



Sealing Fasteners & Components







## Switch Protection:

- Manufactured to fit any size switch and available in many different styles and colors
- Crafted from a single piece design to perform under the most severe environmental conditions
- Rotary and potentiometer switch boots protect switches which have two or more different "states" or modes of operation
- Push Button boots protect all types of push button switches including momentary and latching switches
- Toggle Boots protect toggle switches actuated by a mechanical lever, handle or rocking mechanism
- Our seal washer is economical and provides a permanent seal against liquids, dust and other contaminants
- The silicone rubber has a durometer hardness of 35 to 55
- Excellent resistance to extreme temperatures



## Panel & Circuit Breaker Covers:

- Designed for illuminated and non-illuminated applications
- Provides a positive seal when actuators are projecting from the front panel
- Circuit breaker boots and rocker switch seals are water resistant and made from a high strength transparent silicone rubber or crystal urethane
- Unique molded design keeps out dirt and moisture increasing the switch/circuit breaker's life



## MS Parts

- MS3212/MS3213
- Time Tested & Pressure Tested
- Manufacturing Parts for all Branches of the Military including Army, Navy & Air Force



## Security/Tamper-Proof Seal Screws:

- Variety of drive styles available including socket, 6-lobe, spanner and oneway slotted.
- Tamper-proof and sealing in the complete unit.
- Stock as well as custom pieces are available.



## Sealing Screws & Fasteners:

- Capable of bi-directional sealing and compensates for tolerance run out
- Re-usable and no re-tightening is required
- Dependable and cost effective
- When compressed, forms a complete seal and permits metal to metal contact
- Wide range of sizes and head styles available
- Captive panel and venting screws also available



## Sealing Nuts & Plugs:

- Our nuts are invaluable when a vacuum needs to be created
- Provides a complete seal when gaseous or liquid pressure is a factor
- Our seal plugs are special grooved-head fasteners with an O-ring inserted into the groove
- Acorn nuts are self-sealing and re-usable with exceptional vibration resistance



## A WIDE SPECTRUM OF INDUSTRIES BENEFITING FROM ZAGO'S SEALING PRODUCTS

### MARINE/BOATING

- Dash Board Panels
- Instrumentation & Electrical Panels
- NEMA Enclosures
- Motor Sport Equipment



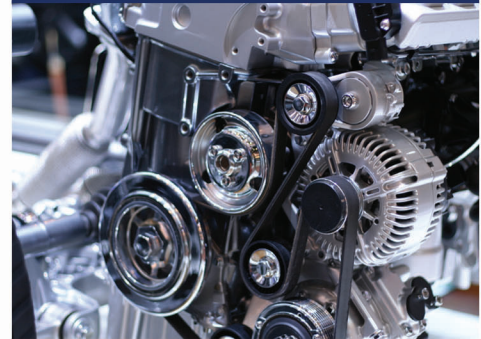
### HEAVY EQUIPMENT

- Off-Road Construction Equipment
- Agricultural Vehicles
- Earth Moving Equipment
- Sanitation Equipment



### AUTOMOTIVE

- Motor & Pump Housings
- Gear boxes & Transmissions
- Fuel Tanks & Shock Absorbers
- Hydraulic Pumps & Fluid Systems



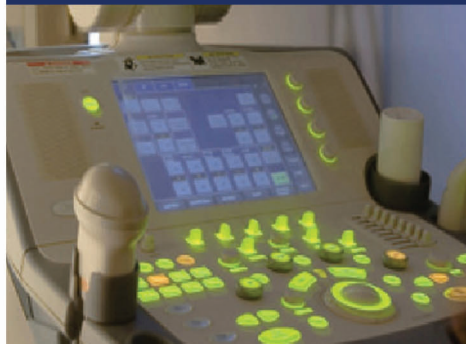
### ALTERNATIVE ENERGY

- Wind Turbines/Solar Panels
- Waste to Energy Equipment
- Tidal Energy Turbines
- Resource Conservation



### MEDICAL

- Test Equipment
- Pressure Sensors
- Gauges & Meters
- Portable Instruments



### MILITARY & AEROSPACE

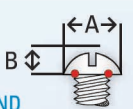








- Robotics
- Night Vision Equipment
- Surveillance Equipment
- Off Road Vehicles and Tankers





## Standard Seal Screws

### Head Dimensions-Machine & Sheet Metal Screws

		0	1	2	3	4	5	6	8	10	12	1/4	5/16	3/8
ROUND		A { .113 .099 .053 .043	.138 .122 .061 .051	.162 .146 .069 .059	.187 .169 .078 .067	.211 .193 .086 .075	.236 .217 .095 .083	.260 .240 .103 .091	.309 .287 .120 .107	.359 .334 .137 .123	.408 .382 .153 .139	.472 .443 .175 .160	.590 .557 .216 .198	.708 .670 .256 .237
	B {													
FLAT		A { .119 .099 .035 .026	.146 .123 .043 .033	.172 .147 .051 .040	.199 .171 .059 .048	.225 .195 .067 .055	.252 .220 .075 .062	.279 .244 .083 .069	.332 .292 .100 .084	.385 .340 .116 .098	.438 .389 .132 .112	.507 .452 .153 .131	.635 .568 .191 .165	.762 .685 .230 .200
	B {													
OVAL		A { .119 .099 .035 .026	.146 .123 .043 .033	.172 .147 .051 .040	.199 .171 .059 .048	.225 .195 .067 .055	.252 .220 .075 .062	.279 .244 .083 .069	.332 .292 .100 .084	.385 .340 .116 .098	.438 .389 .132 .112	.507 .452 .153 .131	.635 .568 .191 .165	.762 .685 .230 .200
	B {													
FILLISTER		A { .096 .083 .045 .037	.118 .104 .053 .045	.140 .124 .062 .053	.161 .145 .070 .061	.183 .166 .079 .069	.205 .187 .088 .078	.226 .208 .096 .086	.270 .250 .113 .102	.313 .292 .130 .118	.356 .334 .148 .134	.414 .389 .170 .155	.518 .490 .211 .194	.622 .590 .253 .233
	B {													
TRUSS		A { ----- ----- ----- -----	----- ----- ----- -----	.194 .180 .053 .044	.326 .211 .061 .051	.257 .241 .069 .059	.289 .272 .078 .066	.321 .303 .086 .074	.384 .364 .102 .088	.448 .425 .118 .103	.511 .487 .134 .118	.573 .546 .150 .133	.698 .666 .183 .162	.823 .787 .215 .191
	B {													
BINDING		A { ----- ----- ----- -----	----- ----- ----- -----	.181 .171 .046 .041	.208 .197 .054 .048	.235 .223 .063 .056	.263 .249 .071 .064	.290 .275 .080 .071	.344 .326 .097 .087	.399 .378 .114 .102	.454 .430 .130 .117	.525 .498 .153 .138	.656 .622 .193 .174	.788 .746 .234 .211
	B {													
PAN HEAD		A { ----- ----- ----- -----	----- ----- ----- -----	.167 .155 .053 .045	.193 .180 .060 .051	.219 .205 .068 .058	.245 .231 .075 .065	.270 .256 .082 .072	.322 .306 .096 .085	.373 .357 .110 .099	.425 .407 .125 .112	.492 .473 .144 .130	.615 .594 .178 .162	.740 .716 .212 .195
	B {													
BUTTON SOCKET		A { ----- ----- ----- -----	----- ----- ----- -----	----- ----- ----- -----	----- ----- ----- -----	.213 .201 .059 .051	----- ----- ----- -----	.262 .250 .073 .063	.312 .298 .087 .077	.361 .347 1.101 .091	----- ----- ----- -----	.437 .419 .132 .122	.547 .527 .166 .152	.656 .636 .199 .185
	B {													
SOCKET CAP		A { .096 .091 .060 .057	.118 .112 .073 .070	.140 .134 .086 .083	.161 .154 .099 .095	.183 .176 .112 .108	.205 .198 .125 .121	.226 .218 .138 .134	.270 .262 .164 .159	.312 .303 .190 .185	----- ----- ----- -----	.375 .365 .250 .244	.469 .457 .312 .306	.562 .550 .375 .368
	B {													

