

Polybutylene Terephthalate (PBT)

DURANEX®

330LW

EF2001/LB3002

For Laser Welding

General Properties of 330LW

table1-1 General Properties (ISO)

Item	Unit	Test Method	For Laser Welding
			330LW
			GF30% Reinforced, High transmissibility, Low Warpage
Color			EF2001/LB3002
ISO(JIS)quality-of-the-material display:		ISO11469 (JIS K6999)	>PBT+PC-GF30<
Density	g/cm ³	ISO 1183	1.48
Water absorption (23°C,24hrs,1mmt)	%	ISO 62	0.1
Tensile strength	MPa	ISO 527-1,2	149
Strain at break	%	ISO 527-1,2	2.6
Flexural strength	MPa	ISO 178	211
Flexural modulus	MPa	ISO 178	8,840
Charpy notched impact strength (23°C)	kJ/m ²	ISO 179/1eA	10.8
Temperature of deflection under load (1.8MPa)	°C	ISO 75-1,2	194
Coefficient of linear thermal expansion (23 - 55°C、 Flow direction)	x10 ⁻⁵ /°C	Our standard	2
Coefficient of linear thermal expansion (23 - 55°C、 Transverse direction)	x10 ⁻⁵ /°C	Our standard	6
Electric strength (3mmt)	kV/mm	IEC 60243-1	-
Volume resistivity	Ω·cm	IEC 60093	-
Volume resistivity (Our standard)	Ω·cm		-
Tracking resistance (CTI)	V	IEC 60112	-
Rockwell hardness	M(Scale)	ISO2039-2	-
Flammability		UL94	-
The yellow card File No.			-
Appropriate List number of Ministerial Ordinance for Export Trade Control			-

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

Introduction

DURANEX® PBT is a polybutylene terephthalate-based crystalline engineering plastic.

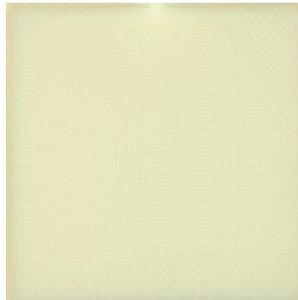
With superior heat resistance and electrical properties in addition to good moldability, it has a strong reputation as a material ideally suited for use in electrical and electronic components, auto parts, various types of precision components, and more.

Here we will introduce **DURANEX® PBT 330LW**, a grade with both high laser transmissibility and low warpage which is ideally suited for laser welding applications.

DURANEX® PBT 330LW color lineup

- Color code: EF2001 Natural color
- Color code: LB3002 Black

EF2001 (Natural color)



LB3002 (Black)

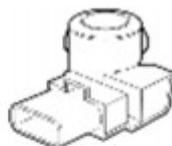


[Application examples]

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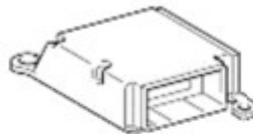


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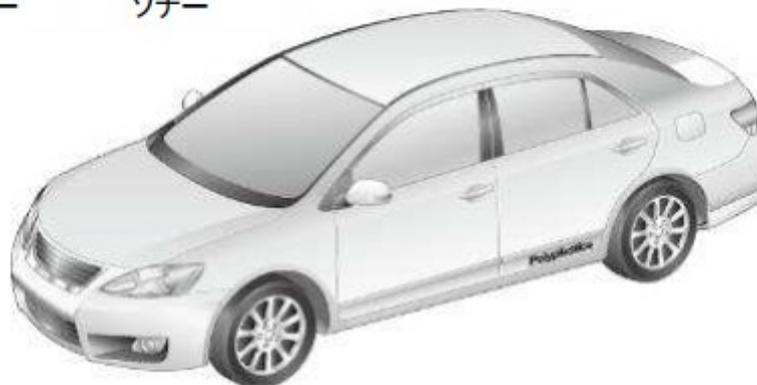
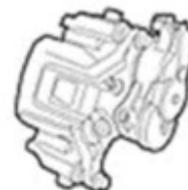


ソナー

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2. High Transmissibility

2.1 Light transmission spectra comparison

Figure 2-1 shows a comparison of the light transmission spectra (1 mmt flat plate) of 330LW grades EF2001 (natural color) and LB3002 (black) and existing grades. 330LW shows high transmittance compared to existing laser welding grade 730LW PLTZ71549 (blue) and standard grade 3300 EF2001 (natural color) in the laser wavelength ranges used for laser welding (near-infrared region).

