

# INSULATION FOR THE OIL AND GAS INDUSTRY

## HT/ArmaFlex<sup>®</sup> Industrial

High density industrial grade FEF  
insulation for elevated temperatures

- // High density and mechanically robust for superior stability and multi-layer application
- // Enhanced temperature capability
- // Built-in water vapour barrier reduces risk of corrosion under insulation (CUI)
- // Retains its physical characteristics throughout its service life
- // Low maintenance and repair costs
- // Low leachable chloride content (< 30 ppm) to minimise stress corrosion cracking (SCC)
- // Low thermal conductivity to minimise energy losses

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 **armacell**<sup>®</sup>  
ArmaFlex<sup>®</sup>

## TECHNICAL DATA – HT/ARMAFLEX INDUSTRIAL

Brief description	HT/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 to provide enhanced thermal resistance of the insulation systems with its low thermal conductivity.
Material type	Synthetic EPDM rubber based foam. Factory made flexible elastomeric foam (FEF) according to EN 14304.
Colour	Black
Special features	HT/ArmaFlex® Industrial is resistant to elevated operating temperatures. 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, 10, 13, 19 and 25 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. HT/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). Certificate of Fire Approval by Lloyd's Register (Class 1, BS 476 part 7).

Property	Value/Assessment		Special Remark
<b>Temperature range*1</b>			
Service temperature	Max. service temperature	+125 °C                      +257 °F	Tested according to EN 14706, EN 14707 and EN 14304
	Min. service temperature	-50 °C                              -58 °F	
<b>Thermal conductivity</b>			
Declared thermal conductivity (metric units)	$\lambda_d \leq 0.041 \text{ W/(m}\cdot\text{K)}$ at 0 °C		Declared according to EN ISO 13787 Tested according to EN 12667 and EN ISO 8497 (Equivalent methods ASTM C177 and C518)
	$\theta_m$	-50      0      +50      +100      +125      [°C]	
	$\lambda_d \leq$	0.039    0.041    0.047    0.057    0.063    [W/(m·K)]	
Equation of declared thermal conductivity as a function of temperature: $\lambda_d(\theta_m) = 0.04028 + 1.25 \times 10^{-4} \times \theta_m + 8 \times 10^{-7} \times (\theta_m - 30)^2 \text{ W/(m}\cdot\text{K)}$ , where $\theta_m$ is mean temperature in °C			
Declared thermal conductivity (imperial units)	$\lambda_d \leq 0.284 \text{ Btu}\cdot\text{in}/(\text{h}\cdot\text{ft}^2\cdot^\circ\text{F)}$ at 32 °F		
	$\theta_m$	-58      +32      +122      +212      +257      [°F]	
	$\lambda_d \leq$	0.271    0.284    0.325    0.393    0.438    [Btu·in/(h·ft²·°F)]	
<b>Water vapour diffusion (transmission) resistance*2</b>			
Water vapour diffusion resistance factor	$\mu \geq 3,000$ (sheets)		Tested according to EN 12086 and EN 13469 (equivalent method ASTM E96)
Water vapour permeability	$\leq 6.51 \times 10^{-11} \text{ g}/(\text{m}\cdot\text{s}\cdot\text{Pa})$ $\leq 0.045 \text{ Perm inch}$		
<b>Fire performance &amp; approvals</b>			
International standards	IMO Part 5 (surface flammability) *3,4		Tested according to IMO 2010 FTP Code
	Class A, < 25 Flame Spread Index		
	Class 1		Approved by Lloyds Register
Reaction to fire (Euroclass)	D-s3, d0 / D <sub>1</sub> -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.		
<b>Density</b>			
Density	sheets: 70 to 85 kg/m <sup>3</sup> tubes: 60 to 75 kg/m <sup>3</sup>	4.4 to 5.3 lb/ft <sup>3</sup> 3.7 to 4.7 lb/ft <sup>3</sup>	Tested according to ISO 845, ASTM D1622



## Acoustic performance

Acoustic insertion loss <sup>5</sup>	When used as part of a system: HT/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 pipework or underlying thermal insulation layers) is -40 °C (-40 °F).		Tested according to ISO 3741 (equivalent method ASTM E1222) Classified according to ISO 15665
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## Mechanical properties

Compression deflection	≥ 15 kPa	≥ 2.2 psi	at 25% deflection	Tested according to ISO 6916-1 (equivalent method ASTM D1056)
Tear strength	≥ 0.4 kN/m	≥ 2.3 lbf/in		Tested according to ISO 34-1 <sup>6</sup>

