

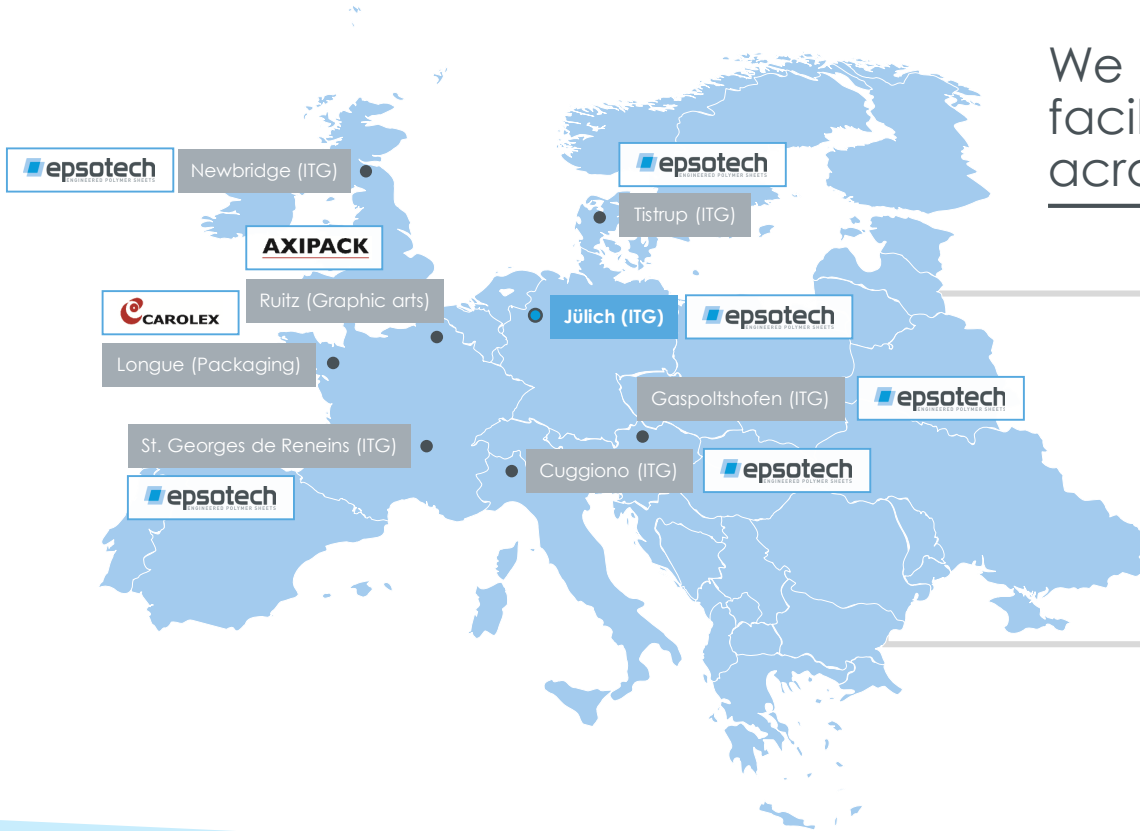


**Polymères innovants et recyclables  
dédiés aux intérieurs de TRAINS**

**Alternative pour la réduction de Poids**

26th November 2019

We have eight production facilities covering markets across Europe and the world



**Headquarters:**  
Jülich (Germany)

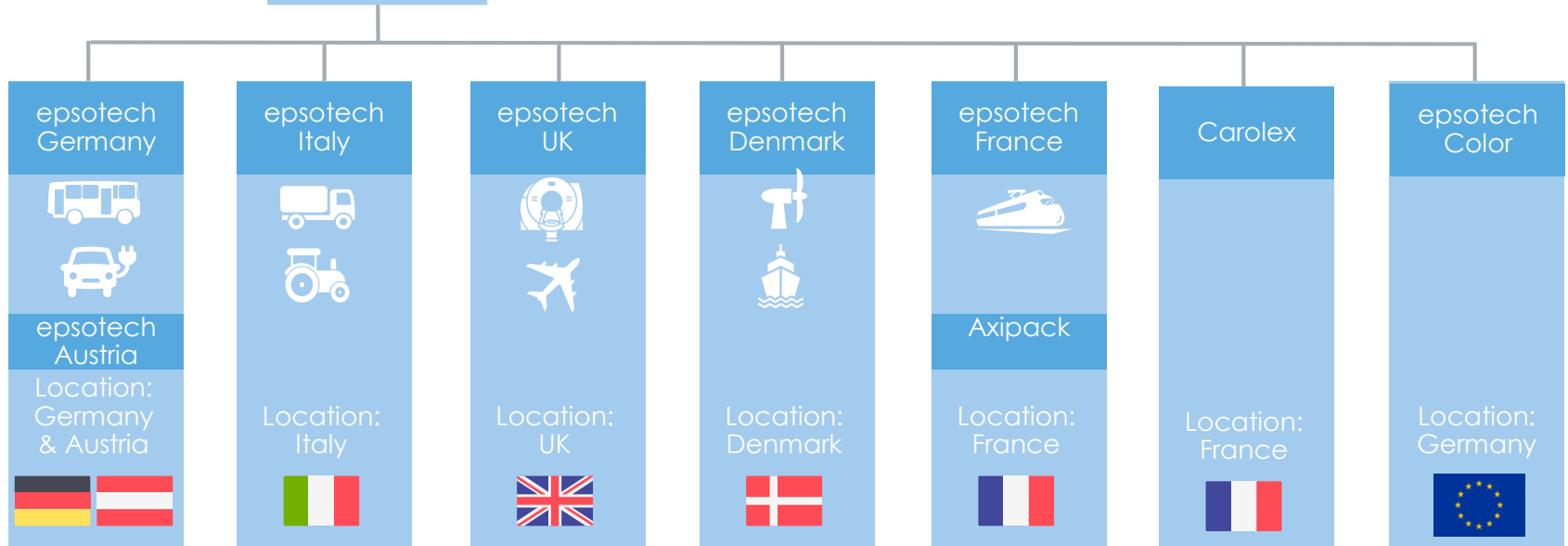


**620**  
employees

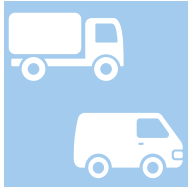
\*Note: ITG = Industrial thick gauge

epsotech  
Holding  
GmbH

epsotech is structured as follows:



We have specific competency centers with a depth of insight and application know-how



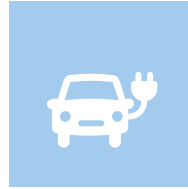
Trucks and vans



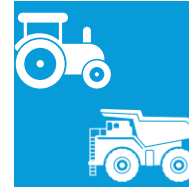
Busses



Caravans /  
Motorhomes



E-mobility



Agricultural  
vehicle and Earth  
moving machines



Aerospace



Marine and  
offshore



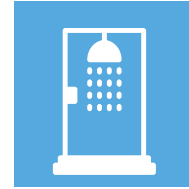
Medical



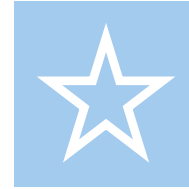
Railway



Wall protection



Sanitary



Special

All types of transportation with special expertise in the **Railway Vehicles**



Automotive /  
Mass Transportation

 **epsotech**  
ENGINEERED POLYMER SHEETS

We focus on the following four main business areas



Industrial

 **epsotech**  
ENGINEERED POLYMER SHEETS



Building /  
Construction

 **epsotech**  
ENGINEERED POLYMER SHEETS



Packaging /  
Graphic Arts

 **CAROLEX / AXIPACK**



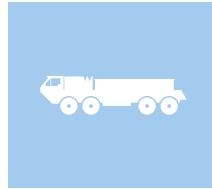
## Automotive / Mass Transportation



## Market segments



Train



Military Vehicle



Emergency  
Vehicle



Caravans /  
Motorhomes



Heavy  
Transport /  
Mining



Bus



Aircraft



Agriculture  
Vehicle



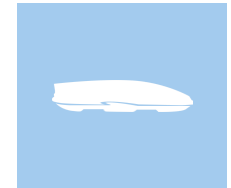
Car



Truck



Marine



Roof Boxes

## Les principaux types de matériaux utilisés en intérieurs

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- Le Metal
- Le Polyester renforcé fibres de verre
- Les thermoplastiques: injectés ou thermoformés

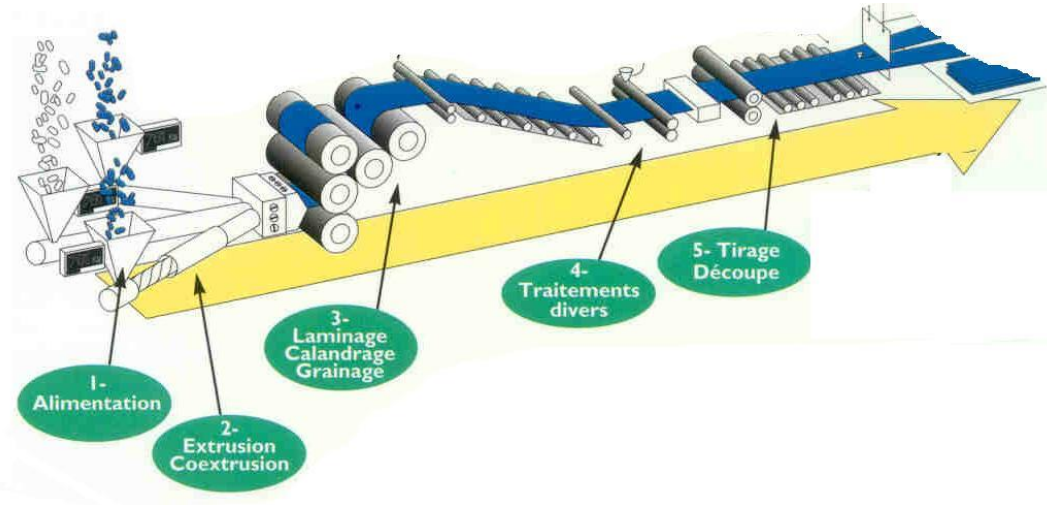
## Qu'est ce que le Thermoformage?

