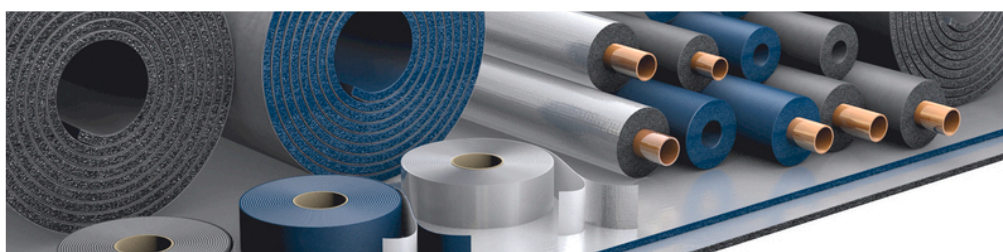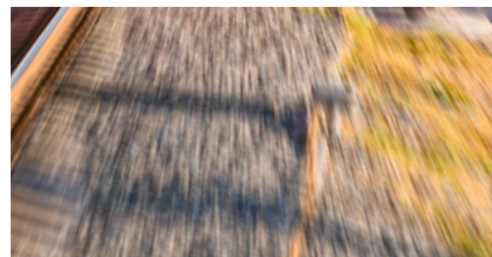# INSTALL IT. TRAVEL SAFELY.

ArmaFlex
Rail ZH-C

First halogen-free FEF insulation that
meets HL3 according to EN45545-2

// Protect assets and people
// Halogen free
// Free of dust and fibres
// Easy to install

armacell®

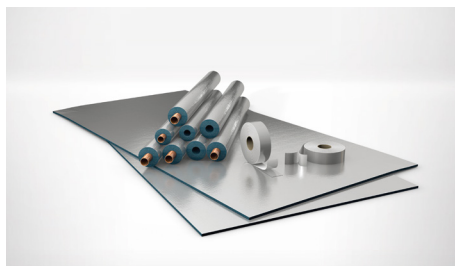MAKING A DIFFERENCE AROUND THE WORLD
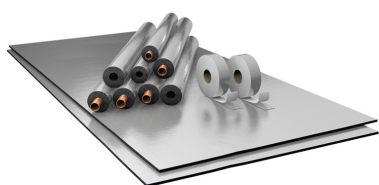
ArmaFlex Rail

// ArmaFlex Rail SD

- Extremely low smoke density and superior fire behaviour
- Built-in Microban® antimicrobial protection reduces mould and bacteria growth
- Complies with most international railway standards for insulation materials
  - EN 45545 – HL2, R1
  - NFPA 130
  - DIN 5510-2
  - GOST 12.1.044-89
  - United Nations ECE R-118 p. 6-8

// ArmaFlex Rail SD-C

- With Microban® antimicrobial product protection
- Excellent mechanical protection and high degree of stability under exposure to ultraviolet light
- Wash-down waterproof and easy to clean
- Meets highest hazard level requirements
  - EN 45545 – HL3,R1

// ArmaFlex Rail ZH-C

- Halogen-free insulation reduces toxicity and corrosive effects on people and equipment
- Resistant to UV, salt water and chemicals
- Wash-down waterproof and easy to clean
- The revolutionary insulation product has a factory-applied, silver-metallic look, reinforced coating for increased hygienic requirements
  - EN 45545 – HL3,R1

// ArmaFlex Rail ZH

- The protective halogen-free insulation to reduce corrosive effects and smoke toxicity in a fire
- Low smoke density, superior fire behaviour
- Fibre- and dust-free material provides low thermal conductivity
- High-tech insulation with built-in fire protection for railway vehicles
  - EN 45545 – HL2,R1

EN 45545
HAZARD LEVEL OF A VEHICLE

Fire safety requirements are part of the European Directive on the interoperability of the trans-European high-speed rail system. The seven-parts standard EN 45545 'Railway applications - Fire protection on railway vehicles' has been developed to harmonize classifications and fire testing.

EN 45545 introduces a new concept – the hazard level of a vehicle (HL). This is obtained by combining the operation and design categories of the vehicle.

EN 45545-2 classifies all material on board in groups which have to fulfil specific requirement sets which often includes several test methods. The most important fire tests used in EN 45545-2 are the flame propagation, the cone calorimeter and the smoke and toxicity tests. For requirement set R1 they are all based on radiant panels with heat fluxes 50 kW/m².

