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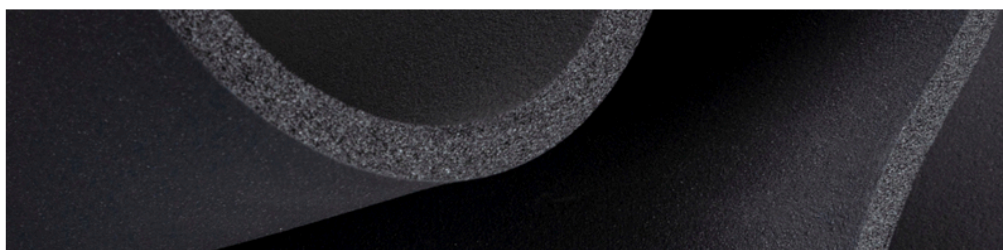
# HT/ArmaFlex Industrial

Industrial grade FEF insulation material designed for applications with elevated temperatures in oil and gas industry

- // 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



 **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	Factory-made flexible elastomeric foam based on ethylene propylene diene methylene (EPDM), according to EN 14304.
Product colour range	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 (including elbows, fittings, flanges, etc.) in offshore, industrial (typically oil and 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 application manual(s). For further information please contact our Technical Services.

### Approvals and compliance

Specification compliance	<ul style="list-style-type: none"> <li>EN 14304 (harmonised construction product standard for FEF)</li> <li>Certificate of Fire Approval by Lloyd's Register (Class 1, BS 476 part 7)</li> </ul>
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Property	Value / Assessment						Standard / Test method
<b>Temperature range</b>							
Service temperature <sup>1</sup>	Min. °C	Min. °F	Max. °C	Max. °F	EN 14706, EN 14707, EN 14304		
	-50	-58	125	257			
<b>Thermal conductivity</b>							
Declared thermal conductivity	θ <sub>m</sub>	-50 °C [-58 °F]	0 °C [+32 °F]	+50 °C [+122 °F]	+100 °C [+212 °F]	+125 °C [+257 °F]	EN ISO 13787, EN 12667, EN ISO 8497 <sup>2</sup>
	λ <sub>d</sub> ≤ [W/(m·K)]	0.039	0.041	0.047	0.057	0.063	
	k ≤ [Btu-in/(h-ft <sup>2</sup> -°F)]	0.271	0.284	0.325	0.393	0.438	
	Formula	Equation of declared thermal conductivity as a function of temperature: λ <sub>d</sub> (θ <sub>m</sub> ) = 0.04028 + 1.25 × 10 <sup>-4</sup> × θ <sub>m</sub> + 8 × 10 <sup>-7</sup> × (θ <sub>m</sub> - 30) <sup>2</sup> W/(m·K), where θ <sub>m</sub> is mean temperature in °C.					
<b>Fire Performance and Approvals</b>							
Surface spread of flame	Class 1						BS 476 Part 7
Reaction to fire	D-s3,d0 / D(L)-s3,d0						EN 13501-1, EN 13823, EN ISO 11925-2
Surface burning characteristics	Class A, <25 Flame Spread Index						ASTM E84
Surface flammability <sup>3,4</sup>	IMO Part 5						IMO 2010 FTP Code, Part 5
<b>Fire performance</b>							
Practical fire behaviour	Self-extinguishing, does not drip, does not spread flames.						
<b>Resistance to water vapour</b>							
Water vapour diffusion resistance factor <sup>5</sup>	μ ≥ 3,000 (sheets)						EN 12086, EN 13469 <sup>6</sup>
Water vapour permeability	≤ 6.51 × 10 <sup>-11</sup> g/(m·s·Pa) (≤0.045 Perm-inch)						EN 12086, EN 13469 <sup>6</sup>
<b>Resistance to water</b>							
Water absorption <sup>3</sup>	≤ 0.1% by volume (total submersion for 2 hours)						ASTM C209
Water absorption by vacuum	≤ 4% by mass (total submersion for 2 x 180 seconds, vacuum pressure 17.2 kPa or 2.5 psi)						ASTM D1056

Property	Value / Assessment	Standard / Test method
<b>Corrosion mitigation</b>		
Leachable (water-soluble) chlorides	≤ 30 ppm (mg/kg or µg/g)	EN 13468, ASTM C871 <sup>7</sup>
pH-value <sup>3</sup>	7 to 9	ISO 10523
Stress corrosion cracking <sup>3,8</sup>	No cracks under magnifying glass on test coupons after evening, cleaning and rebending.	ASTM C692
<b>Physical attributes</b>		
Density	Sheets: 70 to 85 kg/m <sup>3</sup> (4.4 to 5.3 lb/ft <sup>3</sup> ) Tubes: 60 to 75 kg/m <sup>3</sup> (3.7 to 4.7 lb/ft <sup>3</sup> )	ISO 845, ASTM D1622
Dimensions and tolerances	According to EN 14304, for detailed values, please refer to product range tables.	EN 822, EN 823, EN 13467
<b>Mechanical properties</b>		
Tear strength	≥0.4 kNm (≥2.3 lbf/in)	ISO 34-1 <sup>9</sup>
<b>Compression deflection</b>		
Compression deflection 25%	≥ 15kPa (≥ 2.2 psi) at 25% deflection	ISO 6916-1 <sup>10</sup>
<b>Acoustic performance</b>		
System acoustic insertion loss	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).	ISO 3741, ISO 15665 <sup>11</sup>
<b>Weather and UV resistance</b>		
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 Glass-Reinforced Plastic (GRP) cladding. For further information, please contact Technical Services.	
<b>Health and environment</b>		
Health aspects	Neutral, SDS available on request.	
<b>Other technical features</b>		
Adhesion and sealing <sup>12,13</sup>	ArmaFlex HT625 adhesive should be used for reliable adhesion of joints and seams. HT/ArmaFlex tape can be used for application.	
Application conditions <sup>14,15</sup>	Application temperature should be maintained at +5°C to +35 °C (+41°F to +95°F) and at a maximum relative humidity of 80%.	
Closed-cell content	≥ 90% (declared on the basis of the water absorption test.)	
Shelf life <sup>16</sup>	Maximum of 3 years.	
Storage	Material shall be stored indoors, in clean and dry conditions, away from direct sunlight.	

