

“TOYOLAC” Flame Retardant ABS Resin

*Technical Guide
for
Processing & Molding*

Toray Plastics (Malaysia) Sdn. Bhd.

Penang (Head Office)

2628 MK1, SPT., Lorong Perusahaan 4,

Prai Free Industrial Zone,

13600 Prai, Penang, Malaysia.

TEL: +60-4-3988088

FAX: +60-4-3908975

1. Introduction

Fundamentally, “TOYOLAC” Flame Retardant ABS is used to meet fire safety requirements in the applications of construction industry, transport sector, electrical and electronic engineering, office appliances and furniture industry.

The effect is to prevent accidental fired or if it does break out to limit its spread. Together with other fire prevention measures flame retardant plastics ensures a high safety standard and protect human life, health and property.

“TOYOLAC” Flame Retardant ABS is designed to meet the safety requirement of Underwrite Laboratory 94 (UL94 File No. E41797) of USA and Canadian Standard Association (CSA) of Canada

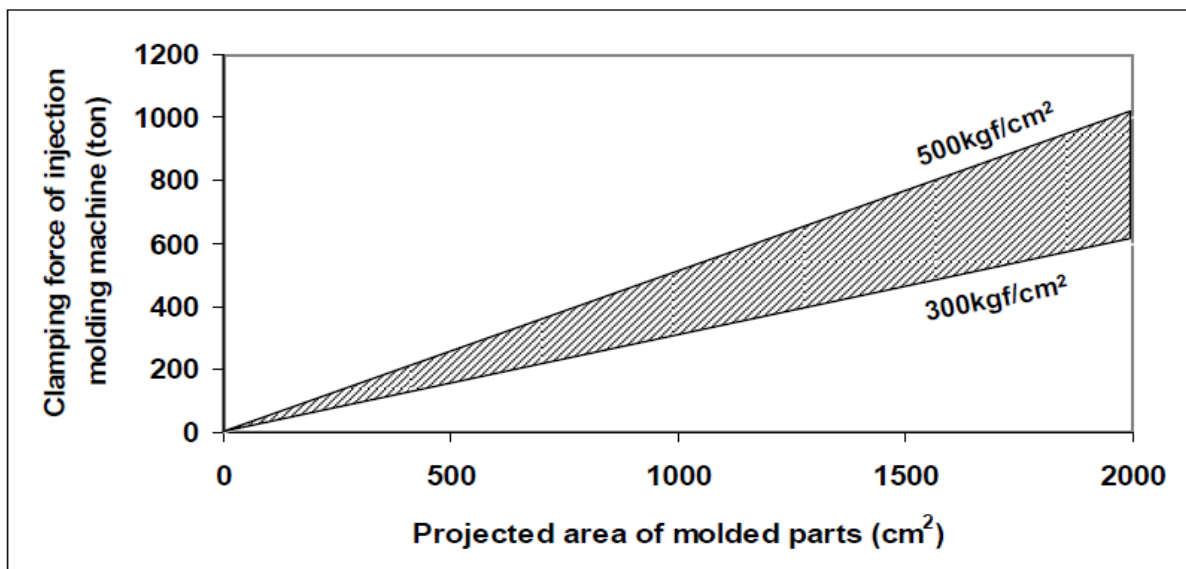
2. Processing & Molding Conditions

2.1 Injection molding machine

- Clamping force of injection molding machine should be calculated below mentioned formula (pressure in cavity of ABS resin is generally around 300-500 kgf/cm²), and refer to below relation graph. Appropriate injection molding machine should be used to match the mold size.

Clamping force (ton)

= Projected area of molded parts (cm²)×pressure in cavity (kgf/cm²)÷1000



- Shot volume of injection molding machine is recommended around 60-80%. It's suitable for following below mentioned formula. In case of less than 50% shot volume, residence time of material inside cylinder should be longer. That situation causes discoloration and deterioration of mechanical property.

Shot volume of injection molding machine > Weight of molded parts ÷ Specific

- Screw type of injection molding machine should be recommended full-flight type (compression ratio 2.0~2.5). There is a possibility that using of high compression ratio type and high kneading type cause burning and discoloration defects.
- For flame retardant ABS resin molding, abrasion and corrosion resistance material should be recommended for injection molding machine, such kind of barrel, screw and backflow protection ring.

2.2 Molding conditions

2.2.1 Pre-Drying

Generally, ABS resin is hygroscopic and absorbs moisture in proportion to the environmental humidity. The absorb process of moisture is reversible process, therefore wet pellets can be removed moisture to environmental air with low humidity. Dried pellets should absorb moisture until the content reaches equilibrium moisture with the moisture in the air. The exact amount of moisture content depends on the relative humidity, how long the resin was exposed.

ABS resin is exposed to humidity, the moisture is absorbed onto the surface and into the inside of the pellets itself, recycled material and moldings. Typical equilibrium moisture of flame retardant grades of "TOYOLAC" content at 23°/ 50% RH range between 0.2 to 0.3%, at 40°/ 95% RH range between 0.5 to 0.6%. The absorbed rate of moisture is depending on pellet size and environmental temperature.