### "O" Ring Materials

When choosing an "O"-ring there are several factors to consider in determining proper selection including: the application for which the "O"-ring is to be used; the media to be sealed; the size of the fastener to be sealed; and the temperature and pressure to which the "O" ring will be subjected. Once each of these factors has been considered and an "O" ring has been chosen, engineering calculations should either be checked manually or by using "O" ring selection software.




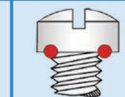


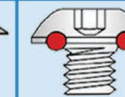
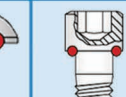
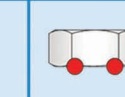
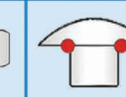
Our customers can choose from six basic materials which come in durometer ranges from 60-70 hardness depending on the chosen material. In addition to the materials listed below, other materials are available upon request.

- **ETHYLENE PROPYLENE (EPDM):** Our EPDM compounds are commonly used in outdoor environments and are excellent for weather & water resistant applications/appliances having excellent ozone, steam and chemical resistance.
- **BUNA- N (Nitrile):** Our Buna-N compound is the most common seal material chosen by our customers because of its versatility and resistance to petroleum-based substances, water and alcohols.
- **NEOPRENE (Chloroprene):** Our neoprene compounds are commonly used in the refrigeration industry for their resistance to ammonia and freon.
- **SILICONE:** Our silicone rubber has an excellent temperature range and can withstand low temperatures without becoming brittle.
- **FLUOROSILICONE:** Our fluorosilicone compounds are commonly used in the automotive and aerospace industries because of their excellent fuel, oil and solvent resistance.
- **FLUOROCARBON (VITON):** Our Viton compounds are the preferred choice when seals are required for aircraft engines and automotive fuel handling because of its excellent resistance to high temperatures and harsh chemicals.



## Part Numbering System

### Head Style

CODE PAN	CODE FL	CODE HEX	CODE FI	CODE RD	CODE TR	CODE BT	CODE CAP	CODE NT	CODE RV
PAN	FLAT	HEX	FILLISTER	ROUND	TRUSS	BUTTON	CAP	NUT	RIVET
									

### Available Drive

PH,SL,TX	PH,SL, SOC,TX,P	N/A	SL,PH	PH,SL	PH,SL	SOC,TX,P	SOC	N/A	N/A
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DRIVE :PH=PHIL,SL=SLOT,TX=6-LOBE,SOC=SOCKET,PIN=SECURITY

### Available Threads For Any Screws (Inch)

0-80	2-56	4-40	6-32	8-32	10-32	10-24	1/4	5/16	3/8
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### Available Threads For Any Screws (Metric)

M2	M2.5	M3	M4	M5	M6	M8	M10	M12	M14
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#### SECONDARY PROCESS CODE

- OX=BLACK OXIDE
- CP=CAD PLATING
- ZN=ZINC
- BZ=BLACK ZINC
- LCP=LOCKING PATCH
- CN=CAPTIVATION
- PT=PAINT HEAD
- TFW=TEFLON WASHER
- LCS=LOCKING STRIP

#### SCREW MATERIALS

- SS
- STEEL
- TITANIUM
- ALUMINUM
- BRASS
- MONEL

OTHER MATERIALS AVAILABLE UPON REQUEST

#### "O" RING MATERIALS-CODES

Our customers can choose from six basic materials which come in durometer ranges from 60-70 hardness depending on the chosen material. In addition to the materials listed below, other materials are available upon request.

- ETHYLENE PROPYLENE (EP)
- BUNA- N (BUN)
- NEOPRENE (NEO)
- SILICONE (SIL)
- FLUROSILICONE (FLU)
- FLUOROCARBON (VIT)

SAMPLE PART # 2-56X1/4 PH PAN SS SIL OX						
THREAD	LENGTH	DRIVE	HEAD	MATERIAL	"O" RING	OPTION
2-56	1/4	PHILP	PAN	STAINLESS STEEL	SILCONE	BLACK OXIDE



## Military Standard Part Numbers MS3212 Phillips Pan Head with Silicone o-ring

MILITARY PART#	ZAGO PART#	MILITARY PART#	ZAGO PART#
MS3212-1	4-40X1/4 PH PAN SS SIL	MS3212-29	8-32X7/8 PH PAN SS SIL
MS3212-2	4-40X5/16 PH PAN SS SIL	MS3212-30	8-32X1 PH PAN SS SIL
MS3212-3	4-40X3/8 PH PAN SS SIL	MS3212-31	10-32X3/8 PH PAN SS SIL
MS3212-4	4-40X7/16 PH PAN SS SIL	MS3212-32	10-32X7/16 PH PAN SS SIL
MS3212-5	4-40X1/2 PH PAN SS SIL	MS3212-33	10-32X1/2 PH PAN SS SIL
MS3212-6	4-40X9/16 PH PAN SS SIL	MS3212-34	10-32X9/16 PH PAN SS SIL
MS3212-7	4-40X5/8 PH PAN SS SIL	MS3212-35	10-32X5/8 PH PAN SS SIL
MS3212-8	4-40X3/4 PH PAN SS SIL	MS3212-36	10-32X3/4 PH PAN SS SIL
MS3212-9	4-40X7/8 PH PAN SS SIL	MS3212-37	10-32X7/8 PH PAN SS SIL
MS3212-10	4-40X1 PH PAN SS SIL	MS3212-38	10-32X1 PH PAN SS SIL
MS3212-11	6-32X1/4 PH PAN SS SIL	MS3212-39	10-24X3/8 PH PAN SS SIL
MS3212-12	6-32X5/16 PH PAN SS SIL	MS3212-40	10-24X7/16 PH PAN SS SIL
MS3212-13	6-32X3/8 PH PAN SS SIL	MS3212-41	10-24X1/2 PH PAN SS SIL
MS3212-14	6-32X7/16 PH PAN SS SIL	MS3212-42	10-24X9/16 PH PAN SS SIL
MS3212-15	6-32X1/2 PH PAN SS SIL	MS3212-43	10-24X5/8 PH PAN SS SIL
MS3212-16	6-32X9/16 PH PAN SS SIL	MS3212-44	10-24X3/4 PH PAN SS SIL
MS3212-17	6-32X5/8 PH PAN SS SIL	MS3212-45	10-24X7/8 PH PAN SS SIL
MS3212-18	6-32X3/4 PH PAN SS SIL	MS3212-46	10-24X1 PH PAN SS SIL
MS3212-19	6-32X7/8 PH PAN SS SIL	MS3212-47	1/4-20X3/8 PH PAN SS SIL
MS3212-20	6-32X1 PH PAN SS SIL	MS3212-48	1/4-20X7/16 PH PAN SS SIL
MS3212-21	8-32X1/4 PH PAN SS SIL	MS3212-49	1/4-20X1/2 PH PAN SS SIL
MS3212-22	8-32X5-16 PH PAN SS SIL	MS3212-50	1/4-20X9/16 PH PAN SS SIL
MS3212-23	8-32X3/8 PH PAN SS SIL	MS3212-51	1/4-20X5/8 PH PAN SS SIL
MS3212-24	8-32X7/16 PH PAN SS SIL	MS3212-52	1/4-20X3/4 PH PAN SS SIL
MS3212-25	8-32X1/2 PH PAN SS SIL	MS3212-53	1/4-20X7/8 PH PAN SS SIL
MS3212-26	8-32X9/16 PH PAN SS SIL	MS3212-54	1/4-20X1 PH PAN SS SIL
MS3212-27	8-32X5/8 PH PAN SS SIL	MS3212-55	1/4-20X1-1/8 PH PAN SS SIL
MS3212-28	8-32X3/4 PH PAN SS SIL	MS3212-56	1/4-20X1-1/4 PH PAN SS SIL