---

- Le thermoformage consiste à chauffer des plaques thermoplastiques et à les conformer sur des moules aluminium régulés, avec de nombreux trous d'aspiration.
- Les plaques sont extrudées à partir de polymères techniques thermoplastiques: ce qui signifie qu'ils peuvent être recyclés en étant re-fondus.
- Le thermoformage s'adresse à des pièces moyennes ou de grandes dimensions dans des petites ou moyenne série.
- Les rebuts de productions, les pièces en fin de vie peuvent être broyées et ré extrudées pour faire de nouvelles plaques et donc de nouvelles pièces.



# Extrusion- PRINCIPES



Full polymer range

Full colour range

Colour consistency,  
UV stabilised

Impact resistance and  
stiffness to suit application

Chemical resistant

Scratch resistant

Flame retardant

Easily formable

Several textures available

Soft feel available

Ability to meet and follow  
legislation requirements

epsotech works with a wide range of material  
that offers **multiple colours** & attributes

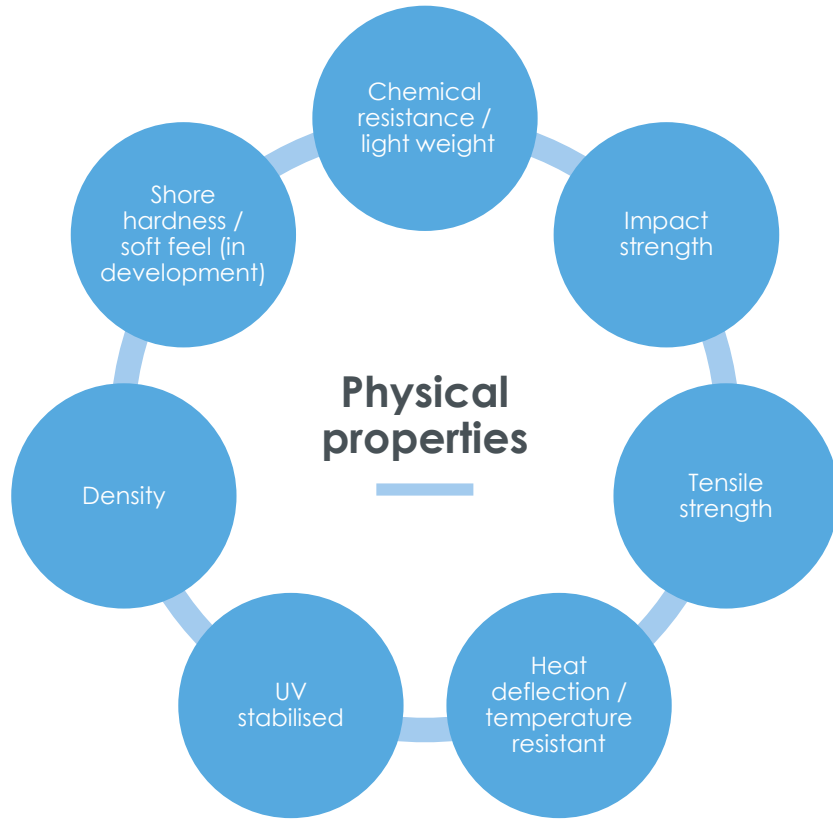
### Extra performance

PP railway material  
PC / ABS railway  
material  
PMMA  
PC

ASA  
TPU  
HDPE  
PP  
PVC

### Performance

*Styrenics:*  
SAN  
ABS  
HIPS

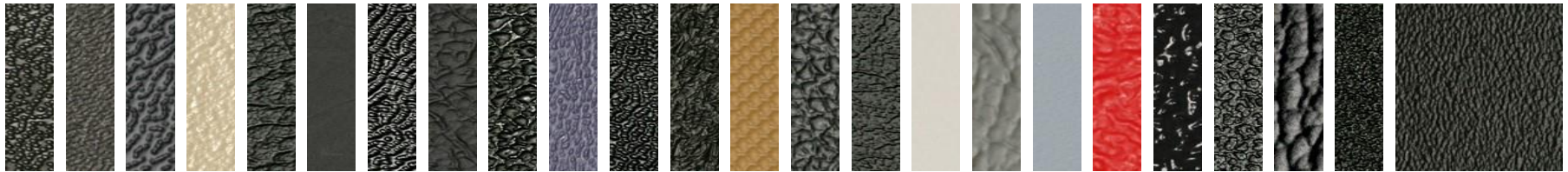
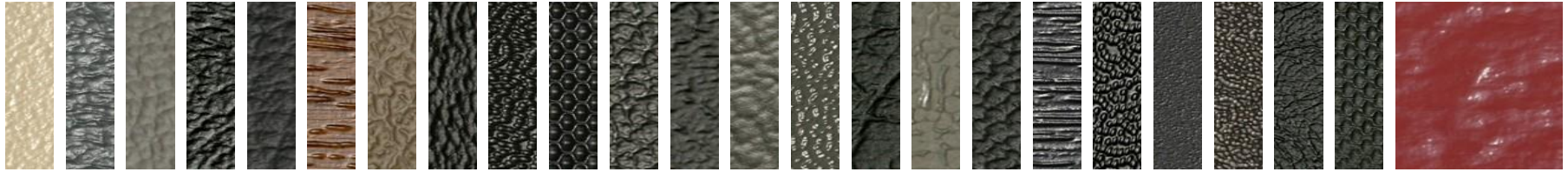


Components can be created to cover a range of required specifications

---

Widest choice of textures in the industry  
depending of the Raw material + Possibility to  
design your ow emboss

---



# Thermoformage- PRINCIPES

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# There are many advantages to using thermoformed parts



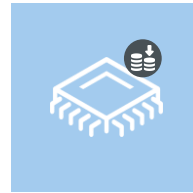
**Weight saving**



Tailor made to  
**customer specifications**



**Cost effective**  
versus **alternative materials**



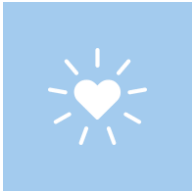
**Cost effective**  
versus **alternative technologies**



**Cost effective** over  
**lower production volumes**



Range of **textures**  
versus **GRP and aluminium**



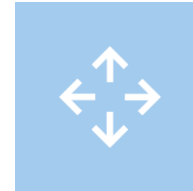
**Long life** and  
durable



**Recyclable**  
and clean



Easy to  
**engineer**



**Easy to change**  
and adapt designs






























**Easy to integrate** into  
production process

# Polymer Sheets VS GRP




























	Polymer Sheets	Rate	GRP	Rate	
<b>Technical Performance</b>	Impact	Very wide range of impact performance possible	★★★★★	Moderate, gel coat less robust	★★★★★
	Rigidity	Reinforcement by backside composite	★★★★★	Rigid, but thick	★★★★★
	Wall thickness	Repeatable, designed in to part, compensation by mould design	★★★★★	Has to be constantly monitored	★★★★★
	Dimensional tolerance	Repeatable, CAD designed and machined mould	★★★★★	Manual construction, challenging	★★★★★
	Burning Behaviour	Can meet the widest range of standards - ECE R118 annex 8, V0, 5VA, FAR, halogen/non-halogen, etc.	★★★★★	Is thermoset, but difficult to optimise	★★★★★
	Surface performance - chemical resistance	Chemical resistance by the main polymer or by co-extrusion - PP, PVC, ASA, PMMA, etc.	★★★★★	Dependant on gel coat tolerance and integrity	★★★★★
	Surface performance - weatherability	Adaptable to requirement, colour stabilisation and full weather resistance	★★★★★	Dependant on gel coat tolerance and integrity	★★★★★
<b>Design</b>	Complexity of part	Very complex shapes possible, including twin-sheeting	★★★★★	Simple parts only, but can reinforce areas of part	★★★★★
	Surface design	Most surface designs possible	★★★★★	Gelcoat or painted, limited options	★★★★★
	Surface feel	Soft-touch super-matt to high scratch-resistant gloss	★★★★★	Gelcoat or painted, limited options	★★★★★
	Integration as composite component	LFI/RIM, lamination, co-extrusion	★★★★★	Integration unlikely as a composite	★★★★★
	Further fabrication enhancements	Twin sheet, welding, gluing	★★★★★	Limited fabrication add-ons after laying up	★★★★★
	Lead time to support new project	6-8 weeks	★★★★★	6-8 weeks	★★★★★
<b>Production Cost</b>	Materials	Good	★★★★★	Similar to sheet	★★★★★
	Labour	Very short cycle times in vacuum forming - single minutes per part	★★★★★	Very slow, hours	★★★★★
	Energy	Just the vacuum forming cycle - low energy to soften, form, cool	★★★★★	Fume extraction, mixing	★★★★★
	Scale	Few parts to thousands low cost improving with volume, can semi-automate forming and trimming	★★★★★	Single parts to low volume, flat cost per moulding	★★★★★
	Quality	Very repeatable, high quality, ready finished	★★★★★	Frequent gelcoat defects/repairs	★★★★★
	Mould cost	Typically only need 1 mould per part	★★★★★	May need multiple moulds for parallel production /higher volumes	★★★★★
<b>Environmental</b>	Scraps recyclability	Nearly always recyclable	★★★★★	Not recyclable	★★★★★
	End of life recyclability	Usually recyclable	★★★★★	Not recyclable	★★★★★
	Lightweight	Inherent low weight (fuel saving)	★★★★★	Heavy	★★★★★
	Chemical hazards	Some flame retardants, otherwise OK	★★★★★	Toxic resins, hard to dispose of	★★★★★

