

Designed to meet the challenges of today's automotive assembly and design

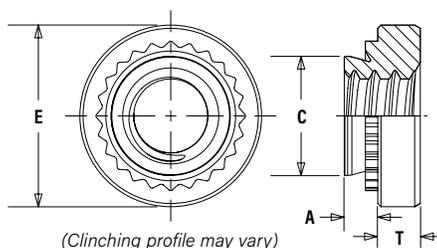
SH™ HARD PANEL NUTS

- Installs into thin, harder, high strength steel materials (high strength steel sheets at 975MPa maximum ultimate tensile)
- Allows overall weight reduction for all vehicles
- Provides lower installed cost



Compare to other thin sheet fastening devices:

- Addresses environmental concerns
- Smaller outer diameter
- Lighter weight
- Flush on reverse side of panel
- Close to edge of panel mounting
- No embossing required
- Hardened nut material provides stronger thread strength
- Can be installed automatically using press or in-die technology



(Clinging profile may vary)
Due to manufacturing procedure, parts may have a counterbore at shank end.

PART NUMBER DESIGNATION

SH - 0420 - 1 X

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Type Thread Code Shank Code Finish

All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Shank Code	A (Shank) Max.	Min. Sheet Thickness ⁽¹⁾	Hole Size in Sheet +.003 -.000	C Max.	E ±.010	T ±.010	Min. Dist Hole to Edge
		Fastener Material									
		Hardened Alloy Steel									
	.250-20 (1/4-20)	SH	0420	1	.054	.056	.344	.343	.440	.170	.34
				2	.087	.090					
	.313-18 (5/16-18)	SH	0518	1	.054	.056	.413	.412	.500	.230	.38
				2	.087	.090					
	.375-16 (3/8-16)	SH	0616	1	.087	.090	.500	.499	.623	.270	.44

All dimensions are in millimeters.

METRIC	Thread Size	Type	Thread Code	Shank Code	A (Shank) Max.	Min. Sheet Thickness ⁽¹⁾	Hole Size in Sheet +0.08	C Max.	E ±0.25	T ±0.25	Min. Dist Hole to Edge
		Fastener Material									
		Hardened Alloy Steel									
	M6 x 1	SH	M6	1	1.38	1.4	8.75	8.73	11.18	4.08	8.6
				2	2.21	2.29					
	M8 x 1.25	SH	M8	1	1.38	1.4	10.5	10.47	12.7	5.47	9.7
				2	2.21	2.29					
	M10 x 1.5	SH	M10	1	2.21	2.29	14	13.97	17.35	7.48	13.5

Threads: Internal, ASME B1.1, 2B / ASME B1.13M, 6H

Material: Hardened Alloy Steel

Standard Finish: X - No finish (with rust preventative oil) ⁽²⁾

For use in sheet hardness: HRC 30 / HB 277 or less

HRC - Hardness Rockwell "C" Scale. HB - Hardness Brinell.

(1) For maximum performance, we recommend that you use the maximum shank length for your sheet thickness.

(2) Unplated threads may be oversized sized as permitted by thread standards to accept minimum plating thickness of .00020"/.0051 mm.

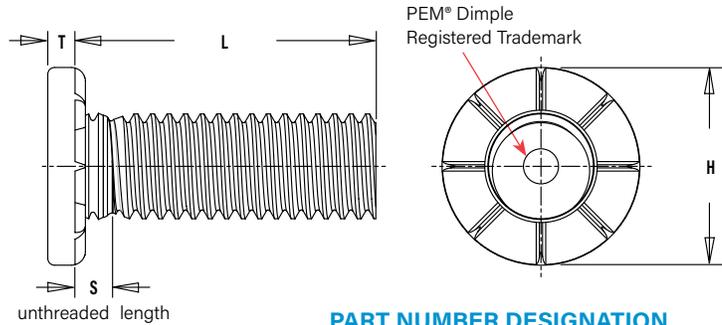
FASTENERS FOR HARD PANELS

HFLH™ HARD PANEL STUDS

- Installs into thinner, harder, high strength steel materials (high strength steel sheets at 700MPa maximum ultimate tensile)
- Allows overall weight reduction for all vehicles
- Provides lower installed cost

