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## CERTIFICATES

MOL PETROCHEMICALS



SLOVNAFT



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August 2023

# MOL GROUP POLYMERS FOR AUTOMOTIVE APPLICATIONS



 **MOLGROUP  
CHEMICALS** | Sustainable  
Reliability



# WHY CHOOSE MOL GROUP?

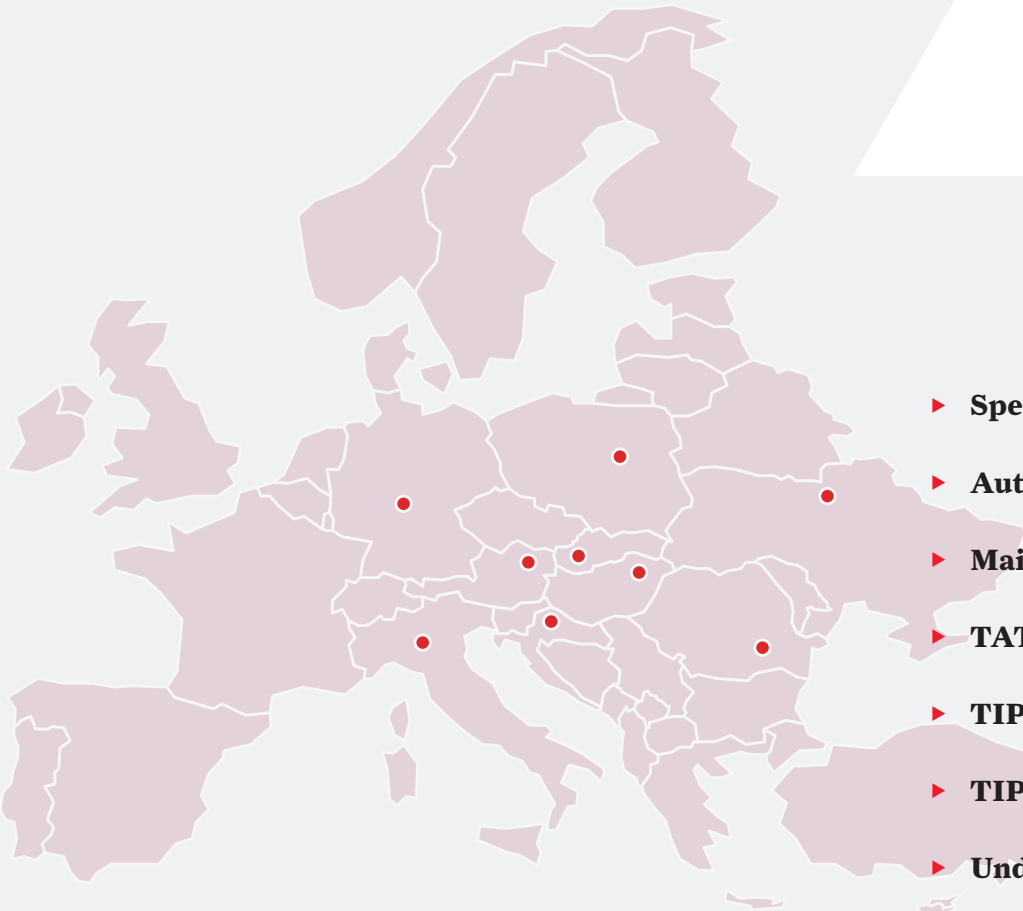
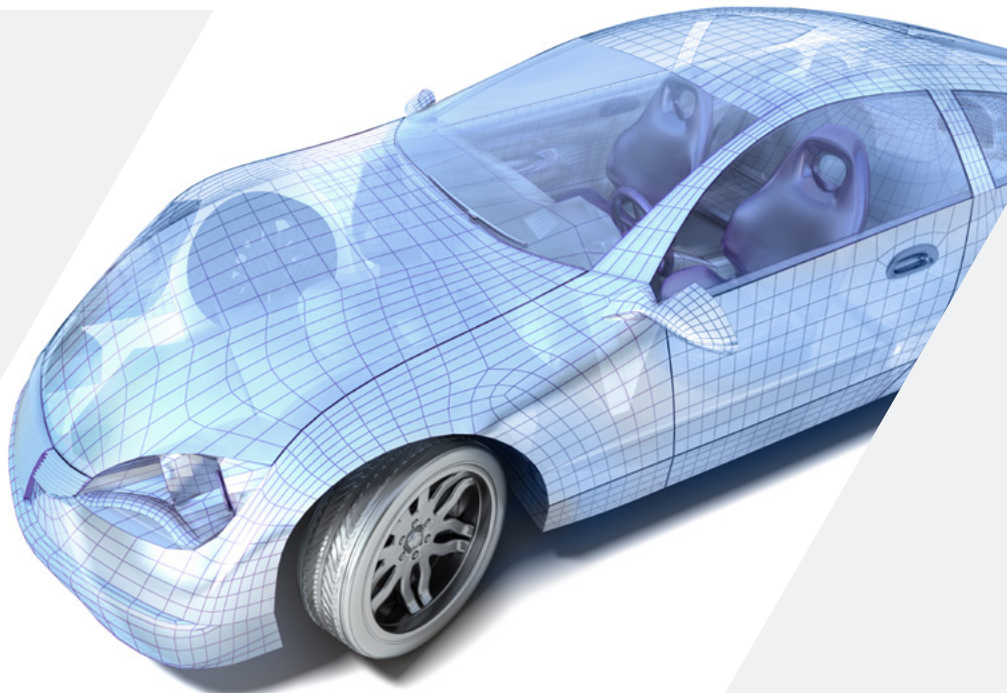
MOL Group is an oil, gas and petrochemicals company. Its petrochemical assets are **integrated** backwards to crude oil, providing **reliability** of supply. We can highly lean on the refinery integration benefits: the secured feedstock supply, the robust financial background and strong position in the regional markets, together with the **high quality** products provided by **state of the art technologies**.

