

Polyacetal (POM)

**DURACON®**

TR-5

CF2001

Mineral Reinforced

# General Properties of TR-5

table1-1 General Properties (ISO)

Item	Unit	Test Method	Mineral Reinforced
			TR-5
			High Rigidity, Low Warpage
Color			CF2001
ISO(JIS)quality-of-the-material display:		ISO11469 (JIS K6999)	>POM-TD5<
Density	g/cm <sup>3</sup>	ISO 1183	1.44
Water absorption (23°C,24hrs,1mmt)	%	ISO 62	0.6
MFR (190°C、 2.16kg)	g/10min	ISO 1133	8
MVR (190°C、 2.16kg)	cm <sup>3</sup> /10min	ISO 1133	7
Tensile strength	MPa	ISO 527-1,2	62
Strain at break	%	ISO 527-1,2	10
Tensile modulus	MPa	ISO 527-1,2	3,200
Flexural strength	MPa	ISO 178	90
Flexural modulus	MPa	ISO 178	3,000
Charpy notched impact strength (23°C)	kJ/m <sup>2</sup>	ISO 179/1eA	4.0
Temperature of deflection under load (1.8MPa)	°C	ISO 75-1,2	108
Coefficient of linear thermal expansion (23 - 55°C、 Flow direction)	x10 <sup>-5</sup> /°C	Our standard	11
Coefficient of linear thermal expansion (23 - 55°C、 Transverse direction)	x10 <sup>-5</sup> /°C	Our standard	11
Electric strength (3mmt)	kV/mm	IEC 60243-1	20
Volume resistivity	Ω·cm	IEC 60093	2 × 10 <sup>14</sup>
Surface resistivity	Ω	IEC 60093	2 × 10 <sup>15</sup>
Volume resistivity (Our standard)	Ω·cm		-
Surface resistivity (Our standard)	Ω		-
Mold Shrinkage (60×60×2mmt, Flow direction, Cavity Pressure 60 MPa)	%	ISO 294-4	2.3
Mold Shrinkage (60×60×2mmt, Transverse direction, Cavity Pressure 60 MPa)	%	ISO 294-4	2.0
Rockwell hardness	M(Scale)	ISO2039-2	80
Specific wear amount (Thrust, vs C-Steel, material side, pressure 0.49MPa, 30cm/s)	x10 <sup>-3</sup> mm <sup>3</sup> /(N·km)	JIS K7218	10
Specific wear amount (Thrust, vs C-Steel, steel side, pressure 0.49MPa, 30cm/s)	x10 <sup>-3</sup> mm <sup>3</sup> /(N·km)	JIS K7218	0.10
Coefficient of Dynamic Friction (Thrust, vs C-Steel, pressure 0.49MPa, 30cm/s)		JIS K7218	0.54

Item	Unit	Test Method	Mineral Reinforced
			TR-5
			High Rigidity, Low Warpage
Specific wear amount (Thrust, vs C-Steel, material side, pressure 0.98MPa, 30cm/s)	$\times 10^{-3} \text{mm}^3/(\text{N} \cdot \text{km})$	JIS K7218	-
Specific wear amount (Thrust, vs C-Steel, steel side, pressure 0.98MPa, 30cm/s)	$\times 10^{-3} \text{mm}^3/(\text{N} \cdot \text{km})$	JIS K7218	-
Coefficient of Dynamic Friction (Thrust, vs C-Steel, pressure 0.98MPa, 30cm/s)		JIS K7218	-
Specific wear amount (Thrust, vs M90-44, material side, pressure 0.06MPa, 15cm/s)	$\times 10^{-3} \text{mm}^3/(\text{N} \cdot \text{km})$	JIS K7218	10
Specific wear amount (Thrust, vs M90-44, M90-44 side, pressure 0.06MPa, 15cm/s)	$\times 10^{-3} \text{mm}^3/(\text{N} \cdot \text{km})$	JIS K7218	80
Coefficient of Dynamic Friction (Thrust, vs M90-44, pressure 0.06MPa, 15cm/s)		JIS K7218	0.40
Flammability		UL94	HB
The yellow card File No.			E45034
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.

# Introduction

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**Duracon® POM TR-5, TR-10D and TR-20** are grades reinforced by inorganic fillers.

