SAERTEX®

SAERTEX LEO®SERIES

LIGHTWEIGHT WITH EXTREME OPPORTUNITIES

EVERYTHING FROM A SINGLE SOURCE: THE LEO SERIES

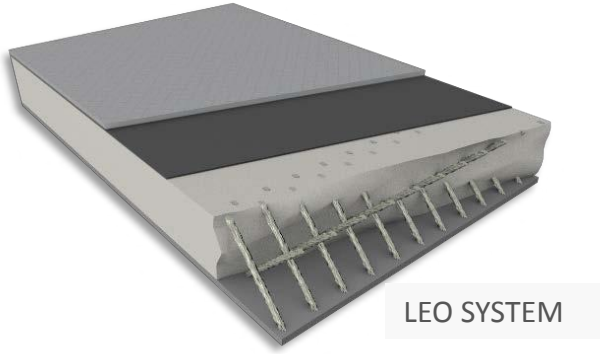
SAERTEX LEO SERIES

SAERCORE LEO

- Interior, non-structural parts
- For fire protection
- RTM processing
- Use with your own filled resin system

LEO SYSTEM

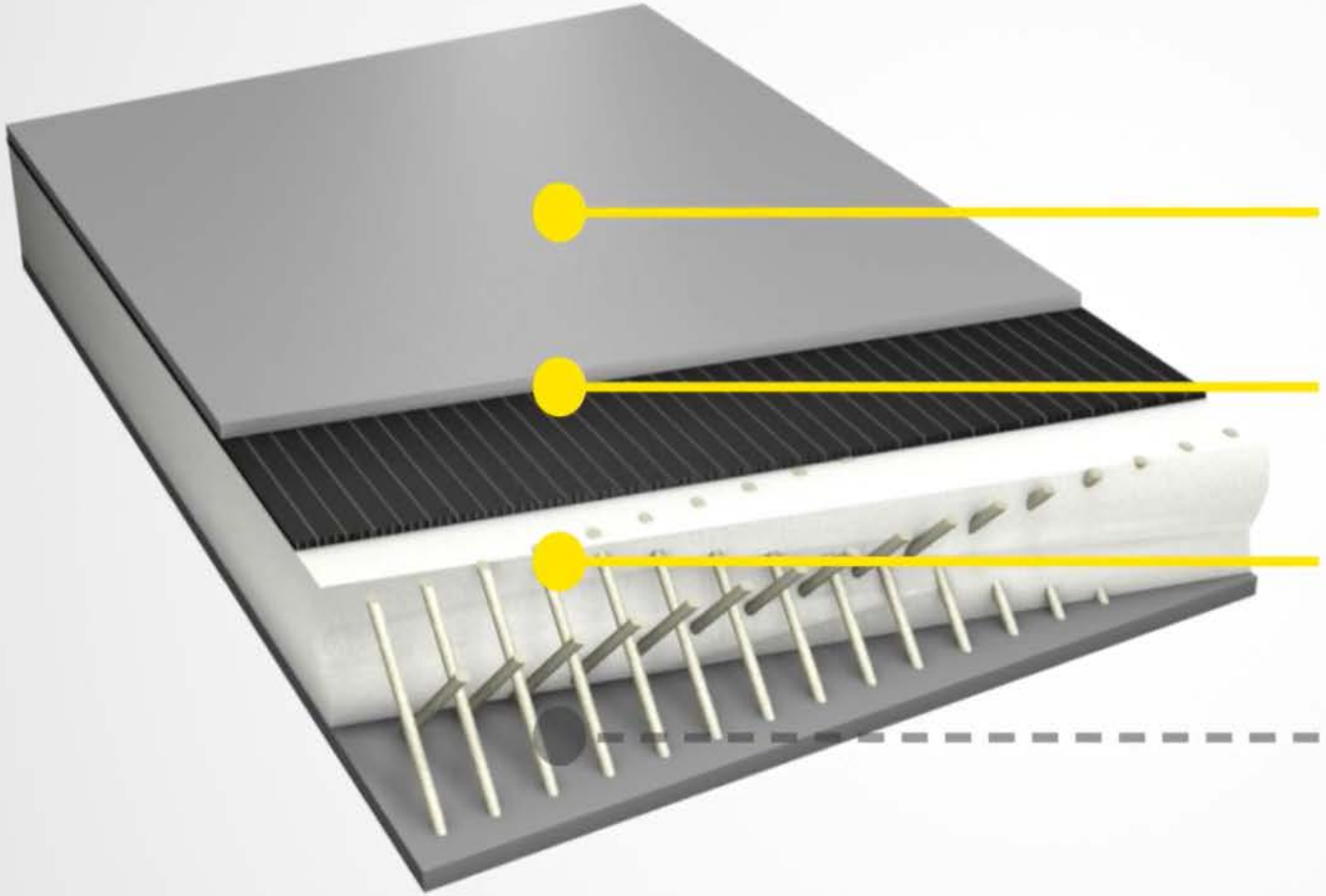
- Structural parts with complex shapes
- For fire protection
- Vacuum infusion and RTM
- System: Non-crimp fabric, Gelcoat, core material, and resin



LEO COATED FABRIC

- Structural parts with simple shapes (flat, single curved)
- For the highest fire protection
- Vacuum Infusion and RTM
- One fabric: NCF with integrated fire protection layer from SAERTEX
- Your standard resin

SAERTEX LEO®: HIGH PERFORMANCE SANDWICH SUPER-STRUCTURES



LEO Protection Layer
(Topcoat / Gelcoat)

LEO Reinforcement Material
(Glass / Carbon / Aramid / Hybrid)

Core Material
(SAERfoam / LEOcore / Balsa)

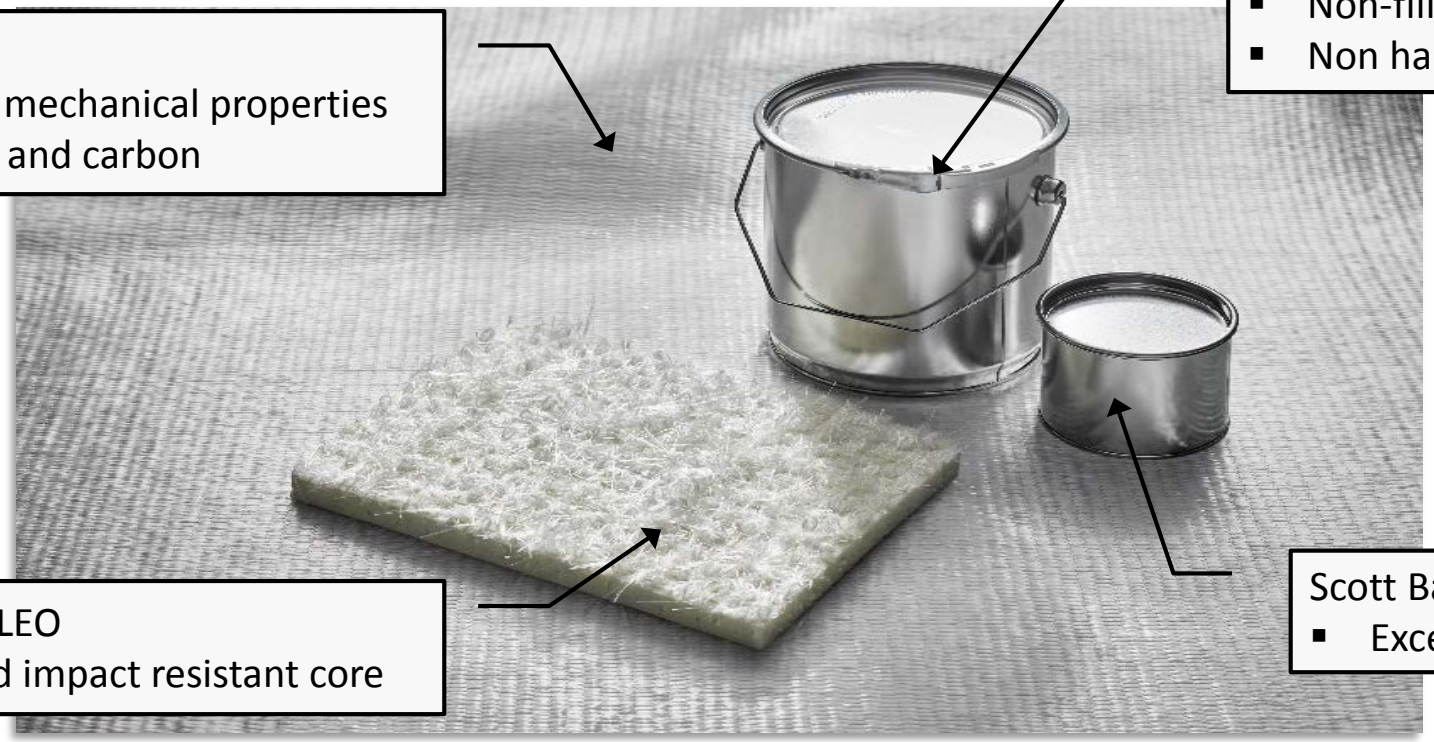
impregnated with
LEO Infusion Resin

SCOTT BADER & SAERTEX JOIN FORCES FOR COMPOSITES WITH FST PROPERTIES

- Optimized solution for infusion of structural composites
- Global availability and representation
- Excellent fire and weathering performance

SAERTEX LEO NCF
- Uncompromised mechanical properties
- Available in glass and carbon

Scott Bader LEO Crestapol 1261PA
- Non-filled resin → easy to infuse
- Non halogenated