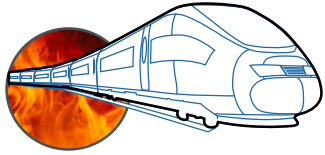
# Polymer Sheets VS Metal

		Polymer Sheets	Rate	Metal	Rate
 <p><b>Technical Performance</b></p>	 Impact	Very wide range of impact performance possible	★★★★★	Robust but lacks rebound	★★★★★
	 Rigidity	Reinforcement by backside composite	★★★★★	Requires underframe	★★★★★
	 Wall thickness	Repeatable, designed in to part, compensation by mould design	★★★★★	Has to be thick enough to withstand dents	★★★★★
	 Dimensional tolerance	Repeatable, CAD designed and machined mould	★★★★★	Repeatable in heavy press	★★★★★
	 Burning Behaviour	Can meet the widest range of standards - ECE R118 annex 8, V0, 5VA, FAR, halogen/non-halogen, etc.	★★★★★	Does not ignite	★★★★★
	 Surface performance - chemical resistance	Chemical resistance by the main polymer or by co-extrusion - PP, PVC, ASA, PMMA, etc.	★★★★★	Relies on paint/coating	★★★★★
	 Surface performance - weatherability	Adaptable to requirement, colour stabilisation and full weather resistance	★★★★★	Relies on paint/coating	★★★★★
 <p><b>Design</b></p>	 Complexity of part	Very complex shapes possible, including twin-sheeting	★★★★★	Limited, cannot make deep pressed parts or complex shapes	★★★★★
	 Surface design	Most surface designs possible	★★★★★	Generally Painted	★★★★★
	 Surface feel	Soft-touch super-matt to high scratch-resistant gloss	★★★★★	Generally Painted	★★★★★
	 Integration as composite component	LFI/RIM, lamination, co-extrusion	★★★★★	Integration unlikely as a composite	★★★★★
	 Further fabrication enhancements	Twin sheet, welding, gluing	★★★★★	Welding, riveting, other fixing, some hardening possible	★★★★★
	 Lead time to support new project	6-8 weeks	★★★★★	22-24 weeks	★★★★★
	 <p><b>Production Cost</b></p>	 Materials	Good	★★★★★	Depends on specification
 Labour		Very short cycle times in vacuum forming - single minutes per part	★★★★★	Similar to vacuum forming	★★★★★
 Energy		Just the vacuum forming cycle - low energy to soften, form, cool	★★★★★	Highest energy requirement for press, hundreds of tonnes of force	★★★★★
 Scale		Few parts to thousands low cost improving with volume, can semi-automate forming and trimming	★★★★★	Can mass produce and automate	★★★★★
 Quality		Very repeatable, high quality, ready finished	★★★★★	OK within limitations of mould depth, painted afterwards	★★★★★
 Mould cost		Typically only need 1 mould per part	★★★★★	Highest cost for mould and press, may need multiple moulds for duplicate production/higher volumes	★★★★★
 <p><b>Environmental</b></p>	 Scraps recyclability	Nearly always recyclable	★★★★★	Nearly always recyclable	★★★★★
	 End of life recyclability	Usually recyclable	★★★★★	Nearly always recyclable	★★★★★
	 Lightweight	Inherent low weight (fuel saving)	★★★★★	Heavy	★★★★★
	 Chemical hazards	Some flame retardants, otherwise OK	★★★★★	Paint	★★★★★



# Polymer Sheets VS Injection Moulding

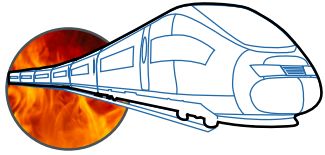
		Polymer Sheets	Rate	Injection Moulding	Rate
 <p><b>Technical Performance</b></p>	 Impact	Very wide range of impact performance possible	★★★★★	Impact somewhat limited by injection grades, single layer	★★★★★
	 Rigidity	Reinforcement by backside composite	★★★★★	Similar to sheet	★★★★★
	 Wall thickness	Repeatable, designed in to part, compensation by mould design	★★★★★	Full optimisation possible	★★★★★
	 Dimensional tolerance	Repeatable, CAD designed and machined mould	★★★★★	Full optimisation possible	★★★★★
	 Burning Behaviour	Can meet the widest range of standards - ECE R118 annex 8, V0, 5VA, FAR, halogen/non-halogen, etc.	★★★★★	Similar, but some trade-off between mould flow and aesthetics. All injection grades are higher melt flow, so depends on fire standard	★★★★★
	 Surface performance - chemical resistance	Chemical resistance by the main polymer or by co-extrusion - PP, PVC, ASA, PMMA, etc.	★★★★★	As a single material, trade-off between other mechanical characteristics and surface properties	★★★★★
 Surface performance - weatherability	Adaptable to requirement, colour stabilisation and full weather resistance	★★★★★	As a single material, trade-off between other mechanical characteristics and surface properties	★★★★★	
 <p><b>Design</b></p>	 Complexity of part	Very complex shapes possible, including twin-sheeting	★★★★★	Most complex shapes possible	★★★★★
	 Surface design	Most surface designs possible	★★★★★	Any surface design possible, flow marks can affect aspect	★★★★★
	 Surface feel	Soft-touch super-matt to high scratch-resistant gloss	★★★★★	Some over-moulding possible, but limited in size and complexity	★★★★★
	 Integration as composite component	LFI/RIM, lamination, co-extrusion	★★★★★	Limited composite formulations as a single component, flow marks	★★★★★
	 Further fabrication enhancements	Twin sheet, welding, gluing	★★★★★	Many possibilities, e.g. can integrate design fixings in to the part shape	★★★★★
	 Lead time to support new project	6-8 weeks	★★★★★	22-24 weeks	★★★★★
 <p><b>Production Cost</b></p>	 Materials	Good	★★★★★	Similar to sheet	★★★★★
	 Labour	Very short cycle times in vacuum forming - single minutes per part	★★★★★	Lowest labour cost, mostly automated	★★★★★
	 Energy	Just the vacuum forming cycle - low energy to soften, form, cool	★★★★★	Lowest energy cost, lowest scraps	★★★★★
	 Scale	Few parts to thousands low cost improving with volume, can semi-automate forming and trimming	★★★★★	Best for mass production, e.g. >5,000 parts	★★★★★
	 Quality	Very repeatable, high quality, ready finished	★★★★★	Comparable to sheet	★★★★★
	 Mould cost	Typically only need 1 mould per part	★★★★★	Very expensive mould, but don't need duplicate processes	★★★★★
 <p><b>Environmental</b></p>	 Scraps recyclability	Nearly always recyclable	★★★★★	Nearly always recyclable	★★★★★
	 End of life recyclability	Usually recyclable	★★★★★	Nearly always recyclable	★★★★★
	 Lightweight	Inherent low weight (fuel saving)	★★★★★	Full optimisation of part weight (fuel saving)	★★★★★
	 Chemical hazards	Some flame retardants, otherwise OK	★★★★★	Some flame retardants, otherwise OK	★★★★★



## The different Railway norms

---

1. Until now national norms for fire and smoke non toxicity:
  - NF 16101 for france: M1F2
  - DIN 5510-2 for Germany: S2 SR2 ST4
2. Now new EUROPEAN NORM EN 45545-2 depending of type of train ( tunnel or not + specific part)= HL x and Rx

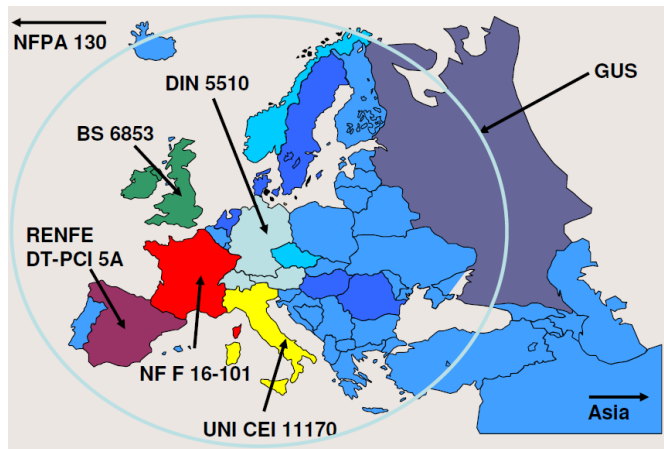


## OUR EXPERIENCE FROM 20 years

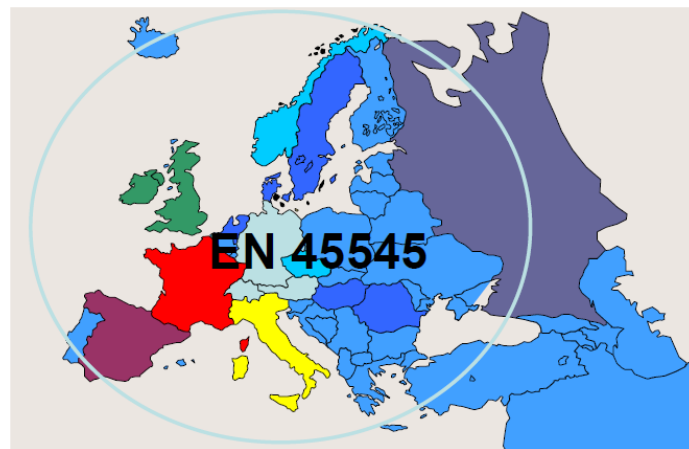
1. GERTEX 10 AE was used for train in Germany + Czech Republic during the 20 last year (BOMBARDIER and SIEMENS, BORCAD, .....)
2. 10 years with ALSTOM France for train and Metro ( GAILLON promoted German success to ALSTOM, and got the approval ( NF 16101 M1F2 + DIN 5510-2)
3. Case study with ALSTOM and COMPIN SEAT 10 years ago to compare Thermoformage/ other technologies.
4. R6 development in GERMANY in 2016-2017: volumes in 2019 ( sheets + IM)
5. R1 PC development 2019
6. R1 + R6 Sales in 2020

