“TOYOLAC”
Non Halogen Flame Retardant ABS

Technical Guide
for
Processing & Molding

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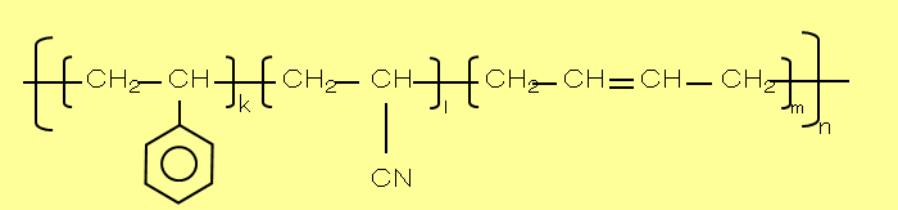
Introduction of TOYOLAC$_{TM}$ Non Halogen Flame Retardant Grade (V-2)
TOYOLAC$_{TM}$ NH82C X01

I. Introduction

- Toray is a comprehensive plastic manufacturer who has the doing polymerization and compounding of engineering plastics such as the ABS, PA, PBT, PPS and LCP.
- TOYOLAC$_{TM}$ is a thermoplastic material known as ABS resin which is composed of Acrylonitrile, Butadiene and Styrene with the chemical structure formula is as below.



- TOYOLAC$_{TM}$ is lightweight, strong and attractive while ensuring excellent mechanical, thermal, chemical and electrical properties. This allows use in many fields ranging from industrial to home use.
- This technical material will specifically show the advantage of Toray ABS resins TOYOLAC$_{TM}$ NH82C X01 which is developed through our years technology knowledge together with the latest flame retardant technology for the usage of various kinds of housings (OA and AV machines).

II. Characteristics of TOYOLAC$_{TM}$ NH82C X01

- **Non Halogen Flame Retardant**
- **Molding Process**
- **Lower Out-gassing**
- **Mechanical Property**
- **Cost**
- **Easy Supply**

1. General Properties

The general properties of TOYOLAC$_{TM}$ NH82C X01 is shown in below **Table 1**.

Table 1: TOYOLAC$_{TM}$ NH82C X01 General Properties

Property 代表物性	Test Method 试验法	Test Conditions 试验条件	Unit 单位	TOYOLAC NH82C X01
Physical Properties 物理性能				
Density 比重	ISO 1183	23°C	kg/m^3	1060
Melt Flow Rate 流动系数	ISO 1133	220°C, 10 kg	g / 10min	57
Mechanical Properties 机械性能				
Charpy Impact, Notched 缺口冲击强度	ISO 179/1eA	23°C / 50% RH	kJ/m^2	17
Tensile Strength 引张强度;降伏点	ISO 527	50 mm/min	MPa	46
Tensile Elongation at Break 拉伸伸长率		50 mm/min	%	> 5
Tensile Modulus 拉伸模数		1 mm/min	MPa	2200
Flexural Strength 弯曲强度	ISO 178	2 mm/min	MPa	69
Flexural Modulus 弯曲模数				2200
Thermal Properties 热性能				
Deflection Temperature under load 热变形温度	ISO 75	1.8 Mpa / 120°C/hr	°C	68
Flammability 燃烧性				
Flammability 燃烧性	UL 94	-	-	0.75mm V-2 3.0mm V-2

※ Figures in the table are typical examples of measurements are evaluated based on predetermined measurement values and are not guaranteed.

2. Drying and Mold Temperature Conditions

TOYOLAC$_{TM}$ NH82C X01 drying and mold temperature condition is shown in **Table 2**.

Table 2: TOYOLAC$_{TM}$ NH82C X01 drying and mold temperature condition

Molding Process Condition			
Molding Condition 成形条件	Molding Temperature 成形温度	ºC	190~230
	Injection Molding 射出圧力	MPa	70~140
	Mold Temperature 金型温度	ºC	30~60
Predrying Condition 予備乾燥条件	Drying Temperature 乾燥温度	ºC	80 ~ 85
	Drying time 乾燥時間	ºC	3~5

※ The molding temperature varies according to the mold material (thin tray) and special molding techniques and not limit to the above temperature.

