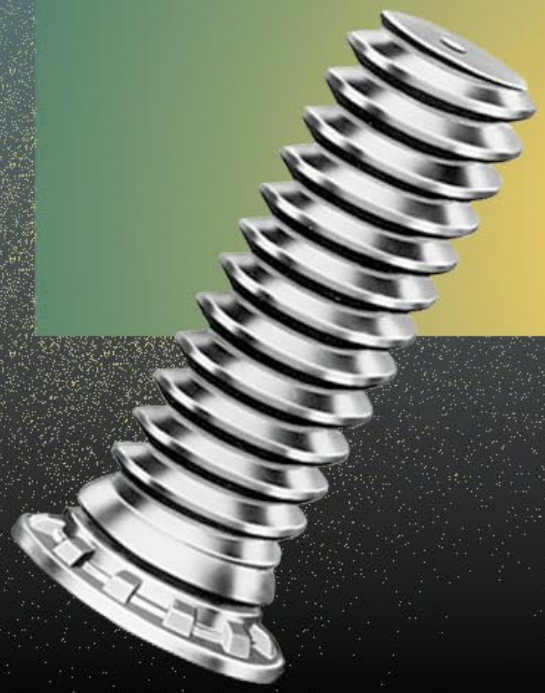
PEM®

Self-Clinching Studs and Pins

BULLETIN



FH

699

SELF-CLINCHING STUDS AND PINS

FH (flush-head) Studs are installed by placing them in punched or drilled holes in the sheets and squeezing into place with any standard press. The squeezing action embeds the head of the stud into the sheet. The metal displaced by the head flows smoothly and evenly around the ribs and into the annular groove – creating a flush-head assembly and securely locking the stud into the sheet with high torque-out and pushout resistances. **(See page FH-4)**

TFH (non-flush) Studs are for sheets as thin as .020 inches / 0.51 mm. They may also be used in thicker sheets where flush head studs are not required. TFH studs are installed in the sheets in the same manner as flush-head studs; however, different punches and anvils are required. When installed, the TFH stud will be securely locked into the thin sheet with ample torque-out and pushout resistances. The stud head will not be flush but will project above the sheet surface approximately .025 in. / 0.64 mm. **(See page FH-5)**

HFH (high-strength) Studs replace weld studs with easier installation at lower costs. The large stud head which projects above the sheet material distributes the axial tightening force over a large area thereby improving pull through resistance. **(See page FH-6)**

HFHB (BUSBAR®) Studs are ideal for applications which demand superior electrical/mechanical attachment points. Phosphor bronze studs offer twice the conductivity of carbon steel studs. **(See page FH-6)**

PEM AUTOSPEC® Dog Point Studs – Originally developed for the automotive industry, the dog point feature provides a lead-in during nut assembly, and protects the first thread of the stud during nut engagement.

For these and other applications, we now offer this dog point feature on our PEM® FH, HFH, and HFE self-clinching studs. This bulletin provides the dimensional data for our standard dog point configuration.

All PEM AUTOSPEC® studs are supplied with proper raw material and plating certifications as required by automotive industry standards. **(See page FH-7)**

FHL (low-displacement head) Studs install closer to the edge of a sheet than standard studs without causing that edge to bulge. Depending on thread size, Type FHL studs can be installed from 25% to 50% closer to the edge of a sheet than standard self-clinching studs. **(See page FH-8)**

FH4 (flush-head) Studs for Stainless Steel are designed to provide strong threads in stainless steel sheets as thin as .040" / 1 mm. These studs are made from 400 Series stainless steel and are designed for use in stainless steel sheets with a hardness of 92 or less on the Rockwell "B" scale. **(See page FH-9)**

TPS (flush-head) Pilot Pins satisfy a wide range of positioning, pivot, and alignment applications. The chamfered end makes mating hole location easy. **(See page FH-10)**

NEW!

HFE (high-strength) Studs are designed with an enlarged head diameter to provide high-strength in sheets as thin as .040" / 1 mm. **(See page FH-11)**

Flush-head Studs.

Thin Sheet Studs.

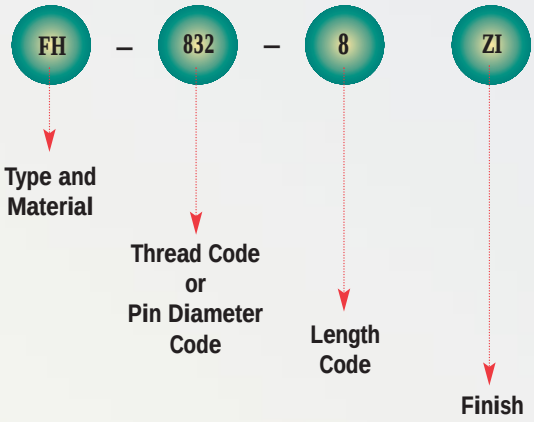
High-strength Studs.

Dog Point Studs.

Low-displacement Head Studs.

Flush-head Pins.

Part Number Designation



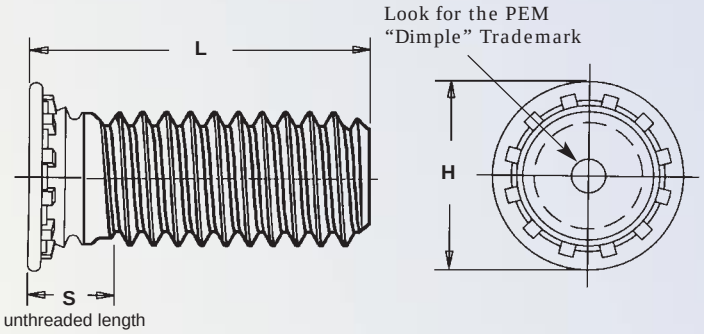
PEM Self-clinching Stud Selector Guide

PEM® Stud Type	Application Requires:									
	Flush-head	High-strength	Sheet thickness as thin as .020" / 0.51mm	High electrical conductivity	Mounting into stainless steel sheets	Compatibility with aluminum anodizing	High corrosion resistance	Reduced centerline-to-edge distance	Unthreaded	Lead-in for assembly ease
FH	•									
FHA	•					•	•			
FHD	•									•
FHL	•							•		
FHLS	•						•	•		
FHS	•						•			
FH4	•				•					
HFH		•								
HFHB				•						
HFHD		•								•
HFHS		•					•			
TFH			•							
TFHS			•				•			
TPS	•						•		•	•
HFE		•								
HFED		•								•

To be sure that your are getting genuine PEM® brand self-clinching studs, look for the "dimple" trademark. (Reg. Pat. & T.M. Off. of the U.S. and other countries.)

TYPE FH/FHS/FHA

- **Flush-head for sheet thickness of .040" / 1 mm and greater.**



All dimensions are in inches.

	Thread Size	Type			Thread Code	Length Code "L" ±.015 (Length Code in 16ths of an inch)										Min. Sheet Thick-ness	Hole Size in Sheet +.003 -.000	Max. Hole in Attach. Parts	H ± .015	S Max.	Min. Dist. Hole C/L to Edge
		Steel	Stainless Steel	Alu-minum		.250	.312	.375	.500	.625	.750	.875	1.00	1.25	1.50						
UNIFIED	.086-56 (#2-56)	FH	FHS	NA	256	4	5	6	8	10	12[NS]	NA	NA	NA	NA	.040	.085	.105	.144	.075	.187
	.112-40 (#4-40)	FH	FHS	FHA	440	4	5	6	8	10	12	14[NS]	16[NS]	NA	NA	.040	.111	.135	.176	.085	.219
	.138-32 (#6-32)	FH	FHS	FHA	632	4	5	6	8	10	12	14	16	20	24[NS]	.040	.137	.160	.206	.090	.250
	.164-32 (#8-32)	FH	FHS	FHA	832	4	5	6	8	10	12	14	16	20	24[NS]	.040	.163	.185	.237	.090	.281
	.190-24 (#10-24)	FH	FHS	FHA[NS]	024	NA	5[NS]	6	8	10	12	14	16	20	24[NS]	.040	.189	.210	.256	.100	.281
	.190-32 (#10-32)	FH	FHS	FHA	032	NA	5[NS]	6	8	10	12	14	16	20	24	.040	.189	.210	.256	.100	.281
	.250-20 (1/4-20)	FH	FHS	FHA	0420	NA	NA	6[NS]	8	10	12	14	16	20	24	.062	.249	.270	.337	.135	.312
	.313-18 (5/16-18)	FH	FHS	NA	0518	NA	NA	NA	8[NS]	10	12	14	16	20	24	.093	.311	.333	.376	.160	.375

All dimensions are in millimeters.

