

LT/Armaflex® Industrial

HIGH DENSITY INDUSTRIAL GRADE FEF INSULATION



- Built-in water vapour barrier mitigates risk of corrosion under insulation (CUI)
- Low maintenance and repair costs
- High density and mechanically robust for superior stability and multi-layer application
- Low thermal conductivity to minimise energy losses
- Low leachable chloride content (< 90 ppm) to minimise stress corrosion cracking (SCC)
- Retains its physical characteristics throughout its service life



Technical Data - LT/Armaflex Industrial

Brief description	LT/Armaflex® Industrial is a flexible, high density and mechanically robust, closed cell thermal insulation material based on extruded elastomeric foam. The product has been specially developed for industrial and offshore environments which require IMO compliant solutions.
Material type	Synthetic NBR rubber based foam. Factory made flexible elastomeric foam (FEF) according to EN 14304.
Colour	Black
Special features	LT/Armaflex® Industrial is characterised by its superior low thermal conductivity and high resistance to water vapour transmission. The product is suitable for use in multi-layer applications including Arma-Sound Industrial Systems.
Product range	Tubes, 13, 19 and 25 mm thickness, for pipe outer diameters ranging from 18 to 89 mm (¾" to 3" NB). Sheets in rolls, 13, 19, 25, 32, 40 and 50 mm thickness.
Applications	Thermal insulation / protection of pipes, vessels and ducts (incl. elbows, fittings, flanges etc.) in offshore, industrial (typically oil & gas) and process equipment facilities. LT/Armaflex® Industrial is also used as a component of Arma-Sound Industrial Systems to provide acoustic insulation on industrial pipework and vessels ensuring reduction of sound transmission.
Installation	For industrial applications it is recommended to consult the relevant Armacell installation instructions and application manuals. Please consult our Customer Service Centre.
Regulation / approval compliance	SOLAS Convention (Safety Of Life At Sea) EN 14304 (harmonized construction product standard for FEF) IMO 2010 FTP (Fire Test Procedure) Code Approval part 2 (smoke generation and toxicity) and part 5 (surface flammability) DNV approval

Property	Value / Assessment				Standard / Test method
Temperature range*1					
Service temperature	Max. service temperature	+110 °C	+230 °F	(±85°C / ±185°F if sheet or tube is glued to the object with its whole surface)	Tested according to EN 14706, EN 14707 and EN 14304
	Min. service temperature	-50 °C	-58 °F		

Thermal conductivity					
Declared thermal conductivity (metric units)	$\lambda_d \leq 0.036 \text{ W/(m·K) at } 0^\circ\text{C}$				
	θ_m	-50	0	+50	+100
	$\lambda_d \leq$	0.032	0.036	0.040	0.044
	Equation of declared thermal conductivity as a function of temperature: $\lambda_d(\theta_m) = 0.036 + 8 \times 10^{-5} \times \theta_m + 3 \times 10^{-8} \times \theta_m^2 \text{ W/(m·K), where } \theta_m \text{ is mean temperature in } ^\circ\text{C}$				
Declared thermal conductivity (imperial units)	$\lambda_d \leq 0.250 \text{ Btu·in/(h·ft}^2\text{·}^\circ\text{F) at } 32^\circ\text{F}$				
	θ_m	-58	+32	+122	+212
	$\lambda_d \leq$	0.222	0.250	0.278	0.307
	[Btu·in/(h·ft ² ·°F)]				

Water vapour diffusion (transmission) resistance		
Water vapour diffusion resistance factor	μ ≥ 7,000	Tested according to EN 12086 and EN 13469 (equivalent method ASTM E96)
Water vapour permeability	≤ 2.79 × 10 ⁻¹¹ g/(m·s·Pa) ≤ 0.019 Perm inch	

Fire performance & approvals			
International standards	IMO Part 2 (smoke generation and toxicity) IMO Part 5 (surface flammability)	Approved by DNV*2	Tested according to IMO 2010 FTP Code
	Class A, < 25 Flame Spread Index		Tested according to ASTM E84
	Class 1		Tested according to BS 476 part 7
Reaction to fire (Euroclass)	C-s3, d0 / C _L -s3, d0		Classified according to EN 13501-1 Tested according to EN 13823 (SBI) and EN ISO 11925-2
General fire performance	Self-extinguishing, does not drip, does not spread flames.		