SAERTEX SAERfoam LEO
- High stiffness and impact resistant core

Scott Bader LEO Fireguard 78PA
- Excellent processability

SAERTEX LEO®

40% LOWER COMPONENT WEIGHT WITH
THE SAME RIGIDITY COMPARED TO HLU
3 X LESS FLAME EXPANSION WHEN
COMPARED TO FIRE PROTECTED PES GRP
98% LESS FLAME PROGRESS WHEN
COMPARED TO NORMAL PES
5 TIMES HIGHER COMPONENTS RIGIDITY
WITH EQUAL WEIGHT
12 x HIGHER TENSILE STRENGTH
VS. HAND LAY-UPS
57 x LESS SMOKE GENERATION
VS. FIRE PROTECTED PES GRP

JEC INNOVATION AWARD FINALIST 2018

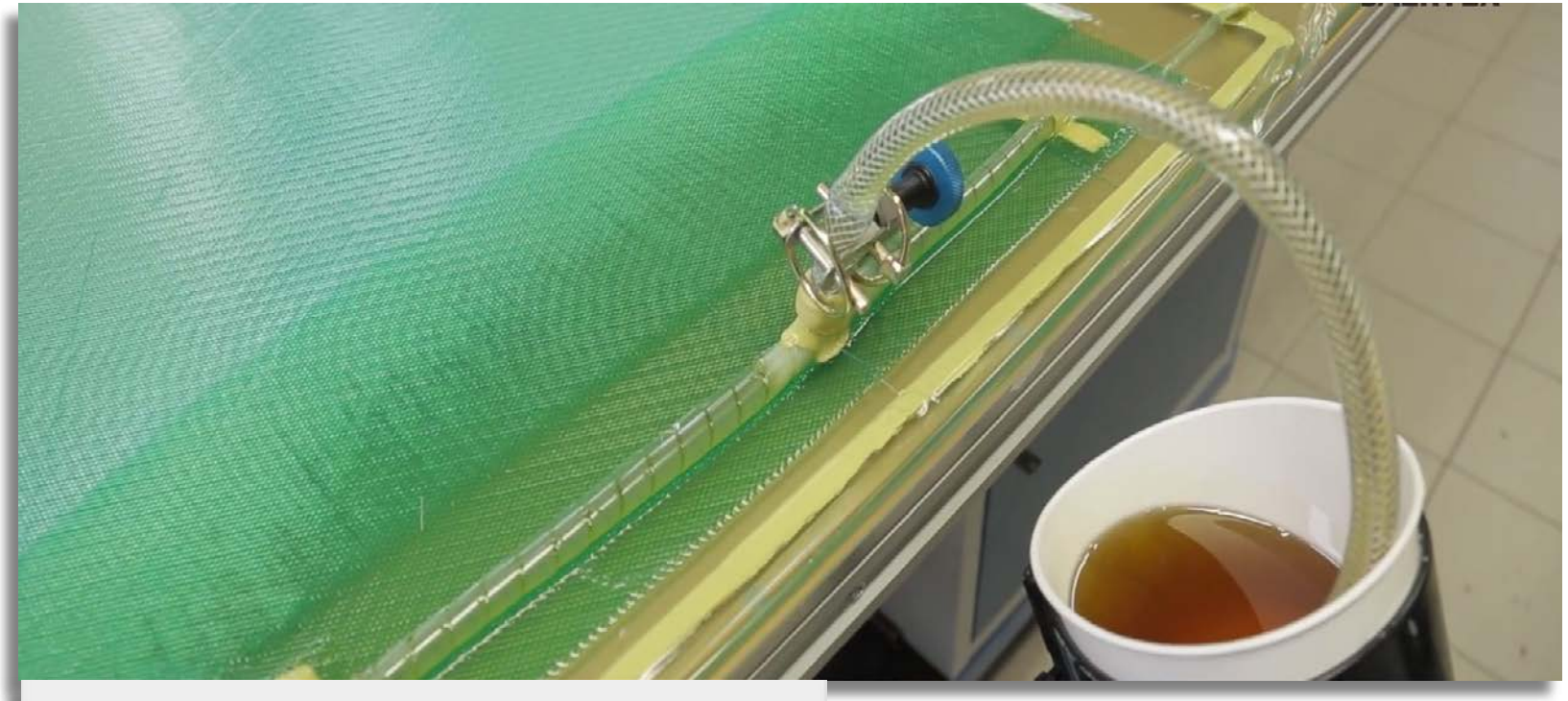
The ICE is the prestigious fastest train of the Deutsche Bahn fleet. There are over 66 trains of the version 3 still in use. This fleet was introduced in the year 2000 and it´s passenger wagons are now being renovated.

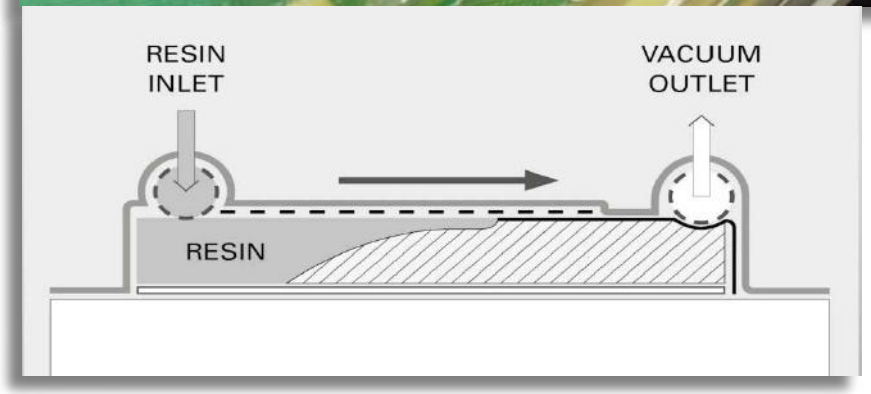
SMT won the tender with floor system based on SAERTEX LEO Materials:

- Lightweight flooring system
- EN 45545 compliant
- High wear and tear resistance as well as corosion resitance
- DIN SPEC 91326 compliant

JEC AWARD FINALIST IN THE CATEGORY „Railways“
SAERTEX IN PARTNERSHIP WITH SMT AND ALAN HARPER

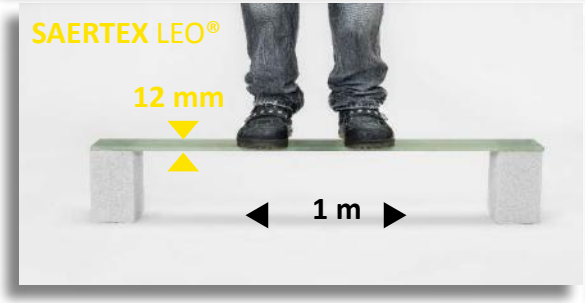
VACUUM INFUSION

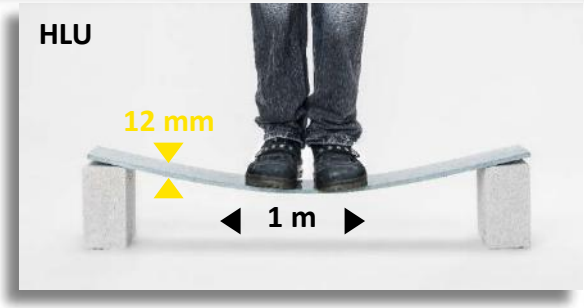


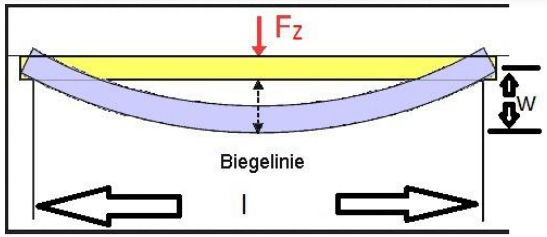


COMPARISON OF MATERIALS

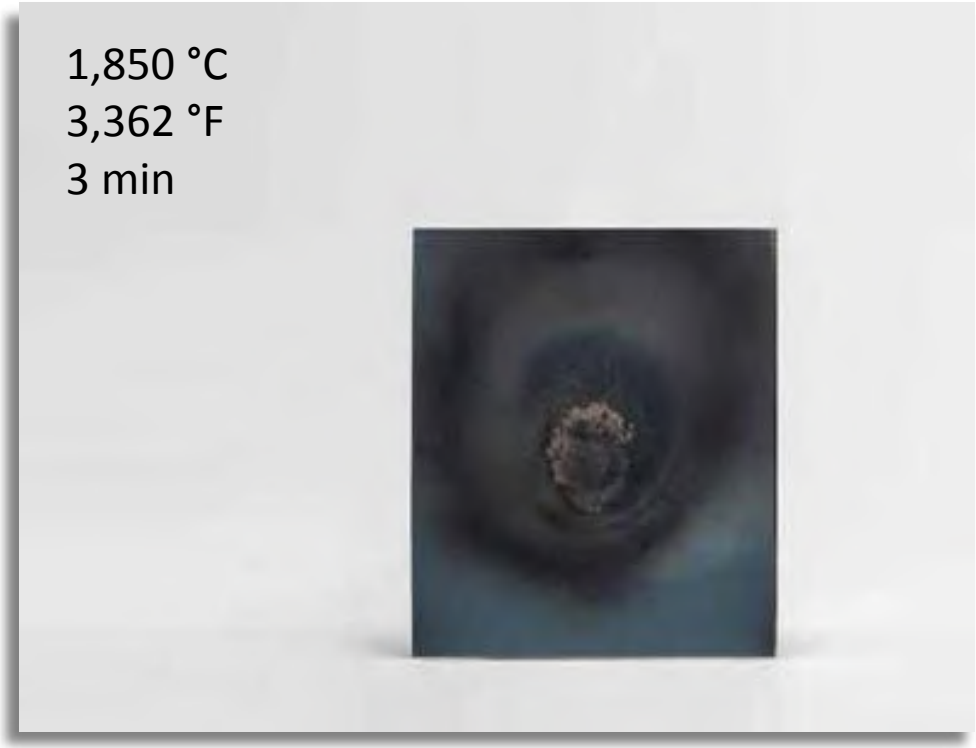
„3-point-bending"				
Parameter	Reference (Hand Laminate)	LEO -Variations (Infusion)		Aluminium
		LEO UD -stiff-	LEO UD -light-	
E-Modulus 0° [GPa]	8,3	42,5	42,5	70
Material Thickness [mm]	11,84	11,9	6,72	11,5
Weight [g]	3.036	3.259	1.833	4,65
Bending [mm]	96,78	18,43	103,38	12,5
Result	Reference	approx. 7 % heavier	**approx. 40% lighter**	approx. 50 % heavier
		5 x stiffer	Similar stiffness	**7 x stiffer**