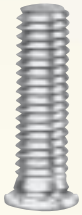
	Thread Size x Pitch	Type			Thread Code	Length Code "L" ±0.4 (Length Code in millimeters)										Min. Sheet Thick-ness	Hole Size in Sheet +0.08	Max. Hole in Attach. Parts	H ± 0.4	S Max.	Min. Dist. Hole C/L to Edge
		Steel	Stainless Steel	Alu-minum		6	8	10	12	15	18	20	25	30	35						
METRIC	M2.5x0.45	FH	FHS	FHA	M2.5	6[NS]	8[NS]	10[NS]	12[NS]	15[NS]	18[NS]	NA	NA	NA	NA	1	2.5	3.1	4.1	1.95	5.4
	M3x0.5	FH	FHS	FHA	M3	6[NS]	8	10	12	15	18	20[NS]	25[NS]	NA	NA	1	3	3.6	4.6	2.1	5.6
	M3.5x0.6	FH	FHS	FHA	M3.5[NS]	6	8	10	12	15	18	20	25	30	NA	1	3.5	4.1	5.3	2.25	6.4
	M4x0.7	FH	FHS	FHA	M4	6[NS]	8	10	12	15	18	20	25	30[NS]	35[NS]	1	4	4.6	5.9	2.4	7.2
	M5x0.8	FH	FHS	FHA	M5	NA	8[NS]	10	12	15	18	20	25	30[NS]	35[NS]	1	5	5.6	6.5	2.7	7.2
	M6x1	FH	FHS	FHA[NS]	M6	NA	NA	10	12	15	18	20	25	30	35	1.6	6	6.6	8.2	3	7.9
	M8x1.25	FH	FHS	NA	M8	NA	NA	NA	12[NS]	15	18	20	25	30	35	2.4	8	8.6	9.6	3.7	9.6

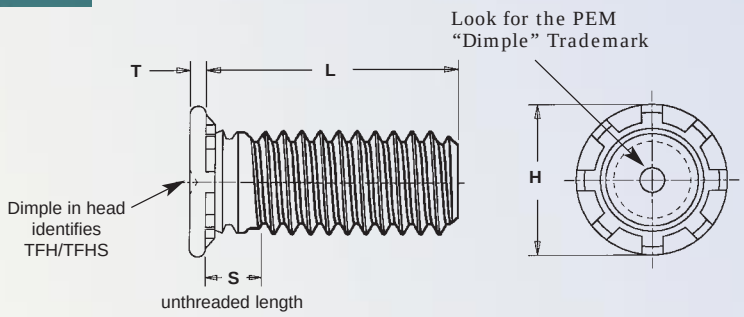
NS *Not Stocked, available on special order.*

NA *Not Available.*

TYPE TFH/TFHS

- **Non-flush for sheets as thin as .020" / 0.51 mm.**





All dimensions are in inches.

	Thread Size	Type		Thread Code	Length Code "L" ±.015 (Length Code in 16ths of an inch)										Min. Sheet Thick-ness	Hole Size in Sheet +.003 -.000	Max. Hole in Attach. Parts	H ±.015	S Max.	T Max.	Min. Dist. Hole C/L to Edge
		Steel	Stainless Steel		.250	.312	.375	.500	.625	.750	.875	1.00	1.25	1.50							
UNIFIED	.086-56 (#2-56)	TFH	TFHS	256	4[NS]	5[NS]	6[NS]	8[NS]	10[NS]	12[NS]	NA	NA	NA	NA	.020	.085	.105	.141	.070	.025	.187
	.112-40 (#4-40)	TFH	TFHS	440	4	5	6	8	10	12	14[NS]	NA	NA	NA	.020	.111	.135	.176	.070	.025	.219
	.138-32 (#6-32)	TFH	TFHS	632	4	5	6	8	10	12	14[NS]	16[NS]	20[NS]	24[NS]	.020	.137	.160	.203	.070	.025	.250
	.164-32 (#8-32)	TFH	TFHS	832	4	5	6	8	10	12	14[NS]	16[NS]	20[NS]	24[NS]	.020	.163	.185	.234	.070	.025	.281
	.190-24 (#10-24)	TFH	TFHS	024[NS]	NA	5	6	8	10	12	14	16	20	24	.020	.189	.210	.250	.090	.025	.281
	.190-32 (#10-32)	TFH	TFHS	032	NA	5[NS]	6[NS]	8	10	12	14	16[NS]	20[NS]	24[NS]	.020	.189	.210	.250	.090	.025	.281

All dimensions are in millimeters.

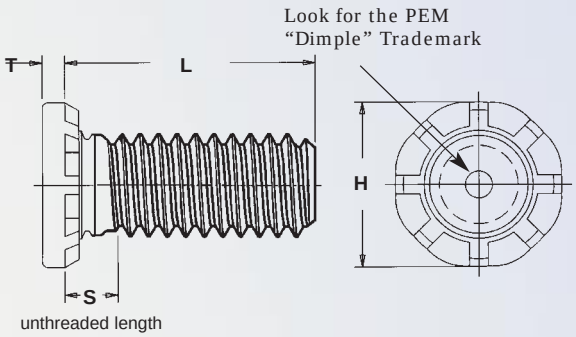
	Thread Size x Pitch	Type		Thread Code	Length Code "L" ±0.4 (Length Code in millimeters)										Min. Sheet Thick-ness	Hole Size in Sheet +0.08	Max. Hole in Attach. Parts	H ±0.4	S Max.	T Max.	Min. Dist. Hole C/L to Edge
		Steel	Stain-less Steel																		
METRIC	M3x0.5	TFH	TFHS	M3	6	8	10	12	15	18	20[NS]	25[NS]	NA	NA	0.51	3	3.6	4.5	1.8	0.64	5.6
	M4x0.7	TFH	TFHS	M4	NA	8[NS]	10	12	15	18	20[NS]	25[NS]	30[NS]	35[NS]	0.51	4	4.6	5.8	1.8	0.64	7.2
	M5x0.8	TFH	TFHS	M5	NA	8[NS]	10	12	15	18	20[NS]	25[NS]	30[NS]	35[NS]	0.51	5	5.6	6.4	2.3	0.64	7.2

NS *Not Stocked, available on special order.*

NA *Not Available.*

TYPE HFH/HFHS/HFHB

- For high-strength applications in sheets as thin as .050" / 1.3 mm.
- Type HFHB for superior electrical/ mechanical attachment in copper.



All dimensions are in inches.

	Thread Size	Type			Thread Code	Length Code "L" ±.015 (Length Code in 16ths of an inch)							Min. Sheet Thick-ness	Hole Size in Sheet +.005 -.000	Max. Hole in Attach. Parts	H ±.01	S Max.	T Max.	Min. Dist. Hole C/L to Edge
		Steel	Stainless Steel	Phosphor Bronze(1)		.500	.750	1.00	1.25	1.50	1.75	2.00							
UNIFIED	.190-32 (#10-32)	HFH	HFHS	HFHB	032	8[NS]	12	16	20	24[NS]	28[NS]	32[NS]	.050	.190	.250	.300	.105	.040	.415
	.250-20 (1/4-20)	HFH	HFHS	HFHB	0420	8[NS]	12	16	20	24[NS]	28[NS]	32[NS]	.060	.250	.312	.380	.125	.050	.460
	.313-18 (5/16-18)	HFH	HFHS	HFHB	0518	8[NS]	12	16	20	24	28[NS]	32[NS]	.075	.312	.375	.480	.140	.070	.500
	.375-16 (3/8-16)	HFH	HFHS	HFHB	0616	NA	12	16	20	24	28[NS]	32[NS]	.090	.375	.437	.580	.155	.085	.530

Thread strength: HFH - 120 ksi / HFHS - 75 ksi / HFHB - 60 ksi

All dimensions are in millimeters.

	Thread Size x Pitch	Type			Thread Code	Length code "L" ±0.4 (Length Code in millimeters)							Min. Sheet Thick-ness	Hole Size in Sheet +0.13	Max. Hole in Attach. Parts	H ±0.25	S Max.	T Max.	Min. Dist. Hole C/L to Edge
		Steel	Stainless Steel	Phosphor Bronze(1)															
METRIC	M5x0.8	HFH	HFHS	HFHB	M5	15[NS]	20	25[NS]	30	35[NS]	40[NS]	50[NS]	1.3	5	6.5	7.8	2.7	1.14	10.7
	M6x1	HFH	HFHS	HFHB	M6	15*	20	25[NS]	30	35[NS]	40[NS]	50[NS]	1.5	6	7.5	9.4	2.8	1.27	11.5
	M8x1.25	HFH	HFHS	HFHB	M8	15[NS]	20	25[NS]	30	35[NS]	40[NS]	50[NS]	2	8	9.5	12.5	3.5	1.78	12.7
	M10x1.5	HFH	HFHS	HFHB[NS]	M10	15[NS]	20	25[NS]	30	35[NS]	40[NS]	50[NS]	2.3	10	11.5	15.7	4.1	2.29	13.7

Thread strength: HFH - 900 MPa / HFHS - 515 MPa / HFHB - 415 MPa

NS *Not Stocked, available on special order.*

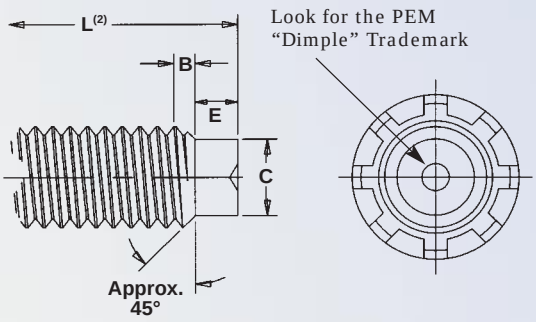
NA *Not Available.*

(1) *The electrical resistance (tested at 10 amps DC) between phosphor bronze studs and copper busbars is below 104µ ohms and 62µ ohms for the #10-32 / M5 and 3/8-16 / M10 thread sizes respectively, after repeated thermal and mechanical cycling. Consult our Marketing department for complete electrical resistance test data for type HFHB studs installed in copper.*

***** *Type HFHB-M6-15 is only available on special order.*

PEM® Dog Point(1) Standard Dimensions

To specify a PEM® AUTOSPEC® dog point stud, choose either Type FH (flush-head), Type HFH or HFE (high-strength) style studs of the appropriate thread size and length, then add a "D" (for dog point) to the Type prefix. If a stainless steel stud is required, an "S" also must be added to the Type designation as shown in the example.



