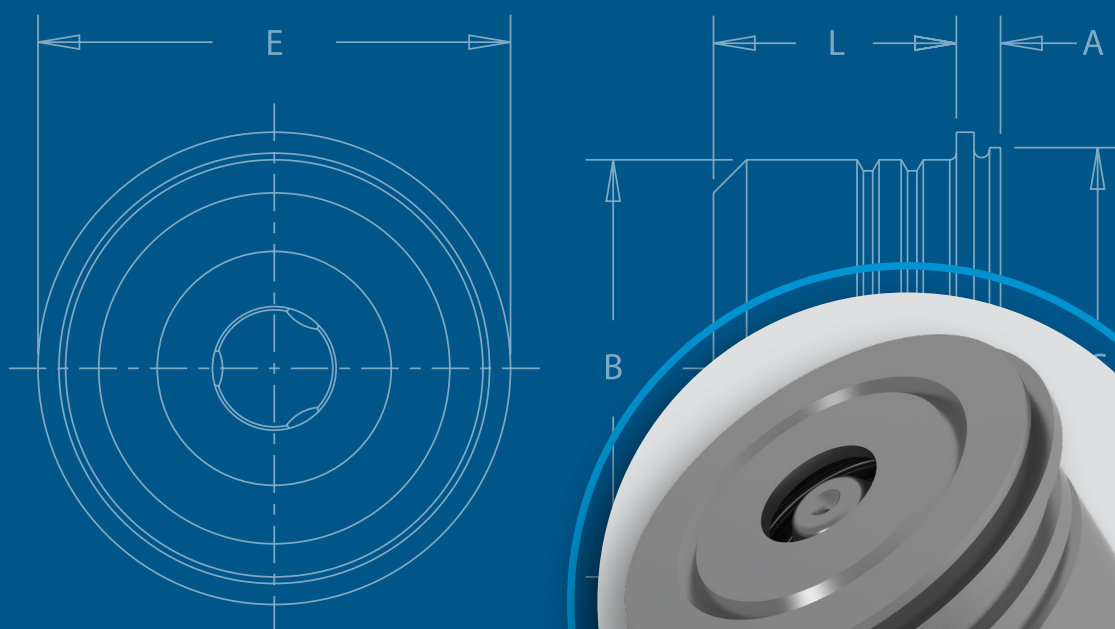




MRF™

PEM® GHOST™ MAGNETIC RELEASE FASTENERS



Fully concealed fastener with
zero visible evidence of how to
disassemble once engaged

Now available in expanded sizes
and custom configurations to meet
specific application requirements.



PEM® GHOST™ FASTENERS

Hidden Fastening. Proven Performance. Engineered to Your Requirements.

The PEM® Ghost™ fasteners are now available in expanded sizes and custom configurations to meet specific application requirements.

Visible hardware can reveal joint location and invite tampering. PEM® Ghost™ Magnetic Release Fasteners provide a fully concealed fastening solution that installs permanently and releases instantly with a magnet.

Product range includes:

- Six sizes spanning 1.2 mm to 4.8 mm pin diameters
- Two floating pin styles:
 - MRPS™ Smooth - greater flexibility in axial engagement
 - MRHPS™ Grooved - higher load performance and reduced joint deflection
- Comprehensive specification data including:
 - Load performance
 - Sheet thickness
 - Float values
 - Magnet requirements
- Compatibility with standard Haeger® and PEMSERTER® installation equipment
- **Custom configurations developed with PEM® application engineering team**



Engineered Around Your Application

Ghost isn't just a standard catalog selection. Because every application presents its own combination of load requirements, panel geometry, aesthetic constraints, and access conditions, the PEM® team works directly with design engineers to develop configurations that fit.

The process starts with your design requirements and is supported at every stage by the PEM® application engineering team.

Application Engineering Services include:

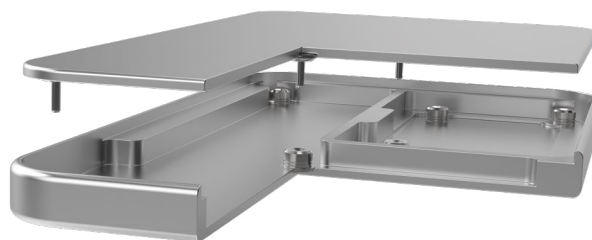
- Application review
- Custom design and product development
- Customer drawings and 3D models
- Prototype development
- Samples for application testing and validation

Ghost fastening solutions are born from collaboration. The catalog sizes and specification data offer a reference point, and the engineering conversation is where the right solution takes shape.