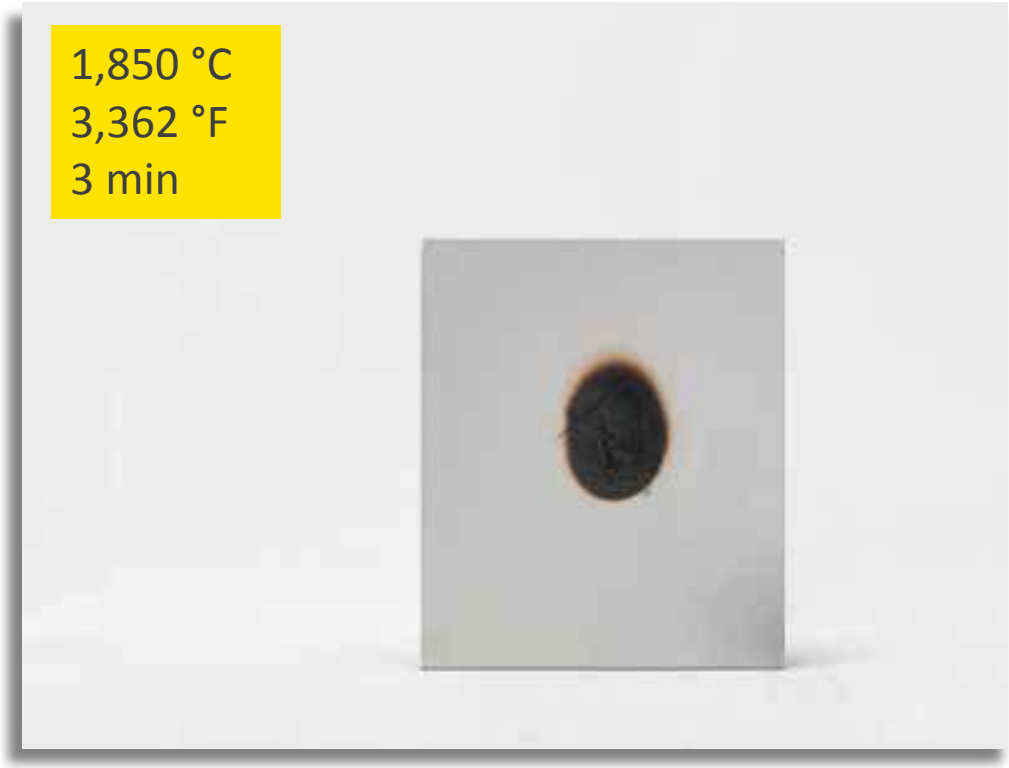




FIRE TESTING RESULTS

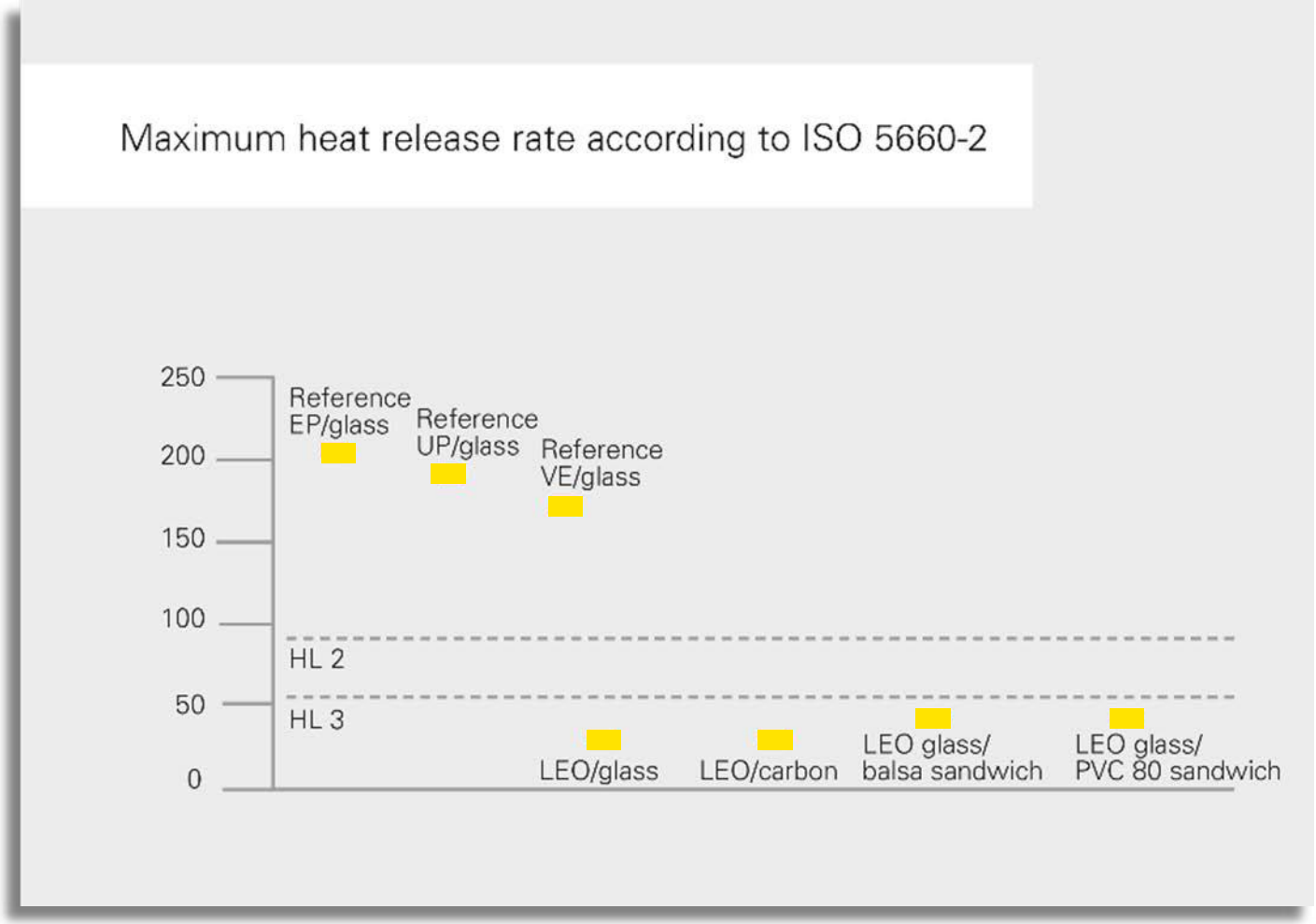


HLU with standard PES



SAERTEX LEO SYSTEM

FACTS AND FIGURES: **SAERTEX** LEO®



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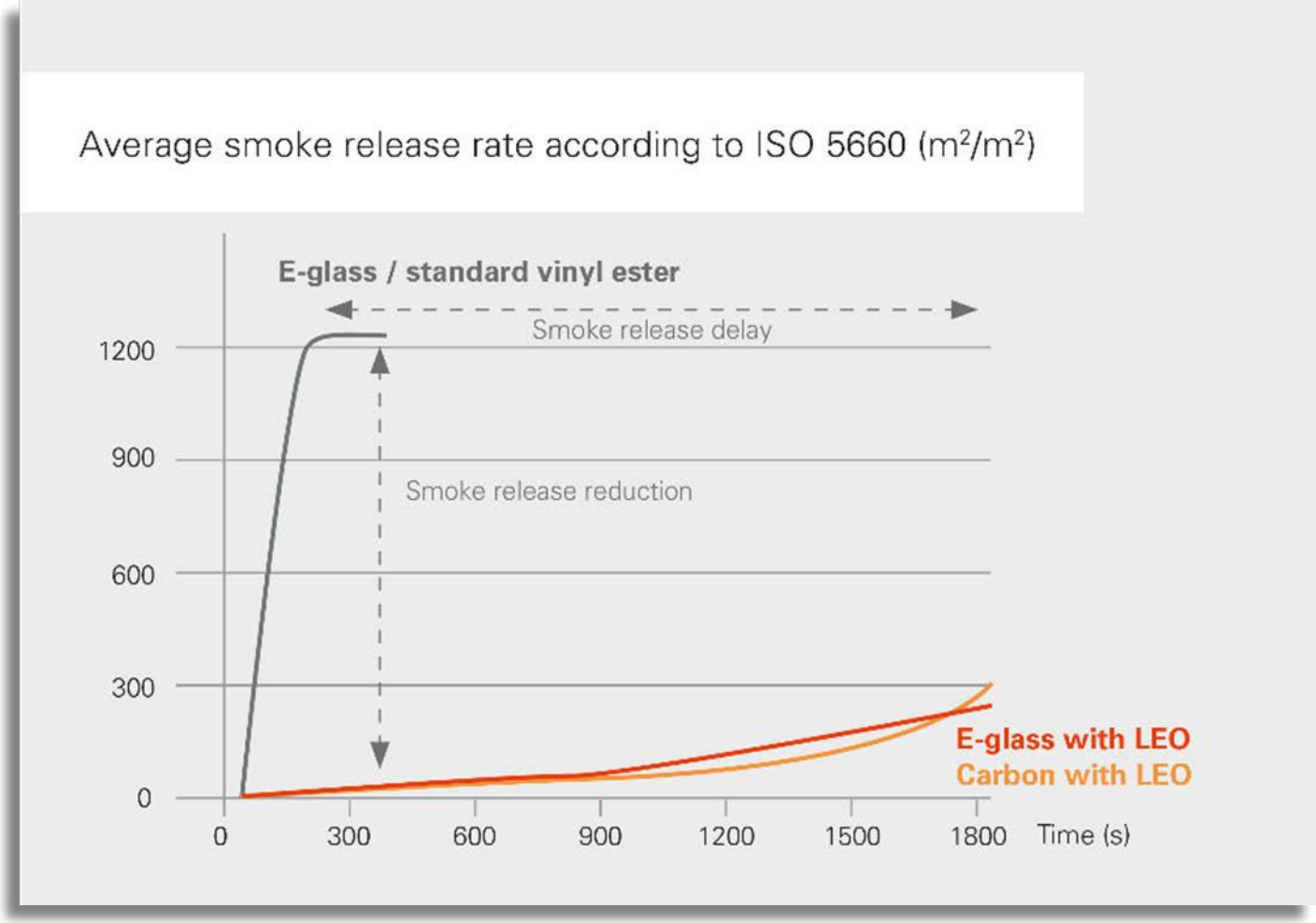

