armacell®

BREEAM COMPLIANCE PRODUCT CARD

Technical insulation

TECHNICAL INSULATION

HEATING AND SANITARY

SH/Armaflex

SH/Armaflex is a highly flexible closed-cell extruded insulation material with antibacterial protection "MICROBAN" and with low thermal conductivity to minimise energy losses on heating and plumbing installations[1].

BREEAM International New Construction 2013

BREEAM is a multi-criteria scheme to assess and certify buildings. Established in UK, it emphasises sustainable development by promoting green, healthy and eco-friendly buildings. Features of the buildings which may be assesed are: materials, quality of indoor enviroments and energy efficiency etc. Nowadays it has become a standard in real estates markets.

BREEAM compliance product card for **SH/Armaflex** was prepared to assist designers, architects, engineers, consultants and developers to provide clear information and to facilitate choosing proper product. Appropriate BREEAM categories related to SH/Armaflex features were chosen and checked. SH/Armaflex compliance and contribution to BREEAM categories are presented below.

Product compliant

Product contributes to a better rating

BREEAM Category	Issue	BREEAM Requirements	Credits	Product compliance	
Life cycle cost and service life planning	Man 05	A life cycle cost and service life planning analysis of the building components should be carried out in order to obtain their full information through all the life cycle.	3••	SH/Armaflex life cycle information may be a part of the building analysis. The following data may be useful: - life cycle durability: as the service life of the equipment or the whole building (> 50 years), - restrictions: insulation thicknesses are available for all common pipe diameters up to an outer diameter of 114 mm for tubes; temperature range: -50°C to +110°C, - recycling: non-recyclable, - costs: during installation and utilization (no costs while in use), - comparison to natural rubber: better temperature resistance - less heat/cold losses and extremely constant quality. More information may be found in Environmental Product Declaration[2].	ⓘ
Acoustic performance	Hea 05	An acoustic indoor performance should be carried out by the suitably qualified acoustician in accordance to requirements and for each stage of investment: design and post-construction.	4••	SH/Armaflex may impact acoustic insulation of energy systems. The following data may be useful for acoustician analysis: - reduction of structure-borne sound transmission: 25,6 dB (A)[3].	ⓘ
Life cycle impacts	Mat 01	An environmental impact of construction materials over the building life cycle should be specified by using an appropriate life cycle assessment (LCA) tool.	7••	Data useful for life cycle assessment (LCA) may be found in Environmental Product Declaration (EPD)[2]. Life cycle assessment in EPD has been carried out in GaBi Software (LCA tool), which is based on ISO 14025 standard and addresses the whole life cycle of product, including disposal.	ⓘ
Insulation	Mat 04	Construction materials should be responsibly sourced. A responsibly sourced confirmation of „supply chain process" and „key process" should be provided.	1•	SH/Armaflex is responsibly sourced which may be confirmed with ISO14001[4] certificates for: - supply chain process (polymer) - key process (insulation production).	✓
Thermal comfort	Hea 03	A thermal comfort analysis shoud be carried out to assess if the indoor environment maintains comfortable conditions for building users in terms of appropriate thermal comfort level according to ISO 7730:2005.	2••	SH/Armaflex is a part of building's systems. Adjusting proper design parameters will enable to improve energy efficiency and its supply to the system appliances. For energy efficiency the main parameter of SH/Armaflex is thermal conductivity which is product thickness dependant: from $\lambda_{40°C} \leq 0{,}036$ W/mK to $\lambda_{40°C} < 0{,}040$ W/mK[1].	
Reduction of energy use and carbon emissions	Ene 01	An energy performance should be carried out to assess building energy consumption during operation in comparison with the notional building (parameters defined by national standards).	15••		ⓘ
Energy efficient cold storage	Ene 05	Greenhouse gas emissions from cold storage systems should be reduced by improving their energy efficiency.	3••		

For detailed information please refer to the documents provided by manufacturer:
[1] SH/Armaflex product card
[2] Environmental Product Declaration: EPD-ARM-20150107-IBB1-DE
[3] Test results of sound reduction SH/Armaflex 09x035 Institut Bauphysik
[4] ISO 14001 certificates are avaliable for the factories in Muenster (Germany), Begur (Spain) as well as for main polymers production.