All dimensions are in inches.

	Thread Size	C ±.005 (3)	E ±.010	B Nom. Transitional Length to Full Thread
UNIFIED	.138-32 (#6-32)	.086	.050	.098
	.164-32 (#8-32)	.111	.055	.099
	.190-24 (#10-24)	.124	.065	.127
	.190-32 (#10-32)	.138	.065	.098
	.250-20 (1/4-20)	.173	.085	.149
	.250-28 (1/4-28)	.192	.085	.110
	.313-18 (5/16-18)	.228	.105	.164
	.313-24 (5/16-24)	.246	.105	.127
	.375-16 (3/8-16)	.282	.125	.182
	.375-24 (3/8-24)	.309	.125	.126

All dimensions are in millimeters.

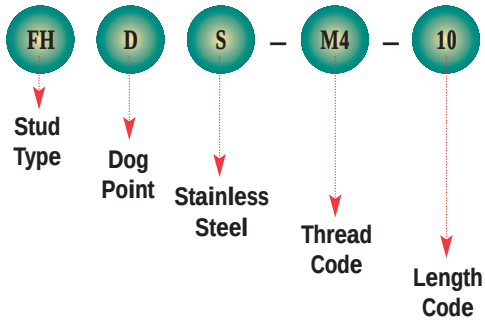
	Thread Size x Pitch	C ±0.13 (3)	E ±0.25	B Nom. Transitional Length to Full Thread
METRIC	M3.5 x 0.6	2.4	1.27	1.88
	M4 x 0.7	2.79	1.4	2.26
	M5 x 0.8	3.66	1.78	2.48
	M6 x 1	4.37	2.03	3.05
	M8 x 1.25	6.05	2.67	3.73
	M10 x 1.5	7.72	3.43	4.37

(1) *PEM studs with dog point feature are a non-stocked standard*

(2) *For "L" refer to type FH, HFE, or HFH lengths.*

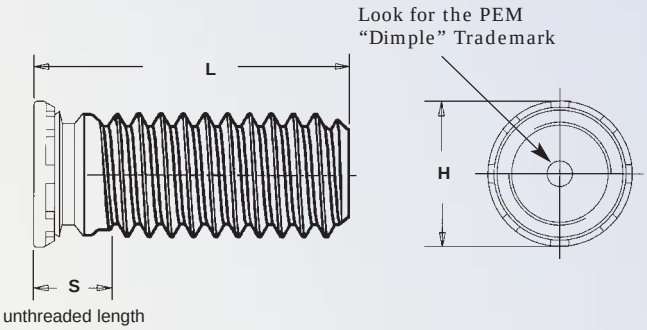
(3) *Maximum dog point diameter is .003" / 0.08 mm less than minimum minor diameter of 2B or 6g nut threads.*

Part Number Designation



TYPE FHL/FHLS™

- Installs closer to the edge of a sheet than standard studs with out causing that edge to bulge.
- Flush-head for sheet thickness .040" / 1 mm and greater.



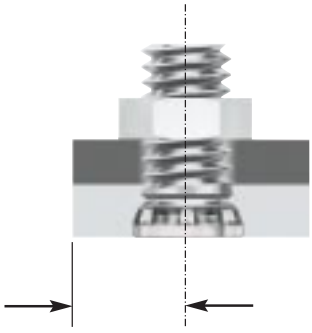
All dimensions are in inches.

	Thread Size	Type		Thread Code	Length Code "L" ±.015 (Length Code in 16ths of an inch)										Min. Sheet Thick-ness	Hole Size in Sheet +.003 -.000	Max. Hole in Attach. Parts	H ±.015	S Max.	Min. Dist. Hole C/L to Edge
		Steel	Stainless Steel		.250	.312	.375	.500	.625	.750	.875	1.00	1.25	1.50						
UNIFIED	.086-56 (#2-56)	FHL	FHLS	256	4	5	6	8	10	12	NA	NA	NA	NA	.040	.085	.100	.112	.080	.098
	.112-40 (#4-40)	FHL	FHLS	440	4	5	6	8	10	12	14	16	NA	NA	.040	.111	.125	.138	.085	.124
	.138-32 (#6-32)	FHL	FHLS	632	4	5	6	8	10	12	14	16	20	24	.040	.137	.150	.164	.090	.150
	.164-32 (#8-32)	FHL	FHLS	832	4	5	6	8	10	12	14	16	20	24	.040	.163	.180	.190	.090	.176
	.190-32 (#10-32)	FHL	FHLS	032	NA	5	6	8	10	12	14	16	20	24	.040	.189	.205	.225	.100	.210

All dimensions are in millimeters.

	Thread Size x Pitch	Type		Thread Code	Length Code "L" ±0.4 (Length Code in millimeters)										Min. Sheet Thick-ness	Hole Size in Sheet +0.08	Max. Hole in Attach. Parts	H ±0.4	S Max.	Min. Dist. Hole C/L to Edge
		Steel	Stainless Steel																	
METRIC	M2.5x0.45	FHL	FHLS	M2.5	6	8	10	12	15	18	NA	NA	NA	NA	1	2.5	2.9	3.15	2.1	2.8
	M3x0.5	FHL	FHLS	M3	6	8	10	12	15	18	20	25	NA	NA	1	3	3.4	3.65	2.1	3.3
	M3.5x0.6	FHL	FHLS	M3.5	6	8	10	12	15	18	20	25	30	NA	1	3.5	3.9	4.15	2.3	3.8
	M4x0.7	FHL	FHLS	M4	6	8	10	12	15	18	20	25	30	35	1	4	4.4	4.65	2.4	4.3
	M5x0.8	FHL	FHLS	M5	NA	8	10	12	15	18	20	25	30	35	1	5	5.4	5.9	2.7	5.6

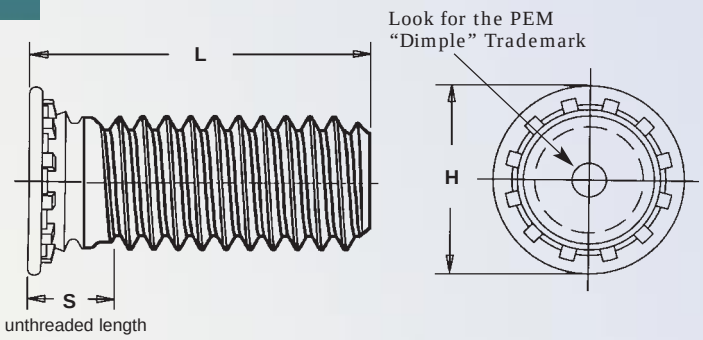
NA *Not Available.*



Depending on thread size, Type FHL studs can be installed from 25% to 50% closer to the edge of a sheet than standard self-clinching studs.

TYPE FH4™

- Permanent installation into stainless steel sheets as thin as .040" / 1 mm.
- For use in sheet hardness of 92 or less on the Rockwell "B" scale.



All dimensions are in inches.

	Thread Size	Type	Thread Code	Length Code "L" ±.015 (Length code in 16ths of an inch) .250	.312	.375	.500	.625	.750	.875	1.00	1.25	1.50	Sheet Thick-ness	Hole Size in Sheet +.003 -.000	Max. Hole in Attach. Parts	H ±.015	S Max.	Min. Dist. Hole C/L to Edge
UNIFIED	.112-40 (#4-40)	FH4	440	4	5	6	8	10	12[NS]	14[NS]	16[NS]	NA	NA	.040-.095	.111	.135	.176	.085	.219
	.138-32 (#6-32)	FH4	632	4	5	6	8	10	12	14	16	20	24[NS]	.040-.095	.137	.160	.206	.090	.250
	.164-32 (#8-32)	FH4	832	4	5	6	8	10	12	14	16	20	24[NS]	.040-.095	.163	.185	.237	.090	.281
	.190-32 (#10-32)	FH4	032	NA	5[NS]	6	8	10	12	14	16	20	24	.040-.095	.189	.210	.256	.100	.281

All dimensions are in millimeters.

