# Torelina® A504X90

Polyphenylene Sulfide **Toray Industries, Inc.** 



### **Technical Data**

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Part Marking Code

Torelina® A504X90 is a Polyphenylene Sulfide (PPS) product filled with 40% glass fiber. It is available in Asia Pacific, Europe, or North America. Applications of Torelina® A504X90 include automotive and electrical/electronic applications. Primary characteristic: flame rated.

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Material Status	Commercial: Active		
Literature <sup>1</sup>	<ul><li>Brochure - Metal Replacement (English)</li><li>Technical Datasheet (English)</li></ul>		
UL Yellow Card <sup>2</sup>	• E41797-233536		
Search for UL Yellow Card	<ul><li>Toray Industries, Inc.</li><li>Torelina®</li></ul>		
Availability	Asia Pacific	<ul> <li>Europe</li> </ul>	North America
Filler / Reinforcement	Glass Fiber, 40% Filler by Weight		
Uses	<ul> <li>Automotive Applications</li> </ul>	<ul> <li>Electrical Parts</li> </ul>	
Appearance	Black	<ul> <li>Natural Color</li> </ul>	

>PPS-GF40

Tensile Stress (23°C)	Physical	Nominal Value Unit	Test Method
Across Flow: 3.00 mm         0.80 %           Flow: 3.00 mm         0.20 %           Water Absorption (24 hr, 23°C)         0.020 %         ISO 62           Mechanical         Nominal Value Unit         Test Method           Tensile Stress (23°C)         200 MPa         ISO 527-2           Tensile Strain (Break, 23°C)         1.8 %         ISO 527-2           Flexural Modulus (23°C)         15500 MPa         ISO 178           Flexural Stress (23°C)         305 MPa         ISO 178           Shear Strength (23°C)         80.0 MPa         JIS K7214           Coefficient of Friction 5         0.25	Density (23°C)	1.66 g/cm <sup>3</sup>	ISO 1183
Flow: 3.00 mm	Molding Shrinkage <sup>4</sup>		Internal Method
Water Absorption (24 hr, 23°C)         0.020 %         ISO 62           Mechanical         Nominal Value Unit         Test Method           Tensile Stress (23°C)         200 MPa         ISO 527-2           Flexural Modulus (23°C)         15500 MPa         ISO 178           Flexural Stress (23°C)         305 MPa         ISO 178           Shear Strength (23°C)         80.0 MPa         JIS K7214           Coefficient of Friction 5         0.25         Taber Abrasion Resistance (1000 Cycles)         50.0 mg         ISO 9352           Impact         Nominal Value Unit         Test Method           Charpy Notched Impact Strength (23°C)         11 kJ/m²         ISO 179           Charpy Unnotched Impact Strength (23°C)         55 kJ/m²         ISO 179           Charpy Unnotched Impact Strength (23°C)         122         ISO 2039-2           Thermal         Nominal Value Unit         Test Method           Rockwell Hardness (R-Scale)         122         ISO 2039-2           Thermal         Nominal Value Unit         Test Method           Heat Deflection Temperature         260 °C         ISO 11357-3           LIST         ISO 11357-3         ISO 11357-3           CLTE         ISO 11357-3         ISO 11357-3           Flow         2.3E-5 c	Across Flow: 3.00 mm	0.80 %	
Mechanical         Nominal Value Unit         Test Method           Tensile Stress (23°C)         200 MPa         ISO 527-2           Tensile Strein (Break, 23°C)         1.8 %         ISO 527-2           Flexural Modulus (23°C)         15500 MPa         ISO 178           Flexural Stress (23°C)         305 MPa         ISO 178           Shear Strength (23°C)         80.0 MPa         JIS K7214           Coefficient of Friction 5         0.25         Test Method           Taber Abrasion Resistance (1000 Cycles)         Nominal Value Unit         Test Method           Charpy Notched Impact Strength (23°C)         11 kJ/m²         ISO 179           Chappy Unnotched Impact Strength (23°C)         55 kJ/m²         ISO 179           Charpy Unnotched Impact Strength (23°C)         55 kJ/m²         ISO 179           Hardness         Nominal Value Unit         Test Method           Rockwell Hardness (R-Scale)         122         ISO 2039-2           Thermal         Nominal Value Unit         Test Method           Heat Deflection Temperature         260 °C         ISO 11357-3           LEF         ISO 11357-3         ISO 11357-3           CLTE         150 Hardness         ISO 11357-3           Flow         2.3E-5 cm/cm/°C         ISO 11357-3	Flow: 3.00 mm	0.20 %	
