Polybutylene Terephthalate (PBT)

DURANEX®

457EV

EF2001/ED3002

Higher impact resistant

POLYPLASTICS CO., LTD.

Introduction

The excellent heat resistance, mechanical properties, and electrical properties of DURANEX® are utilized in its use in a wide variety of application in a diverse array of market segments headed by electrical/electronic and automotive.

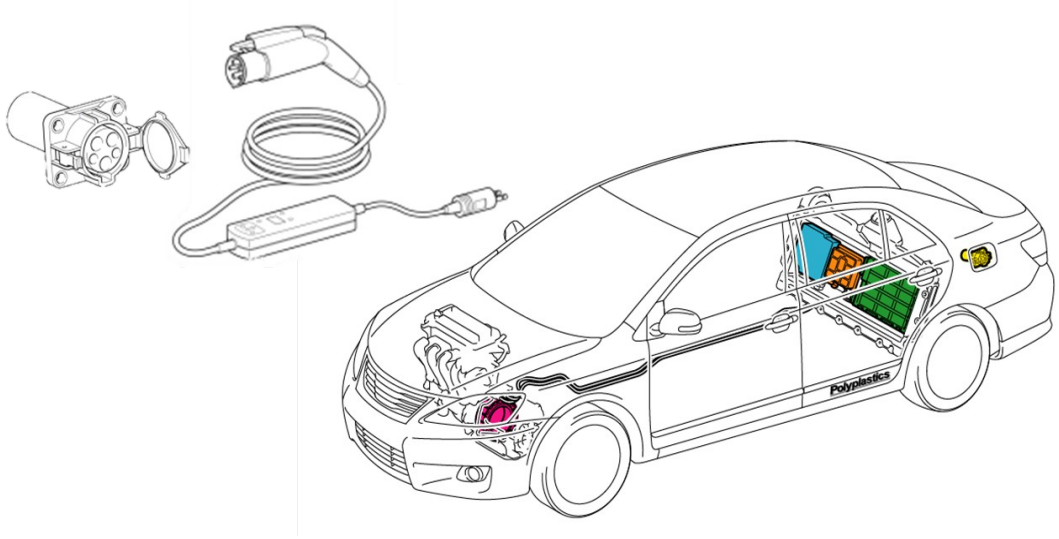
In recent years, interest in reducing CO_2 emissions and global environmental issues are increasing in the market, materials, which are applicable to eco-friendly products such as electric cars, photovoltaic generation, and smart grid, are required.

DURANEX 457EV is an unfilled, flame retardant, and high-impact PBT which conforms to various standards. It has also excellent heat resistance, mechanical properties, and tracking resistance which conventional PBT has.

DURANEX 457EV is superior material for charging connectors of electric cars and housings for vehicle parts and electric appliances.

- Application examples

  Charging connectors for EV/PHV



- Features of DURANEX 457EV
  1. High impact strength
  2. Excellent weather resistance (UL746C f1)・H(RTI：125℃)
  3. Highest level flame retardance (V-0, 5VA)
  4. Excellent electrical properties (HWI：2 or 3, HAI：0, CTI：0)
  5. Good moldability (heat stability, flowability)
  6. Good appearance
  7. Conforming to UL2251 and IEC62196

General Properties of 457EV

table1-1 General Properties（ISO）

Item	Unit	Test Method	Higher impact resistant 457EV Unfilled, flame retardant, higher comparative tracking index
Color			EF2001/ED3002
ISO(JIS)quality-of-the-material display:		ISO11469 (JIS K6999)	>PBT+PC-I-FR(17)<
Density	g/cm^3	ISO 1183	1.37
Water absorption (23°C,24hrs,1mmt)	%	ISO 62	-
Tensile strength	MPa	ISO 527-1,2	46
Strain at break	%	ISO 527-1,2	13*1
Flexural strength	MPa	ISO 178	73
Flexural modulus	MPa	ISO 178	1,970
Charpy notched impact strength (23℃)	kJ/m^2	ISO 179/1eA	21
Temperature of deflection under load (1.8MPa)	℃	ISO 75-1,2	75
Coefficient of linear thermal expansion (23 - 55℃、Flow direction)	x10^{-5}/℃	Our standard	9
Coefficient of linear thermal expansion (23 - 55℃、Transverse direction)	x10^{-5}/℃	Our standard	10
Electric strength (3mmt)	kV/mm	IEC 60243-1	20
Volume resistivity	Ω·cm	IEC 60093	5 × 10^{14}
Tracking resistance (CTI)	V	IEC 60112	600
Rockwell hardness	M(Scale)	ISO2039-2	-
Flammability		UL94	V-0 (1.5mm)
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. UL certification value