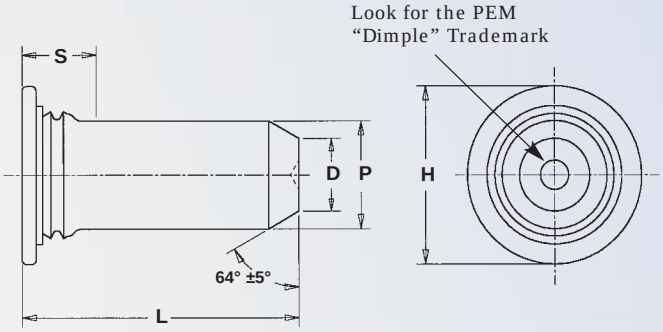
	Thread Size x Pitch	Type	Thread Code	Length Code "L" ±0.4 (Length Code in millimeters) 6[NS]	8	10	12	15	18	20[NS]	25[NS]	NA	NA	Sheet Thick-ness	Hole Size in Sheet +0.08	Max. Hole in Attach. parts	H ±0.4	S Max.	Min. Dist. Hole C/L to Edge
METRIC	M3 x 0.5	FH4	M3	6[NS]	8	10	12	15	18	20[NS]	25[NS]	NA	NA	1 - 2.4	3	3.6	4.6	2.1	5.6
	M4 x 0.7	FH4	M4	6[NS]	8	10	12	15	18	20	25	30[NS]	35[NS]	1 - 2.4	4	4.6	5.9	2.4	7.2
	M5 x 0.8	FH4	M5	NA	8[NS]	10	12	15	18	20	25	30[NS]	35[NS]	1 - 2.4	5	5.6	6.5	2.7	7.2

NS *Not Stocked, available on special order.*

NA *Not Available.*

TYPE TPS™

- Flush-mounted, self-clinching pilot pins.
- Satisfies a wide range of positioning, pivot, and alignment applications.
- Chamfered end makes mating hole location easy.



All dimensions are in inches.

	Pin Diameter P ±.002	Type	Pin Diameter Code	Length Code "L" ± .015 (Length Code in 16ths of an inch)					Min. Sheet Thickness	Hole Size in Sheet +.003 -.000	D ±.006	H ±.015	S Max. (1)	Min. Distance Hole C/L to Edge
				.375	.500	.625	.750	1.00						
UNIFIED	.125	TPS	125	6	8	10	12	NA	.040	.144	.090	.205	.090	.250
	.187	TPS	187	6	8	10	12	16	.040	.205	.132	.270	.090	.280
	.250	TPS	250	NA	8	10	12	16	.040	.272	.177	.335	.090	.310

All dimensions are in millimeters.

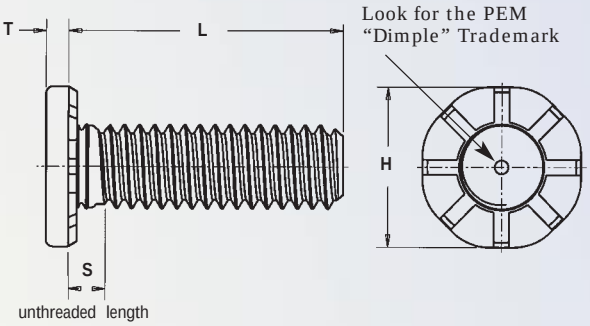
	Pin Diameter P ±0.05	Type	Pin Diameter Code	Length Code "L" ± 0.4 (Length Code in millimeters)					Min. Sheet Thickness	Hole Size in Sheet +0.08	D ±0.15	H ±0.4	S Max. (1)	Min. Distance Hole C/L to Edge
METRIC	3	TPS	3mm	8	10	12	16	NA	1	3.5	2.05	5.2	2.29	6.4
	4	TPS	4mm	8	10	12	16	NA	1	4.5	2.82	6.12	2.29	7.1
	5	TPS	5mm	NA	10	12	16	20	1	5.5	3.53	7.19	2.29	7.6
	6	TPS	6mm	NA	NA	12	16	20	1	6.5	4.24	8.13	2.29	7.9

(1) *Pin diameter may exceed max. in this region.*

NA *Not Available.*

TYPE HFE™

- **Enlarged head diameter provides high-strength in sheets as thin as .040" / 1 mm.**



All dimensions are in inches.

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

Thread strength: 120 ksi

All dimensions are in millimeters.

	Thread Code x Pitch	Type	Thread Code	Length Code "L" ±.0.4 (Length Code in Millimeters)							Min. Sheet Thickness	Hole Size In Sheet +0.13	H ±0.25	S Max.	T Max.	Max. Hole In Attached Parts	Min. Dist. Hole C/L To Edge
METRIC	M5 x 0.8	HFE	M5	15[NS]	20	25[NS]	30	35[NS]	40[NS]	50[NS]	1	5	9.6	2.6	1.35	7.3	10
	M6 x 1	HFE	M6	15[NS]	20	25[NS]	30	35[NS]	40[NS]	50[NS]	1	6	11.35	2.8	1.52	8.3	11.5
	M8 x 1.25	HFE	M8	15[NS]	20	25[NS]	30	35[NS]	40[NS]	50[NS]	1.5	8	15.3	3.3	2.13	10.3	14.5

Thread strength: 900 MPa

NS *Not Stocked, available on special order.*

MATERIAL & FINISH SPECIFICATIONS

	Threads*	Fastener Materials					Standard Finishes			Optional Finish[1]	Sheet Hardness Maximum on the Rockwell "B" Scale:					
Type	External, ANSI B1.1, 2A ANSI/ASME B1.13M, 6g	Heat-Treated Carbon Steel	300 Series Stainless Steel	2024-T4 Aluminum (Plain Finish)	CDA #510 Phosphor Bronze (2)	400 Series Stainless Steel	No Finish (3) (4)	Zinc Per ASTM B 633 SC1 (5µm), Type III, Colorless	Passivated and/or Tested Per ASTM A380	Zinc Per ASTM B 633 SC1 (5µm), Type II, Yellow	50 or less	55 or less	70 or less	80 or less	85 or less	92 or less
FH	•	•					•	•		•				•		
FHS	•		•						•				•			
FHA	•			•			•				•					
FH4	•					•			•							•
FHL	•	•						•						•		
FHLS	•		•						•				•			
TFH	•	•						•		•				•		
TFHS	•		•						•				•			
HFH	•	•					•	•		•					•	
HFHB	•				•		•					•				
HFHS	•		•						•				•			
TPS			•						•				•			
HFE	•	•						•		•					•	
Part Number Codes for Finishes							X	ZI	None	ZC						

(1) *Special order with additional charge.*

(2) *Material properties – yield strength: 50,000 psi (345 MPa), tensile strength: 63,000 psi (434 MPa).*

(3) *Part numbers for aluminum studs have no plating suffix.*

(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" of plating.*

* *For plated studs, Class 2A/6g, the maximum major and pitch diameter, after plating, may equal basic sizes and be gauged to Class 3A/4h. Per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, paragraph 8.2.*

INSTALLATION

For Types FH, FHS, FHA, FHL, FHLS, TFH, TFHS, HFH, HFHB, HFHS and HFE studs

PEM brand self-clinching studs are installed by placing them in punched or drilled holes in the sheet material and squeezing them into place with any standard press.

All that is required is a flat or recessed punch and a plain anvil having a hole to clear the thread diameter so that force is applied between the top of the stud head and underside of the sheet material. The squeezing action forces the ribs of the stud into the sheet, displacing sheet material, causing it to fill the annular groove under the head of the stud.

The following information provides specifics with regard to stud installation.

All dimensions are in inches.

	Thread Code	Anvil Dimensions	
		A	C
UNIFIED	256	.110-.114	.087-.090
	440	.136-.140	.113-.116
	632	.162-.166	.139-.142
	832	.188-.192	.165-.168
	024 & 032	.216-.220	.191-.194
	0420	.295-.300	.250-.253
	0518	.334-.338	.3125-.3155
	0616	–	.375-.378

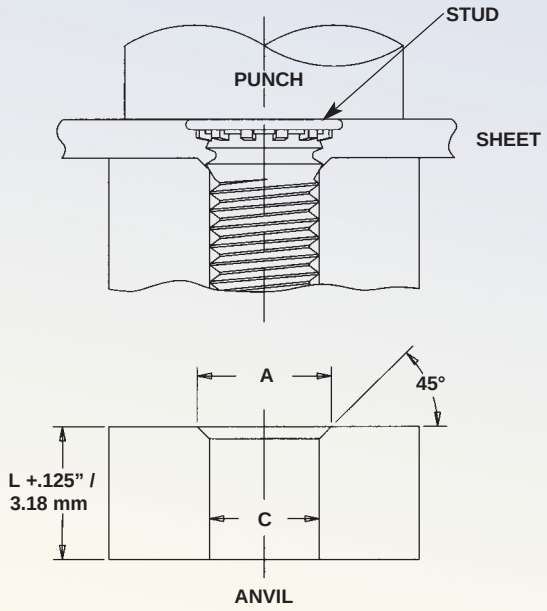
All dimensions are in millimeters.

