

Polybutylene Terephthalate (PBT)

DURANEX®

7400F

EF2001

Low Wear

Introduction

DURANEX® PBT glass fiber-reinforced grades are available as the standard slow-burning grades 3105, 3200, 3300, 3400, and 3405, and the self-extinguishing types 2016, 3116, 3215, 3226 and 3316. The excellent mechanical properties, and superior heat resistance, dimensional stability, and electrical properties of these grades make them highly regarded in their use in a wide variety of applications. However, when these glass fiber-reinforced grades are used

in sliding and rotating components, depending on the motion parameters they can wear the counter material due to the presence of the glass fiber filling. This in turn results in surface roughening, and there are cases whereby the wear of **DURANEX** itself is considerable.

For such cases, we offer a standard slow-burning type, **DURANEX 7400F**, which takes advantage of the benefits of glass fiber reinforcement, while at the same time improving wear properties through the addition of a suitable amount of fluororesin.

General Properties of 7400F

table1-1 General Properties (ISO)

Item	Unit	Test Method	Low Wear
			7400F
			GF30% Reinforced, Standard
Color			EF2001
ISO(JIS)quality-of-the-material display:		ISO11469 (JIS K6999)	>PBT+PTFE-GF30<
Density	g/cm ³	ISO 1183	1.61
Water absorption (23°C,24hrs,1mmt)	%	ISO 62	0.1
Tensile strength	MPa	ISO 527-1,2	131
Strain at break	%	ISO 527-1,2	2.3
Flexural strength	MPa	ISO 178	202
Flexural modulus	MPa	ISO 178	8,970
Charpy notched impact strength (23°C)	kJ/m ²	ISO 179/1eA	10.2
Temperature of deflection under load (1.8MPa)	°C	ISO 75-1,2	216
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	9
Electric strength (3mmt)	kV/mm	IEC 60243-1	21
Volume resistivity	Ω·cm	IEC 60093	3 × 10 ¹⁶
Volume resistivity (Our standard)	Ω·cm		-
Tracking resistance (CTI)	V	IEC 60112	425
Rockwell hardness	M(Scale)	ISO2039-2	90
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.

2. Friction and wear properties of DURANEX® 7400F

Table 2-1 shows the sliding friction test results for metal (steel) using a Suzuki-type experimental apparatus. While quite varied results are obtained for friction and wear characteristics depending on the test parameter, as shown in Table 2-1, the extent to which 7400F

wears under heavy loads is of the order of one-quarter to one-third, which rivals the values for non-glass fiber-reinforced DURACON. For threshold PV values as well, superior values compared with 3300 are indicated.

Table2-1 Friction and wear properties of DURANEX®7400F

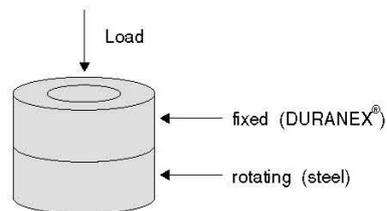
Friction and wear property	Test parameter		DURANEX® 7400F	DURANEX® 3300
	Surface pressure MPa	Velocity cm/s		
Relative wear* ×10 ⁻³ mm ³ /N • km	0.05	100	2.8	2.7
	0.98	4.5	3.3	12.2
	0.98	30	1.5	3.4
	4.90	1.2	4.7	16.6
Threshold PV value** ×10 ⁻¹ MPa • cm/s		20	1,560	1,070
		60	1,320	880
		100	1,120	880

$$* : \text{Relative wear } \text{mm}^3/\text{N} \cdot \text{km} = \frac{\text{wear mass (mg)}}{\text{density (mg/mm}^3) \times \text{load (N)} \times \text{distance of run (km)}}$$

** : Threshold PV value is obtained by calculating the threshold pressure force (threshold pressure force for 30 minutes with no melting) at each sliding linear velocity V (cm/s)

Test method, test parameters

Test piece : Injection molded part (cylinder of i.d 20.0 , o.d. 25.6)
 Counter material : steel and height 15.0mm
 Method of motion : see diagram at right
 Measurement environment : 23°C, 50% RH



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With regards to the coefficient of friction (as measured by a Suzuki-type thrust friction and wear experimental apparatus) it can be seen from Figures 2-1 to 2-4 that the values are almost

the same as those for 3300, although as surface pressure becomes higher, 7400F tends to trend towards being slightly lower.

