

PBT(Polybutylene terephthalate)

DURANEX®

531HS

EF2001/ED3002

(Hydrolysis
Resistant, Heat Shock
Resistant grade)

CONTENTS

Introduction

1.General physical properties of DURANEX® 531HS

2.Design considerations of DURANEX® 531HS

NOTES TO USERS

- All property values shown in this brochure are the typical values obtained under varying conditions prescribed by applicable standards and test method.
- This brochure has been prepared based on our own experiences and laboratory test data, and therefore all data shown here are not always applicable to parts used under different conditions. We do not guarantee that these data are directly applicable to the application conditions of users and we ask each user to make his own decision on the application.
- It is the users' responsibility to investigate patent rights, service life and potentiality of applications introduced in this brochure. Materials we supply are not intended for the implant applications in the medical and dental fields, and therefore are not recommended for such uses.
- For all works done properly, it is advised to refer to the appropriate **"Technical Catalog"** for specific material processing.
- For safe handling of materials we supply, it is advised to refer to the Material Safety Data Sheet **"MSDS"** of the proper material.
- This brochure is edited based on reference literatures, information and data currently available to us. So the contents of this brochure are subject to change without notice due to new data.
- Please contact our office for any questions about products we supply, descriptive literatures or any description in this brochure.

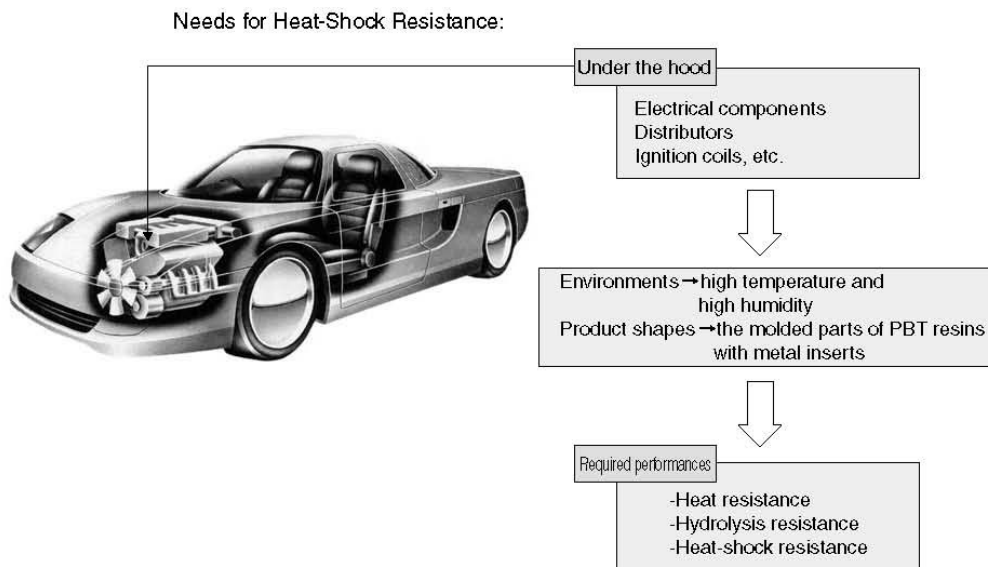
* "DURANEX®" is a registered trademark of Polyplastics Co., Ltd in Japan and other countries, under license to WinTech Polymer Ltd.

* WinTech Polymer Ltd. is a member of the Polyplastics Group, while the "DURANEX®" PBT resin manufactured and sold by that firm is marketed by Polyplastics affiliated companies.

Introduction

Duranex polybutylene terephthalate (PBT) resins are widely used in various environments in the electrical / electronic and automotive industries because of their excellent heat resistance, mechanical properties, and outstanding electrical properties. This combination of properties permits **Duranex** to be used electrical applications. In the automobile, electrical components such as

distributors and ignition coils are especially used under the severest conditions. These electrical components located under the hood and exposed to elevated high temperatures are required to retain resistance to high temperatures and hydrolysis. At the same time, **heat-shock resistance** is required because of their metal parts.



