This guide to Thermoplastic Elastomers (TPE) is based on the classification and nomenclature in accordance with DIN EN ISO 18064 standard.

PTS is the materials specialist in hard/soft combinations and radiation crosslinking.
THERMOPLASTIC ELASTOMERS are among the most innovative products in the plastics industry. In many cases, two-component injection moulding produces a firm material bond between thermoplastics and TPE’s, which saves the need for assembly operations. In general, a distinction is made between block copolymers (1a) and polymer blends (1b), as shown in the overview on page 5.

The properties of Thermoplastic Elastomers and conventional crosslinked rubbers are tending to converge, as the following graphs illustrate in simplified form. Soft TPEs generally have much better compression set behaviour than harder grades, whereas the opposite is generally the case for oil swell, i.e. hard TPS grades or TPV grades are usually significantly better than soft as a result of their high PP content.
TPEs are placed between crosslinked rubbers and thermoplastic materials. Their good recycling and colouration properties are crucial to penetration of the automotive industry.

**Positioning of TPEs**

- **Crosslinked Elastomers**: rubber-elastic properties over a wide temperature range
- **Thermoplastics**: melt processing
- **Recyclability**
In the manufacture of vulcanizates, waste occurs at several stages in the production process. During the manufacture of TPEs, waste can be recycled into the processing stream:
The PTS team has compiled an overview of the many different TPEs with guidance on material selection. In partnership with ARKEMA and BMS MATERIAL SCIENCE AG (DESMOPAN GROUP), the PTS Group has built up comprehensive competence in all the important TPEs.

All the following TPEs are represented in the product ranges of PTS or its above-mentioned partners.

### TPE Overview

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<th>Block copolymers</th>
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### TPE Overview as per DIN ISO 18064 and the standard abbreviations

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<td>Metallocene TPO elastomer</td>
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<td>Metallocene TPE</td>
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2.0  
**TPE-S, SBC/HSBC, styrene block copolymer**  
**ISO 18064: TPS**

For this very large TPE family, various standard abbreviations are used, which are explained as follows:

**TPE-S** stands for styrene-based thermoplastic elastomer, hydrogenated and non-hydrogenated.

**SBC** is the commonly used international designation for STYRENE BLOCK COPOLYMERS.

**HSBC** is similarly the usual designation for HYDROGENATED STYRENE BLOCK COPOLYMERS (e.g. SEBS).

The ISO abbreviation **TPS** describes all styrene-based TPEs.

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**2.1  
TPE-S, SEBS/PP, HSBC**  
**ISO 18064: TPS-SEBS**  
**Trade name: PTS-THERMOFLEX**

**SEBS** stands for STYRENE-ETHYLENE-BUTYLENE-STYRENE.

The base polymers are produced by hydrogenation of SBS (STYRENE-BUTADIENE-STYRENE) (HSBC) and have no double bonds, which makes it possible to achieve high thermal stability by nature compared to SBS. This can be upgraded by using stabilizers, to obtain higher UV resistance and aging behaviour as required in automotive interior and exterior applications. These products have very good resistance to hydrolysis and to most dilute acids and alkalis. With some concentrated acids, it is necessary to compound the materials without fillers, since CaCO$_3$ (Calcium Carbonate) reacts with acid. Resistance to many vegetable fats (unsaturated) is moderate, while resistance to animal fats (saturated) tends to be poor. Resistance to lubricating oil, gasoline and other fuel and many solvents is also poor. Resistance to alcohol and glycol is good. Filled grades have moderately good and unfilled products somewhat better abrasion values.
2.2 TPE-S, SEPS/PP, HSBC
ISO 18064: TPS-SEPS
Trade name: PTS-THERMOFLEX

SEPS stands for STYRENE-ETHYLENE-PROPYLENE-STYRENE.

This polymer family is interchangeable with SEBS but the compounds have higher strength.
A wide spectrum of products from low to high and ultrahigh molecular weight grades is available, as well as dynamically crosslinked grades. Hardness values range from 20 Shore 00 (softest jelly compound), through the Shore A scale to 70 Shore D.

