

HEXSEAL® & E-SEEL®

Hermetic Environmental Sealing Boots For Circuit Breakers & Panel Mounting Holes



For NEMA & IEC Type Electrical Distribution & Industrial Controls



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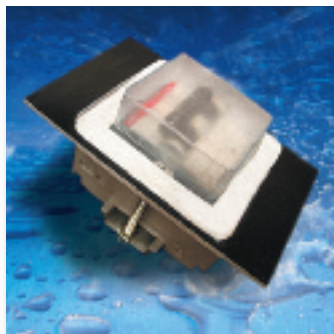


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HEXSEAL® & E-SEEL® SEALING BOOTS – LIFE SUPPORT SYSTEMS FOR CIRCUIT BREAKERS

Why hostile environment protection is needed

Unsealed breakers are internally susceptible to damage and shorting from water, lubricants, dust, dirt, sand, salt spray, corrosive atmospheres, fungus and other damaging contaminants. Even factory sealed circuit breaker actuator function is susceptible to ice and dust build-up. And, all circuit breaker panel-mounting cutouts are vulnerable to contaminant seepage including spilled soft drinks, coffee, etc. APM's UL Recognized HEXSEAL® & E-SEEL® sealing boots provide complete and reliable, cost-effective, long-term protection.

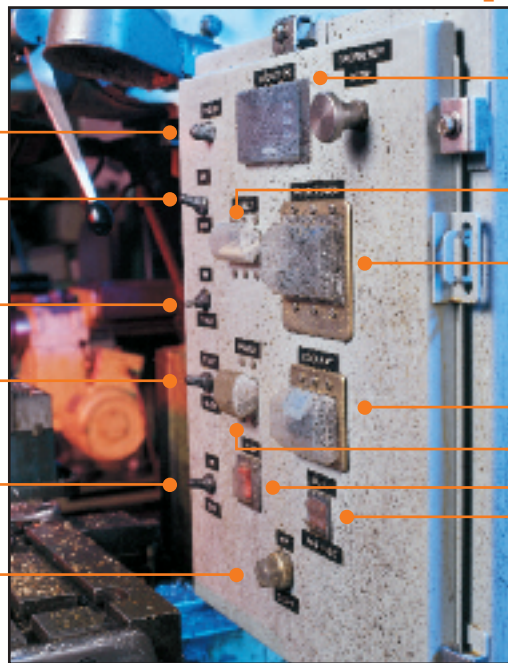


Lever, Toggle, Pushbutton, Rocker Actuated Sealing Boots

How HEXSEAL® & E-SEEL® Boots protect

Working closely with circuit breaker manufacturers and users for more than 50 years, APM has developed an extensive line of tough, pliant silicone rubber panel seals that function harmoniously with the circuit breaker's manual and automatic operation and position status viewing. UL 50 tested and Recognized, they represent a convenient cost-effective method (boots are less expensive than a door/panel-mounted handle-operator) for adding exterior controls to a NEMA/IEC enclosure panel without compromising environmental integrity for the system while maintaining the highest IP Ratings.

NEMA Mounted Enclosure Example



Pushbutton style front-of-panel mounted circuit breaker boot

Toggle style front-of-panel mounted circuit breaker boots

Pushbutton style front-of-panel mounted circuit breaker boot

Lever style back-of-panel mounted circuit breaker boots

Lever style front-of-panel mounted sealing boots

Lever style back-of-panel mounted circuit breaker boot

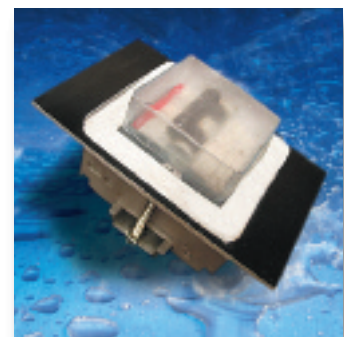
Rocker style front-of-panel mounted circuit breaker boots



Panel Mounting – Lever



Panel Mounting – Toggle



DIN-Rail Mounting



REMOTE HEXSEAL® boots protect circuit breaker mechanisms from degradation due to harsh environments such as salt air/water, oils, dust and ice.



EXTREME HEXSEAL® boots will protect circuit breakers and keep them functioning to temperatures down to -94° F.

Typical Applications

- Marine instrument panels
- Military equipment and vehicles
- Food processing equipment
- Air conditioning systems
- Heat pumps
- Off-road construction equipment
- Machine tool controls
- Spas/hot tubs
- Commercial laundry equipment
- Construction elevator controls
- Waste treatment system controls
- Chemical plant process controls
- Paint spraying equipment
- Industrial machinery
- Medical electronic equipment
- Ground support equipment
- Emergency power equipment
- Outdoor compressor/pump controls
- Transport refrigeration systems
- Automotive diagnostic equipment
- Lighting control centers
- Commercial refrigeration systems
- Or any application requiring environmental protection for circuit breakers.

Learn how others apply HEXSEAL® Circuit Breaker Boots – visit our website “Sealing Solutions” application notes.



RUGGED HEXSEAL® boots are used for controls protection in industrial, manufacturing and processing plants — hostile conditions which are dusty, dirty, greasy and corrosive.



RELIABLE Surgery rooms and food processing plants require frequent wash downs. Their circuit breakers benefit from HEXSEAL® IP68 Rated boots by maintaining dry, clean reliable performance.

Features & Benefits

- **Exclusive UL & CSA-Recognized Component HEXSEAL® & E-SEEL® Boots** ... facilitate easier “agency listing” of the equipment in which they are used. No other competitive seals in the world have these approvals.
- **RoHS compliant** ... per document 2002/95/EC
- **Meets Military Specification** ... most HEXSEAL® boots are designed to meet military specifications (see charts on product pages).
- **Time Tested** ... since our original patents and for more than 50 years, millions of HEXSEAL® Boots reliably function in hostile conditions throughout the world.
- **Transparent RUBGLAS® rugged silicone rubber material** ... resists tearing and most hostile environmental contaminants. Retains tactile feel, will not discolor, yellow, crack or dry out due to UV/aging.
- **Choose precise boot color for opaque boot versions** ... to match panel and/or delineate function – identification.
- **Patented perimeter sealing rib** ... seals the circuit breaker panel-mounting cutout, preventing contaminant seepage.
- **Vibration-resistant mounting** ... secured with high-pressure self-sealing SEELSKREWS® fasteners, resists circuit breaker loosening due to vibration/shock.
- **Unique “trigger-assisted” reset** ... Series CT & HE-T lever-actuated circuit breaker boots feature APM’s patented, molded-in trigger to facilitate easier resetting and eliminate “trigger-teasing.”
- **Toggle actuated boots feature secondary inner seal** ... to protect against contaminant entry in the event the upper chamber portion is punctured.
- **All toggle and pushbutton boots feature high-strength rubber-to-metal bond** ... cross-linking adhesion assures rubber will not separate from the mounting nut.
- **Pre-lubricated half-toggle and full-toggle boots** ... assure easier installation on large diameter actuators.
- **Designed and made in USA** ... to insure high consistent quality with local full tech service backup.
- **Custom design requirements welcome** ... in addition to standard products described in this catalog, APM provides technical design assistance with fast, economical prototyping.

Anatomy Of A High-Pressure Sealing Boot

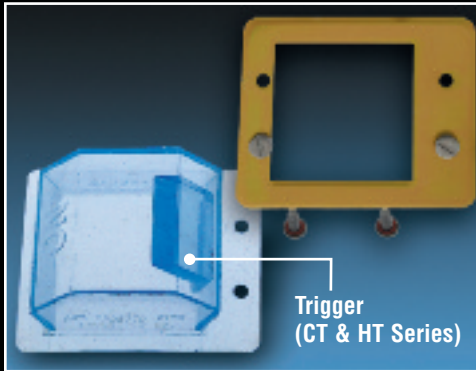
Obviously, your choice of circuit breaker and mounting location determines your initial matching sealing boot selection. The following are some basic specification considerations:

Actuation style is your first consideration. Our product section features two families (see below) to choose from—transparent boots for lever and rocker styles, and opaque (besides basic black/gray any color can be supplied to match panel color or indicate function) and transparent for toggle, pushbutton styles (ideal for position reading/illuminated styles). Next and foremost is the sealing level which should be the highest possible as defined by NEMA/UL/IEC applicable ratings and is incorporated in the following selection charts product pages 8–13.



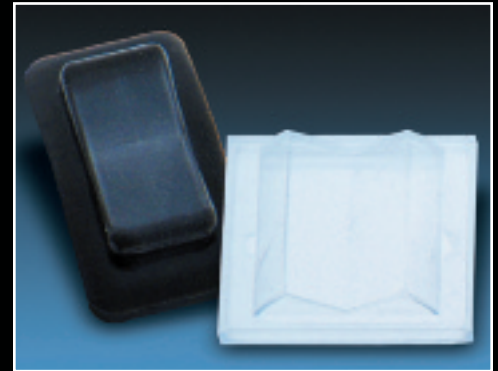
Lever & Rocker Styles

Front-Of-Panel Mounted



TRIGGER IMPROVES BOOTED BREAKER OPERATION
 In addition to protecting circuit breakers from environmental attack, these trigger-action boots can also make it easier to reset and turn on the breaker. To achieve the necessary muscle (leverage) to get the job done right, APM designed their patented "Trigger" arm strategically located inside the silicone rubber seal's dome. The user can easily and positively reset and activate the breaker knowing that a positive reset positioning event has occurred. This feature is available on a number of standard sealing boots (see CT & HT Series).