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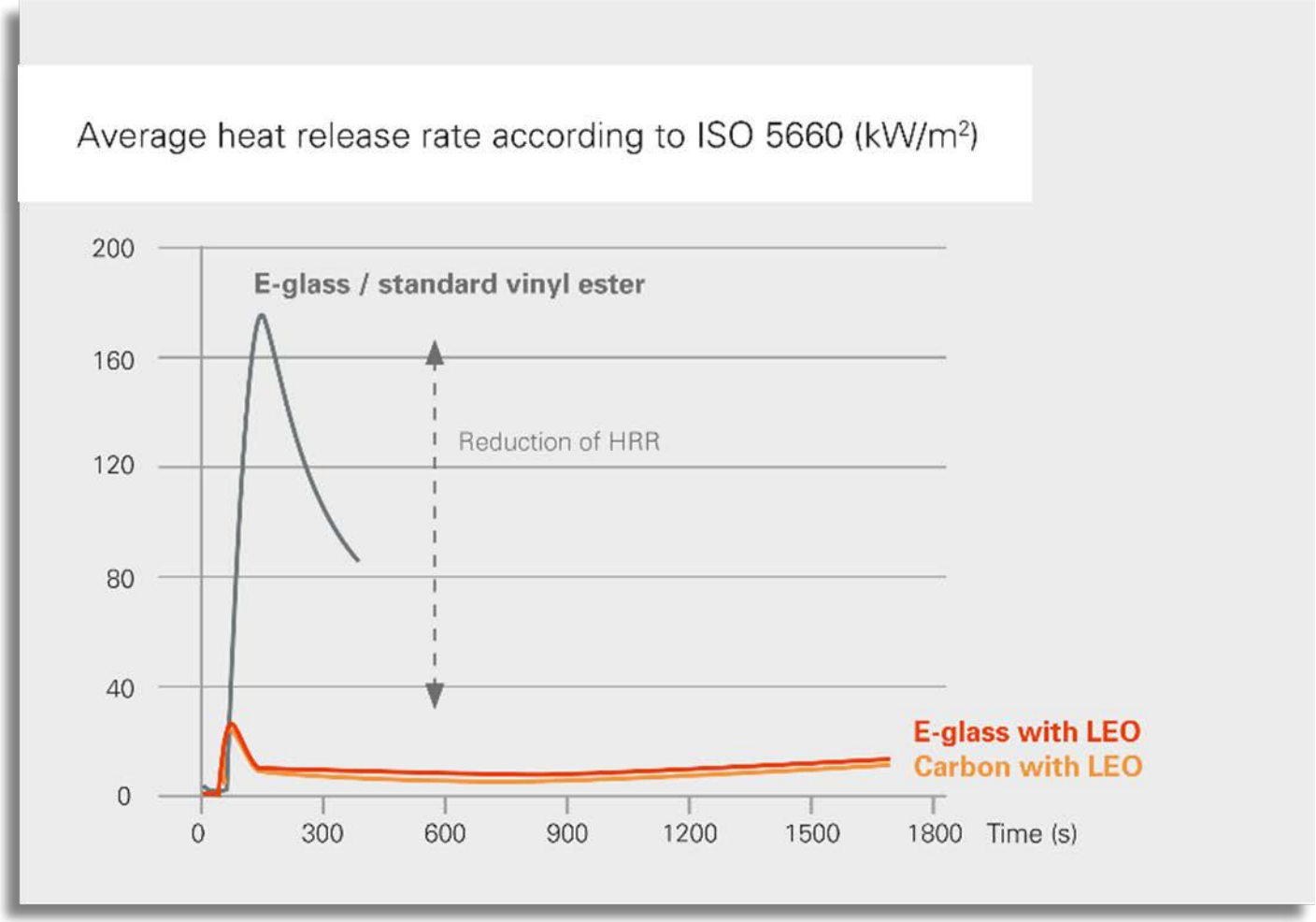

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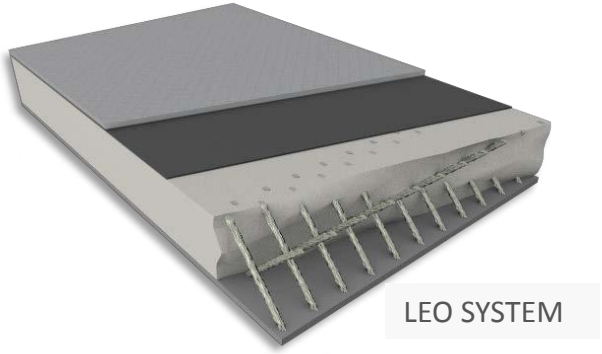
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SAERTEX®

