

Sealing Boots for Pushbutton-Actuated Switches

HEXSEAL® and E-SEEL® pushbutton boots are molded from a high tear-strength silicone rubber bonded to a built-in mounting nut (other materials available for specific environments). Each encloses the base of the protruding switch bushing and forms a watertight and dust-tight seal against the front panel surface.

SPECIFICATIONS

Material	HEXSEALS: Silicone rubber conforms to A-A-59588, Class 3B, Grade 50 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, sunlight, ozone, weather, fungus, and most acids and lubricating oils
Military Specs*	Most HEXSEALS meet MIL-DTL-5423. (See listing on page 6)
Agency Recognition	UL & ULC Recognized Component to UL Std. 50
Installation	Please see installation instructions on page 19

*APM's policy is to manufacture our HEXSEAL® sealing boots as defined by the requirements of MIL-Spec 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 19).

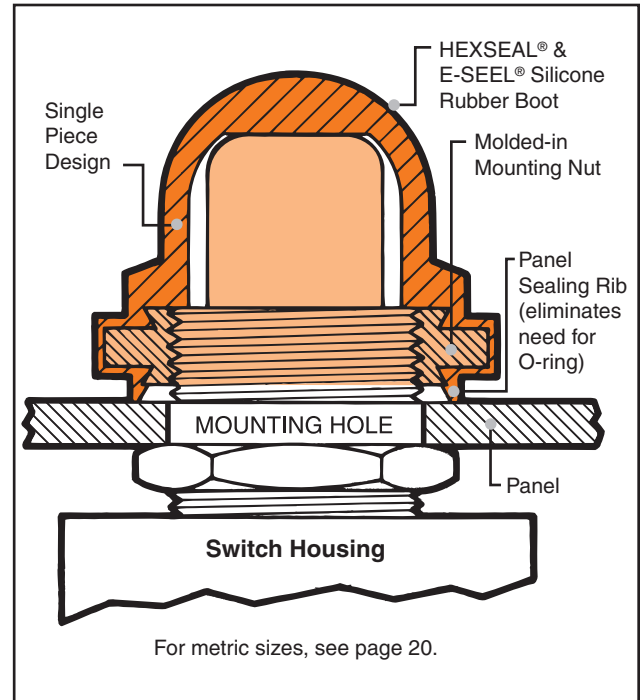


FIGURE 8 Full Pushbutton Boots – IP66/68 Rated

Figure 8

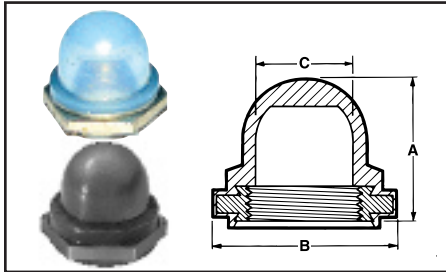


FIGURE 9

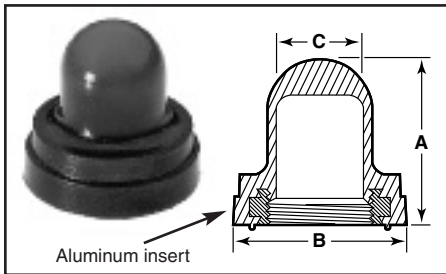
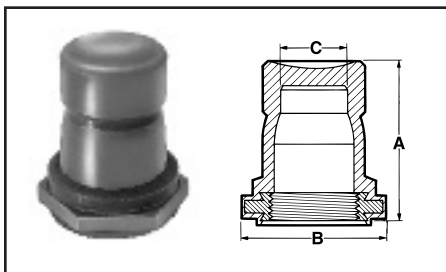