Front-Of-Panel Mounted

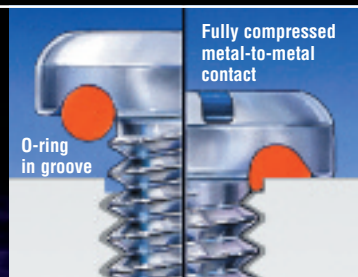


Behind-The-Panel Mounted

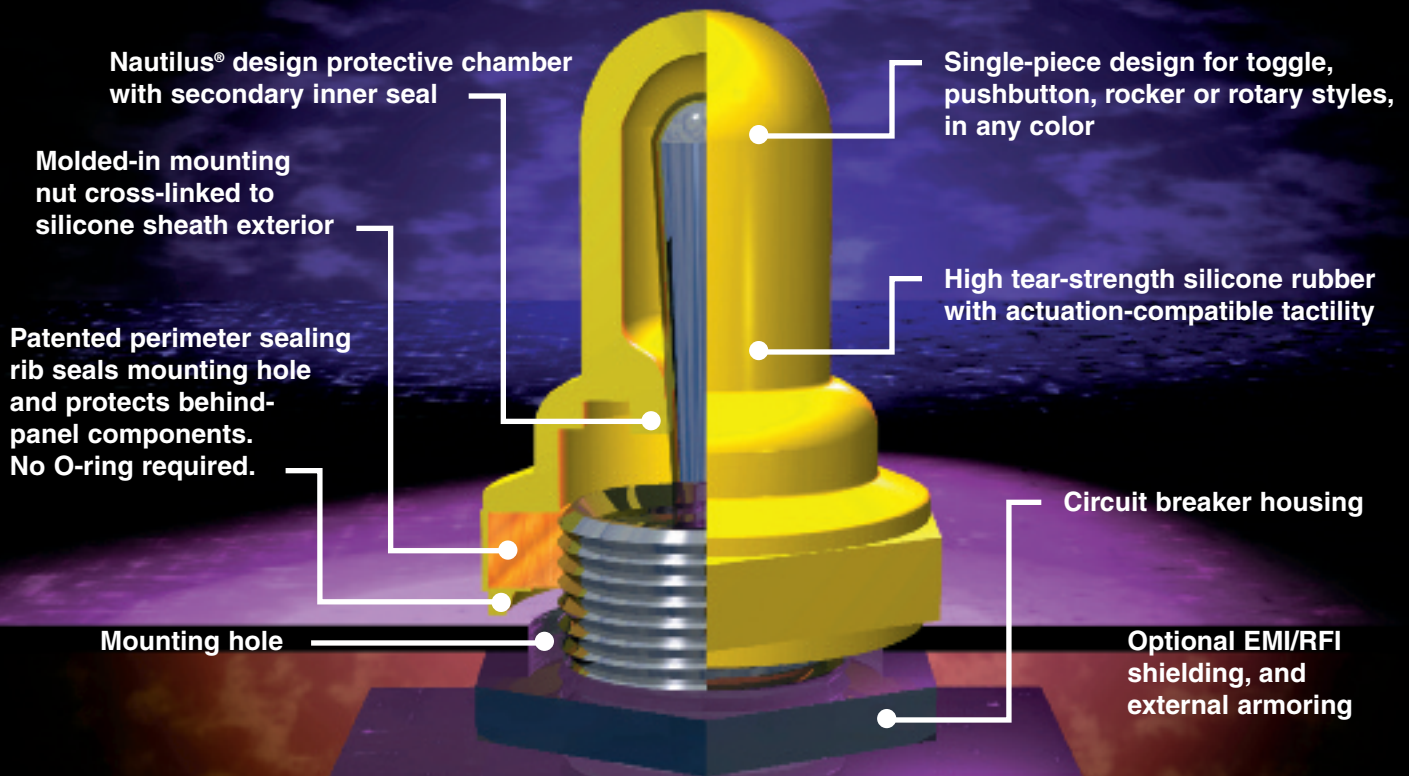


Each boot is supplied with reusable APM high-pressure SEELSKREWS® rated to 20,000 PSIG internal/external. SEELSKREWS® are also available for other applications i.e., panel attachment and any pressure situations requiring sealing. Available in matching panel colors. See page 15 for details.

Self-Sealing Screws



Toggle & Pushbutton Styles



Technical References

SURVIVING HOSTILE CONTROL SYSTEM ENVIRONMENTS

Whether the preferred method of circuit breaker mounting is an outside panel or the exterior of a NEMA/IEC rated enclosure door, there is an IP rated UL Recognized environmental sealing boot expressly designed for selected control components (e.g., circuit breakers, switches, potentiometers, panel meters) that mates with and will provide a number of benefits consistent with design considerations that comply with MIL-DTL-5423 specifications. Originally designed for U.S. military naval applications — subject to salt spray, wide temperature range options, rugged handling (with and without gloves), corrosive atmospheres, lubricant contact, frequent wash-downs — these sealing boots have repeatedly proven their battle-tested worthiness. By supporting all the major manufacturers of thermal-magnetic and hydraulic-magnetic circuit breakers, the same protection and reliability are available for a wide spectrum of commercial and industrial circuit breakers through the APM HEXSEAL® and E-SEEL® sealing boot system. The following reference data and cross reference charts should be helpful in making your selection, however please do not hesitate to contact our sales support department for assistance.

Enclosure Ratings

To cost-effectively satisfy this application diversity, manufacturers of electrical/electronic equipment enclosures offer a

range of products which provide varying degrees of environmental protection. In the interest of “standardizing” an electrical enclosure’s performance, standards-making organizations such as NEMA, UL, CSA, and IEC have established various standards (Table 1).

Use of NEMA ratings does not require independent testing. Compliance is left to the manufacturer. On the other hand, UL conducts an independent evaluation of the submitted product. Tests are performed either at UL’s laboratories or witnessed by UL engineers at the manufacturer’s location. In addition, UL requires follow-up inspections (which may include testing) to assure adherence to prescribed materials and manufacturing procedures.

These ratings provide a quantitative measure of an enclosure’s ability to operate in the environment in which it will be used. Each rating defines the degree of protection against rain, snow, sleet, wind-blown dust, hosedown, corrosive agents, and occasional submersion.

While the detailed wording of ratings from standard to standard varies, each is based on similar application descriptions and performance expectations (Table 2). For example, an enclosure meeting UL Standard 50, Type 6 ratings (and similarly NEMA Standard No. 250, Type 6) is designed for indoor and outdoor use. It provides the degree of protection against hosedown, icing, dust, and the entry of water during temporary submersion at the limited depth required for this rating.

Table 1.
Selected Electrical Enclosure Standards

- National Electrical Manufacturers Association NEMA Standards Publication No. 250, “Enclosures for Electrical Equipment”
- National Electrical Manufacturers Association NEMA Standards Publication No. ICS6, “Enclosures for Industrial Controls and Systems”
- Underwriters Laboratories Inc. UL 50, “Standard for Safety, Enclosures for Electrical Equipment”
- Underwriters Laboratories Inc. UL 508, “Standard for Safety, Industrial Control Equipment”
- Canadian Standards Association CSA Standard C22.2 No. 94 “Industrial Control Equipment for Use in Ordinary (Non-Hazardous) Locations”
- International Electrotechnical Commission, IEC 60529 (Ed. 2.1 b:2001) “Degree of Protection Provided by Enclosures (IP code)”

Table 2. NEMA Enclosure Types

Type	Intended Use and Description
1	Indoor use primarily to provide a degree of protection against limited amounts of falling dirt.
2	Indoor use primarily to provide a degree of protection against limited amounts of falling water and dirt.
3	Outdoor use primarily to provide a degree of protection against rain, sleet, windblown dust and damage from external ice formation.
3R	Outdoor use primarily to provide a degree of protection against rain, sleet, and damage from external ice formation.
3S	Outdoor use primarily to provide a degree of protection against rain, sleet, windblown dust and to provide for operation of external mechanisms when ice laden.
4	Indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water and damage from external ice formation.
4X	Indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, hose-directed water and damage from external ice formation.
5	Indoor use primarily to provide a degree of protection against settling airborne dust, falling dirt, and dripping noncorrosive liquids.
6	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, and the entry of water during occasional temporary submersion at a limited depth and damage from external ice formation.
6P	Indoor or outdoor use primarily to provide a degree of protection against hose-directed water, the entry of water during prolonged submersion at a limited depth and damage from external ice formation.
12	
12K	Indoor use primarily to provide a degree of protection against circulating dust, falling dirt, and dripping noncorrosive liquids.
13	Indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and noncorrosive coolant.

Reprinted with permission of Underwriters Laboratories Inc., Standard for Safety, UL50, Enclosures for Electrical Equipment.

UL/NEMA Rating	Nearest Equivalent IP Code
1	IP 20
2	IP 22
3 & 3S	IP 55
3R	IP 24
4 & 4X	IP 66
5	IP 53
6	IP 67
6P	IP 68
12, 12K & 13	IP 54
IEC has no equivalents to UL/NEMA enclosure types 7, 8, 9, 10, or 11	

Hexseals® and E-Seals® for:	UL Recognized Ratings (to Std UL 50)*	IP Rating*
Toggle Boots	Types 1, 2, 3, 4, 4X 5, 6, 6P, 12, 12K, 13	IP 66 / IP 68
Pushbutton Boots	Types 1, 2, 3, 4, 4X 5, 6, 6P, 12, 12K, 13	IP 66 / IP 68
Rocker Switch Boots	Types 1, 2, 3R, 5, 12, 12K, 13	IP 55
Lever Boots (Front Panel Mounted)	Types 1, 2, 3, 4, 4X 5, 6, 6P, 12, 12K, 13	IP 66 / IP 68
Lever Boots (Behind Panel Mounted)	UL & ULC Recognized Types 1, 2, 3, 4, 4X, 5, 6, 12, 12K, 13	IP 66 / IP 68

IEC enclosure protection requirements are defined in IEC 60529, Degree of Protection Provided by Enclosures (IP Code). This standard defines protection against hazardous contact by personnel and by entry of solids and liquids. Requirements for protection against corrosion and other in-use conditions are covered by the IEC standard for the overall product or by requirement specified by the user.

Within this context, Hexseals® and E-Seals® would have the following Maximum IP Rating: ➔

A dual IP code rating indicates protection against both water jets and water submersion. Rating a product for water immersion ("7" or "8" second digit) does NOT guarantee compliance against water jets from equipment hose down or equal in-use conditions.

