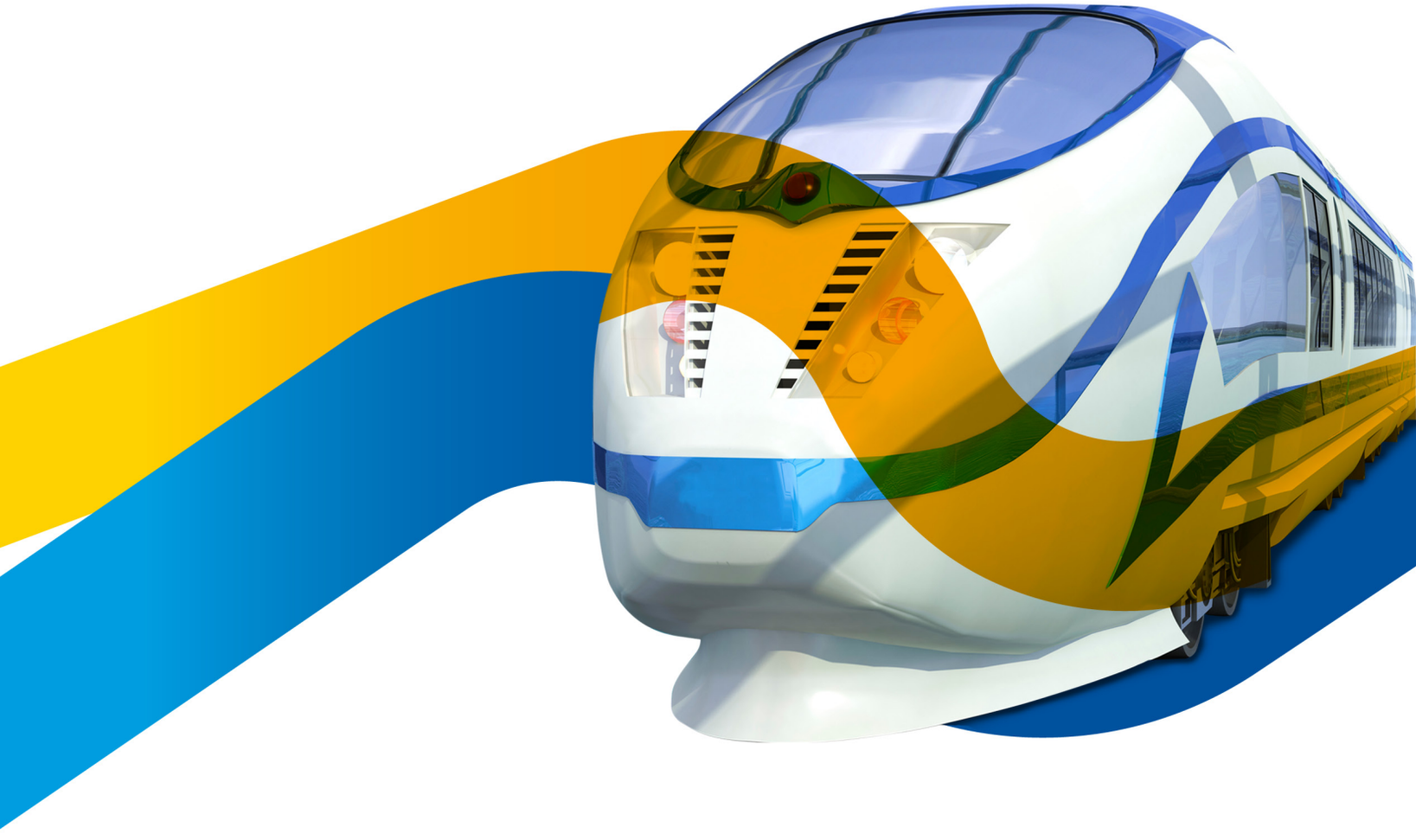
FUNCTIONAL FORMS

SAFETY+ AESTHETICS

LIGHTWEIGHT, COMPLIANT THERMOPLASTIC MATERIALS FOR RAILWAY INTERIORS



CHEMISTRY THAT MATTERS™

COMBINING THERMOPLASTICS EXPERTISE WITH IN-DEPTH KNOWLEDGE OF THE INDUSTRY STANDARDS, REGULATIONS AND TRENDS, SABIC IS COMMITTED TO KEEPING ITS CUSTOMERS IN THE TRANSPORTATION INDUSTRY AT THE LEADING EDGE OF MATERIALS AND PROCESSING TECHNOLOGIES.

