

***“TOYOLAC”***  
**High Heat Glass Fiber Reinforced  
ABS Resin**

# **TECHNICAL GUIDE**

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## **1. INTRODUCTION**

“TOYOLAC” High Heat Glass Fiber Reinforced series are designed and developed to meet the need of high rigidity requirement of plastic parts. To produce glass fibre reinforced grade, glass fibre is added into ABS polymer or AS copolymer. Addition of glass fibre improves the rigidity, hardness, dimensional stability and heat resistant ability of ABS and AS copolymer.

Below are the specialties of “TOYOLAC” High Heat Glass Fiber Reinforced series:

1. Enable user to achieve high precision moulded parts as it has a smaller shrinkage rate and thus they are dimensionally stable.
2. Excellent thermal distortion property as they are rigid and have higher heat distortion temperature level.
3. Allowed to be used outdoor as it has a good weather resistant ability.

## **2. FEATURE OF “TOYOLAC” High Heat Glass Fiber Reinforced SERIES**

“TOYOLAC” High Heat Glass Fiber Reinforced ABS resin are categorised as in *Table 1*.

*Table 1: Categories of “TOYOLAC” High Heat Glass Fiber Reinforced Resin*

Types	Grade	Features
<b>Glass Fibre Reinforced</b>	450G-10R	10% Glass Fibre Reinforced Heat Resistant ABS
	450G-20R 450G-20S	20% Glass Fibre Reinforced Heat Resistant ABS
	450G-30R	30% Glass Fibre Reinforced Heat Resistant ABS

Each user of 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 the suitability of the material or design or both his own particular use.

## **4. APPLICATIONS OF “TOYOLAC” High Heat Glass Fiber Reinforced SERIES**

Type	Typical Applications
450G-10R	Structural Parts of Vehicles, Electrical Goods, Car Audio Speaker and Navigation System cover & etc.
450G-20R 450G-20S	
450G-30R	

#### 4. TYPICAL PHYSICAL PROPERTIES OF “TOYOLAC” High Heat Glass Fiber ABS

Table 2: Typical Properties of “TOYOLAC” High Heat Glass Fiber Reinforced ABS resin

HIGH HEAT GLASS FIBER REINFORCED GRADE							
Property 代表物性	Test Method 试验法	Test Condition 试验条件	Units 单位	Glass Fiber Reinforced ABS 玻璃纤维强化树脂			
			Type 型号	450G-10R	450G-20R	450G-30R	450G-20S
ISO STANDARD							
Melt Flow Rate 流动系数	ISO 1133	220°C / 10 kg	g/10min	8	6	4	1
		240°C / 10 kg	g/10min	24	21	12	5
Charpy Impact Strength (notched) 缺口冲击强度	ISO 179/1eA	23°C / 50 %RH	kJ/m <sup>2</sup>	7	7	6	8
Deflection Temperature Under Load 热变形温度	ISO 75	1.8 MPa / 120°C/hr	°C	114	118	125	130
Tensile Strength 引张强度;降伏点	ISO 527	5 mm/min	MPa	76	95	100	92
Tensile Elongation at Break 拉伸伸长率			%	>2	>2	>2	>2
Tensile Modulus 拉伸模数			1 mm/min	MPa	4700	6900	9500
Flexural Strength 弯曲强度	ISO 178	2 mm/min	MPa	128	155	185	150
Flexural Modulus 弯曲模数				4550	6750	9350	6400
Density 比重	ISO 1183	23°C	kg/m <sup>3</sup>	1150	1230	1310	1230
Glass Content 玻纤含量	Toray Method 东丽法	-	%	10	20	30	20
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」

## **5. PROCESSING**

### **Drying**

ABS resin is hygroscopic in which moisture absorption occurs in proportion to environmental humidity. The water absorption process is a reversible process. Moisture of wet pellets will dissipate to the environment of lower humidity whereas dry pellets will absorb moisture to the amount touches equilibrium amount with the moisture in the air. The moisture absorption content depends on the relative humidity in the air and the period of time the resin was exposed. While “TOYOLAC” resin is exposed to humid, the moisture is absorbed onto surface and into the pellets itself, recycled materials or moulded parts. Typical equilibrium moisture of “TOYOLAC” High Heat Glass Fiber Reinforced grade is around 0.2~0.3% at 23°C, 50%RH, and 0.5~0.6% at 40°C, 95%RH. The moisture absorption rate depends on pellet size, shape and environmental temperature. Non-dried ABS resin can cause silver streak problem on moulded parts. The recommendable moisture content for “TOYOLAC” High Heat Glass Fiber Reinforced grades is less than 0.1%, more desirable is 0.05%. Generally, below drying conditions are recommended.

***Drying Temperature: 80 ~ 90 °C***  
***Drying Time: 2 ~ 4 hrs***

## **6. INJECTION MOULDING**

### **Injection Temperature**

The barrel temperature of injection moulding machine should increase from the hopper to the nozzle gradually.

*Table 3: Recommended Barrel Setting Temperature*

<b>Nozzle (°C)</b>	<b>Zone 4 (°C)</b>	<b>Zone 3 (°C)</b>	<b>Zone 2 (°C)</b>	<b>Zone 1 (°C)</b>	<b>Feed Zone (°C)</b>
250 ~ 270	250 ~ 270	250 ~ 270	240 ~ 260	240 ~ 260	240 ~ 260

It should be properly controlled according to the injection moulding machines, the shapes and size of the products, and the mould structure. Temperature in excess of above recommended could result of discoloration or burn marks troubles. Those troubles are a sign of damage to the material. Melt temperature of resin should be between 250°C and 270°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 trouble.

### **Mould Temperature**

The mould temperature affects the surface quality and the level of residual stress in the moulded products. To provide moulded product having excellent surface finish and less residual stress, the mould temperature should be controlled as high as possible, ranging between 70°C ~ 90°C. However, higher mould temperature may cause longer cycle time and warpage problem. It should be taken attention excessive mould temperature.

### **Injection Speed & Pressure**

Injection speeds will be depending on products shape, gate structure and runner dimensions. Moderate injection speed is preferable in order to prevent orientation of rubber particles due to excessive shear. Injection pressure should be controlled to mould full parts consistently with acceptable appearance. Many parameters affects injection pressure, such as injection temperature, products shape, nozzle and gate size, runner dimensions and mould temperature. Typical injection pressure range is 70~140MPa for “TOYOLAC” High Heat Glass

Fiber Reinforced Grades. It is important that injection pressure should drop off to holding pressure after fill-up immediately.

### **Purging**

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

### **Regrind**

Runners, sprues and shot-shots of “TOYOLAC” High Heat Glass Fiber Reinforced resin moulded under proper moulding conditions can be used for recycle materials. Those non-degraded regrind up to a 20% can be reprocessed with fresh pellets of the same grade. Please do not mix it up with other grades of “TOYOLAC” resin or other plastics. And dry it up before reprocessing.

**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.
2. The material described here is not recommended for medical application involving any implantation inside the human body. Material Safety Data Sheet (MSDS) for the materials concerned should be referred to before any use.