Tensile Stress (23°C)         200 MPa         ISO 527-2           Tensile Strain (Break, 23°C)         1.8 %         ISO 527-2           Flexural Modulus (23°C)         15500 MPa         ISO 178           Flexural Stress (23°C)         305 MPa         ISO 178           Shear Strength (23°C)         80.0 MPa         JIS K7214           Coefficient of Friction ⁵         0.25           Taber Abrasion Resistance (1000 Cycles)         50.0 mg         ISO 9352           Impact         Nominal Value Unit         Test Method           Charpy Notched Impact Strength (23°C)         11 kJ/m²         ISO 179           Charpy Unnotched Impact Strength (23°C)         55 kJ/m²         ISO 179           Hardness         Nominal Value Unit         Test Method           Rockwell Hardness (R-Scale)         122         ISO 2039-2           Thermal         Nominal Value Unit         Test Method           Heat Deflection Temperature         260 °C         ISO 11357-3           LTE         ISO 11357-3         ISO 11357-3           CLTE         ISO 11357-3         ISO 11357-3           Flow         2.3E-5 cm/cm/°C         ISO 11357-3           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         <	Water Absorption (24 hr, 23°C)	0.020 %	ISO 62
Tensile Strain (Break, 23°C)         1.8 %         ISO 527-2           Flexural Modulus (23°C)         15500 MPa         ISO 178           Flexural Stress (23°C)         305 MPa         ISO 178           Shear Strength (23°C)         80.0 MPa         JIS K7214           Coefficient of Friction 5         0.25	Mechanical	Nominal Value Unit	Test Method
Flexural Modulus (23°C)	Tensile Stress (23°C)	200 MPa	ISO 527-2
Flexural Stress (23°C)	Tensile Strain (Break, 23°C)	1.8 %	ISO 527-2
Shear Strength (23°C)         80.0 MPa         JIS K7214           Coefficient of Friction 5         0.25           Taber Abrasion Resistance (1000 Cycles)         50.0 mg         ISO 9352           Impact         Nominal Value Unit         Test Method           Charpy Notched Impact Strength (23°C)         11 kJ/m²         ISO 179           Charpy Unnotched Impact Strength (23°C)         55 kJ/m²         ISO 179           Hardness         Nominal Value Unit         Test Method           Rockwell Hardness (R-Scale)         122         ISO 2039-2           Thermal         Nominal Value Unit         Test Method           Heat Deflection Temperature         ISO 75-2I/A           1.8 MPa, Unannealed         260 °C         ISO 11357-3           CLTE         ISO 11357-3         ISO 11357-3           CLTE         ISO 11359-2         ISO 11359-2           Flow         2.3E-5 cm/cm/°C         ISO 11359-2           Flow         2.3E-5 cm/cm/°C         ISO 11359-2           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms·cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60250           Dissipation Factor <sup>6</sup> (23°C, 1 MHz)         2.0E-3	Flexural Modulus (23°C)	15500 MPa	ISO 178
Coefficient of Friction 5         0.25           Taber Abrasion Resistance (1000 Cycles)         50.0 mg         ISO 9352           Impact         Nominal Value Unit         Test Method           Charpy Notched Impact Strength (23°C)         11 kJ/m²         ISO 179           Charpy Unnotched Impact Strength (23°C)         55 kJ/m²         ISO 179           Hardness         Nominal Value Unit         Test Method           Rockwell Hardness (R-Scale)         122         ISO 2039-2           Thermal         Nominal Value Unit         Test Method           Heat Deflection Temperature         ISO 75-2/A         ISO 75-2/A           1.8 MPa, Unannealed         260 °C         ISO 11357-3           CLTE         ISO 11357-3         ISO 11357-3           CLTE         ISO 11359-2         ISO 11359-2           Flow         2.3E-5 cm/cm/°C         ISO 11359-2           Flow         3.1E-5 cm/cm/°C         Transverse         3.1E-5 cm/cm/°C           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms-cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23°C, 1 MHz)         4.20         IEC 60250	Flexural Stress (23°C)	305 MPa	ISO 178
Taber Abrasion Resistance (1000 Cycles)         50.0 mg         ISO 9352           Impact         Nominal Value Unit         Test Method           Charpy Notched Impact Strength (23°C)         11 kJ/m²         ISO 179           Charpy Unnotched Impact Strength (23°C)         55 kJ/m²         ISO 179           Hardness         Nominal Value Unit         Test Method           Rockwell Hardness (R-Scale)         122         ISO 2039-2           Thermal         Nominal Value Unit         Test Method           Heat Deflection Temperature         ISO 75-2/A         ISO 75-2/A           1.8 MPa, Unannealed         278 °C         ISO 11357-3           CLTE         ISO 11359-2         ISO 11359-2           Flow         2.3E-5 cm/cm/°C         ISO 11359-2           Transverse         3.1E-5 cm/cm/°C         ISO 1000-2           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms·cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23°C, 1 MHz)         4.20         IEC 60250           Dissipation Factor <sup>6</sup> (23°C, 1 MHz)         Nominal Value Unit         Test Method	Shear Strength (23°C)	80.0 MPa	JIS K7214