2.3 TPE-S, SEEPS/PP, HSBC
ISO 18064: not standardized
Trade name: PTS-THERMOFLEX

SEEPS stands for STYRENE-ETHYLENE-ETHYLENE-PROPYLENE-STYRENE.

The properties of these products are largely identical to those of SEPS.
They have somewhat higher tensile strength than SEBS and SEPS.
The glass transition temperature is somewhat higher than that of SEBS.
2.4 TPE-S, SEBS/PPO or SEEPS/PPO, HSBC blend
ISO 18064: not standardized
Trade name: PTS-THERMOFLEX-HH

By blending with PPO (POLYPHENYLENE OXIDE), also known as PPE (POLYPHENYLENE ETHER), high-temperature TPE grades can be obtained with very good compression set properties at high temperatures.

These products have limited use for automotive interiors because of their intrinsic odor.

The dimensional stability of these materials is significantly better than that of standard TPE-V grades (low mould shrinkage and longitudinal/transverse differential shrinkage).
2.5 TPE-S, SEBS or SEEPS blends
adhesion-modified grades
ISO 18064: not standardized
Trade name: PTS-THERMOFLEX A1 - A5

These SEBS or SEEPS blends have been specially modified for the production of hard/soft injection molded parts by two-component injection moulding. Since SEBS and SEEPS are non-polar, suitable modification must be carried out.

PTS-THERMOFLEX-A1:
adhesion-modified for ABS, PA, PC, PC/ABS, PC/PBT, SAN

PTS-THERMOFLEX-A2:
adhesion-modified for PA blends

PTS-THERMOFLEX-A3:
adhesion-modified for PA

PTS-THERMOFLEX-A4:
adhesion-modified for PS, PPO/PPE

PTS-THERMOFLEX-A5:
adhesion-modified for PC, PC/ABS, ABS, PBT, POM, PMMA
Detailed information is given in our ADHESION TESTING brochure (2nd edition, 04/2005). Our application engineering department will also be very pleased to advise you. PTS is licensed for 19 patents, including TICONA patent no. DE 19845235C2 (SEBS/SEPS with adhesion to POM).

2.6 TPE-S, SBS, SBC
ISO 18064: TPS-SBS

These unsaturated, low-priced TPEs tend to have rather poor UV and weathering resistance and moderate stability to elevated temperatures on account of their double bonds. They must be tested for possible yellowing or embrittlement. This product group is sometimes also described as TPR. This abbreviation stands for THERMOPLASTIC RUBBER.

At high melt temperatures and during the recycling process, it is important to watch out for undesirable crosslinking. This product family is very important in the footwear industry. SBS blends with SEBS/SEEPS have improved aging properties.

2.7 TPE-S, SSBS, SBC
ISO 18064: not standardized

SSBS stands for STYRENE-STYRENE-BUTADIENE-STYRENE. This relatively new SBC is inherently transparent and somewhat more thermally stable and UV-resistant than normal SBS.

The styrene content (65%) is very high and the polarity is also higher than for standard SBS.

Only at melt temperatures > 270°C does crosslinking slowly start. With normal SBS, this can be expected at far lower temperatures.
3.0
TPE-U, TPU, block copolymer
ISO 18064: TPU
Trade name: DESMOPAN

To develop polyurethane blends, a strategic partnership was established with BAYER MATERIAL SCIENCE (BMS), a leading manufacturer of thermoplastic polyurethanes.

DESMOPAN is sold through the familiar distribution channels. These products have been further enhanced by PTS and sold as PTS-UNIFLEX-U (modified TPU) or DESMOFLEX (polyurethane blends). The following information was mainly provided by BMS.

Thermoplastic polyurethane is a very diverse product family, suitable for injection moulding and extrusion applications which require high resistance to abrasion, oils and dynamic stress. They have limited resistance to UV and hydrolysis. Special grades can even be used for applications with these requirements. Processing behaviour (cycle time and ejection) is generally considered to be unfavorable, which is only partly true.