FIGURE 10



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					
8-40 NS-2B	.118	3.00	.226	5.70	.250	6.35	.125	3.18	—	1231/17	Gray	•	•
8-40 NS-2B	.188	4.76	.297	7.54	.250	6.35	.120	3.18	SCL6303A-03	N5045	Gray	•	•
1/4-32NS-2B	.203	5.16	.313	7.94	.375	9.53	.188	4.76	M5423/10-01	N5040G	Gray	•	•
1/4-32NS-2B	.453	11.51	.531	13.49	.375	9.53	.125	3.18	—	1231/32	Gray	•	•
1/4-40NS-2B	.141	3.57	.313	7.94	.375	9.53	.188	4.76	M5423/10-03	N5040	Gray	•	•
1/4-40NS-2B	.203	5.16	.313	7.94	.375	9.53	.188	4.76	M5423/10-02	N5040R	Gray	•	•
1/4-40NS-2B	.344	11.51	.531	13.49	.375	9.53	.125	3.18	—	1231/31	Gray	•	•
5/16-32UNEF-2B	.212	5.41	.359	9.13	.437	11.11	.156	3.97	—	1231/27	Gray	•	•
7/16-32UN-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	•	•
5/8-24NEF-2B	.281	7.14	.609	15.48	.750	19.05	.515	13.10	M5423/07-04	N3040	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	•	•

IP66/68 Rated Figure 9

Thread Size	Max. Plunger Height		A		B O.D.		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	•	•
3/8-24NF-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	•	•

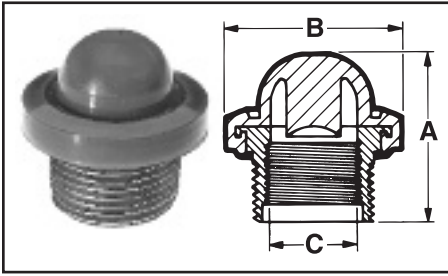
Mounting nut material: Aluminum

IP66/68 Rated Figure 10

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					
7/16-28UNEF-2B	.313	7.94	.797	20.24	.625	15.88	.344	8.73	—	NC3030FL 7/16-28	Gray	•	•
7/16-32UN-2B	.313	7.94	.797	20.24	.625	15.88	.344	8.73	—	NC3030FL 7/16-32	Gray	•	•
15/32-32NS-2B	.313	7.94	.797	20.24	.625	15.88	.344	8.73	—	NC3030FL	Gray	•	•

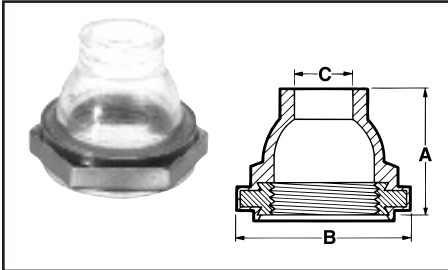
*Other colors available. Please consult factory.

DIMENSIONS FOR REFERENCE ONLY. Current dimensional drawings can be viewed on our website and CAD drawings can also be downloaded.

FIGURE 11 Panel-Mounted Full Pushbutton Boots – IP66/68 Rated
Figure 11


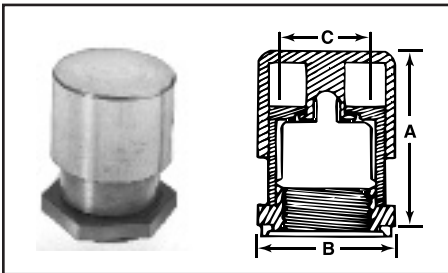
Outside Thread	Plunger-Bushing Height		A		B O.D.		C Inside Thread	Military Part Number	APM Boot Part Number	Color*	HEXSEAL	E-SEAL
	inch	mm	inch	mm	inch	mm						
5/8-27NS-2A	.438	11.12	.844	21.44	.875	22.23	1/2-32NS-2B	M5423/06-01†	3070	Gray	•	
5/8-24NEF-2A	.438	11.12	.844	21.44	.875	22.23	1/2-32NS-2B	M5423/06-03	3073	Gray	•	
5/8-27NS-2A	.688	17.47	.844	21.44	.875	22.23	1/2-32NS-2B	M5423/06-02†	3075	Gray	•	
5/8-24NEF-2A	.688	17.47	.844	21.44	.875	22.23	1/2-32NS-2B	M5423/06-04	3077	Gray	•	

*Other colors available. Please consult factory. †Inactive for new designs.