Impact         Nominal Value Unit         Test Method           Charpy Notched Impact Strength (23°C)         11 kJ/m²         ISO 179           Charpy Unnotched Impact Strength (23°C)         55 kJ/m²         ISO 179           Hardness         Nominal Value Unit         Test Method           Rockwell Hardness (R-Scale)         122         ISO 2039-2           Thermal         Nominal Value Unit         Test Method           Heat Deflection Temperature         ISO 75-2/A         ISO 75-2/A           1.8 MPa, Unannealed         260 °C         ISO 11357-3           CLTE         ISO 11359-2         ISO 11359-2           Flow         2.3E-5 cm/cm/°C         ISO 11359-2           Transverse         3.1E-5 cm/cm/°C         IEC 60093           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms·cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23°C, 1 MHz)         4.20         IEC 60250           Dissipation Factor <sup>6</sup> (23°C, 1 MHz)         2.0E-3         IEC 60250           Flammability         Nominal Value Unit         Test Method	Coefficient of Friction <sup>5</sup>	0.25	
Charpy Notched Impact Strength (23°C)         11 kJ/m²         ISO 179           Charpy Unnotched Impact Strength (23°C)         55 kJ/m²         ISO 179           Hardness         Nominal Value Unit         Test Method           Rockwell Hardness (R-Scale)         122         ISO 2039-2           Thermal         Nominal Value Unit         Test Method           Heat Deflection Temperature         ISO 75-2/A         ISO 75-2/A           1.8 MPa, Unannealed         260 °C         ISO 11357-3           CLTE         ISO 11357-3         ISO 11359-2           Flow         2.3E-5 cm/cm/°C         ISO 11359-2           Flow         3.1E-5 cm/cm/°C         Test Method           Volume Resistivity         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms-cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23°C, 1 MHz)         4.20         IEC 60250           Dissipation Factor <sup>6</sup> (23°C, 1 MHz)         Nominal Value Unit         Test Method	Taber Abrasion Resistance (1000 Cycles)	50.0 mg	ISO 9352
Charpy Unnotched Impact Strength (23°C)         55 kJ/m²         ISO 179           Hardness         Nominal Value Unit         Test Method           Rockwell Hardness (R-Scale)         122         ISO 2039-2           Thermal         Nominal Value Unit         Test Method           Heat Deflection Temperature         ISO 75-2/A           1.8 MPa, Unannealed         260 °C           Melting Temperature         278 °C         ISO 11357-3           CLTE         ISO 11359-2           Flow         2.3E-5 cm/cm/°C           Transverse         3.1E-5 cm/cm/°C           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms-cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23°C, 1 MHz)         4.20         IEC 60250           Dissipation Factor <sup>6</sup> (23°C, 1 MHz)         2.0E-3         IEC 60250           Flammability         Nominal Value Unit         Test Method	Impact	Nominal Value Unit	Test Method
Hardness         Nominal Value Unit         Test Method           Rockwell Hardness (R-Scale)         122         ISO 2039-2           Thermal         Nominal Value Unit         Test Method           Heat Deflection Temperature         ISO 75-2/A           1.8 MPa, Unannealed         260 °C           Melting Temperature         278 °C         ISO 11357-3           CLTE         ISO 11359-2           Flow         2.3E-5 cm/cm/°C           Transverse         3.1E-5 cm/cm/°C           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms·cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23 °C, 1 MHz)         4.20         IEC 60250           Dissipation Factor <sup>6</sup> (23 °C, 1 MHz)         2.0E-3         IEC 60250           Flammability         Nominal Value Unit         Test Method	Charpy Notched Impact Strength (23°C)	11 kJ/m²	ISO 179
Rockwell Hardness (R-Scale)         122         ISO 2039-2           Thermal         Nominal Value Unit         Test Method           Heat Deflection Temperature         ISO 75-2/A           1.8 MPa, Unannealed         260 °C           Melting Temperature         278 °C         ISO 11357-3           CLTE         ISO 11359-2           Flow         2.3E-5 cm/cm/°C           Transverse         3.1E-5 cm/cm/°C           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms·cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23 °C, 1 MHz)         4.20         IEC 60250           Dissipation Factor <sup>6</sup> (23 °C, 1 MHz)         2.0E-3         IEC 60250           Flammability         Nominal Value Unit         Test Method	Charpy Unnotched Impact Strength (23°C)	55 kJ/m²	ISO 179
