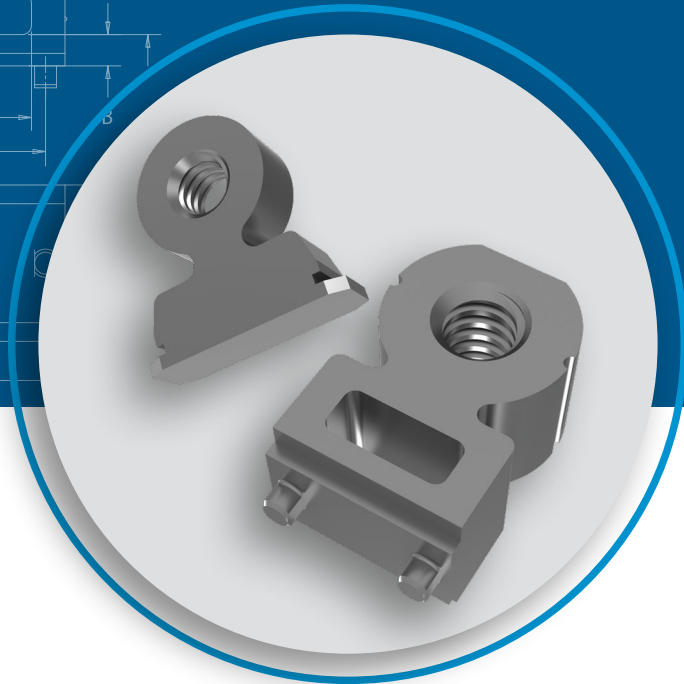
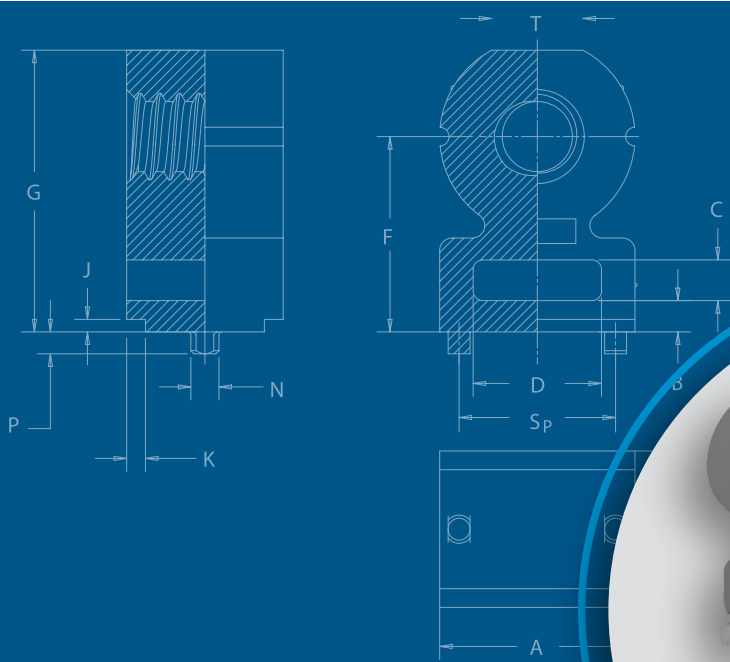




RATM

RIGHT ANGLE FASTENERS



PEM® R'ANGLE® fasteners provide strong right angle attachment points in thin sheets.

PEM® R'ANGLE® fasteners provide strong right angle attachment points in sheet metal or PC Boards. **RAA™** and **RAS™** fasteners for metal are simply pressed into a rectangular mounting hole of the proper size. **SMTRA™** fasteners are installed onto PC Boards using standard surface mount techniques. The holding power of the fastener is unaffected by the repeated tightening and loosening of the screw.

PEM® R'ANGLE® fasteners are cost-effective replacements for:

- Bent edge tabs
- Bent center tabs
- Bent flanges
- Angle brackets
- Tack welds
- Loose hardware

PEM® R'ANGLE® fasteners provide many advantages over bent tabs and flanges, including:

- More predictable designs
- Tighter design control
- Reduction of loose hardware
- Unmarred panel surfaces
- Material savings
- Improved shielding characteristics
- Fewer assembly steps

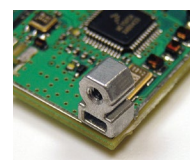
Fastener drawings and models are available at www.pemnet.com.