# Rail way norms evolution

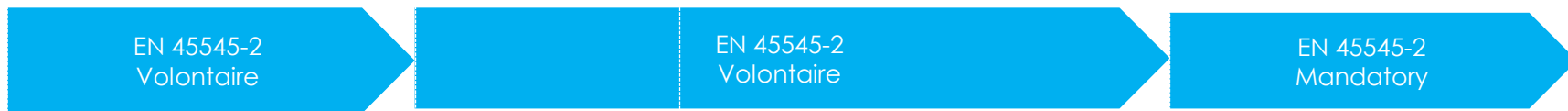
Before 2018



Since 01/2018



Transition



03-2013                      01-2015                      03-2016                      01-2018

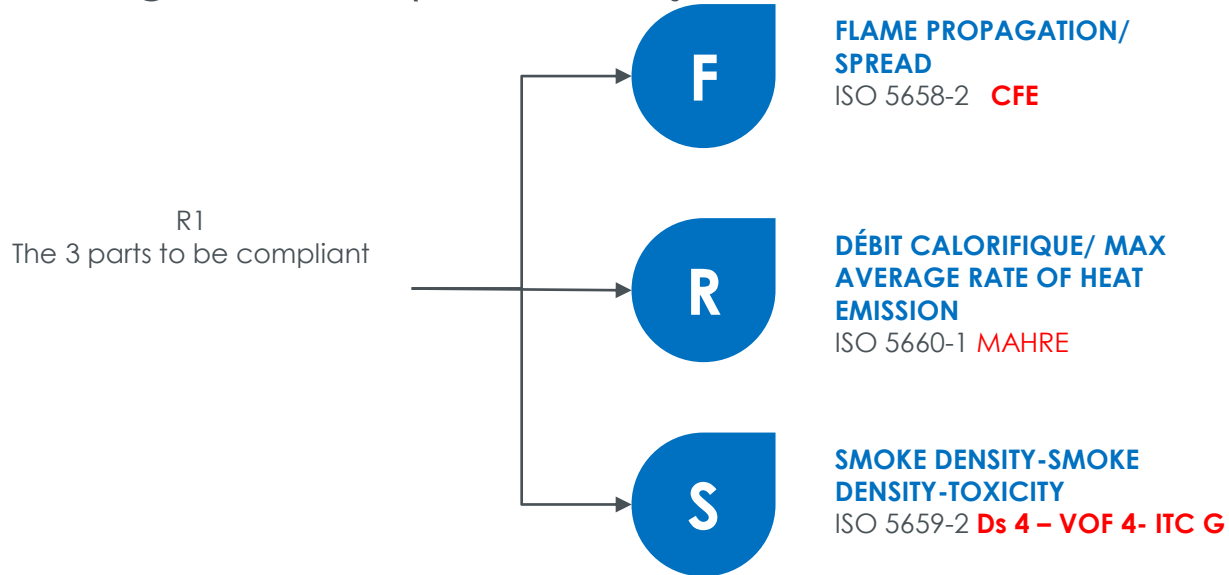
# IV. La norme EN 45542-2 et de ses implications

## Hazard levels

Operation categories	Design categories			
	N Standard vehicles	A Automatic vehicles without trained personnel	D Double decked vehicles	S Sleeping, couchette vehicles
<b>1</b> On infrastructure	HL1	HL1	HL1	HL2
<b>2</b> Underground tunnel <5km with side evacuation	HL2	HL2	HL2	HL2
<b>3</b> Underground tunnel >5km	HL2	HL2	HL2	HL3
<b>4</b> Underground without side evacuation	HL3	HL3	HL3	HL3

# EN 45542-2 what are the values?

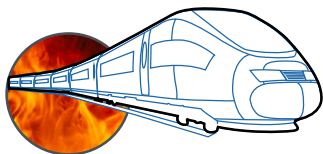
How we evaluate conformity: The CFE Value is often the most critical part. We need to be above 20. Our competitors promote they are above but don't give value ( could be just above/ we are much better)



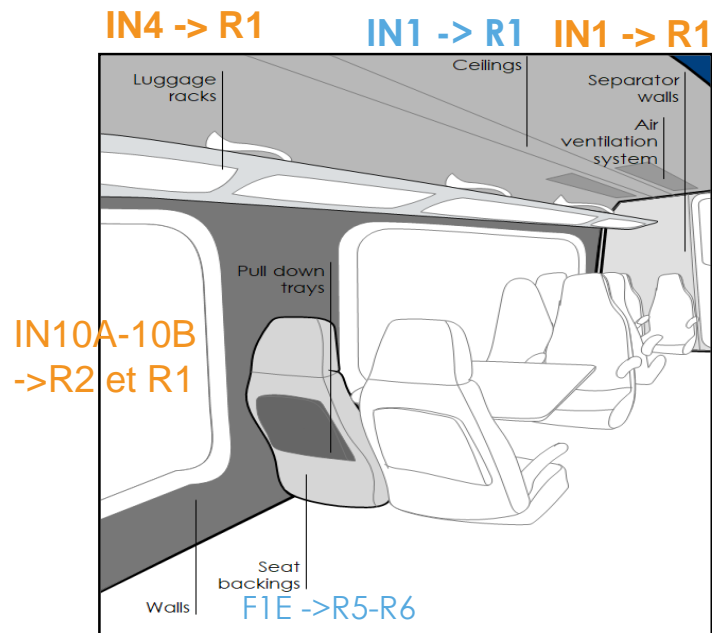
# Values requested/ Type of train

CFE value is mandatory for R1 certificate ( not asked for R6)

Série d'exigences (N° de produit applicable)	Référence de la méthode d'essai	Paramètre et unité	Maximum ou minimum	HL1	HL2	HL3
R1 (IN1A ; IN1B ; IN1D ; IN1E ; IN4 ; IN5 ; IN6A ; IN7 ; IN8 ; IN9B ; IN11 ; IN12A ; IN12B ; IN14 ; F5)	T02 ISO 5658-2	CFE kWm <sup>-2</sup>	Minimum	20 a	20 a	20 a
	T03.01 ISO 5660-1 : 50 kWm <sup>-2</sup>	MARHE kWm <sup>-2</sup>	Maximum	a -	90	60
	T10.01 EN ISO 5659-2 : 50 kWm <sup>-2</sup>	D <sub>s</sub> (4) sans dimension	Maximum	600	300	150
	T10.02 EN ISO 5659-2 : 50 kWm <sup>-2</sup>	VOF <sub>4</sub> min	Maximum	1 200	600	300
	T11.01 EN ISO 5659-2 : 50 kWm <sup>-2</sup>	ITC <sub>G</sub> sans dimension	Maximum	1,2	0,9	0,75



## Interior parts/ requirements



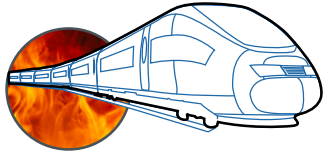
Category	Usage/ parts	Weight estimated kg	Article n°	Request
Ceiling and wall cladding	ceiling	10,8 (par m)	IN1	R1
	Windows frame	0,6 (par m)	IN7	R1
	Wall protection	4,3 (par m)	IN1	R1
	Separative walls	16,2	IN1	R1
Seat shells	Seat structure	1,2	F1E	R5
	Seat shell	1,5		R6
	Arms supports	0,9	F1B,C,D	R21-R22



## PC PU1 R1 COMPARISON/ Norm request

	REQUEST	PC PU1 R1 epsotech
Standard gravity		1,3
Tensile MODULUS		4000
Yield stress		54
Charpy notched ( + 23°C)		30
Charpy notched ( -23°C)		8
VICAT		110
FLAME SPREAD CFE	requested >20	37,7
MAHRE ( rate of heat emission)	requested <90	75,6
Smoke density	<300	136
Smoke density	<600	213
Toxicity	<0,9	0,03

**Our material is: lighter, less rigid ( less brittle) with lower smoke toxicity and density than other material.  
The very good point is The CFE much higher ( products from competition are just at the limit)**