Thermal         Nominal Value Unit         Test Method           Heat Deflection Temperature         ISO 75-2/A           1.8 MPa, Unannealed         260 °C           Melting Temperature         278 °C         ISO 11357-3           CLTE         ISO 11359-2           Flow         2.3E-5 cm/cm/°C           Transverse         3.1E-5 cm/cm/°C           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms·cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23°C, 1 MHz)         4.20         IEC 60250           Dissipation Factor <sup>6</sup> (23°C, 1 MHz)         2.0E-3         IEC 60250           Flammability         Nominal Value Unit         Test Method	Hardness	Nominal Value Unit	Test Method
Heat Deflection Temperature	Rockwell Hardness (R-Scale)	122	ISO 2039-2
1.8 MPa, Unannealed         260 °C           Melting Temperature         278 °C         ISO 11357-3           CLTE         ISO 11359-2           Flow         2.3E-5 cm/cm/°C           Transverse         3.1E-5 cm/cm/°C           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms·cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23°C, 1 MHz)         4.20         IEC 60250           Dissipation Factor <sup>6</sup> (23°C, 1 MHz)         2.0E-3         IEC 60250           Flammability         Nominal Value Unit         Test Method	Thermal	Nominal Value Unit	Test Method
Melting Temperature         278 °C         ISO 11357-3           CLTE         ISO 11359-2           Flow         2.3E-5 cm/cm/°C           Transverse         3.1E-5 cm/cm/°C           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms·cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23°C, 1 MHz)         4.20         IEC 60250           Dissipation Factor <sup>6</sup> (23°C, 1 MHz)         2.0E-3         IEC 60250           Flammability         Nominal Value Unit         Test Method	Heat Deflection Temperature		ISO 75-2/A
CLTE Flow Transverse         2.3E-5 cm/cm/°C         ISO 11359-2           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms·cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23°C, 1 MHz)         4.20         IEC 60250           Dissipation Factor <sup>6</sup> (23°C, 1 MHz)         2.0E-3         IEC 60250           Flammability         Nominal Value Unit         Test Method	1.8 MPa, Unannealed	260 °C	
Flow Transverse         2.3E-5 cm/cm/°C           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms·cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23°C, 1 MHz)         4.20         IEC 60250           Dissipation Factor <sup>6</sup> (23°C, 1 MHz)         2.0E-3         IEC 60250           Flammability         Nominal Value Unit         Test Method	Melting Temperature	278 °C	ISO 11357-3
Transverse         3.1E-5 cm/cm/°C           Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms·cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23°C, 1 MHz)         4.20         IEC 60250           Dissipation Factor <sup>6</sup> (23°C, 1 MHz)         2.0E-3         IEC 60250           Flammability         Nominal Value Unit         Test Method	CLTE		ISO 11359-2
Electrical         Nominal Value Unit         Test Method           Volume Resistivity         1.0E+14 ohms·cm         IEC 60093           Electric Strength         24 kV/mm         IEC 60243-1           Dielectric Constant <sup>6</sup> (23°C, 1 MHz)         4.20         IEC 60250           Dissipation Factor <sup>6</sup> (23°C, 1 MHz)         2.0E-3         IEC 60250           Flammability         Nominal Value Unit         Test Method	Flow	2.3E-5 cm/cm/°C	
Volume Resistivity1.0E+14 ohms·cmIEC 60093Electric Strength24 kV/mmIEC 60243-1Dielectric Constant 6 (23°C, 1 MHz)4.20IEC 60250Dissipation Factor 6 (23°C, 1 MHz)2.0E-3IEC 60250FlammabilityNominal Value UnitTest Method	Transverse	3.1E-5 cm/cm/°C	
Electric Strength24 kV/mmIEC 60243-1Dielectric Constant 6 (23°C, 1 MHz)4.20IEC 60250Dissipation Factor 6 (23°C, 1 MHz)2.0E-3IEC 60250FlammabilityNominal Value UnitTest Method	Electrical	Nominal Value Unit	Test Method
Dielectric Constant 6 (23°C, 1 MHz)4.20IEC 60250Dissipation Factor 6 (23°C, 1 MHz)2.0E-3IEC 60250FlammabilityNominal Value UnitTest Method	*	1.0E+14 ohms·cm	IEC 60093
Dissipation Factor <sup>6</sup> (23°C, 1 MHz) 2.0E-3 IEC 60250  Flammability Nominal Value Unit Test Method	Electric Strength	24 kV/mm	IEC 60243-1
Flammability Nominal Value Unit Test Method	Dielectric Constant <sup>6</sup> (23°C, 1 MHz)	4.20	IEC 60250
· · · · · · · · · · · · · · · · · · ·	Dissipation Factor <sup>6</sup> (23°C, 1 MHz)	2.0E-3	IEC 60250
Flame Rating (0.28 mm) V-0 UL 94	Flammability	Nominal Value Unit	Test Method
	Flame Rating (0.28 mm)	V-0	UL 94

