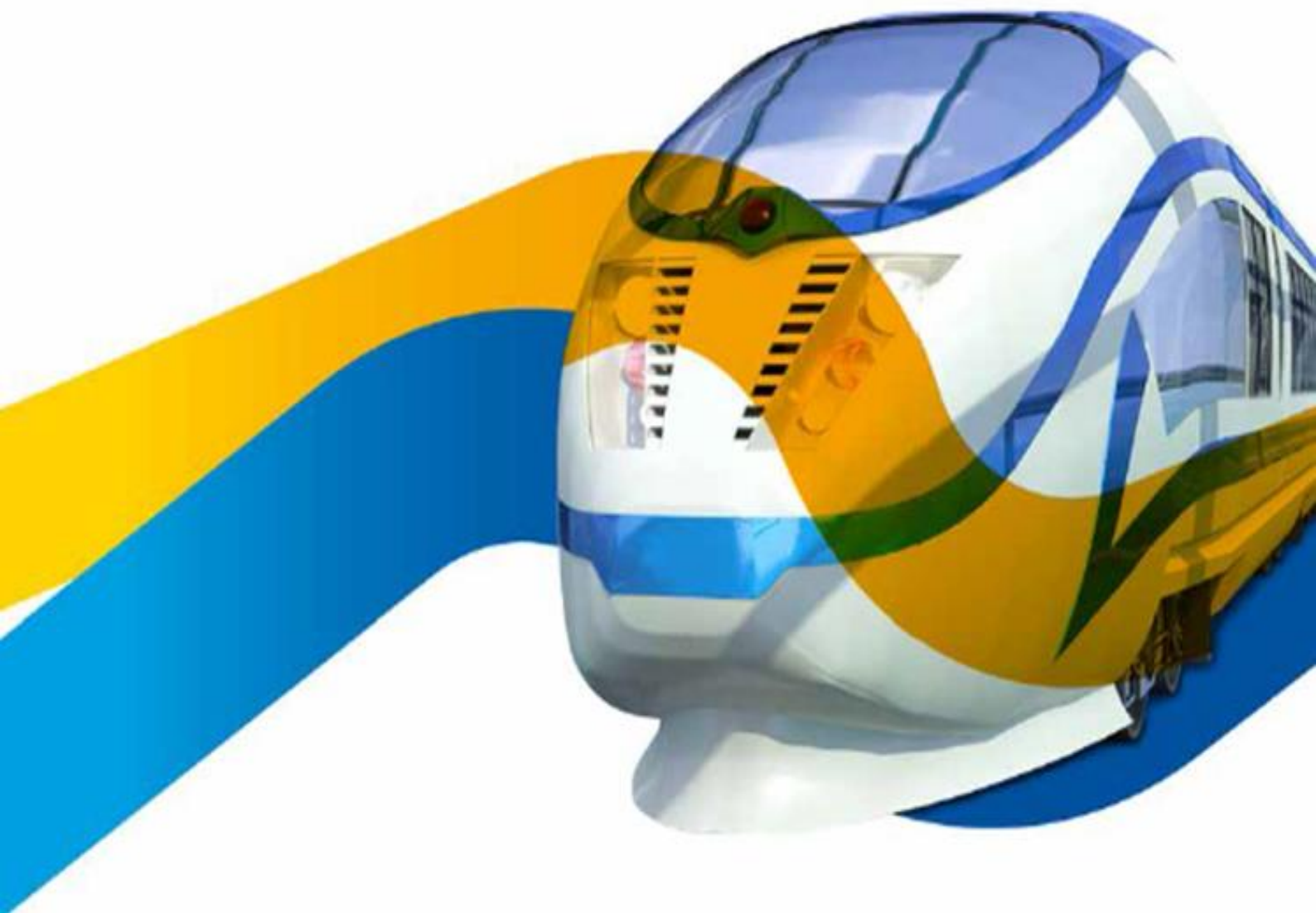


CHEMISTRY THAT MATTERS™



SABIC'S SPECIALTIES MATERIAL SOLUTION FOR THE EUROPEAN RAILWAY STANDARD EN 45545-2



CHEMISTRY THAT MATTERS™

SABIC'S SPECIALTIES MATERIAL SOLUTION FOR RAILWAY STANDARD EN 45545-2

The European Railway standard [EN 45545-2](#) is the result of harmonizing regional standards. It defines per [Design Category](#) (vehicle type) and [Operation Category](#) (passenger escape time) what [Hazard Level](#) (HL) is required. The [Requirement Class](#) (R) determines what tests need to be carried out to validate fire safety for a material in use in a defined application space. The higher the HL (HL1 – HL3) the more severe the safety requirements get.