SABIC OFFERS A PORTFOLIO OF HIGH PERFORMANCE, ENGINEERING THERMOPLASTICS INCLUDING RESINS, SHEETS, FILMS AND COMPOSITES, SPECIFICALLY DESIGNED FOR RAILWAY INTERIORS THAT CAN MEET INDUSTRY STANDARDS AND FIRE RESISTANCE REGULATIONS; MAY REDUCE OVERALL SYSTEM COSTS; AND ENHANCE THE AESTHETICS, SAFETY AND COMFORT OF THE TRAIN CABIN ENVIRONMENT.

SAFETY, AESTHETICS & PERFORMANCE

Today's public transportation industry is increasingly focused on safety. To create differentiated designs for new rail rolling stock or when refurbishing old ones, manufacturers are seeking the latest material solutions that not only meet current and upcoming safety regulations but also provide additional benefits ranging from durability and anti-vandalism protection to improved aesthetics, lower weight and system cost reduction.

Currently, fire safety regulations for rail interiors for conventional intercity, commuter passenger trains and lightweight high-speed trains are defined by The Federal Railroad Administration (FRA) of the U.S. Department of Transportation (DOT). SABIC has proactively developed and independently tested several materials designed specifically for compliance with these standards.

SABIC offers a number of materials for railway interior applications that conform to leading U.S. Department of Transportation, Federal Rail Administration fire safety regulations and supports increased material needs for

- Weight reduction
- Increased fire safety
- Graffiti resistance
- Vandalism resistance
- Lower system cost
- Design freedom
- Easy reparation
- Paint reduction

LIGHTWEIGHT MATERIALS COMPLYING WITH INDUSTRY STANDARDS

The broad portfolio of materials for the rail interiors sector manufactured by SABIC can help manufacturers meet evolving fire safety requirements while delivering additional advantages such as Bromine/Chlorine free fire safety. The company offers a one-stop shop comprising new plastics solutions, assistance with materials and process selection and technical support services worldwide.

SABIC offers a broad portfolio of engineering resins, sheet, film and composite materials for interior applications that conform to the U.S. Department of Transportation Federal Transit Administration (FTA) fire safety norms and the National Fire Protection Association (NFPA) 130 Standard for Fixed Guideway Transit Systems regulation.

SABIC'S SHEET PORTFOLIO

- ULTEM™ R16SG29 sheet
- LEXAN™ H6500 sheet
- LEXAN KH6500 sheet
- LEXAN FRA 25C sheet
- LEXAN FRA 460 sheet
- LEXAN MARGARD™ MRT sheet

SABIC'S RESIN PORTFOLIO

- ULTEM resin
- LEXAN resin
- LEXAN FST resin
- NORYL™ low smoke resins
- CYCOLOY™ resin

RAILWAY PASSENGER SAFETY & REGULATORY OVERVIEW

Below table lists FRA and National Fire Protection Association (NFPA) 130 Standard for Fixed Guideway Transit Systems material requirements for flammability and smoke emission specifications of the rail transit vehicles in U.S.

MATERIALS		FLAMMABILITY		SMOKE EMISSION	
Category[a]	Function[a]	Test Procedure	Performance Criteria	Test Procedure	Performance Criteria
PASSENGER SEATS, SLEEPING AND DINING CAR COMPONENTS	Seat frames, mattress frames , seat and toilet shroud, food trays	ASTM E 162	I_s ≤35 No flaming drips	ASTM E 662	Ds (1.5) ≤ 100 Ds (4.0) ≤ 200
PANELS	Wall, ceiling, partition, tables and shelves, windscreen	ASTM E 162	I_s ≤35 No flaming drips	ASTM E 662	Ds (1.5) ≤ 100 Ds (4.0) ≤ 200
	Window, light diffuser, transparent plastic windscreens[14]	ASTM E 162	I_s ≤100	ASTM E 662	Ds (1.5) ≤ 100 Ds (4.0) ≤ 200

a Categories and functions follow the FRA guidelines. FTA recommend practices are similar, but not identical

14 For double window glazing, only the interior glazing is required to meet the requirements specified herein. (The exterior glazing is not required to meet these requirements.)

EXISTING FRA-CITED TEST METHODS:

American Society for Testing and Materials (ASTM)

ASTM E 162, Surface Flammability of Materials Using a Radiant Heat Energy Source

ASTM E 662, Specific Optical Density of Smoke Generated by Solid Materials

ASTM E1354, Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter

SMP 800C, Toxic Gas Generation by Materials on Combustion

WEIGHT OUT & PART INTEGRATION

Engineering thermoplastics solutions from SABIC can help manufacturers address the growing demand for sustainability, lower system costs, improved durability and comfort and design innovation. Compared to metal, thermosets and glass, thermoplastics can significantly lower system costs through consolidation of parts to streamline production, avoidance of secondary operations such as painting, coating, machining and polishing, and lower shipping costs by reducing weight.