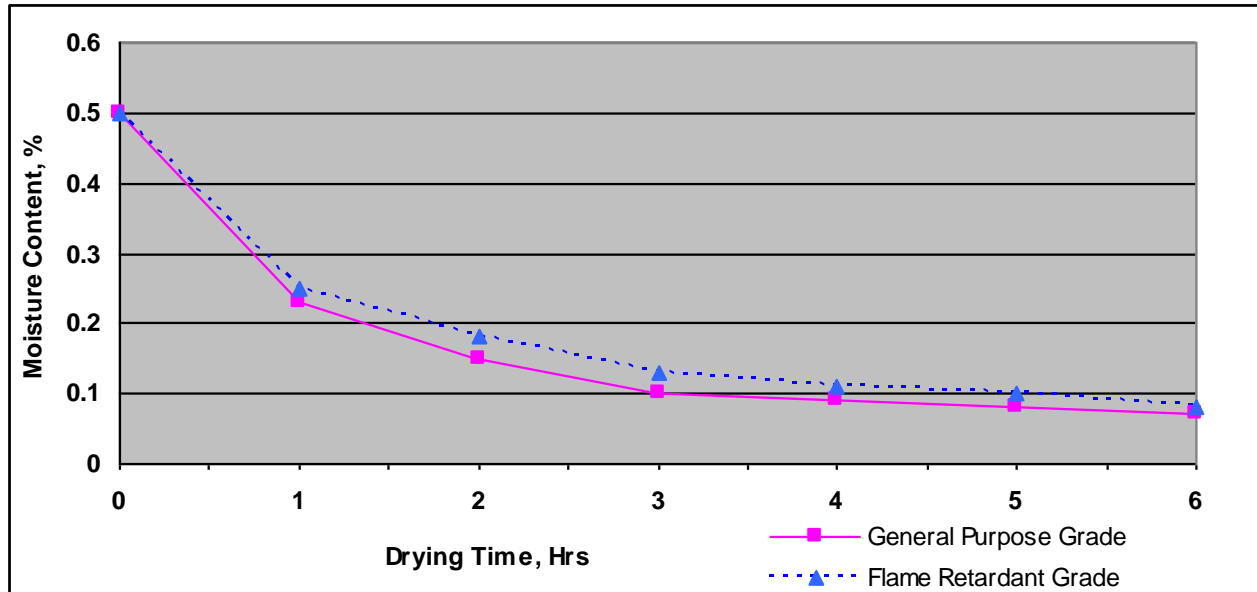
Processing undried ABS resin can be cause in silver streaking problem on moldings. For flame retardant grades of "TOYOLAC" the suggested moisture level for molding is less than 0.1%, more desirable is 0.05%.

Typical drying temperature and time of flame retardant grades of "TOYOLAC" by using oven with internal air circulation are shown as follows;

Drying Temperature : 80~85°C

Drying Time : 3~5 hrs

Drying Variable of "TOYOLAC" Flame Retardant Grade



2.2.2 Injection molding temperature and pressure

Injection molding conditions should be properly controlled according to the molding machines, the shape and size of the products, and the mold structure. Typical molding conditions show as follows;

Melt temperature of polymer : 190 ~ 210 °C (General Purpose FR Grade)

: 210 ~ 230 °C (Light Resistance FR Grade)

Injection pressure : 70 ~ 140 MPa

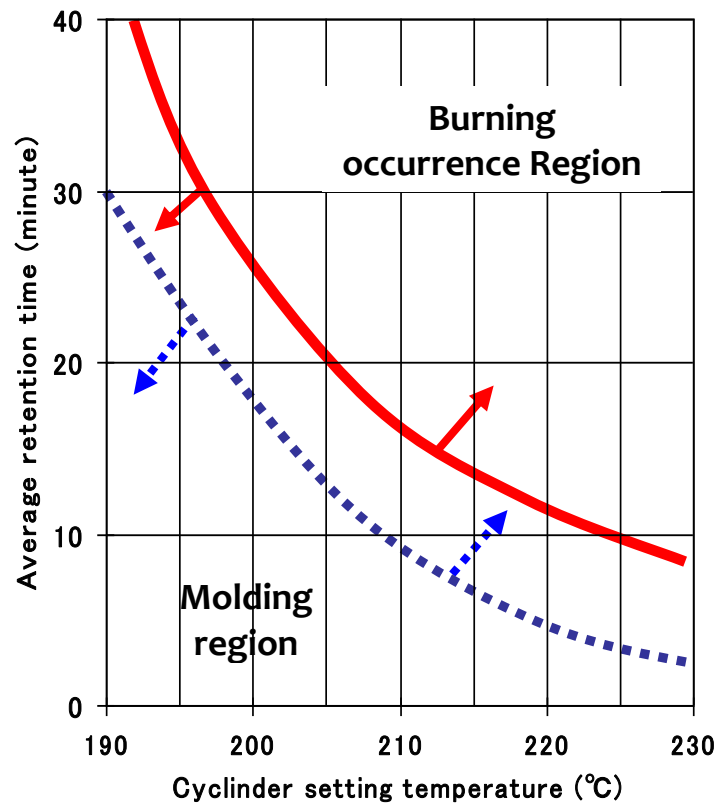
Mold temperature : 30 ~ 60 °C

Screw rotating speed : 30 ~ 70 r. p. m.