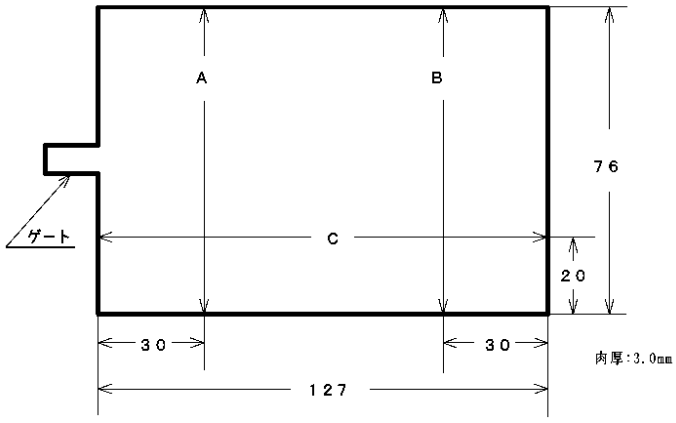
※ Please keep the temperature below 230℃ to keep the resin performance.

3. Mold shrinkage Rate

TOYOLAC$_{TM}$ NH82C X01 mold shrinkage rate is shown in **Table 3**.

Table 3: TOYOLAC$_{TM}$ NH82C X01 Mold Shrinkage rate

Grade	Molding temp. / Mold temp.	Injection Pressure	Measuring Point		
			TD		MD
			A	B	C
TOYOLAC$_{TM}$ NH82C X01	230°C / 60°	Min Pressure + 3%	0.61	0.67	0.56
		Min Pressure + 6%	0.57	0.62	0.52



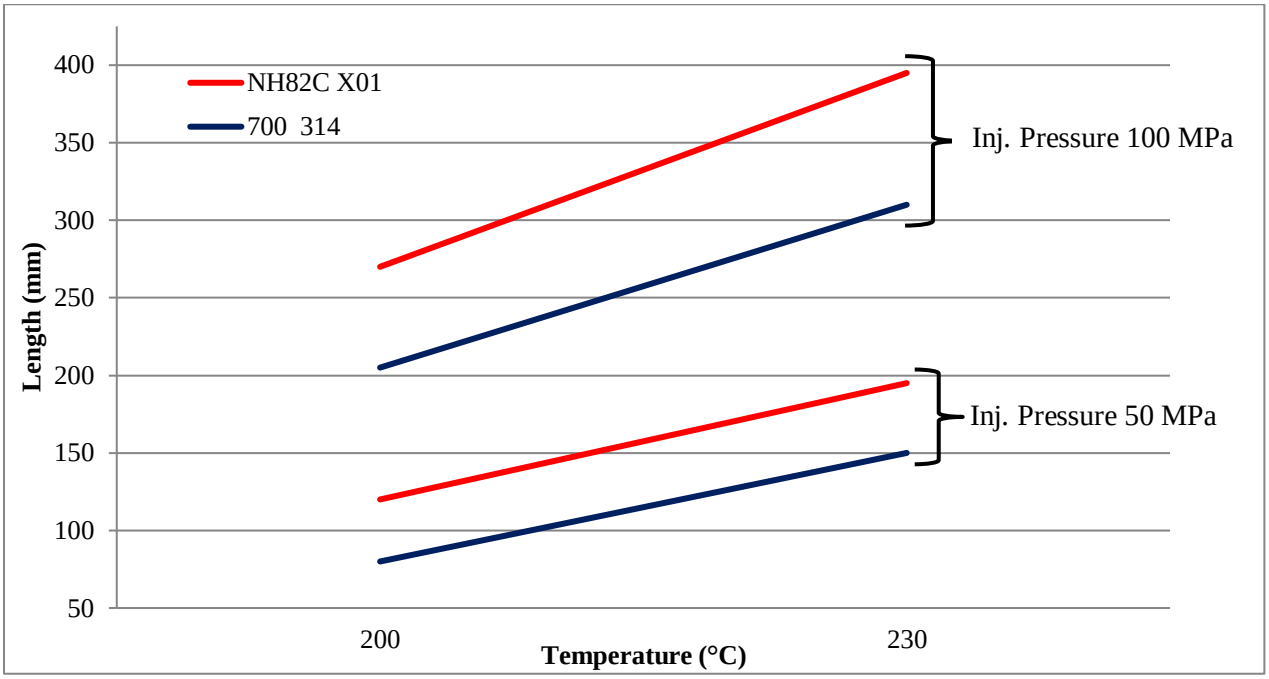
[Molding Condition]
Molding Machine: Sumimoto Nestar S480/150
Molding Temperature: 230°C
Mold Temperature: 60°C
Mold Dimension: 127 × 76 × 3mmt

[Measurement Method]
Measure test piece dimension after 24 hours remaining under 23°C, 50%RH

4. Flowability (Spiral Flow Length)

The flowability (Spiral Flow Length) of TOYOLAC$_{TM}$ NH82C X01 is shown in **Figure 1**.

