564	1.21	1.51	1.85	1.85	1.85	1.85	1.85
WN-M5-0CU	8.86	624	2.82	3.52	4.32	4.32	4.32	4.32	4.32
WN-M6-0CU	12.9	639	4.76	5.95	7.53	7.53	7.53	7.53	7.53
WNS-M3-0	2.6	896	0.31	0.39	0.59	0.82	0.82	0.82	0.82
WNS-M4-0	7.1	846	1.21	1.51	2.27	2.98	2.98	2.98	2.98
WNS-M5-0	13.3	937	2.55	3.19	4.79	6.81	6.97	6.97	6.97
WNS-M6-0	19.3	959	4.35	5.43	8.15	11.6	12.2	12.2	12.2

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

PEM® Brand KF2™ Nuts - Metric									
PEM® Part Number	Min. Axial Strength w/12.9 Screw, kN	Screw Strength Required to Develop Min. Axial, MPa	Mating Screw Recommended Tightening Torque, (N·m) (Assuming K=0.20 - actual K value may vary)						
			Steel PC 4.6	Steel PC 5.6	Stainless A2-70	Steel PC 8.8	Steel PC 9.8	Steel PC 10.9	Steel 12.9
KF2-M2	1.92	925	0.15	0.19	0.28	0.40	0.45	0.45	0.45
KF2-M2.5	2.51	741	0.31	0.38	0.57	0.74	0.74	0.74	0.74
KF2-M3	3.24	692	0.51	0.63	0.95	1.14	1.14	1.14	1.14
KF2-M4	5.63	703	1.15	1.44	2.16	2.65	2.65	2.65	2.65
KF2-M5	9.81	699	2.53	3.16	4.73	5.78	5.78	5.78	5.78
KFS2-M2	2.5	1220	0.15	0.19	0.28	0.40	0.45	0.53	0.53
KFS2-M2.5	3.48	1027	0.31	0.38	0.57	0.81	0.87	0.87	0.87
KFS2-M3	4.49	959	0.51	0.63	0.95	1.35	1.35	1.35	1.35
KFS2-M4	7.79	975	1.15	1.44	2.16	3.07	3.13	3.13	3.13
KFS2-M5	13.6	969	2.53	3.16	4.73	6.73	6.83	6.83	6.83

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Table I
Material Properties for Selected Strength Levels of Mating Screws

UNIFIED	Industry Standard	Designation	Unified Units Material Strength, ksi		Yield/Tensile Ratio	Metric Units Material Strength, MPa	
			Ultimate	Yield		Ultimate	Yield
			SAE J429	Grade 2		74	57
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
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.