Acetal Copolymer AC90GR25

AC90GR25 is an acetal copolymer reinforced with 25% glass fiber, coupled to achieve optimum adhesion at the glass fiber/polymer interface. This results in outstanding strength and rigidity, maintained even at higher temperatures, combined with excellent practical toughness. Incorporation of glass fiber also further improves dimensional stability over a broad temperature range.

Acetal copolymer is a highly crystalline engineering thermoplastic based on trioxane, polymerized with a comonomer to provide exceptional thermal stability both in processing and for molded parts, which may be exposed to high temperature environments.

As with AC90 the base polymer, **AC90GR25** exhibits excellent resistance to the effects of a broad range of chemicals, oils, solvents and greases, as well as very low moisture absorption.

AC90GR25 should be considered for applications, which require the fundamental benefits of acetal combined with the strength and rigidity, especially at high temperature, and dimensional stability benefits of this reinforced compound.

TYPICAL PROPERTIES

	ASTM	ENGLISH		S.I.	
PROPERTY	**TEST METHOD**	**UNITS**	**VALUE**	**UNITS**	**VALUE**
Melting Point	D789	^{o}F	329	^{o}C	165
Specific Gravity	D792	-	1.58	-	1.58
Water Absorption (24 hours immersion)	D570	%	0.27	%	0.27
Heat Deflection Temperature at 264 lbs/in^2 (1.82 MPa)	D648	^{o}F	320	^{o}C	160
Mold Shrinkage Guideline* (Flow Direction)	1/8" section	%		%	0.4-1.4
Tensile Strength at Yield	D638	lbs/in^2	17,500	MPa	121
Elongation at Break	D638	%	3-5	%	3-5
Flexural Strength	D790	lbs/in^2	25,000	MPa	172
Flexural Modulus	D790	lbs/in^2	1,100,000	MPa	7,586
Izod Impact Strength (Notched, 1/8" specimen)	D256	ft. lbs/in of notch	1.4	J/m	75
Tensile Impact Strength (Type S specimen)	D1822	ft. lbs/in	70-80	KJ/m	147-168
Rockwell Hardness	D785	M scale	M84	-	-

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

Experience has shown that some mechanical properties, particularly tensile strength and toughness, are improved by pre-heating **AC90GR25** prior to molding for three hours at 200-220^{o}F. For applications where preservation of natural color is critical, this time/temperature combination should not be exceeded, since some darkening of color may occur.

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^{o}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.

AC90GR25
Processing Guidelines

Pre-heating

Although acetal copolymer resins and compounds do not normally require to be dried before processing, the mechanical property profile of glass-coupled compounds are enhanced significantly by pre-heating the material for 3 hours at 200-220°F before processing. Pre-heating of AC90GR25 is therefore strongly recommended in order to realize optimum performance of molded parts.

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
200-240	440	410-420	380	400	400	410

- A "reverse" temperature profile helps ensure a homogeneous melt, improves screw recovery and by accelerating the transition from solid pellets to a melt significantly reduces abrasive wear on screw and barrel surfaces.
- A mold surface temperature in the suggested range will significantly improve surface appearance, and in addition helps consistency of mold fill and therefore consistency of dimensions, minimizes the effect of weld lines and also helps realize best molded part performance. Temperatures at the recommended level 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.
- A medium to fast injection speed maximizes weld line strength, minimizes molded in stress, and also contributes to achievement of best surface gloss. Good venting of cavities is essential to allow fast fill without burning.

Gate-Size

Experience has shown that generous 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.
For this glass-fiber reinforced compound, a larger gate will also minimize the risk of glass-fiber length attrition.
As a guide, gate area should be at least 50% of the cross-sectional area of the part next to the gate.

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.

Screw Recovery

It is recommended that back pressures of 50 p.s.i gauge to used to help development of a homogeneous melt, and to ensure consistent shot volume, while minimizing the risk of mechanical damage to the glass fibers with consequent loss of part performance. 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.**