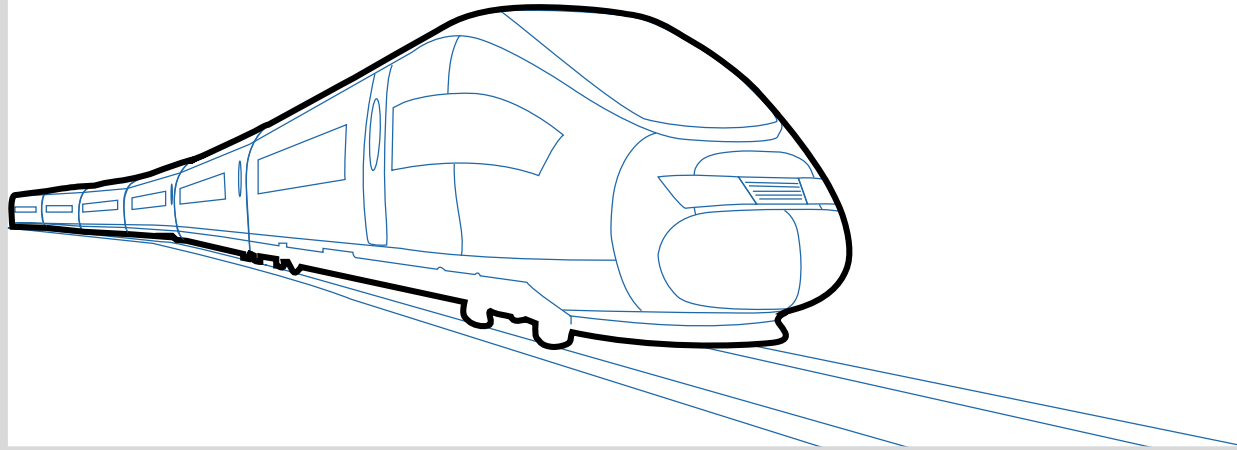


## Epsotech RANGE for RAILWAY

	<b>Gertex AE</b>	<b>Railway R6</b>	<b>epsotech Railway IM</b>	<b>epsotech Railway IM</b>	<b>Railway R1</b>
	Sheets for thermoforming	Sheets for thermoforming	Injection moulding	Injection moulding	
<b>Process</b>	Extruded sheet	Extruded sheet	Compound for injection moulding	Compound for injection moulding only	Extruded sheet
<b>Transformation</b>	Thermoforming or fabrication	Thermoforming or fabrication	Injection	Injection	Thermoforming or fabrication
<b>Polymer</b>	Polycarbonate / Acrylonitrile Butadiene Styrene	Polypropylene	Polypropylene	Polypropylene	Polycarbonate
<b>Halogen free</b>	Yes	Yes	Yes	Yes	Yes
<b>NF M1 F2</b>	Yes	N/A	N/A	N/A	N/A
<b>DIN 5510-2</b>	Yes	N/A	N/A	N/A	N/A
<b>Recyclability</b>	When keeping homologation below 50% regrinds	Yes	To be tested	To be tested	To be confirmed
<b>EN 45 545-2</b>	N/A	Yes	Yes	Yes	Yes
<b>HL1-3</b>	N/A	HL3	HL2	HL3	HL2
<b>Requirement set</b>	N/A	R6	R6	R21	R1
<b>Range</b>	A thickness of 2mm to 6mm	A thickness of 2mm to 6mm	N/A	N/A	A thickness of 2 to 6 mm
<b>Emboss</b>	Multiple offered	Multiple offered	N/A	N/A	Multiple offered

We can supply extruded plastic sheets for the **R6 requirement up to and including hazard level 3**

R6 requirement up to Hazard Level 3 fulfilled ( Could be used for seats)

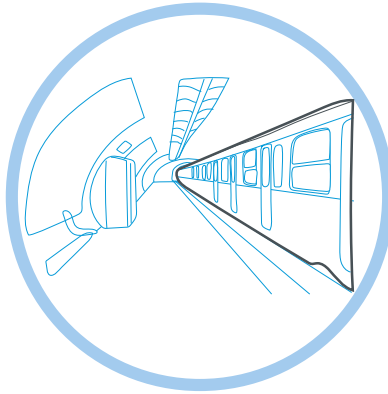


## Full range of railway vehicles covered **with the R6 HL 3 requirement achieved for all**

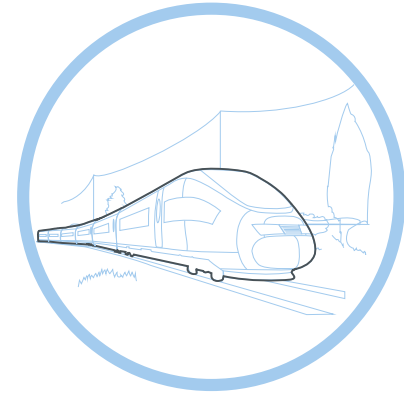
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Inner city



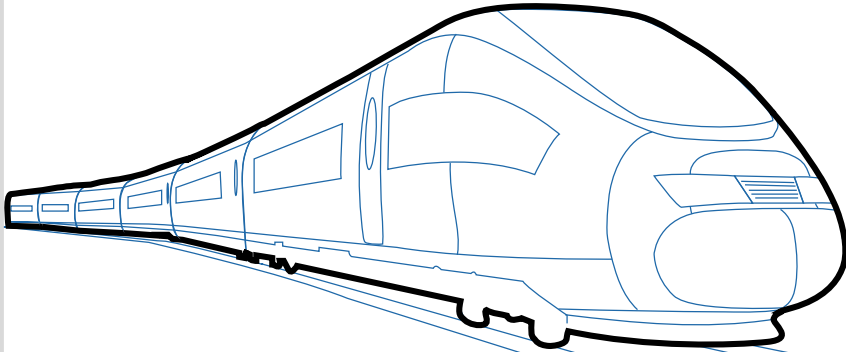
Metro

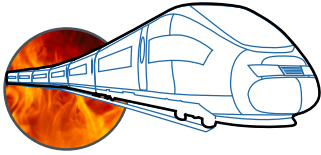


High speed  
intercity

## We can supply Injection granules for the **R6 HL2 and R21 HL3**

R6 requirement up to Hazard Level 2 fulfilled ( Could be used for seats) and R21 HL3 ( could be used for seat covers, arm rests and refurbished seats)





## Railway R6, EN 45545-2 certificate awarded by Deutsche Bahn

 Mobility Networks Logistics



**Anerkennungsurkunde**  
Certificate of approval

DIN EN 45545-2:2013/A1:2015 Bahnanwendungen – Brandschutz in Schienenfahrzeugen  
- Teil 2: Anforderungen an das Brandverhalten von Materialien und Komponenten  
DIN EN 45545-2:2013/A1:2015 Railway applications – Fire protection on railway vehicles  
- Part 2: Requirements for fire behavior of materials and components

**Das Prüfobjekt „Metzoplast Railway“ des Herstellers Vitasheet Group,  
Metzeler Plastics GmbH erfüllt Hazard Level 1 / 2 / 3 (HL1 / HL2 / HL3)  
gem. Tabelle 5, DIN EN 45545-2:2013/A1:2015, Anforderungssatz R6.**

The test object “Metzoplast Railway” of the manufacturer Vitasheet Group,  
Metzeler Plastics GmbH  
is conform to the requirements for hazard level 1 / 2 / 3 (HL1 / HL2 / HL3),  
requirement set R6 according to table 5 of DIN EN 45545-2:2013/A1:2015.

Nr. der Anerkennung (No. of certificate): DB-ST-AU-16-50489-042-1.1  
Ausstellungsort und -datum (Creation location and date): Brandenburg-Kirchmöser, 07.03.2016

  
Dipl.-Ing. Frank Lütjens  
Abteilungsleiter  
Manager of department

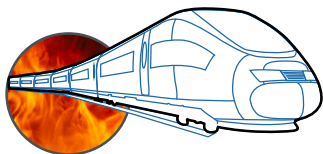
  
DNV-GL  
NO 2331

  
Dr. Sven Böhme  
Sachf. Leiter Brandlabor  
Display head of fire testing laboratory

Die Bewertungsergebnisse beziehen sich ausschließlich auf die in der Anerkennung beschriebenen Prüfobjekte und Prüfverfahren. Diese Anerkennung darf nicht ohne schriftliche Genehmigung des Auftraggebers veröffentlicht werden. Eine auszugsweise Veröffentlichung bedarf zusätzlich der Zustimmung der Ausstellungsstelle.  
The evaluation results presented in this certificate refer solely to the test objects and tests reports described. This certificate may not be published without the written consent of the project sponsor. Furthermore, no part of this certificate may be reproduced without the additional consent of the authority.  
Für den Fall von Abweichungen zwischen der englischen und deutschen Fassung gilt die Letztere an.  
In the event of discrepancy between the English and the German version, the latter shall prevail.

Dokument-Nr. (Document-no.): DB-ST-AU-16-50489-042-1.1 Seite (Page) 1 von (of) 2

1. Conforms to Hazard Level 1, 2 and 3
2. Meets requirement 6 (passenger seat shell) table 5 of the EN 45545-2



# epsotech Railway IM, EN 45545-2 certificate awarded by Deutsche Bahn

**Anerkennungsurkunde**  
Certificate of approval

DIN EN 45545-2:2016 Bahnanwendungen - Brandschutz in Schienenfahrzeugen  
- Teil 2: Anforderungen an das Brandverhalten von Materialien und Komponenten  
DIN EN 45545-2:2016 Railway applications - Fire protection on railway vehicles  
- Part 2: Requirements for fire behavior of materials and components

**Das Prüfobjekt „Vispec Railway IM“  
des Herstellers Metzeler Plastics GmbH  
erfüllt Hazard Level 1 / 2 (HL1 / HL2)  
gemäß Tabelle 5, DIN EN 45545-2:2016, Anforderungssatz R6.**

The test object "Vispec Railway IM"  
of the manufacturer Metzeler Plastics GmbH  
is conform to the requirements for hazard level 1 / 2 (HL1 / HL2),  
requirement set R6 according to table 5 of DIN EN 45545-2:2016.

