



Transparent MABS

Technical Guide

Toray Plastics (Malaysia) Sdn. Bnd.

2628 MK. 1, SPT., Lorong Perusahaan 4,
Prai Free Industrial Zone,
13600 Prai, Penang, Malaysia.
Tel : 04-3988088 Web. : www.torayplastics.com

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1. Introduction

“TOYOLAC” is a well-known ABS thermoplastics resin which consists of Acrylonitrile (A), Butadiene (B) and Styrene (S). Toray always strives to develop new grade by optimizing respective features of A, B and S to fulfill customer requirement.

“TOYOLAC” is widely used in automotive products, media products, OA machines, amusement products and other applications. “TOYOLAC” consists of a variety of grades but this technical guide will focus only on Transparent ABS, which is widely demanded in various sectors.

Toray is the earliest company to start manufacturing and sales of transparent ABS in Japan domestic market. Thus, we have accumulated more than 20 years of experience in transparent ABS technology and knowhow. We do greatly appreciate your consideration to evaluate “TOYOLAC” 920 555, “TOYOLAC” 900 352, “TOYOLAC” 900 352A and “TOYOLAC” 912 X01 in line with the expected expansion in demand for transparent ABS in future.

2. Special Features

Transparent ABS special features are listed as following :

- ❖ High light transmittance (low haze)
- ❖ Excellent weathering resistant (transparency retention against high humidity / temperature)
- ❖ Low out gassing (weight loss upon heating)
- ❖ Balance of flow ability and impact strength
- ❖ Consistent and stable color / transparency

3. Property Data Table

Typical property data of “TOYOLAC” Transparent MABS

TRANSPARENT GRADE 透明型								
Property 代表物性	Test Method 试验法	Test Condition 试验条件	Units 单位		High Rigidity 高刚性	Middle Impact 中抗冲击	Middle Impact 中抗冲击	High Scratch Resistant 高耐刮划
			Type 型号	920	900	900	912	
			Suffix 区分字符	555	352	352A	X01	
ISO STANDARD								
Melt Flow Rate 流动系数	ISO 1133	220°C / 10 kg	g/10min	25	18	20	30	
Charpy Impact Strength (notched) 缺口冲击强度	ISO 179/1eA	23°C / 50 %RH	kJ/m ²	9	12	12	6	
Deflection Temperature Under Load 热变形温度	ISO 75	1.8 MPa / 120°C/hr	°C	77	76	76	78	
Tensile Strength 引张强度;降伏点	ISO 527	50 mm/min	MPa	54	48	53	56	
Tensile Elongation at Break 拉伸伸长率			%	17	15	11	12	
Tensile Modulus 拉伸模数			1 mm/min	MPa	2500	-	2400	-
Flexural Strength 弯曲强度	ISO 178	2 mm/min	MPa	77	66	76	83	
Flexural Modulus 弯曲模数				2260	1870	2310	2630	
Density 比重	ISO 1183	23°C	kg/m ³	1090	1080	1090	1100	
Light Transmittance 光线透过率	ASTM D1003	3 mmt	%	88	86	87	78	
Haze 模糊系数	ASTM D1003	3 mmt	%	2	2	2	16	
Flammability 燃烧性	UL94 File No. E41797			HB	HB	HB	HB	

Note: The above values are typical data for the products under specific test conditions and not intended for use as limiting specifications.

「以上数据谨代表在特定条件下所得的测定值的代表例」

4. Processing Condition

4.1 Pellet Pre-drying

Commonly, transparent ABS resin is absorbent (hygroscopic) and absorbs moisture in proportion to environmental humidity. The moisture absorbing process is reversible. Therefore, moisture of the wet pellet can be removed to environmental air with lower humidity. Dried pellet should absorb moisture until the amount touches equilibrium amount with the moisture in the air. The absorbing moisture content depends on the relative humidity in the air, how long the resin was exposed.

While “TOYOLAC” Transparent ABS resin is exposed to humidity, the moisture is absorbed onto surface and into inside of the pellets itself, recycled materials and molded parts. Typical equilibrium moisture of “TOYOLAC” Transparent ABS is around 0.2~0.3% at 23 °C/50%RH, and 0.5~0.6% at 40 °C/95%RH. The rate of absorbed moisture is depending on pellet size, shape and environmental temperature.




Non-dried Transparent ABS resin can cause silver streaking problem on molded parts. The recommendable moisture content is less than 0.1%, more desirable is 0.05%. Generally, below pre-drying conditions are recommended.