<sup>1</sup>For use in temperatures beyond the published value, please contact Technical Services.

<sup>2</sup>Equivalent methods ASTM C177 and C518.

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

<sup>4</sup>Meets the criteria of floor coverings and primary deck coverings.

<sup>5</sup>For further information regarding water vapour transmission resistance, please contact Technical Services.

<sup>6</sup>Equivalent method to ASTM E96.

<sup>7</sup>Specimen prepared according to 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.

<sup>8</sup>The coupons from type 304 stainless steel, 1.5 mm thick. 28 days drip test using deionized or distilled water at around +100°C.

<sup>9</sup>Minimum value in Machine Direction (MD) and in Cross Direction (CD). Method B, procedure (b), angle test piece with a nick.

<sup>10</sup>Equivalent method to ASTM D1056.

<sup>11</sup>Equivalent method to ASTM E1222.

<sup>12</sup>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.

<sup>13</sup>For further information, please contact our Customer Service.

<sup>14</sup>For environmental conditions outside the given range, please contact Technical Services.

<sup>15</sup>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.

<sup>16</sup>Shelf life (maximum storage time) is limited to ensure that only currently manufactured products are installed 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.

Tube – standard. Black

13.0 mm nominal insulation thickness					19.0 mm nominal insulation thickness				
Pipe Ø [mm]	Item	Inner diameter (minimum) [mm]	Inner diameter (maximum) [mm]	Content [metric]	Pipe Ø [mm]	Item	Inner diameter (minimum) [mm]	Inner diameter (maximum) [mm]	Content [metric]
18	HTI-13X018	19	22	98 m	28	HTI-19X028	29	32	48 m
22	HTI-13X022	23	26	84 m	35	HTI-19X035	36	39	32 m
28	HTI-13X028	29	32	64 m	48	HTI-19X048	49	52	22 m
35	HTI-13X035	36	39	50 m	60	HTI-19X060	61	64	16 m
60	HTI-13X060	61	64	28 m	76	HTI-19X076	77	80	18 m
76	HTI-13X076	77	80	24 m	89	HTI-19X089	90	93	16 m
89	HTI-13X089	90	93	18 m	-	-	-	-	-

Other information

<b>Thickness tolerance</b>	13 mm nominal thickness ± 1.5 mm 19-25 mm nominal thickness ± 2.5 mm
<b>Length tolerance</b>	± 1.5%
<b>Reaction to fire</b>	D-s3, d0 / DL-s3, d0
<b>Regulation</b>	Tube tolerances according to EN 14304.
<b>Remarks</b>	Refer to minimum and maximum inner diameter details for inner diameter tolerances. Steel pipe outside diameter is 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.

Tube – standard. Black

25.0 mm nominal insulation thickness				
Pipe Ø [mm]	Item	Inner diameter (minimum) [mm]	Inner diameter (maximum) [mm]	Content [metric]
22	HTI-25X022	23	26	36 m
28	HTI-25X028	29	32	32 m
35	HTI-25X035	36	39	24 m
42	HTI-25X042	43	46	20 m
48	HTI-25X048	49	52	16 m
60	HTI-25X060	61	64	16 m
76	HTI-25X076	77	80	12 m
89	HTI-25X089	90	93	12 m

Other information

<b>Thickness tolerance</b>	13 mm nominal thickness ± 1.5 mm 19-25 mm nominal thickness ± 2.5 mm
<b>Length tolerance</b>	± 1.5%
<b>Reaction to fire</b>	D-s3, d0 / DL-s3, d0
<b>Regulation</b>	Tube tolerances according to EN 14304.
<b>Remarks</b>	Refer to minimum and maximum inner diameter details for inner diameter tolerances. Steel pipe outside diameter is 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.

Tube – standard. Black

Item	Thickness [mm]	Width (m)	Length [m]	Content [metric]
HTI-10-99/E	10	1	10	10 m <sup>2</sup>
HTI-13-99/E	13	1	8	8 m <sup>2</sup>
HTI-19-99/E	19	1	6	6 m <sup>2</sup>

**Tube – standard. Black**

Item	Thickness [mm]	Width [m]	Length [m]	Content [metric]
<b>Other information</b>				
<b>Thickness tolerance</b>	13 mm nominal thickness $\pm$ 1.5 mm 19-25 mm nominal thickness $\pm$ 2.5 mm			
<b>Length tolerance</b>	$\pm$ 1.5%			
<b>Reaction to fire</b>	D-s3, d0 / DL-s3, d0			
<b>Regulation</b>	Tube tolerances according to EN 14304.			
<b>Remarks</b>	Refer to minimum and maximum inner diameter details for inner diameter tolerances. Steel pipe outside diameter is 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.			

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## ABOUT ARMACELL

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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:  
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