Our vision is to be a **key player** in the **low carbon circular economy** in Central and Eastern Europe, a highly efficient company, providing **sustainable materials** for the economy.

MOL Group aims to

- ▶ convert ~2 mn tons of fuels to more valuable **petrochemical feedstock** by 2030, through investments using highly efficient technologies
- ▶ integrate **circular economy technologies** into its core business, bio and waste-based streams in production and scaling up recycling
- ▶ retain a leading position in traditional Downstream with an accelerated modular transformation to generate attractive return
- ▶ remain among the best refiners in Europe
- ▶ accelerate transformation towards becoming a sustainable chemical company until 2030

**MOL Group** is well represented **in Europe** via its sales offices that are located in Hungary, Slovakia, Austria, Germany, Italy, Poland, Romania, Croatia and Ukraine.



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## HIGH PERFORMANCE



BESIDES REDUCING WEIGHT AND FUEL CONSUMPTION, PLASTICS HAVE MUCH MORE ADVANTAGES FOR THE AUTOMOTIVE INDUSTRY:

- no corrosion, longer vehicle life
- flexible design
- easy integration of components
- functionality and more economic manufacturing
- recyclability

High performance plastics have an increasingly important role in the automotive industry. The light weight of plastics opens the opportunity to reduce more and more fuel consumption. Based on estimations, every 10% reduction in vehicle weight results in a 5–7% reduction in fuel usage. Economic and environmental concerns give top priority to the creation of more fuel efficient vehicles.

# PLASTICS



SPECIALITIES

TYPICAL PROPERTIES, CANNOT BE CONSIDERED AS SPECIFICATION													
Application	Grade/ Parameter	Melt Mass-Flow Rate (MFR) 230°C/2.16 kg	Flexural Modulus¹	Modulus of Elasticity in Tension¹	Tensile Stress at Yield¹	Tensile Strain at Yield¹	Notched Izod Impact Strength at 23°C	Notched Izod Impact Strength at -20°C	HDT (0.45 MPa, flatwise)¹	Hardness Rockwell¹	Hardness Shore D¹	Special features	Additives
	Unit	g/10 min	MPa	MPa	MPa	%	kJ/m²	kJ/m²	°C	R scale	–	–	–
	Test method	ISO 1133-1	ISO 178	ISO 527-1,2	ISO 527-1,2	ISO 527-1,2	ISO 180/A	ISO 180/A	ISO 75-1,2	ISO 2039-2	ISO 868	–	–
Exteriors, like bumper, spoiler, etc.	TATREN TPO 12 76	12	850	900	16.5	13	44²	35²	67	–	50	Narrow MWD, extra high impact strength at minus temperature	NA
Exteriors, like bumper, spoiler, etc.	TATREN TPO 20 77	20	850	900	16.5	12.5	43²	35²	70	–	50	Narrow MWD, extra high impact strength at minus temperature	NA
Interiors, like compounded with glass fibres for dashboard, door panel and central panels	TIPPLEN K 199 TIC	30	1300	1350	24	5	6.4¹	4¹	119	84	–	Narrow MWD, low odour, guaranteed low C-emissions and high flow	NA
Additives: NA Nucleating agent							Notes ¹ Typical properties measured on standard injection moulded test specimen according to ISO 294-1. ² Values have been measured on standard injection moulded specimens prepared in accordance with internal method						



# AUTOMOTIVE COMPOUNDS FROM AURORA KUNSTSTOFFE GMBH

Converting plastic rejects and sprues from different industries into regrinds  
and high-quality compounds

## KEY FACTS AND SUCCESS CRITERIA

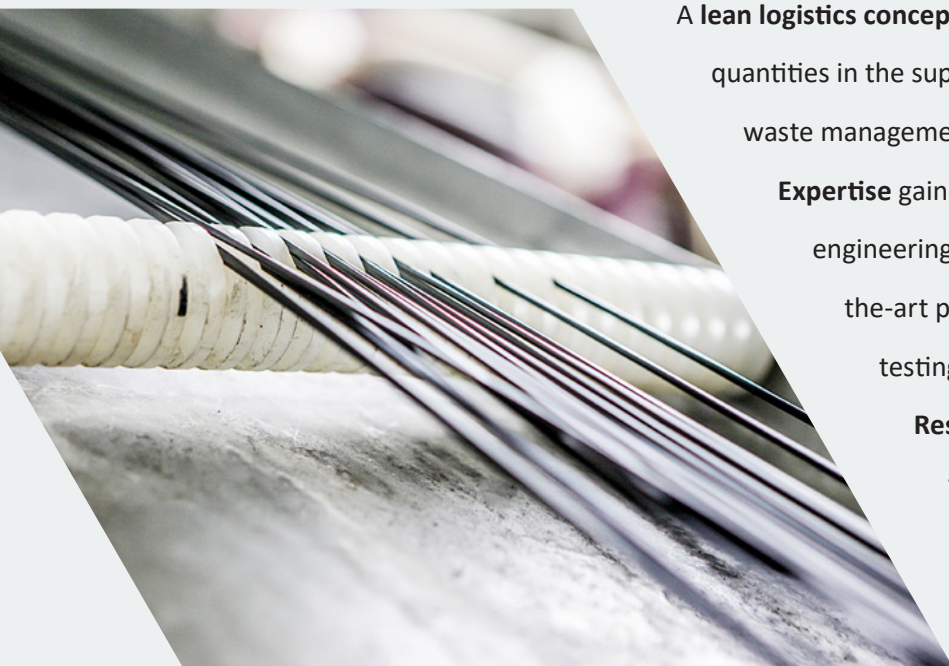
- ▶ Founded in **2009**
- ▶ Member of **MOL Group** since November 2019
- ▶ Three **manufacturing centres** with some 100 employees
- ▶ High-quality, pre-sorted, post-industrial plastic waste from over 300 suppliers as **raw material basis** for supply security over the entire product lifecycle