	N: Standard vehicles	A: Vehicles of automatic train, no emergency trained staff on board	D: Double decked vehicles	S: Sleeping / couchette vehicles
1: No underground lines.	HL1	HL1	HL1	HL2
2: Regular use of underground sections and tunnels. Fast evacuation possible.	HL2	HL2	HL2	HL2
3: Regular use of underground sections and tunnels. Slow evacuation possible.	HL2	HL2	HL2	HL3
4: Regular use of underground sections and tunnels (incl. Euro-Tunnel). No evacuation possible.	HL3	HL3	HL3	HL3

HL1
e.g. tramway

HL2
e.g. TGV, TER, RER, subway

HL3
e.g. subway, metro, couchette wagon

NATIONAL STANDARDS REPLACED BY EN 45545-2

Country	Standard
Great Britain	BS 476-6/7
France	NF 16 101 NF 16 102
Germany	DIN 5510
Italy	UNI CEI 11170
Poland	PN-K-02511

European Standard	Testing Standard
EN 45545-2	Spread of flame ISO 5658-2
Railway application	Heat release, smoke production and mass loss rate ISO 5660
Fire protection on railway vehicles	
Requirements for fire behaviour of materials and components	Smoke optical density and toxicity EN ISO 5659-2

TECHNICAL DATA - ARMAFLEX RAIL ZH-C

Brief description	Halogen free, flexible closed-cell pre-covered insulation foam with improved fire-retardant properties and low smoke generation for railway vehicles.
Additional material information	The pressure-sensitive adhesive coating is based on modified acrylate basis with mesh structure and covered with polyethylene foil. Traces of silicon can be found on the protection paper/foil used to protect self-adhesive closures. The insulation system is designed for easy cleaning.
Product colour range	Dark grey with silver metallic covering
Special features	Without halogens (chloride, bromide) according to DIN/VDE 0472, part 815. Fulfils DIN 1988-200.
Applications	Insulation/protection for air ducts, pipes, vessels, equipments (including elbows, fittings, flanges, etc.) of air-conditioning/refrigeration and plumbing systems to prevent condensation and save energy in rail cars. Also, the product can be placed in different areas of the train such as thermal insulation for walls, ceiling, partitions, etc. The insulation system is designed for easy cleaning.

Property	Value / Assessment		Standard / Test method
Temperature range			
Service temperature	Min. °C	Max. °C[1]	EN 14706, EN 14707, EN 14304
	-50	110	
Thermal conductivity			
Declared thermal conductivity	θm	0 °C	EN ISO 13787, EN 12667, EN ISO 8497
	$\lambda_d \leq$ [W/(m·K)]	0.04	
	Formula	$[40 + 0{,}1 \cdot \vartheta m + 0{,}0009 \cdot \vartheta m^2]/1000$	
Transportation			
Reaction to fire - hazard level	6-25 mm: HL 1,2,3 acc. R1		EN 45545-2
Fire performance			
Practical fire behaviour	Self-extinguishing, does not drip, does not spread flames		
Resistance to water vapour			
Water vapour diffusion resistance factor	$\mu \geq 10000$		EN 12086, EN 13469
Other technical features			
Shelf life	Self-adhesive tapes, self-adhesive sheets and tubes: 1 year		
Storage	Can be stored in dry, clean rooms at normal relative humidity (50% to 70%) and ambient temperature (0 °C – 35 °C).		

[1] +85 °C, for products with a self-adhesive layer.

Tube – precovered. Dark grey with silver metallic covering. 1.0 m Length

9 mm

Pipe Ø [mm]	Item	EAN	Content [metric]
12	ZHC-09X012	7612207389210	96 m
15	ZHC-09X015	7612207389197	82 m
18	ZHC-09X018	7612207389227	75 m
22	ZHC-09X022	7612207389203	61 m
28	ZHC-09X028	7612207389234	45 m
35	ZHC-09X035	7612207389241	34 m
42	ZHC-09X042	7612207389258	26 m

Other information

Thickness tolerance	9 mm ± 1.5 mm
Length tolerance	± 1.5 %
Reaction to fire	Hazard level 3, R1 according to EN 45545-2

Sheet – self-adhesive. Dark grey with silver metallic covering

Item	Thickness [mm]	Width (m)	Length [m]	Content [metric]
ZHC-06MM/A	6	1	2	50 m²
ZHC-10MM/A	10	1	2	34 m²
ZHC-13MM/A	13	1	2	24 m²
ZHC-19MM/A	19	1	2	16 m²
ZHC-25MM/A	25	1	2	12 m²

Other information

Thickness tolerance	6 mm ± 1.0 mm 9-19 mm ± 1.5 mm 25 mm ± 2.0 mm
Length tolerance	1.5 %
Reaction to fire	Hazard level 3, R1 according to EN 45545-2

Accessories

Item	Description	Content [quantity]
ACH-PSATAPES-30	AL tape in width: 30mm, length: 25m, thickness: 0.08	10 roll

Other information

Aluminium self-adhesive tape.

ABOUT ARMACELL

As the inventor of flexible foam for equipment insulation and a leading provider of engineered foams, Armacell develops innovative and safe thermal and mechanical solutions that create sustainable value for its customers. Armacell's products significantly contribute to global energy efficiency making a difference around the world every day. With more than 3,300 employees and 25 production plants in 19 countries, the company operates two main businesses, Advanced Insulation and Engineered Foams. Armacell focuses on insulation materials for technical equipment, high-performance foams for acoustic and lightweight applications, recycled PET products, next-generation aerogel technology and passive fire protection systems.

For more information, please visit:
www.armacell.com

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