	Thread Code	Anvil Dimensions	
		A + 0.1	C + 0.08
METRIC	M2.5	3.1	2.53
	M3	3.6	3.03
	M3.5	4.1	3.53
	M4	4.6	4.03
	M5	5.6	5.03
	M6	6.6	6.03
	M8	8.6	8.03
	M10	–	10.03

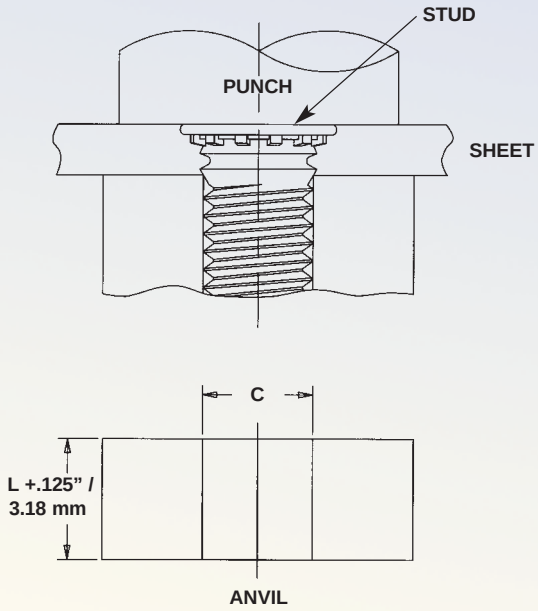
Type FH/FHS/FHA (Flush) Studs

The two sketches below indicate suggested tooling for applying installation forces. 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, 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 #2 thru #10 / M3 thru M5 thread sizes and less than .093" / 2.4 mm for 1/4" / M6 threads.



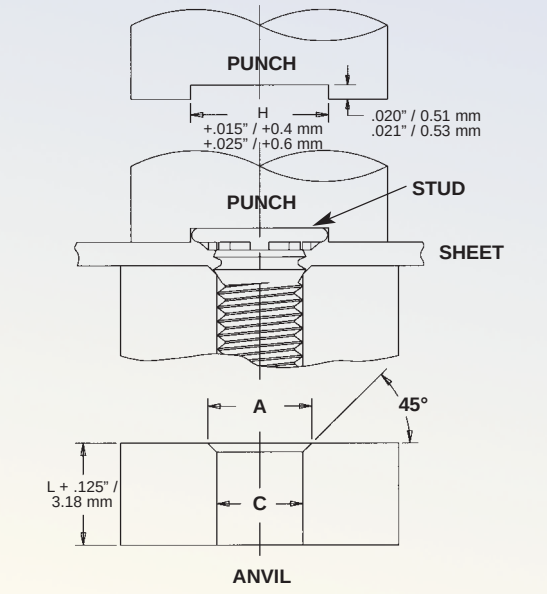
Tooling for sheet thicknesses .060" / 1.51 mm and greater with #2 thru #10 / M3 thru M5 thread sizes and .093" / 2.41 mm and greater for 1/4" and 5/16" / M6 and M8 threads.



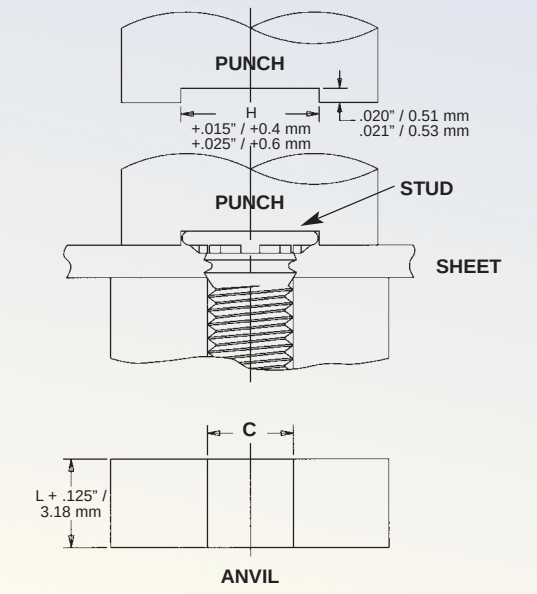
Type TFH/TFHS (Non-Flush) Studs

The sketches below indicate suggested tooling for type TFH studs. Note that for sheets .030" / 0.76 mm and thicker, the anvil requires only a straight thru hole to accommodate the stud. For sheets less than .030" / 0.76 mm down to .020" / 0.51 mm, the hole requires a countersink with dimension A at the top to provide for metal flow around the shank of the stud. The standard punch design below provides clearance for the stud head and reduces chances of over squeezing the head of the stud into the sheet metal. When installed, the stud head is not flush but will protrude approximately .025" / 0.64 mm.

Tooling for sheet thicknesses less than .030" / 0.76 mm down to .020" / 0.51 mm.



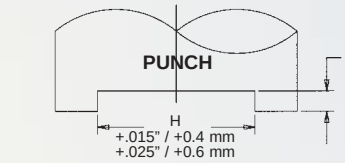
Tooling for sheet thicknesses .030" / 0.76 mm and greater.



Type HFH/HFHB/HFHS Studs

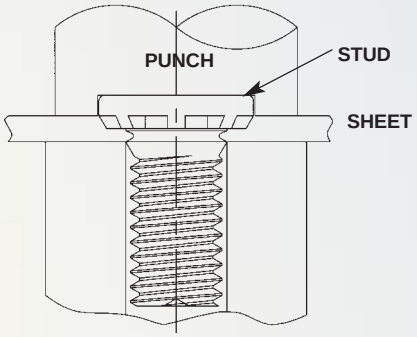
Apply squeezing force on the punch sufficient only to embed the ribs on the head of the stud into the sheet.

The sketches below indicate suggested tooling for Type HFH self-clinching studs. The standard punch design provides clearance for the stud head and reduces chances of over squeezing.



Counterbore Depth

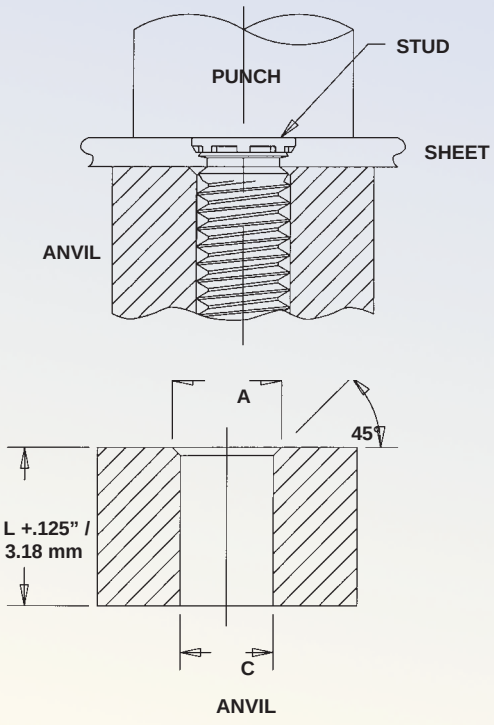
.035" - .036"	(032)	0.94 mm - 0.96 mm (M5)
.045" - .046"	(0420)	1.14 mm - 1.16 mm (M6)
.063" - .064"	(0518)	1.62 mm - 1.64 mm (M8)
.077" - .078"	(0616)	2.1 mm - 2.12 mm (M10)



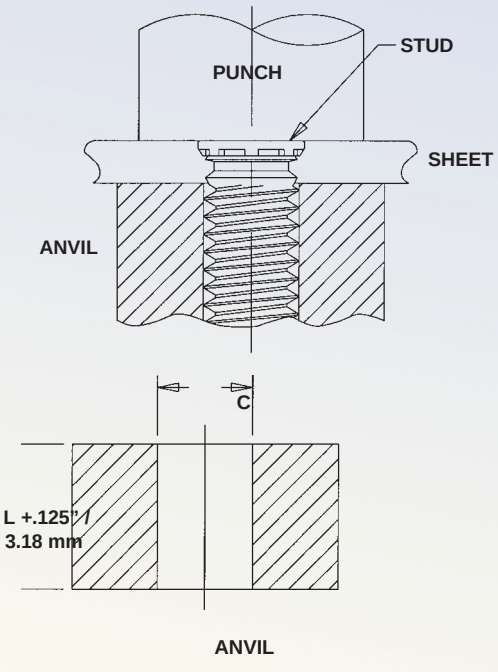
Type FHL/FHLS Studs

The two sketches below indicate suggested tooling for applying installation forces. 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, 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.



Tooling for sheet thicknesses .060" / 1.51 mm and greater.



Type FH4 Self-Clinching Studs for Stainless Steel

For Type FH4 studs, a special anvil with a raised ring is required to create a proper installation. The raised ring acts as a second displacer of the stainless sheet material, thereby ensuring that the annular groove is filled. We do not recommend the use of FH4 studs in sheet thicknesses greater than .095" / 2.41 mm.