Tell Us About Your Application

Share your design requirements with a PEM® engineer and we'll review your application, identify the appropriate configuration, and provide a quote.

Contact our engineering team:
techsupport@pemnet.com



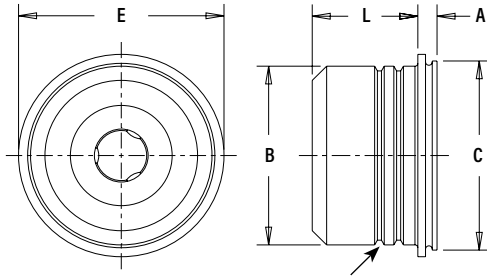
Fully enclosed device utilizing PEM® Ghost™ fasteners.

Fastener drawings and models are available at www.pemnet.com
 Custom sizes are available on special order. [Contact us](#) for more information.

NOTE: The GHOST™ fastener may not be purchased for use in consumer electronics products. Please contact us if you have any questions.

MRFS™ Retainer Assembly

- Fully concealable fastener utilizes near-instant magnetic disassembly
- Cosmetic self clinching attachment leaves no evidence of part placement or function
- Streamline assembly with tool-less press-in engagement
- MRFS retainer assembly for use in non-magnetic panel materials. For example, aluminum, 300 series stainless steels, etc.



PEM® "Two Groove" registered trademark

Part Number Designation

MRFS - 1.2 - 280

Type	Pin Dia. Fit Code	Length Code	Blind Mounting Hole Dia. + .003 -.000/ +0.08mm		Min. Depth of Blind Hole ⁽¹⁾		A (Shank) Max.		B Max.		C Max.		E Nom.		L Length Nom.		Min. Dist. Hole C/L to Edge ⁽²⁾	
Stainless Steel			in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
MRFS	1.2	280	.201	5.11	.023	0.58	.022	0.56	.190	4.83	.200	5.08	.214	5.44	.110	2.79	.142	3.61
	1.6	405	.265	6.73	.030	0.76	.029	0.74	.240	6.1	.264	6.71	.279	7.09	.160	4.06	.190	4.83
	2.0	485	.328	8.33	.038	0.97	.037	0.94	.302	7.67	.327	8.31	.345	8.76	.191	4.85	.225	5.72
	2.4	600	.406	10.31	.043	1.09	.042	1.07	.370	9.4	.405	10.29	.426	10.82	.236	5.99	.290	7.37
	2.8	720	.453	11.51	.048	1.22	.047	1.19	.410	10.41	.452	11.48	.479	12.17	.284	7.21	.315	8
	4.8	1230	.765	19.43	.069	1.75	.068	1.73	.700	17.78	.764	19.41	.804	20.42	.484	12.29	.500	12.7

Type	Pin Dia. Fit Code	Min. Sheet Thickness			
Stainless Steel		Non-cosmetic ⁽³⁾		Cosmetic ⁽⁴⁾	
		in.	mm	in.	mm
MRFS	1.2	.040	1	.065	1.65
	1.6	.044	1.1	.069	1.75
	2.0	.050	1.26	.079	2
	2.4	.058	1.47	.111	2.8
	2.8	.063	1.59	.119	3
	4.8	.068	1.72	.193	4.9

Type	Pin Dia. Fit Code	Max. Sheet Thickness For Magnetic Release	
Stainless Steel		in.	mm
MRFS	1.2	.079	2
	1.6	.181	4.6
	2.0	.205	5.2
	2.4	.232	5.9
	2.8	.236	6
	4.8	.315	8

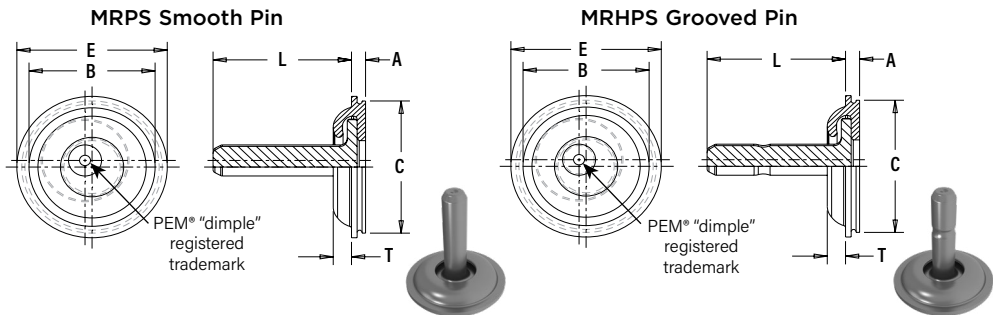
- Blind mounting holes may be deeper than minimums except where sheet material is at or near minimum thickness. Fasteners should always be installed so the flange is flush with the surface of the sheet.
- For more information on proximity to bends and distance to other clinch hardware, see [PEM® Tech Sheet C/L To Edge](#).
- Values refer to thinnest recommended sheet for self clinching; may cause witness marks on backside of sheet.
- Values refer to thinnest recommended sheet designed to ensure un-marked backside of sheet. Slight marking may still occur based on variability of other factors.