Compare to other thin sheet fastening devices:

- Addresses environmental concerns
- Lighter weight
- Close to edge of panel mounting
- No embossing required
- Hardened stud material provides stronger thread strength
- Can be installed automatically using press or in-die technology



PART NUMBER DESIGNATION

HFLH - **0420**- **20** **ZI**

Type Thread Code Shank Code Finish

All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Length Code "L" ±.015 (Length Code in 16ths of an inch)						Min. Sheet Thickness (t)	Hole Size In Sheet +.005 -.000	Max. Hole In Attached Parts	H ±.01	S Max. (2)	T Max.	Min. Dist. Hole To Edge	
		Fastener Material		.500	.750	1.00	1.25	1.50	1.75								2.00
		Hardened Alloy Steel															
	.190-32 (#10-32)	HFLH	032	8	12	16	20	24	28	32	.040	.190	.280	.357	.102	.048	.360
	.250-20 (1/4-20)	HFLH	0420	8	12	16	20	24	28	32	.040	.250	.340	.462	.118	.060	.470
	.313-18 (5/16-18)	HFLH	0518	8	12	16	20	24	28	32	.060	.312	.402	.586	.133	.083	.560

Tensile strength: 120 ksi

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Length Code "L" ±.04 (Length Code in millimeters)						Min. Sheet Thickness (t)	Hole Size In Sheet +.013	Max. Hole In Attached Parts	H ±0.25	S Max. (2)	T Max.	Min. Dist. Hole To Edge	
		Fastener Material		15	20	25	30	35	40								50
		Hardened Alloy Steel															
	M5 x 0.8	HFLH	M5	15	20	25	30	35	40	50	1	5	7.3	9.6	2.6	1.35	10
	M6 x 1	HFLH	M6	15	20	25	30	35	40	50	1	6	8.3	11.35	2.8	1.52	11.5
	M8 x 1.25	HFLH	M8	15	20	25	30	35	40	50	1.5	8	10.3	15.3	3.3	2.13	14.5

Tensile strength: 900 MPa

Threads: External, ASME B11, 2A / ASME B1.13M, 6g

Material: Hardened Alloy Steel

Standard Finish: ZI - Zinc plated, 5µm, colorless ⁽³⁾

Optional Finish: X - No finish (with rust preventative oil) ⁽⁴⁾

For use in sheet hardness: HRB 96 / HB 216 or less

HRB - Hardness Rockwell "B" Scale. HB - Hardness Brinell.

(1) See page 3 for installation tool requirements.

(2) Threads are gaugeable to within 2 pitches of the "S" Max. dimension. A class 3B/5H maximum material commercial nut shall pass up to the "S" Max. dimension.

(3) See PEM Technical Support section of our web site (www.pemnet.com) for related plating standards and specifications.

(4) "X" suffix studs may have pitch diameters and major diameters below 2A "Basic", per ANSI B1.1, Section 7, and B1.13M, Section 8 to allow for minimum of 0.0002" / 0.0051 mm of plating.



FASTENERS FOR HARD PANELS

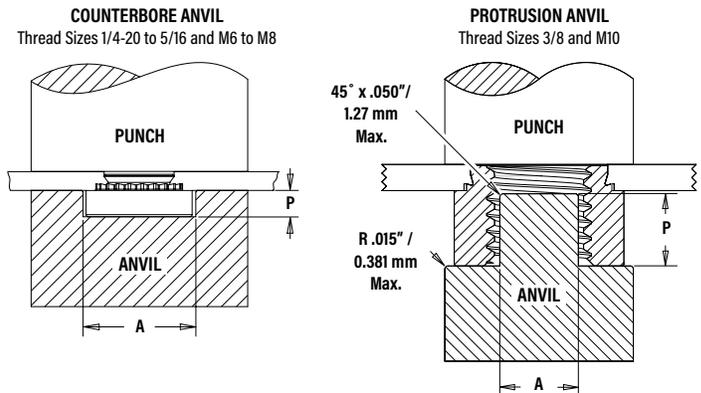
INSTALLATION - SH™ NUTS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Place fastener into the anvil hole and place the mounting hole over the shank of the fastener as shown in diagram to the right.
3. With installation punch and anvil surfaces parallel, apply squeezing force until the head of the nut comes into contact with the sheet material.

UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A	P		
	0420	.454	.150	975200038	975200048
	0518	.517	.200	975200039	975200048
	0616	.280	.250	8020084 ⁽¹⁾	975200901400

METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A	P		
	M6	11.53	3.81	975200038	975200048
	M8	13.13	5.08	975200039	975200048
	M10	7.62	6.35	8005682 ⁽¹⁾	975200901400

(1) Large nut anvils use protrusion to locate part instead of counterbore.

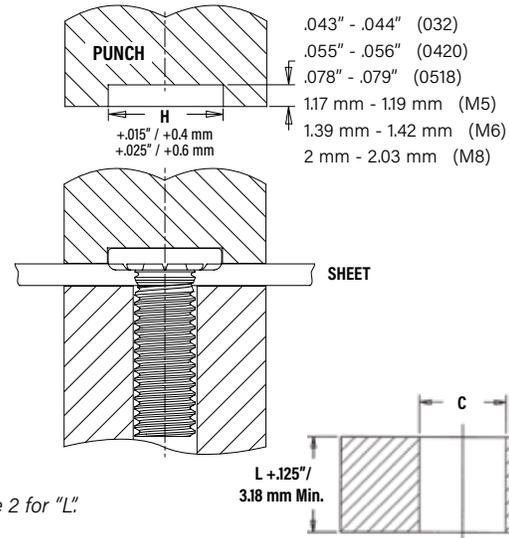
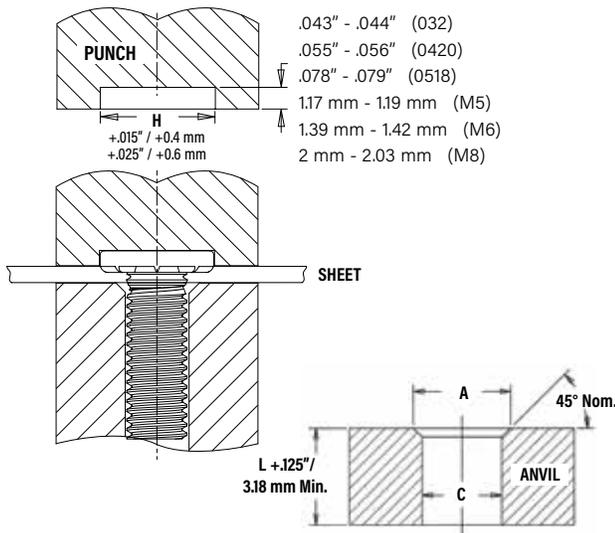


INSTALLATION - HFLH™ STUDS

1. Prepare properly sized mounting hole in sheet. Do not perform any secondary operations such as deburring.
2. Insert stud through mounting hole (punch side) of sheet and into anvil hole.
3. With punch and anvil surfaces parallel, apply squeezing force on the punch sufficient only to embed the ribs on the head of the stud into the sheet. Note that for sheets .060" / 1.51 mm and thicker, the anvil requires only a straight thru hole to accommodate the stud. For sheets less than .060" / 1.51 mm to less than .075" / 1.9 mm, the hole requires a countersink with dimension A at the top to provide for metal flow around the shank of the stud.

Tooling for sheet thicknesses less than .060" / 1.51 mm with #10 / M5 and 1/4" / M6 thread sizes and less than .075" / 1.9 mm with 5/16" / M8 threads.

Tooling for sheet thicknesses .060" / 1.51 mm and greater with #10 / M5 and 1/4" / M6 thread sizes and .075" / 1.9 mm and greater with 5/16" / M8 threads.



