



COMPOSITE MATERIALS
FOR EXTREME FIRE PROTECTION
SAERTEX LEO[®]

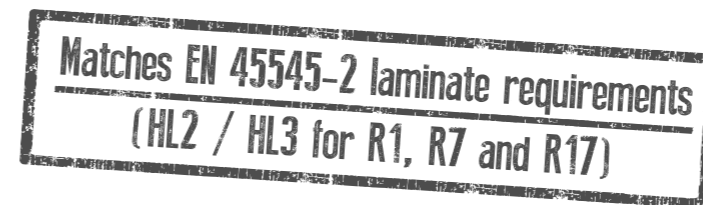


THE NEW GENERATION OF FIRE PROTECTION

SAERTEX LEO®

LIGHTWEIGHT WITH

EXTREME OPPORTUNITIES



LEO is an innovative composite system which meets the high fire protection requirements for FRP parts in the off-shore sector, the marine market, the construction industry and in rail vehicles. At the same time, it avoids the adverse influence on mechanical properties that can be associated with conventional fire protection systems.

1 Meets the highest fire protection standards

- DIN SPEC 91326 compliant
- IMO FTP and EN 45545-2 tested

2 Excellent mechanical properties

- Lightweight: 40 % weight saving with maximum resistance
- Much better rigidity as well as tensile and bending properties compared to hand laminates (HLU) and steel – despite lower material thickness

3 Free of halogens

- 57 x less smoke generation than PES GRP
- No toxic substances released in the event of fire

4 Complete system: everything from a single supplier

- System consisting of Fabrics, Injection Resin and Protection Layer as well as optional core materials geared toward the customer's wishes
- Cutting & Kitting Service, component production by SAERTEX possible

5 Advantage: First class cost effectiveness

- maximum cost effectiveness through the lowest possible material usage
- labour cost efficient manufacturing process (infusion)

6 High-quality

- reproducible fire retardancy and mechanical performance for entire part

SHIPBUILDING
RAILWAY VEHICLES
CONSTRUCTION INDUSTRY
OIL // GAS // OFFSHORE

HIGH PERFORMANCE SANDWICH SUPER-STRUCTURES

The modular assembly system: right components for every project

Depending on customer specific requirements and the intended use of the part, **LEO** provides load optimized fabrics, resins and optional core materials. The lay-up is finished with a **LEO** Protection Layer.

Depending on the application and the part specific requirements, the individual components of **LEO** are adjusted towards each other.

We supply the materials as a system for your component production. On request, we can also offer you supporting services for engineering and production.



THE SAERTEX LEO® MODULAR ASSEMBLY SYSTEM

LEO infusion resin

- Suitable for infusion processes
- Excellent mechanical properties
- Adjustable drip time
- RT curing
- Resistant to chemicals and scratching
- Free of halogens

LEO Protection Layer (top coat / gel coat)

- Top fire protection properties
- Low smoke generation
- Low toxicity
- Can be applied by using brush or spray device
- RT curing
- Free of halogens

LEO Reinforcement material (glass / carbon / aramid / hybrid)

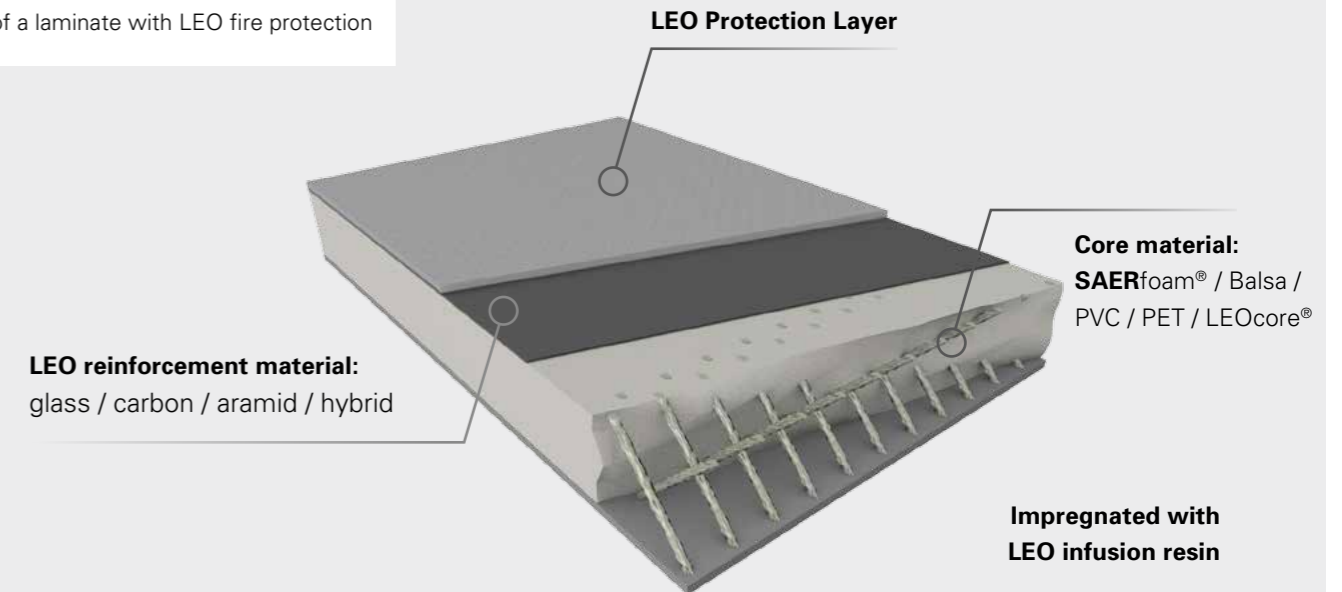
- Including fire protection properties
- High mechanical properties
- Similar draping properties as standard fabrics
- Same permeability as standard fabrics
- Free of halogens

