

PLASTIC SHRINKAGE

SYNOPSIS

- During the injection molding process, after molten resin is injected into the mold, it begins to cool and harden. As it does, the part experiences volumetric contraction or shrinkage (i.e., a reduction in size), which can continue for hours or even days, depending on material type and atmosphere.
- All polymers experience shrinkage. Crystalline materials tend to shrink more, and amorphous materials tend to shrink less.
- The expected shrinkage rate must be considered when designing parts, building molds, and establishing the molding process, particularly for parts requiring tight tolerances.
- Shrinkage associated with excessive or differential wall thickness can result in sink marks, voids and part warpage. Multiple processing parameters can affect shrinkage, too.
- The following chart contains the typical shrinkage rates for the most common types of thermoplastics.

MATERIAL	TYPICAL SHRINKAGE (in/in)	MATERIAL	TYPICAL SHRINKAGE (in/in)
ABS	0.005	PEI [Ultem]	0.006
ASA	0.004-0.007	PET [Dacron]	0.002
EVA	0.007-0.020	PMMA [Acrylic]	0.002-0.006
HDPE [High Density Polyethylene]	0.025-0.035	POM [Acetal; Celcon; Delrin]	0.018-0.035
HIPS [High Impact Polystyrene]	0.003-0.007	PP [Copolymer]	0.010-0.025
LDPE [Low Density Polyethylene]	0.015-0.026	PP [Homopolymer]	0.010-0.025
LLDPE [Linear LDPE]	0.015-0.035	PPE	0.006
NYLON 6	0.009-0.012	PPS [Ryton]	0.003-0.010
NYLON 66	0.015-0.020	PS [Polystyrene; GPPS]	0.003-0.007
NYLON 66 30% Glass Filled	0.003-0.008	PVC	0.002
PBT [Polyester; Valox]	0.012-0.023	SAN	0.002-0.005
PC [Polycarbonate; Lexan]	0.005-0.007	TPE [Thermoplastic Elastomer]	0.017-0.047
PC+ABS	0.005-0.007	TPU [Thermoplastic Polyurethane]	0.012-0.017
PEEK	0.010-0.020	TPV [Santoprene]	0.010-0.050