Custom sizes are available on special order. [Contact us](#) for more information.

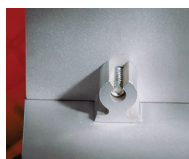
RAS™ fasteners for sheet metal is a threaded right angle fastener that accepts standard unified or metric screws — [PAGE 3](#)



SMTRA™ right angle threaded fasteners are installed on to PC Boards using standard surface mount techniques. They accept standard unified or metric screws — [PAGE 5](#)



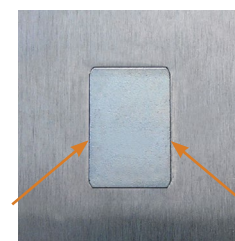
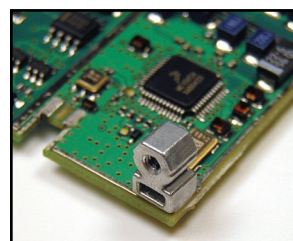
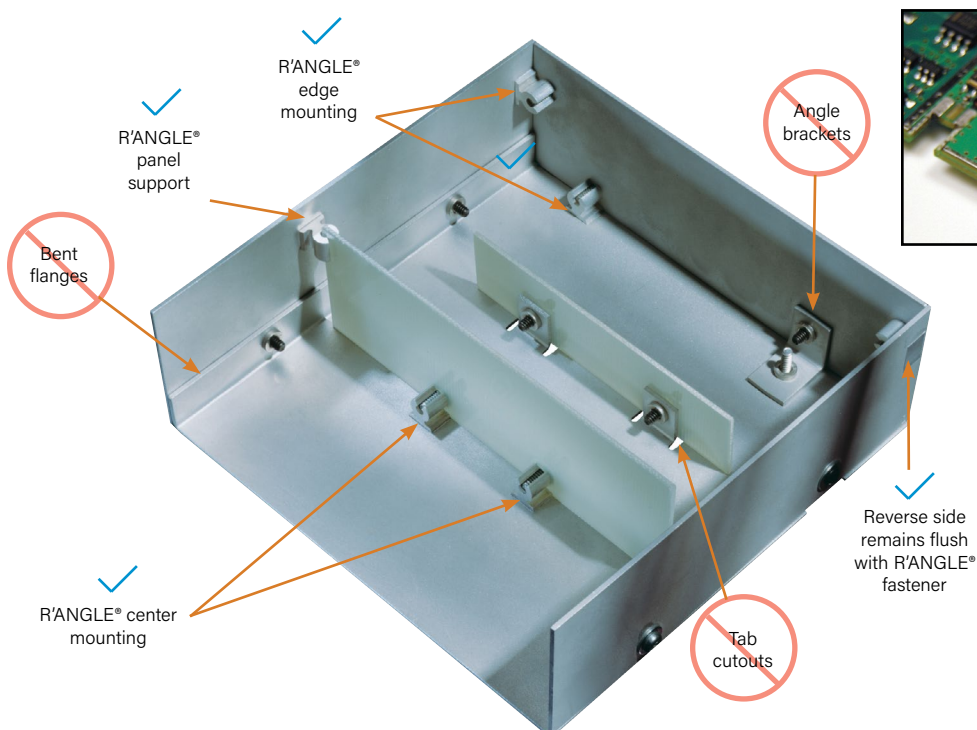
RAA™ right angle fasteners for sheet metal can accept thread forming or self-tapping screws — [PAGE 4](#)



Material and finish specifications — [PAGE 6](#)

Installation — [PAGE 6 - 7](#)