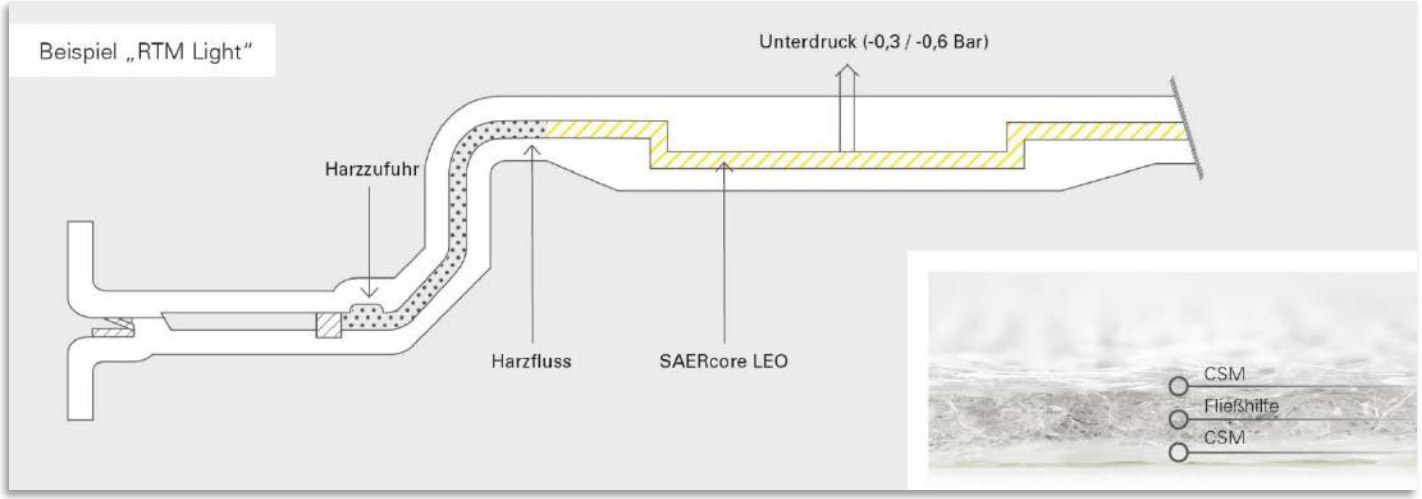
SAERCORE LEO®

CLOSED MOLD REINFOCEMENTS WITH INTEGRATED FIRE PROTECTION

WITHOUT COMPROMISE: LIGHTWEIGHT TECHNOLOGIES

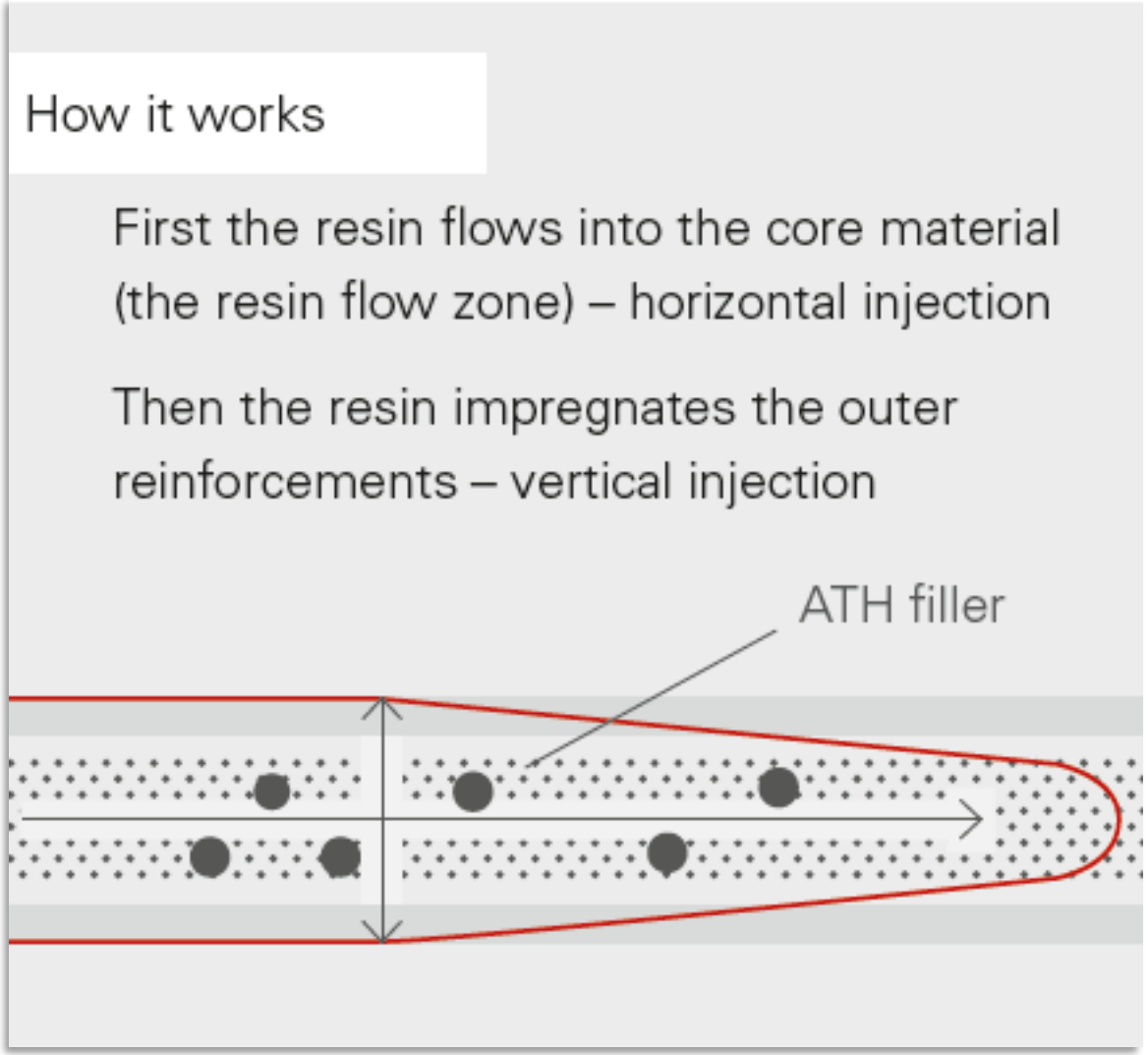
- New European fire protection norm for rail vehicles EN 45545-2 obligatory since 2018
- Energy efficiency with the use of light weight materials
- Ideal for interior components with complex shapes and high surface quality requirements

EASY TO WORK WITH AND TO DRAPE



- Easy to drape: sutured structure with two layers of chopped strand mat (CSM) and an intelligent PP flow mesh
- Ideal for interior components with complex shapes and high surface quality requirements
- Rapid wet-out and homogeneous impregnation in RTM and RTM Light processes

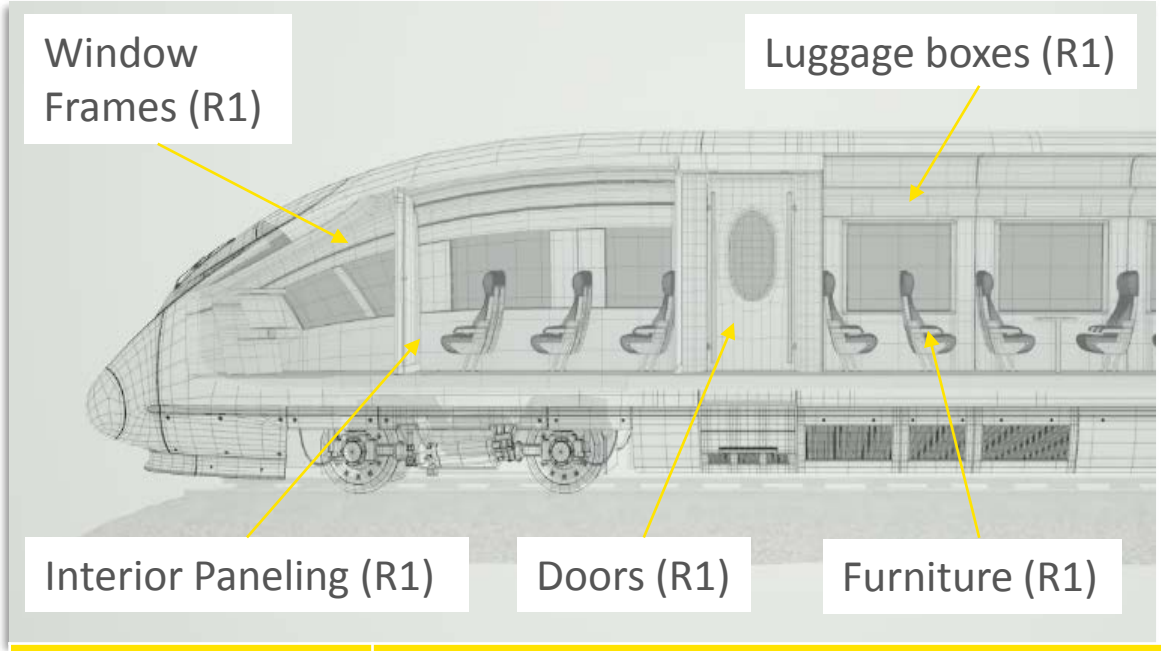
INTELLIGENT FLOW MESH FOR RESINS WITH HIGH VISCOSITIES



- Modified polypropylene core for resins with high viscosities of 500 to 1000 mPas
- PP24 core (PP24 = polypropylene 240 g/m^2)
- No filtration of ATH filers

COMPONENTS	SAERcore LEO		
CSM per layer $[g/m^2]$	450	600	750
Cavity (withGelcoat)$[mm]$	2.5–3	3–4.5	4.5–5
Flow mesh	PP24 = 240 g/m^2		

APPLICATIONS OF SAERCORE LEO®



REQUIREMENT	DESCRIPTION
R1	Interior vertical, horizontal, and downward-facing surface materials
R7	Interior surfaces of gangways/ Air ducts
R17	Cab housing – external surfaces

- For the use in non-structural interior components, like doors and paneling
- Optimum application in complex shapes
- Ideal for components with high surface quality requirements
- Suitable for filled resins
- Fire protection in rail vehicles: HL2 and HL3 in accordance with EN 45545-2 for requirements R1, R7, and R17

SAFETY AND FIRE PROTECTION IN ACCORDANCE WITH EN 45545-2

- Fulfils the legal requirement for fire protection in rail vehicles
- For painted components
- Verifiable for hazard levels HL2 and HL3
- Halogen-free
- Lower combustibility without compromising drapeability and weight

TEST PROCEDURE		TEST VALUE	REQUIREMENT FOR HAZARD LEVEL HL2	HL3	Test results **SAER**core**LEO** painted
ISO 5658-2	Spread of flame	CFE $[kW/m^2]$	≥ 20	≥ 20	25.4
ISO 5660-1	Rate of heat emission	MARHE $[kW/m^2]$	≤ 90	≤ 60	51.9
DIN EN ISO 5659-2	Optical density of smoke	$D_s(4)$ $D_{s\,max}$ VOF_4	≤ 300 ≤ 600 ≤ 600	≤ 150 ≤ 300 ≤ 300	79 162 198

SELF-ADHESIVE IN COMBINATION WITH SAERFIX®

- Solve the challenge of application with a dry Gelcoat
- Enables optimum molding and positioning, even for vertical surfaces
- No shifting in the mold
- No additional injection with adhesives necessary
- Mechanical characteristics are not significantly altered in combination with **SAER**fix®

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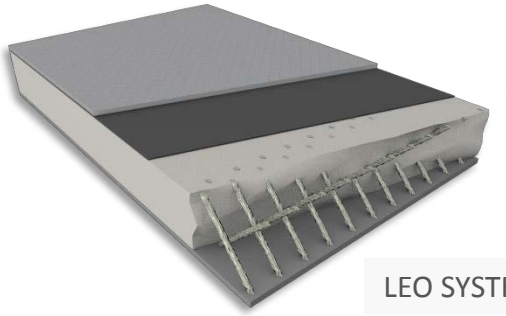