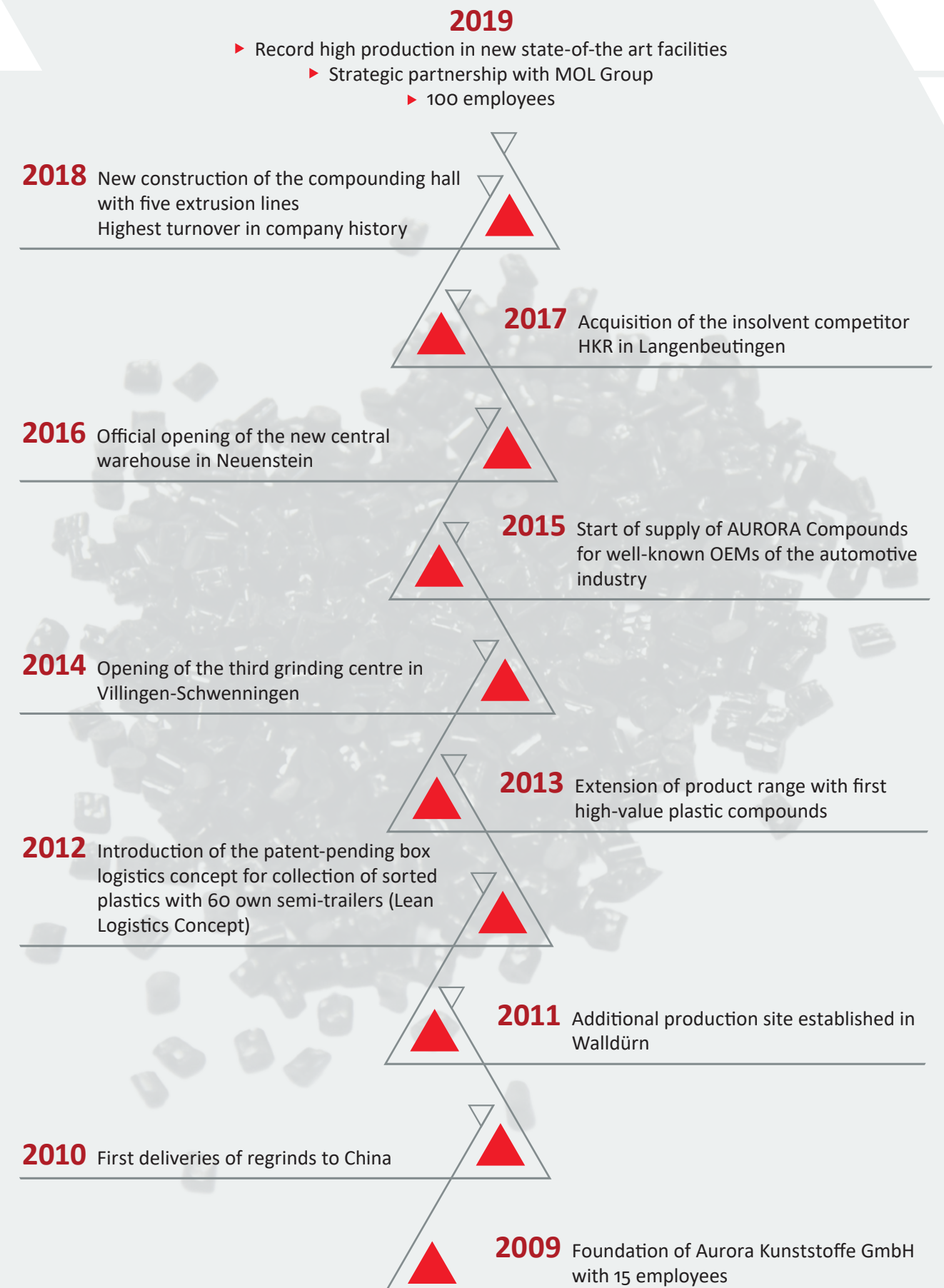
A **lean logistics concept** to ensure the desired quality and quantities in the supply chain and to support our suppliers' waste management

**Expertise** gained from many years of processing engineering plastics supported by new state-of-the-art production and laboratory facilities and testing technology

**Resource-saving and environmentally friendly recycling** with both significant potential for reductions in CO<sub>2</sub> emissions and product quality at virgin material level



## MAIN MILESTONES





## TATREN IM 45 54

### DEVELOPED TO REDUCE COST & WEIGHT

## IMPACT COPOLYMER POLYPROPYLENE FOR IMPROVED PRODUCTIVITY AND REDUCED RAW MATERIAL CONSUMPTION

The new high crystallinity in-reactor PP TATREN IM 45 54 is produced using non-phthalate catalytic system and provides substantial properties to improve sustainability and to reduce costs.

