**Polybutylene Terephthalate (PBT)**

# DURANEX®

3405

EF2001/ED3002

HB, standard

**POLYPLASTICS CO., LTD.**

# Introduction

**DURANEX® PBT** 3300 is offered as a general-purpose glass fiber-reinforced grade with a fiber loading of 30% but in applications where high strength and high stiffness are demanded, we offer two suitable grades in 3400 (with a 40% glass fiber loading), and **3405** (with a 45% glass fiber loading).

# General Properties of 3405

table1-1 General Properties（ISO）

| Item | Unit | Test Method | HB, standard |
|---|---|---|---|
| | | | 3405 |
| | | | GF45% reinforced |
| Color | | | EF2001/ED3002 |
| ISO(JIS)quality-of-the-material display: | | ISO11469 (JIS K6999) | >PBT-GF45< |
| Density | $g/cm^3$ | ISO 1183 | 1.7 |
| Water absorption (23°C,24hrs,1mmt) | % | ISO 62 | 0.1 |
| Tensile strength | MPa | ISO 527-1,2 | 162 |
| Strain at break | % | ISO 527-1,2 | 1.7 |
| Flexural strength | MPa | ISO 178 | 254 |
| Flexural modulus | MPa | ISO 178 | 14,500 |
| Charpy notched impact strength (23℃) | $kJ/m^2$ | ISO 179/1eA | 16 |
| Temperature of deflection under load (1.8MPa) | ℃ | ISO 75-1,2 | 214 |
| Coefficient of linear thermal expansion (23 - 55℃、Flow direction) | $x10^{-5}$/℃ | Our standard | 1 |
| Coefficient of linear thermal expansion (23 - 55℃、Transverse direction) | $x10^{-5}$/℃ | Our standard | 7 |
| Electric strength (3mmt) | kV/mm | IEC 60243-1 | 24 |
| Volume resistivity | Ω·cm | IEC 60093 | $3 \times 10^{16}$ |
| Tracking resistance (CTI) | V | IEC 60112 | - |
| Rockwell hardness | M(Scale) | ISO2039-2 | 100 |
| Flammability | | UL94 | HB |
| The yellow card File No. | | | E213445 |
| Appropriate List number of Ministerial Ordinance for Export Trade Control | | | Item 16 of Appendix -1 |

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

In addition, **Figures 1-1** and **1-2** show the temperature dependence of flexural properties as examples of the temperature dependence of mechanical properties. The dart drop impact strength, which is considered representative of practical impact properties, is also superior for **3400** and **3405** when compared with 3300. **Figure 1-3** compares an example of dart drop impact strength for a flat plate molded from **3400** with one molded from 3300.

