

RESINEX, a part of RAVAGO Group, is a leading European supplier of plastics and rubbers with local branches and warehouses in all European countries. The RESINEX portfolio consists of over 10,000 items from commodity plastics PE, PP, PS through engineering plastics ABS, PC, PC / ABS, PA6, PA66 to special polymers such as POM, PBT, LCP, PPS, TPE, TPU, PMMA, PA12, PA11 and others. RESINEX is the official distributor of companies including Dow Plastics, Styron, Solvay, Celanese, LG Chem, Braskem, DSM, Total, Altuglas, Arkema, ExxonMobil and others (representation may vary in different countries).

*Even Being The Best Is Sometimes Not Enough. Therefore We Try Harder. Resinex, The original and still the best plastics Distributor.*

# **RESINEX**News

## Meet All Your **TPE** Needs With Materials From One Supplier

RESINEX supplies Thermoplastic elastomers (TPE-S, TPE-V and TPU) from its sister companies Enplast (Turkey) and Ravago Steinfurt (Germany).



### **TPE-S ENSOFT®** and **SCONABLEND®**

- based on saturated styrenic block copolymer SEBS (styrene-ethylene-butylene-styrene) and polyolefins, mainly polypropylene (PP).

**TPE-V ENFLEX®** - Based on dynamically vulcanized Ethylene/Propylene/Diene (EPDM) and Polypropylene (PP) blends.

**TPE-V EZPRENE®** - Next Generation TPE-V. Based on dynamically vulcanized Ethylene/Propylene/Diene (EPDM) and Polypropylene (PP) blends. Proprietary crosslinking technology gives improvements in colour, processability and aesthetics.

**TPU RAVATHANE®** - based on Polyester and Polyether based Linear Block Copolymer Polyurethanes.

Beside thermoplastic elastomers from its sister companies, Resinex Group also distributes (may differ by country):

**TPE-O** (Dow Engage®) - a compounded or reactor produced polyolefin (PP or PE) as the hard segment and various (Poly) olefins (or co Monomers) as the soft segment.

**TPE-E** (DSM Arnitel®, Ticona Riteflex®) - a synthetic polyester as the hard segment and polyether as the soft segment.

**TPE-A** (Arkema Pebax®) - a synthetic block copolymer based on polyether / ester as the soft segment and a polyamide as the hard segment.

## Why should I choose Resinex as my supply partner for TPE

- Competitive own production of 65 000 T / year at 3 sites, a leading European producer of TPE-S, TPE-V and TPU.
- Branded distribution of alternative Elastomeric polymer families (TPE-O, TPE-A, TPE-E) from well-known producers.
- World class R&D facilities at Enplast.
- Local warehousing and Technical Sales force in every European country.
- A broad range of products from high quality grades to economic grades.
- Industry experts happy to discuss your next project.



ENPLAST, Resinex sister company also belonging into Ravago Group, is the leading supplier of thermoplastic polyolefin material and technology to the European Industry with the complete range of EZPrene®, ENSOFT® and ENFLEX® TPE materials.

The production and engineering operations of ENPLAST are certified to the standards of ISO/TS 16949:2002 for quality systems.

Ravago has a production capacity of over 65,000 Tonnes of TPE from the Ravago plants in Turkey, Germany and the U.S.A..

# Thermoplastic Elastomers

Thermoplastic Elastomers (TPE) are generally dual phase systems containing soft elastic and hard thermoplastic components. They combine the physical properties of rubber and the processing properties of thermoplastics.

The elastomeric phase determines rubber like properties such as:

- Elasticity
- Softness
- Flexibility
- Compression set
- Minimum service temperature.

The rigid phase determines thermoplastic properties such as:

- Hardness
- Processability
- Recyclability
- Maximum service temperature.

TPE can be processed on conventional melt processing Injection and extrusion equipment and provide a link between thermoplastics and elastomers.

TPE is one of the fastest growing polymer families with growth rates of 5-7% predicted for the next 5 years, fuelled by design freedom, aesthetics (colour, transparency, touch), recyclability and easier conventional 'plastics' processing compared to thermoset Elastomers.