Today, there are grades available with very good solidification kinetics, e.g. DESMOPAN 487 special ester, and also DESMOFLEX grades (see 3.8) with optimal processability. As is usual for TPUs, the values quoted in the data sheets were measured after annealing at 80°C for 15 hours up to 92 Shore A or at 110°C for 15 hours above 92 Shore A.

3.1
TPE-U, TPU esters
ISO 18064: TPU-ARES
Trade name: DESMOPAN
100 - 400 series

This ISO designation TPU-ARES refers to TPU grades with an aromatic hard segment and an ester soft segment. This product family is characterized by good wear strength, hot-air stability and oil resistance.

Exposure to stress in a humid environment can be critical because these products have only moderate hydrolysis resistance (TPU ether and carbonate grades are better suited to such conditions). TPU ester grades have better dynamic properties than TPU ether grades. They also have better resistance than ether grades to mechanical degradation under UV radiation.
The best combinations of all ester TPUs are found in the DESMOPAN 400 series (special esters). This range of products combines optimum compression set properties and very good abrasion resistance with fast cycling (good curing kinetics) and optimum hot-air stability.

DESMOPAN 2586A and 2590A - Textile coatings/conveyor belts

DESMOPAN 392
Drive belts/toothed belts

DESMOPAN 3385A
Profiles and spiral hoses

DESMOPAN 3685A
Highly transparent grades for sports shoes

DESMOPAN 8792A
Sports shoe grades with excellent low-temperature flexibility
3.2 TPE-U, TPU ethers

**ISO 18064: TPU-ARET**

Trade name: DESMOPAN 600 and 900 series

The ISO designation TPU-ARET refers to TPU grades with an aromatic hard segment and an ether soft segment. The DESMOPAN 600 series (C3 ethers) comprises materials with good hydrolytic and microbial resistance at the expense of compromises in mechanical strength and hot-air stability.

The DESMOPAN 900 series (C4 ethers) partially eliminates these mechanical property disadvantages. This family also offers optimum low-temperature flexibility, which is why these grades are frequently used for cable sheathing (also radiation crosslinked/V-PTS-UNIFLEX-U).

The curing kinetics are also favourable, i.e. the materials solidify relatively quickly.

Soft blends based on these DESMOPAN grades (C4 ethers) with a Shore A hardness below 60 are supplied under the trade name DESMOFLEX.

PTS supplies radiation-crosslinkable TPU-ARET grades under the trade name V-PTS-UNIFLEX-U or radiation crosslinkable TPU blends marketed as V-DESMOFLEX.

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**Hydrolysis resistance of TPU in boiling water**


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![Graph showing hydrolysis resistance of TPU in boiling water](image-url)
3.3 TPE-U, TPU ether-esters
ISO 80: TPU-AREE
Trade name: DESMOPAN 500 series

The ISO designation TPU-AREE refers to TPU grades with an aromatic hard segment and an ether-ester soft segment. This family represents a compromise between ester and ether TPUs and offers medium mechanical properties, e.g. DESMOPAN 500 series.

3.4 TPE-U, TPU aliphatics, esters
ISO 80: TPU-ALES
Trade name: DESMOPAN W8000 series

The ISO designation TPU-ALES refers to TPU grades with an aliphatic hard segment and a polyester soft segment. Aliphatic TPU grades, such as the DESMOPAN W8000 series, are preferably used in the automotive sector, e.g. for slush moulded dashboards and UV-resistant components. Their mechanical values are lower than those of TPU-ARES (ester grades). Their resilience is the best of all TPUs.

3.5 TPE-U, TPU aliphatics, ethers
ISO 80: TPU-ALET
Trade name: DESMOPAN W8000 series

The ISO designation TPU-ALET refers to TPU grades with an aliphatic hard segment and a polyether soft segment.
3. TPE-U, TPU aliphatics, ether-esters

ISO 80: not standardized
Trade name: DESMOPAN
W8000 series

This ISO category includes TPU grades with an aliphatic hard segment and a polyether-ester soft segment.