Figure 1-1 Temperature dependence of flexural strength

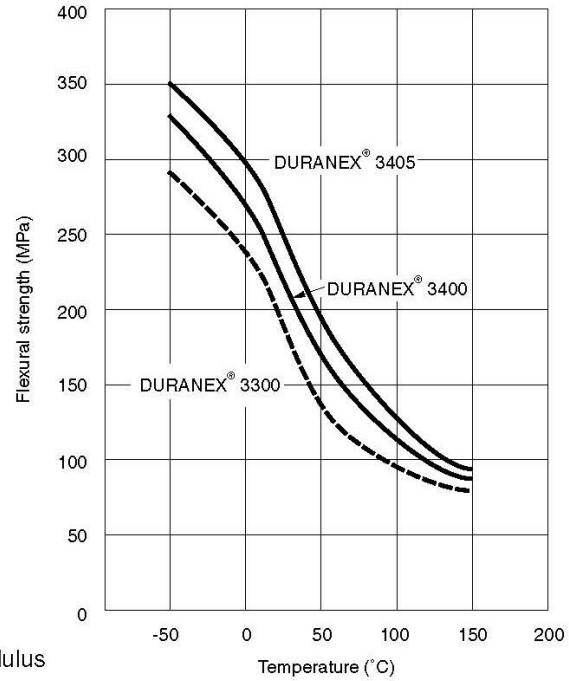



Figure 1-2 Temperature dependence of flexural modulus

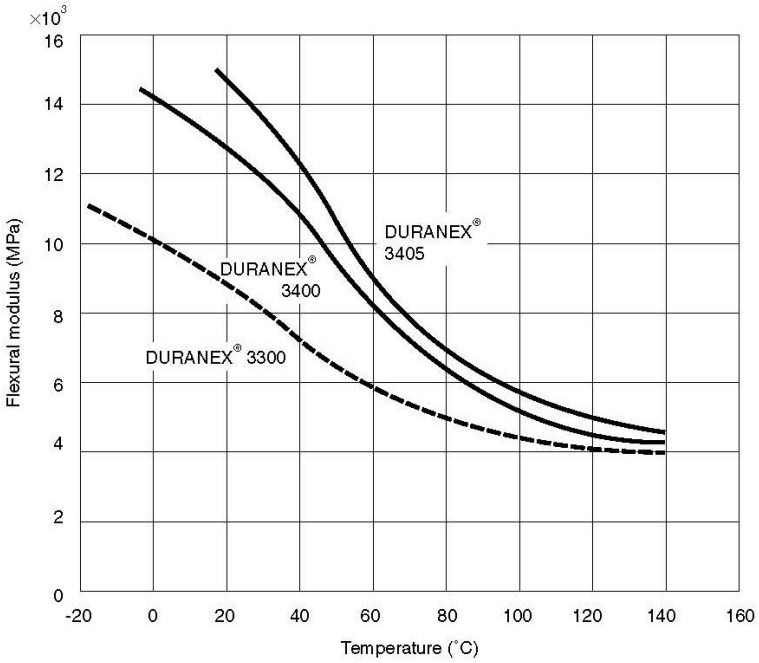
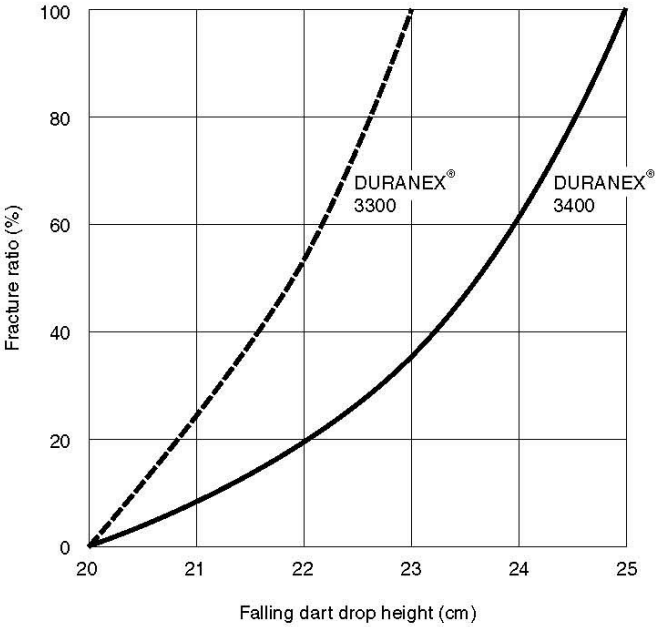
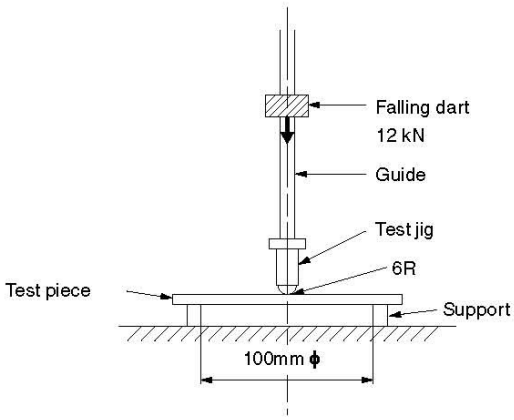


Figure 1-3 Dart drop impact strength for DURANEX® 3400
(relationship between fracture ratio and falling dart drop height)




As shown in the diagram below, a flat plate test piece (120×120×3 mm) is placed on a support (100 mm ϕ), and after the test jig has been set, a weighted dart is dropped, and the dart's drop height is correlated with the fracture ratio.