## Corrosion mitigation

Leachable (water-soluble) chlorides	≤ 30 ppm (mg/kg or µg/g)			Tested <sup>7</sup> according to EN 13468 and ASTM C871
pH-value	7 to 9 <sup>3</sup>			Tested according to ISO 10523
Stress corrosion cracking	No cracks under magnifying glass on test coupons after evening, cleaning and rebending. <sup>3,8</sup>			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 <sup>3</sup>	≤ 0.1% 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.		
Vacuum water absorption	≤ 4 % by mass	Total submersion for 2 x 180 seconds, vacuum pressure 17.2 kPa (2.5 psi).		Tested according to ASTM D1056
Application conditions <sup>9</sup>	Application temperature <sup>10</sup> :	+5 °C to +35 °C	+41 °F to +95 °F	
	Max. relative humidity:	80%		
Sealing and adhesion <sup>11</sup>	ArmaFlex Adhesive HT625 shall be used for reliable adhesion of joints and seams.			
Tape <sup>12</sup>	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 <sup>13</sup>	Max. 3 years			

1. For temperatures below or above those published please contact Technical Services to request for the corresponding technical information.

2. For further information on water vapour transmission resistance of HT/ArmaFlex Industrial tubes please contact Technical Services.

3. Based on single test results. Can be used for information / reference only.

4. Meets the criteria of floor coverings and primary deck coverings

5. For further details on acoustic classes according to ISO 15665 please consult our brochure on ArmaSound Industrial Systems.

6. Minimum value in Machine Direction (MD) and in Cross Direction (CD). Method B, procedure (b), angle test piece with a nick.

7. 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.

8. 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.

9. For environmental conditions outside the given range please contact Technical Services.

10. 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.

11. During storage of the product blooming on the surfaces may occur. This blooming does not affect the technical properties of the material, but can affect the adhesion properties. Therefore, the surface needs to be cleaned (wiped off) before adhesives can be applied.

12. For further information and application instructions please contact Technical Services.

13. 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.



### Sheets

Item	Nominal Thickness [mm]	Nominal Width x Length [m]	m <sup>2</sup> /carton
HTI-10-99/E	10	1x10	10
HTI-13-99/E	13	1x8	8
HTI-19-99/E	19	1x6	6
HTI-25-99/3,5	25	1x3.5	3.5
<b>Tolerances for sheets</b> According to EN 14304	<b>Thickness tolerances</b>	13 - 19 mm nominal thickness 25 mm nominal thickness	± 1.5 mm ± 2 mm
	<b>Width tolerances</b>		± 2 %
	<b>Length tolerances</b>		± 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	HTI-13X018	98	HTI-19X018	58	HTI-25X018	36
1/2	15	21.3	22	23.5 - 25.0	HTI-13X022	84	HTI-19X022	50	HTI-25X022	36
3/4	20	26.9	28	29.5 - 31.5	HTI-13X028	64	HTI-19X028	48	HTI-25X028	32
1	25	33.7	35	36.5 - 38.5	HTI-13X035	50	HTI-19X035	32	HTI-25X035	24
1 1/4	32	42.4	42.4	44.0 - 46.0	HTI-13X042	40	HTI-19X042	24	HTI-25X042	20
1 1/2	40	48.3	48.3	50.0 - 52.0	HTI-13X048	32	HTI-19X048	22	HTI-25X048	16
---	---	54.0	54	56.0 - 58.0	HTI-13X054	32	HTI-19X054	18	HTI-25X054	16
2	50	60.3	60.3	62.0 - 64.0	HTI-13X060	28	HTI-19X060	16	HTI-25X060	16
2 1/2	65	76.1	76.1	78.0 - 80.0	HTI-13X076	24	HTI-19X076	18	HTI-25X076	12
3	80	88.9	89	91.0 - 94.0	HTI-13X089	18	HTI-19X089	16	HTI-25X089	12
<b>Tolerances for tubes</b> According to EN 14304		<b>Thickness tolerances</b>		13 mm nominal thickness 19-25 mm nominal thickness		± 1.5 mm ± 2.5 mm				
		<b>Inner diameter tolerances</b>					see min/max in the table above			
		<b>Length tolerances</b>					± 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 our Customer Service Centre.

### Accessories

Item	Article description	Units/carton
HT-TAPE	Tape 3 mm (Roll 15 m x 50 mm)	12 Roll
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

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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 3,100 employees and 24 production plants in 16 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.

For more information, please visit:  
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