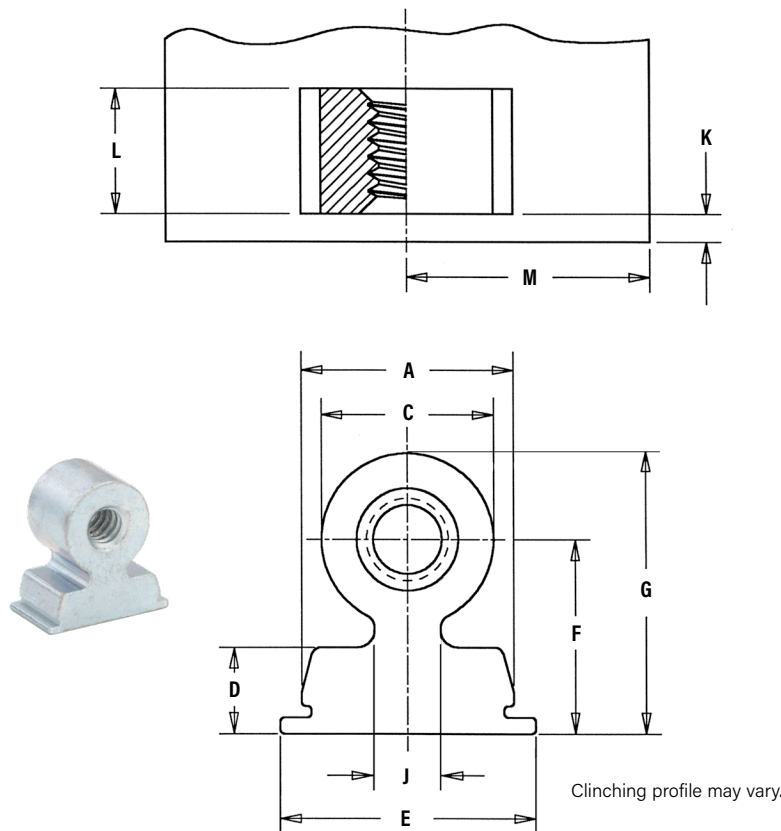
Performance data — [PAGE 7 - 8](#)



Depending on placement of the fastener within the mounting hole, a slight gap may be noticeable along the non-clinching edges of the fastener after installation. If gap is not acceptable in your application, check with [techsupport](#) for a solution.

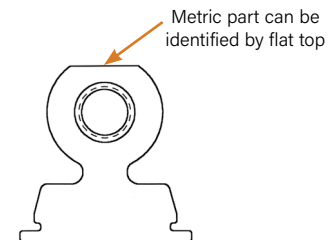
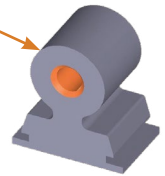
PEM® RAS™ Threaded Right Angle Fastener

For use with standard metric or unified screws.



PEM® "Circle on Pedestal"
(Registered Trademark)

Fastener drawings and
models are available at
www.pemnet.com



Part Number Designation

RA S 440 - 9 - 6 ZI

Type Material Thread Code Height Code Length Code Finish Code

All dimensions are in inches.

	Thread Size	Type	Fastener Material	Thread Code	Height Code	Length Code	Length L ±.003	Min. Sheet Thickness	Hole Size In Sheet +.002 -.001	A ±.003	C Nom.	D Nom.	E ±.006	Height F ±.006	G Nom.	J Nom.	Min. Part Face to Edge K	Min. Dist. Hole C/L to Edge M (1)
Unified	.112-40 (#4-40)	RA	S	440	9	4	.121	.040	.312 x .125	.308	.250	.125	.370	.281	.406	.096	.040	.30
						6	.183		.312 x .187									.35
						8	.246		.312 x .250									.43
	.138-32 (#6-32)	RA	S	632	10	4	.121	.040	.375 x .125	.371	.300	.125	.433	.312	.462	.141	.040	.35
						8	.246		.375 x .250									.50
						10	.308		.375 x .312									.55
	.164-32 (#8-32)	RA	S	832	12	6	.183	.040	.406 x .187	.402	.350	.125	.464	.375	.550	.157	.040	.40
						9	.277		.406 x .281									.58
						12	.371		.406 x .375									.65