## Military Standard Part Numbers MS3213 Phillips Pan Head with Fluorosilicone o-ring

MILITARY PART#	ZAGO PART#	MILITARY PART#	ZAGO PART#
MS3213-1	4-40X1/4 PH PAN SS FLU	MS3213-29	8-32X7/8 PH PAN SS FLU
MS3213-2	4-40X5/16 PH PAN SS FLU	MS3213-30	8-32X1 PH PAN SS FLU
MS3213-3	4-40X3/8 PH PAN SS FLU	MS3213-31	10-32X3/8 PH PAN SS FLU
MS3213-4	4-40X7/16 PH PAN SS FLU	MS3213-32	10-32X7/16 PH PAN SS FLU
MS3213-5	4-40X1/2 PH PAN SS FLU	MS3213-33	10-32X1/2 PH PAN SS FLU
MS3213-6	4-40X9/16 PH PAN SS FLU	MS3213-34	10-32X9/16 PH PAN SS FLU
MS3213-7	4-40X5/8 PH PAN SS FLU	MS3213-35	10-32X5/8 PH PAN SS FLU
MS3213-8	4-40X3/4 PH PAN SS FLU	MS3213-36	10-32X3/4 PH PAN SS FLU
MS3213-9	4-40X7/8 PH PAN SS FLU	MS3213-37	10-32X7/8 PH PAN SS FLU
MS3213-10	4-40X1 PH PAN SS FLU	MS3213-38	10-32X1 PH PAN SS FLU
MS3213-11	6-32X1/4 PH PAN SS FLU	MS3213-39	10-24X3/8 PH PAN SS FLU
MS3213-12	6-32X5/16 PH PAN SS FLU	MS3213-40	10-24X7/16 PH PAN SS FLU
MS3213-13	6-32X3/8 PH PAN SS FLU	MS3213-41	10-24X1/2 PH PAN SS FLU
MS3213-14	6-32X7/16 PH PAN SS FLU	MS3213-42	10-24X9/16 PH PAN SS FLU
MS3213-15	6-32X1/2 PH PAN SS FLU	MS3213-43	10-24X5/8 PH PAN SS FLU
MS3213-16	6-32X9/16 PH PAN SS FLU	MS3213-44	10-24X3/4 PH PAN SS FLU
MS3213-17	6-32X5/8 PH PAN SS FLU	MS3213-45	10-24X7/8 PH PAN SS FLU
MS3213-18	6-32X3/4 PH PAN SS FLU	MS3213-46	10-24X1 PH PAN SS FLU
MS3213-19	6-32X7/8 PH PAN SS FLU	MS3213-47	1/4-20X3/8 PH PAN SS FLU
MS3213-20	6-32X1 PH PAN SS FLU	MS3213-48	1/4-20X7/16 PH PAN SS FLU
MS3213-21	8-32X1/4 PH PAN SS FLU	MS3213-49	1/4-20X1/2 PH PAN SS FLU
MS3213-22	8-32X5-16 PH PAN SS FLU	MS3213-50	1/4-20X9/16 PH PAN SS FLU
MS3213-23	8-32X3/8 PH PAN SS FLU	MS3213-51	1/4-20X5/8 PH PAN SS FLU
MS3213-24	8-32X7/16 PH PAN SS FLU	MS3213-52	1/4-20X3/4 PH PAN SS FLU
MS3213-25	8-32X1/2 PH PAN SS FLU	MS3213-53	1/4-20X7/8 PH PAN SS FLU
MS3213-26	8-32X9/16 PH PAN SS FLU	MS3213-54	1/4-20X1 PH PAN SS FLU
MS3213-27	8-32X5/8 PH PAN SS FLU	MS3213-55	1/4-20X1-1/8 PH PAN SS FLU
MS3213-28	8-32X3/4 PH PAN SS FLU	MS3213-56	1/4-20X1-1/4 PH PAN SS FLU



## NASM 82496

ZAGO's military standard parts meet the strict specifications of both the MS and NASM82496. We are committed to providing the highest quality made in American parts.



## NASM 82496

ZAGO's MS3212/MS3213 parts are time-tested and pressure tested. In fact, ZAGO is the only manufacturer of sealing screws capable of performing NASM specified pressure testing.

We are proud of our ability to meet the exacting needs of our military which in turn enables our customers to support our military in its mission of securing our defense.

Our engineering department is always available for consultation on any our sealing screws products.

## Military Standard Parts

ZAGO manufactures sealing screws for all branches of the military including the Army, Navy and Air Force as well as to companies producing sophisticated technology necessary to ensure our national defense through our trusted distributors.

## Dimensional Chart

NOMINAL SIZE	#4 .112	#6 .138	#8 .164	#10 .190	#10 .190	#1/4 .250
THREADS PER INCH	40UNC-2A	32UNC-2A	32UNC-2A	32UNC-2A	24UNC-2A	20UNC-2A
HEAD DIAMETER MAX MIN	.238 .205	.294 .256	.347 .306	.403 .357	.403 .357	.517 .473
HEAD HEIGHT MAX MIN	.080 .070	.097 .087	.115 .105	.133 .122	.133 .122	.175 .162
DIAMETER OF RECESS MAX MIN	.122 .109	.166 .153	.182 .169	.199 .186	.199 .186	.281 .268
DRIVE SIZE	1	2	2	2	2	3



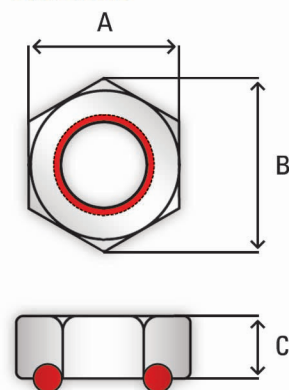
## Sealing Nuts

ZAGO nuts meet and/or exceed the requirements of environments where gaseous or liquid pressure is a factor and a complete seal is required. ZAGO's nuts are also invaluable when a vacuum needs to be created. The nuts are reusable and can be made from numerous combinations of rubber and steel.

