Acetal Homopolymer AH10P

AH10P is an acetal homopolymer material, with a high viscosity suitable for injection molding applications where superior toughness or dynamic fatigue performance is required, or for best fill of heavy wall section components with least "sink". **AH10P** also offers a melt viscosity suitable for extrusion of stock shapes such as rod and slab, or simple profiles. Acetal Homopolymer is a highly crystalline engineering thermoplastic polymer exhibiting predictable mechanical properties over a wide temperature range and for long time periods. A combination of high tensile strength and rigidity, resilience and toughness, outstanding dynamic and static fatigue resistance, excellent dimensional stability, resistance to the effects of a very wide range of chemicals, oils and solvents and natural lubricity makes acetal homopolymer the material of choice for a wide range of applications in all major end-use categories.

TYPICAL PROPERTIES

	ASTM	ENGLISH		S.I.	
PROPERTY	TEST METHOD	UNITS	VALUE	UNITS	VALUE
Melting Point	D789	°F	347	°C	175
Specific Gravity	D792	-	1.42	-	1.42
Water Absorption (24 hrs. immersion)	D570	%	0.22	%	0.22
Heat Deflection Temp. at 264 lbs/in^2	D648	°F	277	°C	136
Mold Shrinkage* (Flow Direction)	1/8" section	%	2.4	%	2.4
Tensile Strength at Yield	D638	lbs/in^2	10,500	MPa	73
Elongation at Break	D638	%	50	%	50
Flexural Strength	D790	lbs/in^2	12,000	MPa	83
Flexural Modulus	D790	lbs/in^2	405,000	MPa	2,793
Izod Impact Strength (Notched, 1/8" specimen)	D256	ft. lbs/in of notch	2.1	J/m	112
Rockwell Hardness	D785		R120	-	-

*** Please review shrinkage projections for specific applications with an MDE Technical Representative.**

All data generated using test specimens injection molded from natural color material. Inclusion of color pigments or other additives may change some or all of these test results. Tests are conducted at 23°C and 50% relative humidity unless otherwise stated.

These mechanical property test data have been developed using injection molded specimens tested under standardized conditions; furthermore, many of the mechanical properties of thermoplastic materials can be influenced by changes in processing conditions, environmental factors such as temperature and humidity, and rate of application of stress. Therefore, these test results, which characterize typical production material, should not be used either to establish specification limits or alone as the basis for engineering design.

AH10P
Processing Guidelines

Pre-heating
Although acetal homopolymer resins and compounds do not normally require to be dried before processing, drying is suggested if due to storage or weather conditions, moisture may have condensed on the surface of the pellets. Drying conditions would typically combine a material temperature of 170-190°F with a drying time of 1-2 hours in an air circulating or de-humidifying drier.

Temperature Guidelines
The following temperature guidelines are suggested for general use **if a machine can be selected where shot size is 40-70% of nominal machine capacity.**

Tool Surface Temperature (°F)	Melt Temperatures (°F)			Typical Cylinder Temperatures (°F)		
	Max.	Preferred	Min.	Front	Center	Rear
180-240	440	400-420	375	410	400	390

A mold surface temperature in the range of 180-200°F can significantly improve surface appearance, helps consistency of mold fill and therefore consistency of dimensions, minimizes the effect of weld lines and will realize best molded part performance. Mold cavity temperatures in the range of 200-240°F are suggested for precision molding, or to achieve exceptional surface appearance. Temperatures at these levels can normally be achieved by conventional mold heaters, using water, provided the water supply is at a minimum of 30 p.s.i. gauge. Extreme care is required, however, to minimize the risk of water line breakage -the use of appropriately rated flexible hose and fittings is a mandatory safety precaution.

Injection Speed
Optimum injection speed is dependent on part geometry, gate location and size, and the melt temperature. To achieve good surface appearance, injection speeds should be high enough to ensure that the cavity is filled before the resin starts to solidify. With thin section parts, high injection speeds are usually required to fill the cavity before the melt freezes. Local surface flaws such as jetting and gate blush can be minimized by careful adjustments of injection speed. For some components, a very slow injection speed combined with a high molding tool temperature can minimize such flaws and produce excellent surface appearance.

Gate Size
Experience has shown that for conventionally gated cavities, a generous gate size assists the production of parts of not only best performance, but also optimum surface appearance. A land-length maximum of 0.040 inches also helps to minimize injection pressure losses. As a guide, gate area should be at least 50% of the cross-sectional area of the part next to the gate. Multi-cavity tools for smaller thin wall parts have been very successfully pin or sub-gated.

Screw Forward Time
Adequate screw forward time under follow-up pressure is important to ensure proper packing before gate freeze, during which time it is essential to maintain a "cushion" of 1/8"-1/4". Optimum screw forward time can be judged by a part weight vs. forward time plot. Avoid overpacking, which can generate molded-in stresses and reduce practical toughness.

Screw Recovery
It is recommended that back pressure of about 50 p.s.i. to be applied to the screw to help development of a homogeneous melt, and to ensure consistent shot volume. Screw rotation should also be as slow as possible consistent with cycle time goals, usually 40-80 r.p.m.

Mold Shrinkage
Standard ASTM test specimens are used to develop shrinkage guidelines. Test specimens are end-gated, 1/8 inch thickness, and molded at conditions recommended for this formulation. Actual shrinkage in molded parts will depend on several variables, including processing conditions, part configuration and gate location, both of which influence material flow direction, and wall section thickness.