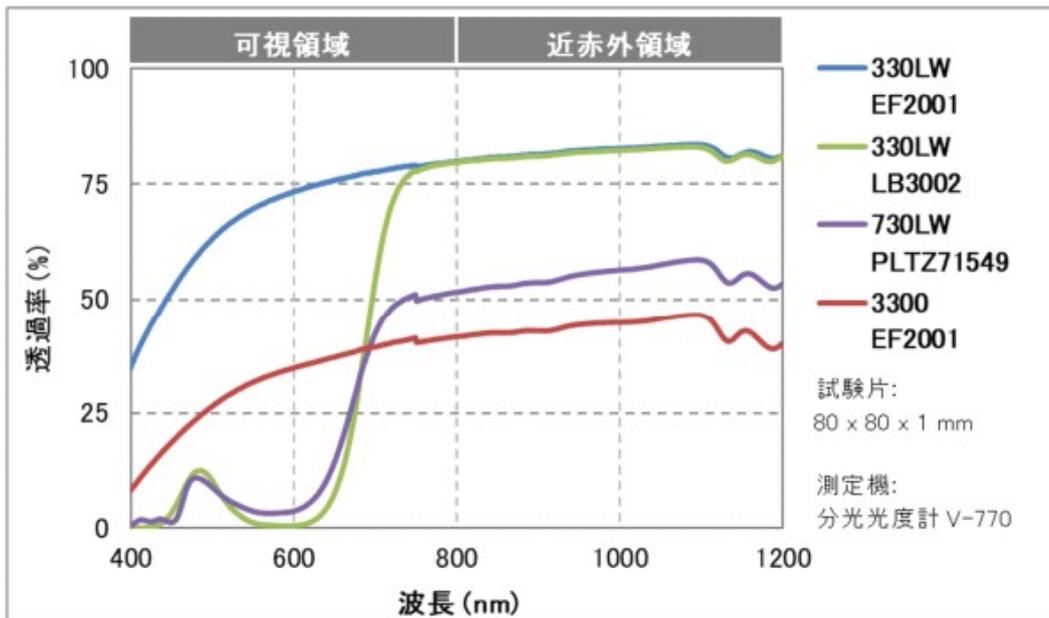


Figure 2-1: Light transmission spectra of DURANEX® PBT 330LW, 730LW, and 3300

2.2 Visibility of the welded part

Figure 2-2 shows the outer appearance of a 330LW EF2001 (natural color) laser welded article. Since 330LW EF2001 shows high transmittance even in the visible range (Figure 2-1) we can observe the state of the welded part directly.

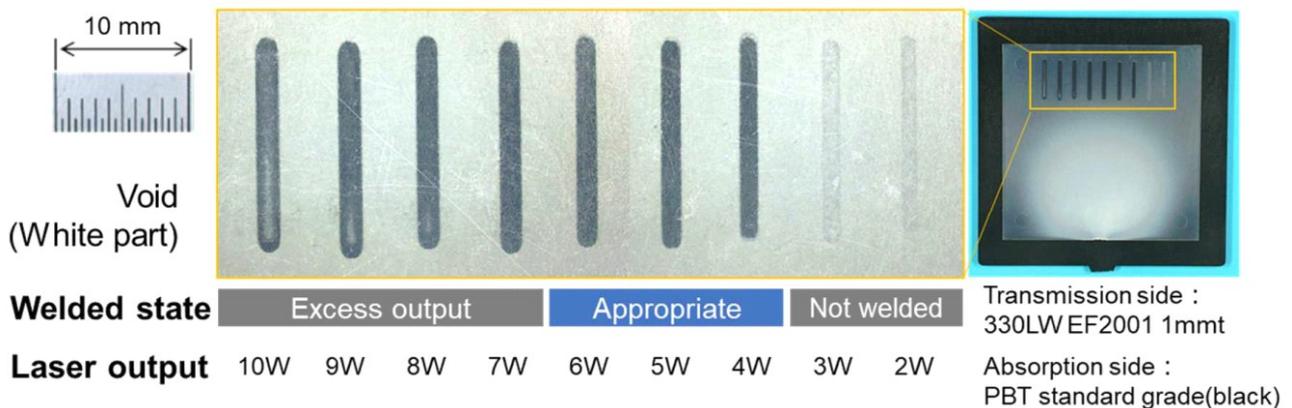


Figure 2-2: Visibility of the welded part of DURANEX® PBT 330LW EF2001

2.3 Comparing thickness dependency of transmittance

Figure 2-3 and Figure 2-4 compare the near-infrared transmittance of 330LW and an existing grade at different thicknesses (1/1.5/2 mm). Compared to standard grade 3300 EF2001 (natural color), 330LW shows high transmittance at all thicknesses. The transmittance of 330LW is sufficient for laser welding even at 2 mm of thickness.