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•• SH/Armaflex has an indirect impact on the following categories. Using SH/Armaflex with another appropriate products may contribute to achieve credits. Maximum number of credits influenced by the product for each category was stated above.

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BREEAM International New Construction 2016

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Product compliant

Product contributes to a better rating

BREEAM Category	Issue	BREEAM Requirements	Credits	Product compliance	
Life cycle cost and service life planning	Man 02	A life cycle cost and service life planning analysis of the building components and elements should be carried out in order to obtain their full information through all the life cycle.	3••	SH/Armaflex life cycle information may be a part of the building analysis. The following data may be useful: - life cycle durability: as the service life of the equipment or the whole building (> 50 years), - restrictions: insulation thicknesses are available for all common pipe diameters up to an outer diameter of 114 mm for tubes; temperature range: -50°C to +110°C, - recycling: non-recyclable, - costs: during installation and utilization (no costs while in use), - comparison to natural rubber: better temperature resistance - less heat/cold losses and extremely constant quality. More information may be found in Environmental Product Declaration[2].	ⓘ
Indoor air quality: Minimising sources of air pollution	Hea 02	At least four of five finishing materials should meet appropriate volatile organic compounds (VOC) emission levels and confirm compliance with testing standards ISO 10580, ISO 16000-9, CEN/TS 16516 or CDPH Standard Method v1.1. VOC emission limits for insulation were listed in Tables 17 and 18 of BREEAM International NC 2016 Manual.	3•	Sampling, testing and evaluation were performed according to ISO 16000-9. Insulation meets exemplary level emission limits[3]: - Formaldehyde ≤ 0,01 mg/m3 - Total volatile organic compounds ≤ 0,3 mg/m3 - Total semi-volatile organic compounds ≤ 0,1 mg/m3 - Category 1A and 1B carcinogens ≤ 0,001 mg/m3	✓
Acoustic performance	Hea 05	An acoustic indoor performance should be carried out by the suitably qualified acoustician in accordance to requirements and for each stage of investment: design and post-construction.	4••	SH/Armaflex may impact acoustic insulation of energy systems. The following data may be useful for acoustician analysis: - reduction of structure-borne sound transmission ≤ 25,6 dB (A)[4].	ⓘ
Life cycle impacts	Mat 01	An environmental impact of construction materials over the building life cycle should be specified by using an appropriate life cycle assessment (LCA) tool.	5••	Data useful for life cycle assessment (LCA) may be found in EPD[2]. Life cycle assessment in EPD has been carried out in GaBi Software (LCA tool), which is based on ISO 14025 standard and addresses the whole life cycle of product, including disposal.	ⓘ
		At least five products out of ten material categories, including insulation products, should have Environmental Products Declarations (EPD). In one material category maximum two products' EPDs may be counted. The EPD must be compliant with ISO 14025, ISO 21930 or EN 15804.	2•	Using SH/Armaflex with other products having EPD will help to score a credit. SH/Armaflex EPD[2] is compliant with ISO 14025 and ISO 15804.	✓
Responsible sourcing of construction	Mat 03	Construction materials should be responsibly sourced. A responsibly sourced confirmation of „supply chain process" and „key process" should be provided.	4•	SH/Armaflex is responsibly sourced which may be confirmed with ISO14001[5] certificates for: - supply chain process (polymer) - key process (insulation production).	✓
Material efficiency	Mat 06	In order to minimise materials' environmental impact more efficient materials should be used during building design, procurement, construction, maintenance and end of life.	1••	SH/Armaflex as a part of building energy system has the following efficiency features: - a service life is more than 50 years, - it may be damaged only by extraordinary impacts or during installation, - varied packaging: appropriate size and package type (2 m tubes, endless tubes, tapes and sheets). Packaging waste is reduced.	ⓘ
Thermal comfort	Hea 04	A thermal comfort analysis shoud be carried out to assess if the indoor environment maintains comfortable conditions for building users in terms of appropriate thermal comfort level according to ISO 7730:2005.	3••	SH/Armaflex is a part of building's systems. Adjusting proper design parameters will enable to improve energy efficiency and its supply to the system appliances. For energy efficiency the main parameter of SH/Armaflex is thermal conductivity which is product thickness dependant: from $\lambda_{40°C} \leq 0{,}036$ W/mK to $\lambda_{40°C} \leq 0{,}040$ W/mK[1].	
Reduction of energy use and carbon emissions	Ene 01	An energy performance should be carried out to assess building energy consumption during operation in comparison with the following requirements: notional building (parameters defined by national standards) and BREEAM best practice building (BREEAM defined parameters).	15••		ⓘ
Energy efficient cold storage	Ene 05	Greenhouse gas emissions from cold storage systems should be reduced by improving their energy efficiency.	3••		