***These ratings are based on standardized tests. APM recommends that the user review the actual installation for product suitability. APM welcomes the opportunity to work with the user to assist in finding the most cost-effective sealing solution.**

IP CODE																																					
IEC 60529 DEGREES OF ACCESS TO HAZARDOUS PARTS, FIRST CHARACTERISTIC NUMERAL	IEC 60529 DEGREES OF PROTECTION AGAINST WATER INGRESS, SECOND CHARACTERISTIC NUMERAL																																				
First Characteristic Numeral: With Respect to Solid Foreign Objects	Second Characteristic Numeral: With Respect to the Harmful Ingress of Water																																				
<table border="1"> <thead> <tr> <th>IP</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Non-protected</td> </tr> <tr> <td>1</td> <td>Protected against solid foreign objects ≥ 50 mm diameter</td> </tr> <tr> <td>2</td> <td>Protected against solid foreign objects ≥ 12.5 mm diameter</td> </tr> <tr> <td>3</td> <td>Protected against solid foreign objects ≥ 2.5 mm diameter</td> </tr> <tr> <td>4</td> <td>Protected against solid foreign objects ≥ 1.0 mm diameter</td> </tr> <tr> <td>5</td> <td>Dust-protected (Dust shall not penetrate in quantity to interfere with satisfactory operation of the apparatus or to impair safety)</td> </tr> <tr> <td>6</td> <td>Dust-tight (No ingress of dust)</td> </tr> </tbody> </table>	IP	Description	0	Non-protected	1	Protected against solid foreign objects ≥ 50 mm diameter	2	Protected against solid foreign objects ≥ 12.5 mm diameter	3	Protected against solid foreign objects ≥ 2.5 mm diameter	4	Protected against solid foreign objects ≥ 1.0 mm diameter	5	Dust-protected (Dust shall not penetrate in quantity to interfere with satisfactory operation of the apparatus or to impair safety)	6	Dust-tight (No ingress of dust)	<table border="1"> <thead> <tr> <th>IP</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Non-protected</td> </tr> <tr> <td>1</td> <td>Protected against vertically falling water drops</td> </tr> <tr> <td>2</td> <td>Protected against vertically falling water drops when enclosure tilted up to 15°</td> </tr> <tr> <td>3</td> <td>Protected against spraying water</td> </tr> <tr> <td>4</td> <td>Protected against splashing water</td> </tr> <tr> <td>5</td> <td>Protected against water jets</td> </tr> <tr> <td>6</td> <td>Protected against powerful water jets</td> </tr> <tr> <td>7</td> <td>Protected against the effects of temporary immersion in water</td> </tr> <tr> <td>8</td> <td>Protected against the effects of continuous immersion in water</td> </tr> </tbody> </table>	IP	Description	0	Non-protected	1	Protected against vertically falling water drops	2	Protected against vertically falling water drops when enclosure tilted up to 15°	3	Protected against spraying water	4	Protected against splashing water	5	Protected against water jets	6	Protected against powerful water jets	7	Protected against the effects of temporary immersion in water	8	Protected against the effects of continuous immersion in water
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Cross Reference List

Front-Panel Mounted Lever-Actuated Circuit Breaker Boots (Consult factory for additional listings.)

APM Part No.	Airpax	Carling Technologies	CBI	E-T-A	Heinemann/Eaton	Tyco/Potter & Brumfield
HE-1015 HE-1015T CT-1015	IEL/APL/UPL/205 (1-pole) IEL (2 & 3 pole) MIL-M-55629/1, /2 Series	C & D Series (1-pole)	D-Frame	8345 B/C Series (1-pole)	AM-1S, AM-1R, AM-1, AM-12	W91, M91 Series
HE-1020 HE-1020T CT-1020	IELH/APL/UPL/205 (2-pole) IEL (4 pole) MIL-M-55629/3, /4 Series	C & D Series (2-pole)	D-Frame	8345 B/C Series (2-pole)	AM-2S, AM-2R, AM-2, AM-33	W92, M92 Series
HE-1050 HE-1050T CT-1050	IELH/APL/UPL/205 (3-pole) IEL (5-pole) MIL-M-55629/5, /6 Series	C & D Series (3-pole)	D-Frame	8345 B/C Series (3-pole)	AM-3S, AM-3R, AM-3, AM-333	W93, M93 Series
HE-1035	—	—	—	—	1163, 2263, 3363 Series	—
HE-1040	209, 219, 229, 239, 269 & 299 Series (1-pole)	E Series (1-pole)	—	—	CF-1, AM-1515	—
1113/34	209, 219, 229, 239, 269 & 299 Series (2-pole)	E Series, (2-pole)	—	—	CF-2, 2XAM-1516	—
HE-1070	209, 219, 229, 239, 269 & 299 Series (3-pole)	—	—	—	CF-3, 3XAM-1516	—
HE1080	—	—	—	—	3X-1163	—
1113/26	IPGH/IEGH/APGH/UPGH (4-pole) IEG (6-pole) (Handle Actuator)	C Series (4-pole)	—	—	AM-4S, AM-4R, AM-4, AM-3333	—
1113/69	IPGH/IEGH/APGH/UPGH (5-pole)	C Series (5-pole)	—	—	AM-5, AM-33333	—
1113/47	IAGH111, IUGH111, IEGH111, CEGH111, IAG111, IUG111, IEG111, CEG111 (3-pole)	AA3, AB3, BA3, BB3, BS3, BT3 (3-pole)	C-Frame	8340F Series (3-pole)	JA3	W69, M69 Series
1113/48	IAGH1, IUGH1, IEGH1, CEGH1, IAG1, IUG1, IEG1, CEG1 (1-pole)	AA1, BA1, BS1, BT1 (1-pole)	C-Frame	8340F Series (1-pole)	JA1	W67, M67 Series
1113/49	IAGH11, IUGH11, IEGH11, CEGH11, IAG11, IUG11, IEG11, CEG11 (2-pole)	AA2, AB2, BA2, BB2, BS2, BT2 (2-pole)	C-Frame	8340F Series (2-pole)	JA2	W68, M68 Series
1113/60	JAE, JRE, JLE Series (1-pole)	FA, FS, FT Series (1-pole)	—	—	GJ-1	—
1113/94	JAE, JRE, JLE Series (2-pole)	FA, FS, FT Series (2-pole)	—	—	GJ-2	—
1113/77	JAE, JRE, JLE Series (3-pole)	FA, FS, FT Series (3-pole)	—	—	GJ-3	—
1077	Used with circuit breaker model AQB-A50 & AQB-A101 manufactured by SPD Technologies and Cutler-Hammer/Westinghouse Products.					

Back-of-Panel Mounted Lever-Actuated Circuit Breaker Boots (Consult factory for additional listings.)

APM Part No.	Airpax	Carling Technologies	CBI	E-T-A	Heinemann/Eaton	Tyco/Potter & Brumfield
HE-1073	—	—	—	—	AM-13	—
1113/40 C1113/40	IPG/IEG/APG/UPG (1-pole) IEG (2 & 3-pole) (Handle Actuator)	BA1	C-Frame	8340-F-0 8345-B/C-0 8340-F-1 8345-B/C-1	JA-1, JA-1S	W67, M67 Series
HE-1076	—	—	—	—	XAM-17	—
1113/42 C1113/42	IPGH/IEGH/APGH/UPGH (2-pole) IEG (4-pole) (Handle Actuator)	BA2	C-Frame	8340-F-2 8345-B/C-2	JA-2, JA-2S	W68, M68 Series
HE-1077	—	—	—	—	2XAM-17	—
1113/43 C1113/43	IPGH/IEGH/APGH/UPGH (3-pole) IEG (5-pole) (Handle Actuator)	BA3	C-Frame	8340-F-3 8345-B/C-3	JA-3, JA-3S	W69, M69 Series

For matching toggle, pushbutton and rocker boots please visit our website for details and dimensional drawings.

Sealing Boots for Lever-Actuated Circuit Breakers

HEXSEAL® and E-SEEL® sealing boots for lever-actuated style circuit breakers are molded from APM's proprietary RUBRGLAS™ ... a transparent high tear-strength silicone rubber which won't yellow or discolor. Each boot is supplied with APM's patented self-sealing SEELSKREWS® to insure total sealing integrity for the breaker, its panel cutout, and the boot mounting holes. Front panel mounted boots are also supplied with a plated, steel frame. These tough, flexible boots provide a dust-tight and watertight seal without compromising breaker operation or position status viewing.

SPECIFICATIONS

Material: Boot: APM-RUBRGLAS (transparent silicone rubber) conforms to ZZ-R-765, Class III Grade 50. Frame: steel. Screws: SEELSKREWS (self-sealing screws), stainless steel with silicone rubber O-ring.

Temperature Range: HEXSEALS: -94°F to +400°F (-70°C to +204°C)
E-SEELS: -80°F to +400°F (-62°C to +204°C)

Pressure Range: Dust tight and splashproof.

Resistant to: Salt spray, weather, UV, sunlight, ozone, corona and most acids.

Shelf Life: Excess of 25 years.

Operational Life: 10,000 actuations, minimum.

Notes:

1. Mounting screws are supplied in lengths shown unless otherwise specified.
2. New sizes and types of RUBRGLAS-SEELS are being added regularly. Please request other types and styles as required.

Military Specifications*: Most HEXSEALS meet MIL-DTL-5423 (see selection charts)

Agency Recognition: All Circuit Breaker Boots are UL-Recognized Components to UL Std. 50, Types 1, 2, 3, 3R, 3S, 4(X), 6 (6P for Front-Panel Mounted), 12 & 13. UL Recognition also includes compliance with Canadian National Standards.

*APM's policy is to manufacture our HEXSEAL® sealing boots as defined by the requirements of MIL-DTL-5423 which we regard as the standard for the switch, circuit breaker and potentiometer industry. These requirements were formulated based on our original patent.

FIGURE 1

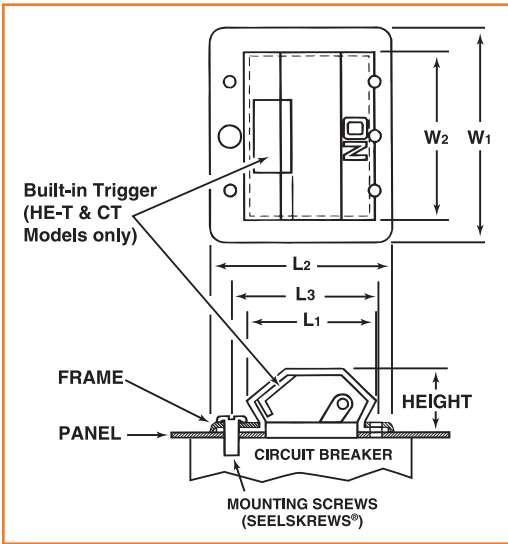


FIGURE 2

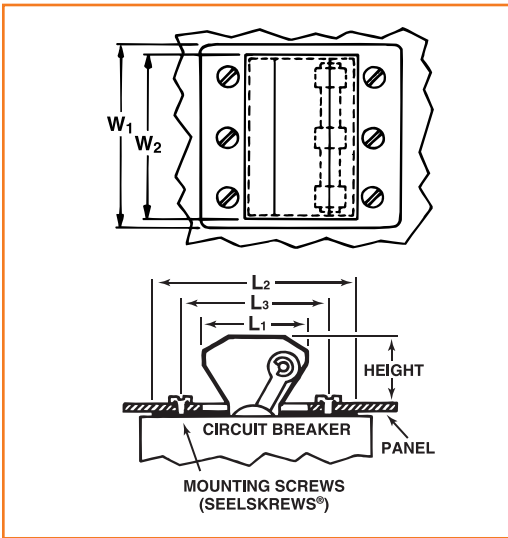
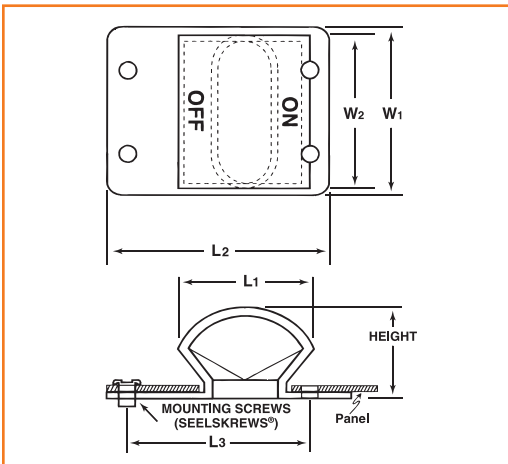


FIGURE 3



DIMENSIONS FOR REFERENCE ONLY.