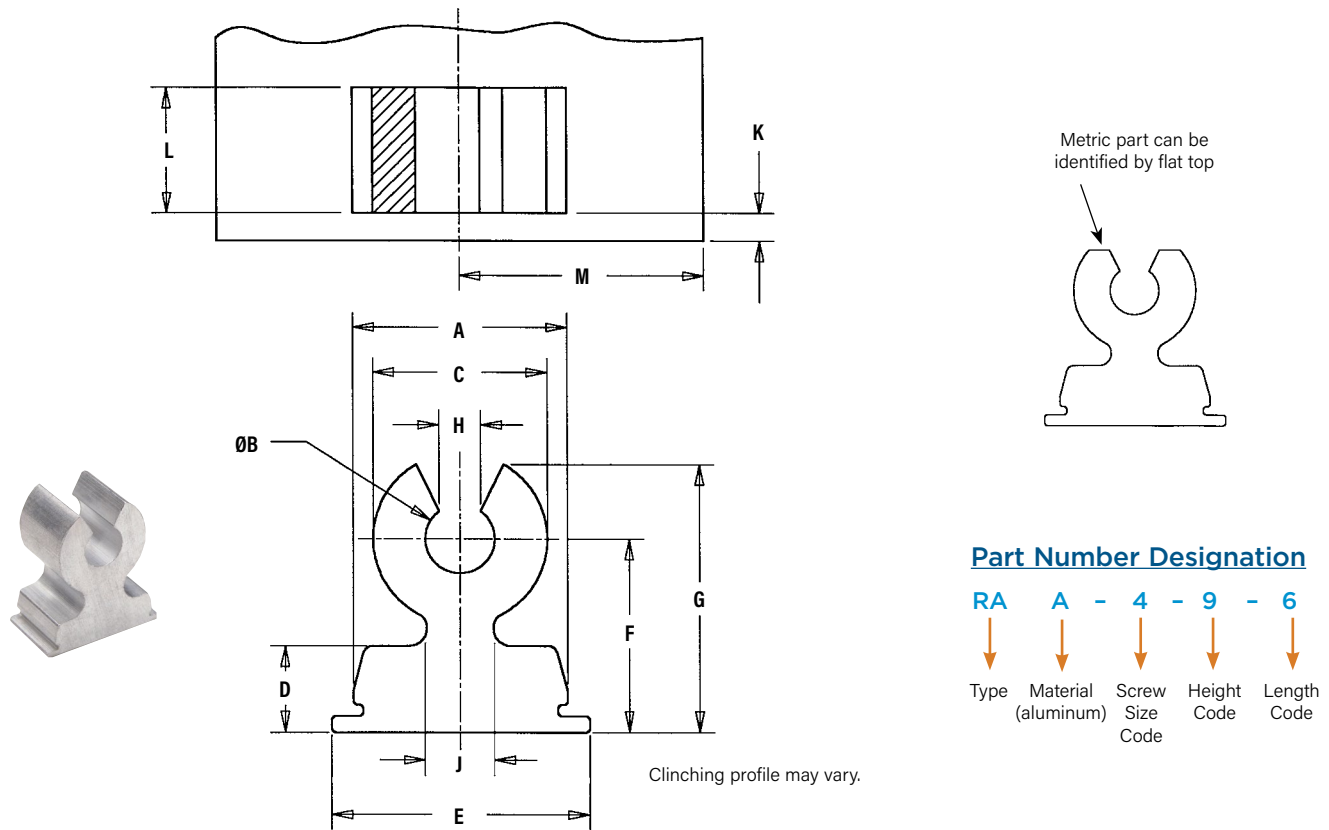
All dimensions are in millimeters.

	Thread Size x Pitch	Type	Fastener Material	Thread Code	Height Code	Length Code	Length L ±.08	Min. Sheet Thickness	Hole Size In Sheet +.05 -.03	A ±.08	C Nom.	D Nom.	E ±.15	Height F ±.15	G Nom.	J Nom.	Min. Part Face to Edge K	Min. Dist. Hole C/L to Edge M (1)
Metric	M3 x 0.5	RA	S	M3	7	3	2.89	1	8 x 3	7.89	6.35	3.18	9.47	7	9.78	2.87	1.02	7.6
						4	3.89		8 x 4									9.1
						6	5.89		8 x 6									10.7
	M4 x 0.7	RA	S	M4	9	4	3.89	1	10 x 4	9.89	8.89	3.18	11.48	9	13.21	4.06	1.02	10
						7	6.89		10 x 7									14.7
						9	8.89		10 x 9									16.3

(1) For more information on proximity to bends and distance to other clinch hardware, see [PEM® Tech Sheet C/L To Edge](#).