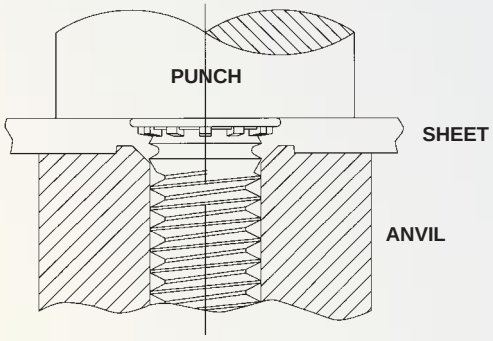
The special anvils are available from PEM stock or can be machined from suitable tool steel. A hardness of Rc55 minimum is required to provide long anvil life. We recommend measuring the "P" dimension every 5000 installations to ensure that the anvil remains within specification.

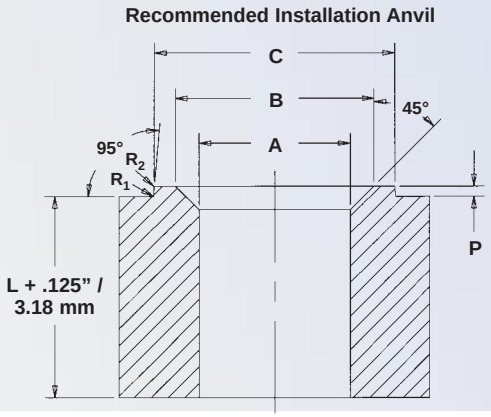
All dimensions are in inches.

	Thread Code	Anvil Dimensions						Anvil Part No.
		A +.003 -.000	B ±.002	C ±.002	P ±.001	R_1 Max.	R_2 Max.	
UNIFIED	440	.113	.144	.174	.010	.003	.005	8001645
	632	.140	.170	.200	.010	.003	.005	8001644
	832	.166	.202	.236	.010	.003	.005	8001643
	032	.191	.235	.275	.010	.003	.005	8001642

All dimensions are in millimeters.

	Thread Code	Anvil Dimensions						Anvil Part No.
		A +0.08	B ±0.05	C ±0.05	P ±.025	R_1 Max.	R_2 Max.	
METRIC	M3	3.05	3.81	4.57	0.25	0.08	0.13	8001678
	M4	4.04	4.95	5.82	0.25	0.08	0.13	8001677
	M5	5.08	6.15	7.16	0.25	0.08	0.13	8001676





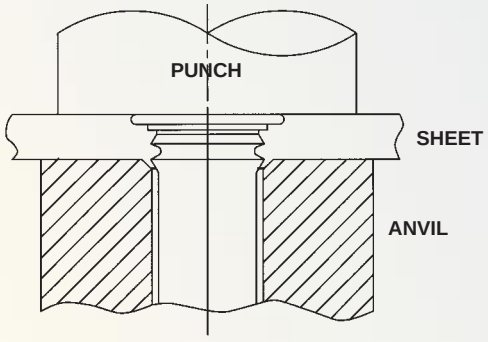
For Type TPS Flush-Mounted, Self-Clinching Pilot Pins

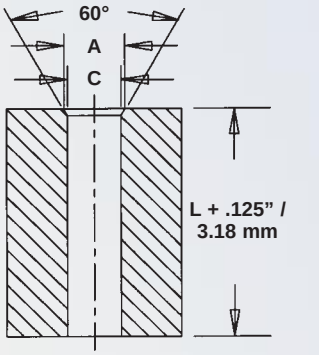
All dimensions are in inches.

	Pin Dia. Code	Sheet Thickness	Anvil Dimensions	
			A ±.002	C ±.002
UNIFIED	125	.040 - .060	.160	.130
		Over .060	(1)	
	187	.040 - .065	.220	.192
		Over .065	(1)	
	250	.040 - .075	.285	.255
		Over .075	(1)	

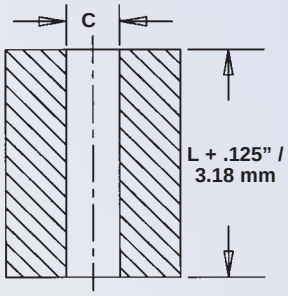
All dimensions are in millimeters.

	Pin Dia. Code	Sheet Thickness	Anvil Dimensions	
			A ±0.05	C ±0.05
METRIC	3mm	1 - 1.7	3.88	3.11
		Over 1.7	(1)	
	4mm	1 - 1.7	4.88	4.11
		Over 1.7	(1)	
	5mm	1 - 1.8	5.89	5.13
		Over 1.8	(1)	
	6mm	1 - 1.9	6.89	6.12
		Over 1.9	(1)	





Recommended tooling when a chamfered anvil is required.



Recommended tooling when a chamfered anvil is not required.

(1) *Chamfered anvil not required.*

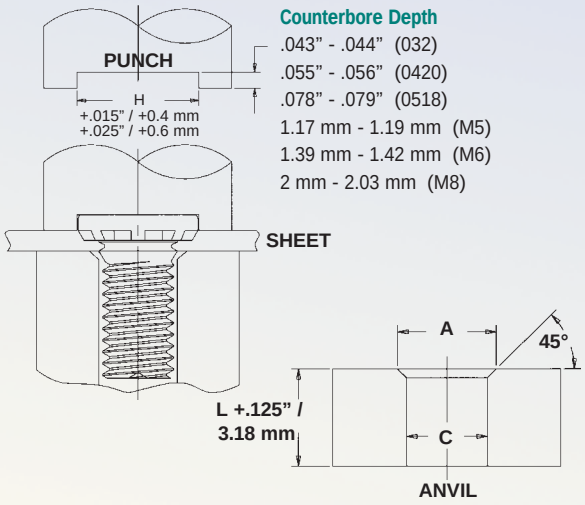
PEMSERTER® PRESSES

For best results we recommend using a PEMSERTER® press for either manual or automatic installation of PEM FH, FHS, FHA, FHL, FHLS, FH4, TFH, TFHS, HFH, HFHB, HFHS and TPS fasteners. For more information on our line of presses call 1-800-523-5321 (USA only).

Type HFE Studs

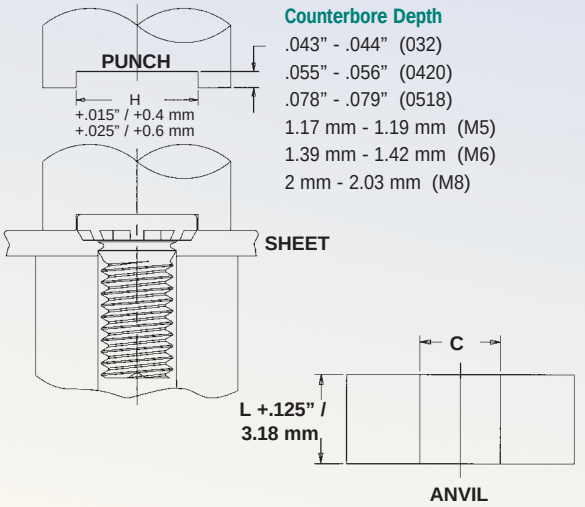
The two sketches below indicate suggested tooling for applying installation forces. Note that for sheets .060" / 1.51 mm and thicker, the anvil requires only a straight thru hole to accommodate the stud. For sheets less than .060" / 1.51 mm to less than .075" / 1.9 mm, the hole requires a countersink 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.



Counterbore Depth
.043" - .044" (032)
.055" - .056" (0420)
.078" - .079" (0518)
1.17 mm - 1.19 mm (M5)
1.39 mm - 1.42 mm (M6)
2 mm - 2.03 mm (M8)

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.



Counterbore Depth
.043" - .044" (032)
.055" - .056" (0420)
.078" - .079" (0518)
1.17 mm - 1.19 mm (M5)
1.39 mm - 1.42 mm (M6)
2 mm - 2.03 mm (M8)

PERFORMANCE DATA

The pushout, torque-out, and pull thru values reported here pertain only to the holding power of the stud to the sheet into which it is installed. These values in no way pertain to the axial strength of the threads, allowable tightening torque or design loading of an assembly. The values reported are anticipated ***destructive averages*** *when all installation specifications and procedures are followed. When properly installed, PEM self-clinching studs should perform better than the values given here.*