SABIC has introduced two new LEXAN sheet products to its materials portfolio. These new products include LEXAN H6500 sheet, a PC/ABS sheet grade and LEXAN KH6500 sheet, an anti-graffiti sheet grade that both comply with U.S. FRA railway standard. These products have been engineered to help rail customers meet growing demand for enhanced sustainability and advanced thermoplastic technologies with non-chlorinated and non-brominated flame retardance that enhance the design and development of rail interior applications.

LEXAN 9034 sheet, available in clear transparent and translucent colors, is a flame retardant, lightweight product that can be an excellent choice for light diffusers and light covers. It offers ease of processing, excellent formability and can help achieve part integration in train ceilings with light diffusers.

Railway interior using new LEXAN KH6500 sheet

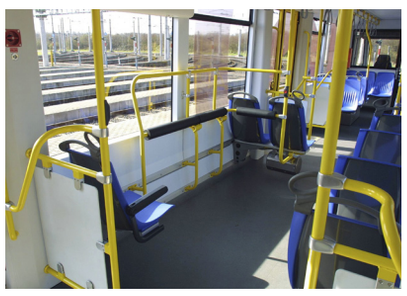
LEXAN H6500 sheet is an opaque, solid, low-gloss PC/ABS blend that delivers high stiffness for railway sidewalls, tables and seating. Its sustainable fire retardance meets the requirements of the Restriction of Hazardous Substances (RoHS) directive and it delivers non-chlorinated and non-brominated product technology. LEXAN H6500 sheet complies with current U.S. FRA standards. The material can be thermoformed at a lower temperature than traditional PC materials. Its molded-in color capability can help avoid the cost and environmental hazards of painting and provides excellent aesthetics.

Amtrak uses LEXAN FRA 25C sheet for its passenger train's window glazing.

Both LEXAN FRA 25C sheet (.250") and LEXAN FRA 460 sheet (.460") are monolithic, high impact resistant polycarbonate sheets with a proprietary abrasion resistant surface, providing 70 times the impact resistance of laminated glass with no spalling. These products have been specifically developed for rail glazing applications. LEXAN FRA 460 sheet and dual glazed LEXAN FRA 25C sheet with a .250" air gap meet the UMTA glazing guidelines and the FRA Type I & II ballistic and impact requirements. Both products are UL listed.

LEXAN FR60 flame-retardant film is a clear, thin-gauge polycarbonate film with a polish finish on both sides, meeting the stringent requirements in railway interior applications. LEXAN FR60 film offers ease of thermoforming, hydroforming, embossing, die-cutting, folding and bending and is very suitable for applications such as print advertisement in passengers trains or metro, backlit advertisement panels and displays.

ULTEM R16SG29 sheet is a polyetherimide (PEI) material that features inherent flame retardancy and low smoke emission. It complies with the U.S. FRA norm for interior applications. ULTEM R16SG29 sheet delivers excellent impact resistance and chemical resistance for easy cleaning, anti-graffiti performance and long use of life.



ULTEM R16SG29 (PEI) sheet railway interior cladding

Compin chose LEXAN™ EXL resin to make various seating parts for the “Future Interior of the TGV” French railways high-speed train.

LEXAN FST resin (flame-smoke-toxicity) polycarbonate (PC) copolymer is the first thermoplastic resin solution for rail seating applications to meet the strictest fire safety requirements under the U.S. railway NFPA-130 standard. LEXAN FST3403 copolymer is developed specifically for seat back shells and side covers . In addition to its exceptional heat release, smoke density and toxicity performance, documented by independent laboratory testing, the LEXAN FST copolymer provides high flow capabilities that enable large parts, such as seat back shells, to be injection molded without marks, texture defaults, flow lines and other surface defects. Another aesthetic benefit of the copolymer is its ability to be custom colored, which avoids the need for secondary painting.

LEXAN EXL resin demonstrates durability in railway seating designed for Très Grande Vitesse (TGV) – the French railway high-speed trains. COMPIN chose this super-tough polycarbonate resin with added impact performance and low temperature ductility. LEXAN EXL resin maintains impact ductility after outdoor exposure, demonstrating good weatherability. It also has a low temperature ductility to -60 °C. This resin’s flame retardancy conforms to Blue Angel and TCO99 standards and resists a variety of industrial and consumer chemicals. LEXAN EXL resin also has a 20 - 40% reduction in cycle time processability. This resin exhibits good flow properties and extensive color capability. It also matched the customer’s specific requirement for a particular shade of grey (gris 150 sable). This, plus its light-weight, makes LEXAN EXL resin a great materials candidate for various railway seating parts.

