

INSULATION FOR THE OIL AND GAS INDUSTRY

LT/ArmaFlex[®] Industrial

High density industrial grade
FEF installation

- // 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

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 **armacell**[®]
ArmaFlex[®]

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 ArmaSound 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 ArmaSound 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 contact Technical Services.
Regulation / approval compliance	EN 14304 (harmonized construction product standard for FEF) Type Approval Certificate by DNV-GL / IMO 2010 FTP Code part 2 and part 5.

Property	Value/Assessment					Special Remark	
Temperature range **							
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)	$\lambda_d \leq 0.036 \text{ W/(m}\cdot\text{K)}$ at 0 °C					Declared according to EN ISO 13787 Tested according to EN 12667 and EN ISO 8497 (Equivalent methods ASTM C177 and C518)	
	θ_m	-50	0	+50	+100 +110		[°C]
	$\lambda_d \leq$	0.032	0.036	0.040	0.044		0.045
Equation of declared thermal conductivity as a function of temperature: $\lambda_d(\theta_m) = 0.036 + 8 \times 10^{-5} \times \theta + 3 \times 10^{-8} \times \theta_m^2 \text{ W/(m}\cdot\text{K)}$, where θ_m is mean temperature in °C							
Declared thermal conductivity (imperial units)	$\lambda_d \leq 0.250 \text{ Btu}\cdot\text{in}/(\text{h}\cdot\text{ft}^2\cdot^\circ\text{F)}$ at 32 °F						
	θ_m	-58	+32	+122	+212 +230		[°F]
	$\lambda_d \leq$	0.222	0.250	0.278	0.307		0.313
Water vapour diffusion (transmission) resistance							
Water vapour diffusion resistance factor	$\mu \geq 7000$					Tested according to EN 12086 and EN 13469 (equivalent method ASTM E96)	
Water vapour permeability	$\leq 2.79 \times 10^{-11} \text{ g}/(\text{m}\cdot\text{s}\cdot\text{Pa})$ $\leq 0.019 \text{ Perm inch}$						
Fire performance & approvals							
International standards	IMO Part 2 (smoke generation and toxicity) IMO Part 5 (surface flammability)			Approved by DNV-GL 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 _i -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.						
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. Minimum acoustic service temperature (interface temperature to underlying pipework or thermal insulation layers) is -20°C (-4°F).					Tested according to ISO 3741 (equivalent method ASTM E1222) Classified according to ISO 15665	
Density							
Density	65 to 80 kg/m ³		4.1 to 5.0 lb/ft ³			Tested according to ISO 845, ASTM D1622	



Mechanical properties

Compression deflection	≥ 14 kPa	≥ 2.0 psi	at 25% deflection	Tested according to ISO 6916-1 (equivalent method ASTM D1056)
Tear strength	≥ 0.5 kN/m	≥ 2.85 lbf/in		Tested according to ISO 34-1 ⁴

Corrosion mitigation

Leachable (water-soluble) chlorides	≤ 90 ppm (mg/kg or µg/g)			Tested ⁵ according to EN 13468 and ASTM C871
Leachable (water-soluble) ammonia ions	≤ 100 ppm (mg/kg or µg/g) ⁶			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. ^{6,7}			Tested according to ASTM C692

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 contact Technical Services.			
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	Application temperature: ⁹	+5 °C to +35 °C	+41 °F to +95 °F	
	Max. relative humidity:	80%		
Sealing and adhesion	ArmaFlex Adhesive 520 or Adhesive HT625 shall be used for reliable adhesion of joints and seams.			
Tape ¹⁰	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 ¹¹	Max. 3 years.			

- For temperatures below or above those published please contact Technical Services to request for the corresponding technical information.
- 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.
- For further details on acoustic classes according to ISO 15665 please consult our brochure on ArmaSound Industrial Systems.
- Minimum value in Machine Direction (MD) and in Cross Direction (CD). Method B, procedure (b), angle test piece with a nick.
- Specimen preparation in accordance with EN 13486: neither cut, ground nor blended. Test temperature +100°C, leaching time 0.5 hours as specified in the standard for product maximum service temperature.
- Based on single test results. Can be used for information / reference only.
- 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.
- For environmental conditions outside the given range please contact Technical Services.
- Application temperature (temperature of installation) refers to the ambient temperature during application and the surface temperature of the substrate to which the product is installed.
- Does not meet IMO classification. For further information and application instructions please contact Technical Services.
- 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.

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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 %
	Width tolerances		± 2 mm
	Length tolerances		± 1.5 %

Tubes

STEEL PIPES*		Outside diameter OD*	Pipe max. outside diameter	Inner diameter of insulation tube min/max	Nominal insulation thickness:		Nominal insulation thickness:		Nominal insulation thickness:	
Nominal pipe size NPS	Nominal diameter DN				13mm	19mm	25mm	Item	m/ carton	Item
[inch]		[mm]	[mm]	[mm]	Item	m/ carton	Item	m/ carton	Item	m/ carton
3/8	10	17.2	18	19.5 - 21.0	LTI-13X018	112	LTI-19X018	70	LTI-25X018	48
1/2	15	21.3	22	23.5 - 25.0	LTI-13X022	96	LTI-19X022	60	LTI-25X022	40
3/4	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
1 1/4	32	42.4	42.4	44.0 - 46.0	LTI-13X042	48	LTI-19X042	32	LTI-25X042	22
1 1/2	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
2 1/2	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 sheets According to EN 14304		Thickness tolerances		13 - 19 mm nominal thickness 25 mm nominal thickness		± 1.5 mm ± 2.5 mm				
		Inner diameter tolerances				see min/max in the table above				
		Length tolerances				± 1.5 %				

* In accordance with European standards for steel pipes with the exception of Outside Diameter 54 for copper pipe. For further dimensions please contact Technical Services.

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

All data and technical information are based on results achieved under the specific conditions defined according to the testing standards referenced. It is the customer's responsibility to verify if the product is suitable for the intended application. The responsibility for professional and correct installation and compliance with relevant regulations and project specification lies with the customer. 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 at the time of publication. By ordering/receiving product you accept the **Armacell General Terms and Conditions of Sale** applicable in the region. Please request a copy if you have not received these.

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ABOUT ARMACELL

As the inventors of flexible foam for equipment insulation and a leading provider of engineered foams, Armacell develops innovative and safe thermal, acoustic 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 3,000 employees and 27 production plants in 17 countries, the company operates two main businesses, Advanced Insulation and Engineered Foams. Armacell focuses on insulation materials for technical equipment, high-performance foams for high-tech and lightweight applications and next generation aerogel blanket technology.

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