# 2. Thermal properties of DURANEX® 3400 and 3405

As indicated by **Table 2-1**, the thermal properties of **3400** and **3405** hardly vary from those of 3300. However, the linear coefficient of thermal expansion is slightly higher for **3405**.

Table 2-1 Thermal properties of DURANEX® 3400 and 3405

| Item | | Test Method (ASTM) | Unit | DURANEX® 3405 | DURANEX® 3400 | DURANEX® 3300 |
|---|---|---|---|---|---|---|
| Melting point | | – | °C | 228 | 228 | 228 |
| DTUL * (1.82 MPa) | | D648 | °C | 214 | 2 ~ 4 | 213 |
| Coeff. of Thermal Expansion** | Flow Direction | – | $10^{-5}$/°C | 1.5 | 1.5 | 2.0 |
| | Transverse Direction | | | 12 | 12 | 12.5 |

* Using an annealed test piece.
** 30 ~ 140°C value

# 3. Processing characteristics of DURANEX® 3400 and 3405

## 3.1 Flow characteristics

As shown in **Table 3-1**, which indicates test results from a bar flow length test mold, the flowability of **3400** is somewhat lower than that of 3300. The flowability of **3405** is even lower than that of **3400**. It is therefore recommended that the cylinder and mold temperatures be maintained at slightly higher temperatures than indicated below when molding.

Table 3-1 Flow lengths of DURANEX® 3400 and 3405 (mm)

(2mmt)

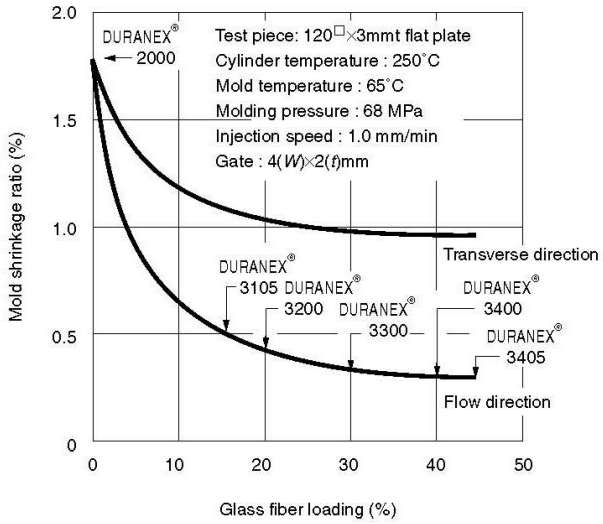
| Grade / Injection Pressure | DURANEX® 3405 | DURANEX® 3400 | DURANEX® 3300 |
|---|---|---|---|
| 49MPa | 135 | 160 | 225 |
| 73MPa | 185 | 220 | 295 |
| 98MPa | 220 | 270 | 350 |

Processing parameters (nozzle)
Cylinder temperature :240-220-200˚C
Mold temperature :65˚C
Injection speed :67mm/sec
Cycle time : 12 s holding phase/7 s cooling
Cavity thickness : 2 mm
Gate : 20(*W*)×2(*t*)mm

## 3.2 Mold shrinkage ratio

As seen from **Figure 3-2**, there is no great difference in terms of mold shrinkage ratio compared with 3300.

Figure 3-2 Glass fiber loadings and mold shrinkage ratios for Duranex slow-burning grades



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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.
- 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 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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