Current dimensional drawings can be viewed on our website and CAD drawings can also be downloaded.



Lever-Actuated Front-Panel Mounted Boots – IP66/68 Rated Figure 1

APM Part No.	No. of Poles	Boot Markings	Height	L1	L2	L3	W1	W2	Slotted SEELSKREWS Provided	Military Part No.	HEXSEAL	E-SEAL
HE-1015 HE-1015T	1	ON	7/8"	17/8"	25/8"	2.062"	13/8"	7/8"	2 ea. #6-32x3/8"	M5423/14-05 M5423/14-05A	•	
CT-1015	1	ON	7/8"	17/8"	25/8"	2.062"	13/8"	7/8"	2 ea. #6-32x3/8"	—		•
HE-1020 HE-1020T	2	ON	7/8"	17/8"	221/32"	2.062"	27/32"	119/32"	4 ea. #6-32x3/8"	M5423/14-06 M5423/14-06A	•	
CT-1020	2	ON	7/8"	17/8"	221/32"	2.062"	27/32"	119/32"	4 ea. #6-32x3/8"	—		•
HE-1050 HE-1050T	3	ON	7/8"	17/8"	221/32"	2.062"	231/32"	211/32"	6 ea. #6-32x3/8"	M5423/14-07 M5423/14-07A	•	
CT-1050	3	ON	7/8"	17/8"	221/32"	2.062"	231/32"	211/32"	6 ea. #6-32x3/8"	—		•
HE-1035	1		1 1/8"	2"	3 5/8"	2.75"	2 1/16"	11 1/32"	4 ea. #8-32x3/8"	M5423/14-02	•	
HE-1040	1	ON	1 7/64"	2 5/32"	3 15/16"	2.75"	1 19/32"	1 3/32"	2 ea. #6-32x3/8"	M5423/14-01	•	
1113/34	2	ON	7/8"	2"	3 3/4"	2.75"	2 5/8"	2"	4 ea. #6-32x3/8"	—		•
HE-1070	3	ON	59/64"	2"	3 23/32"	2.75"	3 21/32"	3 5/32"	6 ea. #6-32x3/8"	M5423/14-03	•	
HE-1080	3	ON	1"	1 15/16"	3 1/2"	3.062"	4 13/16"	4 5/16"	12 ea. #8-32x3/8"	M5423/14-04	•	
1113/26 1113/26T	4	ON OFF	7/8"	1 25/32"	2 21/32"	2.062"	3 23/32"	3 3/32"	8 ea. #6-32x3/8"	M5423/14-08 M5423/14-08A	•	
1113/69	5	ON	7/8"	2"	2 7/8"	1.66"	4 1/4"	3 7/8"	10 ea. #6-32x3/8"	—		•
1113/47	3	ON OFF	13/16"	13/16"	2 1/8"	1.66"	2 5/8"	2 5/32"	6 ea. #6-32x3/8"	—		•
1113/48	1	ON OFF	13/16"	13/16"	2 1/8"	1.66"	1 1/8"	2 1/32"	2 ea. #6-32x3/8"	—		•
1113/49	2	ON OFF	13/16"	13/16"	2 1/8"	1.66"	1 7/8"	1 13/32"	4 ea. #6-32x3/8"	—		•
1113/60	1	—	1 5/8"	2 3/4"	3 3/8"	2.812"	2 1/8"	1 5/8"	2 ea. #10-32x3/8"	—		•
1113/94	2	—	1 5/8"	2 3/4"	3 3/8"	2.812"	4 1/4"	3 1/8"	4 ea. #10-32x3/8"	—		•
1113/77	3	—	1 5/8"	2 3/4"	3 1/2"	2.812"	5 1/2"	4 5/8"	6 ea. #10-32x3/8"	—		•
1077	1	—	1 1/32"	1 29/32"	3 3/4"	N/A	2 1/4"	1 1/4"	None	MIL-C-17361	•	

NOTE: Assembly consists of boot, frame, and SEELSKREW self-sealing mounting screws.

Lever-Actuated Back-of-Panel Mounted Boots – IP66/68 Rated Figure 2

APM Part No.	No. of Poles	Boot Markings	Height	L1	L2	L3	W1	W2	Slotted SEELSKREWS Provided	Military Part No.	HEXSEAL	E-SEAL
HE-1073	1		3/4"	1 11/16"	2 1/2"	1.81"	3/4"	1 3/32"	2 ea. #6-32x5/16"	—	•	
HE-1075/3	3		1"	1 9/32"	2 1/2"	1.81"	2 1/4"	2"	6 ea. #6-32x5/16"	M5423/13-03	•	
HE-1076	1		1"	1 1/4"	2 1/2"	1.81"	3/4"	33/64"	2 ea. #6-32x5/16"	M5423/13-01	•	
HE-1077	2	ON OFF	1"	1 21/64"	2 1/2"	1.81"	1 1/2"	1 17/64"	4 ea. #6-32x5/16"	M5423/13-02	•	
HE-1078	1	ON OFF	25/32"	1 15/16"	3 3/4"	2.75"	5 1/32"	4 5/8"	10 ea. #6-32x5/16"	—	•	

NOTE: Assembly consists of boot and SEELSKREW self-sealing mounting screws.

Lever-Actuated Back-of-Panel Mounted Boots – IP66/68 Rated Figure 3

APM Part No.	No. of Poles	Boot Markings	Height	L1	L2	L3	W1	W2	Slotted SEELSKREWS Provided	Military Part No.	HEXSEAL	E-SEAL
1113/40	1	ON OFF	13/16"	13/16"	2"	1.66"	3/4"	2 1/32"	2 ea. #6-32x5/16"	—	•	
1113/42	2	ON OFF	13/16"	13/16"	2"	1.66"	1 1/2"	1 13/32"	4 ea. #6-32x5/16"	—	•	
1113/43	3	ON OFF	13/16"	13/16"	2"	1.66"	2 1/4"	2 5/32"	6 ea. #6-32x5/16"	—	•	
C1113/40	1	ON OFF	13/16"	13/16"	2"	1.66"	3/4"	2 1/32"	2 ea. #6-32x5/16"	—	•	
C1113/42	2	ON OFF	13/16"	13/16"	2"	1.66"	1 1/2"	1 13/32"	4 ea. #6-32x5/16"	—	•	
C1113/43	3	ON OFF	13/16"	13/16"	2"	1.66"	2 1/4"	2 5/32"	6 ea. #6-32x5/16"	—	•	

NOTES: For multiple breakers with a single trigger actuator, use part number C1113/40 or 1113/40. Assembly consists of boot and SEELSKREW self-sealing mounting screws.

Selecting the Correct Part Number

First determine the correct number of poles. Will it be front or back-of-panel mounted? This will determine which chart on the page to choose from. Next, match the screw-hole locations of circuit breaker to the boot holes (L3). Proceed with other dimensions such as height, etc. For additional information, visit our web site's PDF/CAD drawings section.

Bushing Seals for Sealed Circuit Breaker Panel Mounting Hole

Protect & Prevent Seepage/Leakage Through Circuit Breaker Panel Cutout

These reusable self-sealing washers are designed for use with popular sealed circuit breakers. While such sealed breakers are designed to tolerate hostile environments (such as salt spray, wash-downs, lubricating fluids, weather, dust and other contaminants) that may compromise reliable switch operation, *they typically do not seal the panel cutout in which they are mounted.* Hence, these same contaminants may “leak past” the bushing through the panel cutout causing equipment/system failures.

Designed to prevent such leakage, each is fabricated from a stainless steel washer with a bonded high-tear strength silicone rubber sealing ring. The soft resilient ring conforms to the panel surface to seal out harmful contaminants.

- Seals the panel cutout in which the circuit breaker is mounted, protecting behind-panel components from dirt/moisture. No O-ring required.
- Reusable in the event the circuit breaker fails and replacement is needed.
- Easy to install without the need for special tools, sealing compounds, sealing tapes, et al.
- Does not compromise circuit breaker performance.
- Meets stringent Military, UL and Canadian National Standards environmental requirements for electrical enclosures.
- UL Recognized for Type 4X & Type 6 enclosure protection.

SPECIFICATIONS

Material.....Stainless steel with bonded silicone rubber conforms to ZZ-R-765 Class 3. (both sides P/N 60064; one side only P/N 60225)

Temperature Range....-94°F to +400°F (-70°C to +204°C)

MountingEither Front or Behind Panel

Shelf LifeIn excess of 25 years

Resistant to.....Salt spray, sunlight, ozone, weather, fungus, and most acids and lubricating oils

Agency Recognition...UL-Recognized Component to UL Std. 50, Types 1, 2, 3(R)(S), 4(X), 6, 12 & 13. UL Recognition also includes compliance with Canadian National Standards.