Core material (optional)

- SAERfoam® structural core with 3D glass bridges
- Balsa / PVC / PET
- LEOcore®



Example of a laminate with LEO fire protection



FIRE PROTECTION IN A NEW DIMENSION

Convincing in many ways

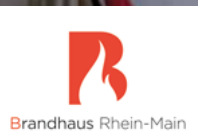
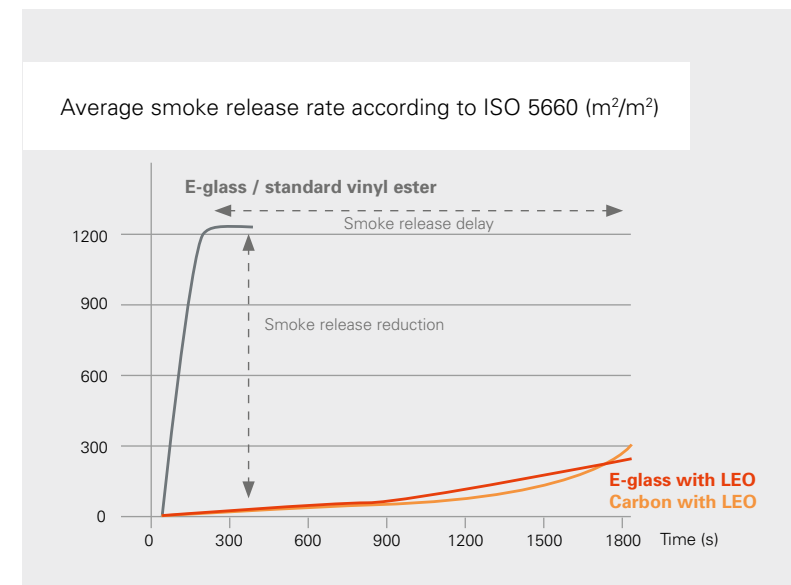
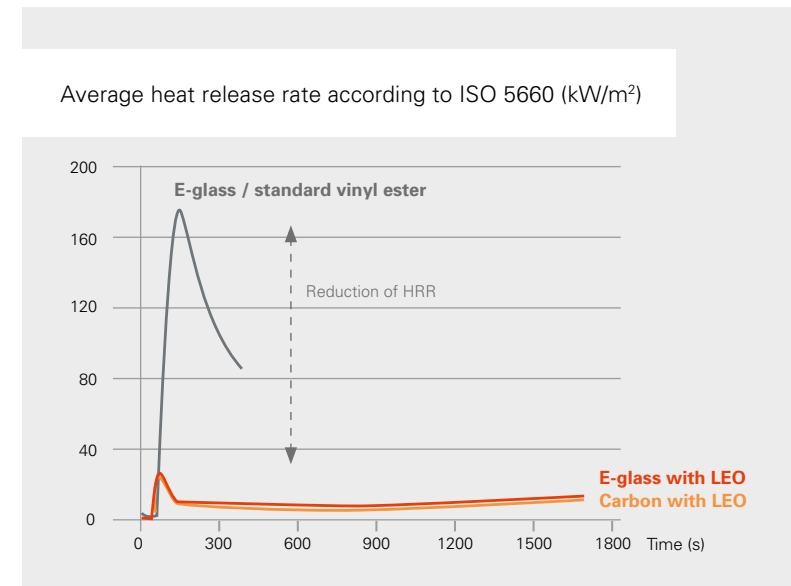
LEO has been tested in accordance with international fire protection standards and offers a unique combination of maximum fire protection and top mechanical performance with minimum component weight.