For detailed information please refer to the documents provided by manufacturer:
[1] SH/Armaflex product card
[2] Environmental Product Declaration: EPD-ARM-20150107-IBB1-DE
[3] Eurofins Product Testing A/S report No. G21428B
[4] Test results of sound reduction SH/Armaflex 09x035 Institut Bauphysik
[5] ISO 14001 certificates are avaliable for the factories in Muenster (Germany), Begur (Spain) as well as for main polymers production.

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LEED 2009

for Green Building Design and Construction

LEED is a multi-criteria scheme to assess and certify buildings. Established in USA, it emphasises sustainable development by promoting green, healthy and eco-friendly buildings. Features of the buildings which may be assesed are: materials, quality of indoor enviroments and energy efficiency etc. Nowadays it has become a standard in real estates markets.

LEED compliance product card for **SH/Armaflex** was prepared to assist designers, architects, engineers, consultants and developers to provide clear information and to facilitate choosing proper product. Appropriate LEED categories related to SH/Armaflex features were chosen and checked. SH/Armaflex compliance and contribution to LEED categories are presented below.

Product compliant

Product contributes to a better rating

LEED Issue		Credit	LEED Requirements	Points	Product compliance
EA	Prerequisite 2	Minimum Energy Performance	Building's energy performance calculated using computer simulation model should demonstrate a 10% improvement for new buildings, or a 5% for major renovations in comparison to the baseline as a compulsory achievement by using energy efficient measures.	-	SH/Armaflex is a part of building's systems. Adjusting proper design parameters will enable to improve energy efficiency and its supply to the system appliances. For energy efficiency the main parameter of the SH/Armaflex is thermal conductivity which is product thickness dependant: from $\lambda_{40°C} \leq 0{,}036$ W/mK to $\lambda_{40°C} \leq 0{,}040$ W/mK[1].
EA	Credit 1	Optimize Energy Performance	Building's energy performance calculated using computer simulation model should demonstrate an improvement in comparison to the baseline. Number of points awarded depends on percentage improvment and building type.	21••	
IEQ	Prerequisite 3	Minimum Acoustical Performance (Schools only)	Background noise level from HVAC systems should not exceed 45 dBA within learning spaces. It may be achieved by i.a. using sound-absorptive finishes performing Noise Reduction Coefficient (NRC) value of 0,70 or higher. Additionally, for spaces above 20,000 cubic feet the reverberation time should not exceed 1,5 seconds.	-	SH/Armaflex may impact acoustic insulation of energy systems since its parameters are as follows: - reduction of structure-borne sound transmission $\leq 25{,}6$ dB (A)[2].
IEQ	Credit 9	Enhanced Acoustician Performance (Schools only)	Background noise level from HVAC systems should not exceed 40 dBA within learning spaces and learning space partitions should meet the Sound Transmission Class (STC) in line with ANSI Standard S12.60-2002, Acoustical Performance Criteria, Design requirements for Schools.	1••	
IEQ	Credit 3.2	Construction Indoor Air Quality Management Plan – before occupancy	A building flush-out or IAQ testing should be conducted prior to occupancy to demonstrate contaminant limits are not exceeded. The maximum concentration of formaldehyde in air is: 27 parts per billion while volatile organic compounds (VOC): 500 micrograms per cubic meter.	1••	SH/Armaflex may contribute reducing air contamination. Sampling, testing and evaluation of the product determine low levels of formaldehyde and VOC[3].
IEQ	Credit 10	Mold prevention (Schools only)	HVAC systems and controls should be designed to limit space relative humidity to 60% or less at all load conditions. Addtition requirements should be met: compliance with IEQ Credits c3.1, c7.1, c7.2 and implementation an IAQ management program in line with the U.S. Environmental Protection Agency (EPA).	1••	SH/Armaflex may contribute protecting against mold and mildew within the building. It is equipped with MICROBAN® technology which is EPA-registered antimicrobial protection.