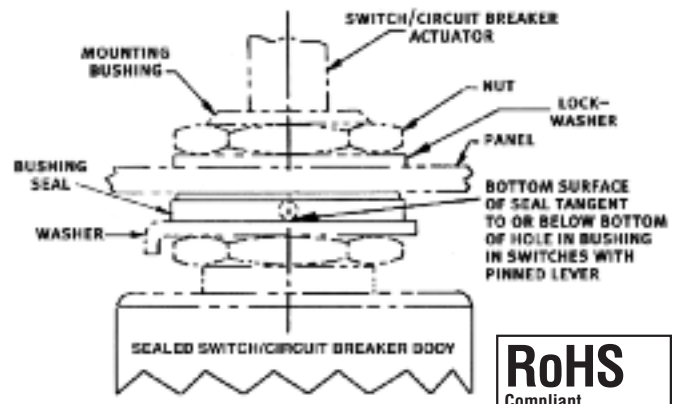
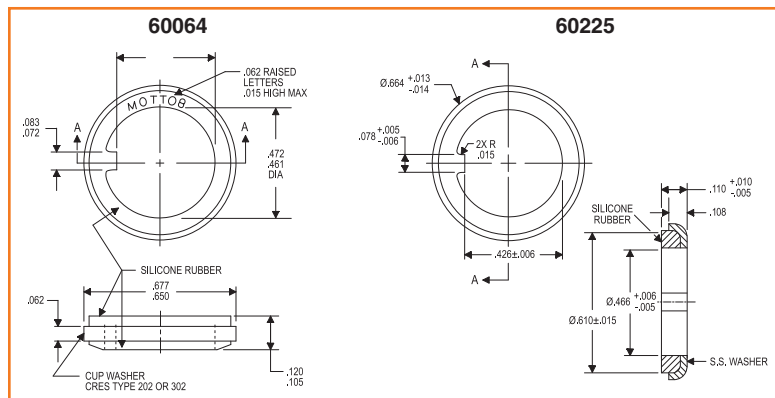
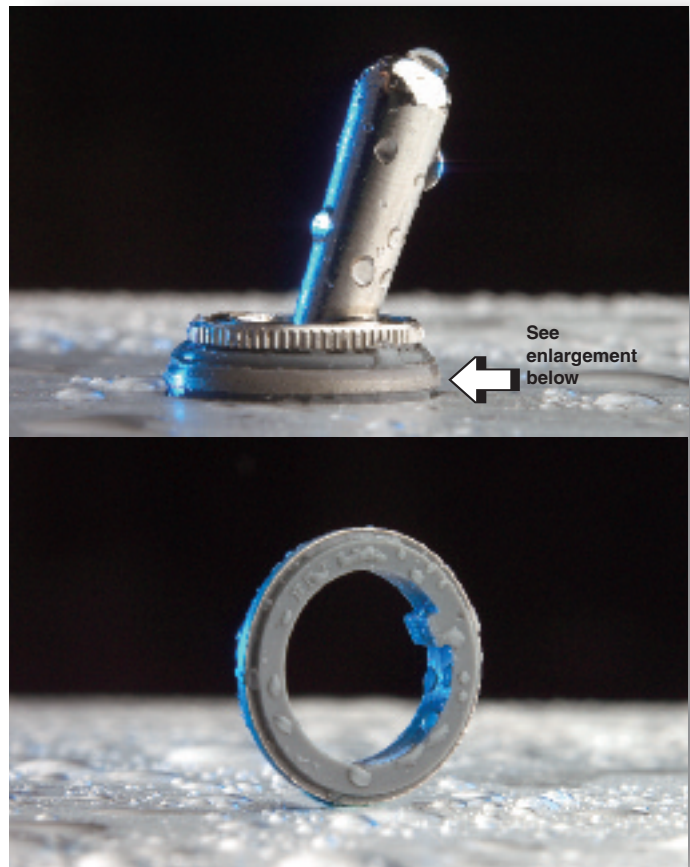
HOW TO ORDER

Specify selected APM boot part number shown in chart below.

APM Part Number	Compatible Switch Bushing	Washer Diameter	Washer Thickness	Color	Approvals
60064 60225	15/32-32	0.677" 0.660"	0.120" 0.105"	Gray	Meets MIL-DTL-5423/16-01, MS25196, UL & ULC Recognized Component

Visit our website for dimensional drawings and to download CAD drawings.

Note: Where the possibility of ice build-up or other contaminants can accumulate in the toggle breaker external actuating mechanism, we recommend using a full silicone sealing boot which will protect the actuator mechanism and keep it operating smoothly, and its perimeter seal will protect the mounting hole from potential seepage.



RoHS
Compliant

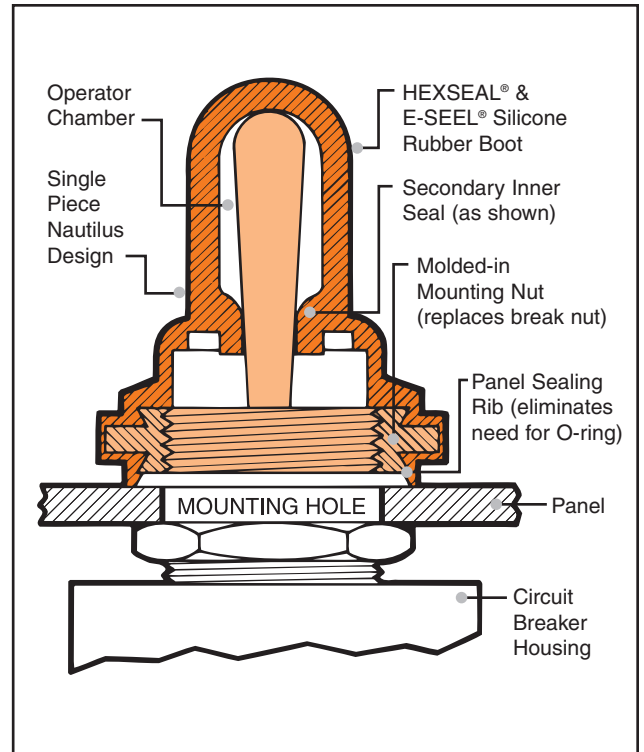
Sealing Boots for Toggle-Actuated Circuit Breakers

HEXSEAL® and E-SEEL® sealing boots for toggle-actuated style circuit breakers are molded from a high tear-strength silicone rubber bonded to a built-in mounting nut. Each encloses the base of the protruding circuit breaker bushing and forms a watertight and dust-tight seal against the front panel surface.

SPECIFICATIONS

Material	HEXSEALS: Silicone rubber conforms to ZZ-R-765 Class III, GR 50 (unless otherwise specified). E-SEELS: Silicone rubber polymer type ASTM D 1418
Mounting Nut	HEXSEALS: Brass, nickel-plated E-SEELS: Brass, black-oxide
Temperature Range	HEXSEALS: -94°F to +400°F (-70°C to +204°C) E-SEELS: -80°F to +400°F (-62°C to +204°C)
Enclosure Protection	NEMA/UL/ULC Types 1, 2, 3, 3S, 3R, 4, 4X, 6P, 12, 13; IEC IP66/IP68
Pressure Range	Exceeds 15 psi internal and 1500 psi external
Operational Life	100,000 actuations (minimum)
Shelf Life	Excess of 25 years
Resistant to	Salt spray, sunlight, ozone, weather, fungus, and most acids and lubricating oils
Military Specs*	Most HEXSEALS meet MIL-DTL-5423 (see selection charts)
Agency Recognition	UL & ULC Recognized Component to UL Std. 50
Installation	Please see installation instructions on page 14

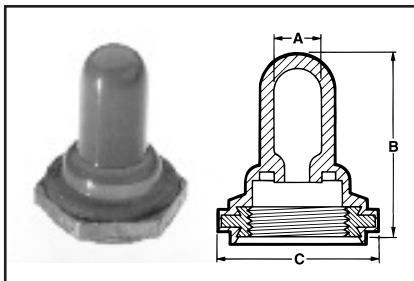
*APM's policy is to manufacture our HEXSEAL® sealing boots as defined by the requirements of MIL-DTL-5423 which we regard as the standard for the switch, circuit breaker and potentiometer industry. These requirements were formulated based on our original patent.



HOW TO ORDER

Specify APM boot part number and, if necessary, the appropriate bushing adaptor part number (please see page 14).

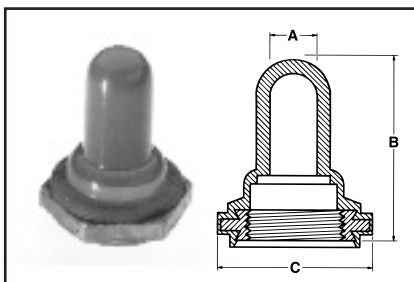
FIGURE 4 Full-Toggle Boot with Integral Secondary Inner Seal – IP66/68 Rated Figure 4



Thread Size	Max. Toggle Height Above Bushing (in.)	A Throat or I.D.		B Height		C Flat		Military Part Number	APM Boot Part Number	Color*	HEXSEAL	E-SEEL
		in.	mm	in.	mm	in.	mm					
1 ⁵ / ₃₂ -32NS-2B	.66	.219	5.55	.844	21.44	.625	15.88	M5423/01-01	N-1030	Gray	•	
1/2-32NS-2B	.66	.219	5.55	.844	21.44	.625	15.88	—	N-1030 1/2-32	Gray	•	
1 ⁵ / ₃₂ -32NS-2B	.71	.219	5.55	.937	23.81	.625	15.88	—	C1131/27	Black		•

*Other colors available. Please consult factory.

FIGURE 5 Full-Toggle Boots (with constant I.D.) – IP66/68 Rated Figure 5

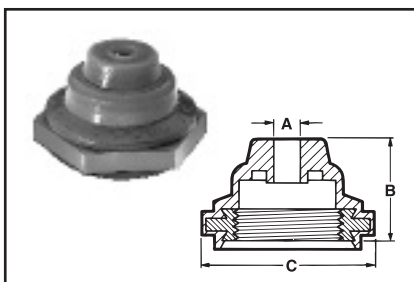


Thread Size	Max. Toggle Height Above Bushing (in.)	A Throat or I.D.		B Height		C Flat		Military Part Number	APM Boot Part Number	Color*	HEXSEAL	E-SEEL
		in.	mm	in.	mm	in.	mm					
1 ⁵ / ₃₂ -32NS-2B	.66	.219	5.55	.844	21.44	.625	15.88	—	IN-1030	Gray	•	
1/2-32NS-2B	.66	.219	5.55	.844	21.44	.625	15.88	—	IN-1030 1/2-32	Gray	•	
1 ⁵ / ₃₂ -32NS-2B	.71	.219	5.55	.937	23.81	.625	15.88	—	C1132/28	Black		•

*Other colors available. Please consult factory.