### Inches Sealing Nuts

Nominal Size or Basic Major Diameter of Thread		A			B		C
		Width Across Flats			Width Across Corners		Thickness
		Basic	Max	Min	Max	Min	Basic
2	0.0860	3/16	0.188	0.180	0.217	0.205	0.0615
4	0.1120	1/4	0.250	0.241	0.289	0.275	0.0925
6	0.1380	5/16	0.312	0.302	0.361	0.344	0.108
8	0.1640	11/32	0.344	0.332	0.397	0.378	0.1235
10	0.1900	3/8	0.375	0.362	0.433	0.413	0.1235
1/4	0.2500	1/2	0.500	0.488	0.577	0.556	0.234
5/16	0.3125	9/16	0.562	0.546	0.650	0.622	0.296
3/8	0.3750	11/16	0.688	0.669	0.794	0.763	0.359
7/16	0.4375	3/4	0.750	0.728	0.866	0.830	0.421
1/2	0.5000	7/8	0.875	0.850	1.010	0.969	0.484
9/16	0.5625	15/16	0.938	0.909	1.083	1.037	0.546
5/8	0.6250	1-1/16	1.062	1.031	1.227	1.175	0.609
3/4	0.7500	1-1/4	1.250	1.212	1.443	1.382	0.734
7/8	0.8750	1-7/16	1.438	1.394	1.660	1.589	0.859
1	1.0000	1-5/8	1.625	1.575	1.876	1.796	0.984

### Self-Sealing Fasteners

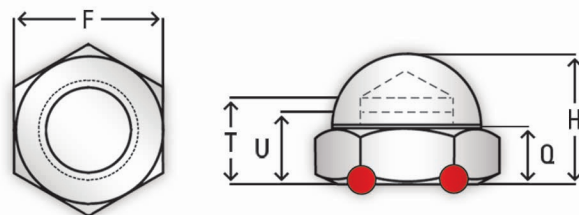


### Metric Sealing Nuts

Normal Size	Thread Pitch	A		B	C	
		Width Across Flats		Width Across Corners	Thickness	
		Max	Min	Min	Max	Min
M2	0.4	4	3.82	4.32	1.6	1.35
M2.5	0.45	5	4.82	5.45	2	1.75
M3	0.5	5.5	5.32	6.01	2.4	2.15
M4	0.7	7	6.78	7.66	3.2	2.9
M5	0.8	8	7.78	8.79	4.7	4.4
M6	1	10	9.78	11.05	5.2	4.9
M8	1.25	13	12.73	14.38	6.8	6.44
M10	1.5	16	15.73	17.77	8.4	8.04
M12	1.75	18	17.73	20.03	10.8	10.37
M14	2	21	20.67	23.35	12.8	12.1
M16	2	24	23.67	26.75	14.8	14.1
M20	2.5	30	29.16	32.95	18	16.9
M24	3	36	35	39.55	21.5	20.2
M30	3.5	46	45	50.85	25.6	24.3
M36	4	55	53.8	60.79	31	29.4

**Description:** A six-sided internally threaded nut with sealing arrangement captive inside the nut.

Several materials, finishes and secondary operations are available. Please indicate when ordering.



### Acorn Seal Nuts

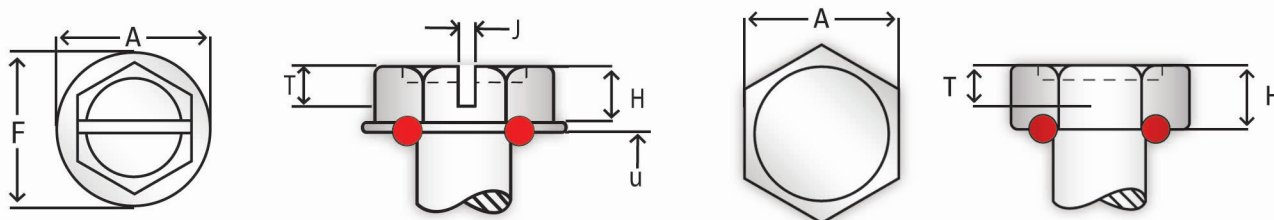
Nominal Size or Basic Major Diameter of Thread		F		H	Q	T	U
		Width Across Flats		Overall Height	Hexagon Height	Drill Depth	Full Thread
		Max	Min			Max	Min
6	0.1380	0.3125	0.302	0.34	0.16	0.25	0.16
8	0.1640	0.3125	0.302	0.34	0.16	0.25	0.16
10	0.1900	0.3750	0.362	0.41	0.19	0.28	0.19
1/4	0.2500	0.4375	0.428	0.47	0.22	0.34	0.25
5/16	0.3125	0.5000	0.489	0.53	0.25	0.41	0.31
3/8	0.3750	0.5625	0.551	0.62	0.28	0.45	0.38
1/2	0.5000	0.7500	0.736	0.81	0.38	0.59	0.50
5/8	0.6250	0.9375	0.922	1.00	0.47	0.75	0.62
3/4	0.7500	1.0625	1.045	0.16	0.53	0.88	0.75





## Sealing Plugs

The ZAGO sealing plug is a special grooved-head fastener. An "O"-ring is inserted into the groove which, when compressed, provides a positive seal against air and other gases, as well as liquids. ZAGO seal plugs are available in many different materials. Please call for technical assistance and more information.

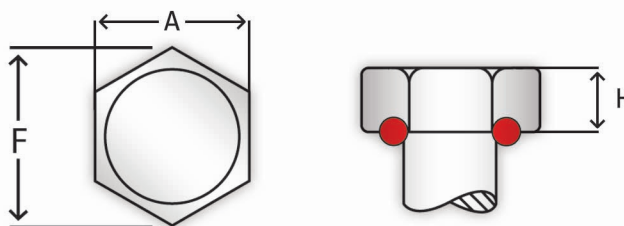


## Sealing Hex Plugs, Bolts & Washers

Nominal Size	A		H		F		U		J		T	
	Width Across Flats		Height of Head		Diameter of Washer		Thickness of Washer		Width of Slot		Depth of Slot	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
4	.188	.181	.060	.049	.243	.225	.019	.011	.039	.031	.042	.025
5	.188	.181	.070	.058	.260	.240	.025	.015	.043	.035	.049	.030
6	.250	.244	.093	.080	.328	.302	.025	.015	.048	.039	.053	.033
8	.250	.244	.110	.096	.348	.322	.031	.019	.054	.045	.074	.052
10	.312	.305	.120	.105	.414	.384	.031	.019	.060	.050	.080	.057
12	.312	.305	.155	.139	.432	.398	.039	.022	.067	.056	.103	.077
1/4	.375	.367	.190	.172	.520	.480	.050	.030	.075	.064	.111	.083
5/16	.500	.489	.230	.208	.676	.624	.055	.035	.084	.072	.134	.100
3/8	.562	.551	.295	.270	.780	.720	.063	.037	.094	.081	.168	.131

## Sealing Hex Bolts Metric

Nominal Size	Thread Pitch	A		H		F
		Width Across Flats		Height of Head		Width Across Corner
		Max	Min	Max	Min	Min
M3	0.50	5.5	5.32	2.125	1.875	6.01
M4	0.70	7	6.78	2.925	2.675	7.66
M5	0.80	8	7.78	3.65	3.35	8.79
M6	1.00	10	9.78	4.15	3.85	11.05
M8	1.25	13	12.73	5.45	5.15	14.38
M10	1.50	17	15.73	6.58	6.22	17.77
M12	1.75	19	17.73	7.68	7.32	20.03
M14	2.00	22	20.67	8.98	8.62	23.36
M16	2.00	24	23.67	10.18	9.82	26.75





## Sealing Components

### TYPES:

ZAGO manufactures many types of fasteners including screws, bolts, rivets and socket caps with many varieties of heads and drives. In addition, ZAGO is capable of manufacturing both right-handed screws (screw tightened by being turned clockwise) and left-handed screws (screws tightened by being turned counter-clockwise).