NORYL NH6010B resin, offers low smoke density (ASTM E662 test) and toxicity (NF X 70-100 test) values compared to metal conduits, while remaining economically viable. This can be a critical advantage in transportation applications, as the first four minutes after the start of a fire are considered crucial in terms of occupant survival. Materials that generate low smoke in this short span can help facilitate passengers’ exit to safety. With increasing awareness about environmental concerns, Fraenkische Rohrwerke (Germany), manufacturer of electrical conduit and drainage systems, introduced a range of halogen-free conduits based on NORYL NH6010B non-halogenated resin offering low smoke, toxicity, and flame performance to comply with IEC 61386, the European Union (EU) standard for electrical conduit and suitable for extrusion or injection molding.

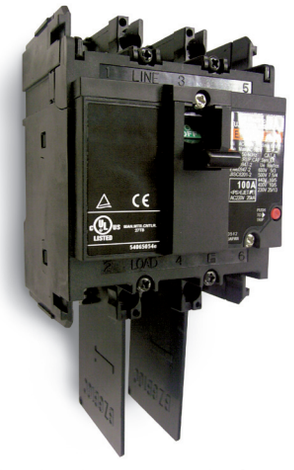
For first-class railcars' tough, new seat back shells and side panels, Grammer Railway Interior GmbH has selected SABIC's new LEXAN FST copolymer – which meets requirements for the highest hazard level (HL3) for R6 under Europe's EN 45445-2 harmonized standard for fire safety.

CYCOLOY resins are amorphous PC/ABS blends that offer the superior mechanical properties and heat resistance of polycarbonate (PC) resins combined with the excellent processability of ABS materials. In addition, CYCOLOY resins offer non-brominated and non-chlorinated FR systems, odorless solutions and superior heat aging and color stability properties versus comparable ABS materials.

Generic property comparison

PROPERTY	ABS MATERIALS	PC/ABS
Halogen free FR	●	●
Low emission / odorless	●	●
Heat aging	●	●
Color stability	●	●
High Heat	●	●
Impact @ RT	●	●
Impact @ low T	●	●
Shrinkage	●	●
Flow	●	●

ULTEM resin spun fibers may address your need for inherent flame resistance; low smoke toxicity; aesthetic. For railway interior fabrics and panels, ULTEM polyetherimide (PEI) resin from SABIC has the high-temperature performance and inherent flame resistance manufacturers need to meet the increasing challenges of stringent flame resistance and low FST (Flame, Smoke and Toxicity) regulations. Plus, with great aesthetic qualities and good dyeability, it's a smart way to achieve both compliance and appearance at the same time. This advanced amorphous polymer allows woven fabrics to be colored using conventional exhaust dying techniques, resulting in exceptional colorfastness and high tolerance to UV light. ULTEM resin also offers lightweight advantages along with outstanding mechanical integrity at elevated temperatures, and can be blended with other fibers for an optimal balance of performance and cost.



Fuji Electric using NORYL resins for switch gear isolator plates

The new seats of Brazil's new Sao Paolo monorail are being manufactured by Monte Meão for Bombardier using NFPA-130 compliant LEXAN FST3403 resin.

ANTI-VANDALISM

For passenger comfort and overall usability, thermoplastics from SABIC provide ease of cleaning, protection against graffiti and high impact performance to resist vandalism.

SABIC's new product, called LEXAN™ KH6500 sheet is an opaque product with outstanding anti-graffiti properties that will help railway interior designers and manufacturers to create aesthetically-pleasing components which are resistant to graffiti and vandalism, helping lower maintenance cost. LEXAN KH sheet meets the requirements of current U.S. FRA rail standard, offering customers a non-chlorinated and non-brominated material option supporting their sustainability efforts.

This new LEXAN sheet solution complies with French anti-graffiti norm NF F 31-112, offering outstanding chemical resistance against graffiti and cleaning agents, providing cost-efficient choice. They are an excellent choice to replace polyvinyl chloride (PVC), polyester, vinyl ester or phenolic fiber-reinforced plastic (FRP) materials used in many interior train applications including interior panels, window frames, ceilings and other large interior parts.