**TR series** grades have the following advantages.

## 1) High Rigidity

Compared with the general grade M90, **TR-5, TR-10D and TR-20** are improved in flexural strength and flexural modulus due to inorganic fillers reinforcement. Mechanical strength at elevated temperature is also good compared with M90, judging from improvement in temperature of deflection under load.

## 2) Low Creep Deformation

**TR-5, TR-10D and TR-20** are not only improved

in short-term rigidity, but also have lower longterm creep deformation in comparison with M90.

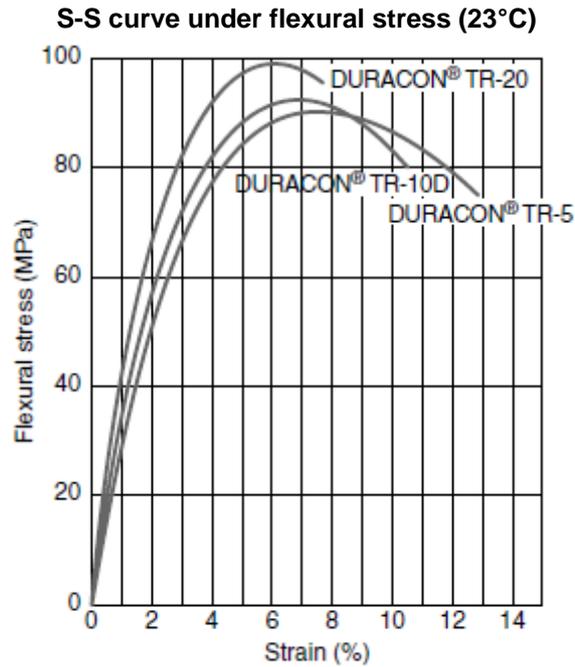
## 3) Low Warpage

Properties of inorganic fillers used in **TR-5, TR-10D and TR-20** do not differ with direction to the same degree as those of glass fibers. Thus, these grades' small anisotropy in mold shrinkage, which is large in glass fiber-reinforced grades, gives effect of low deformation and low warpage. Flowability, rigidity and toughness of **TR-5, TR-10D and TR-20** are provided by formulation of inorganic fillers and base resins. The advantage of each grade is shown below.

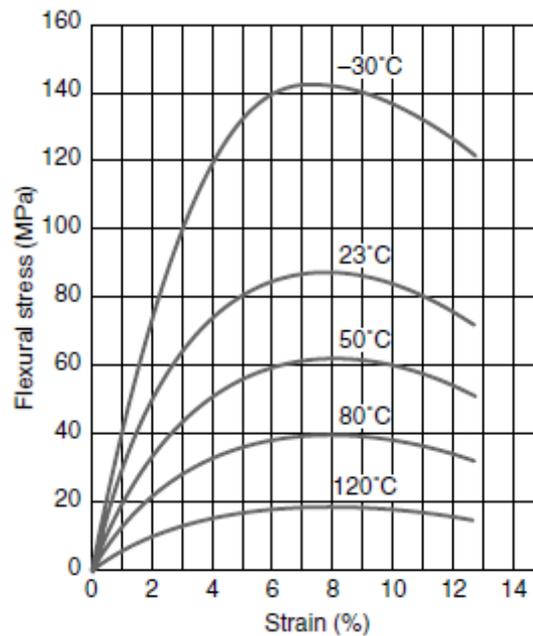
<b>TR-5</b>	<b>:The grade that balances rigidity and toughness</b>
<b>TR-10D</b>	<b>:The grade of high rigidity and especially improved flowability</b>
<b>TR-20</b>	<b>:The grade of high rigidity providing an effect of low warpage</b>

# 1. Flexural Properties of TR-5, TR-10D, TR-20 (S-S curve)

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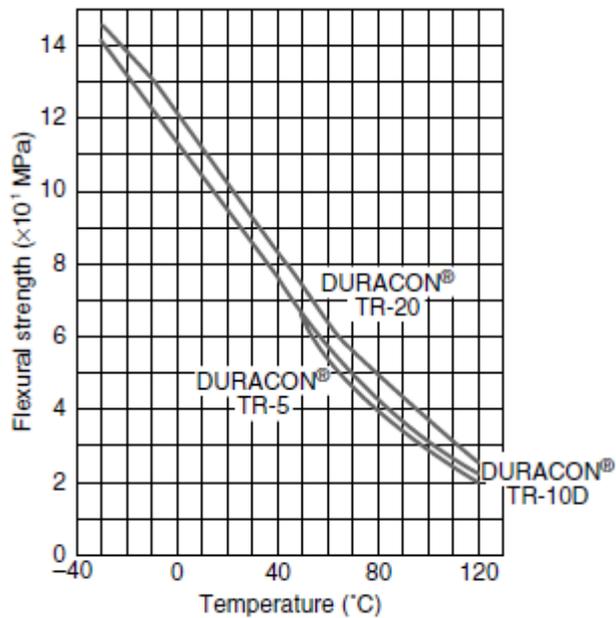