Mounting nut material: Aluminum

FIGURE 6 Half-Toggle Boots (toggle actuator protrudes) – IP66/68 Rated Figure 6



Thread Size	Toggle Diameter Accommodated (in.)	A Throat or I.D.		B Height		C Flat		Military Part Number	APM Boot Part Number	Color*	HEXSEAL	E-SEEL
		in.	mm	in.	mm	in.	mm					
1 ⁵ / ₃₂ -32NS-2B	.155-.240	.078	1.98	.437	11.10	.625	15.88	M5423/02-01	N-1030B	Gray	•	
1/2-32NS-2B	.155-.240	.078	1.98	.437	11.10	.625	15.88	—	N-1030B 1/2-32	Gray	•	
1 ⁵ / ₃₂ -32NS-2B	.155-.240	.078	1.98	.437	11.10	.625	15.88	—	C1132/20	Black		•

*Other colors available. Please consult factory.

DIMENSIONS FOR REFERENCE ONLY.

Current dimensional drawings can be viewed on our website and CAD drawings can also be downloaded.



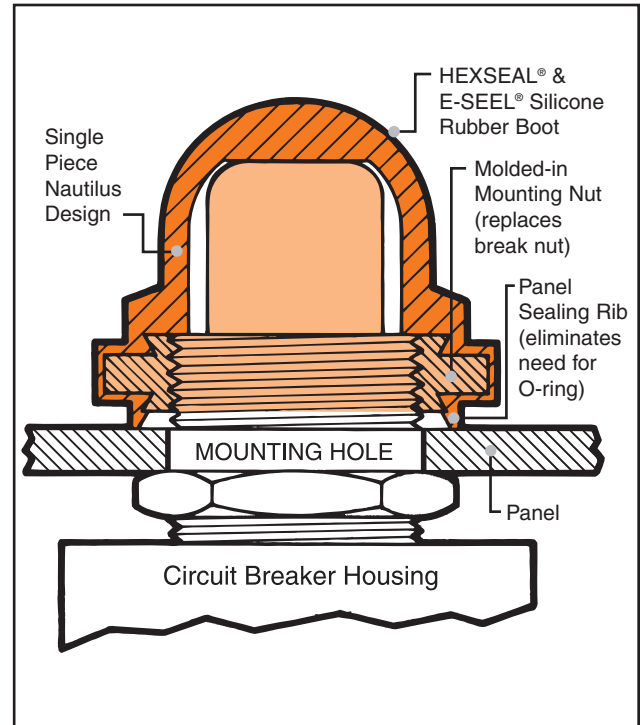
Sealing Boots for Pushbutton-Actuated Circuit Breakers

HEXSEAL® and E-SEEL® sealing boots for pushbutton actuated style circuit breakers are molded from a high tear-strength silicone rubber bonded to a built-in mounting nut. Each encloses the base of the protruding circuit breaker bushing and forms a watertight and dust-tight seal against the front panel surface.

SPECIFICATIONS

Material	HEXSEALS: Silicone rubber conforms to ZZ-R-765 Class III, Gr. 60 unless otherwise specified. E-SEELS: Silicone rubber polymer type ASTM D1418
Mounting Nut	HEXSEALS: Brass, nickel-plated E-SEELS: Brass, black-oxide
Temperature Range	HEXSEALS: -94°F to +400°F (-70°C to +204°C) E-SEELS: -80°F to +400°F (-62°C to +204°C)
Enclosure Protection ..	NEMA/UL/ULC Types 1, 2, 3, 3S, 3R, 4, 4X, 6P, 12, 13; IEC IP66/IP68
Pressure Range	Exceeds 15 psi internal and 1500 psi external
Operational Life	100,000 actuations (minimum)
Shelf Life	Excess of 25 years
Resistant to	Salt spray, UV, sunlight, ozone, weather, fungus, and most acids and lubricating oils
Military Specs*	Most HEXSEALS meet MIL-DTL-5423 (see selection charts)
Agency Recognition ...	UL & ULC Recognized Component to UL Std. 50
Installation	Please see installation instructions on page 14

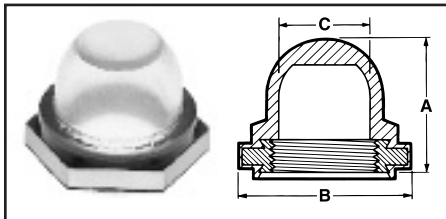
*APM's policy is to manufacture our HEXSEAL® sealing boots as defined by the requirements of MIL-DTL-5423 which we regard as the standard for the switch, circuit breaker and potentiometer industry. These requirements were formulated based on our original patent.



HOW TO ORDER

Specify APM boot part number and, if necessary, the appropriate bushing adaptor part number (please see page 14).

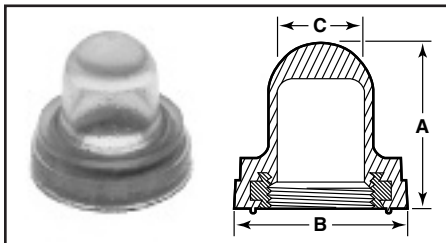
FIGURE 7 Full Pushbutton Boots – IP66/68 Rated



Thread Size	Max. Plunger Height		A		B Flat		C I.D.		Military Part Number	APM Boot Part Number	Color*	HEXSEAL	E-SEEL
	inch	mm	inch	mm	inch	mm	inch	mm					
3/8-27NS-2B	.545	13.80	.653	16.60	.500	12.70	.300	7.60	—	1231/8	Clear	•	
3/8-32NEF-2B	.545	13.80	.653	16.60	.500	12.70	.300	7.60	—	1231/35	Clear	•	
7/16-28NEF-2B	.438	11.11	.719	18.26	.625	15.88	.422	10.72	—	NC3030 7/16-28	Clear	•	
7/16-32UN-2B	.438	11.11	.719	18.26	.625	15.88	.422	10.72	—	NC3030 7/16-32	Gray	•	
15/32-32NS-2B	.281	7.14	.547	13.89	.625	15.88	.422	10.72	M5423/07-01	N3030	Gray	•	
15/32-32NS-2B	.281	7.14	.547	13.89	.625	15.88	.422	10.72	M5423/07-11	N3030-2513	Clear	•	
15/32-32NS-2B	.438	11.11	.719	18.26	.625	15.88	.422	10.72	M5423/07-02	NC3030	Gray	•	
15/32-32NS-2B	.438	11.11	.719	18.26	.625	15.88	.422	10.72	M5423/07-12	NC3030-2513	Clear	•	
1/2-32NS-2B	.281	7.14	.547	13.89	.625	15.88	.422	10.72	M5423/07-03	NH3030	Gray	•	
1/2-32NS-2B	.188	4.76	.547	13.89	.625	15.88	.422	10.72	M5423/07-05	NH3030S	Gray	•	
1/2-32NS-2B	.469	11.91	.734	18.65	.625	15.88	.422	10.72	—	NC3030H	Gray	•	
15/32-32NS-2B	.281	7.14	.547	13.89	.625	15.88	.422	10.72	—	C1231/41	Black	•	•
15/32-32NS-2B	.438	11.11	.719	18.26	.625	15.88	.422	10.72	—	C1231/42	Black	•	•

*Additional colors available. Please consult factory.

FIGURE 8

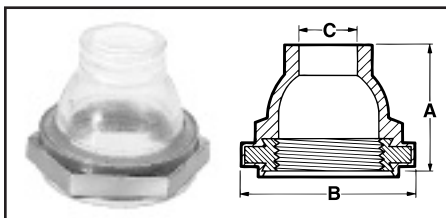


Full Pushbutton Boots – IP66/68 Rated

Thread Size	Max. Plunger Height		A		B		C I.D.		Military Part Number	APM Boot Part Number	Color*	HEXSEAL	E-SEEL
	inch	mm	inch	mm	inch	mm	inch	mm					
3/8-27NS-2B	.330	8.38	.609	15.48	.641	16.27	.320	8.11	—	1221/12	Gray	•	
15/32-32NS-2B	.400	10.14	.719	18.26	.766	19.45	.375	9.53	—	1221/15	Gray	•	
3/8-32NEF-2B	.330	8.38	.609	15.48	.641	16.27	.320	8.11	—	C1221/20	Clear	•	•
3/8-24NF-2B	.330	8.38	.609	15.48	.641	16.27	.320	8.11	—	C1221/22	Clear	•	•
3/8-27NS-2B	.330	8.38	.609	15.48	.641	16.27	.320	8.11	—	C1221/21	Black	•	•
3/8-27NS-2B	.330	8.38	.609	15.48	.641	16.27	.320	8.11	—	C1221/21 4	Clear	•	•
3/8-32NEF-2B	.330	8.38	.609	15.48	.641	16.27	.320	8.11	—	C1221/23	Clear	•	•

*Additional colors available. Please consult factory. Mounting nut material: Aluminum

FIGURE 9



Half Pushbutton Boots (Pushbutton Actuator Protrudes) – IP65 Rated

Thread Size	A Height		B Flat		C Throat		Military Part Number	APM Boot Part Number	Color	HEXSEAL	E-SEEL
	inch	mm	inch	mm	inch	mm					
7/16-28NS-2B	.547	13.89	.625	15.88	.250	6.35	—	N3030B 7/16-28	Clear	•	•
7/16-32NS-2B	.547	13.89	.625	15.88	.250	6.35	—	N3030B 7/16-32	Clear	•	•
15/32-32NS-2B	.547	13.89	.625	15.88	.250	6.35	—	N3030B**	Clear	•	•
1/2-32NS-2B	.547	13.89	.625	15.88	.250	6.35	—	NH3030B	Clear	•	•

**N3030B may be used with MS 25244(ASG); MS 24510 (USAF) and model MP-1500 manufactured by Mechanical Products, Inc.

DIMENSIONS FOR REFERENCE ONLY.

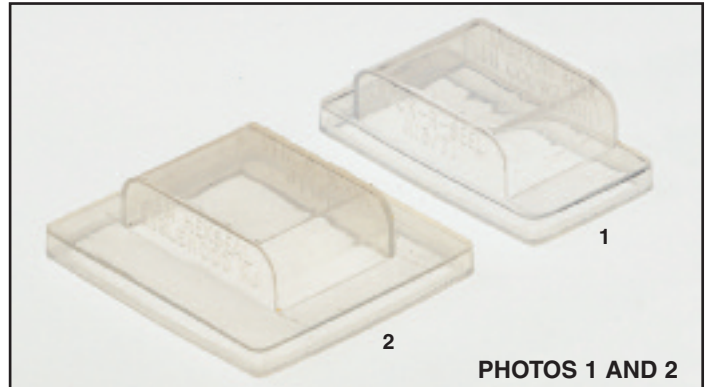
Current dimensional drawings can be viewed on our website and CAD drawings can also be downloaded.