### KEY BENEFITS FOR YOU:

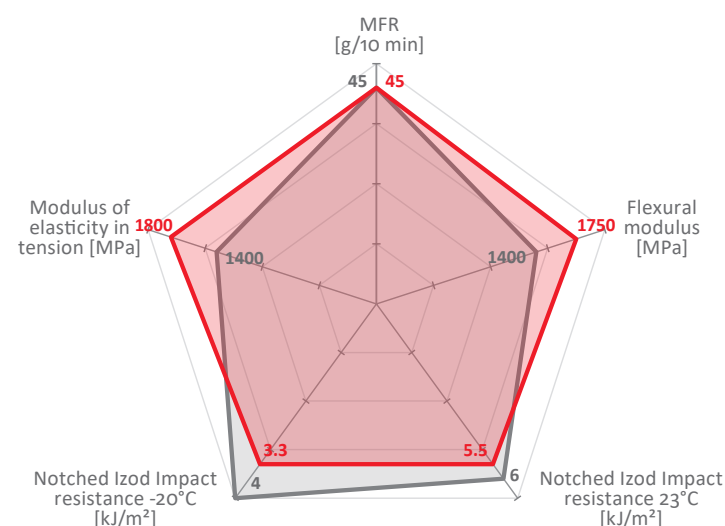
- ▶ Lightweight solution – very high stiffness with potential for reducing mineral filler during compounding
- ▶ Excellent stiffness/impact balance with potential for wall thickness reduction
- ▶ High crystallisation temperature (T<sub>c</sub>) to reduce cycle time



## LIGHTWEIGHT SOLUTION

### Excellent stiffness/impact balance

PP TATREN IM 45 54 is characterised by very high stiffness and good impact resistance. Outstanding stiffness over conventional PP COPO brings opportunity for **lightweight** solutions.



■ TATREN IM 45 54 ■ Competitive PP COPO MFR 45

## TIPOLEN FD 244-55

### LDPE FOR FOAM EXTRUSION

## NEW LDPE COPOLYMER GRADE DESIGNED FOR CROSSLINKED FOAM EXTRUSION

### KEY FEATURES:

- ▶ Recommended for all types of foams, produced with chemical blowing agents or physical gases
- ▶ Suitable for crosslinked and non-crosslinked foams



### KEY BENEFITS FOR YOU COMPARED TO GENERAL PURPOSE LDPE GRADES:

- ▶ Increased and narrower MFR range  
→ **issue-free processability** at high extrusion output
- ▶ Lower friction heat generated due to co-monomer content  
→ **higher extruder output**
- ▶ Increased unsaturated carbon bond numbers  
→ **higher strength** and homogenous cell wall
  - **Better** surface **smoothness** of the end-product
  - **Higher gloss** of the foam surface
  - **More homogeneous** structure of foam cells
- ▶ **Stiffer foams**

### MAIN AUTOMOTIVE APPLICATIONS:

- ▶ Automotive sound and heat insulation, interior trim
- ▶ Automotive sealing

# TIPELIN BS 502-43

## HIGH PERFORMANCE UNIMODAL HDPE

grade for managing recyclability requirements (PCR/PIR)

IMPROVED HEAT AND COLOUR STABILITY  
SIMPLIFIES ECONOMICAL POST-CONSUMER (PCR)  
OR POST-INDUSTRIAL (PIR) RECYCLING AND  
SUPPORTS MULTIPLE RECYCLING PROCESSES

### Targeted applications:

- ▶ Air ducts and other automotive applications
- ▶ Blow moulded products where high recycling ratio is used

### Key benefits for you:

- ▶ The improved additive package for the grades allows **own recycled ratio of up to 80%**.
- ▶ High Oxidation Induction Time (OIT) values reflect the **long-term stability** of these grades/rHDPE blends made thereof under demanding conditions, as well as their potential for multiple use in the recycling loop.
- ▶ High Quality Blends with rHDPE shares of more than 30% are possible. (\*)
- ▶ Improved machine utilisation and reduction of off-spec production in stop-and-go operation. Effective extruder cleaning to reduce black/brown spots caused by burned particles after production restarts. (Waste reduction could be achieved by up to 75 wt.% at stop-and-go operation model.)
- ▶ More aesthetic product: smoother inner/outer surface.
- ▶ Less die deposits phenomena, resulting in lower cleaning cost and higher process utilisation
- ▶ Less polymer degradation and less smoke during processing means polymer properties remain longer in final product

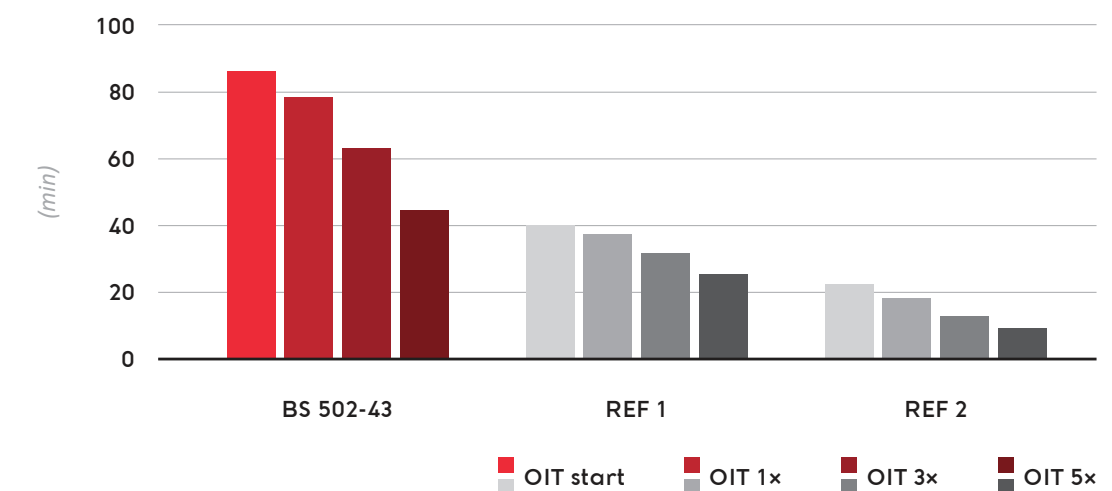
(\*) The actual rHDPE share of a blend is dependent on the quality of the recycled material and on the design of the final product.

