Rubber Shrinkage Technical Bulletin

Rubber products shrink after moulding and during post moulding processes. The rate at which they shrink varies, but is mostly determined by the compound. Operating parameters also affect shrinkage, but usually to a lesser extent.

Rubber moulds are manufactured to compensate for shrinkage, but shrink rates vary so parts may differ if being used in a mould tool not designed for that particular compound, or even hardness of compound.

Variations in tolerance need to be considered as well as the product shrinkage. Due to a variety of reasons, the tolerances of moulded items tend to be greater than those for machined products.

The mould tool used to produce the parts is manufactured according to our best knowledge based on experience of using that particular compound, however it must be noted that this is not a guaranteed shrinkage rate for life as over time ingredients within an initial mix of compound may be discontinued and a substitute can result in different shrinkage rates. Operating parameters and post moulding operations required, also affect the overall shrinkage.

Finally, certain compounds are more prone to variances in size.

Design engineers need to consider both of these factors when designing moulded parts.

See page 1 for moulding tolerances to ISO3302. Generally we offer mouldings to Class M3 and M4 tolerances.

The only proven way to ensure the tightest tolerances is to mould a test button with the batch of compound that is going to be used then, after measuring the shrinkage rate, have the mould tool made to the confirmed shrinkage. This generally proves unfeasible though as the next batch of compound using the same ingredients may shrink differently to the initial batch, thus making it very expensive, as our range of mould tools cost up to £6,000 and tool modification is not always possible.

The chart below shows the shrinkage range of each polymer type.

ASTM Designation	Common or Trade Names	Shrinkage Range
ACM	Acrylic	2.0-4.0%
AEM	Vamac®	2.0-4.0%
AU / EU	Urethane	1.6-3.3%
CR	Neoprene	1.0-3.0%
CSM	Hypalon	1.8-3.0%
ECO	Hydrin®	2.0-3.0%
EPDM	EPDM	1.9-3.5%
FEPM	Aflas®	3.0-4.5%
FKM	Viton®, Fluorel®	2.0-4.5%
FVMQ	Fluorosilicone	2.8-4.7%

HNBR	Highly Saturated Nitrile	2.0-3.0%
IIR / CIIR	Butyl	1.0-2.5%
NBR	Buna N, Nitrile	1.5-3.5%
XNBR	Carboxylated Nitrile	1.5-3.5%
NR / IIR	Natural	2.0-3.5%
PVMQ / VMQ	Silicone	2.0-5.0%
SBR	Buna S	2.0-3.0%