### DRIVES:

**Available drives include:** Phillips, Slotted, Combination Phillips/Slotted, Allen (a.k.a. socket), Hexagonal Recess, Square, 6 Lobe, Hex/Slotted Hex/Hex Flange, One Ways, and Socket Pin Heads Spanner.

### HEAD RECESS GUIDELINES:

Choosing the correct drive recess for an application can mean the difference between optimum productivity and down time. Often these decisions are only addressed when problems occur in the production line. For a difficult assembly application, we also offer assistance from our engineering department to help in resolving existing problems or to improve your product drive system.

### HEAD STYLE:

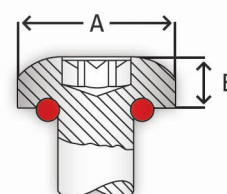
After you have chosen the correct recess system, you will next have to select the appropriate head style. ZAGO can supply all types of head styles including pan heads, flat heads, button heads, round heads, truss heads, oval or raised heads, bugle head, cheese head, fillister head, socket head and mirror head screws. ZAGO offers you the choice of military standard screws or other head style designs.

### MATERIAL:

ZAGO's fasteners are available in a number of different materials. The most common material requested by ZAGO's customers is stainless steel. Where great resistance to weather or corrosion is required, stainless steel, titanium, brass or bronze may be used, or a coating such as brass, zinc or black oxide applied.

### THREADING:

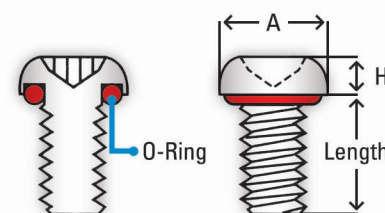
ZAGO can supply its customers with all standard threading including Class 2A and will work with its customers to meet their specific threading needs. Non-standard lengths of threads and special threads such as left hand, metric and double lead threads are no problem for ZAGO to manufacture.



### 6 Lobe Drive Pan Heads

Screw Size	A		B		Driver Size
	Head Dimensions				
	Head Diameter		Head Height		
	Max	Min	Max	Min	
2	.167	.155	.062	.053	T8
4	.219	.205	.080	.070	T10
6	.270	.256	.097	.087	T15
8	.322	.306	.115	.105	T20
10	.373	.357	.133	.122	T25
1/4	.492	.473	.175	.162	T30

### Metric Phillips Pan Head Self-Sealing Screws



SIZE	M2	M2.5	M3	M4	M6	M6
A-MAX	4.0	5.0	5.6	8.0	9.5	12.0
H-MAX	1.6	2.1	2.4	3.1	3.7	4.6
LENGTH	Lengths in 1/16" increments to 5/8" long; 1/8" increments to 1" long. Tolerance in lengths up to 1/2" + .00 - .02, from 1/2" to 1" inclusive + .00 - .03					



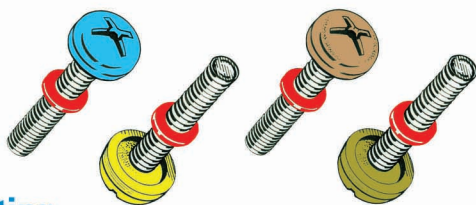
## Cut-down

ZAGO is capable of cutting down fasteners to any size you require. ZAGO maintains a state-of-the-art machine shop with CNC machines capable of precisely cutting down screws to our customers' unique specifications.



## Over-size Head Fasteners

ZAGO specializes in providing its customers with customized solutions for all their sealing needs. Therefore, if you need a fastener with dimensions outside the standard range, ZAGO is your best source for unusual lengths and head sizes.



## Painting

ZAGO offers its customers the option of painting its fasteners. Fully qualified mil-spec materials are used.

## Plating

ZAGO offers numerous platings the choice of which depends upon the screw material you are seeking to coat:

- **BLACK CHROME** (MIL-C-14538B)
- **BLACK OXIDE COATING** (MIL-C-13924B)
- **CADMIUM** (QQ-P-416C)
- **PASSIVATE** (QQ-P-35/MIL S-500SC)
- **PHOSPHATE COATING LIGHT** (TT-C-00490B)
- **GOLD** (MIL-G-45204B)
- **NICKEL** (QQ-N-290A)
- **ZINC** (QQ-Z-325C)



## Drilling

ZAGO is capable of doing any type of drilling your fasteners require including head drilling, shank drilling and specialties.

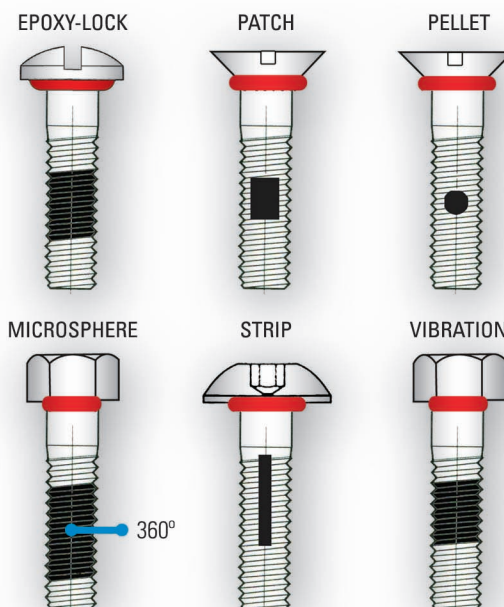


## Captive Panel Screws

ZAGO is capable of quickly grinding the thread of any fastener to make it a captive panel screw. All ZAGO captive screws are per customer specifications. ZAGO offers a great lead-time with only a 100-piece minimum purchase requirement.