3.7 TPE-U, TPU carbonate

ISO 18064: TPU-ARCE
Trade name: DESMOPAN
700 series

These grades have been developed for special applications.
They have good microbial and hydrolytic resistance, swell less in water than ether TPUs and offer similar mechanical properties to ester grades.

- DESMOFLEX TPU blends with optimized solidification behaviour and short cycle times
- DESMOFLEX B grades with a good price/performance ratio

3.8 TPE-U, TPU blends
ISO 18064: not standardized
Trade name: DESMOFLEX

DESMOFLEX TPU blends can be developed from all products in the DESMOPAN 100-900 series. In some cases, market-ready products are already available with the following properties:
- Soft DESMOFLEX grades with hardness values between 50 and 85 Shore A and optimized processing properties
- DESMOFLEX TPU blends with good adhesion to PA, ABS, PC/ABS, PS, etc.
4.0
TPE-E, COPE, block copolymer
ISO 18064: TPC
Trade name: PTS-UNIFLEX-E

Thermoplastic polyester elastomers are characterized by good thermal melt stability and heat resistance in the end application. Their solidification behaviour is good. Here again, a distinction must be made between ester-ester and ether-ester grades. As a result of their low mechanical loss factor tan δ, polyester elastomers are used particularly for applications involving exposure to dynamic loads, such as CV boots. Only PEBAX (COPA) has an even better tan δ at low temperatures. For applications requiring stability to high thermal stress peaks and improved chemical and hydrolysis resistance, these grades are modified by PTS to make them radiation crosslinkable. PTS has TPE-E grades between 25 and 72 Shore D in its range.

4.1
TPE-E, ester-ether COPE
ISO 18064: TPC-EE

Polyester elastomers with soft segments composed of ether and ester elements. This series of grades provides a good combination of heat resistance, thermal aging stability, dynamic properties and adequate hydrolysis resistance. Permanent contact with hot water is not recommended for any TPE-E.

4.2
TPE-E, ester COPE
ISO 18064: TPC-ES

Polyester elastomers with a polyester soft segment. These polyester elastomers have the best hot-air stability. They are more sensitive to hydrolysis than ether-ester COPE.

Zu 4.3
TPE-E, ether COPE
ISO 18064: TPC-ET
Trade name: PTS-UNIFLEX-E

Polyester elastomers with a polyether soft segment. This product group has somewhat better hydrolysis resistance but somewhat poorer stability to hot-air aging than the pure ester grades.
5.0
TPE-A, COPA, block copolymer, PEBA
ISO 18064: TPA

PEBA is the commonly used abbreviation for poly-ether block amide. Polyamide 6 and 12 elastomers are characterized by high strength. Softer TPA grades usually have a lower melting point than harder grades and lower chemical resistance. The good resilience of TPA under flexural load, also known as “snappiness”, is very important in the sports shoe industry.

At the present time, only PA12 and PA6 COPAs are of any practical significance.

5.1
TPE-A, PA12 COPA, PEBA
ISO 18064: TPA-ET
Trade name: PEBAX

These materials combine low hardness (from 25 Shore D) with the highest mechanical property values.

Example: PEBAX 2533 SA01 has a hardness of only 25 Shore D but still offers a tensile strength of 32 MPa at > 750% elongation at break.

Low-temperature flexibility is better than for TPU or TPE-E. The tan δ is virtually unchanged at low temperature. PEBAX is ideal for injection moulding hard/soft combinations based on PA12.

The best bond strength is obtained with amorphous PA12. Abrasion resistance is generally described as good. PEBAX can be supplied in a radiation crosslinkable version by PTS. The low melting point of the soft PEBAX grades is of only minor importance after radiation crosslinking.