Heat-Shock Resistance:

When the molded parts of PBT resins with metal inserts are heat-shocked, stress occurs due to the higher thermal expansion and contraction rate of the PBT resins than those of metals. The stress causes cracks at weld lines and the metal's sharp edges, critically damaging the electrical components.

The performance of heat-shock resistance depends on complexly interrelated factors such as the shape of molded part and material performance. For example, a slight change of the shape changes the areas of stress and the product's life cycle so the shape should be considered carefully.

DURANEX® 531HS:

Through our accumulated expertise and research efforts, our company has succeeded in developing **Duranex 531HS**, a PBT resin with the most outstanding grade of heat-shock resistance.

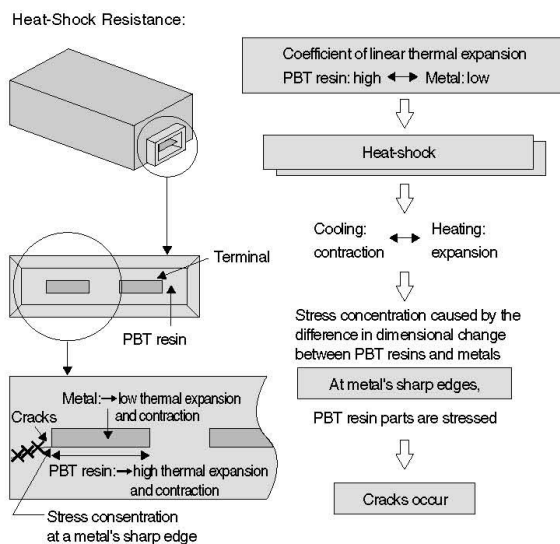
Duranex 531HS was developed with the following concepts:

1. Strengthening the Weld Lines

- a) to adjust the molecular weight of PBT resins to maximize durability and flowability
- b) to select durable modifiers with excellent dispersion to strengthen the welded interfaces

2. Reduction of Stress at the Metal's Sharp Edges

- a) to reduce stress by reducing the thermal expansion of resins which is caused by heat-shock due to difference in dimensional change between resins and metals
- b) to reduce stress in the early stages of molding by reducing mold shrinkage



General Properties of 531HS

table1-1 General Properties (ISO)

Item	Unit	Test Method	Hydrolysis Resistant,Heat Shock Resistant
			531HS
			GF30% reinforced
Color			EF2001/ED3002
ISO(JIS)quality-of-the-material display:		ISO11469 (JIS K6999)	>PBT+AMMA-GF30<
Density	g/cm ³	ISO 1183	1.47
Tensile strength	MPa	ISO 527-1,2	118
Strain at break	%	ISO 527-1,2	2.7
Flexural strength	MPa	ISO 178	187
Flexural modulus	MPa	ISO 178	8100
Charpy impact strength (notched)	kJ/m ²	ISO 179/1eA	10.8
Temperature of deflection under load (1.8MPa)	℃	ISO 75-1,2	208
Coefficient of linear thermal expansion (23～55℃、Flow direction)	x10 ⁻⁵ /℃	ISO 11359-2	2
Coefficient of linear thermal expansion (23～55℃、Transverse direction)	x10 ⁻⁵ /℃	ISO 11359-2	13
Dielectric breakdown strength (3mmt)	kV/mm	IEC 60243-1	16
Volume resistivity	Ω・cm	IEC 60093	1 × 10 ¹⁶
Tracking resistance (CTI)	V	IEC 60112	-
Flammability		UL94	HB
The yellow card File No.			E213445
Appropriate List number of Ministerial Ordinance for Export Trade Control			Item 16 of Appendix -1

※1) Nominal strain at break

All figures in the table are the typical values of the material and not the minimum values of the material specifications.