Sealing Boots for Rocker-Style Circuit Breakers

E-SEEL® (Rock-R-Seal™) boots for rocker-style circuit breakers are made of RUBRGLAS™, APM's proprietary high tear-strength, transparent silicone rubber. These durable and flexible boots lock out dust, dirt, and moisture ... without compromising circuit breaker operability, position status viewing or legend visibility. Each is designed to fully enclose the breaker bezel, while our unique molded-in "panel sealing rib" forms a water resistant and dust-tight seal against the front panel surface.

SPECIFICATIONS

MaterialAPM RUBRGLAS™ (transparent silicone rubber), polymer type, ASTM D1418
Temperature Range.....-80°F to +400°F (-62°C to +204°C)
Operational Life50,000 actuations (minimum)
Resistant to.....Salt spray, UV, sunlight, ozone, weather, fungus, and most acids and lubricating oils
Agency Recognition...UL-Recognized Component to UL Std. 50, Types 1, 2, 3R, 5, 12(K) & 13. UL Recognition also includes compliance with Canadian National Standards.
Shelf LifeExcess of 25 years



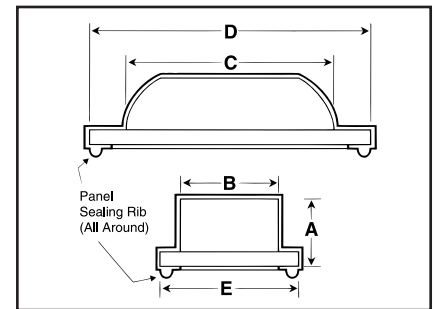
HOW TO ORDER

Specify APM boot part number.

Photo #	E-SEEL Part #	Dimensions										IP Rating	Compatible with These Manufacturers (Partial List)
		A		B		C		D		E			
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		
1	C1113/71	.413	10.49	.687	17.46	1.046	26.59	1.327	36.51	.703	17.86	IP55	Carling Technologies M Series Airpax Eaton/Heinemann R11 LC-1
2	C1113/75	.413	10.49	.687	17.46	1.046	26.59	1.437	36.51	1.390	35.32	IP55	Carling Technologies M Series Airpax Eaton/Heinemann R21 LC-2

NOTE: Other rocker-style switch and circuit breaker boots are available. Please consult factory.

FIGURE 10



Rocker-Actuated Front Panel Mounted Boots

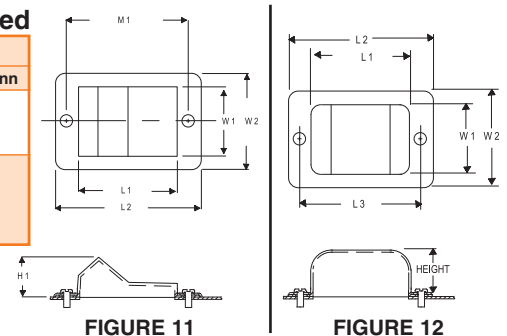
IP66/68 Rated

APM Part No.	No. of Poles	Height	L1	L2	L3	W1	W2	Slotted SEELSKREWS Provided	Compatible with these manufacturers			
									Airpax	Carling	CBI	Heinemann
HE1010 (Fig. 11)	1	0.45	1.30	1.09	1.66	0.80	1.20	2 ea #6-32x3/8	IAGBX, IUGBX, IEGBX, IALBX, IULBX, IELBX		C-Frame DD-Frame	
HE1045 (Fig. 12)	1	0.45	1.30	1.90	1.66	0.80	1.20	2 ea #6-32x3/8	IALZX, IULZX, IELZX, IMLZX, IAGZX, IUGZX, IEGZX	AC, AF, CC, CF		JCS

NOTE: Assembly consists of Boot, Frame, and slotted Seelskrew self-sealing mounting screws.

DIMENSIONS FOR REFERENCE ONLY.

Current dimensional drawings can be viewed on our website and CAD drawings can also be downloaded.



Meets Military Specifications*

Lever-Actuated Circuit Breaker Boots

Gov't. Designation	APM P/N	Page
M5423/13-01	HE1076	8, 9
M5423/13-02	HE1077	8, 9
M5423/13-03	HE1075/3	8, 9
M5423/14-01	HE1040	8, 9
M5423/14-02	HE1035	8, 9
M5423/14-03	HE1070	8, 9
M5423/14-04	HE1080	8, 9
M5423/14-05	HE1015	8, 9

Lever-Actuated Circuit Breaker Boots

Gov't. Designation	APM P/N	Page
M5423/14-05T	HE1015T	8, 9
M5423/14-06	HE1020	8, 9
M5423/14-06T	HE1020T	8, 9
M5423/14-07	HE1050	8, 9
M5423/14-07T	HE1050T	8, 9
M5423/14-08	1113/26	8, 9
M5423/14-08T	1113/26T	8, 9
MIL-C-17361		
AQB-A50 AQB-A101	1077	8, 9

Toggle-Actuated Circuit Breaker Boots

Gov't. Designation	APM P/N	Page
M5423/01-01	N1030	11
M5423/02-01	N1030B	11

Pushbutton-Actuated Circuit Breaker Boots

Gov't. Designation	APM P/N	Page
M5423/07-01	N3030	12
M5423/07-11	N3030-2513	12
M5423/07-02	NC3030	12
M5423/07-12	NC3030-2513	12
M5423/07-03	NH3030	12
M5423/07-05	NH3030S	12

Sealed Switch Sealing Bushings

Gov't. Designation	APM P/N	Page
M5423/16-01	60064	10
M5423/16-01	60225	10

*APM's policy is to manufacture our HEXSEAL® sealing boots as defined by the requirements of MIL-DTL-5423 which we regard as the standard for the switch, circuit breaker and potentiometer industry. These requirements were formulated based on our original patent.

Installation Instructions for Lever-Actuated Circuit Breaker Seals

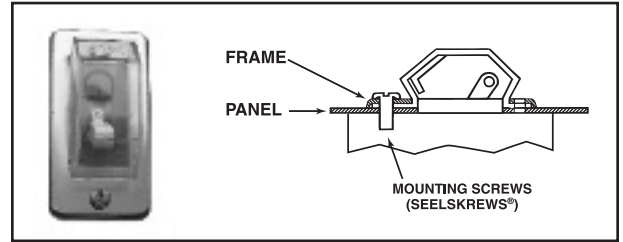
FRONT-PANEL MOUNT WITH FRAME (Figure 11)

For APM part numbers:

HE-1015 HE-1020T HE-1050 HE-1080 1113/60 CT-1050
 HE-1015T HE-1035 HE-1050T 1113/26 CT-1015
 HE-1020 HE-1040 HE-1070 1113/26T CT-1020

1. Place boot through opening in frame and nest boot flange into frame.
2. Insert circuit breaker from back of panel.
3. Place boot and frame assembly over the breaker from the front of panel taking care to align "ON" position of breaker actuator.
4. Insert SEELSKREWS® and draw frame firmly into place.

FIGURE 11



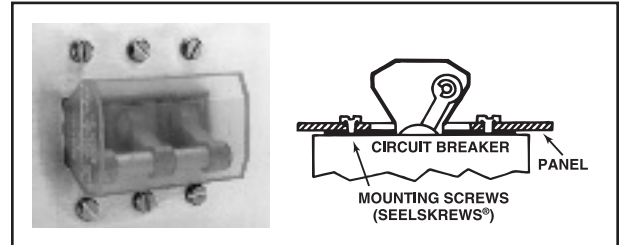
BACK-OF-PANEL MOUNT (no frame required) (Figure 12)

For APM part numbers:

HE-1073 HE-1076 HE-1078 1113/42 C1113/40 C1113/43
 HE-1075/3 HE-1077 1113/40 1113/43 C1113/42

1. With circuit breaker in "OFF" position, place boot over the breaker actuator. Boot flange should match circuit breaker top and not interfere with the actuator.
2. Align boot and breaker assembly with panel mounting hole with breaker actuator protruding through the panel opening.
3. Insert SEELSKREWS® and draw assembly firmly into place.

FIGURE 12



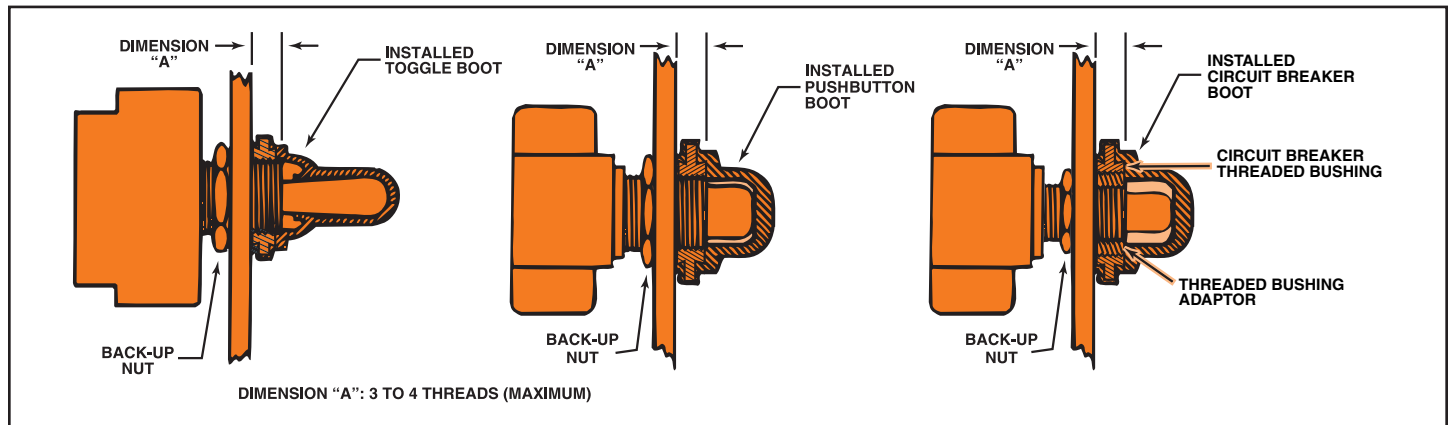
Installation Instructions for Threaded Circuit Breaker Seals

Recommended installation instructions for installing threaded HEXSEAL® and E-SEEL® circuit breaker boots:

1. Remove front mounting nut from circuit breaker bushing.
2. Put threaded bushing through panel.
3. Adjust back-up nut to allow the specified number of threads to protrude past front of panel (Dimension "A").
4. If needed, install appropriate bushing adaptor (See selection chart below).
5. Install circuit breaker boot.