Properties of TPE-S vs TPV		
Property	Ensoft TPE-S	Enflex TPE-V
Density g/cm3	0.90 - 1.20	0.90 -1.00
Harness (Shore A/D)	0A - 50D	35A - 50D
Upper Operating temperature (°c)	100/110	125
Lower Operating temperature (°c)	-50	-60
Compression set 70/100 °c (%)	0/-	++/0
Resistance to Hydrocarbons	-	0
Water based non polar solvent resistance	+	+ / ++

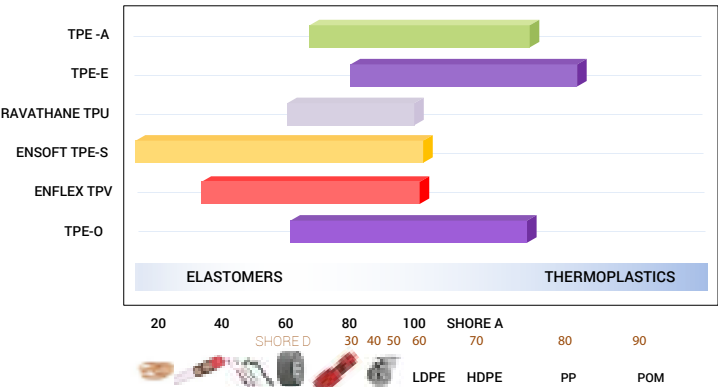
Enflex TPE- V (phenolic cure)	EZPrene TPE- V (peroxide cure) <span>NEW</span>	Ensoft TPE -S
Strong Performance		
<ul style="list-style-type: none"> <li>• Good elastic properties (low compression set)</li> <li>• Good chemical and fluid resistance</li> <li>• Good UV resistance</li> <li>• Good heat aging properties</li> <li>• Good dynamic properties at high temperatures</li> </ul>	<ul style="list-style-type: none"> <li>• Good elastic properties (low compression set)</li> <li>• Good chemical and fluid resistance</li> <li>• Good UV resistance</li> <li>• Good heat aging properties</li> <li>• Good dynamic properties at high temperatures</li> <li>• Whitish colour , easier to colour than Enflex</li> <li>• Good aesthetics</li> <li>• Non – Hygroscopic</li> <li>• Very high flow</li> <li>• Low odour / fogging</li> </ul>	<ul style="list-style-type: none"> <li>• Broad hardness range</li> <li>• Excellent colorability</li> <li>• Good elasticity, tear strength compression set at low-med temp.</li> <li>• Bondability to many different substrates</li> <li>• Fast cycle time</li> <li>• Cost</li> <li>• Wide hardness range good chemical resistance</li> <li>• Easy processability / no drying</li> </ul>
Weaker performance		
<ul style="list-style-type: none"> <li>• Poor tensile and tear strength at low hardness</li> <li>• Yellow colour - Poor colorability vs. TPE-S</li> <li>• More difficult processing vs. TPE-S</li> <li>• Hygroscopic / needs drying</li> </ul>	<ul style="list-style-type: none"> <li>• Poor tensile and tear strength at low hardness</li> <li>• Cost</li> </ul>	<ul style="list-style-type: none"> <li>• Poor high temperature elasticity</li> </ul>

## General TPE properties

### Hardness

Generally for TPE this is measured using a probe applied against the surface of the TPE with a certain force and duration. One of the most common methods used is the Shore Durometer measurement, generally reading on the 'D' scale for harder materials to the 'A' scale for softer materials and in the case of extremely soft materials the '00' scale.

#### HARDNESS RANGES OF TPE's

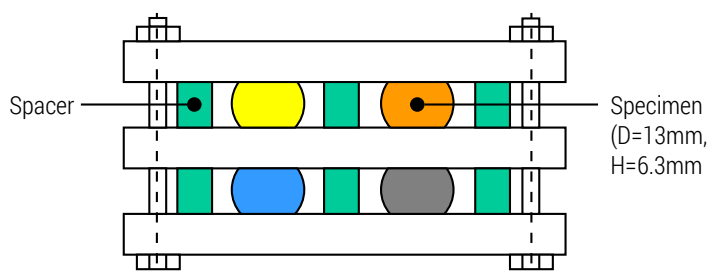


Durometer for measuring TPE hardness.

## Compression set

Compression set is measured using defined standards (DIN 53 517, ISO 815 – 1969 or ASTM D – 395).