2. Design considerations of DURANEX® 531HS

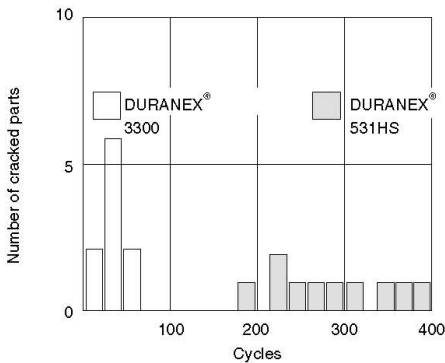
By adding durable modifiers, **Duranex 531HS** has significantly enhanced its heat-shock resistance

Because of their excellent compatibility with and uniform dispersion within the base polymer of PBT resin, the durable modifiers intensify the toughness and impact resistance of **Duranex 531HS**. these enhancements achieve the desired effect of stress reduction at the metal's sharp edges.

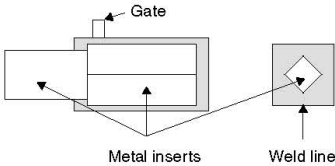
Table 2-1 Heat-shock resistance (unit: cycle)

	DURANEX® 531HS	DURANEX® 3300
Average life	300	40

Fig. 2-1 Heat-shock resistance



Heat-shock Test Mold:



Test methods
Conditions: -40°C (90min.) ↔ 140°C (90min.)
Inspection of test samples every 20 cycles
(n=10)

Fig. 2-2 Hydrolysis resistance (80°C×95%RH)

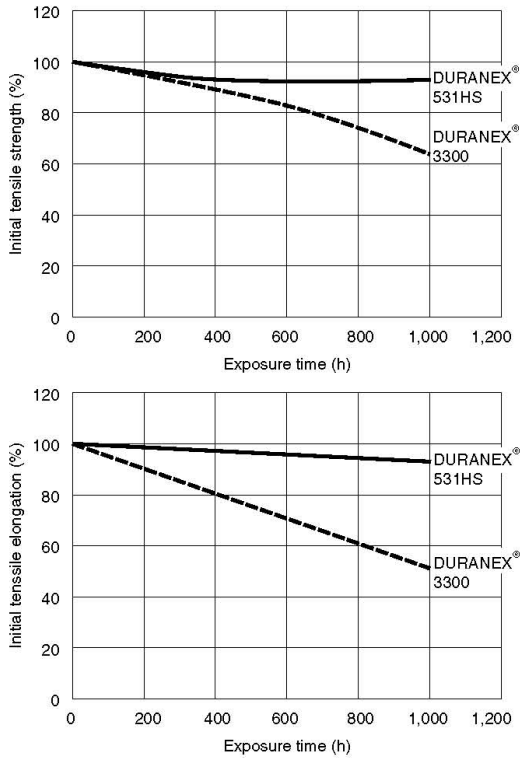


Fig. 2-3 Linear thermal expansion

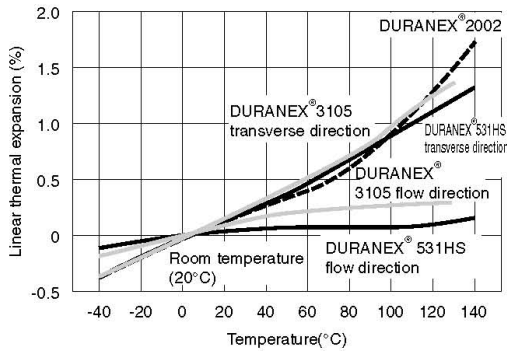


Fig. 2-4 Effect of Temperature on Izod impact Strength (notched side)