RAA™ Right Angle Fastener

For use with thread forming screws.



Part Number Designation

RA A - 4 - 9 - 6
Type Material Screw Size Height Length
(aluminum) Code Code Code

All dimensions are in inches.

Unified	Thread Form Screw Size	Type	Fastener Material	Screw Size Code	Height Code	Length Code	Length L ±.003	Min. Sheet Thickness	Hole Size In Sheet +.002 -.001	A ±.003	ØB ±.004	C Nom.	D Nom.	E ±.006	Height F ±.006	G Nom.	H ±.007	J Nom.	Min. Part Face to Edge K	Min. Dist. Hole C/L to Edge M (1)
	#4-40	RA	A	4	9	6	.183	.040	.312 x .187	.308	.100	.250	.125	.368	.281	.389	.054	.096	.040	.35
						8	.246		.312 x .250											.36
	#6-32	RA	A	6	10	8	.246	.040	.375 x .250	.371	.123	.300	.125	.431	.312	.442	.066	.141	.040	.50
						10	.308		.375 x .312											.55
	#8-32	RA	A	8	12	9	.277	.040	.406 x .281	.402	.145	.350	.125	.462	.375	.525	.078	.157	.040	.58
						12	.371		.406 x .375											.65

All dimensions are in millimeters.

Metric	Thread Form Screw Size	Type	Fastener Material	Screw Size Code	Height Code	Length Code	Length L ±0.08	Min. Sheet Thickness	Hole Size In Sheet +0.05 -0.03	A ±0.08	ØB ±0.1	C Nom.	D Nom.	E ±0.15	Height F ±0.15	G Nom.	H ±0.18	J Nom.	Min. Part Face to Edge K	Min. Dist. Hole C/L to Edge M (1)
	M3 x 0.5	RA	A	M3	7	4	3.89	1	8 x 4	7.89	2.77	6.35	3.18	9.42	7	9.27	1.5	2.87	1.02	9.1
						6	5.89		8 x 6											10.7
	M4 x 0.7	RA	A	M4	9	7	6.89	1	10 x 7	9.89	3.68	8.89	3.18	11.43	9	12.19	1.97	4.06	1.02	14.7
						9	8.89		10 x 9											16.3

(1) For more information on proximity to bends and distance to other clinch hardware, see [PEM® Tech Sheet C/L To Edge](#).

Material And Finish Specifications

NOTE: PennEngineering's standard SMT parts support IPC-A-610 Class 1 and 2 applications. For Class 3 applications, please [contact us](#) so your specific requirements can be addressed and met with a custom part.

	Threads	Fastener Materials			Standard Finishes ⁽¹⁾			For Use In Sheet Hardness: ⁽²⁾		
Type	Internal, ASME B1.1, 2B ASME B1.13M, 6H	Aluminum	Steel	Zinc Die Cast	Zinc Plated per ASTM B633, SC1 (5µm), Type III, Colorless	Natural	Electro-plated Tin ASTM B 545, Class A with Clear Preservative Coating, Annealed	HRB 45 / HB 84 or Less	HRB 60 / HB 107 or Less	PC Board
RAS	▪		▪		▪				▪	
RAA		▪				▪		▪		
SMTRA	▪			▪			▪			▪
Part Number Codes for Finishes					ZI	None	ET ⁽³⁾			

(1) See PEM® Technical Support section of our website for related plating standards and specifications.

(2) HRB - Hardness Rockwell "B" Scale. HB - Hardness Brinell.

