

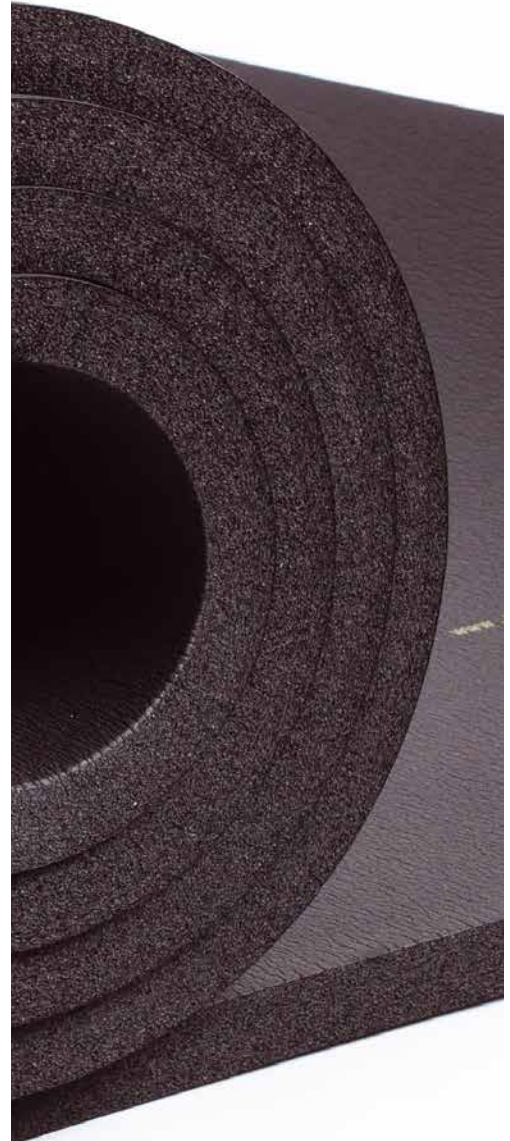
# INSULATION FOR THE OIL AND GAS INDUSTRY

## HT/ArmaFlex<sup>®</sup> Industrial IMO

IMO compliant FEF insulation for elevated temperatures  
in offshore and industrial applications

- // IMO compliant for offshore safety requirements
- // Built-in water vapour barrier mitigates risk of corrosion under insulation (CUI)
- // High density and mechanically robust for superior stability and multi-layer application
- // Low maintenance and repair costs
- // For temperatures up to +125 °C
- // Low leachable chloride content (< 30 ppm) to minimise stress corrosion cracking (SCC)
- // Retains its physical characteristics throughout its service life
- // Low thermal conductivity to minimise energy losses

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

## TECHNICAL DATA – HT/ARMAFLEX INDUSTRIAL IMO

Brief description	HT/ArmaFlex® Industrial IMO 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 offshore environments which require IMO compliant solutions.
Material type	Synthetic EPDM rubber based foam. Factory made flexible elastomeric foam (FEF) according to EN 14304.
Colour	Black
Special features	HT/ArmaFlex® Industrial IMO is resistant to elevated operating temperatures. The product is suitable for use in multi-layer applications including ArmaSound Industrial Systems.
Product range	Tubes, 25 mm thickness, for pipe outer diameters ranging from 18 to 89 mm (¾" to 3" NB). Sheets in rolls, 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 IMO 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 5.