MARINE	RAIL	CONSTRUCTION	OTHERS
IMO RES. A 653 (16) FTP	DIN EN 45545-2:2016	EN ISO 13501-1:2007	STANAG 4602
CODE MSC 61 (67)	HL 2 / 3 for R1	B - s2,d0	AFAP 4/5 - F2
Annex 1 Part 2	HL 2 / 3 for R7		AFAP 2 - S2
Annex 1 Part 5	HL 2 / 3 for R17		AFAP 3 - T1
IMO FTP Code; Part 10	DIN 5510	DIN 4102-1	
HSC 2000 (ISO 9705)	S4/SR2/ST2	B1	
> 9 min 46			
DIN 4102-1	NFF 16-101	NFF 16-101	
B1	UNE 23.721:1990	M1 / F1	
	M1 / F1		
ASTM E 84	BS 6853	ASTM E 84	
class A / class 1	BS 476-6 - class 0	class A / class 1	
	BS 476-7 - class 1		
	BS 6853, Annex B		
	cat1b exterior		
	cat 2 interior		
	NFPA 13:2007	UNE 23.721:1990	
	ASTM E 662	M1 / F1	
	ASTM E 162		
	ASTM E 1354		
	BSS 7239		

57 x LESS SMOKE GENERATION WHEN COMPARED TO FIRE-PROTECTED PES GRP

Free of halogens

LEO is toxicologically harmless. No toxic substances are released, even in the event of fire. Smoke generation is minimal. No special protective clothing is required for processing.



3 x LESS FLAME EXPANSION WHEN COMPARED TO FIRE-PROTECTED PES GRP*

22 x LESS FLAME EXPANSION WHEN COMPARED TO NORMAL PES GRP*

98 % LESS FLAME PROGRESS WHEN COMPARED TO NORMAL PES*

96 % LESS FLAME PROGRESS WHEN COMPARED TO FIRE-PROTECTED GRP*

*) Tests acc. to ISO/FDIS 25762 (Plastics – Guidance on the assessment of the fire characteristics and fire performance of fibre-reinforced polymer composites)