## SOLUTION SUPPORTING CIRCULAR ECONOMY

### Thermo-oxidative stability in multiply extrusion

Due to their higher OIT values the polymer chains of TIPELIN BS 502-43 are protected against the negative effects of high temperatures combined with oxygen — even if more recycling loops are applied or a higher own recycled ratio (more than 30%). The material copes with repeated recycling without quality deterioration — offering a production opportunity of an environmental tax-free product.

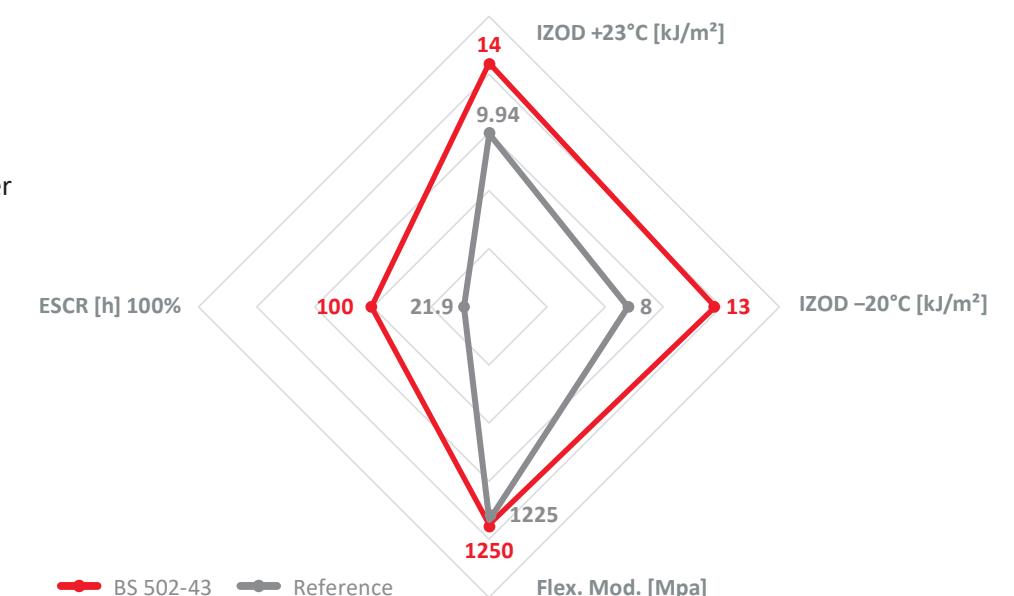
Oxidative induction time trend (OIT 200°C) – in multiply extrusion [min.]



## LIGHTWEIGHT SOLUTION

### Excellent stiffness / impact balance

Compared to other unimodal market references the TIPELIN BS 502-43 shows a much better stiffness/impact balance. This enables a downgauging opportunity and the reduction of plastics used.



# UNDER-THE-HOOD / SMALL TANKS FROM HDPE

TYPICAL PROPERTIES, CANNOT BE CONSIDERED AS SPECIFICATION															
	Grade/ Parameter	Melt Mass-Flow Rate (MFR)	Density 23°C <sup>4</sup>	Tensile Stress at Yield <sup>4</sup>	Tensile Strain at Yield <sup>4</sup>	Tensile Stress at Break <sup>4</sup>	Tensile Strain at Break <sup>4</sup>	Flexural Modulus <sup>4</sup>	Notched Izod Impact Strength <sup>4</sup>	Vicat Softening Temperature <sup>4</sup>	Shore D Hardness <sup>4</sup>	ESCR F50 B method	OIT 200°C	Application	Processing technology
	Unit	g/10 min	kg/m <sup>3</sup>	MPa	%	MPa	%	MPa	kJ/m <sup>2</sup>	°C	–	h	min	–	–
	Test method	ISO 1133-1	ISO 1183-2	ISO 527-3	ISO 527-3	ISO 527-3	ISO 527-3	ISO 178	ISO 180/A	ISO 306/A120	ISO 868	ASTM D 1693	EN 728	–	–
Bimodal	TIPELIN 6301B	0.30 <sup>1</sup> 1.3 <sup>2</sup> 30 <sup>3</sup>	954	29	10	29	1110	1500	8	128	65	300 <sup>6</sup>	105	Tanks for non-aggressive chemicals with heat load resistance	Blow moulding
	TIPELIN BA 550-13	0.35 <sup>1</sup> 1.5 <sup>2</sup> 28 <sup>3</sup>	954	29	11	–	1180	1500	14	130	65	40 <sup>5</sup>	8	Tanks for non-aggressive chemicals, oils; <b>homologated at OEM</b>	Blow moulding
Unimodal	TIPELIN BS 502-43	0.2 <sup>1</sup> 0.76 <sup>2</sup> 19 <sup>3</sup>	950	26	12	25	1300	1250	14	129	62	100 <sup>5</sup>	90	Airducks, tanks for non-aggressive chemicals, oils	Blow moulding
	TIPELIN 6000B	0.30 <sup>1</sup> 1.3 <sup>2</sup> 30 <sup>3</sup>	958	31	10	20	1100	1650	9	129	65	150 <sup>6</sup>	30	Thin walled tanks; <b>homologated at OEM</b>	Blow moulding, Injection moulding/ welding
Bimodal	TIPELIN 6010B	0.30 <sup>1</sup> 1.3 <sup>2</sup> 30 <sup>3</sup>	958	30	10	20	1080	1750	8	126	66	150 <sup>6</sup>	90	Thin wall tanks with long-term colour stability	Blow moulding
								<b>Notes:</b> <sup>1</sup> MFR at 190°C and 2.16 kg <sup>2</sup> MFR at 190°C and 5 kg <sup>3</sup> MFR at 190°C and 21.6 kg <sup>4</sup> Values have been measured on standard pressed specimens (ISO 293) conditioned at room temperature (ISO 291) <sup>5</sup> Values have been measured in 100% Igepal CO-630 on standard pressed specimens (ISO 293) conditioned at room temperature (ISO 291) <sup>6</sup> Values have been measured in 10% Igepal CO-630 on standard pressed specimens (ISO 293) conditioned at room temperature (ISO 291)							