LEXAN MARGARD™ MRT sheet can be an excellent choice to reduce railcar weight by replacing traditional glass, offering excellent abrasion resistance behavior combined with excellent chemical resistance. Additionally, LEXAN MARGARD MRT sheet can provide reduced weight, high impact strength and forced entry protection, graffiti resistance, excellent flame retardance and UV- and abrasion resistance. It can be an excellent candidate for the compartment partitions, windscreens, interior separation windows and map covers.

Coated, transparent LEXAN MARGARD Sheet has been chosen by TOHO SHEET & FRAME CO., LTD, a leading Japanese converter, for the double glazing of side windows of The JAPAN RAILWAYS HOKKAIDO.

Italian railways compartment separators using LEXAN MARGARD sheet.

THERMOPLASTICS SHEET AND RESIN PORTFOLIO ADDRESSING TRENDS

			OPAQUE SHEET			TRANSPARENT SHEET				
			ULTEM Sheet (PEI)	POLYCARBONATE & Blends FR - Transportation		POLYCARBONATE FR - Transportation				
			High Modulus Meets U.S. FRA Norm Ceilings & Side Walls	High Modulus Meets U.S. FRA Norm	Anti-Graffiti, High Stiff, Low Gloss FR, Meets U.S. FRA Norm	Flame Retarded Clear Polycarbonate (Also Available in Opal White)	Coated Flame Retarded Polycarbonate for Rail Glazing	UV, Mar-resistant, High Optical Quality PC	FRA Compliant for Glazing, Coated Polycarbonate	Flame Retardant Thin Gauge Film
			ULTEM R16SG29 SHEET	LEXAN H6500 Sheet	LEXAN KH6500 sheet	LEXAN F2000 Sheet	LEXAN FRA 25C Sheet	MARGARD MR5E Sheet	LEXAN FRA 460 Sheet	LEXAN FR60 Film
Ceilings & Side Walls		CEILING	●	●	●	–	–	–	–	–
		WINDOW FRAME	●	●	●	–	–	–	–	–
		WALL CLADDING	●	●	●	–	–	–	–	●
		PARTITIONS	●	●	●	–	●	●	●	–
		DRAFT SCREENS	–	–	–	–	●	●	●	–
		OVERHEAD LUGGAGE RACKS	●	●	●	●	●	●	●	–
		DRIVERS DESK	●	●	●	–	–	–	–	–
		SUN BLIND	●	●	●	●	●	–	–	–
		AIR DUCTING	●	●	●	–	–	–	–	–
		CONTAINERS & COMPARTMENTS	●	–	–	–	–	–	–	–
		INTERIOR SURFACE GANGWAYS	●	●	●	–	–	–	–	–
		TABLES - including bottom surface	●	●	●	–	–	–	–	–
		ENCLOSURES FOR ELECTRICAL EQUIPMENT	●	●	●	–	–	–	–	–
		PASSENGER INFO DEVICES	–	–	–	●	●	–	–	–
Seats & Arm Rests		SEAT BACKS - Back & Base Shell	●	●	●	–	–	–	–	–
		TRAY TABLES	●	●	●	–	–	–	–	–
		ARM RESTS	●	●	●	–	–	–	–	–
Lighting, Electrical & Signage		LIGHT DIFFUSERS	–	–	–	●	–	●	–	–
		VERTICAL COVER STRIPS - ON WALLS	–	–	–	●	–	●	–	–
		LAMP COVERINGS	–	–	–	●	–	●	–	–
		CONNECTORS & ELECTROTECHNICAL APPLICATIONS	–	–	–	–	–	–	–	–
		CABLE CHANNELS	–	–	–	–	–	–	–	–
		LIGHTING COVERING	●	●	–	●	–	●	–	–
SPECIFICATIONS & NORMS	EUR	EN 45545-2:2013 R1 Interior Surfaces	HL3 @ 2.6-4mm	–	–	–	–	–	–	–
	EUR	EN 45545-2:2013 R4 Light Diffusers	–	–	–	HL3 @ 2-4mm	–	–	–	–
	EUR	EN 45545-2:2013 R6 Passenger Seat Shells	HL3 @ 2.6-4mm	–	–	–	–	–	–	–
	EUR	EN 45545-2:2013 R22 Connectors & Electrotechnical applications	–	–	–	–	–	–	–	–
	DE	DIN 5510-2:2009	–	S4/SR2/ST2 @3-4mm	S4/SR2/ST2 @3-5mm	S4/SR2/ST2 @3-6mm	–	–	–	–
	FR	NF F 16-101 / -102	–	M1@2-4mm F1@ 3-4mm	–	M2/F2 @2-8mm	–	–	–	–
	FR	Anti- Graffiti NF F 31-112 SNCF	–	–	Pass	–	–	–	–	–
	IT	UNI CEI 11170-3	–	–	–	Class 1A @ 2-4mm	–	–	–	–
	POL	PN-K-02511 & UIC564-2, Annex 7-11-15	–	P1(A)-R1-A D2(B)- T2 @3mm	–	P1(B)-R1-A D2-B @3mm	–	–	–	–
	USA	ASTM E162 - Flame Spread Index I_s ≤35 no flaming drips	Pass	Pass	Pass	–	–	–	–	–
	USA	ASTM E162 - Flame Spread Index I_s ≤ 100	–	–	–	to be tested	Pass	Pass	Pass	–
	USA	ASTM E662 - Optical Smoke Density	Pass	Pass	Pass	to be tested	Pass	Pass	Pass	–
	USA	ASTM E1354 - Heat Release	Data on file	Data on file	Data on file	to be tested	Pass	Pass	Pass	–
	INT	Smoke Toxicity – BSS 7239, SMP800C	Pass	Pass	–	–	–	–	–	–
	INT	UL-94 V0	–	@3mm (5VA)	–	@ 3mm	–	–	–	@ 0.23mm
	INDIA	UIC 564-2 App 15 - Smoke Density	–	–	–	–	–	–	–	–
	INDIA	NCD 1409 - Toxicity Index (100g)	–	–	–	–	–	–	–	–
	RUS	GOST 12.1.044-89	–	FR(TG) T2 SLOW D3	–	–	–	–	–	–
	DE	ECO FR - Chlorine & Bromine Free	●	●	●	–	–	–	–	–