Figure 1: TOYOLAC$_{TM}$ NH82C X01 flowability (Spiral Flow Length)



[Spiral Flow Molding Condition]

Injection Molding Machine	: Toshiba IS-50A
Molding Dimension	: 10W × 2mmt Spiral
Mold Temperature	: 60°C
Molding Cycle	: 10/20 seconds (Injection/Cooling)
Molding Temperature	: 200°C, 230°C
Injection Pressure	: 50 MPa, 100 MPa

5. Out-gassing

i. Volatile Content

The Volatile content for NH82C X01 shown in **Table 4** below.

Table 4: TOYOLAC$_{TM}$ NH82C X01 Volatile Content

	Test Condition	Unit	**NH82C X01**
Volatile Content	240 °C, 3Hr	%	1.4

[Testing Method]
3gm pellet is weighted and put into an oven at 240°C for 3 hours, after burning the weight loss is measured.

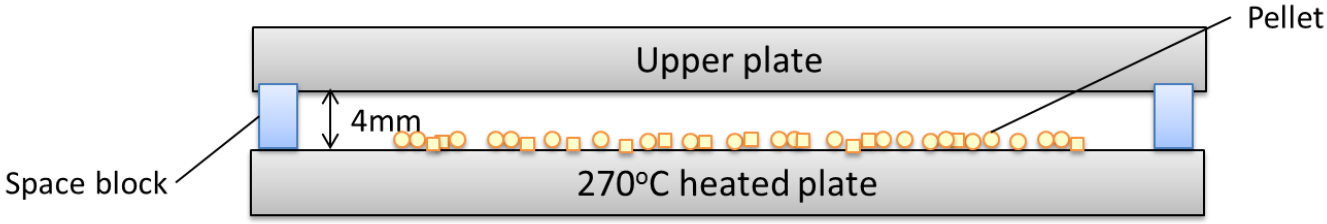
ii. Mold Deposit (Bleed Content)

The Mold deposit (Bleed Content) for NH82C X01 shown in **Table 5** below.

Table 5: TOYOLAC$_{TM}$ NH82C X01 Mold Deposit (Bleed Content)

	Test Condition	Unit	**NH82C X01**
Bleed out Content	270 °C, 10 minutes	%	0.073

Figure 2: Bleed Content Testing Diagram



[Testing Method]
15gm resin pellet is put on top of a 270°C heated plate, after 10 minutes the bleed material accumulated at the top plate is measured.

6. Thermal Retention Stability

The thermal retention stability (burnt resin) of the NH82C X01 is shown in Table 6 below. The NH82C X01 resin burnt after retention time of 30 minutes at 250°C, therefore it is not recommend to retain the hot melt in the barrel for long time between injection cycles to avoid melt form degrading.

[Testing Method]
After continuous molding, the resin material is retained inside molding machine barrel with the condition (250°C, 30 minutes). 10 continuous molding shots are done, the resin burnt level is then judged manual visual.

7. Recycle Property

The Recycle Property of NH82C X01 is shown in Table 7 below. NH82C X01 able to retain most of the properties after 3 times re-extrude using single screw extruder.

Table 7: TOYOLAC$_{TM}$ NH82C X01 Recycle Property

	Unit	Initial	1st	2nd	3rd
Melt Flow Rate	g/10min	46.5	46.7	46	47.6
Charpy Impact, notched	kJ/m^2	18.2	18.3	18.1	17.9
Tensile Strength	MPa	47	47.2	47.6	47.7
Tensile Modulus	MPa	2220	2250	2240	2240
Tensile Elongation	%	10.4	9.7	10.3	9.03
Flexural stress	MPa	69.5	72.5	72.5	72.5
Flexural Modulus	MPa	2200	2350	2360	2350
DTL, 1.8MPa	°C	69	68.7	67	67.3

※ *The Figure in the table are typical examples of measurement are evaluated based on predetermined measurement values are not guaranteed.*

[Testing Method]
Resin sample is re-extruded for up to 3 cycles, and then the resin is molded. Properties is check after cool downed condition at 23°C, 50%RH.

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.