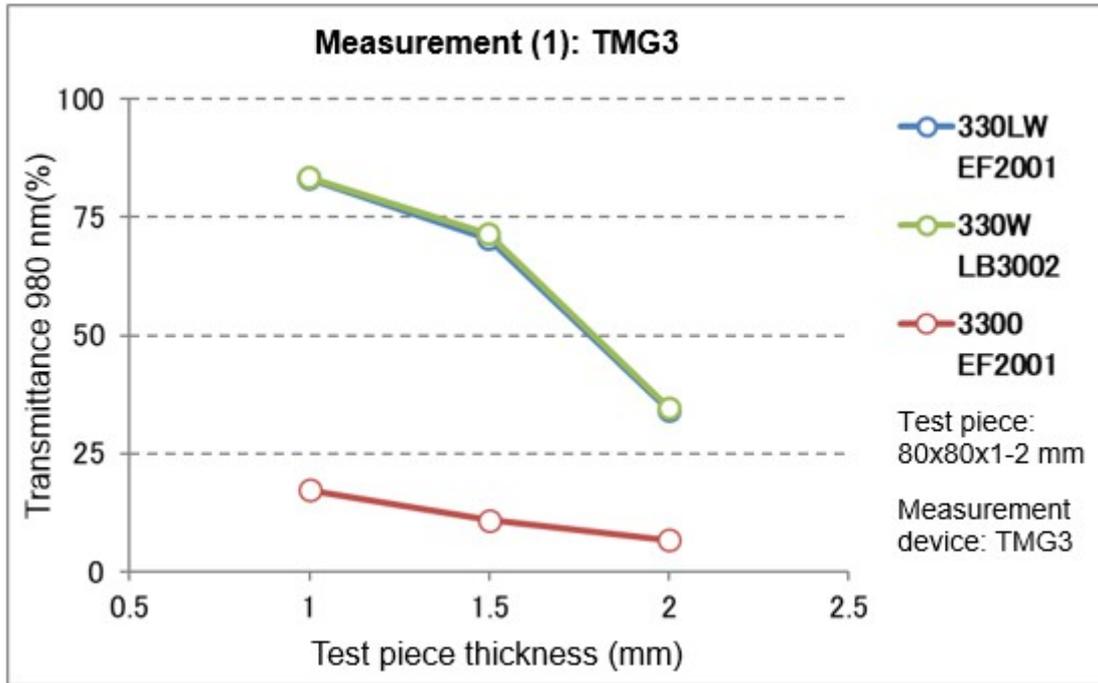


Figure 2-3: Transmittance of DURANEX® PBT 330LW and 3300 (TMG3)