Un-marked backside of sheet in a cosmetic application. See note (4) above.

MRPS™ and MRHPS™ Floating Pins

- Self clinching floating pins designed for ease of assembly
- Accommodate misalignment with radial float ranging from .022" - .058" / 0.56mm - 1.47mm
- Smooth pin accommodates large axial tolerances with variable engagement depth
- Heavy-duty grooved pin provides improved performance with tighter engagement depth specification



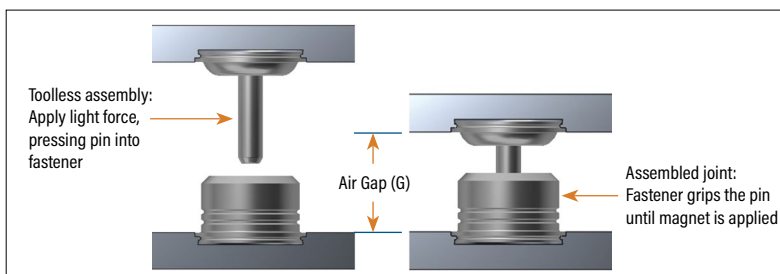
Type	Pin Dia. Code	Length Code	Blind Mounting Hole Dia. + .003 -.000 / +0.08mm		Min. Depth of Blind Hole (1)		A (Shank) Max.		B Max.		C Max.		E Nom.		G Air Gap (2)		L Length ± .008" ± 0.2mm		T Max.		Min. Dist. Hole C/L to Edge (5)	
			in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
MRPS (3)	1.2MM	400													.141 - .153	3.58 - 3.89	.157	4				
		500	.201	5.11	.023	0.59	.022	0.56	.183	4.65	.200	5.08	.214	5.44	.180 - .192	4.57 - 4.88	.197	5	.029	0.74	.142	3.61
		600													.219 - .231	5.56 - 5.87	.236	6				
	1.6MM	610	.272	6.91	.030	0.76	.029	0.74	.246	6.25	.271	6.88	.287	7.29	.231 - .247	5.87 - 6.27	.240	6.1	.027	0.69	.190	4.83
	2.0MM	700	.319	8.1	.038	0.97	.037	0.94	.292	7.42	.318	8.08	.337	8.56	.260 - .280	6.60 - 7.11	.275	7	.024	0.61	.225	5.72
	2.4MM	840	.374	9.5	.043	1.09	.042	1.07	.343	8.71	.373	9.47	.395	10.03	.313 - .335	7.95 - 8.51	.330	8.39	.027	0.69	.290	7.37
	2.8MM	990	.433	11	.048	1.22	.047	1.19	.395	10.03	.432	10.97	.464	11.79	.369 - .394	9.37 - 10.01	.39	9.91	.032	0.81	.315	8
MRHPS (4)	1.2MM	400													.142 - .158	3.61 - 4.01	.157	4				
		500	.201	5.11	.023	0.59	.022	0.56	.183	4.65	.200	5.08	.214	5.44	.176 - .192	4.47 - 4.88	.197	5	.029	0.74	.142	3.61
		600													.215 - .231	5.47 - 5.88	.236	6				
	1.6MM	610	.272	6.91	.030	0.76	.029	0.74	.246	6.25	.271	6.88	.287	7.29	.214 - .230	5.44 - 5.84	.240	6.1	.027	0.69	.190	4.83

Type	Pin Dia. Code	Min. Sheet Thickness			
		Non-cosmetic (6)		Cosmetic (7)	
Stainless Steel		in.	mm	in.	mm
MRPS MRHPS	1.2MM	.04	1	.065	1.65
	1.6MM	.044	1.1	.069	1.75
MRPS	2.0MM	.05	1.26	.079	2
	2.4MM	.058	1.47	.111	2.8
	2.8MM	.063	1.59	.119	3
	4.8MM	.068	1.72	.193	4.9