Graph for 5.1

Tests on pipes with 6 mm outside diameter

- PA11 plasticized, uncrosslinked
- PA11 plasticized, crosslinked
**Mechanical properties on 33 series PEBAX**

Source: ARKEMA

**Full range of Moduli**

According to standard ASTM D 790 at 23°C

**Tensile strength at break**

According to standard ASTM D 638 at 23°C

**Elongation at break**
**Mechanical properties on 33 series PEBAX**

Source: ARKEMA

*Outstanding low temperature properties*

No rigidification of PEBAX with low temperature

PEBAX keeps its properties in a wide range of temperatures

**Very good impact strength even at very low temperature**

Impact strength (IZOD) at -40°C

According to standard ASTM D 638 at 23°C

Test pieces injection molded and conditioned 14 days at 23°C and 50% H.R.
**PEBAX Dynamical properties**

*Source: ARKEMA*

Comparison of PEBAX with TPU and copolyester elastomers (ATOFINA result)

**Advantages**

**PEBAX retains its low hysteresis at:**

- **Low temperatures**

  PEBAX still has a long service life at low temperatures (in addition to conserving its modulus)

- **High frequencies**

  PEBAX is very good for high-frequency use such as dynamic applications (belting, couplings, gears etc.) while other materials become rigid at these high frequencies

*These properties allow PEBAX to have very good damping characteristics (so avoiding vibrations)*
5.2
TPE-A, PA6 COPA, PEBA
ISO 18064: TPA-ET
Trade name: PEBAX

PA6 elastomers have much higher melting points than PA12 elastomers with the same hardness. For example, in a comparison between a PA12 elastomer and PA6 elastomer, each having a hardness value of 40 Shore D, a PA12 elastomer, such as PEBAX 4033, melts at 160°C, whereas a PA6 elastomer, such as PEBAX MP 1878, does not melt until 204°C. The water absorption of PA6 COPA is significantly higher than that of PA12 COPA.

6.0 and 6.1
Silikon-TPE, block copolymer
ISO 18064: not standardized
Trade name: GENIOMER

GENIOMER from WACKER is a polysiloxane urea block copolymer. GENIOMER is a new thermoplastic silicone TPE with unusual properties. It is used as a processing additive, e.g. for polyolefins. In partnership with WACKER CHEMIE, PTS is working on marketing and further development of this product for the injection moulding market. GENIOMER is melt processable, highly transparent, water-repellent and extremely flexible at low temperature. Its scratch resistance and surface touch are outstanding. PTS can supply GENIOMER in brilliant colours. Conventional colouration with a poly-olefin masterbatch is not possible. The advantages of GENIOMER TPEs are therefore not at high but at low temperatures and under moderate temperature stress (70-100°C without mechanical load). Apart from GENIOMER, no known TPE material at the present time can offer virtually unchanged stiffness between room temperature and -100°C. The glass transition temperature of GENIOMER is -100°C. GENIOMER has very good sealing properties at low temperature, while most other TPEs tend to seal poorly at low temperature. At -18°C, the compression set of GENIOMER 200 is 10% (information provided by WACKER CHEMIE). This is an excellent value. GENIOMER can be used as a light guide because of its high transparency.

7.0
TPE-O
ISO 18064: TPO

TPE-O, i.e. olefin-based thermoplastic elastomers, are used in applications such as automotive bumpers and airbag covers. The rubber component is not crosslinked or only very slightly crosslinked, which is why these materials should be classified more as flexible plastics with high toughness rather than elastomers. The compression set values of these materials tend to be moderate. It is their low-temperature impact strength that is important.

7.1
TPE-O, EPDM/PP compound
ISO 18064: TPO (EPDM+PP)

TPOs with slightly crosslinked or uncrosslinked EPDM rubber are really plasticized resins with excellent low-temperature impact strength. Their elastic behaviour is moderate.

7.2
TPE-O, PP soft, EP reactor blends
ISO 18064: not standardized

Soft PP reactor blends in the Shore A hardness range are creating new application opportunities. Here again, the property profile is more like that of plasticized resins than of elastomers.