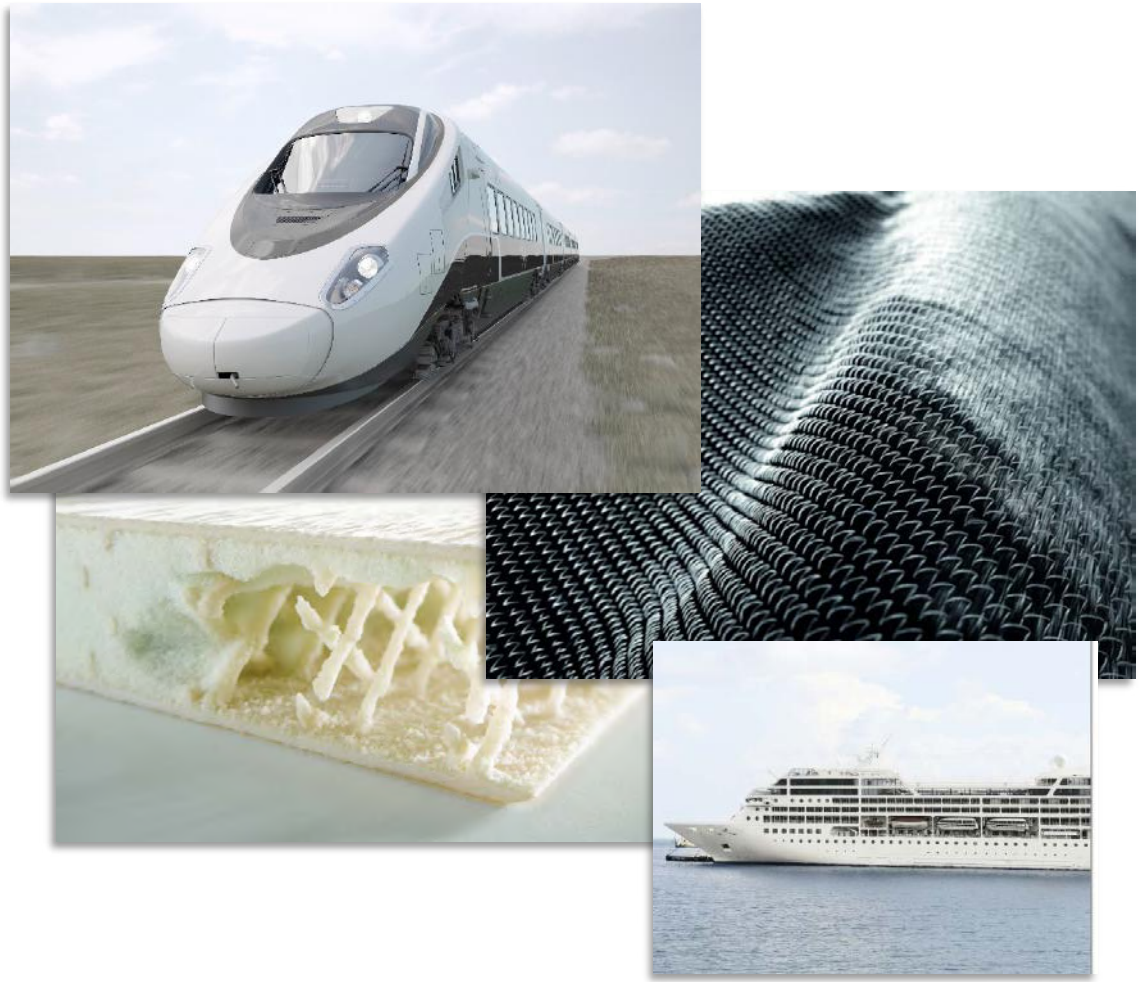
LEO SYSTEM

LEO COATED FABRIC

SAERTEX

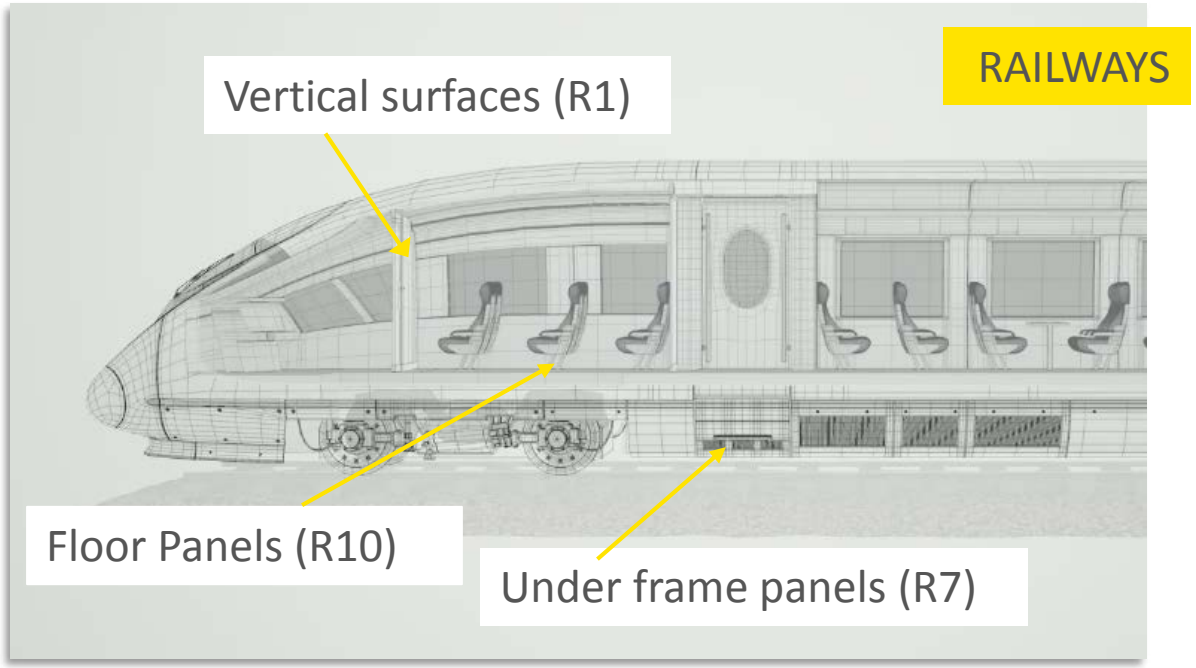
SAERTEX LEO® COATED FABRIC NON-CRIMP FABRICS WITH INTEGRATED FIRE PROTECTION

LIGHTWEIGHT TECHNOLOGIES WITHOUT COMPROMISE



- Energy Efficiency by use of lightweight materials
- Weight savings with composite vs. steel up to 80% or 5 times better mechanical properties by the same weight
- New European fire protection regulation for railways: EN 45545-2 (obliged from 2018)
- News from fire tests IMO FTP Codes in ship building

APPLICATIONS IN RAILWAYS // LEO COATED FABRIC



- Covering HL3 in EN 45545-2, additionally EI30 in EN 45545-3
- Applications are simple shaped parts like floor panels, walls or under frame panels
- Good weather resistance, suitable for outdoor use as underframe panel (for other outside use, to be painted)

IN15	Floor composites	The floor composites include the floor substrate (together with any thermal insulation) and floor covering (together with any fixings or adhesives applied in end use conditions).	R10
EX3	Under frame of external body shell	External surfaces of under frame structure of the body shell (floor) including paint and coating systems (thermal, design and acoustic coating) and protective floor panelling.	R7
IN1A	Interior vertical surfaces	Interior components (structure and covering) such as side walls, front walls / end-walls, partitions, room dividers, flaps, boxes, hoods, louvres. Interior doors, interior lining of the front-/end-wall doors and external doors. Windows (including plastics and glazing) Insulation material and interior surface of body shell. Kitchen interior surfaces (except those of kitchen equipment).	R1

MORE APPLICATIONS OF THE LEO COATED FABRIC

SHIPBUILDING

- Tested acc. IMO FTP Code, part 2,3,5 und 10
- Customer has to perform Risk-Based Design for his applications