Type	Pin Dia. Code	Radial Float (8) (Nom.)		Axial Float (Nom.)	
		in.	mm	in.	mm
MRPS MRHPS	1.2MM	.011	0.28	.006	0.15
	1.6MM	.016	0.41	.006	0.15
MRPS	2.0MM	.017	0.43	.006	0.15
	2.4MM	.022	0.56	.006	0.15
	2.8MM	.022	0.56	.006	0.15
	4.8MM	.029	0.74	.01	0.25

Type	Pin Dia. Code	Joint Compression For Release (9) (Min.)	
		in.	mm
MRHPS	1.2MM	.006	0.15
	1.6MM	.008	0.2

- (1) Blind mounting holes may be deeper than minimums except where sheet material is at or near minimum thickness. Fasteners should always be installed so the flange is flush with the surface of the sheet.
- (2) Air Gap specification refers to spacing between assembled panels and correlated engagement depth of pin. See diagram below for further description of G specification.
- (3) G values shown for MRPS Smooth Pins reflect a range of viable values, the limits of which ensure normal function and fastening performance as shown on page 8.
- (4) G values shown for MRHPS Grooved Pins reflect the total tolerance for the assembled Air Gap (G). While most assemblies will be near the midpoint, applications using MRHPS parts must accommodate the full tolerance range.
- (5) For more information on proximity to bends and distance to other clinch hardware, see [PEM® Tech Sheet C/L To Edge](#).
- (6) Values refer to thinnest recommended sheet for self clinching; may cause witness marks on backside of sheet.
- (7) Values refer to the thinnest possible sheet designed to provide an un-marked backside panel surface. Slight marking may still occur based on variability of other factors.
- (8) Radial float value refers to the total amount of available float in a given direction from center.
- (9) When properly engaged, MRHP floating pins require a small amount of overtravel or joint compression to ensure Retainer Assembly mechanism is fully disengaged.



Part Number Designation

MRPS - 1.2MM - 400
MRHPS - 1.2MM - 400

↓
Type & Material Code Pin Diameter Code Length Code

For more detailed guidance on product features and application, please refer to [MRF Application Resource](#).
This document will clarify recommended usage and outline certain application considerations.

Material and Finish Specifications

Type and Material		Component Material				Standard Finishes		For Use in Sheet Hardness HRB 70 / HB 125 or less (2)
		300 Series Stainless Steel	Precipitation Hardening Grade Stainless Steel	2000 Series Aluminum	Ceramic	Passivated and/or Tested per ASTM A380 (1)	Natural Finish	
MRFS	Retainer	▪				▪		▪
	Assembly Cap			▪			▪	
	Internal Component 1		▪			▪		
	Internal Component 2	▪					▪	
	Internal Component 3				▪		▪	
MRPS	Retainer	▪				▪		▪
	Smooth Pin							
MRHPS	Retainer	▪				▪		▪
	Grooved Pin							

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

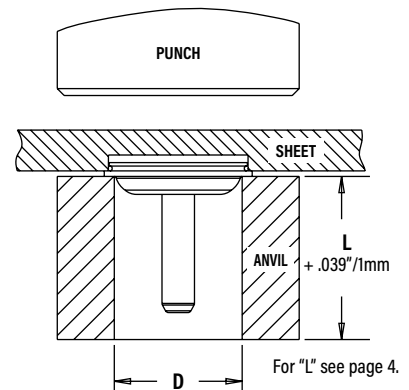
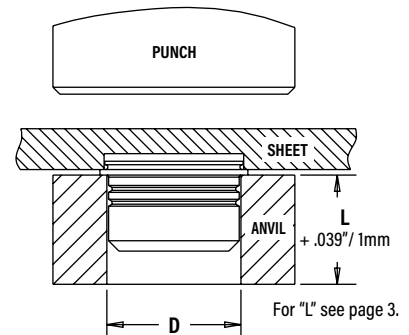
(2) HRB - Hardness Rockwell "B" Scale. HB - Hardness Brinell.

Installation

1. Mill a round blind hole to the correct minimum depth.
2. Place fastener into anvil hole.
3. Place the mounting hole over the shank of the fastener.
4. With punch and anvil surfaces parallel, apply squeezing force until the flange is flush with the mounting sheet.

