



POWERED BY COMPOSITE INNOVATION

lightweight rail components

PROVEN LIGHTWEIGHT SOLUTIONS

Elbe Flugzeugwerke GmbH (EFW) has been manufacturing lightweight tramway floor panels since 2009. EFW's sandwich panel lay-up is optimized for interiors and load carrying structure of rail and road transportation.

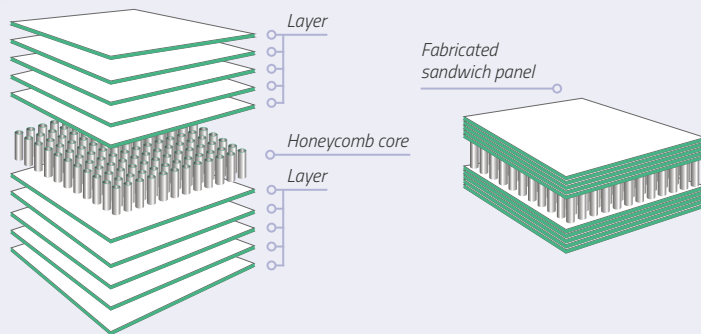
Application areas of lightweight rail components:

- > Lining
- > Walls in sanitary facilities
- > Floor panels
- > Heated sandwich panels
- > Partition walls



CLASSIC LAY-UP

Classic sandwich panel lay-up is built by two main elements: preimpregnated glass fibre layers and a honeycomb core.



weight



strength



stiffness



FST



reliability



acoustics



non-toxicity



environment

	UNIT	CLASSIC LAY-UP	STANDARD
Sandwich thickness	mm	18	
Specific weight	kg/m ²	6,1	
Max. plate dimensions	m	2,90 × 1,88	
Sandwich bending stiffness	Nmm ²	586 × 10 ⁶	EI related to 100 mm width
Max. support distance for L/300	mm	550	
Indentation (8 mm diameter)	N	750	
Climbing Drum Peel	L-direction	N/mm	1,0
	W-direction	N/mm	1,8
Fatigue resistance	cycles	20 Mio.	
MARHE	kW/m ²	5,5	ISO 5660-1: 25kW/m ²
D_{5,max}	-	1,3	EN ISO 5659-2: 25kW/m ²
CIT_G	-	0,01	EN ISO 5659-2: 25kW/m ²
Burn through	°C	950	DIN 4102-8
Acoustic damping	dB	27	DIN EN ISO 140-3
Media resistance	-	Salt water, Cola, hydraulic fluids	
Impact	Joule	No significant damages up to 6J impact energy	
Service temperature	°C	-35 to 70	
Insulation	W/(m ² K)	3,89	ISO 8301

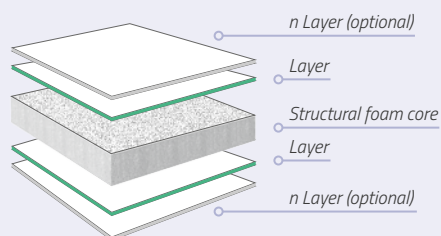


WHY SHOULD YOU USE COMPOSITES IN TRANSPORTATION?

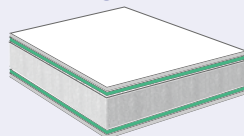
- > Functional integration
- > Substitution of wooden floor panels and reduction of load carrying metallic structures
- > Outstanding thermal insulation and noise absorption
- > Excellent fire safety properties

Customization by system integration:

- > Heating systems
- > Provisions for electrics, hydraulics, pneumatics, mechanical applications



Fabricated sandwich panel



SMART LAY-UP

Smart sandwich panel lay-up

combines preimpregnated glass or carbon fibre layers and a foam core.



weight



strength



stiffness



FST



reliability



acoustics



non-toxicity



environment



cost optimized

	UNIT	SMART LAY-UP			STANDARD
Sandwich thickness	mm	10..	12	..30	
Specific weight	kg/m ²	3..	7	..8	
Max. plate dimensions	m		2,90 x 1,88		
Sandwich bending stiffness	Nmm ²	50 x 10 ⁶ ..	158 x 10 ⁶	..2000 x 10 ⁶	EI related to 100 mm width
Max. support distance for L/300	mm	200..	350	..735	
Indentation (8mm diameter)	N	500..	750	..1000	
Climbing Drum Peel	N/mm	1..	1,5	..2	EN2243-3
Fatigue resistance	cycles		up to 20 Mio.		
MARHE	kW/m ²	2..	2,3	..4	ISO 5660-1:25kW/m ²
D_{S,max}	-	1..	1,00	..3	EN ISO 5659-2:25kW/m ²
CIT_G	-	0..	0,00	..0,05	EN ISO 5659-2:25kW/m ²
Burn through	°C		950		DIN 4102-8
Acoustic damping	dB	27..	30	..33	DIN EN ISO 140-3
Media resistance	-		Salt water, Cola		
Impact	Joule		No significant damages up to 6J impact energy		
Service temperature	°C		-35 to 70		
Insulation	W/(m ² K)	3..	2,49	..2	ISO 8301



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