Nr. der Anerkennung (No. of certificate): DB-ST-AU-17-52391-053-1.1  
Ausstellungsort und -datum (Creation location and date): Brandenburg-Kirchmöser, 04.10.2017

Dipl.-Ing. Frank Lüders  
Arbeitsgruppenleiter  
Manager of department

DNV-GL  
ISO 9001  
Anerkennung nach DIN EN ISO 9001  
Deutsche Gesellschaft für Zertifizierung von Managementsystemen  
Germanian Institution for Certification of Management Systems

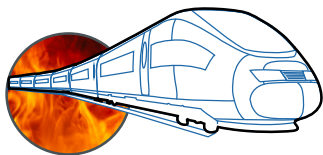
M.Sc. Andreas Bödger  
Leiter Brandlabor  
Head of the laboratory

Die Bewertungsergebnisse beziehen sich ausschließlich auf die in der Anerkennung beschriebenen Prüfobjekte und Prüfbedingungen. Diese Anerkennung darf nicht ohne schriftliche Genehmigung des Auftraggebers veröffentlicht werden. Eine ausgangsbewusste Veröffentlichung bedarf zusätzlich der Zustimmung der Ausstellungsstelle.  
The test results presented in this certificate refer solely to the test objects and test reports described. This certificate may not be published without the written consent of the project sponsor. Furthermore, no part of this certificate may be reproduced without the additional consent of the authors.

Für den Fall von Abweichungen zwischen der englischen und deutschen Fassung gilt die Letztgenannte.  
In the event of discrepancy between the English and the German version, the latter shall prevail.

Dokumen-Nr. (Document no.): DB-ST-AU-17-52391-053-1.1 Seite (Page) 1 von (of) 2

1. Conforms to **Hazard Level 1 and 2.**
2. Meets requirement 6 (passenger seat shell) table 5 of the EN 45545-2



# epsotech Railway IM, EN 45545-2 certificate awarded by Deutsche Bahn

1. Conforms to Hazard Level 1,2 and 3.
2. **Meets requirement 21** (armrest and head rest) table 5 of the EN 45545-2

**Anerkennungsurkunde**  
Certificate of approval

DIN EN 45545-2:2016 Bahnanwendungen – Brandschutz in Schienenfahrzeugen  
- Teil 2: Anforderungen an das Brandverhalten von Materialien und Komponenten

DIN EN 45545-2:2016 Railway applications – Fire protection on railway vehicles  
- Part 2: Requirements for fire behavior of materials and components

**Das Prüfobjekt „Vispec Railway IM“  
des Herstellers Metzeler Plastics GmbH  
erfüllt Hazard Level 1 / 2 / 3 (HL1 / HL2 / HL3)  
gemäß Tabelle 5, DIN EN 45545-2:2016, Anforderungssatz R21.**

The test object "Vispec Railway IM"  
of the manufacturer Metzeler Plastics GmbH  
is conform to the requirements for hazard level 1 / 2 / 3 (HL1 / HL2 / HL3),  
requirement set R21 according to table 5 of DIN EN 45545-2:2016.

Nr. der Anerkennung (No. of certificate): DB-ST-AU-17-52391-053-2.1

Ausstellungsort und -datum (Creation location and date): Brandenburg-Kirchmöser, 04.10.2017

Dipl.-Ing. Frank Lüders  
Abteilungsleiter  
Manager of department

DNV-GL  
ISO 9001  
Zertifizierungssystem  
Übersicht über alle DNV-GL  
Leistungsleistungen zur Zertifizierung von Managementsystemen  
and/or  
Certification services for certification of management systems

M.Sc. Andreas Böttger  
Leiter Brandlabor  
Head of fire laboratory

Die Bewertungsgegenstände beziehen sich ausschließlich auf die in der Anerkennung beschriebenen Prüfobjekte und Prüfverfahren. Diese Anerkennung darf nicht ohne schriftliche Genehmigung des Auftraggebers veröffentlicht werden. Eine auszugswise Veröffentlichung bedarf zusätzlich der Zustimmung der Ausstellungsstelle.  
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Für den Fall von Abweichungen zwischen der englischen und deutschen Fassung gilt die Letztere.  
In the event of discrepancy between the English and the German version, the latter shall prevail.

Dokument-Nr. (Document no.): DB-ST-AU-17-52391-053-2.1 Seite (Page) 1 von (of) 2



- PPR6 has to be promoted to OEM.
  - We have only one competitor in PP ( Italian Vamp tech) but only in contact with injection producers ( not in contact with OEM)
- Weight saving is the USP: necessity to compare €/m<sup>2</sup> or to explain that for same weight they will have more parts

## VACUUM FORMING

- Quite difficult to thermoform.
- Customer need to have modern thermoforming machine (Gueiss?)
- Some unmelts parts-
- **WHY Not to propose a PC R6. Just for thermoforming ?**

# PPR6: our experience and strenght FOCUS ON INJECTION

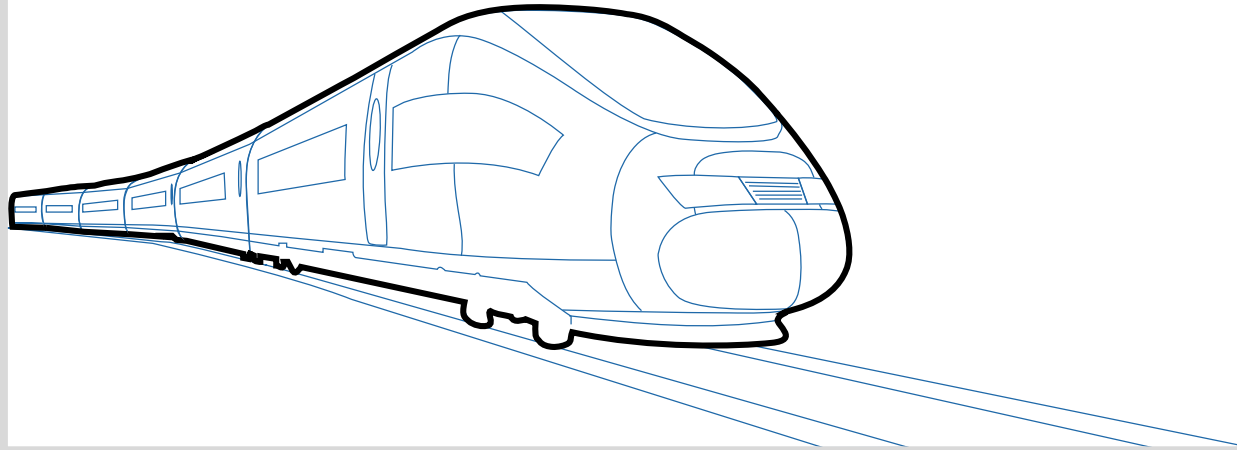
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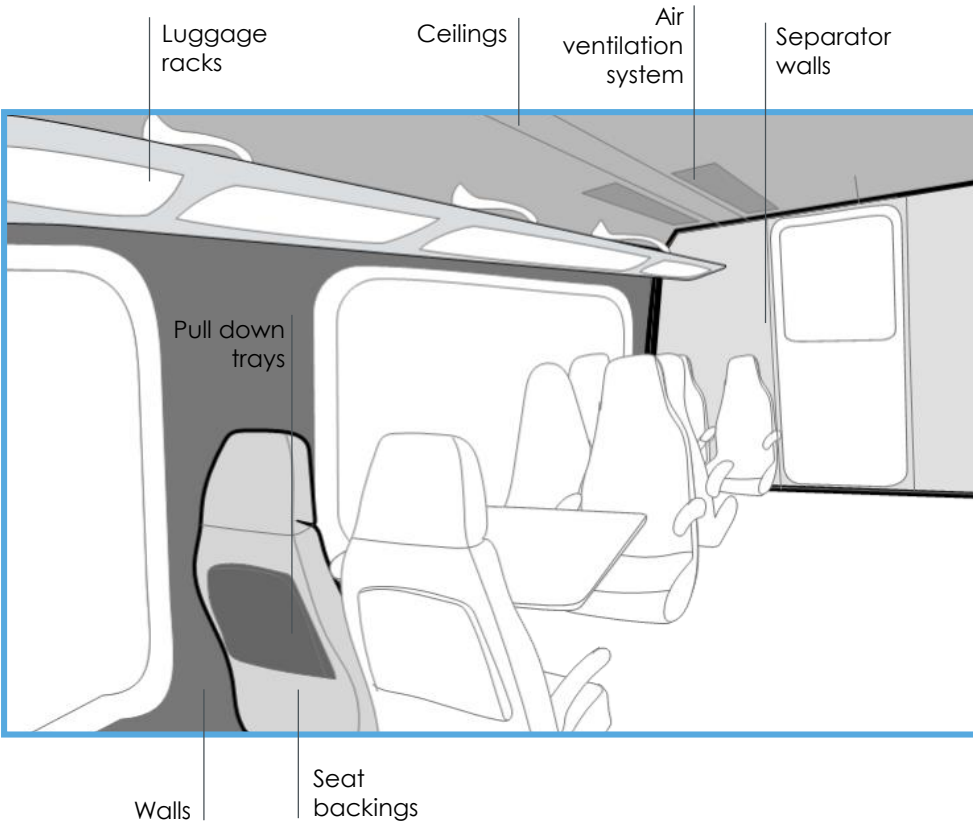
## INJECTION

- No set up losses
- Quicker than thermoformage to produce
- No colour deviation
- Weight saving versus Polyamide
- We sell to OEM who will deliver to his sub contractors

We can supply extruded plastic sheets for the **R1 requirement up to and including hazard level 2**