N=Normal Vehicles



A=Automatic Train



D=Double Decks



S=Sleeping Vehicles

DESIGN CATEGORY

- N = Normal Vehicles (Tram, Trains)
- A = Automatic Train (Subway)
- D = Double Decks
- S = Sleeping Vehicles

OPERATIONAL CATEGORY

- 1 = No Tunnel
- 2 = Tunnel < 5km
- 3 = Tunnel > 5km
- No side evacuation

DEFINITION OF HAZARD LEVELS ACCORDING TO EN45545-2: HL3 MOST SEVERE

Operation Category (OC)		Design Category (DC)			
		N Standard	A Automatic	D Double Deck	S Sleeping
1	No Tunnel	HL1	HL1	HL1	HL2
2	Tunnel < 5km	HL2	HL2	HL2	HL2
3	Tunnel > 5km	HL2	HL2	HL2	HL3
4	No side evacuation	HL3	HL3	HL3	HL3

Each application has its own unique set of requirements. See table 2 of EN 45545-2

REQUIREMENT CLASSES (R) – EXAMPLES :

- R1 = Interior Cladding (e.g. side panels, partition walls, ducts)
- R4 = interior Lighting (e.g. covers, diffusers)
- R6 = Seating (back & base shells)
- R22 = Interior Electrical applications (e.g. connectors, circuit breakers)
- R23 = Exterior Electrical applications and smaller non listed products

SABIC'S SPECIALTIES MATERIAL SOLUTION FOR RAILWAY STANDARD EN 45545-2

Railway is playing an important role under the aspect of **Mobility**. SABIC's ULTEM™ & NORYL™ resins and LNP™ Copolymers & Compounds, are offering a range of materials **fulfilling** the stringent fire safety requirements as defined in **EN 45545-2**. This standard has become effective since 2018. Besides, properties such as low temperature ductility, transparency, enhanced weatherability, chemical resistance & **thin wall** design capability can be offered as well.



INDUSTRY TRENDS

- Increasingly stringent regulations
- Sufficient chemical resistance
- UV & mechanical aging
- Large geometries & part integration
- Weight out & cost optimization
- Interior design

TYPICAL MATERIAL REQUIREMENTS

- EN 45545-2 certification
- Resistance to cleaners & disinfectants
- Weathering acc. to UL 746C f1/ f2
- Good flow to fill the designs
- Capability beyond injection molding
- Custom color

PORTFOLIO EXAMPLES:

R22 / R23 CONNECTORS: FR, WEATHERING & DUCTILITY

- LNP EXL9330 resin: V-0 @ 1,5mm & f1, R22-HL2*
- LNP EXL5689 resin: GF10, V-0 @ 1,5mm & f1, R22-HL3

R22 / R23 CONNECTORS: THINWALL FR & STRENGTH

- LNP VALOX™ ENH4550 resin: V-0 @ 0,75mm, 5VA @ 2mm & f1, R23-HL2
- ULTEM 2300 resin: V-0 @ 0,25mm, R22-HL3

R1 CLADDING, CABLE & AIRDUCTS: FST & LOW SMOKE

- NORYL NH6010B resin: V-0 @ 1,5mm, extrusion, R1-HL3
- LNP FST3403T resin: LT¹ 78,4-80,4 %, molding & extrusion R1-HL3

R22 / R4 LIGHTING: TRANSPARENCY & DIFFUSIVITY

- LNP LUX7630C resin: V-0 @ 1mm, 5VA @ 3mm & f1, LT¹ 88%, R22-HL3
- LNP ELCRES™ SLX2471T resin: LT¹ 86%; LNP FXD9332T resin: diffusive, extrusion, R4-HL3

R6 SEATING: FLAME, SMOKE & TOXICITY, HEAT RELEASE

- LNP FST3403T resin: sufficient flow, custom colors, R6-HL3
- ULTEM 9085 resin: higher heat, R6-HL3

¹ LT (Light transmission) according to ASTM D1003 @ 2.54mm on injection molded plaques