## Self-Locking Features

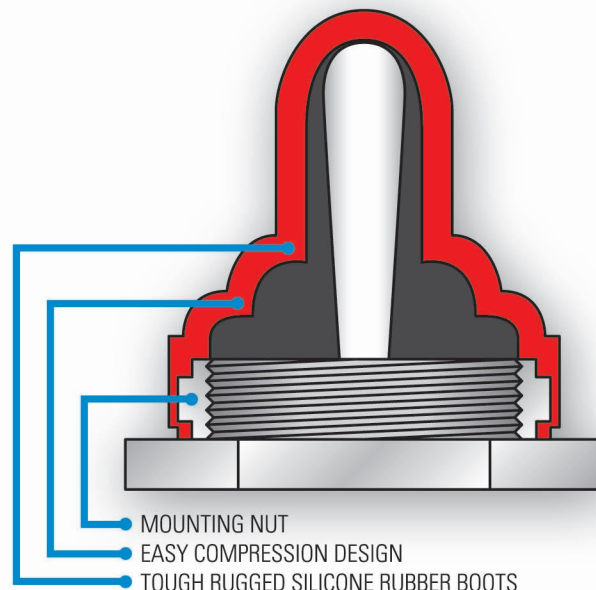
ZAGO offers the widest range of high quality self-locking components available for both military and commercial usage. All of our Pellet, Strip and Patch products meet or exceed the required specifications for MIL-F-18240, IFI 124 and IFI 524.





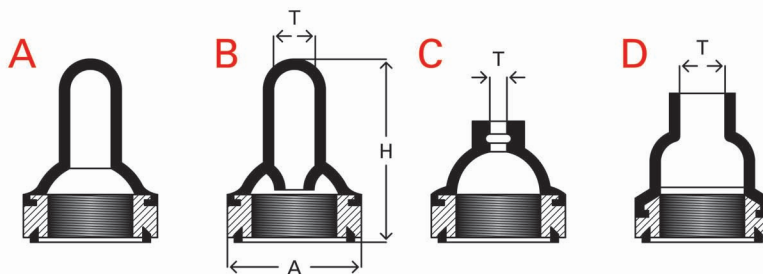
## Toggle Switch Boots

- **Material:**
  - **Military** – Silicone Rubber in accordance with A-A-59588 Class 3a, grades 30, 50, or 60. Standard color is gray.
  - **Commercial** – High Strength silicone rubber, grades 30, 50 or 60.
- **Mounting Nut:** Corrosion resistant – Nickel Plated Brass
- **Design and Construction:** Boots are designed and constructed to the physical dimensions specified. All threaded parts are in accordance with FED-STD-H28 unless otherwise specified.
- **Temperature Range:** -93 F to +400 F
- **Pressure Range:** 15 psi internal and 15 psi external
- **Military Specification:** Meets MIL-B-5423
- **Shelf Life:** 25 Years



Specifications are written and applied with the intent of guaranteeing product performance. Specifications can be written by the customer for the rubber parts they are buying, but are often derived from a formal system developed by a technical association, such as the SAE (Society of Automotive Engineers), a government or military organization or the commonly applied commercial standard from ASTM (D-2000). International standard requirements are also commonplace.

Specifications for rubber products generally include physical and chemical tests for the compound. These may be relatively limited, such as basic levels of hardness, tensile strength, elongation, and resistance to oils and/or heat. These requirements may be expanded to include a variety of tests, such as compression set, flame resistance, low temperature resistance, special fluid or chemical exposure, toxicity evaluations, and more.



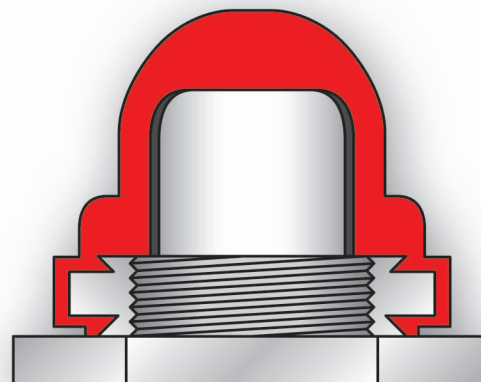
## Specifications:

ZAGO Part Number	Bushing Thread	Design	Max Throat Height Above Bushing	A Hex/Dia	T I.D.	H Height
TH 603	15/32-32 UNS-2B	B	.625	.625 H	.212	.850
TH 612	15/32-32 UNS-2B	A	1.08	.625 H	.400	1.30
TH 601	15/32-32 UNS-2B	C	N/A	.625 H	.100	.412
TH 609	15/32-32 UNS-2B	A	.730	.625 H	.200	.945
TH 608	15/32-32 UNS-2B	A	.510	.625 H	.204	.745
TH 607	15/32-32 UNS-2B	A	.845	.625 H	.208	1.09
TH 606	15/32-32 UNS-2B	A	.640	.625 H	.209	.885
TH 602	1/4-40 UNS-2B	C	N/A	.375 H	.047	.260
TH 605	1/4-40 UNS-2B	A	.355	.375 H	.071	.500
TH 604	M12 X 1.0	C	N/A	.625 H	.100	.412
OP 715	15/32-32 UNS-2B	D	N/A	.625 H	.205	.550
OP 716	7/16-28 UNEF-2B	D	N/A	.625 H	.205	.550
TH 618	1/2-32 UNS-2B	A	.640	.625 H	.219	.885
TH 622	15/32-32 UNS-2B	A	.925	.625 H	.300	1.16



## Push Button Switch Boots

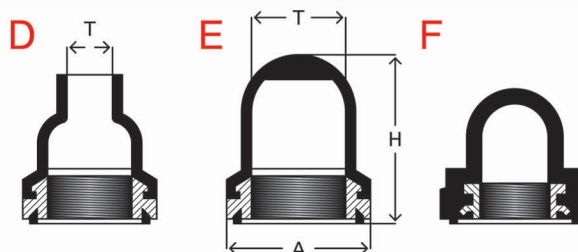
- **Material:**
  - **Military** – Meets Mil-B-5423. Silicone Rubber in accordance with A-A-59588 Class 3a, grade 50.
  - **Commercial** – High Strength silicone rubber grade 50.
- **Mounting Nut:** Corrosion resistant – Nickel plated brass.
- **Temperature Range:** -93 F to +400 F
- **Pressure Range:** 15 psi internal and 15 psi external
- **Material:** Standard silicone rubber is gray or black. All other colors can be made at an additional charge. Minimum order 25pcs/item.



## Equipment Malfunctions

**The problem:** Machine shop controls are often exposed to moisture which can seep into their mechanisms and short out entire systems. Residue from food products, plant dust or grease from a worker's oily fingers can cause a stoppage by clogging or jamming equipment.

**The solution:** ZAGO's sealing switch boots keep foreign matter out regardless of whether the switch is used indoors or outdoors. Our switch boots are crafted from a single-piece design, install easily and fit over most standard switches to provide maximum protection. We offer many standard sizes as well as custom specifications to meet your needs.



