Samyang Corporation TRIEL®
Thermoplastic Ether Ester Elastomer
TRIEL®, a thermoplastic polyester elastomer (TPC-ET, TPEE, COPE), offers significant chemical resistance, thermal resistance, weatherability, and low temperature flexibility.

Chemistry & Rheology

TPC-ET chemical structure is as shown below. TPC-ET is a block copolymer composed of PBT hard segment and aliphatic ether ester soft segment.

Having the same chemical structure as PBT, the hard segments is also known as PBT-Elastomer. PBT hard segment, a crystalline polymer, affects physical properties by forming crystalline in a polymer and produces mechanical strength like an engineering polymer. PTMG (Poly tetramethylene glycol) is used for aliphatic ether ester soft segment which gives flexible characteristics of rubber.

TPC-ET is mainly composed of PBT. The higher the content of soft segment is, the lower TRIEL®’s hardness becomes. TRIEL®’s lowest possible hardness is approximately 28D (82A).

Shore D is used for hardness and please refer to the side image for conversion from Shore D to Shore A.

TRIEL®’s rheological properties portray behaviors similar to that of engineering plastics. Melt temperature, crystallization temperature, approximate processing temperature at each grade are as shown below.

Changes in melt viscosity by processing method and sheer force resemble crystalline polymer. Melt viscosity versus temperature figure is as shown below.
Samyang Corporation retains TPV (Thermoplastic Vulcanizates) that covers the TPC-ET’s shortcomings such as high density and materialization of low hardness.

Although TPV uses TRIEL®, the regulation for naming each grade is different. Please refer to TPV Coding.
Automotive Application

With its excellent properties, TRIEL® is mainly applied to automotive materials since automotive materials require long term mechanical performance and a wide range of thermal properties.

TRIEL® is used in CVJB (Constant Velocity Joint Boots) which is crucial to a vehicle operation and requires flexural fatigue resistance. TRIEL® is supplied to various OEM companies and its outstanding properties are being recognized.

TRIEL® has been adopted for use in rack & pinion steering boots and bellows based on its great thermal properties and toughness.

Recently, Samyang Corporation entered air intake ducting area by developing a duct material which is used in airducts system.

[ Blow molding products ]

[ Air-duct : TRIEL 5551BM BK ]  [ Wiper blade : TRIEL 5351SP BK ]

Damper boots protects the suspension from dirt, rocks, and other debris on the road. Having excellent thermal resistance, durability and compression set at high temperature, TRIEL® helps the damper boots to maintain their function from repeated suspension compression. TRIEL® is widely used in Korean OEM makers’ damper boots.

Furthermore, TRIEL® offers a range of solutions for applications in airbag covers, a bush, boots, tube & hose and in numerous other situations demanding exceptional combination of chemical, thermal, electrical and mechanical characteristics.

<table>
<thead>
<tr>
<th>Hardness</th>
<th>Grade</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CVJB</td>
<td>General</td>
</tr>
<tr>
<td>40</td>
<td>5400BM BK</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>DT5400BM BK</td>
<td>High heat resistance</td>
</tr>
<tr>
<td>40</td>
<td>A55401BM BK</td>
<td>High heat resistance, Anti-squeak noise performance</td>
</tr>
<tr>
<td>43</td>
<td>H56430BM BK</td>
<td>High heat resistance for Inboard Boots</td>
</tr>
<tr>
<td></td>
<td>Bellows</td>
<td>General</td>
</tr>
<tr>
<td>40</td>
<td>5401BM BK</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>HV5451BM BK</td>
<td>High viscosity, High heat resistance.</td>
</tr>
<tr>
<td></td>
<td>Air-duct</td>
<td>General</td>
</tr>
<tr>
<td>55</td>
<td>HS5551BM BK</td>
<td>High viscosity, High heat resistance.</td>
</tr>
<tr>
<td>58</td>
<td>5581BM BK</td>
<td>High heat resistance.</td>
</tr>
</tbody>
</table>

[ CVJ Boots : DT5400BM BK ]
Extrusion & Injection Grade

With high adhesion to PC, PC/ABS, TPC-ET material is widely used in double injection. By compounding SBS and SEBS, Samyang Corporation developed double adhesive material with PA6, PA6.6, and glass fiber reinforced PA.

**Cable & tube**
TPC-ET is applied to cable & tube that requires improved thermal property and toughness. TPC-ET also has outstanding processability and productivity.

**Mobile & Electronics**
TRIEL® is the choice of nature in mobile appliances where UV resistance and soft touch applications are crucial. Especially TRIEL® is applied to a band part of mobile appliances. TRIEL® also offers great chemical-resistance which allows it to be used in mobile devices’ battery electrolyte and sealing.

**Semiconductor tray**
When you need a product, such as semiconductor tray, in which outgassing is a crucial factor, TRIEL® is the answer. TRIEL® minimized Ti content by using less polymerization catalyst in order to make it applicable to semiconductor tray.

**Food contact grade**
Thanks to its enhanced polymerization and remaining monomer control technology, TRIEL® has FDA approved grade that is used as material for airtight containers and container sealing.

**Medical devices**
TRIEL® TPV grade is used in medical devices such as syringes, catheter, medical tubing, and IV solution bags.

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**Halogen-free flame retardant TRIEL®**

When TPC-ET is applied to automotive & electronic cables, fiber, and films, halogen-free flame retardant characteristics are often requested. TRIEL® can meet your needs. Halogen-free flame retardant TPC-ET is generally limited in various applications due to degradation in tensile strength and tensile strain. But, samyang’s TRIEL® minimized these shortcomings.

![Tensile Strength](chart1)

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![Tensile Strain](chart2)

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![Halogen-free flame retardant grade](chart3)
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