7.3
TPE-O, metallocene, TPO elastomer
ISO 18064: not standardized

Metallocene polyethylenes from 50 Shore A but with a very low melting point can be used for modification of polyolefinic materials. Their low solidification temperature gives rise to long cycles. Radiation crosslinking is possible and improves thermal stress resistance, e.g. for cable insulation.
7.4 TPE-O, metallocene-PO, EP/PP blends  
ISO 18064: not standardized  
Trade name: PTS-THERMOFLEX-O

Blends of soft PP reactor blends with PP will replace EPDM/PP grades.

8.0 TPE-V, dynamically crosslinked  
ISO 18064: TPV

The products in this group are also referred to as “dynamic vulcanizes”. They are polymer blends of a thermoplastic material (e.g. PP) and a conventional rubber (e.g. EPDM), which is crosslinked in the extruder during production (dynamic crosslinking) and finely dispersed in the thermoplastic matrix. The smaller the rubber particles are, the better the properties achieved.

This compounding operation can be carried out in one or two stages. In the first stage, a standard internal mixer for rubber can be used.

If the rubber component is highly crosslinked, TPV grades with rubber-like behavior over a wide temperature range are obtained. These products have low to moderate elongation at break and strength. Their elastic behaviour is good and their chemical resistance is better than that of TPS (TPE-S) because of the matrix material used (generally PP).

TPV-EPDM+PP even swells far less than EPDM rubber on account of the PP component.

Partially crosslinked TPVs have higher strength and elongation at break but their compression set behaviour is considerably poorer.

The production process for these dynamic vulcanizes is shown in the following diagram:

8.1 TPE-V, EPDM/PP-V  
ISO 18064: TPV-EPDM+PP  
Trade name: PTS-UNIPRENE

These materials can be obtained from PTS with hardness values ranging from 20 Shore A to 60 Shore D. PTS-UNIPRENE has very little intrinsic color and excellent flow properties. The products are easy to colour.

Food contact grades are available. Depending on the particular grade and requirements, PTS-UNIPRENE can be used as a seal at temperatures of 100-120°C.

Adhesion-modified grades for two-component injection moulding with PA6, PC, PBT and POM/Hostaform are available from PTS. The TPV adhesion-modified grades for POM are patented jointly by TICONA and PTS.
8.2
TPE-V, EPDM/PP-V adhesion-modified grades
ISO 18064: not standardized
Trade name: PTS-THERMOPRENE

PTS-THERMOPRENE-A10:
adhesion-modified for POM/HOSTAFORM.
Patent situation: PTS and TICONA have jointly patented adhesion-modified TPV for HOSTAFORM/POM.

8.3
TPE-V, PO elastomer/PP-V
ISO 18064: not standardized
Trade name: PTS-THERMOPRENE

This TPV family with hardness values between 30 Shore A and 60 Shore D is a new development by PTS. PTS-THERMOPRENE achieves a similar property spectrum to PTS-UNIPRENE (TPV-EPDM+PP), while offering considerably higher production flexibility. It has better sealing properties and, depending on hardness and application requirements, can be used for seals at service temperatures up to 120°C. Injection moulding, extrusion, and cable coating grades can be supplied. Two-component injection moulding with PP is an important market segment, as in 8.1.

8.4
TPE-V, SEEPS/PP-V
ISO 18064: not standardized
Trade name: PTS-THERMOFLEX-V

PTS-THERMOFLEX-V has been on the market since January 2006.

PTS was the first company to launch this unusual TPV, which is produced by dynamic crosslinking of completely new TPS materials and has the best elastic behaviour of all known TPE grades.

Crosslinking takes place in the elastic centre block and the rigid end block, giving rise to previously unattainable properties. Even after 1000 hours at 120°C, the compression set of unannealed materials is still only about 40%. By annealing at 120°C for 24 h, the values can be further improved.

Long-term behaviour at 120°C
9.0
TPE radiation crosslinkable
ISO 16064: not standardized
Trade name: PTS-GAMMAFLEX

Parts produced from these thermoplastic materials are crosslinked by high-energy radiation after moulding.

After crosslinking, these parts no longer exhibit thermoplastic behaviour.

As a result, their chemical resistance and compression set properties are substantially improved.
The dynamic development of thermoplastic elastomers is by no means finished yet.