2.1 UL certification value

Table 2-1 UL certification value: UL94, UL746A, and UL746B

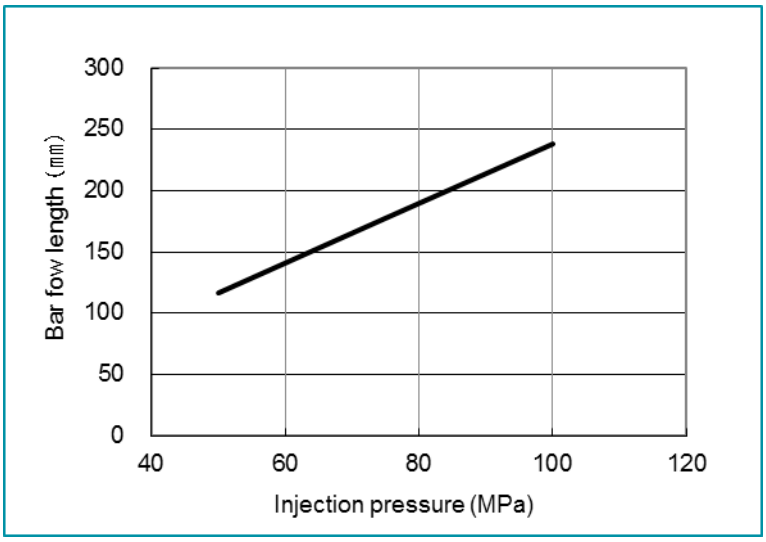
Grade	Color	Min. thick	UL94	UL746A			UL746B		
			Flammability	HWI	HAI	CTI	Mech.		Ele.
		mm	Class				Imp.	Str.	
457EV	BK	1.2	V-0	3	0	0	125	140	140
	ALL	1.5	V-0	3	0		125	140	140
		3.0	V-0 5VA	2	0		125	140	140

Note) **DURANEX® 457EV is PBT grade to possess outdoor weather resistance according to UL746C (f1).**

For details, please refer to the Yellow Card published by UL (File No. E213445).

3. Moldability

3.1 Bar flow length



<Molding condition>
Cylinder temperature : 260-260-260-240℃
Mold temperature : 65℃
Injection speed :70mm/sec

Fig. 3-1 Bar flow length of 457EV (2mm thick)