Type	Pin Dia. Fit Code	Anvil Dimensions		HAEGER® Part Number		PEMSERTER® Part Number	
		D		Anvil	Punch	Anvil	Punch
Stainless Steel		in. +.003	mm +0.08				
MRFS	1.2	.194	4.93	H-187-GB194	H-108-0019L	8026789	975200048
	1.6	.244	6.2	H-155-1.6	H-108-062L	8027213	975200048
	2	.306	7.77	H-155-2.0	H-108-062L	8027214	975200048
	2.4	.375	9.53	H-155-2.4	H-108-075L	8027215	8012030
	2.8	.415	10.54	H-155-2.8	H-108-075L	8027216	8012030
	4.8	.705	17.91	H-155-4.8	H-108-5	8027217	8027342
MRPS MRHPS	1.2MM	.185	4.7	H-187-GB185	H-108-0019L	8026790	975200048
	1.6MM	.250	6.35	H-156-1.6	H-108-062L	8027219	975200048
	2.0MM	.296	7.52	H-156-2.0	H-108-062L	8027220	975200048
	2.4MM	.347	8.81	H-156-2.4	H-108-062L	8027221	975200048
	2.8MM	.399	10.13	H-156-2.8	H-108-075L	8027222	8012030
	4.8MM	.645	16.38	H-156-4.8	H-108-5	8027223	8027342

Note: These fasteners can also be installed with Haeger® machines that have the optional positive stop system. [Contact us](#) for more information.



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

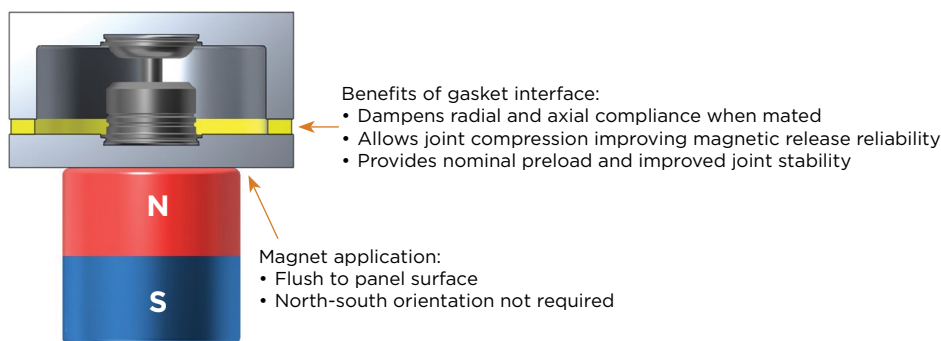


Recommended Magnet Specifications (minimum)

Type	Pin Dia. Fit Code	Shape	Diameter Nom.		Thickness Nom.		Magnetized Direction	Material	Magnetic Grade	Pull Force Nom. (lbs.)	Plating
Stainless Steel			in.	mm	in.	mm					
MRFS	1.2	Cylinder	3/8"	9.5	1/2"	12.7	Through Thickness (Axial Direction)	Neodymium	N52	11	Nickel, TYP (Optional)
	1.6, 2.0, 2.4, 2.8		1/2"	12.7	1/2"	12.7				18	
	4.8		5/8"	15.9	3/4"	19.1				31	

Notes:

- Alternative magnet materials and size may be used in all cases. Separate validation is recommended when deviating from minimum specification shown.
- Magnet specifications shown are the minimum required to ensure magnetic release capability at the Max. Panel Thickness specified on page 3. If fasteners are installed at panel thicknesses closer to the minimum specification, a lower magnetic force may be sufficient to release the joint.
- Alternative magnet configurations are available which may improve magnetic release range and reliability. Please contact [techsupport](#) for more information.
- MRF retainer assembly for use in non-magnetic panel materials. For example, aluminum, 300 series stainless steels, etc.