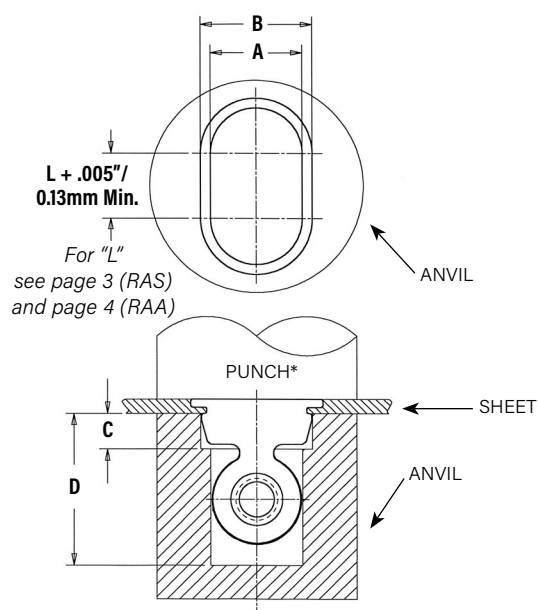
(3) Optimal solderability life noted on packaging.

Custom sizes are available on special order. [Contact us](#) for more information.

Installation

RAS™ and RAA™ Fasteners

1. Prepare a properly sized rectangular mounting hole in the sheet. Do not perform any secondary operations such as deburring.
2. Place the fastener through the mounting hole (preferably the punch side) and into the anvil as shown in the drawing to the right.
3. With the installation punch and anvil surfaces parallel, apply a squeezing force until the bottom of the fastener becomes flush with the sheet.



Installation Tooling

Unified	Screw Thread Size Code	HAEGER® Part No.		PEMSERTER® Part No.		Anvil Dimensions (in.)			
		Anvil	Punch	Anvil	Punch	A ±.001	B ±.001	C ±.005	D Min.
	4/440	H-180-440-L	H-108-0020L	8002711	8003076	.257	.313	.100	.425
	6/632	H-180-632-L	H-108-0020L	8002712	8003076	.307	.376	.100	.500
	8/832	H-180-832-L	H-108-0020L	8003642	8003076	.357	.407	.100	.575

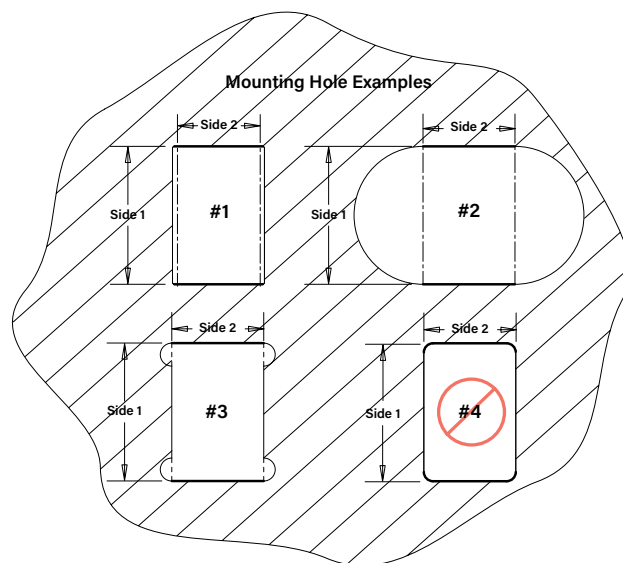
Metric	Screw Thread Size Code	HAEGER® Part No.		PEMSERTER® Part No.		Anvil Dimensions (mm)			
		Anvil	Punch	Anvil	Punch	A ±0.03	B ±0.03	C ±0.1	D Min.
	M3	H-180-M3-L	H-108-0020L	8002713	8003076	6.53	8.02	2.54	10.8
	M4	H-180-M4-L	H-108-0020L	8002714	8003076	9.07	10.03	2.54	12.7

* NOTE: The punch must be large enough to cover the entire base of the fastener to ensure proper installation.

Installation tooling is available from PennEngineering.

Mounting Hole Examples

The mounting hole is defined by two dimensions. The two thick lines shown must be straight for the entire length defined by "Side 2" and must be separated by the distance shown as "Side 1" (Side 1 and Side 2 are the two dimensions given for the mounting hole on pages 3 and 4). The illustration shows three examples (#1, #2, and #3) of how it can be achieved. Example #4 in the lower right side will not work.