Figure 2-1 Velocity dependence of dynamic coefficient of friction for DURANEX® 7400F with steel

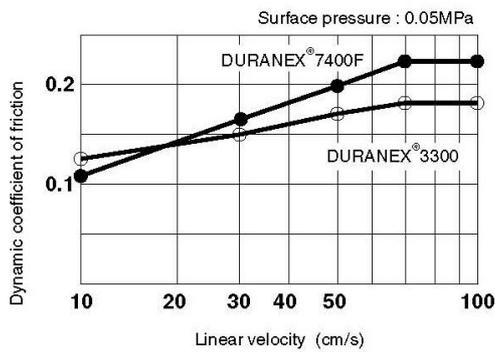


Figure 2-2 Velocity dependence of dynamic coefficient of friction for DURANEX® 7400F with steel

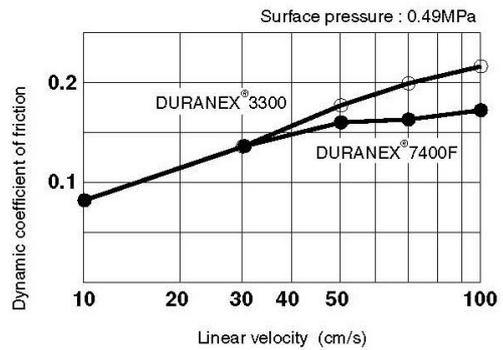


Figure 2-3 Velocity dependence of dynamic coefficient of friction for DURANEX® 7400F with steel

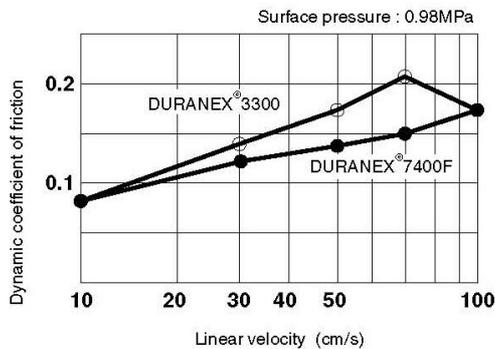
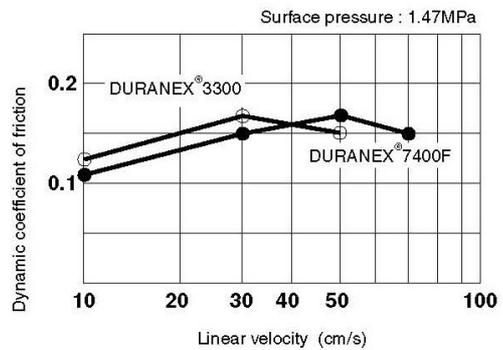


Figure 2-4 Velocity dependence of dynamic coefficient of friction for DURANEX® 7400F with steel



In addition, **Table 2-2** shows the maximum static coefficient of friction and the dynamic coefficient

of friction calculated using the ASTM-D1894 test method.

Table2-2 Maximum static coefficient of friction and the dynamic coefficient of friction for DURANEX® 7400F

	Maximum static coefficient of friction	Dynamic coefficient of friction
DURANEX®7400F	0.17	0.14
DURANEX®3300	0.17	0.14

Test method, test parameters

Testing apparatus : Toyo Seiki Friction Angle Measurement Apparatus (Type TR)

Test piece : Injection molded part (cylinder of i.d.20.0 , o.d. 25.6) and height 15mm) Contact area = 2 cm²

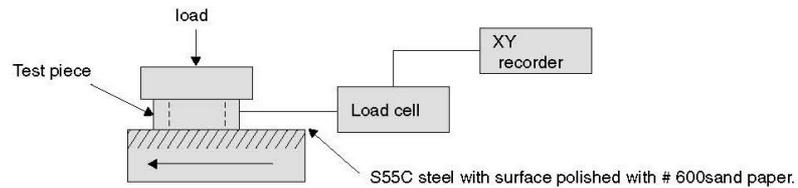
Counter material : steel

Method of motion : see diagram at right

Velocity : 0.25cm/s

Load : 9.8MPa

Measurement environment : 23°C , 50%RH



3. Processability of DURANEX® 7400F

The processability of 7400F is about the same as 3300. Please consult the technical literature "Injection Molding of Duranex for processing parameters."

Points of caution when molding

- Duranex ®7400F as described in this catalog contains fluoro-resin.
- If this grade is heated to over 260°C, there are

cases whereby a small amount of the added fluoro-resin will thermally decompose, thereby generating a toxic fluorine-based gas. Therefore, please be careful not to inhale this gas by installing a gas ventilation system. In addition, we generally recommend land filling as the preferred means of disposal.

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.
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- For safe handling of materials we supply, it is advised to refer to the Safety Data Sheet "SDS" of the proper material.
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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/>