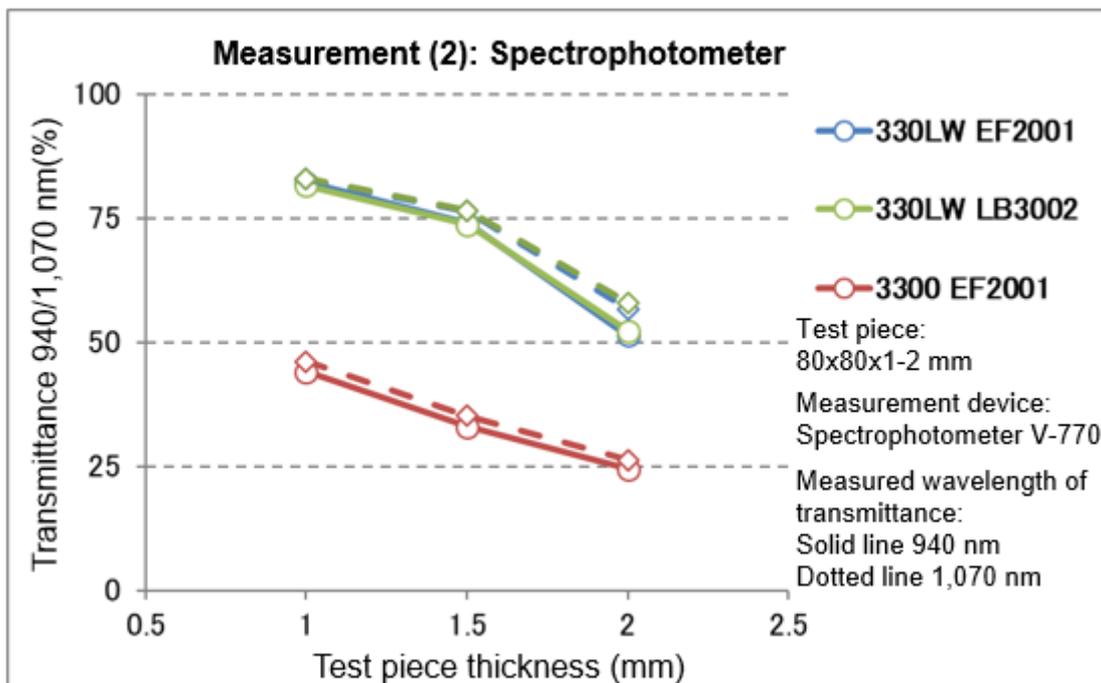


Figure 2-4: Transmittance of DURANEX® PBT 330LW and 3300 (spectrophotometer)

3. Low Warpage

3.1 Comparison of flatness

Figure 3-1 compares the flatness of 330LW with that of an existing grade. Compared to standard grade 3300, 330LW is superior in terms of low warpage and has low flatness. During laser welding, we can therefore expect it to be effective in preventing excessive clearance in the welded part due to warpage in the molded article.

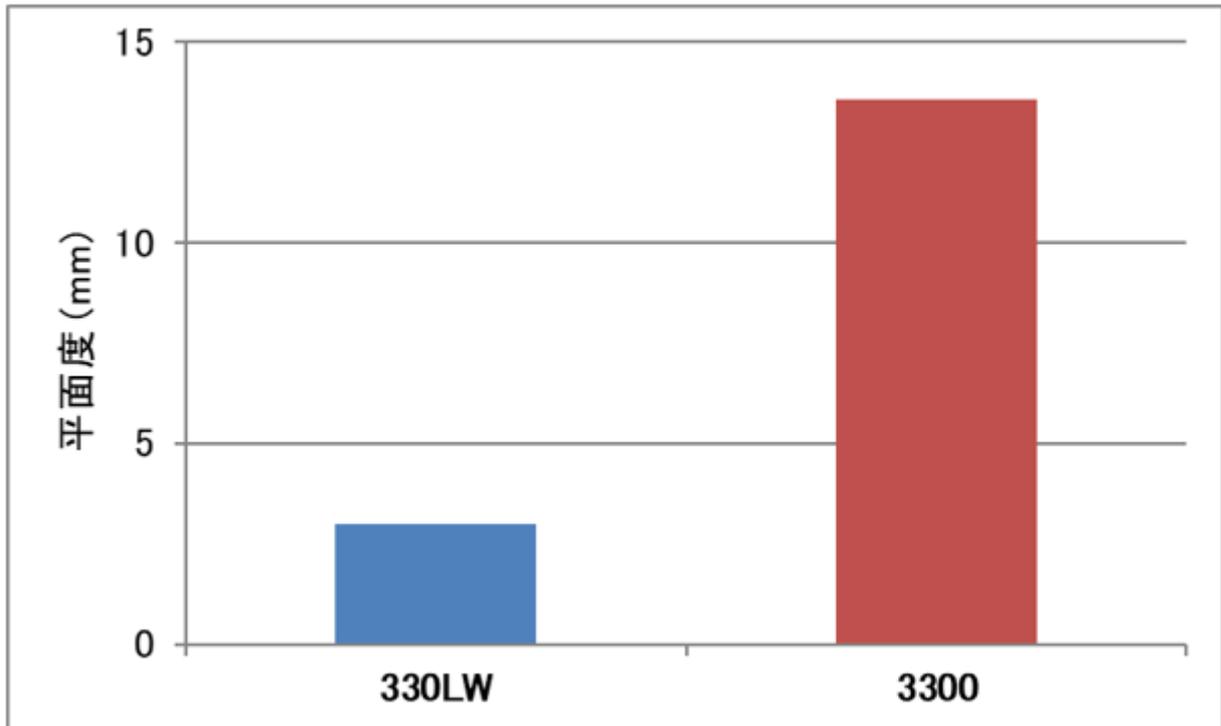
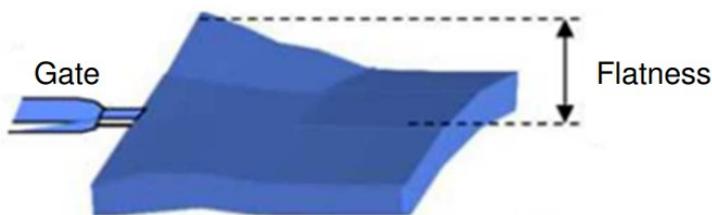