Recommended installation tools:

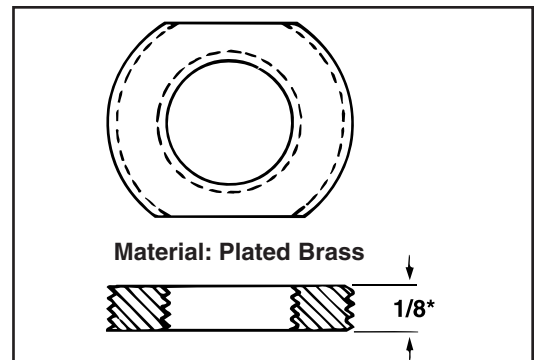
1. Six point hex socket wrench (for boots with molded-in hex mounting nut)
2. Adjustable wrench (without serrated jaws)



Threaded Bushing Adaptors

Inside (Bushing) Thread Size (Class 2B)	Outside (Boot) Thread Size (Class 2A)	APM Part Number
3/8-32	15/32-32	2500/1/5*
15/32-32	11/16-32	2500/1/7
1/2-32	11/16-32	2500/1/10
15/32-32	13/16-32	2500/1/8
1/2-24	13/16-32	2500/1/9
5/8-24	13/16-32	2500/1/11
5/8-24	7/8-32	2500/1/12
3/4-32	7/8-32	2500/1/13*
3/4-20	7/8-32	2500/1/14*

*5/32" thick. Additional sizes, including metric, available. Please consult factory.



Self-Sealing Fasteners with Optional Self-Locking



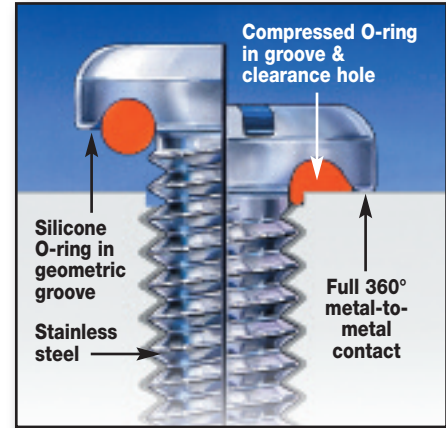
**Sealing
under
pressure/
vacuum to
20,000 psig**

**RoHS
Compliant**

**DFARS
Compliant**

UL US
UL Recognized Component
Also meets Canadian
requirements

Made in USA



SEELSKREW® High-pressure, self-sealing panel screws

- STANDARD PAN HEAD — Type S Slotted
- OVERSIZED PAN HEAD — Type SL Oversized
- METRIC PAN HEAD — Type S/SM Slotted
- 6-LOBE PAN HEAD — Tamper resistant
- SIZES: #2 to 1/4 (Metric sizes available)
- STANDARD PAN HEAD — Type R Phillips Recessed
- METRIC PAN HEAD — Type RM Phillips Recessed
- FLAT HEAD — Type SFR Phillips Recessed
- OPTIONAL THREADLOCKING
- METRIC M2 to M6



SEELBOLTS® High-pressure, self-sealing bolts

- TYPE ST HEXAGON HEAD
- TYPE SB & AN
- METRIC M3 to M12
- OPTIONAL THREADLOCKING

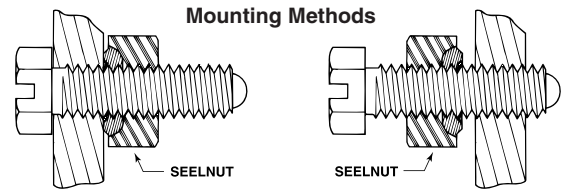
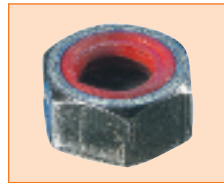
Sizes: 1/4" to 1/2" (Metric sizes available)



SEELNUTS® / JAM-NUTS® High-pressure, self-sealing locking nuts

- METRIC M3 to M20
- OPTIONAL THREADLOCKING

Sizes: 6-32 to 5/8-18 (Metric sizes available)



SEELRIVETS® High-pressure, self-sealing rivets

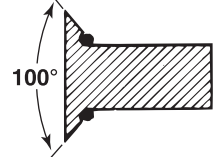
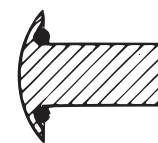
- TYPE SRU
- TYPE SRC

Sizes: 1/8" to 3/8" (Metric sizes available)



Universal Head

Flat Head

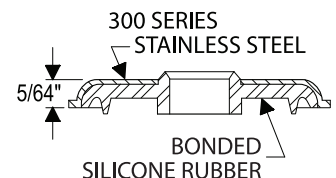


SEELOC® WASHERS

Vibration-resistant, self-sealing washers

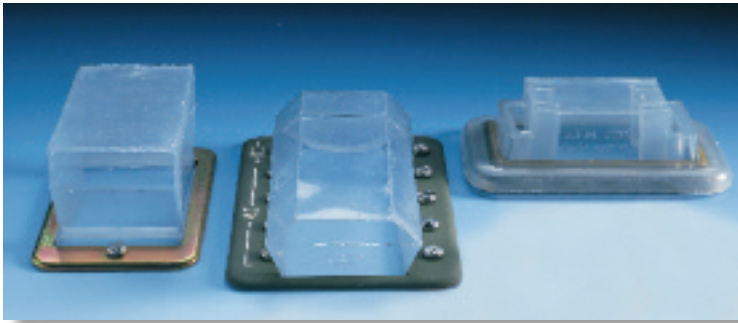
- Pressure Range Exceeds 100psi Internal/External
- Temperature Range -100°F to +500°F (-73°C to +260°C)

Sizes: #6 to 1/2; O.D. 1/2" to 1 1/2" (Metric sizes available)



Custom Circuit Breaker Seals

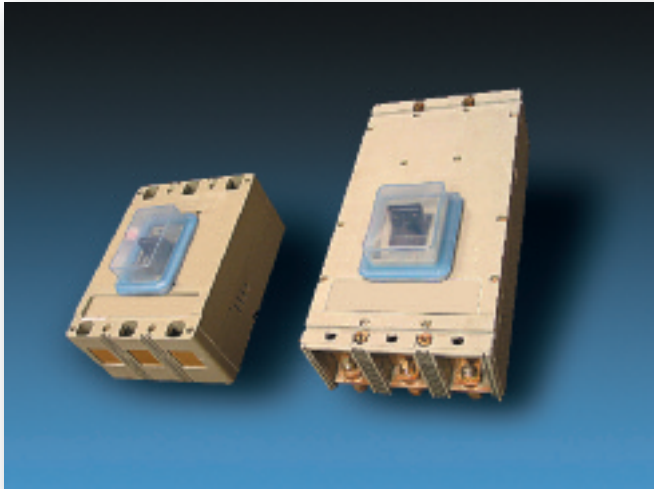
This catalog defines and displays proven circuit breaker sealing boots. They are matched to standard breaker models from leading United States and European breaker manufacturers. Should you have an application that does not



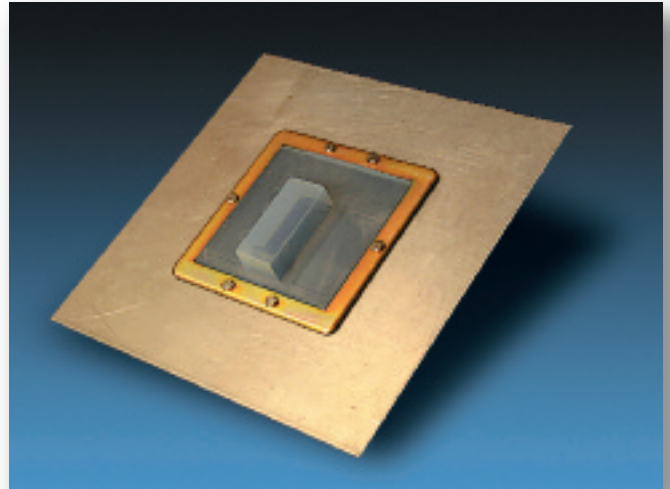
conform to these standard designs, APM would be pleased to assist you in modifying an existing boot design or design and build a completely new sealing boot assembly from the

ground up. Our Fast-Track Prototype Mold Method assures quick and economical solutions. To further coordinate and compliment your special requirements, custom graphics can be incorporated as part of the boot mold and panel matching colors with

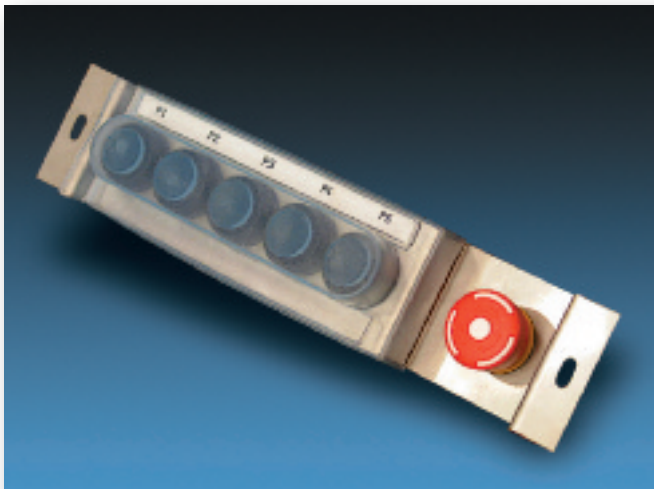
graphic identification instructions (as shown on the center boot in the picture above) can be etched onto the mounting frame.



Surface mounted sealing boots for 250 Amp & 400 Amp Circuit Breakers. Mounted on custom power supply system enclosures for military application.



Modified boot and mounting frame configuration for 30 Amp circuit breaker mounted onto security equipment power system enclosure.



Vehicle production work station panel sealing-shield for bank of circuit breakers to protect from spillage from alcohol, soapy water, antifreeze and brake fluids.



Push-Pull circuit breaker boots to mate with a wide variety of standard push-pull breakers from leading circuit breaker manufacturers.



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