Form No. TDS-59838-en

## Torelina® A504X90

Polyphenylene Sulfide **Toray Industries, Inc.** 



Additional Information

Nominal Value Unit

Test Method

Bar Flow Length <sup>7</sup> (320°C, 1.00 mm)

135 mm

Internal Method

#### **Notes**

- <sup>1</sup> These links provide you with access to supplier literature. We work hard to keep them up to date; however you may find the most current literature from the supplier.
- <sup>2</sup> A UL Yellow Card contains UL-verified flammability and electrical characteristics. UL Prospector continually works to link Yellow Cards to individual plastic materials in Prospector, however this list may not include all of the appropriate links. It is important that you verify the association between these Yellow Cards and the plastic material found in Prospector. For a complete listing of Yellow Cards, visit the UL Yellow Card Search.
- <sup>3</sup> Typical properties: these are not to be construed as specifications.
- 4 80x80x3mm
- <sup>5</sup> vs. Metal
- <sup>6</sup> 60% RH
- <sup>7</sup> 98 MPa

# Toray Industries, Inc.



#### Where to Buy

#### Supplier

Toray Industries, Inc.

Tokyo, Japan

Web: http://www.toray.jp/plastics/en/

#### Distributor

#### **ALBIS Plastic**

ALBIS Plastic is a global distribution and compounding company. Contact ALBIS Plastic for availability of individual products per country. Telephone: +49-40-78105-0

Web: http://www.albis.com/

Availability: Austria, Belgium, Bulgaria, Croatia, Czech Republic, France, Germany, Hungary, Luxembourg, Netherlands, Poland, Romania,

Russian Federation, Serbia, Slovakia, Slovenia, Switzerland

#### **Distrupol Ltd**

Distrupol Ltd is a Pan European distribution company. Contact Distrupol Ltd for availability of individual products by country.

Telephone: 08452003040 Web: http://www.distrupol.com/

Availability: Belgium, Luxembourg, Netherlands

#### **ESSE International - OMYA**

ESSE International - OMYA is a Pan European distribution company. Contact ESSE International - OMYA for availability of individual products

by country.

Telephone: +33-1-30-80-56-56 Web: http://www.omya.com

Availability: France

#### **GAZECHIM PLASTIQUES**

GAZECHIM PLASTIQUES is a Pan European distribution company. Contact GAZECHIM PLASTIQUES for availability of individual products

by country.

Telephone: +33-4-67-49-55-37 Web: http://www.gazechim.com/

Availability: France

### Plastics Plus, Inc.

Telephone: 248-393-0300 Web: http://www.plasplus.com/ Availability: North America