OPAQUE RESIN

POLYCARBONATE & PC/ABS FR
- Transportation

Flame Retarded, High Flow, Mould Release	Flame Retarded, High Flow, Improved Impact & Processing	Flame Retarded, UV Stabilized	Flame Retarded, Improved Flow	Flame Retarded, Improved Flow	Flame Retarded + 10%GF, UV Stabilized	Flame Retarded + 10%GF, Improved Impact & Processing	Flame Retarded + 20%GF	Flame Retarded, High Flow, UV Stabilized	Flame Retarded PC/ABS, Extrusion	Flame Retarded, High Flow PC/ABS, Improved Impact
LEXAN 915R (LEXAN 916R) resin	LEXAN EXL9330 resin	LEXAN 945U resin	LEXAN FST3403 resin	LEXAN FST3002 resin	LEXAN 505RU resin	LEXAN EXL5689 resin	LEXAN 3412ECR resin	LEXAN 923X resin	CYCOLOY C3650 resin	CYCOLOY CX7240 resin
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–	–	–	HL3 @ 3mm	HL2 @ 3mm	–	–	–	–	–	–
HL3 @ 2mm	HL3 @ 2mm	HL3 @ 1.5-3mm	–	–	HL3 @ 1.5-3mm	HL3 @ 3mm	HL3 @ 1.5-3mm	–	–	–
–	–	–	S4/SR2/ST2 @ 3mm	–	–	–	S4/SR2/ST2 @ 2mm	–		
–	M2 / F2 @ 2-3mm	–	M2 / F2 @ 3mm	–	F1 / I2 @ 1.6mm	F2 / I3 @ 3mm	F1 / I2 @ 1.3mm	–	M2 / F2 / I3 @ 2mm	M2 / F2 / I3 @ 2mm
–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–
–	–	–	P1-D2-R2-A-T2 @ 3mm	–	–	–	–	–	–	–
–	–	–	5	–	–	–	–	–	–	–
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–	–	–	5 @ 1.5 min 92 @ 4 min	–	–	–	–	–	–	–
–	–	–	in progress	–	–	–	–	–	–	–
–	–	–	pass	–	–	–	–	–	–	–
@ 1.1mm (@ 0.8mm)	@ 1.49mm	@ 1.5mm	(@ 0.8mm)	-	@ 1.5mm	@ 1.5mm	@ 1.5mm	–	@ 1.5mm	@ 0.75mm
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THERMOPLASTICS SHEET AND RESIN PORTFOLIO ADDRESSING TRENDS