R1 requirement up to Hazard Level 2 fulfilled ( Could be used interior passengers coaches)

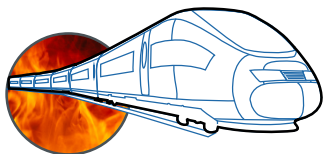





## We supply a range of material suitable for railway interiors

1. Walls\*
2. Separator walls\*
3. Pull down trays\*
4. Ceilings\*
5. Luggage racks\*
6. Air ventilation systems\*


meet the appropriate EN standard R1 HL2,





# Railway R1 (extruded sheet), EN 45545-2 certificate awarded by **CURRENTA**

**CURRENTA** 

**Klassifizierungsbericht Nr. 19/1791**  
*Classification report No. 19/1791*

 Currenta GmbH & Co. OHG  
ANT-14-Brandtechnologie  
CHEMPARK, Gebäude 8 411  
D-51368 Leverkusen  
  
brandtechnologie@currenta.de  
www.brandversuche.de  
www.fire-testing.eu  
  
Sitz der Gesellschaft: Leverkusen  
Antagengr. Köln, HR A 20833


 


<b>Berichtsdatum</b> <i>Date of report</i>	2019-09-25		
<b>Auftraggeber</b> <i>Client</i>	EPSOTECH FRANCE SAS MEUNIER Operational Director 367 BOULEVARD NAPOLEON BULLUKIAN 96630 SAINT GEORGES DES REINENS, FRANCE Sandrine.meunier@epsotech.fr		
<b>Geprüftes Produkt</b> <i>Product tested</i>	Gertex 15 MT	<b>Geprüfte Dicke</b> <i>Thickness tested</i>	4.3 – 4.4 mm
<b>Klassifizierungsnorm</b> <i>Classification standard</i>	EN 45545-2:2013+A1:2015 Bahnanwendungen – Brandschutz in Schienenfahrzeugen Teil 2: Anforderungen an das Brandverhalten von Materialien und Komponenten EN 45545-2:2013+A1:2015 Railway applications – Fire protection on railway vehicles Part 2: Requirements for fire behavior of materials and components		
<b>Produktgruppe/ Einsatzbereich</b> <i>Product group/ field of application</i>	Keine Angabe Not stated		


**Klassifizierungsergebnis**  
*Classification result*

Das geprüfte Produkt erfüllt die folgenden Anforderungen der EN 45545-2:  
*The tested product meets the following requirements of EN 45545-2:*

Anforderungssatz <i>Requirement set</i>	Gefährdungsstufe <i>Hazard level</i>
R1	HL1, HL2

 25.09.2019  
Michael Hoffmann  
(Präsident/Head of Fire Technology Department)



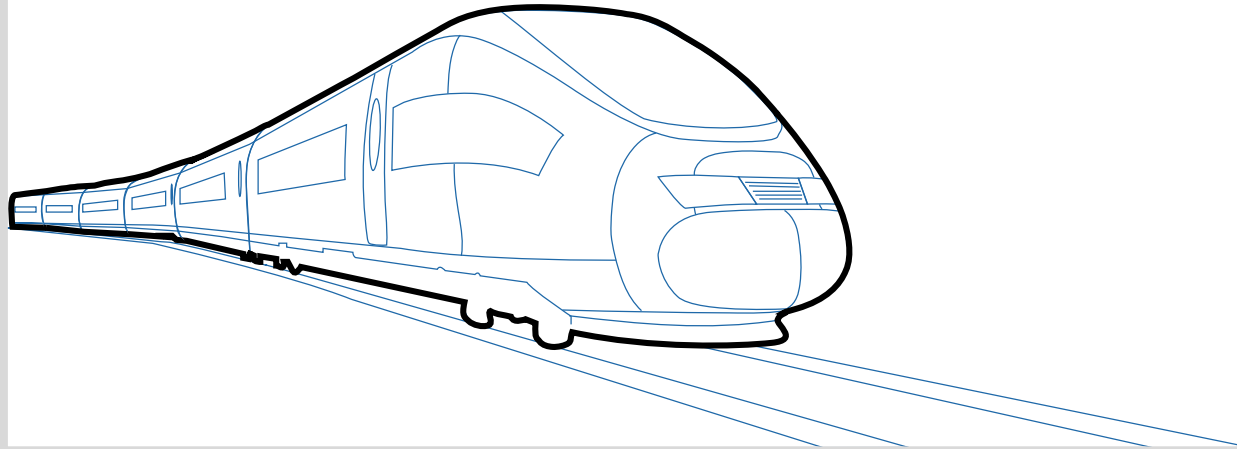
 26.09.2019  
Karsten Richter  
(Geschäftsführer/Chief Technology Officer  
/Fire Technology Department, Customer Support)

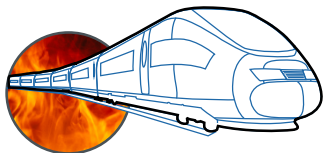
Seite 1 von 6  
Page 1 of 6

1. Conforms to **Hazard Level 1, 1 and 2**
2. Meets requirement 1 (ceiling and window frames, cladding and overhead components) table 5 of the EN 45545-2

We can supply extruded plastic sheets OUTSIDE EUROPE WITH CERTIFICATES Linked to DIN And NF

R1 requirement up to Hazard Level 2 fulfilled ( Could be used interior passengers coaches)





# Gertex 10 AE, DIN 5510-2 certificate awarded by **CURRENTA**

**SAFRAN**  
Herakles

Établissement Centre de Recherches du Bouchet  
5, rue Lavoisier  
37120 Saint-Pierre-Francis  
Tel. : 33 (0)1 64 99 14 51  
Fax : 33 (0)1 64 99 14 16

<b>RAPPORT DE CLASSEMENT</b>	<b>N° : 18489-14/1</b>	
<b>DETERMINATION DE L'INDICE DE FUMÉE</b>	<b>NF F 16-101</b>	
<b>MATÉRIAU PRÉSENTÉ PAR :</b> GAILLON S.A.S. - VitaSheetGroup 191 Chemin des Vernailles 69830 St Georges de Reneins France		
<b>RÉFÉRENCE DU PRODUIT :</b> GERTEX 10AE		
<b>DESCRIPTION SOMMAIRE :</b> Plaque plane, lisse et rigide de thermoplastique extrudée mono couche constituée d'un mélange de polycarbonate et d'acrylonitrile butadiène styrène (PC/ABS) ignifugé Bayblend FR3030 additivé à 2% d'un masterbatch gris.  Épaisseur : 3 mm Masse volumique : 1,19 g/cm <sup>3</sup> Couleur : Gris RAL 7045		
<b>NATURE DES ESSAIS :</b> -Analyse des gaz de pyrolyse et combustion d'après la norme NF X 70-100 (2006)& STM-S-001c (2006) -Détermination de l'opacité des fumées d'après la norme NF X 10-702 (1995) & STM-S-001c (2006)		
	<b>Valeurs</b>	<b>Observations</b>
I.T.C.	<b>21,63</b>	Voir rapport d'essai n° 18489-14A/1
Dim	<b>309,3</b>	Voir rapport d'essai n° 18489-14B/1
VOF4	<b>412,4</b>	Voir rapport d'essai n° 18489-14B/1
<b>RESULTATS</b>	<b>Indice de fumée I.F.</b> <b>28</b>	<b>Classement F :</b> <b>F2</b>

Rq : l'incertitude de mesure associée au résultat n'a pas été prise en compte pour prononcer ce classement.

Au Bouchet le 13/10/2014  
Le Responsable des Essais  
Charlotte BECK

Le Chef du Laboratoire  
Hélène BARBIER

Ce procès verbal annule et remplace le procès verbal N° 18489-14 datant du 24 septembre 2014

Nota : - ce rapport de classement ne concerne que les produits soumis aux essais.  
- ce rapport de classement ne peut être reproduit que dans sa totalité : il comporte une page.

Modèle 02/013 TME/PPV 7/10/10  
COFFRE  
ACCREDITATION  
N° 14385  
France Hexametre

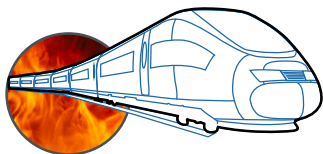
HERAKLES - SA au capital de 34 000 000 euros - RCS Nanterre 440 913 020  
Siège social : rue du Tonnerre - 92100 Nanterre - FRANCE

1. Flammability class S4
2. Smoke generation class SR2
3. Droplet formation ST2

## Halogen Free

Extruded sheet  
available  
at **2 to 6mm.**

**2 to 4mm** meets  
the **M1F2** standard  
and **4 to 6mm**  
meets the **M2F2**  
standard.



# Gertex 10 AE, NF F 16-101 certificate awarded by **SAFRAN**

CURRENTA GmbH & Co. OHG  
AMT Brandtechnologie  
CEM/PARK, Gießallee 5411  
51388 Leverkusen



Prüfbericht / Test report 14/0650

erstellt / created 2014-04-11

**Prüfung**  
Test standard  
DIN 54837:2007  
Prüfung von Werkstoffen, Kleinteilen und Bauteilabschnitten für Schienenfahrzeuge - Bestimmung des Brennverhaltens mit einem Gasbrenner

DIN 54837:2007  
Testing of materials, small components and component sections for rail vehicles - Determination of burning behaviour using a gas burner

**Klassifizierung**  
Classification standard  
DIN 5510-2:2009  
Vorbeugender Brandschutz in Schienenfahrzeugen  
Teil 2: Brennverhalten und Brandnebenerscheinungen von Werkstoffen und Bauteilen - Klassifizierung, Anforderungen und Prüfverfahren