## Specifications:

ZAGO Part Number	Bushing Thread	Design	Max Throat Height Above Bushing	A Hex/Dia	T I.D.	H Height
PH 700	15/32-32 UNS-2B	E	.300	.625 H	.390	.570
PH 702	15/32-32 UNS-2B	E	.480	.625 H	.390	.750
PH 711	15/32-32 UNS-2B	E	.530	.625 H	.420	.815
PH 707	1/4-40 UNS-2B	E	.180	.375 H	.180	.320
PH 703	1/2-32 UNS-2B	E	.300	.625 H	.390	.565
PH 706	1/4-32 UNEF-2B	E	.180	.375 H	.188	.320
PH 708	1/2-32 UNS-2B	E	.205	.625 H	.390	.570
PH 716	7/16-32 UN-2B	E	.480	.625 H	.390	.750
PH 717	5/8-24 UNEF-2B	E	.281	.750 H	.515	.609
PR 727	3/8-27 UNS-2B	F	.325	.625 D	.310	.616
OP 715	15/32-32 UNS-2B	D	N/A	.625 H	.205	.550
OP 716	7/16-28 UNEF-2B	D	N/A	.625 H	.205	.550
OP 701	M12X1.00	E	.480	.625 H	.390	.750
PH 702M	15132-32 UNS-2B	E	.480	.625 H	.420	.750
PR 728	3/8-32 UNEF-2B	F	.325	.625 D	.310	.616
IL 100	7/3-32 UNEF-2B		.475	1.135 D	.740	.875

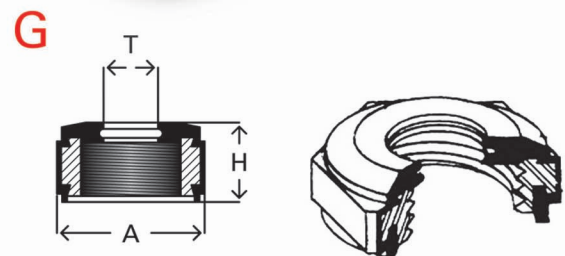
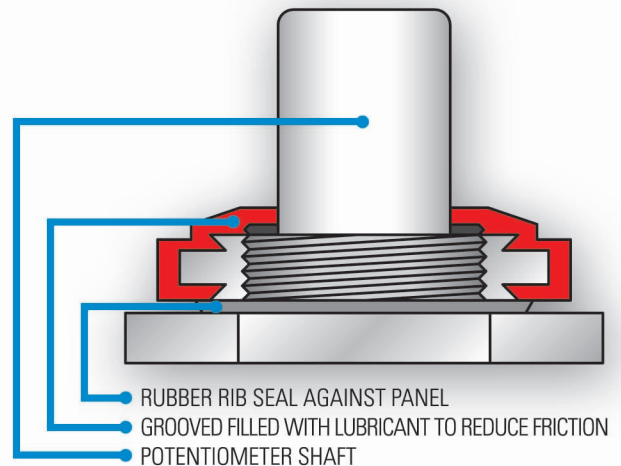


## Rotary Switch Boots

- **Material:**
  - **Military** – Meets Mil-B-5423. Silicone Rubber in accordance with A-A-59588 Class 3a, grade 50.
  - **Commercial** – High Strength silicone rubber grade 50.
- **Mounting Nut:** Corrosion resistant – Nickel plated brass.
- **Temperature Range:** -93 F to +400 F
- **Pressure Range:** 15 psi internal and 15 psi external
- **Material:** Standard silicone rubber is gray or black. All other colors can be made at an additional charge. Minimum order 25pcs/item.

**ZAGO Rotary Switch Boots** protect switches that are used on devices which have two or more different "states" or modes of operation. A rotary switch consists of a spindle or "rotor" that has a contact arm or "spoke" which projects from its surface.

Our switch boots are crafted from a single piece design to perform under the most severe environmental conditions, providing full protection against exposure to harsh elements such as water, oil, sand, dust, dirt, humidity, moisture, precipitation and other contaminants. Technologies that benefit from our switch boots include aerospace, automotive, computer and electronic equipment and alternative energy producers.



## Specifications:

ZAGO Part Number	Bushing Thread	Design	A Hex/Dia	T Shaft	H Height
<b>RH801</b>	3/8-32 UNEF-2B	G	.500 H	.250	.245
<b>RH800</b>	1/4-32 UNEF-2B	G	.375 H	.125	.230
<b>HR 802H</b>	3/8-32 UNEF-2B	G	.500 H	.250	.359
<b>RH 802</b>	1/4-32 UNEF-2B	G	.375 H	.094	.230
<b>RH 804</b>	M10X0.75	G	.500 H	.250	.245



## Panel Bushing Seals

Our seal washers are stainless steel, type 202 or 302, molded both front and back with silicone rubber, to fit toggle switches 0.469" in diameter. ZAGO's bushing seals are designed for quick, easy and convenient installation and can be assembled so that the surface marked "bottom" is down.

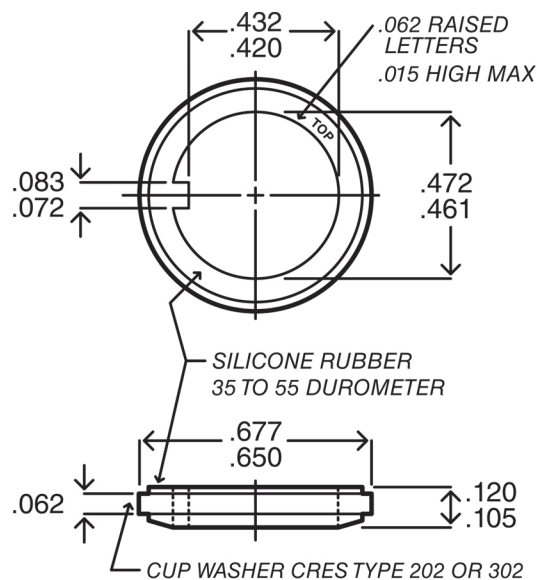
The ZAGO seal washer is economical and provides a permanent seal against liquids, dust and other contaminants. The silicone rubber has a durometer hardness of 35 to 55, and excellent resistance to extreme temperatures. These washers are reusable as long as the silicone rubber elements remain intact. All of our panel bushing seals meet milspec Mil-DTL-5423.



## Specifications

- **Material:** Stainless steel with bonded silicone rubber conforms to A-A-59588 GR. 50
- **Mounting:** Either Front or Behind Panel
- **Temperature Range:** -94F to +400F (-70C to +204C)
- **Protects Against:** Salt spray, dirt, oils, water, most acids, overall harsh environment
- **Shelf Life:** In excess of 25 years

- **Seals the panel cut-out protecting components from exposure to harsh environments, without the need of an O-ring.**
- **Easy installation, no tools required.**
- **Reusable in the event the switch fails and replacement is needed.**
- **Meets MIL-DTL-5423/16-01**

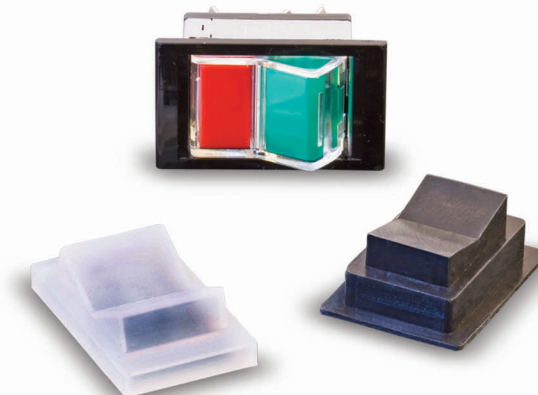


## How to Order

ZAGO Part Number	Compatible Switch Bushing	Washer Diameter	Washer Thickness	Color	Conforms to
WR0001	15/32-32	0.677"	0.120"	Grey	MIL-DTL-5423/16-01
WR0001M	15/32-32	0.666"	0.105"	Grey	MS25196

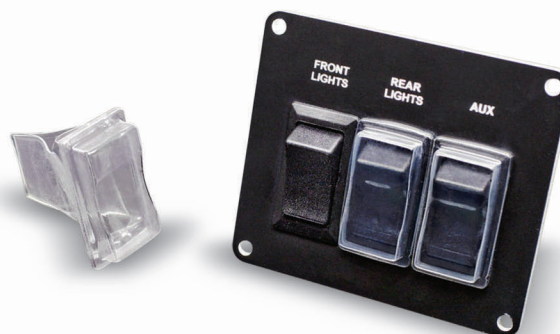
## Silicone Rocker Switch Boots

**Rocker Switch Sealing Boots designed from tear-resistant silicone rubber.** Each rocker switch seal is designed to fully surround the switch and switch frame, while their unique molded-in "panel sealing rib" forms a watertight and dust-tight seal against the front panel surface to ensure the longevity of the equipment on which they are installed.