*Thickness depending – See detailed listing next page

SABIC'S SPECIALTIES MATERIAL SOLUTIONS FOR RAILWAY STANDARD EN 45545-2

SABIC'S SPECIALTIES MATERIAL SOLUTIONS OVERVIEW PER REQUIREMENT CLASS

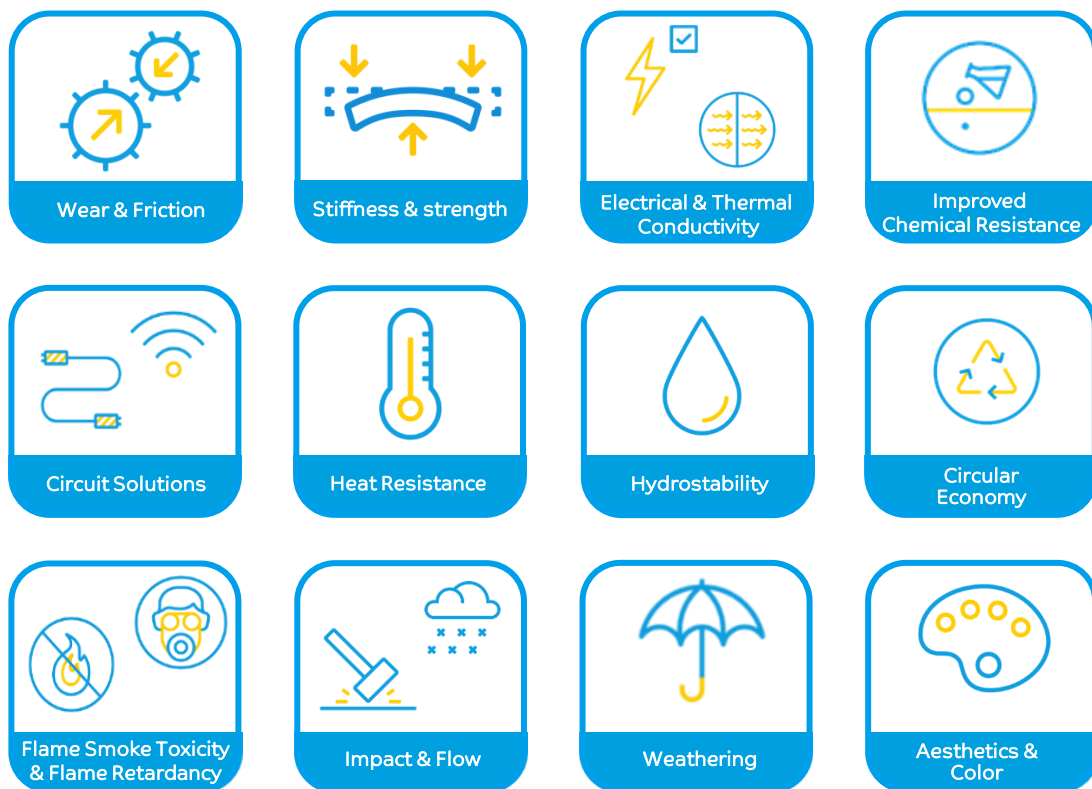
SABIC's Specialties LNP™ Copolymers & Compounds, NORYL™ and ULTEM™ resins			Classification according to EN 45545-2			
Product	Grade	[mm]	Cladding (Side panels, Partition Walls)	Lighting (Covers, Diffusers)	Seating (Back & Base Shell)	Electrical applications (Connectors, Circuit breakers)
			R1	R4	R6	R22 interior (R23 exterior)
LNP LUX Copolymer	LUX7630C	1.5 - 3		R4-HL3		R22-HL3
LNP LUX Copolymer	LUX7630	1.5 - 3				R22-HL3
LNP EXL Copolymer	EXL9330	1.5 - 3				R22-HL2
LNP EXL Copolymer	EXL5689 (10% GF)	1.5 - 3				R22-HL3
LNP FST Copolymer	FST3403	3	R1-HL3		R6- HL3	
LNP FST Copolymer	FST3403T	1 - 4	R1-HL3	R4-HL3	R6-HL3	
LNP FXD Resin	FXD9332T Extrusion	2		R4-HL3		
LNP ELCRES SLX Copolymer	SLX2471MT	3 - 4		R4-HL3		
LNP THERMOCOMP™ Compound	UX06032 (30% GF)	1.6				R22-HL3
LNP THERMOCOMP Compound	LX97024 (15% GF)	0.8 – 1.5				R22-HL1
LNP THERMOCOMP Compound	DC0041XX5* (20% CF)	2 - 4			R6-HL3	
LNP VALOX™ Resin	ENH4550 (25% GF)	1.5-3				R23-HL2
NORYL Resin	NH6010B	2.5 – 4	R1-HL3 (1.5mm) R1-HL2 (4mm)		R6-HL3 (1.5mm) R6-HL2 (4mm)	
NORYL Resin	NP6100	1.5				R22-HL3
ULTEM Resin	1000	3				R22-HL1
ULTEM Resin	2300 (30% GF)	3				R22-HL3
ULTEM Resin	9085	3-4			R6-HL3	