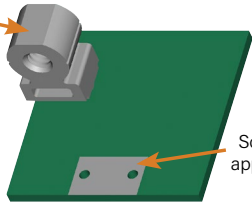


Installation Notes

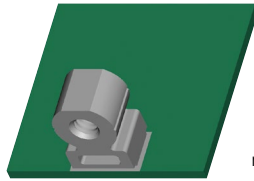
- For best results we recommend using a HAEGER® or PEMSERTER® machine for installation of PEM® self-clinching fasteners. Please check our website for more information.
- Visit the Animation Library on our website to view the installation process [for this product](#).

SMTRA™ Surface Mount Fasteners

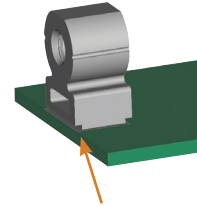
Flat top
for vacuum
pick up.



Solder paste
applied to pad
on PCB.



Solder fastener
in place using
standard surface
mount techniques.



Undercut to accept
solder fillet and permit
flush to edge installation.



For Additional HAEGER®
and PEMserter® Tooling
Information/Part Numbers
visit our [tooling wizard](#)



Performance Data⁽¹⁾

SMTRA™ R'ANGLE® Fasteners With ET Finish⁽¹⁾⁽²⁾

Unified	Part Number	Pullout (lbs.)	Side Load (lbs.)
	SMTRA256-8-6	51.7	71
	SMTRA440-9-6	89.5	10.8
	SMTRA632-10-8	110.3	8.4
	SMTRA832-12-9	137.2	21.2

Metric	Part Number	Pullout (N)	Side Load (N)
	SMTRAM2-6-5	418.2	56.8
	SMTRAM25-6-5	216.5	36.9
	SMTRAM3-7-5	257.6	41.3
	SMTRAM4-9-7	369.3	73.3

Testing Conditions

Oven	Quad ZCR convection oven with 4 zones
Vias	None
High Temp	518° F / 270°C
Board Finish	62% Sn, 38% Pb
Paste	Amtech NC559LF Sn96.5/3.0Ag/0.5Cu (SAC305) Lead-free
Board	.062" thick, Single Layer FR-4
Stencil	.0067" / 0.17 mm thick
Screen Printer	Ragin Manual Printer

(1) With lead-free paste. Average values of 30 test points. The data presented here is for general comparison purposes only. Actual performance is dependent upon application variables. We will be happy to provide samples for you to install. If required, we can also test your installed hardware and provide you with the performance data specific to your application.

(2) Further testing details can be found in the literature section on our website.

Performance Data⁽¹⁾

RAS™ Threaded Fasteners

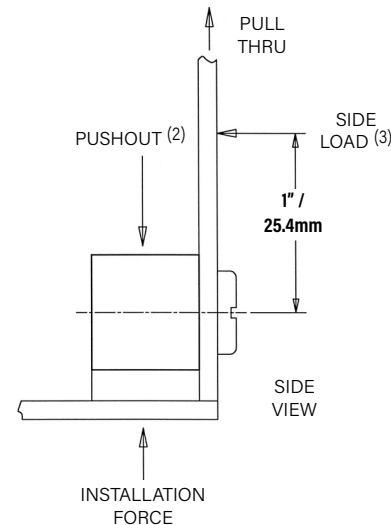
Unified	Thread Code	Height Code	Length Code	Test Sheet Material									
				5052-H34 Aluminum					Cold-rolled Steel				
				Max. Rec. Tightening Torque (in. lbs.)	Installation (lbs.)	Pushout (lbs.) (2)	Side Load (lbs.) (3)	Pull Thru (lbs.)	Max. Rec. Tightening Torque (in. lbs.)	Installation (lbs.)	Pushout (lbs.) (2)	Side Load (lbs.) (3)	Pull Thru (lbs.)
440	9		4	13	1800	100	7	80	16	2400	180	9	80
			6	17	1800	145	8	80	17	2400	260	9	80
			8	17	2100	180	13	80	17	3000	315	15	80
632	10		4	20	2000	100	7	85	20	2500	190	9	85
			8	21	2500	190	12	85	26	3200	335	16	85
			10	21	2800	230	16	85	26	4000	385	20	85
832	12		6	20	2400	140	15	100	27	3200	260	11	100
			9	23	3300	195	16	100	29	4200	345	20	100
			12	30	3500	260	20	100	35	4700	420	27	100