## Crystal™ Rocker Switch Boots

ZAGO's Crystal™ Rocker Switch Boots are made from our urethane material, which enhances the appearance of the switch while economically converting a standard switch into a completely sealed switch. No tooling charge is required and we can offer quick turn-around time on custom boots.

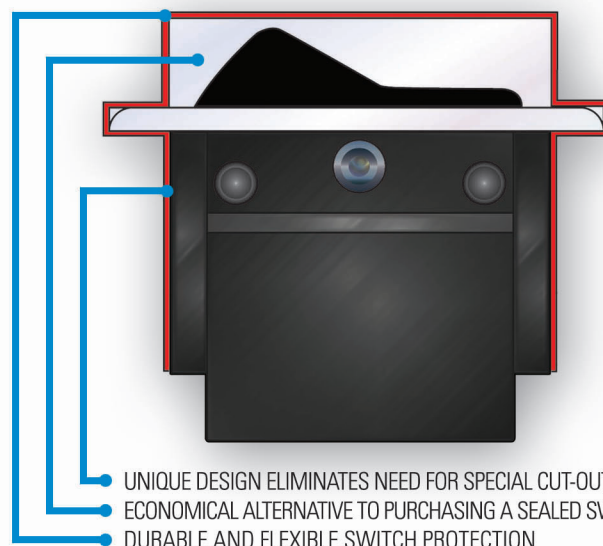


## Benefits for Both Materials

- Wide operating temperature range
- Can meet military specifications
- Environmentally friendly GreenSealing™ solutions
- Custom designs and colors
- ISO 9001:2008 quality standards

## Rocker Switch Boots Material

Type of Material	Urethane	Silicone
Specification	ASTM D2240 ASTM D792	ASTM D2240 D1415, D412
Hardness	85A +/- 5	50A – 60A
Gravity	1.20	1.14-2.05
Low Temp Service	-10 to -30 F	-70 to -80 F
High Temp Service	225F	400F
Tear Strength	Excellent	Fair
Electrical Insulation	Good	Excellent





## Multi-Switch Panel Cover

ZAGO switch sealing covers come in a wide variety of colors and are also available in transparent material for illuminated and non-illuminated applications. These covers provide a positive seal when actuators are projecting from the front panel, providing protection from salt sprays, spills and other harsh environmental challenges. The switch covers maintain effective sealing for temperature ranges of -67F to 356F. This kind of performance and added reliability can be economically designed into your panel with minimum orders as low as 25 pieces.



## Circuit Breaker Cover

ZAGO circuit breaker covers are water resistant and made from high strength silicone transparent rubber per MIL-STD ZZR 765. The unique molded design keeps out dirt and moisture and increases the breaker's lever life.

**ZAGO's unique breaker covers can be applied in two ways:**

- (1) they can be placed over the circuit breaker and bonded to the panel;
- (2) they can be applied behind the panel and shaped to fit between the breaker and the panel.

ZAGO specializes in designing alternative economical sealing solutions that will ensure the long lasting operation of circuit breakers. ZAGO's technical group is always available to work alongside its customers' engineers to create a unique design to fit their specifications and ensure the highest quality product.

Today major manufacturers of circuit breakers are increasingly choosing ZAGO's waterproof rubber boots not just for their high quality and cost competitiveness, but also because ZAGO's circuit covers have an excellent "feel" upon actuation, they are durable and dependable, and can be ordered in a wide variety of colors.





## ZAGO "25" Years in the Making

ZAGO began in 1994 as a two employee "mom and pop" business in the New Jersey Institute of Technology Enterprise Development Center small business incubator. In 1998 Zago "graduated" from the incubator and moved with seven employees to the Ironbound District of Newark to a rental property which ZAGO quickly outgrew. In 2002 ZAGO bought a 100 year old building in the South Ward of Newark which we have completely renovated over the years to suit our production and administrative needs.



In July 2007 ZAGO became approved to the ISO (International Standards Organization) 9001:2008 management systems, standards and guidelines. Since adopting the standard, ZAGO's quality control has improved over 100% and our rate of rejection has decreased to well below 1%. It is anticipated that early in 2018 ZAGO will be approved to the ISO 9001:2015 standard.

In 2013 ZAGO decided to go "all in" in our Newark facility and installed a 50 Kilowatt solar array on our rooftop. The solar array today plays a substantial part not only in ZAGO's contribution to environmental sustainability, but also to our economic sustainability. Since installation ZAGO's energy costs have essentially been zeroed out between savings on our energy bills through net metering and our monthly receipt of SRECS (solar renewable energy credits) and the tax benefits ZAGO earned through the installation.





## Meet the Team



At the same time that we are investing in our infrastructure and developing our products and processes, we understand that our economic future also requires investing in our employees. At ZAGO we understand the smartest investment we can make is in the training and education of our employees. Towards that end, in September of 2015 our General Manager Jackie Luciano began her EMBA program at Rutgers Newark School of Business. She successfully completed the program with her MBA in finance in May 2017 and now is our V.P. of Manufacturing Operations.

In addition, we are sending factory workers to classes at local community colleges for courses in tooling, CNC machining and manufacturing, and supporting our sales and marketing associate with her pursuit of a degree in Supply Chain Management at Kean University.





## Customization

**ZAGO offers a wide variety of custom services. Our state-of-the-art machine shop is capable of producing "specials" to order quickly, and in any quantity.**

Our facility is dedicated to producing the best products to your exact specifications. In addition, our deep raw material inventory allows our company to provide you with the shortest lead-times possible. Our facility is able to provide you with parts that are complete with plating, heat-treating, grinding, and other finishing operations. Our in-house capability to machine parts, as well as our extremely competitive pricing for customization, makes us the right choice for your custom sealing needs.

## Quality, Service and Value

**Over the years ZAGO has developed and refined its "best practices" for manufacturing products here in the United States allowing us to quickly and efficiently manufacture the highest quality products at exceptionally competitive prices.**

To assure our customers top quality products, we maintain a quality assurance system that satisfies the requirements of ISO 9001:2008. We pride ourselves on maintaining a nearly flawless on-time shipping rate with the shortest lead times in the industry. We also incorporate lean manufacturing practices to ensure that there is no waste in the production process allowing us to offer our products to our customers at the lowest possible price. As always, customer care is our first priority. Our sales and engineering departments are always available to assist you.

[www.zago.com](http://www.zago.com)



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