**S-S curve of DURACON® POM TR-5 under flexural stress**

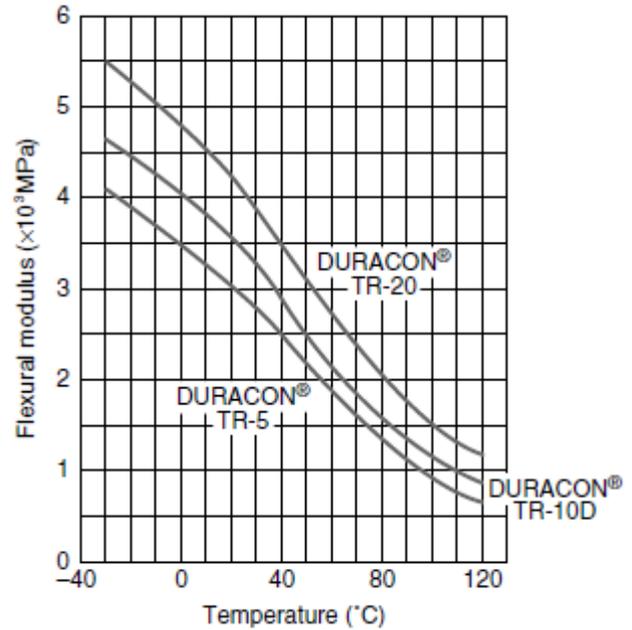


## 2. Temperature Dependence of TR-5, TR-10D, TR-20

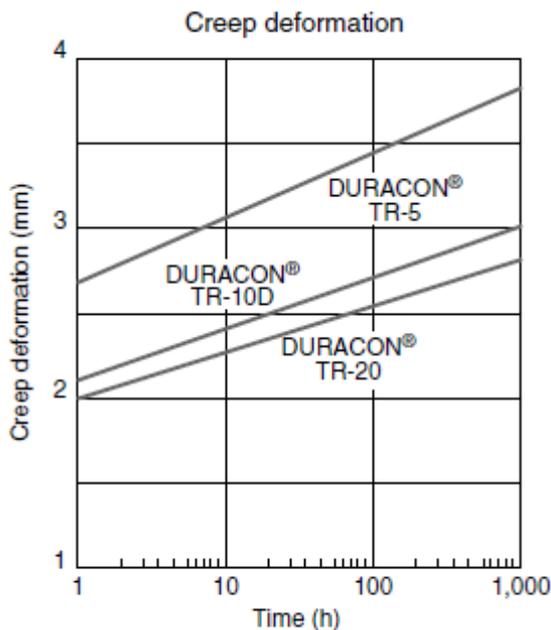
Dependence of flexural strength on temperature