Metric	Thread Code	Height Code	Length Code	Test Sheet Material									
				5052-H34 Aluminum					Cold-rolled Steel				
				Max. Rec. Tightening Torque (N-m)	Installation (kN)	Pushout (N) (2)	Side Load (N) (3)	Pull Thru (N)	Max. Rec. Tightening Torque (N-m)	Installation (kN)	Pushout (N) (2)	Side Load (N) (3)	Pull Thru (N)
M3	7		3	1.47	8	423	36	356	2.26	10.7	778	40	356
			4	1.92	8	534	36	356	2.71	10.7	1001	40	356
			6	2.15	9.3	756	58	356	2.71	13.3	1312	67	356
M4	9		4	2.15	8.9	556	53	423	3.28	11.6	956	44	423
			7	2.6	13.3	890	76	423	4.07	16	1512	80	423
			9	2.83	13.3	1112	93	423	4.52	18.7	1846	116	423

RAA™ Fasteners

Unified	Screw Size Code	Height Code	Length Code	Thread Forming Torque (in. lbs.)	Max. Rec. Tightening Torque (in. lbs.)	Test Sheet Material	Installation (lbs.)	Pushout (lbs.) (2)	Side Load (lbs.) (3)	Pull Thru (lbs.)
4	9		6	3	6	5052-H34 Aluminum	1800	140	8	80
			8	4	10	Aluminum	1800	180	13	80
6	10		8	5.5	11	5052-H34 Aluminum	2500	175	12	85
			10	5.5	17	Aluminum	2500	235	16	85
8	12		9	6.5	18	5052-H34 Aluminum	3100	205	13	105
			12	8.0	20	Aluminum	3100	255	21	105

Metric	Screw Size Code	Height Code	Length Code	Thread Forming Torque (N-m)	Max. Rec. Tightening Torque (N-m)	Test Sheet Material	Installation (kN)	Pushout (N) (2)	Side Load (N) (3)	Pull Thru (N)
M3	7		4	.17	.56	5052-H34 Aluminum	.71	556	27	356
			6	.23	1.02	Aluminum	.71	756	44	356
M4	9		7	.56	2.26	5052-H34 Aluminum	13.3	890	76	423
			9	.56	2.83	Aluminum	13.3	1045	107	423



- (1) Published installation forces are for general reference. Actual set-up and confirmation of complete installation should be made by observing proper seating of fastener as described in the installation steps. Other performance values reported are averages when all proper installation parameters and procedures are followed. Variations in mounting hole size, sheet material, and installation procedure may affect performance. Performance testing this product in your application is recommended. We will be happy to provide technical assistance and/or samples for this purpose.
- (2) Pushout test is conducted without side panel attached to R'ANGLE® fastener.
- (3) 1" / 25.4mm from screw centerline.

All PEM® products meet our stringent quality standards. If you require additional industry or other specific [quality certifications](#), special procedures and/or part numbers are required. Please contact your local sales office or representative for further information.

Regulatory [compliance information](#) is available in Technical Support section of our website. Specifications subject to change without notice. See our website for the most current version of this bulletin.



North America: Danboro, Pennsylvania USA | E-mail: info@pemnet.com | Tel: +1-215-766-8853 | 800-237-4736 (USA)
Europe: Galway, Ireland | E-mail: europe@pemnet.com | Tel: +353-91-751714
Asia/Pacific: Singapore | E-mail: singapore@pemnet.com | Tel: +65-6-745-0660
Kunshan, China: E-mail: salesgreaterchina@pemnet.com | Tel: +86-512-5276-9300

Visit our PEMNET™ Resource Center at www.pemnet.com • Technical support e-mail: techsupport@pemnet.com