UNDER-THE-HOOD /  
SMALL TANKS FROM PP

TYPICAL PROPERTIES, CANNOT BE CONSIDERED AS SPECIFICATION													
Material Description	Grade/ Parameter	Melt Mass-Flow Rate (MFR) 230°C / 2.16 kg	Flexural Modulus <sup>1</sup>	Modulus of Elasticity in Tension <sup>1</sup>	Tensile Stress at Yield <sup>1</sup>	Tensile Strain at Yield <sup>1</sup>	Notched Izod Impact Strength at 23°C <sup>1</sup>	Notched Izod Impact Strength at -20°C <sup>1</sup>	HDT (0.45 MPa, flatwise) <sup>1</sup>	Hardness Rockwell <sup>1</sup>	Special features	Additives	Processing technologies
	Unit	g/10 min	MPa	MPa	MPa	%	kJ/m²	kJ/m²	°C	R scale	–	–	–
	Test method	ISO 1133-1	ISO 178	ISO 527-1,2	ISO 527-1,2	ISO 527-1,2	ISO 180/A	ISO 180/A	ISO 75-1,2	ISO 2039-2	–	–	–
Homopolymer	TIPPLEN H 880	0.25	1950	1750	40	11	9	–	130	93	Excellent long-term heat stability, reactor grade; <b>homologated at OEM for coolant expansion tank and degassing tank</b>	SA	Injection moulding/ welding, extrusion blow moulding
Block Copolymer	TIPPLEN K 880	0.35	1500	1400	28	10	49	8.5	120	76	Excellent heat and detergent resistance, very high impact strength; reactor grade	SA	Injection moulding/ welding, extrusion blow moulding
Additives: SA Slip agent								Notes: ¹ Typical properties measured on standard injection moulded test specimen according to ISO 294-1					



# UNDER-THE-HOOD /

## CORRUGATED PIPES FOR CABLE PROTECTION FROM PP BLOCK COPOLYMER

TYPICAL PROPERTIES, CANNOT BE CONSIDERED AS SPECIFICATION											
Grade/ Parameter	Melt Mass - Flow Rate (MFR) 230°C/2.16 kg	Flexural Modulus <sup>1</sup>	Modulus of Elasticity in Tension <sup>1</sup>	Tensile Stress at Yield <sup>1</sup>	Tensile Strain at Yield <sup>1</sup>	Notched Izod Impact Strength at 23°C <sup>1</sup>	Notched Izod Impact Strength at -20°C <sup>1</sup>	HDT (0.45 MPa, flatwise) <sup>1</sup>	Hardness Rockwell <sup>1</sup>	Special features	Additives
Unit	g/10 min	MPa	MPa	MPa	%	kJ/m²	kJ/m²	°C	R scale	–	–
Test method	ISO 1133-1	ISO 178	ISO 527-1,2	ISO 527-1,2	ISO 527-1,2	ISO 180/A	ISO 180/A	ISO 75-1,2	ISO 2039-2	–	–
TIPPLEN K 880	0.35	1500	1400	28	10	49	8.5	120	76	High impact strength and stiffness; reactor grade	SA
TIPPLEN K 691	1.3	1500	1450	27	6	43	8	126	82	High impact strength and stiffness; reactor grade	SA, NA
TIPPLEN K 693	2.0	1500	1380	26	7	20	6.5	115	79	High impact strength and stiffness; reactor grade	SA
<b>Additives:</b> SA Slip agent NA Nucleating agent						<b>Notes:</b> <sup>1</sup> Typical properties measured on standard injection moulded test specimen according to ISO 294-1					