Dependence of flexural modulus on temperature

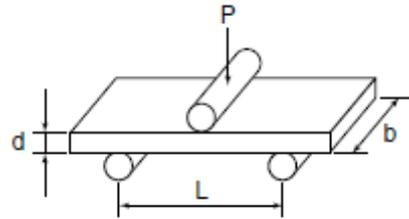


## 3. Creep Characteristics of TR-5, TR-10D, TR-20

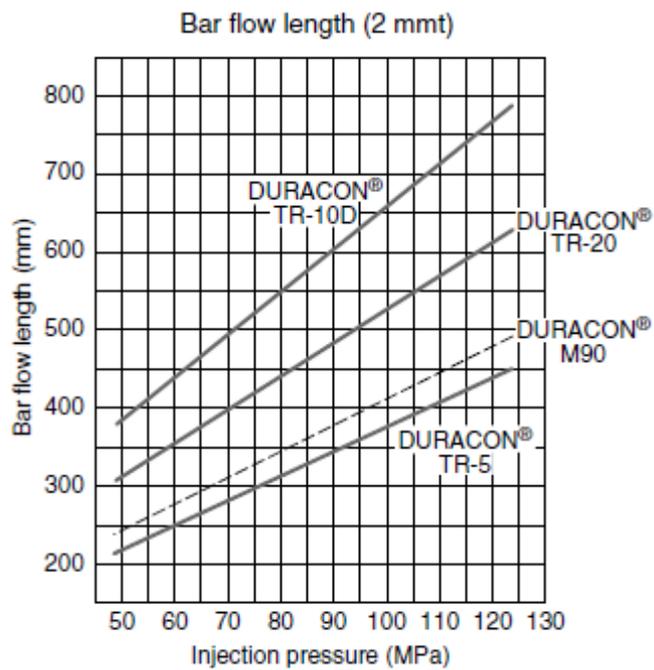


Span: L= 50.8 mm  
 Width: b= 12.7 mm  
 Thickness : d= 3.2 mm

Test conditions  
 Stress :  $\sigma=19.6$  MPa  
 Load : P=33.4 N  
 Temperature : 60°C



## 4. Moldability of TR-5, TR-10D, TR-20



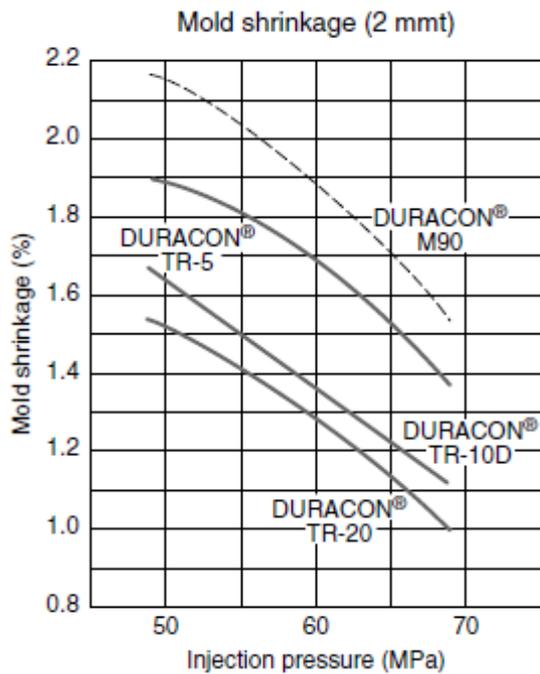
### Molding conditions

Cylinder temperature : 190-190-170-150°C

Mold temperature : 80°C

Injection speed : 67mm/s

Mold : 2 mmt bar flow mold



**Molding conditions**

Cylinder temperature :200-190-170-150°C

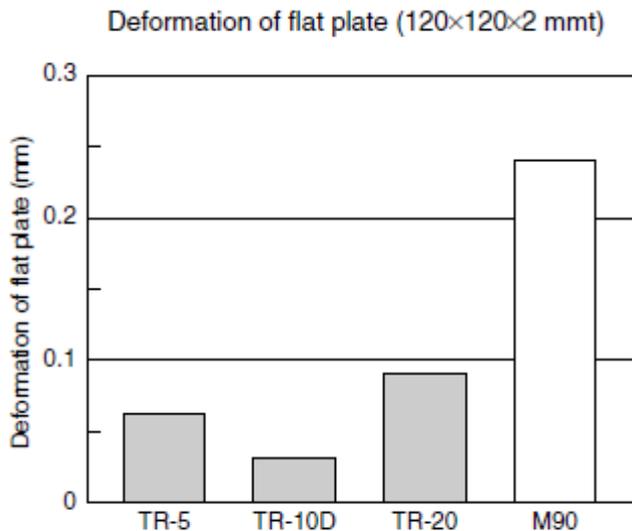
Mold temperature : 80°C

Injection speed: 17mm/s

Cycle : Dwelling for 30 s/cooling for 10 s

Mold : Flat plate 120· 120· 2 mmt

## 5.Low Warpage of TR-5, TR-10D, TR-20



**Molding conditions**

Cylinder temperature : 200-190-170-150°C

Mold temperature : 80°C

Injection speed : 17mm/s

**Injection pressure**

maintained: 68.6 MPa

Cycle : Dwelling for 20 s/cooling for 10 s

Mold : Flat plate 120· 120· 2 mmt



## **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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