			OPAQUE RESIN		OPAQUE RESIN			TRANSPARENT RESIN			
			PPE Blends FR - Transportation		POLYETHERIMIDE FR - Transportation			POLYCARBONATE FR - Transportation			
			Flame Retarded, Extrusion & Injection Moulding	Flame retarded, Extrusion	Flame Retarded, Natural	Flame Retarded + 30%GF	Flame Retarded + 20%GF, Improved Chemical Resistance, Mould Release	Flame Retarded, Extrusion, UV Stabilized (Also Available in Opal White)	Flame retarded, Extrusion, Special Satin Effect Opal White	Flame Retarded, Injection MoUlding, UV Stabilized (Also Available in Opal White)	Flame Retarded, Injection Moulding, UV Stabilized
			NORYL NH6010B resin	NORYL ENV150 resin	ULTEM 1000 (ULTEM 1010) resin	ULTEM 2300 resin	ULTEM CRS5201R resin	LEXAN EX9332T resin	LEXAN FXD9332T resin WH 1G003X	LEXAN 2034 resin	LEXAN 945AU resin
Ceilings & Side Walls		CEILING	–	–	–	–	–	–	–	–	–
		WINDOW FRAME	–	–	–	–	–	–	–	–	–
		WALL CLADDING	–	–	–	–	–	–	–	–	–
		PARTITIONS	–	–	–	–	–	–	–	–	–
		DRAFT SCREENS	–	–	–	–	–	–	–	–	–
		OVERHEAD LUGGAGE RACKS	–	–	–	–	–	–	–	–	–
		DRIVERS DESK	–	–	–	–	–	–	–	–	–
		SUN BLIND	–	–	–	–	–	–	–	–	–
		AIR DUCTING	–	–	–	–	–	–	–	–	–
		CONTAINERS & COMPARTMENTS	–	–	–	–	–	–	–	–	–
		INTERIOR SURFACE GANGWAYS	–	–	–	–	–	–	–	–	–
		TABLES - including bottom surface	–	–	–	–	–	–	–	–	–
		ENCLOSURES FOR ELECTRICAL EQUIPMENT	–	–	–	–	–	–	–	–	●
		PASSENGER INFO DEVICES	–	–	–	–	–	–	–	–	–
Seats & Arm Rests		SEAT BACKS - Back & Base Shell	–	–	–	–	–	–	–	–	–
		TRAY TABLES	–	–	–	–	–	–	–	–	–
		ARM RESTS	–	–	–	–	–	–	–	–	–
Lighting, Electrical & Signage		LIGHT DIFFUSERS	–	–	–	–	–	●	●	●	–
		VERTICAL COVER STRIPS - ON WALLS	–	–	–	–	–	–	–	–	–
		LAMP COVERINGS	–	–	–	–	–	–	–	–	–
		CONNECTORS & ELECTROTECHNICAL APPLICATIONS	–	–	–	–	–	●	–	●	–
		CABLE CHANNELS	●	–	●	●	●	–	–	–	–
		LIGHTING COVERING	●	●	–	–	–	●	●	●	–
SPECIFICATIONS & NORMS	EUR	EN 45545-2:2013 R1 Interior Surfaces	HL3 @ 2mm HL1 @ 3-4mm	–	–	–	–	–	–	–	–
	EUR	EN 45545-2:2013 R4 Light Diffusers	–	–	–	–	–	HL3 @ 2-3mm	HL3 @ 2-3mm	HL3 @ 2-3mm	
	EUR	EN 45545-2:2013 R6 Passenger Seat Shells	HL3 @ 2mm	–	–	–	–	–	–	–	–
	EUR	EN 45545-2:2013 R22 Connectors & Electrotechnical applications	–	–	–	–	–	–	–	–	HL3 @ 3mm
	DE	DIN 5510-2:2009	S4/SR2/ST2 @ 2-4mm	–	–	–	–	S4 / SR1 / ST2 @ 2-3mm	–	S4 / SR2 / ST2 @ 2-4mm	–
	FR	NF F 16-101 / -102	M2 / F1 / I3 @ 2-3mm	M2 / F3 @ 2mm	M1 / F2 @ 2-3mm	F1 / I2 @ 2-3mm	F1 / I3 @ 3mm	M1 / F2 @ 2mm M2 / F2 @ 3mm	–	M2 / F2 @ 2-4mm	F1 @ 2mm
	FR	Anti- Graffiti NF F 31-112 SNCF	–	–	–	–	–	–	–	–	–
	IT	UNI CEI 11170-3	–	–	–	–	–	–	–	–	–
	POL	PN-K-02511 & UIC564-2, Annex 7-11-15	–	–	–	–	–	–	–	–	–
	USA	ASTM E162 - Flame Spread Index I_s	@ 1.5mm	–	(@3.2mm)	–	–	–	–	–	–
	USA	ASTM E662 - Optical Smoke Density	@ 1.5mm	–	(@3.2mm)	–	–	–	–	–	–
	USA	ASTM E1354 - Heat Release	–	–	(@3.2mm)	–	–	–	–	–	–
	INT	Smoke Toxicity – BSS 7239, SMP800C	–	–	(@3.2mm)	–	–	–	–	–	–
	INT	UL-94 V0	@ 1.5mm	@ 1.5mm	@ 0.75mm	@ 0.25mm	@ 1.5mm	@ 1.5mm	–	@ 2.5mm	@ 3mm
	INDIA	UIC 564-2 App 15 - Smoke Density	–	–	–	–	–	–	–	–	–
	INDIA	NCD 1409 - Toxicity Index (100g)	–	–	–	–	–	–	–	–	–
	RUS	GOST 12.1.044-89	–	–	–	–	–	–	–	–	–
	DE	ECO FR - Chlorine & Bromine Free	●	●	●	●	●	–	–	●	●