FIGURE 12 Half-Pushbutton Boots (Pushbutton Actuator Protrudes) – IP66/68 Rated
Figure 12


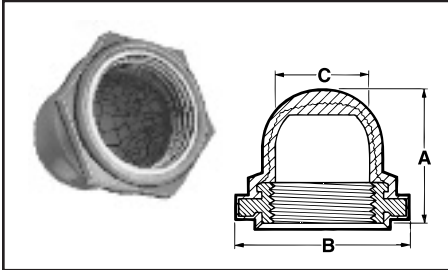
Thread Size	A Height		B Flat		C Throat		Military Part Number	APM Boot Part Number	Color*	HEXSEAL	E-SEAL
	inch	mm	inch	mm	inch	mm					
7/16-28NS-2B	.547	13.89	.625	15.88	.250	6.35	—	N3030B 7/16-28	Clear	•	
7/16-32UN-2B	.547	13.89	.625	15.88	.250	6.35	—	N3030B 7/16-32	Clear	•	
15/32-32NS-2B	.547	13.89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

*Other colors available. Please consult factory.

FIGURE 13 Armored Pushbutton Boots – IP66/68 Rated
Figure 13


Thread Size	Plunger Height		A		B Flat		C I.D.		Military Part Number	APM Boot Part Number	Color	HEXSEAL	E-SEAL
	inch	mm	inch	mm	inch	mm	inch	mm					
15/32-32NS-2B	.438	11.11	.984	25.00	.750	19.05	.422	10.72	—	1238/1 SS	††	•	
15/32-32NS-2B	.438	11.11	.984	25.00	.750	19.05	.422	10.72	—	1238/5* SS	††	•	

*P/N 1238/5 features a 1 1/4" diameter actuator button.
††Stainless steel housing with silicone boot.

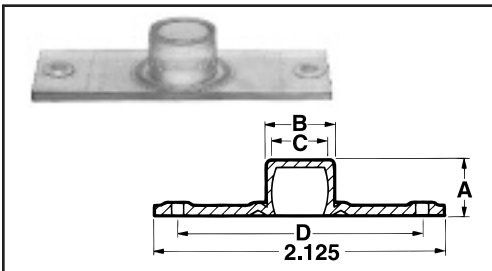

FIGURE 14 EMI/RFI Shielded Full Pushbutton Boots – IP66/68 Rated
Figure 14


Thread Size	Plunger Height		A		B Flat		C I.D.		Military Part Number	APM Boot Part Number	Color*	HEXSEAL	E-SEAL
	inch	mm	inch	mm	inch	mm	inch	mm					
15/32-32NS-2B	.281	7.14	.547	13.89	.625	15.88	.422	10.72	M5423/07-06	N3030RFI	Gray	•	
15/32-32NS-2B	.438	11.11	.719	18.26	.625	15.88	.422	10.72	M5423/07-07	NC3030RFI	Gray	•	
1/2-32NS-2B	.281	7.14	.547	13.89	.625	15.88	.422	10.72	M5423/07-08	NH3030RFI	Gray	•	
1/2-32NS-2B	.188	4.76	.547	13.89	.625	15.88	.422	10.72	M5423/07-10	NH3030SRFI	Gray	•	
5/8-24NEF-2B	.281	7.14	.609	15.48	.750	19.05	.516	13.10	M5423/07-09	N3040RFI	Gray	•	
1/2-32NS-2B	.469	11.91	.734	18.65	.625	15.88	.422	10.72	—	NC3030HRFI	Gray	•	

*Other colors available. Please consult factory.