Excessive temperature recommended above could result in discoloration or burn marks problems. These are sign of damage to the material. Temperature in excess of those recommended could result of noxious and corrosive vapors which could cause mold and equipment corrosion. The mechanism of degradation is time / temperature effective and involves total heat history of the resin.

This excess heat could be controlled by gate and land dimension, slower injection rate or lower injection pressure. In case of accidental thermal degradation, noxious and corrosive gas may be occurred. Purge the barrel, shut off machine, quench purge shot in water. Please refer to further information that is mentioned under the title “Purging”.

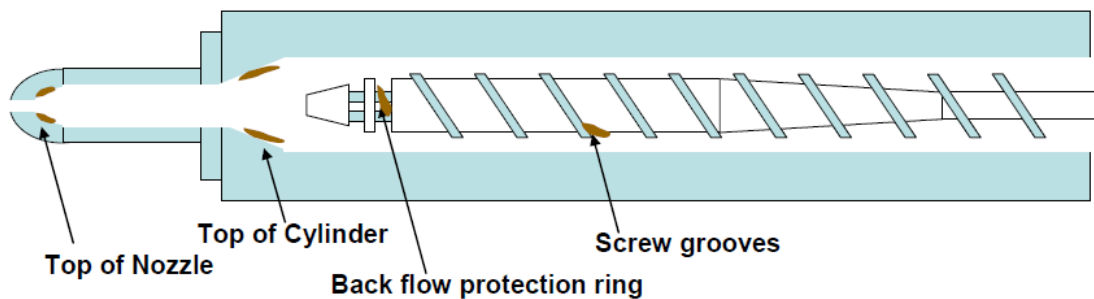
Even though cylinder temperature of injection molding machine is controlling recommended temperature range, longer residence time might be cause of thermal degradation and carbonized materials should be generated.



.....	884-X01
————	844V-X05, 834V-X01, 834-X06 824V-X01, NH82A-X01

3. Purging

- Purging operation should be required if carbonized material is generated during continuous molding operation. Equipment cleaning should include frequent purging with natural color ABS resin or AS resin. In case of carbonized material does not stop generating even though purging operation has been carried out sufficiently, screw should be taken out and remove carbonized materials that are stuck on screw surface, screw grooves, top of nozzle and cylinder should be cleaned up.



- If shut-down is required, remove the material from the machine and purge with natural ABS resin (or AS resin) or proper screw cleaning agent due to avoid the burning trouble and the corrosion of equipment.
- In case of molding operation is resumed after shut-down, purging operation should be required until carbonized material does not come out throughout

4. Regrind

Regrind material such as runners, sprues and short-shots of general purpose ABS resin can be used for recycle materials. However, flame retardant ABS resin should be avoided to use regrind material for the reason that regrind material has been undergone heat histories and it might be degraded easily.

“TOYOLAC” Flame Retardant Grade Typical Properties

FLAME RETARDANT GRADE 阻燃型								
Property 代表物性	Test Method 试验法	Test Condition 试验条件	Units 单位		General Purpose 一般	Light Resistant 耐光		
				Type 型号	884	844V	834V	824V
				Suffix 区分字符	X01	X05	X01	X01
ISO STANDARD								
Melt Flow Rate 流动系数	ISO 1133	200°C / 5 kg	g/10min	5	-	-	-	
		220°C / 10 kg		-	35	32	37	
Charpy Impact Strength (notched) 缺口冲击强度	ISO 179/1eA	23°C / 50 %RH	kJ/m ²	14	12	15	15	
Deflection Temperature Under Load 热变形温度	ISO 75	1.8 MPa / 120°C/hr	°C	70	76	78	79	
Tensile Strength 引张强度;降伏点	ISO 527	50 mm/min	MPa	49	46	46	48	
Tensile Elongation at Break 拉伸伸长率			%	>5	>5	>5	>5	
Tensile Modulus 拉伸模数			1 mm/min	MPa	2700	2600	2500	2500
Flexural Strength 弯曲强度	ISO 178	2 mm/min	MPa	70	68	67	69	
Flexural Modulus 弯曲模数				2500	2400	2400	2400	
Density 比重	ISO 1183	23°C	kg/m ³	1160	1170	1150	1100	
Flammability 燃烧性	UL94 File No. E41797			0.75 mm V-2 1.5 mm V-0 2.5 mm 5VA	1.5 mm V-0 2.5 mm 5VA 2.0 mm 5VB	2.0 mm V-0 3.0 mm 5VA	0.75 mm V-2	

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」

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 are not recommended for medical application involving any implantation inside the human body. Material Safety Data Sheet (MSDS) for the materials concerned should referred to before any use.