Type FH and FHS Flush-Head Studs

	Thread Code	Max. Nut Tightening Torque (in. lbs.)[1]	Type	Sheet Thickness and Sheet Material	Sheet Hardness HRB	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)	Pull Thru (lbs.)
UNIFIED	256	2.3	FH	.062" Aluminum	29	2000	145	6	460
			FHS	.062" Aluminum	29	2000	145	5	333
			FH	.060" Steel	59	2500	250	6	460
			FHS	.060" Steel	59	2500	250	5	333
	440	5	FH	.064" Aluminum	29	3800	200	11	750
			FHS	.064" Aluminum	29	3200	200	10	550
			FH	.060" Steel	59	4300	280	11	750
			FHS	.060" Steel	59	4700	280	10	550
	632	9	FH	.064" Aluminum	29	3800	220	19	1050
			FHS	.064" Aluminum	29	3500	220	19	820
			FH	.060" Steel	59	4700	350	25	1180
			FHS	.060" Steel	59	5000	350	19	820
	832	17	FH	.064" Aluminum	29	4800	290	32	1220
			FHS	.064" Aluminum	29	4500	290	30	1150
			FH	.060" Steel	59	6800	400	45	1510
			FHS	.060" Steel	59	5500	400	35	1260
	032	27	FH	.064" Aluminum	29	5500	330	38	1400
			FHS	.064" Aluminum	29	5500	330	40	1430
	024	24	FH	.060" Steel	59	7500	500	60	1740
			FHS	.060" Steel	59	6800	500	50	1570
	0420	58	FH	.093" Aluminum	28	6500	500	80	2800
			FHS	.093" Aluminum	28	6500	450	90	2600
			FH	.088" Steel	46	9500	700	120	3600
			FHS	.088" Steel	46	10000	700	120	2860
	0518	120	FH	.093" Aluminum	28	6500	550	110	2950
			FHS	.093" Aluminum	28	6700	550	140	2800
			FH	.093" Steel	46	10000	850	200	4300
			FHS	.093" Steel	46	11200	850	200	3800

(1) *Maximum recommended tightening torques for aluminum studs are 60 percent of these values.*

Type FH and FHS Flush-Head Studs (Continued)

	Thread Code	Max. Nut Tightening Torque (N•m)[1]	Type	Sheet Thickness and Sheet Material	Sheet Hardness HRB	Installation (kN)	Pushout (N)	Torque-out (N•m)	Pull Thru (N)
METRIC	M2.5	0.41	FH	1.6 mm Aluminum	29	8.9	625	1.1	2880
			FHS	1.6 mm Aluminum	29	11.6	625	0.9	2070
			FH	1.5 mm Steel	59	11.1	1025	1.1	2880
			FHS	1.5 mm Steel	59	13.8	1025	0.9	2070
	M3	0.74	FH	1.6 mm Aluminum	29	12.9	890	1.7	3700
			FHS	1.6 mm Aluminum	29	12.9	890	1.3	3070
			FH	1.5 mm Steel	59	14.7	1250	1.7	4200
			FHS	1.5 mm Steel	59	14.7	1250	1.3	3070
	M3.5	1.15	FH	1.6 mm Aluminum	29	15.6	980	2.1	4500
			FHS	1.6 mm Aluminum	29	15.6	980	2.1	4140
			FH	1.5 mm Steel	59	22.3	1550	2.8	5560
			FHS	1.5 mm Steel	59	22.3	1550	2.1	4140
	M4	1.7	FH	1.6 mm Aluminum	29	20	1290	3.6	5340
			FHS	1.6 mm Aluminum	29	22.3	1290	3.4	5250
			FH	1.5 mm Steel	59	28.9	1780	5.1	6540
			FHS	1.5 mm Steel	59	26.7	1780	3.9	5340
	M5	3.5	FH	1.6 mm Aluminum	29	24.5	1470	4.5	6230
			FHS	1.6 mm Aluminum	29	24.5	1470	4.5	5860
			FH	1.5 mm Steel	59	33.4	2440	7.3	7560
			FHS	1.5 mm Steel	59	32.5	2440	7.3	7380
	M6	5.9	FH	2.4 mm Aluminum	28	28.9	2000	9	12680
			FHS	2.4 mm Aluminum	28	28.9	2000	8.4	11200
			FH	2.2 mm Steel	46	44.5	3110	13.6	16600
			FHS	2.2 mm Steel	46	44.5	3110	12.4	12300
	M8	14.2	FH	2.4 mm Aluminum	28	29.8	2440	15.8	12400
			FHS	2.4 mm Aluminum	28	29.8	2440	15.8	11800
			FH	2.4 mm Steel	46	44.5	3780	21.5	19100
			FHS	2.4 mm Steel	46	49.8	3780	21.5	16950

Type TFH and TFHS Non-Flush Studs

	Thread Code	Max. Nut Tightening Torque (in. lbs.)	Type	Sheet Thickness and Sheet Material	Sheet Hardness HRB	(2) Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)
UNIFIED	440	5	TFH	.020" Aluminum	28	1300	80	8
			TFHS	.020" Aluminum	28	1200	60	8
			TFH	.023" Steel	52	2800	160	8
			TFHS	.025" Steel	52	1500	125	8
	632	9	TFH	.020" Aluminum	28	2100	60	9
			TFHS	.020" Aluminum	28	1500	60	9
			TFH	.023" Steel	52	2500	130	17
			TFHS	.025" Steel	52	2500	130	17
	832	17	TFH	.020" Aluminum	28	2100	70	12
			TFHS	.020" Aluminum	28	2200	70	12
			TFH	.023" Steel	52	3100	150	27
			TFHS	.025" Steel	52	2700	150	27
	024	24	TFH	.020" Aluminum	28	2300	80	15
			TFHS	.020" Aluminum	28	2500	80	15
	032	27	TFH	.023" Steel	52	3700	160	30
			TFHS	.025" Steel	52	3000	160	30

	Thread Code	Max. Nut Tightening Torque (N•m)	Type	Sheet Thickness and Sheet Material	Sheet Hardness HRB	(2) Installation (kN)	Pushout (N)	Torque-out (N•m)
METRIC	M3	0.74	TFH	0.5 mm Aluminum	28	5.8	356	0.9
			TFHS	0.5 mm Aluminum	28	5.3	245	0.8
			TFH	0.6 mm Steel	52	12.5	710	0.9
			TFHS	0.6 mm Steel	52	6.7	490	1
	M4	1.7	TFH	0.5 mm Aluminum	28	12.5	490	1.4
			TFHS	0.5 mm Aluminum	28	9.8	310	1.3
			TFH	0.6 mm Steel	52	17.8	755	2.7
			TFHS	0.6 mm Steel	52	13.4	670	3
	M5	3.5	TFH	0.5 mm Aluminum	28	15.6	530	1.5
			TFHS	0.5 mm Aluminum	28	13.4	350	1.7
			TFH	0.6 mm Steel	52	26.7	845	2.4
			TFHS	0.6 mm Steel	52	17.8	710	3.4

(1) *Maximum recommended tightening torques for aluminum studs are 60 percent of these values.*

(2) *Installation controlled by proper cavity depth in punch.*

Type HFH and HFHS High Strength Studs and Type HFHB Phosphor Bronze Studs

	Thread Code	Type	Max. Nut Tightening Torque (ft. lbs.)	Sheet Thickness and Sheet Material	Sheet Hardness HRB	(1) Installation (lbs.)	Pushout (lbs.)	Torque-out (ft. lbs.)	(2) Tensile Strength (lbs.)	Torque Thru (ft. lbs.)	Test Bushing Torque Thru Hole Size
UNIFIED	032	HFH	3.25	.060" Aluminum	15	3000	175	4	2400	5	.250
		HFH	3.25	.060" Steel	65	6000	350	6	2400	5	.250
		HFHS	3.25	.050" Aluminum	38	3000	175	4	1800	4.8	.250
		HFHS	3.25	.058" Steel	52	4500	350	4.9	1800	4.8	.250
		HFHB	2.56	.061" Copper CDA-110	28	3400	250	2.7	1200	3	.250
	0420	HFH	8	.060" Aluminum	43	5500	340	12	3820	11	.315
		HFH	8	.060" Steel	59	7000	600	12	3820	13	.315
		HFHS	8	.064" Aluminum	32	4000	340	10	2900	10.7	.315
		HFHS	8	.072" Steel	43	6500	559	10.3	2900	10.7	.315
		HFHB	4.35	.061" Copper CDA-110	28	6000	380	4.9	2000	8	.315
	0518	HFH	16	.091" Aluminum	39	8000	400	23	6280	32	.375
		HFH	16	.090" Steel	58	10000	650	27	6280	32	.375
		HFHS	16	.087" Aluminum	41	5500	380	19	4700	16.8	.375
		HFHS	16	.099" Steel	44	7500	630	20.9	4700	16.8	.375
		HFHB	10.55	.126" Copper CDA-110	32	7500	500	11.3	2900	13	.375
	0616	HFH	27	.091" Aluminum	39	9000	550	28	9300	44	.437
		HFH	27	.090" Steel	58	12000	900	36	9300	48	.437
		HFHS	27	.123" Aluminum	44	7500	520	25	6800	32.3	.437
		HFHS	27	.099" Steel	44	10500	870	32	6800	36.9	.437
		HFHB	21	.126" Copper CDA-110	32	9500	600	23.7	4400	26	.437