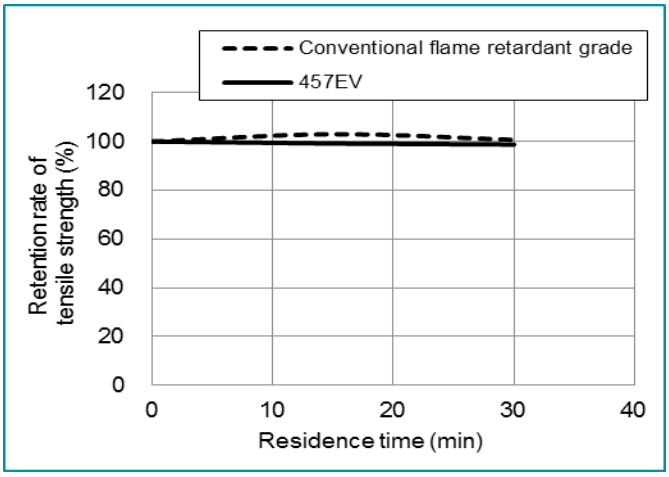
3.2 Mold shrinkage

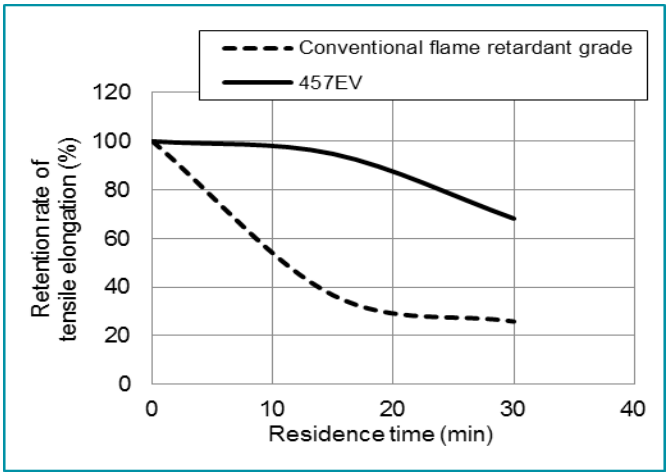
Table 3-1 Mold shrinkage of 457EV

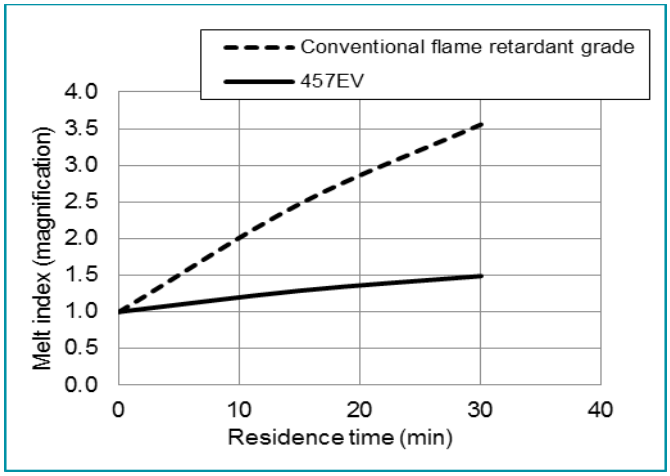
Specimen	Pressure	Direction	Mold shrinkage (%)
120×120×2mmt Flat plate	60MPa	Flow direction	1.1
		Transverse direction	1.2
		Average	1.2
	70MPa	Flow direction	1.0
		Transverse direction	1.1
		Average	1.0

<Molding condition>
Cylinder temperature : 260-260-260-240℃
Mold temperature : 65℃
Injection speed :20mm/sec
Gate size :Side gate 4w,2t

3.3 Retention test in heated cylinder





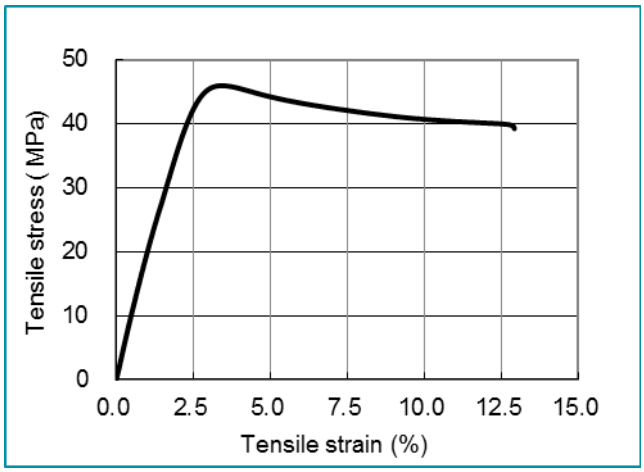


<Molding condition>
Cylinder temperature : 260-260-260-240℃
Mold temperature : 80℃
Injection speed :17mm/sec
Test specimen : ISO test piece