See page 2 for "L"

PEMSERTER® Installation Tooling

UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part No.	Punch For Sheets	Part Number
		A	C			
	032	.216-.220	.191-.194	970200009300	.040" - .060"	8003707
	0420	.295-.300	.250-.253	970200010300		8003708
					For Sheets > .060"	
					For Sheets > .075"	
	0518	.334-.338	.3125-.3155	970200011300		8003709

METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part No.	Anvil Part No.	Punch Part Number
		A + 0.1	C + 0.08			
	M5	5.6	5.03	970200020300	For Sheets > 1.51 mm	8003710
	M6	6.6	6.03	970200230300	For Sheets 1 mm - 1.51 mm	8003711
					For Sheets > 1.9 mm	
	M8	8.6	8.03	970200231300	For Sheets 1.5 - 1.9 mm	8003712

INSTALLATION NOTES

- For best results we recommend using a PEMSERTER® press 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 select products](#).



FASTENERS FOR HARD PANELS

PERFORMANCE DATA⁽¹⁾

SH™ NUTS

UNIFIED	Thread Code	Shank Code	Test Sheet Thickness and Material (in.)	Sheet Hardness HRC	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)
	0420	1	.098" S700MC	23	11700	950	150
		2	.098" S700MC	23	12900	1000	170
	0518	1	.098" S700MC	23	12600	1050	265
2		.098" S700MC	23	12900	1100	265	
0616	1	.098" S700MC	23	15300	1200	500	

METRIC	Thread Code	Shank Code	Test Sheet Thickness and Material (mm)	Sheet Hardness HRC	Installation (kN)	Pushout (N)	Torque-out (N-m)
	M6	1	2.5 mm S700MC	23	52.1	4200	17
		2	2.5 mm S700MC	23	57.4	4500	19
	M8	1	2.5 mm S700MC	23	56.1	4600	30
2		2.5 mm S700MC	23	57.4	4900	30	
M10	1	2.5 mm S700MC	23	71.2	5400	56	

HFLH™ STUDS

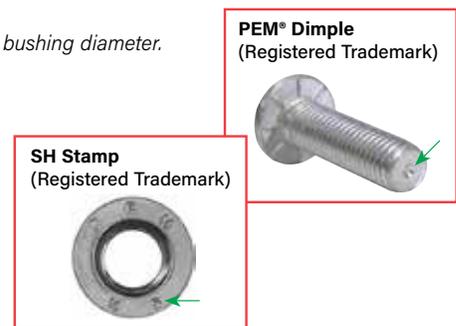
UNIFIED	Thread Code	Max. Nut Tightening Torque (ft. lbs.)	Test Sheet Thickness and Material (in.)	Sheet Hardness HRB	Installation (lbs.) (2)	Pushout (lbs.)	Torque-out (in. lbs.)	Tensile Strength (lbs.) (3)	Pull Thru (lbs.)	Test Bushing Hole Size For Pull Thru Tests
	032	3.25	.040" HC500LA	89	9500	300	60	2400	2200	.279
	0420	8	.040" HC500LA	89	13500	340	130	3820	3600	.335
	0518	16	.060" HC500LA	91	16000	575	290	6280	6400	.407

METRIC	Thread Code	Max. Nut Tightening Torque (N-m)	Test Sheet Thickness and Material (mm)	Sheet Hardness HRB	Installation (kN) (2)	Pushout (N)	Torque-out (N-m)	Tensile Strength (kN) (3)	Pull Thru (kN)	Test Bushing Hole Size For Pull Thru Tests
	M5	4.4	1 mm HC500LA	89	51.1	1350	8.1	12.8	10.6	7.4
	M6	10	1 mm HC500LA	89	60	1400	14.4	18.1	15.5	8.2
	M8	21.7	1.5 mm HC500LA	91	71.1	2400	33.9	32.9	27.5	10.3

(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) Installation controlled by proper cavity depth in punch.

(3) Head size is adequate to ensure failure in threaded area when tested with industry standard tensile bushing diameter.



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.

PennEngineering®



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