In the TPS sector, very soft, ultrahigh molecular weight compounds are expected to make a breakthrough as a replacement for foam rubber.

In addition, the dynamically crosslinked PTS-THERMOFLEX-V family with its excellent compression set values, even at 120°C, will be able to replace classic elastomers in many areas.

New block copolymers with an olefinic structure, abbreviated as OBCs, will complement the present range of block copolymers.

Universal-bonding TPEs adhere to both polar and nonpolar thermoplastics. PTS plans to introduce these in the 1st quarter of 2008.

End-block-modified TPS materials offering about twice the strength of existing unfilled grades with the same hardness are being prepared, e.g. for hot water hoses.

Dynamically crosslinked olefin elastomers, O-TPVs, are being added to the range of classic TPV-EPDM/PP grades.

In the TPU sector, the use of DESMOFLEX technology and our partnership with BMS BAYER MATERIAL SCIENCE will generate new, mostly soft, TPU blends that ideally combine the properties of TPU and other thermoplastic elastomers.

With the development of PTS-THERMOPRENE adhesion-modified grades, patented jointly by TICONA and PTS, it is finally possible to produce TPV seals with good adhesion to HOSTAFORM.

Further promising new developments with various TPVs can be expected.

TPVs based on dynamically crosslinked rubbers with low gas permeability and good sealing properties are being developed by PTS.

In 2008, PTS will be launching oil-resistant, crystal-clear thermoplastic elastomers with excellent adhesion to PMMA, PC and SMA.

From autumn 2007, PTS will be able to supply highly transparent TPAs based on RILSAN PA 12.

TPAs produced from RILSAN PA 11, which is based on renewable resources (castor oil), will also be available from PTS in the 4th quarter of 2007.

Radiation crosslinkable thermoplastic elastomers based on TPO, TPC, TPU and TPA are closing the gap between TPEs and Vulcanizes.

PTS is the only TPE producer that can supply the diverse range of materials described here from a single source.
PTS is the **materials specialist** in hard/soft combinations and radiation crosslinking.
Acknowledgement of sources:
This publication contains information and technical contributions from the following companies:

ARKEMA (RILSAN/PEBAX Group)
BMS Bayer Material Science (DESMOPAN Group)
Kraton Polymers
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Teknor Apex
Wacker Chemie

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Our advice does not exempt you from conducting your own checks on our latest advice – particularly our safety data sheets and technical specifications – and on our products, with a view to their suitability for the intended processes and uses.

The application, use and processing of our products and the products manufactured by you on the basis of our technical advice are beyond our control and therefore entirely your own responsibility.

Our products are sold in accordance with the current version of our GENERAL CONDITIONS OF SALE AND DELIVERY.
CREATIVE COMPOUNDS!

- PTS-THERMOFLEX (SEBS/SEPS/SEEPS)
- PTS-UNIFLEX-E (TPE-E)
- PTS-UNIPRENE (TPE-V)
- PTS-THERMOPRENE (TPE-V)
- DESMOFLEX (TPU blends)
- PTS-GAMMAFLEX (TPE) radiation-crosslinkable
- GENIOMER (TPSE) thermoplastic silicone elastomers
- PTS-CREAMID (PA6, PA6.6)
- PTS-CREATEC (PBT)
- V-PTS-CREAMID (PA6, PA6.6) radiation-crosslinkable
- PTS-CREABLEND-A (PC/ABS)
- PTS-CREABLEND-B (PC/PBT)
- PTS-CREABLEND-D (PA/ABS)
- PTS-CREALEN (PP)
- PTS-CREALON (PC)
- COOLPLAST* (heat-conductive polymers)
- PTS-DURAMID® (special high-stiffness polyamides with attractive finish)
- RILSAN (PA11, PA12)
- PEBAX (TPE-A)
- ORGALLOY (PA/PO)
- PANLITE (PC)

- **TIMEOUT**® (cycle accelerator)
- **BETALINK**® (crosslinking booster)
- **FLAMEX**® (flame-retardant concentrate)