Fig. 3-2 Retention test in heated cylinder

4. Mechanical properties

4.1 Stress - Strain curve

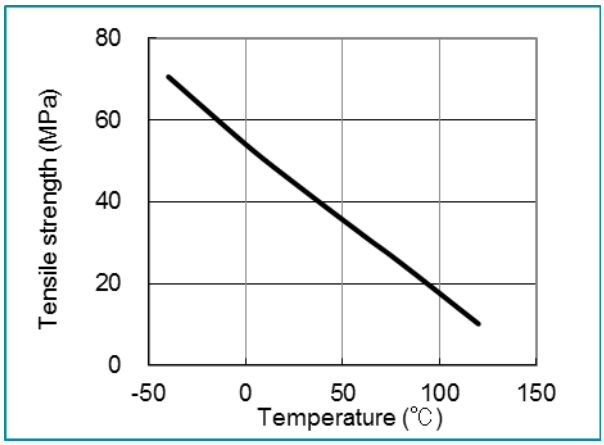


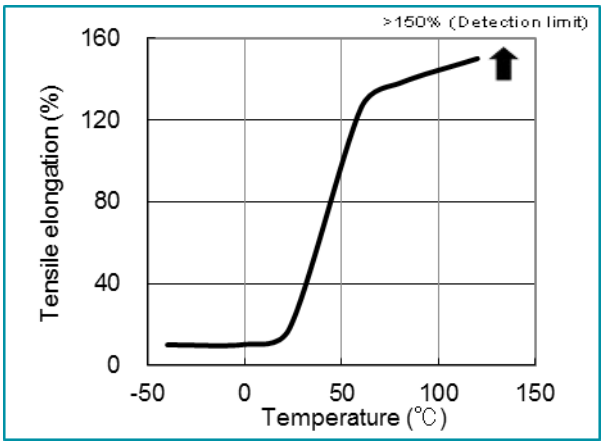
<Test condition>
Test speed : 50mm/min
Temperature : 23℃

Fig. 4-1 Stress - Strain curve of 457EV

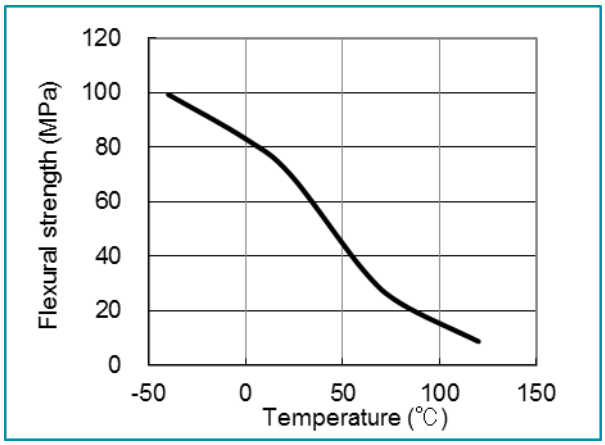
4.2 Effect of temperature

(1) Tensile property





(2) Flexural property



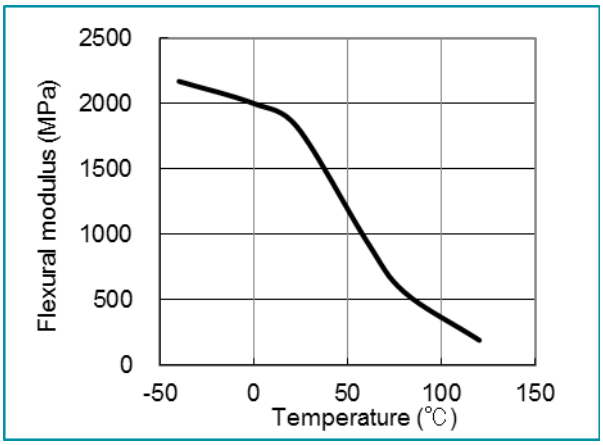
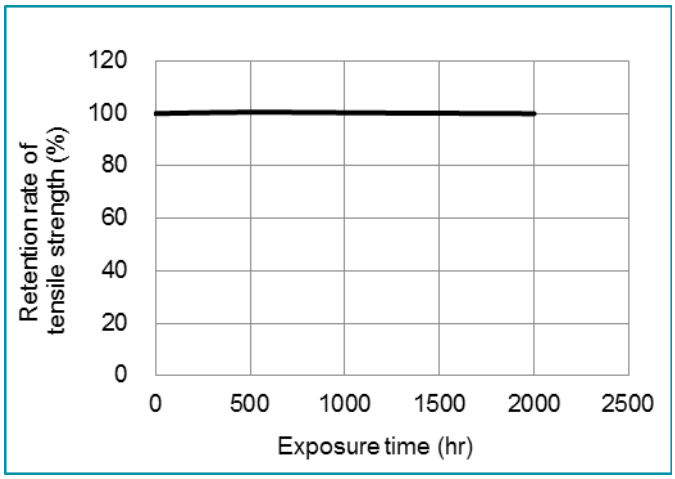
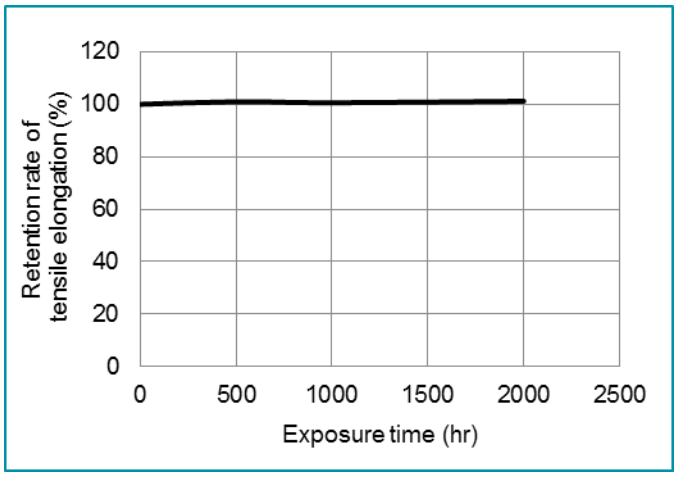