SABIC INTERNAL DATA - VALIDITY OF CERTIFICATE TO BE CHECKED

SABIC'S SPECIALTIES MATERIAL SOLUTIONS PORTFOLIO OVERVIEW

As the 'home of unique offerings' within SABIC, the Specialties business is focused on challenging technology endeavors that deliver fundamental progress to the way the world travels, communicates, works and lives. Leveraging global application technology centers and deep materials processing expertise, Specialties' solutions are provided to a wide range of industries to support global Megatrends such as [Healthcare & Water Management](#), [Automotive Electrification](#), [Renewable Energy](#), [Connectivity](#) and [Sustainability](#), helping our customers to make the difference.

SABIC's Specialties portfolio under the brands of [ULTEM™](#), [EXTEM™](#), [SILTEM™](#), [NORYL™](#), [LNP™](#), [ELCREST™](#) and [ELCRIN™](#) includes engineering thermoplastic resins, copolymers, blends, compounds, composites, films, filaments and additives which can be described by 12 properties and strives to push boundaries



CONTACT US: Europe T1(0) 0800 1 238 5060, T2 00 36 1 238 5060, E webinquiries@sabic.com

DISCLAIMER: THE MATERIALS, PRODUCTS AND SERVICES OF SAUDI BASIC INDUSTRIES CORPORATION (SABIC) OR ITS SUBSIDIARIES OR AFFILIATES ("SELLER") ARE SOLD SUBJECT TO SELLER'S STANDARD CONDITIONS OF SALE, WHICH ARE AVAILABLE UPON REQUEST. INFORMATION AND RECOMMENDATIONS CONTAINED IN THIS DOCUMENT ARE GIVEN IN GOOD FAITH. HOWEVER, SELLER MAKES NO EXPRESS OR IMPLIED REPRESENTATION, WARRANTY OR GUARANTEE (I) THAT ANY RESULTS DESCRIBED IN THIS DOCUMENT WILL BE OBTAINED UNDER END-USE CONDITIONS, OR (II) AS TO THE EFFECTIVENESS OR SAFETY OF ANY DESIGN OR APPLICATION INCORPORATING SELLER'S MATERIALS, PRODUCTS, SERVICES OR RECOMMENDATIONS. UNLESS OTHERWISE PROVIDED IN SELLER'S STANDARD CONDITIONS OF SALE, SELLER SHALL NOT BE RESPONSIBLE FOR ANY LOSS RESULTING FROM ANY USE OF ITS MATERIALS, PRODUCTS, SERVICES OR RECOMMENDATIONS DESCRIBED IN THIS DOCUMENT. Each user is responsible for making its own determination as to the suitability of Seller's materials, products, services or recommendations for the user's particular use through appropriate end-use and other testing and analysis. Nothing in any document or oral statement shall be deemed to alter or waive any provision of Seller's Standard Conditions of Sale or this Disclaimer, unless it is specifically agreed to in a writing signed by Seller. Statements by Seller concerning a possible use of any material, product, service or design do not, are not intended to, and should not be construed to grant any license under any patent or other intellectual property right of Seller or as a recommendation for the use of any material, product, service or design in a manner that infringes any patent or other intellectual property right.

SABIC and brands marked with ™ are trademarks of SABIC or its subsidiaries or affiliates, unless otherwise noted.
© 2021 Saudi Basic Industries Corporation (SABIC). All Rights Reserved.

Any brands, products or services of other companies referenced in this document are the trademarks, service marks and/or trade names of their respective holders.