Density					
Density	65 to 80 kg/m³		4.1 to 5.0 lb/ft³		Tested according to ISO 845, ASTM D1622

Acoustic performance		
Acoustic insertion loss*3	When used as part of a system: LT/Armaflex® Industrial complies to ISO 15665 Classes A to C and Shell DEP 31.46.00.31-Gen Class D.	Tested according to ISO 3741 (equivalent method ASTM E1222) Classified according to ISO 15665
	Minimum acoustic service temperature (interface temperature to underlying pipework or thermal insulation layers) is -20°C (-4°F).	

Mechanical properties					
Compression deflection	$\geq 14 \text{ kPa}$	$\geq 2.0 \text{ psi}$	at 25% deflection		Tested according to ISO 6916-1 (equivalent method ASTM D1056)
Tear strength	$\geq 0.5 \text{ kN/m}$	$\geq 2.85 \text{ lbf/in}$			Tested according to ISO 34-1*4

Corrosion mitigation					
Leachable (water-soluble) chlorides	$\leq 90 \text{ ppm (mg/kg or } \mu\text{g/g)}$				Tested*5 according to EN 13468 and ASTM C871
pH-value	6 to 8				Tested according to ISO 10523
Stress corrosion cracking	No cracks under magnifying glass on test coupons after evening, cleaning and rebending.*6 and 7				Tested according to ASTM C692

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Other technical features

Dimensional tolerances	According to EN 14304, for detailed values please refer to product range tables.	Tested according to EN 822, EN 823 and EN 13467
Weather resistance	In all industrial applications the outer layer of the material must be protected with an adequate covering like Arma-Chek R, metal jacketing or preformed UV-cured GRP (Glass-Reinforced Plastic) cladding. For further information please consult our Customer Service Centre.	
Health aspects	Neutral, MSDS available on request.	
Water absorption	≤ 0.2% by volume (total submersion for 2 hours)	Tested according to ASTM C209
Closed cell content	≥ 90% declared on the basis of the water absorption test	
Application conditions*8	Ambient temperature: +5 °C to +35 °C Max. relative humidity: 80%	+41 °F to +95 °F
Sealing and adhesion	Armaflex Adhesive 520 or Adhesive HT625 shall be used for reliable adhesion of joints and seams.	
Tape*9	HT/Armaflex Tape can be used for application.	
Storage	Material shall be stored indoors, in clean and dry conditions, away from direct sunlight.	
Shelf (storage) life*10	Max. 3 years	

1. For temperatures below or above those published please contact our Customer Service Centre to request for the corresponding technical information.
2. The product satisfies the criteria of surface flammability (Part 5) for bulkheads, ceilings and linings as required by IMO 2010 FTP Code for insulation of pipe fittings for cold service systems. Further to this mandatory requirement the product meets the criteria of smoke generation and toxicity (Part 2) for bulkheads, ceilings and linings. In addition, the criteria of surface flammability (Part 5) and smoke generation and toxicity (Part 2) for floor coverings and primary deck coverings are met.
3. For further details on acoustic classes according to ISO 15665 please consult our leaflet on ArmaSound Industrial Systems.
4. Minimum value in Machine Direction (MD) and in Cross Direction (CD). Angle test piece with a nick.
5. Specimen preparation in accordance with EN 13486: neither cut nor blended. Test temperature +100°C, leaching time 0.5 hours as specified in the standard for product maximum service temperature.
6. Based on single test results which are not monitored in regular frequency. Can be used for information / reference only.
7. The coupons from type 304 stainless steel sheet, 1.5 mm thick. 28 days drip test using deionized or distilled water at around +100 °C.
8. For environmental conditions outside the given range please contact our Customer Service Centre.
9. Does not meet IMO classification. For further information and application instructions please contact our Customer Service Centre.
10. Shelf life (maximum storage time) is limited in order to make sure that only currently manufactured products are applied on projects. This limitation is restricted solely to storage of the product and does not affect the lifetime of product after it has been installed.