Figure 3-1: Low warpage of DURANEX® PBT 330LW



Molding conditions:	
Cylinder temperature:	260° C
Mold temperature:	60°C
Injection pressure:	70 MPa
Mold used:	120 x 120 x 2mmt flat plate
Side gate:	4w x 2mmt

4. Moldability

4.1 Mold shrinkage

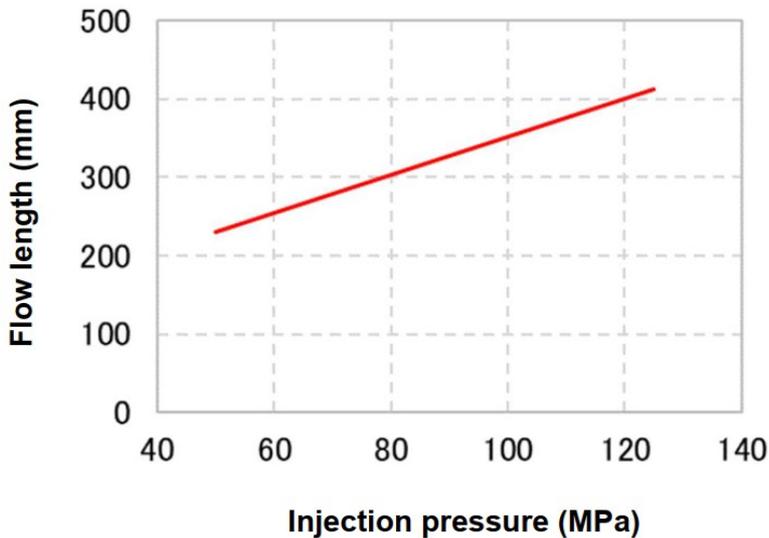
Table 4-1: Mold shrinkage of DURANEX® PBT 330LW

Cavity pressure		330LW
60MPa	Flow direction	0.2
	Transverse direction	0.5
70MPa	Flow direction	0.2
	Transverse direction	0.4

Molding conditions:
 Cylinder temperature: 260°C
 Mold temperature: 80°C
 Injection speed: 24 mm/s
 Mold used: 60 x 60 x 2mmt flat plate film gate

(Unit: percentage)

4.2 Flowability



Molding conditions:
 Cylinder temperature: 260°C
 Mold temperature: 65°C
 Injection speed: 66.7 mm/s
 Mold used: 2 mmt bar flow test mold

Figure 4-1: Flowability of DURANEX® PBT 330LW

Points to note for handling

---Transmittance of the molded article increases when retained at high temperature during molding ---

The laser transmittance of 330LW molded articles is stable in typical PBT molding conditions, but the transmittance of the molded articles could rise if retained in heat in the cylinder during molding. For example, the transmittance (980 nm) of 1.5 mmt flat plate molded articles rises by up to 10% if retained at a cylinder temperature of 260°C for 30 minutes. Please observe the following recommended molding conditions for 330LW and avoid retention in cylinder during molding.

----- Recommended conditions -----

- 1) Predrying: 140°C, 3 hours or longer
- 2) Resin temperature: 250-270°C
- 3) Mold temperature: 40-80°C
- 4) Retention in cylinder: Perform continuous molding and avoid retention in cylinder.
Purging operations are recommended when retention takes place.

NOTES TO USERS

- All property values shown in this brochure are the typical values obtained under conditions prescribed by applicable standards and test methods.
- 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.
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POLYPLASTICS CO., LTD.

JR Shinagawa East Bldg.,
18-1, Konan 2-chome, Minato-ku, Tokyo, 108-8280 Japan
Tel: +81-3-6711-8610 Fax: +81-3-6711-8618

<http://www.polyplastics.com/en/>