For detailed information please refer to the documents provided by manufacturer:
[1] SH/Armaflex product card
[2] Test results of sound reduction SH/Armaflex 09x035 Institut Bauphysik
[3] Eurofins Product Testing A/S Attestation and Test report No. G21462B

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LEED v4

for Building Design and Construction

LEED is a multi-criteria scheme to assess and certify buildings. Established in USA, it emphasises sustainable development by promoting green, healthy and eco-friendly buildings. Features of the buildings which may be assesed are: materials, quality of indoor enviroments and energy efficiency etc. Nowadays it has become a standard in real estates markets.

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Product compliant

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LEED Issue		Credit	LEED Requirements	Points	Product compliance
EA	Prerequisite Minimum Energy Performance	Option 1. Whole-building energy simulation	An energy calculation should be carried out based on a simulation model in accordance to the ANSI/ASHRAE/IESNA Standard 90.1-2010, Appendix G with errata. An improvement of 5% (new construction projects), 3% (major renovations projects), 2% (core and shell projects) over a baseline should be demonstrated.	-	SH/Armaflex is a part of building's systems. Adjusting proper design parameters will enable to improve energy efficiency and its supply to the system appliances. For energy efficiency the main parameter of the SH/Armaflex is thermal conductivity which is product thickness dependant: from $\lambda_{40°C} \leq 0{,}036$ W/mK to $\lambda_{40°C} \leq 0{,}040$ W/mK[1].
EA	Optimize Energy Performance	Option 1. Whole-building energy simulation	Building's energy performance calculated using computer simulation model should demonstrate an improvement in comparison to the baseline. Number of points awarded depends on percentage improvment.	18••	
EQ	Thermal Comfort	Thermal Comfort Design Option 2. ISO and CEN Standards	A thermal comfort analysis should be carried out in accordance to the standards: ISO 7730:2005 and EN 15251:2007.	1••	
MR	Building Product Disclosure and Optimization – Environmental Product Declarations	Option 1. Environmental Product Declarations (EPD)	At least 20 materials sourced from 5 different manufacturers should have product specific Type III EPD. EPD should conform standards: ISO 14025, ISO 14040, ISO 14044 and EN 15804, at least cradle to gate scope and include an external verification.	1•	SH/Armaflex has got an EPD[2] with a third party certification (Type III) in accordance to ISO 14025 and EN 15804 and includes an external verification. A cradle to grave scope has been provided.
EQ	Low-Emitting Materials	Option 1. Product category calculations	Up to 7 product categories of finishing materials should be compliant with relevant volatile organic compounds (VOC) emission levels and testing standards: - CDPH Standard Method (2010) or - German AgBB Testing and Evaluation Scheme (2010) or - ISO 16000-3/6/9/11:2010 in conjunction with AgBB or French legislation on VOC emission class labeling or the DIBt testing method (2010).	3•	SH/Armaflex has been tested[3] in accordance to: ISO 16000-3/6/9/11:2010 in conjunction with the German AgBB Testing and Evaluation Scheme (2012), DIBt (2010) and French legislation on VOC emission class. Product complies with limit values of the AgBB and DIBt regulations. For the French regulation emission class is A+.
EQ	Acoustic Performance	HVAC Background Noise	Background noise levels of HVAC systems should be compliant with standards: 2011 ASHRAE Handbook, HVAC Applications, Chapter 48, Table 1 or AHRI Standard 885-2008, Table 15 or a local equivalent. Sound transmission class and reverbration time should be compliant with the Tables specified under this issue.	1••	SH/Armaflex may impact acoustic insulation. The following data may be useful while checking compliance with the requirements: - reduction of structure-borne sound transmission $\leq 25{,}6$ dB (A).[4]

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[1] SH/Armaflex product card
[2] Environmental Product Declaration: EPD-ARM-20150107-IBB1-DE
[3] Eurofins Product Testing A/S Attestation and Test report No. G21462B
[4] Test results of sound reduction SH/Armaflex 09x035 Institut Bauphysik

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