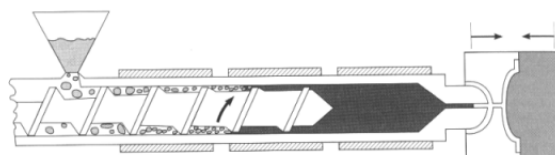
Hot air ventilated dryer: 80 °C ; 3 ~ 5 hours
 90 °C ; 2 ~ 4 hours

4.2 Standard Molding Condition

Generally, the barrel temperature of injection molding machine should increase from the hopper to the nozzle gradually.

Typical barrel temperature setting : 200 ~ 240°C (Example temperature profiles are shown in following table)

Profile	From Hopper to Nozzle	Remarks
Fixed		Constant profile is used to utilize plasticizing capacity
Rising		Rising profile to allow moderate fusion of resin
Mixed		Lower temperature at nozzle to prevent drooling or stringing



It should be properly controlled according to the injection molding machines, the shapes and size of the products, and the mold structure. Temperature in excess of above recommended and long cycle time with long retention time inside barrel could result in discoloration or yellowish problem on the molded part. Those problems are the sign of damage to the material. Melt temperature of resin should be between 230°C and 250°C. It should be checked frequently and maintained within above recommended range to prevent defect of appearance and mechanical properties.

If shutdown is required, remove the material from the machine and purge out completely to avoid burning problem.

Injection Speed & Pressure

Injection speed will be depending on products shape, gate structure and runner dimensions. Basically moderate injection speed is preferable in order to prevent orientation of rubber particles due to excessive shear stress.

Injection pressure should be controlled to mold full parts consistently with acceptable appearance. Many parameters affects injection pressure, such as injection temperature, products shape, nozzle and gate size, runner dimensions and mold temperature. Typical injection pressure range is 70~140 MPa. It is important that injection pressure should drop off to holding pressure after fill-up immediately.

Mold Temperature

The mold temperature affects the surface quality and the level of residual stress in the molded products. To provide a molded product having excellent surface finish and less residual stress, the mold temperature should be controlled as high as possible, ranging between 40°C ~ 80°C. However, higher mold temperature may cause longer cycle time and warpage problem. It should be taken attention excessive mold temperature.

Purging

General maintenance and equipment cleaning should include frequent purging with natural transparent ABS resin. If prolonged shut-down is required, reduce barrel temperature less than 150°C, remove the material from the injection machine and purge with AS resin. Continue this operation until hopper is empty throughout and confirm barrel temperature has been dropped less than 150°C.

5. Troubleshooting Guide

Typical molding problems and problem solutions are shown in following table. Particular molding problem may be caused by several factors such as improper molding conditions, imperfect design of mold and moldings. Any one of the suggested remedies may solve a particular problem. However some problems may require a combination of suggested remedies. Each user of “TOYOLAC” Transparent ABS should make his own evaluation to determine the suitability of the material for his own particular use. If problems are still encountered after trying the remedies outlined below, contact Toray Plastics (M) Sdn. Bhd. for more information.

Defects	Barrel Temperature			Injection Conditions			Plasticizing Conditions		Holding Conditions		Cooling Conditions		Others	
	Rear	Centre-Front	Nozzle	Speed	Pressure	Cycle	Screw rpm	Back Pressure	Pressure	Time	Temp. (°C)	Time	Machine Size	Pre-drying
Molded Part Defect	Silver Streak	U	D	D	D		D						D	R
	Flow Mark		U		U						U			
	Jetting		U		D									
	Sink Mark		D			U			U		O	U		
	Warpage				U	U					O			
	Low Gloss		U		U	U			O		U			
	Burnt Mark		D		D	D	S	D	U				D	
	Weld Line		U		U						U		U	
Molding Defect	Poor Plasticizing	D					D	D						
	Crack during mold release				D	D					U	D		

Remark : U = up, D = down, O = optimize, R = reinforced, S = short

Important Notes:

1. In as much as Toray Plastics (Malaysia) Sdn. Bhd. has no control over the use to which other may put this material, it does not guarantee that the same result as those described herein will be obtained. Nor does Toray Plastics (Malaysia) Sdn. Bhd. guarantee the effectiveness or safety of any possible or suggested design for articles of manufacturer as illustrated herein by any photographs, technical drawing and the like. Each user of the material or design or both should make his own tests to determine the suitability of the material or any material for the design, as well as suitability or suggested uses of the material or design described herein are not to be construed as constituting a license under any Toray Plastics (Malaysia) Sdn. Bhd. patent covering such use or as recommendations for use of such material or design in infringement of any patent
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