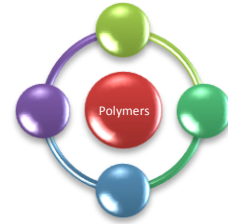




# Technical Reference Bulletin

## RMA Dimensional Tolerances for Elastomers

Unlike rigid machined materials such as steel or aluminum, thermoset molded elastomer parts manufactured via a transfer or compression process do not lend themselves to the same level of exacting tolerances. Thermally molded elastomers are subject to many variables including: temperature, cure time, mold tolerance, mold registration, compound variation, and shrinkage.



The Rubber Manufacturers Association (RMA) has developed tolerance tables with ranges to provide communication between user and provider across a wide range of industries, from precision aerospace electronic components to open-tolerance products for consumer goods. These tolerance designations relate to the variability inherent in processing molded rubber parts and are referred to as RMA A2 "Precision" and RMA A3 "Commercial" dimensional tolerance designations.

To comply with the more stringent dimensional tolerances of the RMA A2 level there are additional costs involved in meeting this specification. Included are preparations for tooling, more complex cavity surface features, cavity finishes, and cavity flow provisions. Additionally, exacting temperature controls and molding cycle timing may possibly add cost to the molded component.

The type of elastomer material and particularly its durometer will determine if the part will experience substantial size change when room temperature is reached.

- ✓ Very soft rubbers (15 to 30 durometer) typically demonstrate a 3 to 4.5% shrink category.
- ✓ Firm to almost rigid compounds (65 to 85 durometer) will shrink 1-1/2 to 2%, allowing for tighter tolerances.

Shrinkage occurs on all rubber components and is a volume effect. Although factored into the tool, it will vary depending on the part complexity within the same cavity. Shrinkage occurs when the part is removed from the heated mold and allowed to cool. The engineering challenge is to cut a steel cavity that will reliably and repeatedly provide a dimensionally true rubber part.

The tables below call out the RMA tolerances for "A2 Precision" and "A3 Commercial" tolerances for molded rubber products.

"A2" Precision Drawing Designation Dimensional Tolerance Table for Molded Rubber Products					
Size (Millimeters)			Size (Inches)		
Above - Included	Fixed	Closure	Above - Included	Fixed	Closure
0 - 10	+/- .16	+/- .20	0 - .40	+/- .006	+/- .008
10 - 16	.20	.25	.40 - .63	.008	.010
16 - 25	.25	.32	.63 - 1.00	.010	.013
25 - 40	.32	.40	1.00 - 1.60	.013	.016
40 - 63	.40	.50	1.60 - 2.50	.016	.020
63 - 100	.50	.63	2.50 - 4.00	.020	.025
100 - 160	.63	.80	4.00 - 6.30	.025	.032
160 & over	X .004	x .005	6.30 & over	X .004	X .005

"A3" Commercial Drawing Designation Dimensional Tolerance Table for Molded Rubber Products					
Size (Millimeters)			Size (Inches)		
Above - Included	Fixed	Closure	Above - Included	Fixed	Closure
0 - 10	+/- .20	+/- .32	0 - .40	+/- .008	+/- .013
10 - 16	.25	.40	.40 - .63	.010	.016
16 - 25	.32	.50	.63 - 1.00	.013	.020
25 - 40	.40	.63	1.00 - 1.60	.016	.025
40 - 63	.50	.80	1.60 - 2.50	.020	.032
63 - 100	.63	1.00	2.50 - 4.00	.025	.040
100 - 160	.80	1.25	4.00 - 6.30	.032	.050
160 & over	X .005	x .008	6.30 & over	X .005	X .008

**When applying tolerances, keep the following rules in mind:**

- Consider using the maximum possible tolerance on your product.
- Regarding "A2" tolerances and tighter, it is highly advisable to predetermine and agree upon a common method of measurement to reduce repeatability errors and rejected shipments.
- It is often practical and wise to have a prototype cavity machined to evaluate the dimensional accuracy of the part you wish to manufacture. A much superior job of "dialing in" the desired final result can be accomplished using this method.