BOATS

- Engine room
- Passes Norm: MGN280

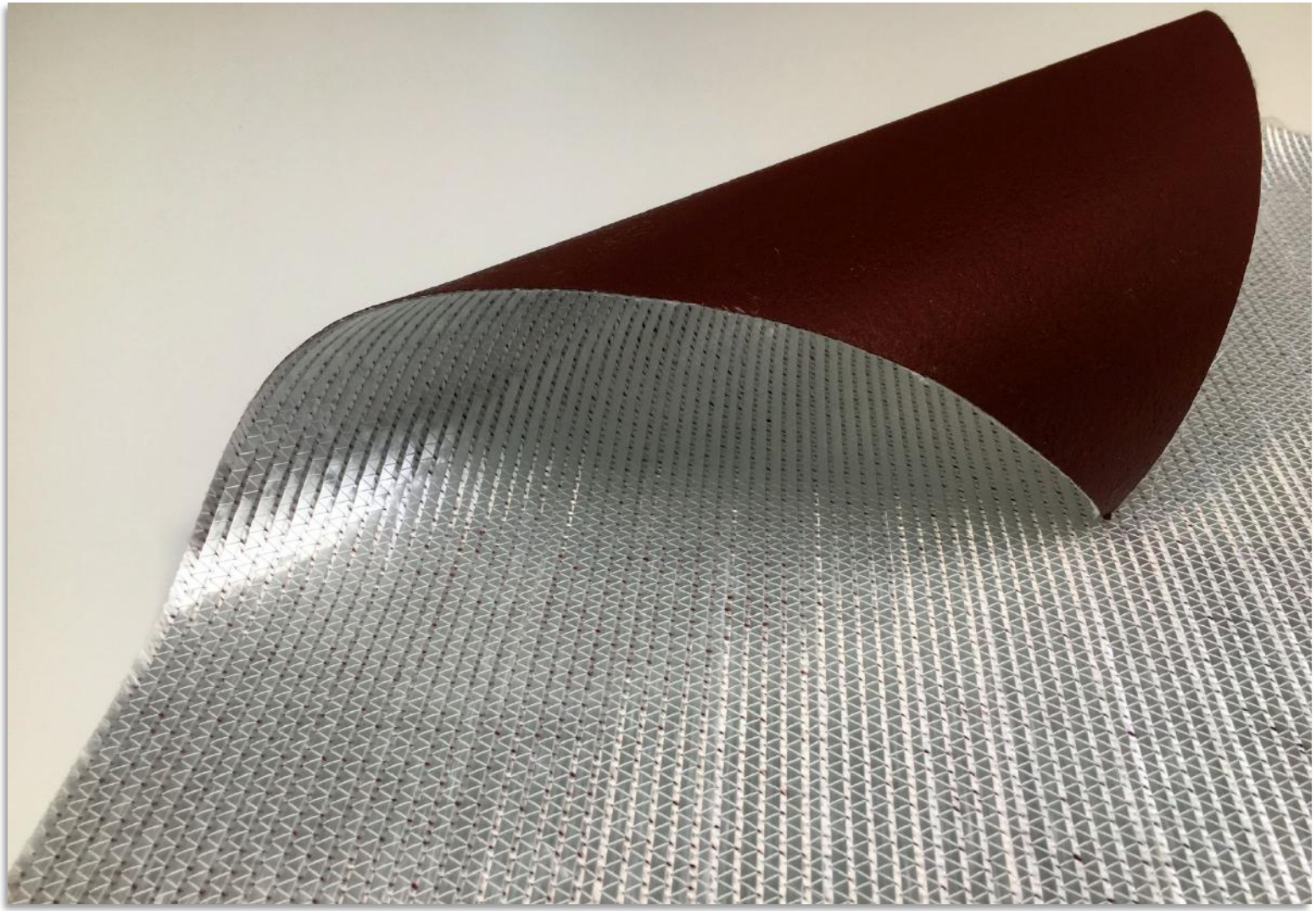
E-MOBILITY

- For cars, busses and trucks:
- Battery cases

CONSTRUCTION

- Floors, Walls Ceilings
- Flat panels
- Claddings
- Fire Doors
- Can pass harsh fire tests

HIGHER & CONSTANT COMPONENT QUALITY



Standardised and reproducible material layer thickness thanks to the controlled machine application of the fire retardant material onto the fabric.

- No weak spots
- Reproducible results

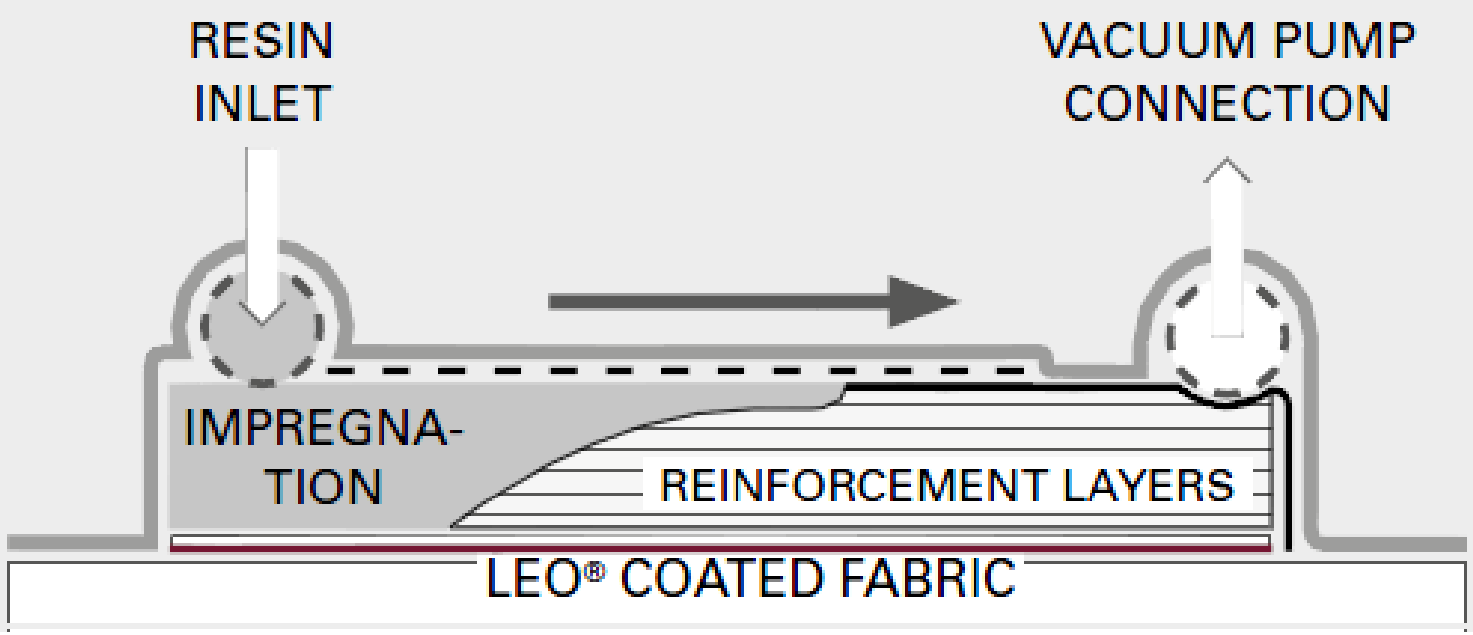
EASY TO PROCESS WITH STANDARD RESIN SYSTEMS

- No special FST resin to be used
- Thanks to the integrated fire protective layer and the low proportion of binders
- Usable resin systems:
  - Vinylester
  - Polyester
  - DCPD
  - Epoxid
  - Phenol
  - PFA
  - Polyurethan

50% TIME SAVINGS THANKS TO INTEGRATED FIRE PROTECTIVE LAYER

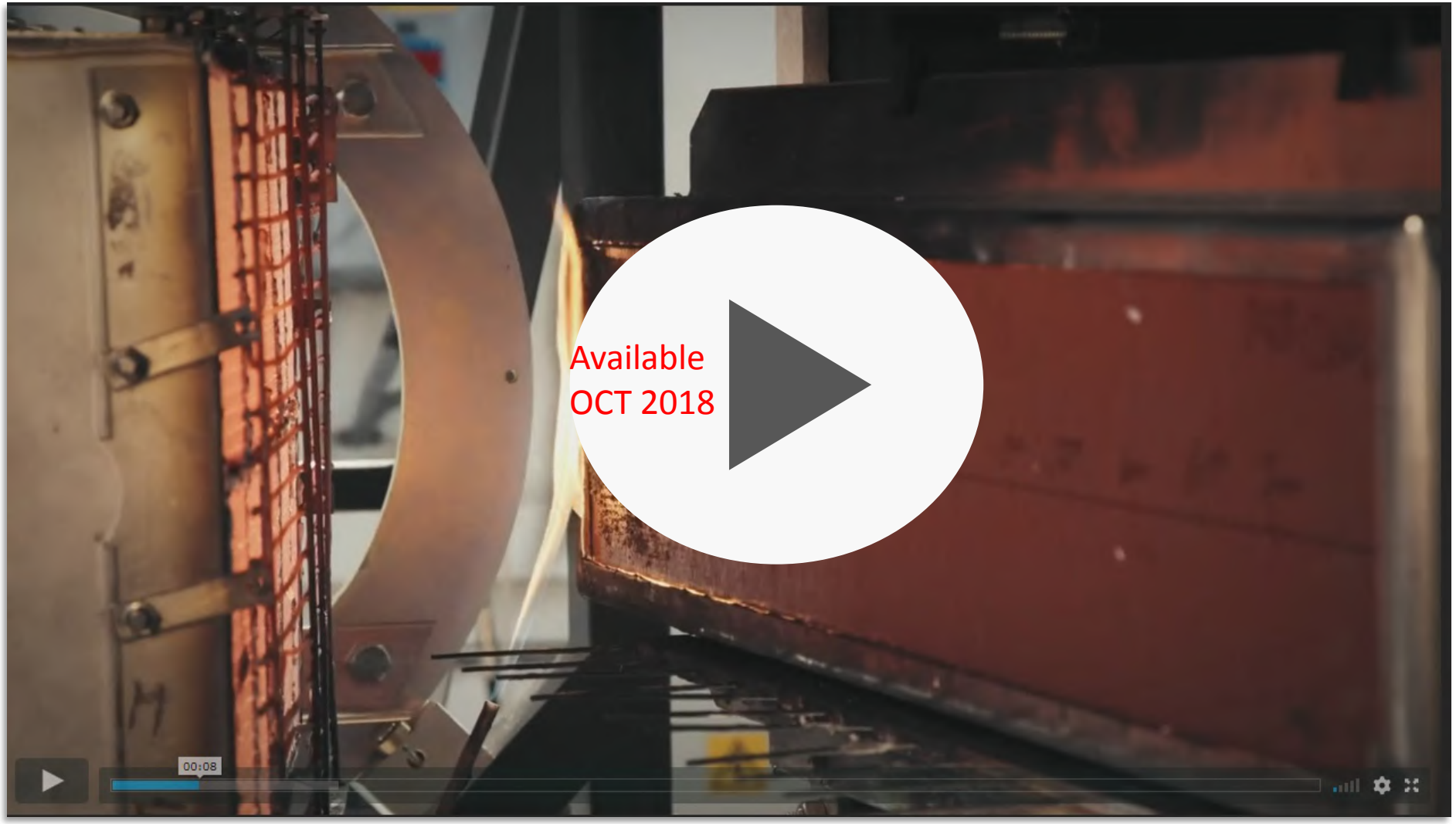
1. Insertion LEO® COATED FABRIC
2. Inserting the reinforcement layers
3. Vacuum infusion using standard resin systems

No Gelcoat application required!