Performance Data ⁽¹⁾

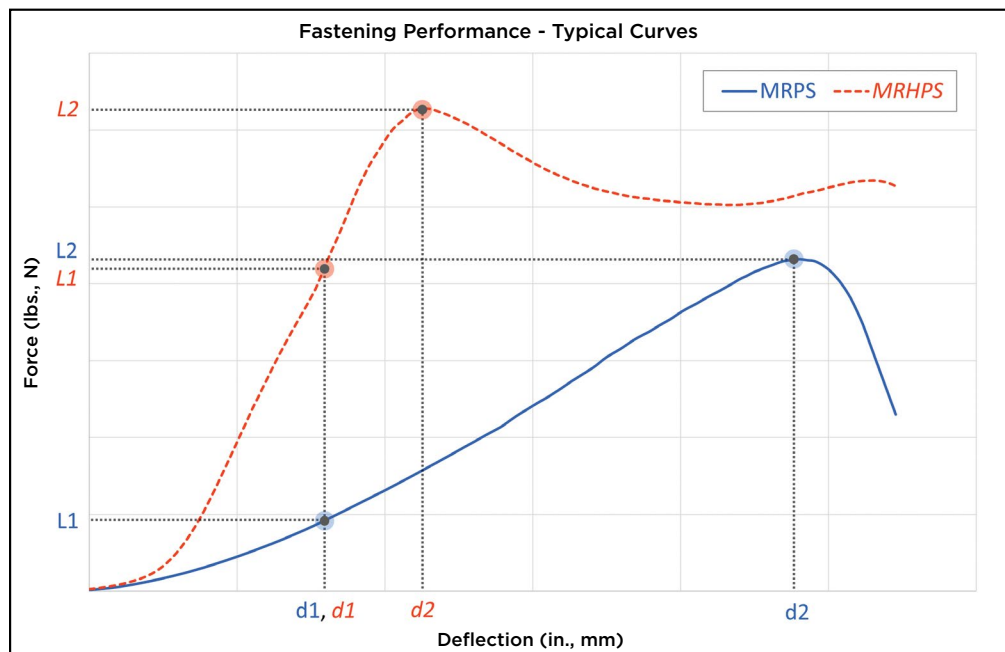
Self Clinching Data

Type	Pin Dia. Fit Code / Code	Test Sheet Thickness (mm)	Test Sheet Material			
			5052-H34 Aluminum			
			Installation ⁽²⁾		Pullout	
Stainless Steel			(lbs.)	(kN)	(lbs.)	(N)
MRFS	1.2	1	450	2	39.5	176
	1.6	1.4	600	2.7	99.5	443
	2.0	1.8	800	3.6	173	770
	2.4	2	1150	5.1	291	1294
	2.8	2.3	1750	7.8	397	1766
	4.8	3.3	5150	22.9	1060	4715
MRPS MRHPS ⁽³⁾	1.2MM	1	450	2	39.5	176
	1.6MM	1.4	700	3.1	108	480
	2.0MM	1.8	925	4.1	180	801
	2.4MM	2	1200	5.3	281	1250
	2.8MM	2.3	1800	8	397	1766
	4.8MM	3.3	4650	20.7	957	4257

- (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 force values shown will provide optimal fastener performance. Installation force as low as 400lbs./1.78kN may help the side of the sheet opposite installation remain smooth. Separate validation is recommended when deviating from the specification shown.
- (3) MRPS and MRHPS floating pins have the same self clinching performance. Values listed here represent either pin type.

Product Selection Guide

Loading Curves ⁽¹⁾



Fastening Data

Type	Pin Type	Pin Dia. Code	Performance Targets (Recommended)							
			Example Load ⁽²⁾				Maximum Load ⁽³⁾			
Stainless Steel	Stainless Steel		L1 (lbs.)	d1 (in.)	L1 (N)	d1 (mm)	L2 (lbs.)	d2 (in.)	L2 (N)	d2 (mm)
MRF-8	MRPS	1.2MM	5.3	.024	24	0.6	28.7	.071	128	1.8
		1.6MM	10.4	.031	46	0.8	48.6	.094	216	2.4
		2.0MM	16.8	.039	75	1	82.6	.123	368	3.1
		2.4MM	23.8	.047	106	1.2	125	.153	554	3.9
		2.8MM	31.9	.055	142	1.4	223	.200	994	5.1
		4.8MM	99.1	.094	441	2.4	525	.301	2336	7.6
	MRHPS	1.2MM	31.8	.024	141	0.6	32	.026	143	0.7
		1.6MM	47.5	.031	211	0.8	70.6	.050	314	1.3

(1) Curves shown in plot represent the typical loading profile of the two respective pin types, MRPS Smooth Pins and MRHPS Grooved Pins. Values corresponding to L (load) and d (deflection) are listed in fastening data table for each specific part size and pin type.

(2) Recommended Example Load shown is intended to reflect joint deflection under operational loading. Design parameters are application-specific.

(3) Loading beyond the recommended maximum shown may result in joint failure. This value is intended to correlate with an allowable amount of physical deflection in the mated joint.

For more detailed guidance on product features and application, please refer to [MRF Application Resource](#). This document will clarify recommended usage and outline certain application considerations.

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