	Thread Code	Type	Max. Nut Tightening Torque (N•m)	Sheet Thickness and Sheet Material	Sheet Hardness HRB	(1) Installation (kN)	Pushout (N)	Torque-out (N•m)	(2) Tensile Strength (kN)	Torque Thru (N•m)	Test Bushing Torque Thru Hole Size
METRIC	M5	HFH	4.4	1.5 mm Aluminum	15	13	778	5.4	12.6	6.8	6.35
		HFH	4.4	1.5 mm Steel	65	26	1556	8.1	12.6	6.8	6.35
		HFHS	4.4	1.62 mm Aluminum	35	12.4	1446	5.4	8.7	5.9	6.35
		HFHS	4.4	1.47 mm Steel	54	21.7	2026	8	8.7	5.9	6.35
		HFHB	3.47	1.5 mm Copper CDA-110	28	15.6	1115	3.86	5.4	3.8	6.35
	M6	HFH	10	1.5 mm Aluminum	43	29	1620	16.3	17.8	17.9	7.49
		HFH	10	1.5 mm Steel	59	33	2020	16.4	17.8	23.7	7.49
		HFHS	10	1.62 mm Aluminum	35	15.4	1672	13.3	12.5	10.8	7.49
		HFHS	10	1.6 mm Steel	45	24.6	2019	14.2	12.5	10.8	7.49
		HFHB	5.9	1.5 mm Copper CDA-110	28	25.3	1600	6.94	7.5	9.5	7.49
	M8	HFH	21.7	2.3 mm Aluminum	39	35.6	1780	31.2	32.5	43.4	9.53
		HFH	21.7	2.3 mm Steel	58	44.5	2890	36.6	32.5	43.4	9.53
		HFHS	21.7	2.23 mm Aluminum	44	24.4	1780	26.2	21.3	30.9	9.53
		HFHS	21.7	2.48 mm Steel	43	37.8	2890	32.6	21.3	32.8	9.53
		HFHB	14.3	3.2 mm Copper CDA-110	32	33	2250	15.9	13.8	18.1	9.53
	M10	HFH	36.6	2.3 mm Aluminum	39	40	2445	38	51.5	59.7	11.56
		HFH	36.6	2.3 mm Steel	58	54	4000	48.8	51.5	65.1	11.56
		HFHS	36.6	2.3 mm Aluminum	44	33.3	2310	33.9	31	43.8	11.56
		HFHS	36.6	2.3 mm Steel	44	46.7	3870	43.3	31	50	11.56
		HFHB	28.5	3.2 mm Copper CDA-110	32	42	2670	33.2	20	35.2	11.56

(1) *Installation controlled by proper cavity depth in punch.*

(2) *Head size is adequate to ensure failure in threaded area.*

Type FHL and FHLS Self-clinching Studs

	Thread Code	Max. Nut Tightening Torque (in. lbs.)	Type	Sheet Thickness and Sheet Material	Sheet Hardness HRB	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)	Pull Thru (lbs.)	Pull Thru Test Bushing Hole Size (in.)
UNIFIED	256	2.3	FHL / FHLS	.047" Aluminum	33	700	55	4	230	.106
		2.3	FHL / FHLS	.045" Steel	54	1200	85	8	425	.106
	440	4.0	FHL / FHLS	.047" Aluminum	33	1000	60	5	300	.132
		5.0	FHL / FHLS	.045" Steel	54	1200	105	11	580	.132
	632	5.4	FHL / FHLS	.047" Aluminum	33	1000	65	6.5	325	.158
		9.0	FHL / FHLS	.045" Steel	54	1500	110	15	650	.158
	832	6.9	FHL / FHLS	.047" Aluminum	33	1200	80	9	350	.184
		15.2	FHL / FHLS	.045" Steel	54	1500	125	18	740	.184
	032	9.7	FHL / FHLS	.047" Aluminum	33	2500	115	18	395	.210
		19.4	FHL / FHLS	.045" Steel	54	4500	210	38	800	.210

	Thread Code	Max. Nut Tightening Torque (N•m)	Type	Sheet Thickness and Sheet Material	Sheet Hardness HRB	Installation (kN)	Pushout (N)	Torque-out (N•m)	Pull Thru (N)	Pull Thru Test Bushing Hole Size (mm)
METRIC	M2.5	0.41	FHL / FHLS	1.2 mm Aluminum	33	3.1	285	0.55	1200	3
		0.41	FHL / FHLS	1.1 mm Steel	54	5.3	450	1.1	2250	3
	M3	0.46	FHL / FHLS	1.2 mm Aluminum	33	4.4	285	0.65	1300	3.5
		0.74	FHL / FHLS	1.1 mm Steel	54	5.3	475	1.25	2500	3.5
	M3.5	0.58	FHL / FHLS	1.2 mm Aluminum	33	4.4	290	0.76	1400	4
		1.15	FHL / FHLS	1.1 mm Steel	54	6.6	500	1.75	2800	4
	M4	0.75	FHL / FHLS	1.2 mm Aluminum	33	5.3	365	1.1	1550	4.5
		1.7	FHL / FHLS	1.1 mm Steel	54	6.6	550	2.1	3300	4.5
	M5	1.11	FHL / FHLS	1.2 mm Aluminum	33	11.1	530	2.2	1850	5.5
		2.25	FHL / FHLS	1.1 mm Steel	54	20	1000	4.4	3750	5.5

Type FH4 Self-Clinching Studs(1)

	Thread Code	Max. Nut Tightening Torque (in. lbs.)	Sheet Thickness and Sheet Material	Sheet Hardness HRB Max.	Installation (lbs.)	Pushout (lbs.)	Torque-out (in. lbs.)	Pull Thru (lbs.)
UNIFIED	440	6	.060" Stainless Steel	92	9000	750	16	800
	632	11	.060" Stainless Steel	92	9500	900	27	1350
	832	21	.060" Stainless Steel	92	11200	1000	58	1800
	032	33	.060" Stainless Steel	92	12000	1100	95	2250

	Thread Code	Max. Nut Tightening Torque (N•m)	Sheet Thickness and Sheet Material	Sheet Hardness HRB Max.	Installation (kN)	Pushout (N)	Torque-out (N•m)	Pull Thru (N)
METRIC	M3	.9	1.5 mm Stainless Steel	92	40	3300	1.8	3500
	M4	2.1	1.5 mm Stainless Steel	92	50	4400	6.5	8000
	M5	4.3	1.5 mm Stainless Steel	92	53	4900	10.7	10000

(1) *Performance values shown are typical for fasteners properly installed using raised ring tooling in good condition. We recommend replacing installation tooling when the height of the "P" (see page FH-14) dimension is reduced to .005" / 0.13 mm due to wear. Reductions in performance may occur as the height of the protrusion wears. Variations in hole preparation, installation force, and sheet material type, thickness, and hardness will affect both performance and tooling life.*

Type TPS™ Flush-Mounted, Self-Clinching Pilot Pins

	Pin Dia. Code	Sheet Material	Sheet Hardness HRB	Installation (lbs.)	Pushout (lbs.)
UNIFIED	125	Aluminum	20	4500	150
		Steel	62	6500	250
	187	Aluminum	18	6500	230
		Steel	60	8000	400
	250	Aluminum	18	7000	270
		Steel	62	9000	500

	Pin Dia. Code	Sheet Material	Sheet Hardness HRB	Installation (kN)	Pushout (kN)
METRIC	3mm	Aluminum	22	12	0.56
		Steel	65	22	0.98
	4mm	Aluminum	19	22	0.89
		Steel	66	26.4	1.54
	5mm	Aluminum	18	28.6	1.01
		Steel	60	35.2	1.76
	6mm	Aluminum	18	30.8	1.1
		Steel	62	39.6	2.1

Type HFE Self-Clinching Studs

	Thread Code	Max. Nut Tightening Torque (ft. lbs.)	Sheet Thickness And Material (in.)	Sheet Hardness HRB	Installation (lbs.) (1)	Pushout (lbs.)	Torque-out (in. lbs.)	Pull Thru (lbs.)	Test Bushing Hole Size For Pull Thru Tests
UNIFIED	032	3.25	.040" Aluminum	27	7500	170	60	1900	.279
			.040" Cold-rolled Steel	67	9500	300	60	2200	
	0420	8	.040" Aluminum	27	8000	180	120	3200	.335
			.040" Cold-rolled Steel	67	13500	340	130	3600	
	0518	16	.060" Aluminum	22	9000	275	240	6000	.407
			.060" Cold-rolled Steel	65	15500	575	290	6400	

	Thread Code	Max. Nut Tightening Torque (N•m)	Sheet Thickness And Material (mm)	Sheet Hardness HRB	Installation (kN) (1)	Pushout (N)	Torque-out (N•m)	Pull Thru (kN)	Test Bushing Hole Size For Pull Thru Tests
METRIC	M5	4.4	1 mm Aluminum	27	37.7	690	8.1	9.7	7.4
			1 mm Cold-rolled Steel	67	51.1	1350	8.1	10.6	
	M6	10	1 mm Aluminum	27	39	750	11.8	14.2	8.2
			1 mm Cold-rolled Steel	67	60	1400	14.4	15.5	
	M8	21.7	1.5 mm Aluminum	22	42	1230	23.5	25	10.3
			1.5 mm Cold-rolled Steel	65	71.1	2400	33.9	27.5	

(1) *Installation controlled by proper cavity depth in punch.*

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