The material is loaded to reach a compressive deformation (25%), at various temperature, depending on the test (23 °C, 70°C, 100°C or 125°C) for a defined period of time (22, 72 or 168 hours) and the compression set is expressed as the final % deformation with the load removed vs. the original deformation.



This is a measurement of the elastic recovery of the TPE after deformation under a fixed load and temperature. Therefore the lower the % compression set, the more 'rubber like' is the TPE.

## Density

Density and composition of the TPE play an important part in the performance and economics. The formulations utilise the Polymer families, mineral fillers, oils and additives to modify hardness levels and performance levels together with enhancing the economics of the final compound.

## TPE-S

## TPE-S Ensoft® portfolio:

- General purpose grades for Injection and extrusion
- Soft touch and wet grip grades
- General applications with high filler content
- Types for 2-K injection with enhanced adhesion to different Polymers
- For demanding applications – types with excellent elasticity, mechanical properties and abrasion resistance
- Transparent types (for example, for cosmetic applications)
- Flame retardant grades
- High Temperature resistant grades
- Foamed types
- Food contact compliant grades

Ensoft Product Range									
Core grade series									
Grade Series	Improved UV resistance	High melt flow	Low fogging grades	Injection molding	Extrusion	Blow molding	General Purpose	High Performance	Additional properties
S...141	●			●	●		●		Medium filled SEBS grades
S...161	●			●	●		●		Highly filled SEBS grades
S...200	●	●		●	●				Bondable to ABS, PC, PA, SAN
S...300	●	●	●	●	●			●	Unfilled SEBS grades



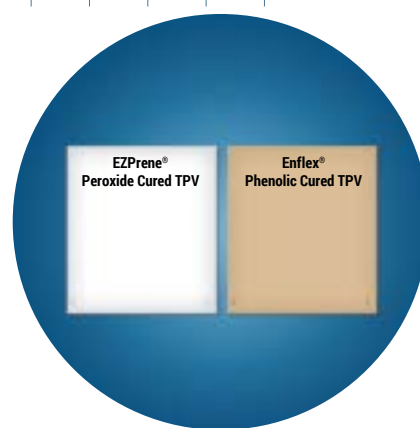
# TPE-V

## TPE-V Enflex® portfolio:

- General purpose grades for Injection and extrusion
- Low emission grades for interior automobile applications
- Types for 2K injection with enhanced adhesion and high flow
- Speciality grades for glass encapsulation
- Partially crosslinked economic types
- Flame retardant grades
- Types with increased heat resistance and enhanced resistance against oils
- High Temperature resistant grades
- Foamed types
- Food contact compliant grades

Enflex® Product Range Core grade series								
Grade Series	Improved UV resistance	High melt flow	Low fogging grades	Injection molding	Extrusion	Blow molding	General Purpose	High Performance
V...120	•			•	•	•	•	•
V...227	•			•				
V...420	•		•	•	•	•	•	
Additional properties								
Low compression set grade								
EPDM overmolding								
Standard grade								

Natural colour difference between new generation TPE-V EZPrene® and standard TPE-V Enflex®



## TPE-V EZPrene® portfolio

- General purpose grades for Injection and extrusion produced with proprietary curing technology
- All grades have a strong white base colour allowing design freedom in colouring
- All grades are non-hygroscopic, and do not require drying before processing
- Speciality super high flow grade for glass encapsulation
- Low emission grades for interior automobile applications
- All grades have a non-greasy 'clean' touch surface
- All grades have enhanced UV stability.

EZPrene® Product Range Core grade series								
Grade Series	Improved UV resistance	High melt flow	Low fogging grades	Injection molding	Extrusion	Blow molding	General Purpose	High Performance
VL 320	•			•	•	•		•
VU 320	•		•	•	•	•	•	
Additional properties								
Up to 100% vulcanised EPDM Phase								
Standard grade								

## Ensoft® processing conditions

Hardness	Barrel Temperatures °c				Mould °c
< 55 Shore A	140-160	150-170	160-180	170-180	20-40
55 – 85 Shore A	150-170	160-180	170-190	180-190	20-40
>85 Shore A	160-180	170-190	180-190	190-200	20-40

## Enflex® and EZPrene® processing conditions

Hardness	Barrel Temperatures °c				Mould °c
55 – 85 Shore A	170-180	180-190	180-200	190-210	20-50
>85 Shore A	170-180	180-190	180-200	190-210	20-50