DIN 5510-2:2009  
Preventive fire protection in railway vehicles  
Part 2: Fire behaviour and fire side effects of materials and parts - Classification, requirements and test methods

**Auftraggeber**  
Client  
GAILLON S.A.S. - VitaSheetGroup Company  
191 Chemin des Vemailles  
F-69830 St Georges de Reneins  
France

Name: Herr / Mr. Regis BEROUJON  
Email: regis.beroujon@vitasheetgroup.fr

**Material**  
Material  
Nennstärke  
Nominal thickness  
GERTEX 10AE  
2.0 mm

## Prüfergebnis / Test result

Prüfdatum Date of test	Brennbarkeitsklasse Flammability class	Rauchentwicklungsklasse Smoke generation class	Tropfbarkeitsklasse Droplet formation class
2014-04-14	S4	SR2	ST2

07.05.2014 16:33  
Frank Volkenbom  
(Laboranten-Brandtechnologie)  
(Laboratory Manager of Fire Technology Department)



07.05.2014 16:33  
Michael Kalkbrenner  
(Fachberater Brandtechnologie)  
(Customer Support of Fire Technology Department)

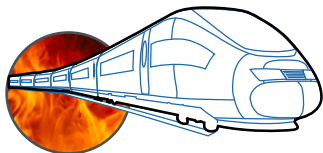


1. I.T.C 21.63
2. Dm 309.3
3. VOF4 412.4

## Halogen Free


Extruded sheet  
available  
at **2 to 6mm.**

**2 to 4mm** meets  
the **M1F2** standard  
and **4 to 6mm**  
meets the **M2F2**  
standard.



# Gertex 10 AE, M1 certificate awarded by **CREPIM**

E09/06 c du 03/09/2014

  
**CREPIM**  
Institut par Actions Créatives 790 179 838 R.C. ARRAS  
Siège social: Parc de l'Europe Nord - rue Christophe Colomb  
62700 Bruay la Bussière France  
Tel: 03 21 65 64 00 Fax: 03 21 65 64 01  
Email: [crepim@crepim.fr](mailto:crepim@crepim.fr) [www.crepim.fr](http://www.crepim.fr)  
SIRET 790 179 838 00010 - RCS ARRAS F 790 179 838

## PROCES-VERBAL DE CLASSEMENT DE REACTION AU FEU D'UN MATERIAU

Valable 5 ans à compter du 12 Janvier 2015

Selon l'arrêté du 21 novembre 2002 relatif à la réaction au feu des produits de construction et d'aménagement  
Laboratoire agréé du Ministère de l'Intérieur (arrêté du 23/03/2010 modifiant l'arrêté du 03/02/1999 modifié)

**Procès-verbal n° 1215/08/324 A**

Et annexe de 3 pages

**Matériau présenté par :** VITASHEET GROUP  
191 Chemin des vanneries  
69 830 Saint Georges de Reneins  
France

**Référence commerciale :** GERTEX 10AE (V2)

**Description sommaire :** Plaque PCI/ABS Flame Retardant FR3030 Epaisseur 2,5mm.  
Aspect granité sur 1 face (Grant).  
Application Ferroviaire  
Epaisseur nominale totale : 2,5 mm.  
Masse volumique mesurée : 1191,8 kg/m<sup>3</sup>.  
Masse surfacique mesurée : 2,98 kg/m<sup>2</sup>.  
Coloris présenté : Gris 74060.

**Nature de l'essai :** NF P 92-501 - Essai par rayonnement  
NF P 92-504 - Essai de persistance  
NF P 92-505 - Essai chute de gouttes


**Référence du rapport d'essai :** RE IM 1215/08/324 A du 12/01/2015  
RE IM 1215/08/324 A du 12/01/2015  
RE SM 1215/08/324 A du 12/01/2015

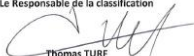
**Classement :** **M1**

**Durabilité du classement :** Non limitée a priori.  
Compte tenu des critères résultants des essais décrites dans le rapport annexé.  
Ce procès verbal atteste uniquement des caractéristiques de l'échantillon soumis aux essais et ne préjuge pas des caractéristiques de produits similaires. Il ne constitue donc pas une certification de produit au sens de l'article L. 115-27 du code de la consommation et de la loi du 3 juin 1994.  
« Valable pour toute application pour laquelle le produit n'est pas soumis au marquage CE »

A Bruzay-la-Buissière, le 12 janvier 2015

**Pour ordre, suppléant du Président, Franck POUTCH** **Le Responsable de la classification**

  
Skander KHELIFI

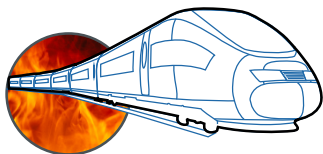
  
Thomas TURF

Nota. - Sont seules autorisées les reproductions intégrales et par photocopie du présent procès-verbal de classement  
ou de l'ensemble procès-verbal de classement et rapport d'essais annexé.

Page 3 sur 3

1. 2 to 4mm meets the **M1F2** standard
2. 4 to 6mm meets the **M2F2** standard
3. Halogen free





## Epsotech OFFER

	<b>Gertex AE</b> Sheets for thermoforming	<b>Railway R6</b> Sheets for thermoforming	<b>epsotech Railway IM</b> Injection moulding	<b>Railway PC PUI R1</b>
<b>Process</b>	Extruded sheet	Extruded sheet	Compound for injection moulding	Extruded sheet
<b>Transformation</b>	Thermoforming or fabrication	Thermoforming or fabrication	Injection	Thermoforming or fabrication
<b>Polymer</b>	Polycarbonate / Acrylonitrile Butadiene Styrene	Polypropylene	Polypropylene	Polycarbonate
<b>Halogen free</b>	Yes	Yes	Yes	Yes
<b>NF M1 F2</b>	Yes	N/A	N/A	N/A
<b>DIN 5510-2</b>	Yes	N/A	N/A	N/A
<b>Recyclability</b>	When keeping homologation below 50% regrinds	Yes	To be tested	To be confirmed
<b>EN 45 545-2</b>	N/A	Yes	Yes	Yes
<b>HL1-3</b>	N/A	HL3	HL2- HL3	HL2
<b>Certificate EN</b>	2-4mm and 4 to 6 mm	3 mm	-	4,3 mm
<b>Requirement set</b>	N/A	R6	R6 HL2- R21 HL3	R1
<b>Range</b>	A thickness of 2mm to 6mm	A thickness of 2mm to 6mm	N/A	A thickness of 2 to 6 mm
<b>Emboss</b>	Multiple offered	Multiple offered	N/A	Multiple offered including smooth



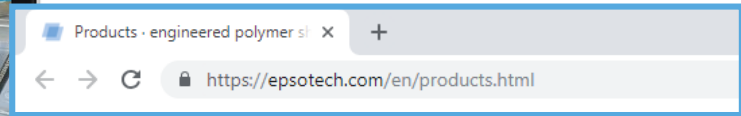
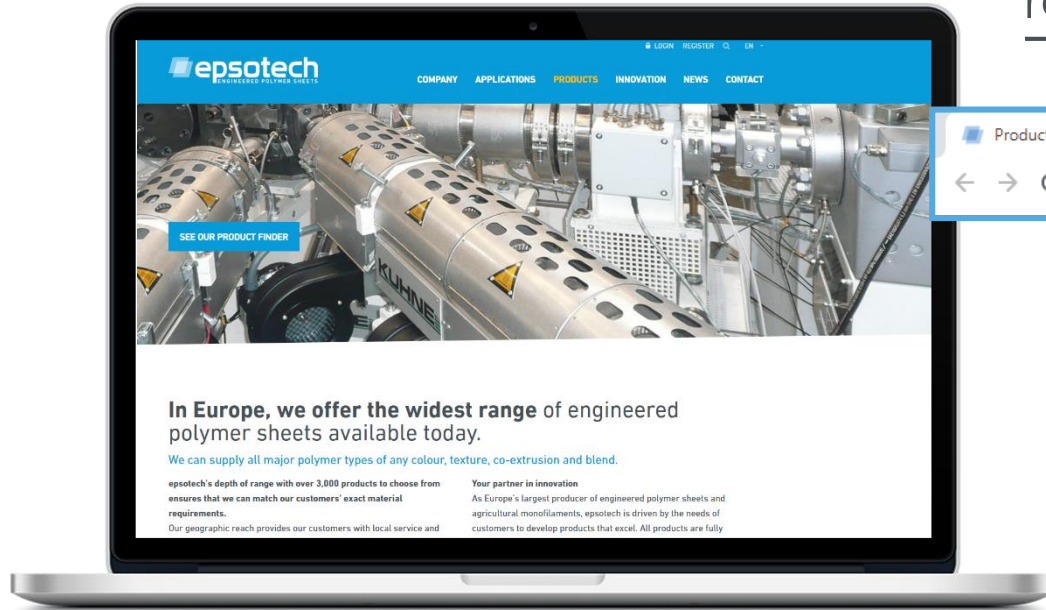
Sustainability

## Sustainability

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You can find detailed information about our product range online



## We offer the best solution for your needs

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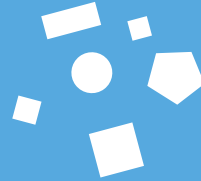
Highest quality materials



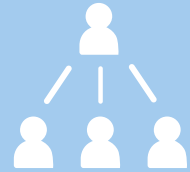
Flexibility to offer multiple tailor-made solutions to your specific needs



Local footprints ensuring fast delivery



Many more parts available through thermoforming



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# THANK YOU

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