Fig. 4-2 Effect of temperature on tensile and flexural properties of 457EV

5. Heat resistance

5.1 Aging in hot air (120℃)



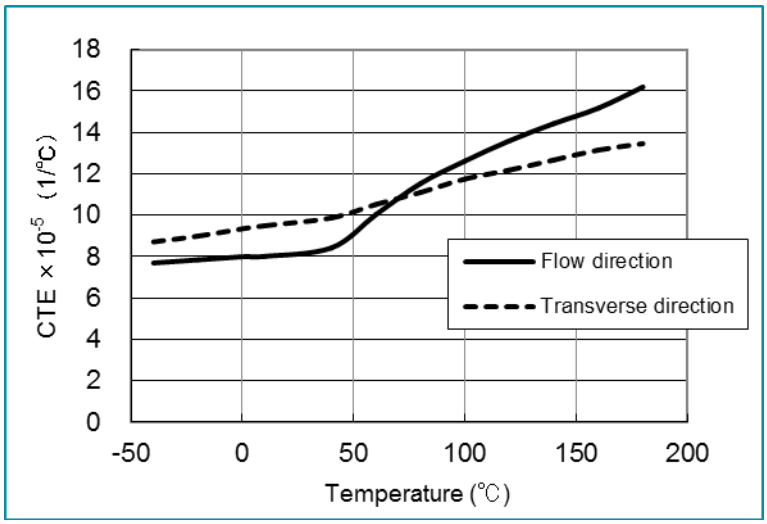


<Test condition>
Test specimen : ISO tensile test piece
Temperature : 120℃

Fig. 5-1 Heat resistance of 457EV

6. Thermal properties

6.1 Coefficient of linear thermal expansion (CTE)



<Test condition>
Standard temperature : 20℃
Programing rate of temperature : 2℃/min
Test load : 490mN
Annealing : 190℃×1hr
Test specimen : Cut out from ISO tenslie test piece,4mm thick

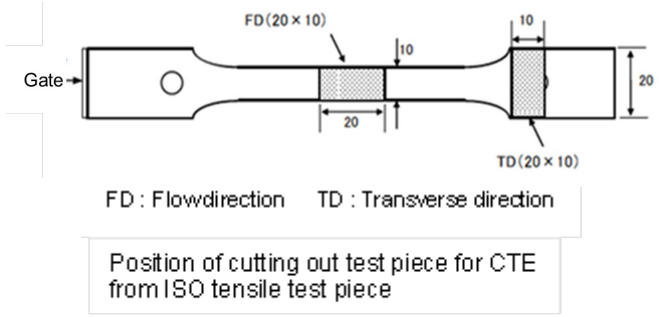


Fig. 6-1 Coefficient of linear thermal expansion of 457EV

7. Chemical resistance

7.1 Chemical resistance （Environmental stress cracking）

Table 7-1 Chemical resistance of 457EV

Chemicals	Observation of surface
Non-chemicals	No crack
LLC	No crack
Brake fluid	No crack
Windshield washer fluid	No crack
CRC556 （rust prevention spray）	No crack
Gasoline	No crack
Gas oil	No crack

<Test condition>
Temperature : 23℃
Exposure time : 24hr
Test specimen : 10mm×80mm×1mmt
Flexural strain : 0.5%
Note :
The surfaces of specimens are observed after applying chemicals to specimens and storing them at room temperture for 24 hours.

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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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- For all works done properly, it is advised to refer to appropriate technical catalogs for specific material processing.
- For safe handling of materials we supply, it is advised to refer to the Safety Data Sheet "**SDS**" of the proper material.
- This brochure is edited based on reference literature, information and data available to us at the time of creation. The contents of this brochure are subject to change without notice upon achievement of new data.
- Please contact our office for any questions about products we supply, descriptive literatures or any description in this brochure.

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(R190507-1901)