UNDER-THE-HOOD /  
AIR DUCTS FROM HDPE

TYPICAL PROPERTIES, CANNOT BE CONSIDERED AS SPECIFICATION														
Material Description	Grade/ Parameter	Melt Mass-Flow Rate (MFR)	Density 23°C <sup>4</sup>	Tensile Stress at Yield <sup>4</sup>	Tensile Strain at Yield <sup>4</sup>	Tensile Stress at Break <sup>4</sup>	Tensile Strain at Break <sup>4</sup>	Flexural Modulus <sup>4</sup>	Notched Izod Impact Strength <sup>4</sup>	Vicat Softening Temperature <sup>4</sup>	Shore D Hardness <sup>4</sup>	ESCR F50 B method	OIT 200°C	Application
	Unit	g/10 min	kg/m³	MPa	%	MPa	%	MPa	kJ/m²	°C	–	h	min	–
	Test method	ISO 1133-1	ISO 1183-2	ISO 527-3	ISO 527-3	ISO 527-3	ISO 527-3	ISO 178	ISO 180/A	ISO 306/ A120	ISO 868	ASTM D 1693	EN 728	–
Unimodal	TIPELIN BS 520-14	0.10 <sup>1</sup> 0.45 <sup>2</sup> 10 <sup>3</sup>	952	28	12	34	1500	1400	24	130	65	260 <sup>5</sup>	40	Air ducts
	TIPELIN BA 550-13	0.35 <sup>1</sup> 1.5 <sup>2</sup> 28 <sup>3</sup>	954	29	11	–	1180	1500	14	130	65	40 <sup>5</sup>	8	
	TIPELIN BS 502-43	0.2 <sup>1</sup> 0.76 <sup>2</sup> 19 <sup>3</sup>	950	26	12	25	1300	1250	14	129	62	100 <sup>5</sup>	90	
Bimodal	TIPELIN 6000B	0.30 <sup>1</sup> 1.3 <sup>2</sup> 30 <sup>3</sup>	958	31	10	20	1100	1650	9	129	65	150 <sup>6</sup>	30	
	TIPELIN 6010B	0.30 <sup>1</sup> 1.3 <sup>2</sup> 30 <sup>3</sup>	958	30	10	20	1080	1750	8	126	66	150 <sup>6</sup>	90	
	TIPELIN 6301B	0.30 <sup>1</sup> 1.3 <sup>2</sup> 30 <sup>3</sup>	954	29	10	20	1010	1500	8	128	65	300 <sup>6</sup>	105	
								<b>Notes:</b> <sup>1</sup> MFR at 190°C and 2.16 kg <sup>2</sup> MFR at 190°C and 5 kg <sup>3</sup> MFR at 190°C and 21.6 kg <sup>4</sup> Values have been measured on standard pressed specimens (ISO 293) conditioned at room temperature (ISO 291) <sup>5</sup> Values have been measured in 100% Igepal CO-630 on standard pressed specimens (ISO 293) conditioned at room temperature (ISO 291) <sup>6</sup> Values have been measured in 10% Igepal CO-630 on standard pressed specimens (ISO 293) conditioned at room temperature (ISO 291)						



# UNDER-THE-HOOD / BATTERY CASES FROM PP

TYPICAL PROPERTIES, CANNOT BE CONSIDERED AS SPECIFICATION											
Grade/ Parameter	Melt Mass - Flow Rate (MFR) 230°C/2.16 kg	Flexural Modulus <sup>1</sup>	Modulus of Elasticity in Tension <sup>1</sup>	Tensile Stress at Yield <sup>1</sup>	Tensile Strain at Yield <sup>1</sup>	Notched Izod Impact Strength at 23°C <sup>1</sup>	Notched Izod Impact Strength at -20°C <sup>1</sup>	HDT (0.45 MPa, flatwise) <sup>1</sup>	Hardness Rockwell <sup>1</sup>	Special features	Additives
Unit	g/10 min	MPa	MPa	MPa	%	kJ/m²	kJ/m²	°C	R scale	–	–
Test method	ISO 1133-1	ISO 178	ISO 527-1,2	ISO 527-1,2	ISO 527-1,2	ISO 180/A	ISO 180/A	ISO 75-1,2	ISO 2039-2	–	–
TATREN IM 6 56	6.0	1530	1530	27	6.5	10	4.5	95	89	Excellent long-term heat stability, high stiffness and good impact resistance; reactor grade	AS
TIPPLEN K 499	6.5	1300	1300	25	6	16	7	107	83	Excellent resistance to heat and chemicals; reactor grade	SA
<b>Additives</b> SA Slip agent AS Antistatic agent						<b>Notes</b> <sup>1</sup> Typical properties measured on standard injection moulded test specimen according to ISO 294-1					





# INTERIOR & UNDER-THE-HOOD / FOAMS FROM PP RANDOM COPOLYMER

TYPICAL PROPERTIES, CANNOT BE CONSIDERED AS SPECIFICATION

Grade/ Parameter	Melt Mass -Flow Rate (MFR) 230°C/2.16 kg	Melting Temperature	Crystallization Temperature	Flexural Modulus <sup>1</sup>	Modulus of Elasticity in Tension <sup>1</sup>	Tensile Stress at Yield <sup>1</sup>	Tensile Strain at Yield <sup>1</sup>	Notched Izod Impact Strength at 23°C <sup>1</sup>	HDT (0.45 MPa, flatwise) <sup>1</sup>	Hardness Rockwell <sup>1</sup>
Unit	g/10 min	°C	°C	MPa	MPa	MPa	%	kJ/m²	°C	R scale
Test method	ISO 1133-1	ISO 11357-3	ISO 11357-3	ISO 178	ISO 527-1,2	ISO 527-1,2	ISO 527-1,2	ISO 180/A	ISO 75-1,2	ISO 2039-2
TIPPLEN R 780	0.50	143	98	1050	1000	29	13	18	95	75

# INTERIOR & UNDER-THE-HOOD / FOAMS FROM LDPE

TYPICAL PROPERTIES, CANNOT BE CONSIDERED AS SPECIFICATION

Grade/ Parameter	Melt Mass - Flow Rate (MFR) 190°C/2.16 kg	Density (23°C) <sup>2</sup>	Vicat Softening Temperature	Melting Temperature	Crystallization Temperature
Unit	g/10 min	kg/m³	°C	°C	°C
Test method	ISO 1133-1	ISO 1183-1	ISO 306/A 50	ISO 11357-3	ISO 11357-3
BRALEN+ FB 2-16	2.0	923	93 <sup>1</sup>	112	97
TIPOLEN FC 243-51	2.0	922	94 <sup>2</sup>	112	97
BRALEN+ FB 4-31	4.0	922	91 <sup>1</sup>	111	97
TIPOLEN FD 243-51	4.0	922	92 <sup>2</sup>	112	97
<b>Notes</b> <sup>1</sup> Typical properties measured on standard injection moulded test specimen according to ISO 294-1 <sup>2</sup> Typical properties measured on standard pressed specimens according to ISO 293					