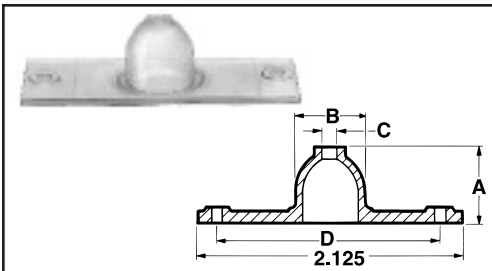
All standard EMI/RFI boots feature a molded knitted Monel shield. EMI/RFI shielded pushbutton boots have an operational life of 15,000 actuations (minimum)

Back-of-Panel Mounted Pushbutton Boots

FIGURE 15 Full Pushbutton Boots
Figure 15


A Height		B O.D.		C		D Hole Locations		Width		Military Part Number	APM Boot Part Number	Color	HEXSEAL	E-SEAL
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm					
.906	23.02	.531	13.49	.453	11.51	1.813	46.04	.750	19.05	—	3050	Clear	•	
.399	10.13	.438	11.11	.359	9.13	1.813	46.04	.750	19.05	—	3051	Clear	•	

Part numbers in this group conform to A-A-59588 Gr. 50.

FIGURE 16 Half Pushbutton Boots (Pushbutton Actuator Protrudes)
Figure 16


A Height		B O.D.		C Throat		D Hole Locations		Width		Military Part Number	APM Boot Part Number	Color	HEXSEAL	E-SEAL
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm					
.578	14.68	.531	13.49	.156	3.97	1.813	46.04	.750	19.05	—	3050B	Clear	•	

Part numbers in this group conform to A-A-59588 Gr. 50.

DIMENSIONS FOR REFERENCE ONLY.

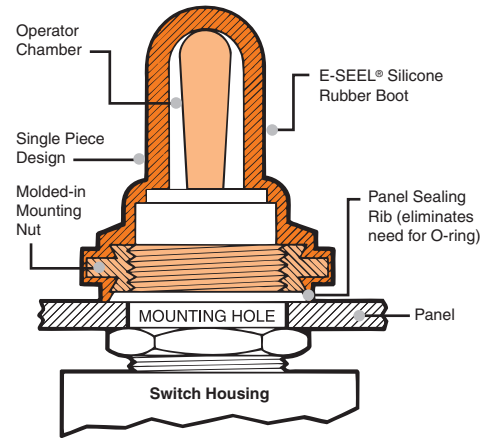
Current dimensional drawings can be viewed on our website and CAD drawings can also be downloaded.



METRIC Sizes for Toggle, Pushbutton and Rotary Switches and Circuit Breakers

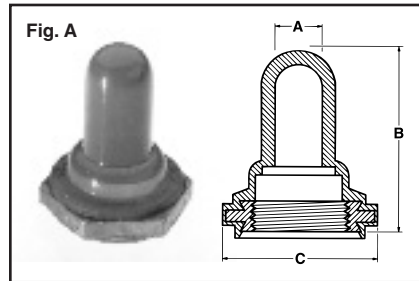
SPECIFICATIONS

Material.....Silicone rubber polymer type ASTM D 1418
Mounting Nut Brass, black-oxide. *Brass, nickel-plated.
Temperature Range....-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
Agency Recognition...UL & ULC Recognized Component to UL Std. 50
Installation.....Please see installation instructions on page 19



Additional metric sizes available (consult factory)

TOGGLE SWITCH BOOTS



IP66/IP68/NEMA 6P Enclosure Protection

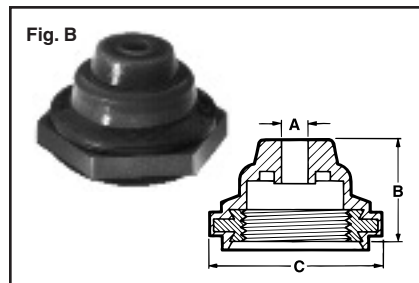
Full Toggle (with Constant I.D.) Switch Boots (covers all external portions of switch & seals switch mounting hole)

Figure A

Thread Size	Throat Size ¹ ("A")		Max Toggle Height ²		Max Boot Height ("B")		Flat ("C")		Color	APM Cat. No.
	mm	in.	mm	in.	mm	in.	mm	in.		
M6 X 0.75	2.9	0.116	10.8	0.43	14.3	0.562	9.0	0.352	Black	1131/25*
M12 X 0.75	5.3	0.21	16.2	0.64	21.6	0.85	15.8	0.625	Black	C1131/41
M12 X 0.75	5.5	0.219	22.8	0.90	27.7	1.1	15.8	0.625	Black	1131/26-M12-.75
M12 X 1	6.5	0.256	16.7	0.66	21.4	0.844	15.8	0.625	Black	1131/31-M12
M12 X 1	5.9	0.234	16.9	0.66	21.8	0.859	15.8	0.625	Black	1131/40
M12 X 1	5.5	0.219	22.8	0.90	27.7	1.1	15.8	0.625	Black	1131/26-M12-.10

¹ Throat size is the maximum diameter of the switch toggle/handle (Dimension "A").