All data and technical information are based on results achieved under typical application conditions. Recipients of this information should, in their own interest and responsibility, clarify with us in due time whether or not the data and information apply to the intended application area. Armacell takes every precaution to ensure the accuracy of the data provided in this document and all statements, technical information and recommendations contained within are believed to be correct. However, Armacell cannot guarantee that the data are 100 % accurate. Furthermore, minor deviations in colour, quality and dimensions are unavoidable and in most cases do not influence the performance of the product. Armacell expressly disclaims any and all liability in relation to any results obtained or arising from any use of the product or reliance on such information. No warranty of fitness for any particular purpose, warranty of merchantability or any other warranty, expressed or implied, is made concerning the goods described or the information provided herein. Please consult our Customer Service Centre before insulating stainless steels. Installation instructions are available in our Armaflex installation manual. All the statements and technical information within this document should be read in conjunction with the customer's own specification. It is the responsibility of the recipient to inform all involved parties about the content of these documents. The described and recommended methods should be strictly followed. If there is a requirement to deviate from our recommendations, please contact us in advance to discuss possible suitable alternatives. Armacell will not be liable for any claim resulting from a failure to observe our specification or any other agreed solutions and from non-observance of the customer's specification.

Product Range - LT/Armaflex Industrial

Sheets			
Item	Nominal Thickness [mm]	Nominal Roll Length [m]	m ² /carton
LTI-13X99/E	13	8	8
LTI-19X99/E	19	6	6
LTI-25X99/E	25	4	4
LTI-32X99/E	32	3	3
LTI-40X99/E	40	3	3
LTI-50X99/E	50	2.5	2.5
Tolerances for sheets According to EN 14304	Thickness tolerances	13 - 19 mm nominal thickness 25 - 50 mm nominal thickness	± 1.5 mm ± 2 mm
	Width tolerances		± 2 %
	Length tolerances		± 1.5 %

Tubes										
Steel pipes *			Pipe max. Outside Diameter	Inside Diameter ID of Insulation Tube min/max	Nominal Insulation Thickness:		Nominal Insulation Thickness:		Nominal Insulation Thickness:	
Nominal Pipe Size NPS	Nominal Diameter DN	Outside Diameter OD*			13mm		19mm		25mm	
[inch]		[mm]	[mm]	[mm]	Item	m/ carton	Item	m/ carton	Item	m/ carton
¾	10	17.2	18	19.5 - 21.0	LTI-13X018	112	LTI-19X018	70	LTI-25X018	48
½	15	21.3	22	23.5 - 25.0	LTI-13X022	96	LTI-19X022	60	LTI-25X022	40
¾	20	26.9	28	29.5 - 31.5	LTI-13X028	84	LTI-19X028	48	LTI-25X028	32
1	25	33.7	35	36.5 - 38.5	LTI-13X035	60	LTI-19X035	40	LTI-25X035	24
1¼	32	42.4	42.4	44.0 - 46.0	LTI-13X042	48	LTI-19X042	32	LTI-25X042	22
1½	40	48.3	48.3	50.0 - 52.0	LTI-13X048	40	LTI-19X048	24	LTI-25X048	20
---	---	54.0	54	56.0 - 58.0	LTI-13X054	32	LTI-19X054	24	LTI-25X054	18
2	50	60.3	60.3	62.0 - 64.0	LTI-13X060	24	LTI-19X060	24	LTI-25X060	16
2½	65	76.1	76.1	78.0 - 80.0	LTI-13X076	24	LTI-19X076	16	LTI-25X076	10
3	80	88.9	89	91.0 - 94.0	LTI-13X089	18	LTI-19X089	12	LTI-25X089	8
Tolerances for tubes According to EN 14304			Thickness tolerances		13 - 19 mm nominal thickness 25 mm nominal thickness			± 1.5 mm ± 2.5 mm		
			Internal Diameter tolerances					see ID min/max in the table above		
			Length tolerances					± 1.5 %		
Notes			* In accordance with European standards for steel pipes with the exception of Outside Diameter 54 for copper pipe. For further dimensions please contact our Customer Service Centre.							

Accessories			
Item	Article description	Units / carton	
ADH520/2,5E	2.5 Litre TIN	20	Litre
ADH520/1,0E	1 Litre TIN	12	Litre
ADH-HT625/1,0	1 Litre TIN	12	Litre

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