# INTERIOR & EXTERIOR / INJECTION MOULDING AND COMPOUNDING

TYPICAL PROPERTIES, CANNOT BE CONSIDERED AS SPECIFICATION													
Material Description	Grade/Parameter	Melt Mass-Flow Rate (MFR) 230°C/2.16 kg	Flexural Modulus¹	Modulus of Elasticity in Tension¹	Tensile Stress at Yield¹	Tensile Strain at Yield¹	Notched Izod Impact Strength at 23°C¹	Notched Izod Impact Strength at -20°C¹	HDT (0.45 MPa, flatwise)¹	Hardness Rockwell¹	Hardness Shore D¹	Special features	Additives
	Unit	g/10 min	MPa	MPa	MPa	%	kJ/m²	kJ/m²	°C	R scale		–	–
	Test method	ISO 1133-1	ISO 178	ISO 527-1,2	ISO 527-1,2	ISO 527-1,2	ISO 180/A	–	ISO 75-1,2	ISO 2039/2	ISO 868	–	–
PP-Homopolymer	TATREN HT 25 11	25	1450	1550	33	10	3	–	78	101	–	Controlled rheology, narrow molecular distribution	AGF
	TATREN HM 50 46	50	1850	1900	36.5	8	3	–	100	106	–	High stiffness, controlled rheology	NA, AS
PP-Impact Copolymer	TIPPLEN K 597	4.0	1100	1100	22	6.3	50	8	104	70	–	High Izod impact resistance; reactor grade	SA
	TATREN IM 12 59	12	1500	1500	24.5	5	11.5	5.5	92	78	–	Well balanced stiffness and impact resistance; reactor grade	NA
	TATREN IM 15 79	15	1050	1100	20	10	43²	6.5²	74	–	55	High cold Impact, reduction of mineral filler, controlled rheology	NA, AS
	TATREN IM 22 63	22	1300	1350	23.5	5.5	10	5	84	76	–	Well balanced stiffness and impact resistance, controlled rheology	NA, AS
	TATREN IM 25 75	25	1100	1150	20	6	40²	6²	80	55	–	High cold impact - reduction of mineral filler, controlled rheology	NA, AS
	TIPPLEN K 948	45	1270	1400	24	4.5	6	4	120	83	–	Low C-emission; reactor grade	NA
	TATREN IM 55 80	55	1450	1400	23	4	7	4	92	83	–	Higher flowability; reactor grade	NA, AS
	TATREN IM 75 81	75	1400	1400	23	4	6	4	92	83	–	Higher flowability; reactor grade	NA, AS
	TATREN IM 100 85	100	1350	1400	23	4	4.5	3	92	80	–	Higher flowability; reactor grade	NA, AS
<b>Additives:</b> NA Nucleating agent AS Antistatic agent SA Slip agent AGF Anti gas fading							<b>Notes</b> ¹ Typical properties measured on standard injection moulded test specimen according to ISO 294-1. ² Values have been measured on standard injection moulded specimens prepared in accordance with internal method						





# TIPELIN BS 450-27

## HDPE FOR PLASTIC FUEL TANK APPLICATION

### UNIMODAL HDPE CO-POLYMER GRADE DESIGNED FOR EXTERNAL LAYERS OF MULTILAYER PLASTIC FUEL TANKS

- ▶ Excellent fuel ageing
- ▶ Outstanding chemical resistance
- ▶ Cold impact strength even with decreased wall thickness
- ▶ Very low transmission rates
- ▶ Homologated grade by OEM for fuel tank application

#### PROCESSING

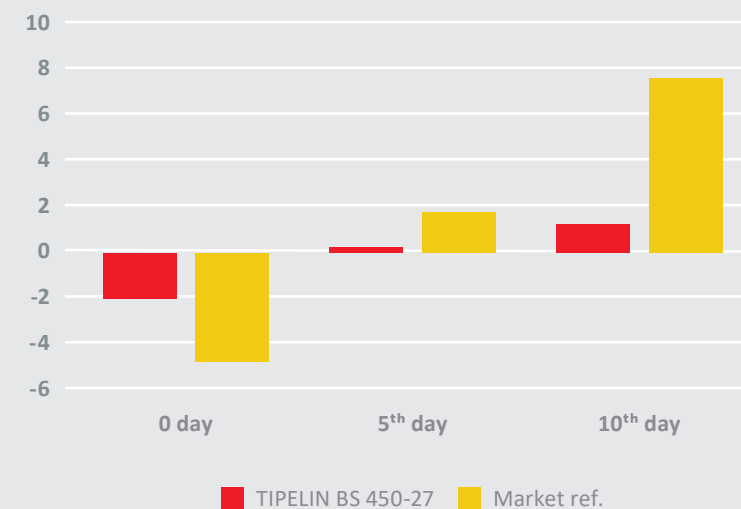
- ▶ Extrusion
- ▶ Blow moulding
- ▶ Thermoforming



### EXTENDED LIFE CYCLE OF FUEL TANK

#### Strong additivation

Oven test – ASTM D 3012  
Changes in yellowness index



Changes in Yellowness Index over-perform market reference due to the strong additivation. This can help in **extending the life cycle of the fuel tank** and also **supports the combination of TIPELIN BS 450-27 with rHDPE**.

### LIGHTWEIGHT SOLUTION

#### Outstanding impact and tensile properties

Outstanding impact and tensile properties increase the safety of the final product. Outstanding stiffness enables the **decrease of wall thickness of the fuel tank** which is in line with the light-weighting efforts of the industry.