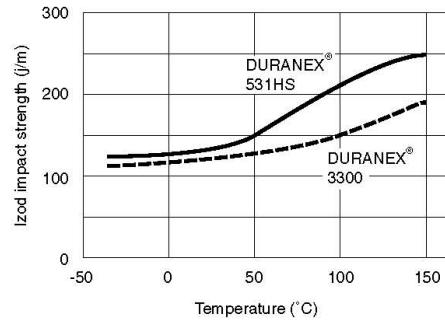


Fig. 2-5 Flexural S-S Curves

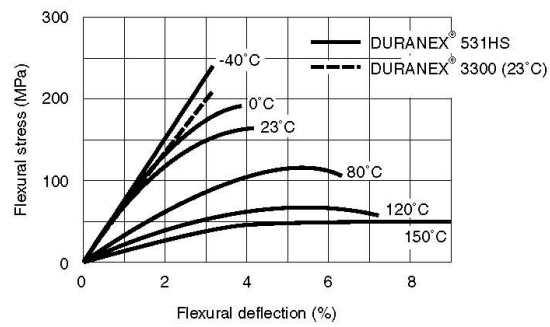


Fig. 2-6 Effect of temperature on flexural deflection at break

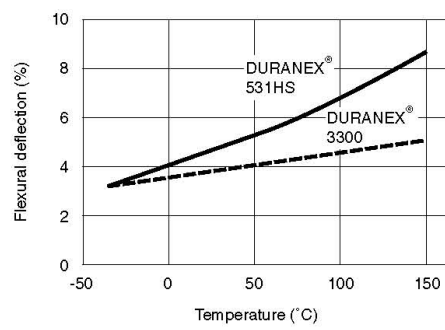
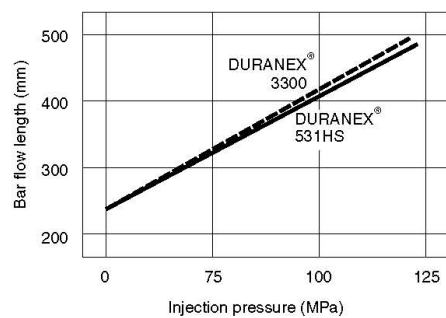
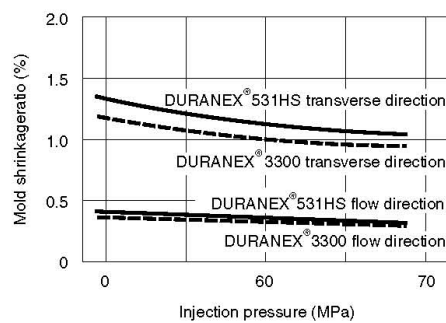


Fig. 2-7 Bar Flow Length (2mm ϕ)



Processing parameters
 Cylinder temperatures: 260-260-230-210°C
 Mold temperature: 65°C
 Injection rate: **4m/min**
 Mold: Bar flow test mold

Fig. 2-8 Mold Shrinkage ratio (120 \square ×2mm ϕ)



Processing parameters
 Cylinder temperatures: 260-260-230-210°C
 Mold temperature: 65°C
 Injection rate: **1m/min**
 Mold: Plate (120×120×2mm ϕ)
 (Side gate: 4(W)×2 ϕ)

Polyplastics

POLYPLASTICS CO., LTD.

JR Shinagawa East Building
18-1, Konan 2-chome, Minato-ku, Tokyo 108-8280 Japan
Phone: 81-3-6711-8600

- *Affiliates*

Polyplastics Asia Pacific Sdn. Bhd.(Kuala Lumpur)
Polyplastics Asia Pacific Singapore Pte.Ltd.(Singapore)
Polyplastics Marketing (T) Ltd.(Bangkok)
Polyplastics China Limited (Hong Kong)
Polyplastics (Shanghai) Ltd.(Shanghai)
Polyplastics Trading (Shanghai) Ltd.(Shanghai)
Polyplastics Taiwan Co., Ltd.(Taipei)
PTM Engineering Plastics (Nantong) Co., Ltd.(Nantong)