- The material is processed like a standard fabric using vacuum infusion.
- This eliminates the usual manufacturing process required to apply a fire protective coating.
- For simple shapes like panels or single-curved parts
- Also in RTM possible

WATCH THE VIDEO OF THE NEW LEO COATED FABRIC



EN 45545-2: NEXT LEVEL FIRE PROTECTION FOR ADVANCED COMPOSITES

LEO COATED FABRIC for Railways:

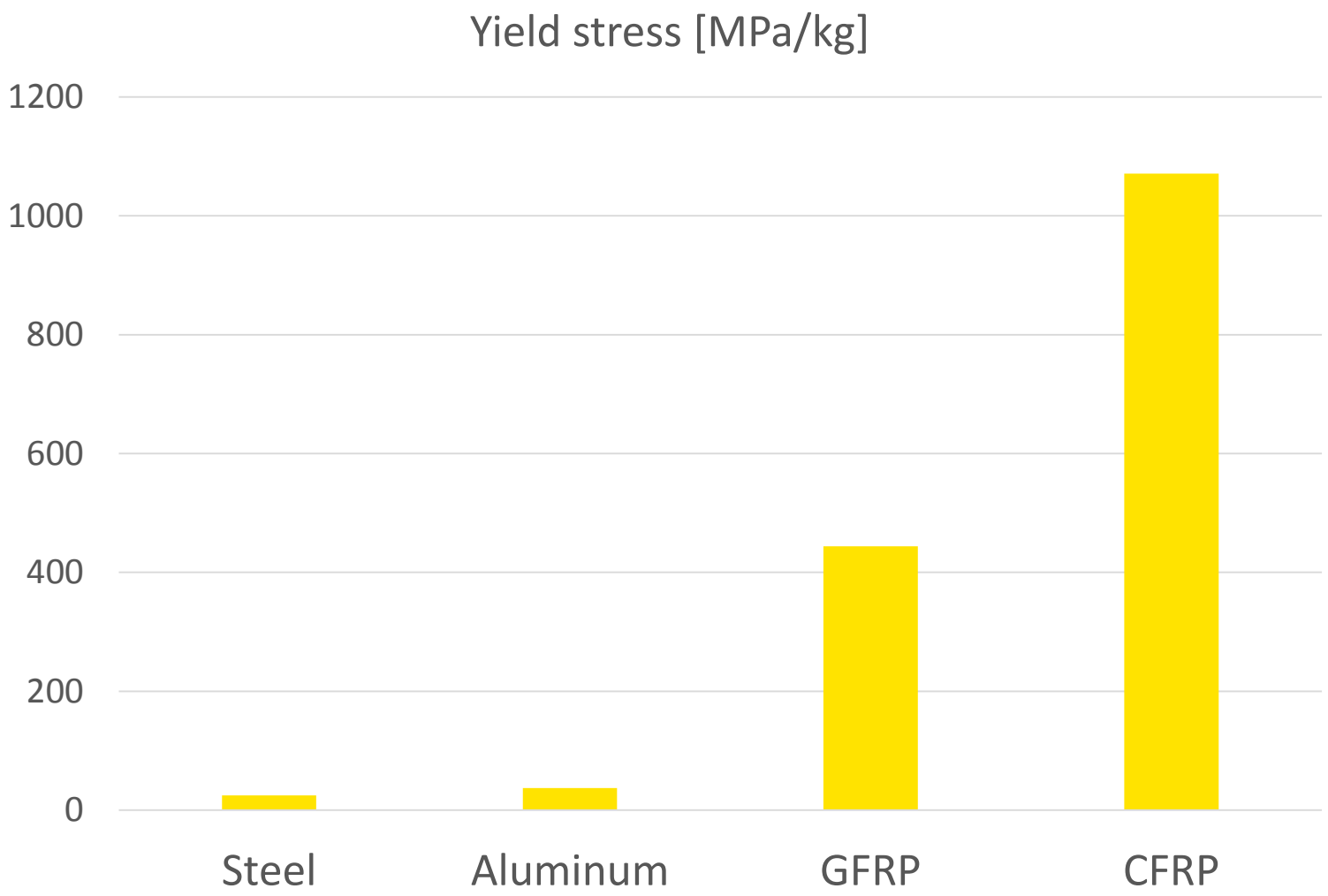
- Passes HL3 according EN 45545-2 and EI30 according EN 45545-3
- MARHE without paint <20, MARHE with paint = 27
- Good weather resistance

IMO FTP: NEXT LEVEL FIRE PROTECTION FOR ADVANCED COMPOSITES

LEO COATED FABRIC for ship buidling:

- 10 min flame treatment at 100 kW: no additional release of heat or smoke. IMO FTP Code 2010 Part 10
- Toxicity values of laminate panel signifi cantly undershoot the permitted limits
- Low flame spread adjustable to specific levels
- Further test results on request

LIGHTWEIGHT: UP TO 40% WEIGHT SAVINGS



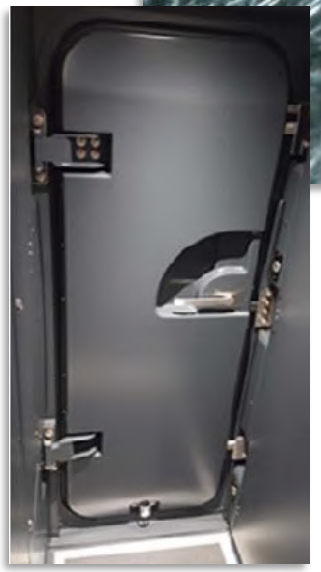
- Low material thickness
- Highest fire protection without additional isolation layers
- Excellent tensile and bending properties
- Up to 5x greater rigidity by the same weight or 40% lighter than aluminum for the same rigidity
- Very high energy efficiency.

TRIED AND TESTED STANDARD MAKE-UP

We support your material qualification testing by supplying you with our extensive collection of test data.

- Time-saving
- Test results for EN 45545 and IMO FTP available
- With different resin types
- More on request

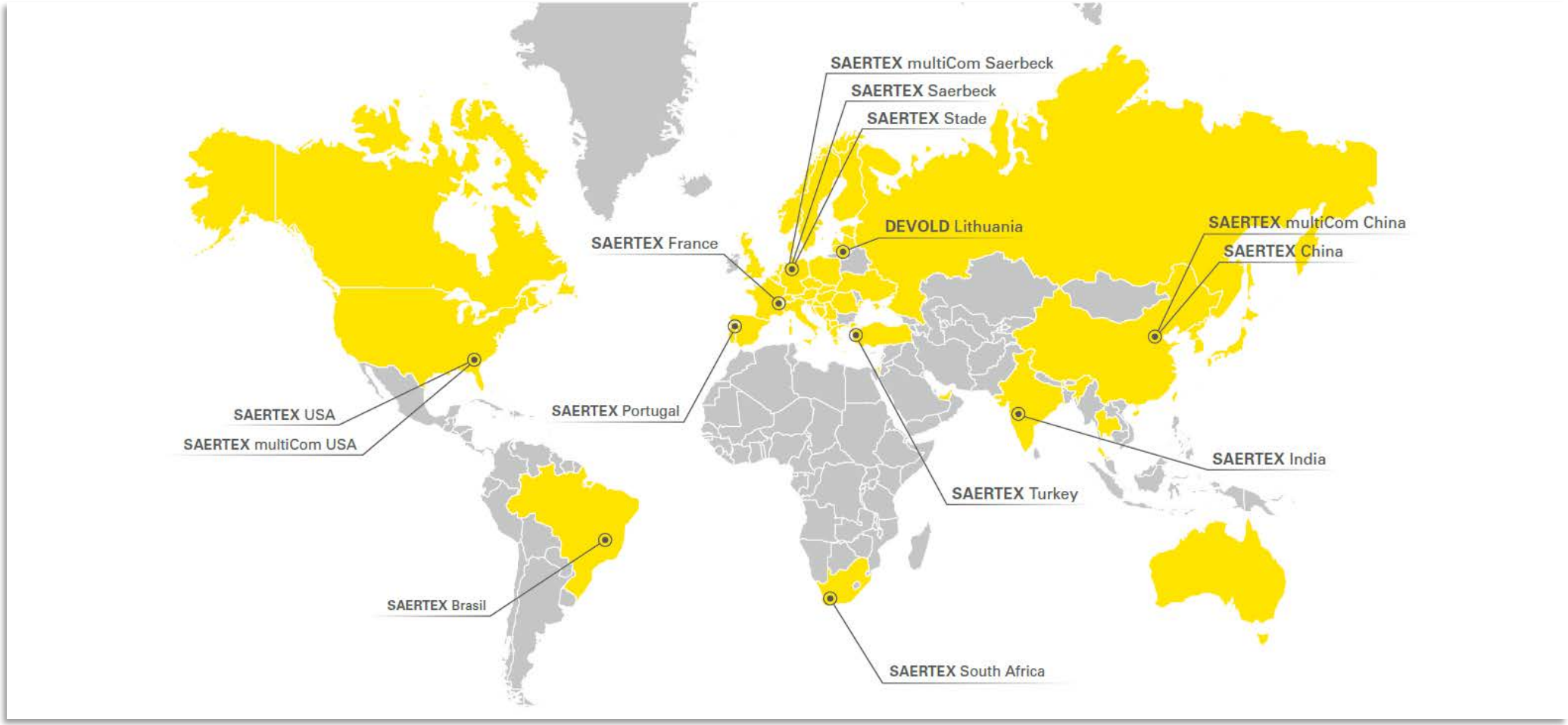
REFERENCES



SAERTEX LEO SERIES used by:

- Bombardier Transportation, Germany
- Barat, France
- Carbures Civil Works, Spain
- Meyer Neptun Werft, Germany
- Noma (TGV), France
- Norman Foster Architects, UK
- RCS (Stadler), Germany
- SMT (ICE-3), Germany
- Tenryu, Japan

Further references on request.

WORLDWIDE AVAILABILITY

- Global production network with 14 locations in 10 countries on 5 continents