Property	Value/Assessment	Standard/Test method
<b>Temperature range<sup>1</sup></b>		
Service temperature	Max. service temperature	+125 °C                      +257 °F
	Min. service temperature	-50 °C                         -58 °F
<b>Thermal conductivity</b>		
Declared thermal conductivity (metric units)	$\lambda \leq 0.044 \text{ W/(m}\cdot\text{K)}$ at 0 °C	
	$\theta_m$	-50      0            +50      +100    +125    [°C]
	$\lambda_d \leq$	0.043   0.044   0.049   0.059   0.065   [W/(m·K)]
	Equation of declared thermal conductivity as a function of temperature: $\lambda_d(\theta_m) = 0.0437 + 10^{-4} \times \theta_m + 8 \times 10^{-7} \times (\theta_m - 20)^2$ W/(m·K), where $\theta_m$ is mean temperature in °C	
Declared thermal conductivity (imperial units)	$\lambda_d \leq 0.305 \text{ Btu}\cdot\text{in}/(\text{h}\cdot\text{ft}^2\cdot^\circ\text{F)}$ at 32 °F	
	$\theta_m$	-58      +32      +122    +212    +257    [°F]
	$\lambda_d \leq$	0.296   0.305   0.343   0.408   0.451   [Btu·in/(h·ft²·°F)]
<b>Water vapour diffusion (transmission) resistance<sup>2</sup></b>		
Water vapour diffusion resistance factor	$\mu \geq 2,700$	Tested according to EN 12086 and EN 13469 (equivalent method ASTM E96)
Water vapour permeability	$\leq 7.23 \times 10^{-11} \text{ g}/(\text{m}\cdot\text{s}\cdot\text{Pa})$ $\leq 0.05 \text{ Perm inch}$	
<b>Fire performance &amp; approvals</b>		
International standards	IMO Part 2 (smoke generation and toxicity) IMO Part 5 (surface flammability)	Approved by DNV-GL <sup>3</sup>
	Class A, < 25 Flame Spread Index	
	Class 1	
Reaction to fire (Euroclass)	D-s3, d0 / D <sub>1</sub> -s3, d0	Tested according to IMO 2010 FTP Code
General fire performance	Self-extinguishing, does not drip, does not spread flames.	Tested according to ASTM E84
		Tested according to BS 476 part 7
		Classified according to EN 13501-1
		Tested according to EN 13823 (SBI) and EN ISO 11925-2
<b>Density</b>		
Density	Sheets: 75 to 85 kg/m <sup>3</sup> 4.7 to 5.3 lb/ft <sup>3</sup> Tubes: 75 to 90 kg/m <sup>3</sup> 4.7 to 5.6 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 IMO 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>4</sup>			Tested according to ISO 10523
Stress corrosion cracking	No cracks under magnifying glass on test coupons after evening, cleaning and rebending. <sup>4,8</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>4</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			

- For temperatures below or above those published please contact Technical Services to request for the corresponding technical information.
- $\mu \geq 2,000$  according to CE declaration.
- The product meets 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 surface flammability (Part 5) and smoke generation and toxicity (Part 2) for floor coverings and primary deck coverings.
- Based on single test results. Can be used for information / reference only.
- 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.
- 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.
- During storage of the product blooming on the surfaces may occur, especially at wall thickness below 19 mm. 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.
- 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.

Sheets

Item	Nominal thickness [mm]	Nominal width x length [m]	m <sup>2</sup> /carton
HTO-13-99/E	13	1x8	8
HTO-19-99/E	19	1x6	6
HTO-25-99/3,0	25	1x3	3
<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*		Nominal diameter DN	Outside diameter OD*	Pipe max. outside diameter	Inner diameter of insulation tube min/max	Nominal insulation thickness: 25mm	Item	m/ carton
Nominal pipe size NPS	[inch]							
			[mm]	[mm]	[mm]			
3/8	10	17.2	18	19.5 - 21.0	HTO-25X018	40		
1/2	15	21.3	22	23.5 - 25.0	HTO-25X022	32		
3/4	20	26.9	28	29.5 - 31.5	HTO-25X028	24		
1	25	33.7	35	36.5 - 38.5	HTO-25X035	24		
1 1/4	32	42.4	42.4	44.0 - 46.0	HTO-25X042	22		
1 1/2	40	48.3	48.3	50.0 - 52.0	HTO-25X048	18		
---	---	54,0	54	56.0 - 58.0	HTO-25X054	18		
2	50	60.3	60.3	62.0 - 64.0	HTO-25X060	16		
2 1/2	65	76.1	76.1	78.0 - 80.0	HTO-25X076	12		
3	80	88.9	89	91.0 - 94.0	HTO-25X089	10		
<b>Tolerances for tubes</b> According to EN 14304	<b>Thickness tolerances</b>		25 mm nominal thickness		± 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 Technical Services.

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

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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 3,135 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: [www.armacell.com](http://www.armacell.com).

For product information, please visit:  
[www.armacell.com/energy](http://www.armacell.com/energy)