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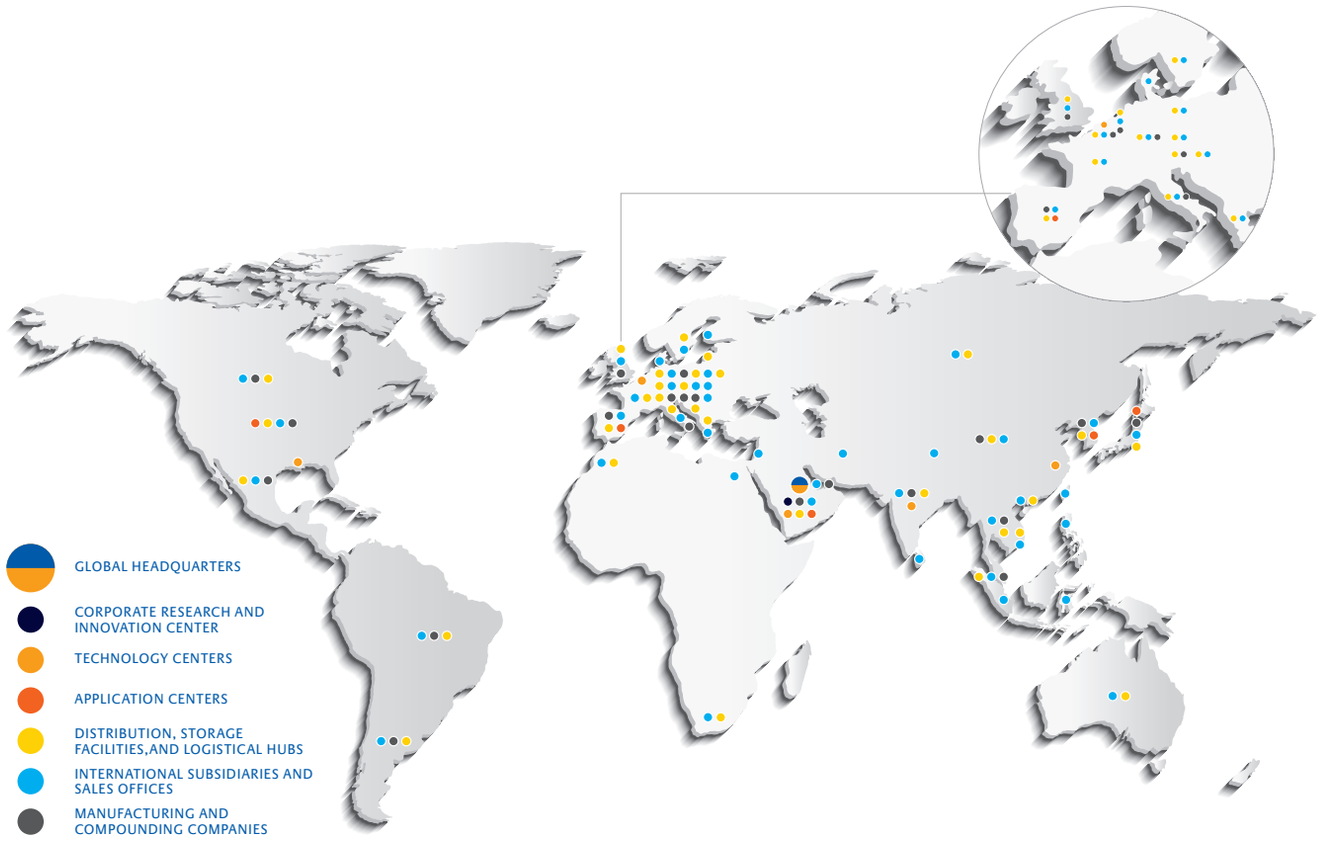

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