² Max toggle height is the maximum distance from the end of the switch mounting stem to the end of the switch toggle.



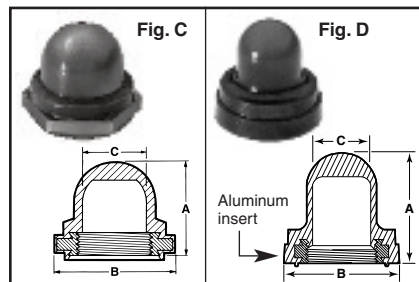
IP66/IP68/NEMA 6P Enclosure Protection

Half Toggle Switch Boots (Seals switch mounting stem & hole; toggle actuator protrudes)

Figure B

Thread Size	Throat Size ("A")		Toggle Diameter Accommodated		Max Boot Height ("B")		Flat ("C")		Color	APM Cat. No.
	mm	in.	mm	in.	mm	in.	mm	in.		
M5 X 0.5	1.1	0.42	1.57-4.57	0.062-0.18	5.7	0.225/0.25	7.9	0.313	Black	1132/17-M5-5
M12 X 1	2.36	0.093	2.92-6.09	0.115-0.24	11.1	0.437	15.9	0.625	Black	1132/33-M12-1

PUSHBUTTON SWITCHES & CIRCUIT BREAKERS/PROTECTORS



IP66/IP68/NEMA 6P Enclosure Protection

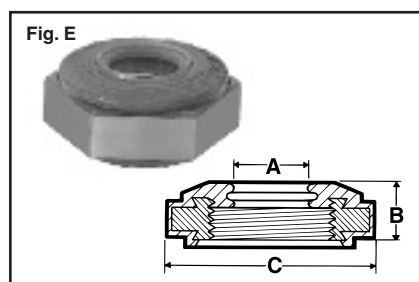
Half Toggle Switch Boots (Seals switch mounting stem & hole; toggle actuator protrudes)

Figures C & D

Thread Size ¹	Max Boot Height ("A")		Max Plunger Height		Dimension "B"		Max Plunger Diameter ("C")		Color ¹	APM Cat. No.	Fig.
	mm	in.	mm	in.	mm	in.	mm	in.			
M10 X 1	15.47	0.62	8.4	0.33	16.3	0.64	8.1	0.32	Black	C1221/21	D
M11 X 1	15.47	0.62	11.9	0.469	18.3	0.72	10.72	0.422	Clear	C1221/27	D
M12 X 1	18.64	0.47	11.9	0.469	15.9	0.625	10.72	0.422	Black	NC3030H-M12-1	C

¹ "Clear" allows viewing of breaker amp rating and trip state; please enquire for other available colors.

ROTARY SHAFT SEALS



IP66/IP68/NEMA 6P Enclosure Protection

Seal the shaft and mounting hole of standard rotary switches/potentiometers that use a threaded stem and nut mounting.

Figure E

Thread Size	Shaft Size ¹ ("A")		Height ("B")		Flat ("C")		Color ²	APM Cat. No.
	mm	in.	mm	in.	mm	in.		
M7 X 0.75	5.0	0.2	5.5	0.2	12.7	0.500	Gray	1332/39-2*
M9 X 0.75	6.35	0.250	5.56	0.219	12.7	0.500	Gray	C1332/41*
M10 X 1	6.0	0.236	5.9	0.236	12.7	0.500	Gray	1332/45*

¹ Switch/potentiometer shaft must have a smooth, round cross-section where it meets the sealing edge of the shaft seal device.

² Please enquire for other available colors.