SAERTEX LEO®
IS TOXICOLOGICALLY
HARMLESS



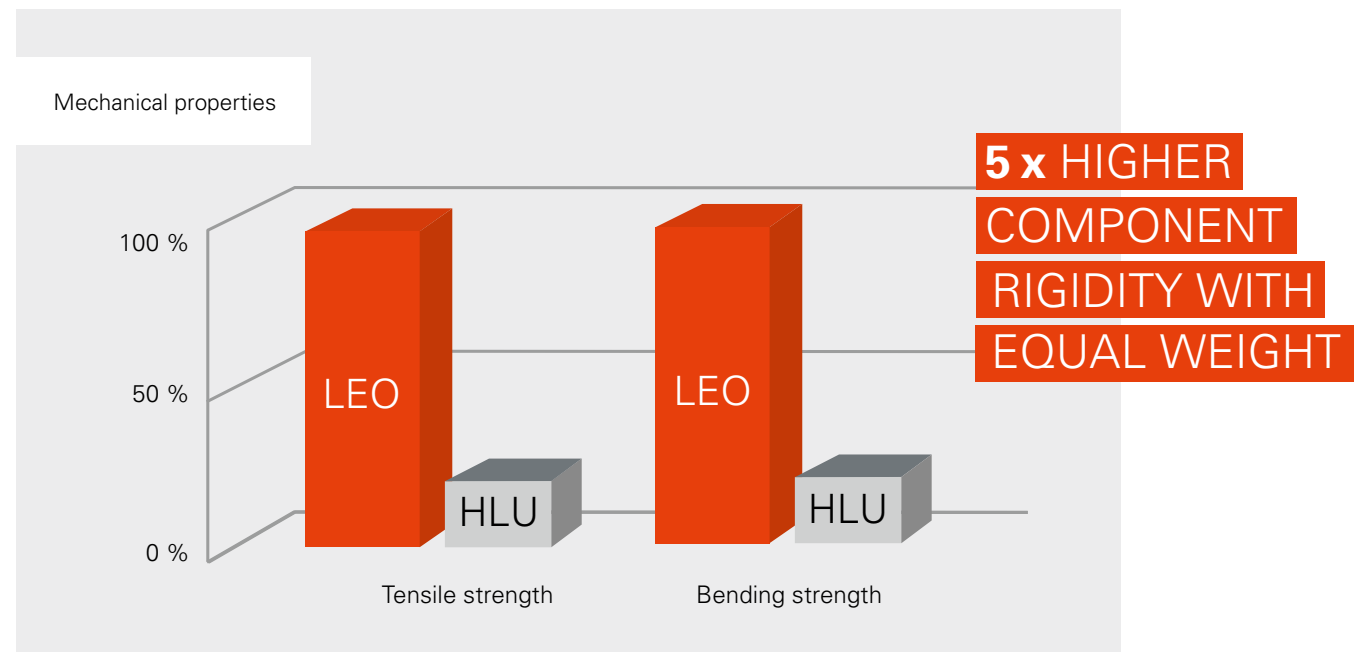
IMPRESSIVELY LIGHTWEIGHT

Thanks to its low weight, **LEO** is vastly superior compared to conventionally produced components in terms of cost efficiency. The excellent mechanical parameters are just as impressive: many times better rigidity, tensile and bending properties – despite its low weight and reduced material thickness.



**40 % LOWER COMPONENT WEIGHT WITH
THE SAME RIGIDITY COMPARED TO HLU**

**12 x HIGHER TENSILE STRENGTH
COMPARED TO HAND LAY-UP LAMINATE**



FIRST-CLASS COST-EFFECTIVENESS



Material saving

LEO offers maximum cost effectiveness through the lowest possible material usage, a labour cost efficient manufacturing process (infusion) and the production of components without time consuming intermediate curing of individual layers. **LEO** can also be processed at normal room temperature.

**30–35 % FASTER COMPONENT
PRODUCTION COMPARED TO HLU**



High-quality

Standardised practices (infusion technology) in the processing of **LEO** ensure highly reproducible component quality. The top quality of the individual components is guaranteed by documented tests carried out during production.

Competent

The entire techno-commercial cooperation is handled through by a "single point of contact". **SAERTEX** is your competent contact during each phase of your project, with the know-how and manpower to successfully implement your wishes and objectives.

SAERTEX® – WE WILL TAKE YOU FURTHER

Cutting-edge composite solutions made of glass, carbon and aramid

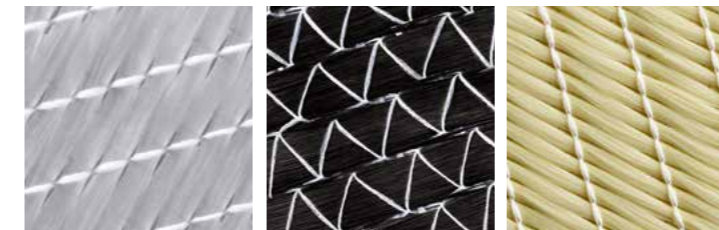
We are fascinated by new challenges as much as you are. We produce and develop the ideal fibre composite materials for your ideas – light, robust and resource-saving. **SAERTEX** offers you an ever expanding toolkit of tailor-made non-crimp fabrics made of glass, carbon and aramid fibres. We can also support you with the appropriate on demand services for engineering and production.

Tailor-made:
SAERTEX products

- **Multiaxial fabrics:** Glass / carbon / aramid
- **Special function materials:** SAERcore / SAERflow / SAERfix / 3D Fabrics
- **Core material for sandwich structures:** SAERfoam
- **Fire protection materials for composites:** LEO

Ideal support:
SAERTEX services

You can choose to make the most of **SAERTEX** services whenever it is advantageous for you. For instance, in the event of production bottlenecks, for your cost benefits or simply because you would like to use our technology.



- Engineering support
- Preforming
- Laboratory tests, GL certified
- Cutting & Kitting
- Component production services (RTM, RTM light, vacuum infusion)

REINFORCING YOUR IDEAS



Klaus Lammers, Bruno Lammers, Simon Lammers (Managing Partners)

A family-owned business,
at your service worldwide

- Established in Saerbeck, Germany in 1982
- 12 sites in 8 countries on 5 continents
- 1300 employees worldwide
- 50 countries with customer service
- 2,500 customer-specific product solutions



SAERTEX GmbH & Co. KG / Brochterbecker Damm 52 / 48369 Saerbeck / Germany

Contact: Phone: +49 2574 902-0 / E-Mail: info@saertex.com

www.saertex-leo.com

REINFORCING YOUR IDEAS