

SUSTAINABLE CONSTRUCTION

WITH ARMAFLEX INSULATION

Armacell is the **first manufacturer** of flexible technical insulation materials to present **environmental product declarations (EPDs)**.



 **armacell**[®]

„Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs.“

Report of the Brundtland Commission, 1987



MAKING A DIFFERENCE AROUND THE WORLD

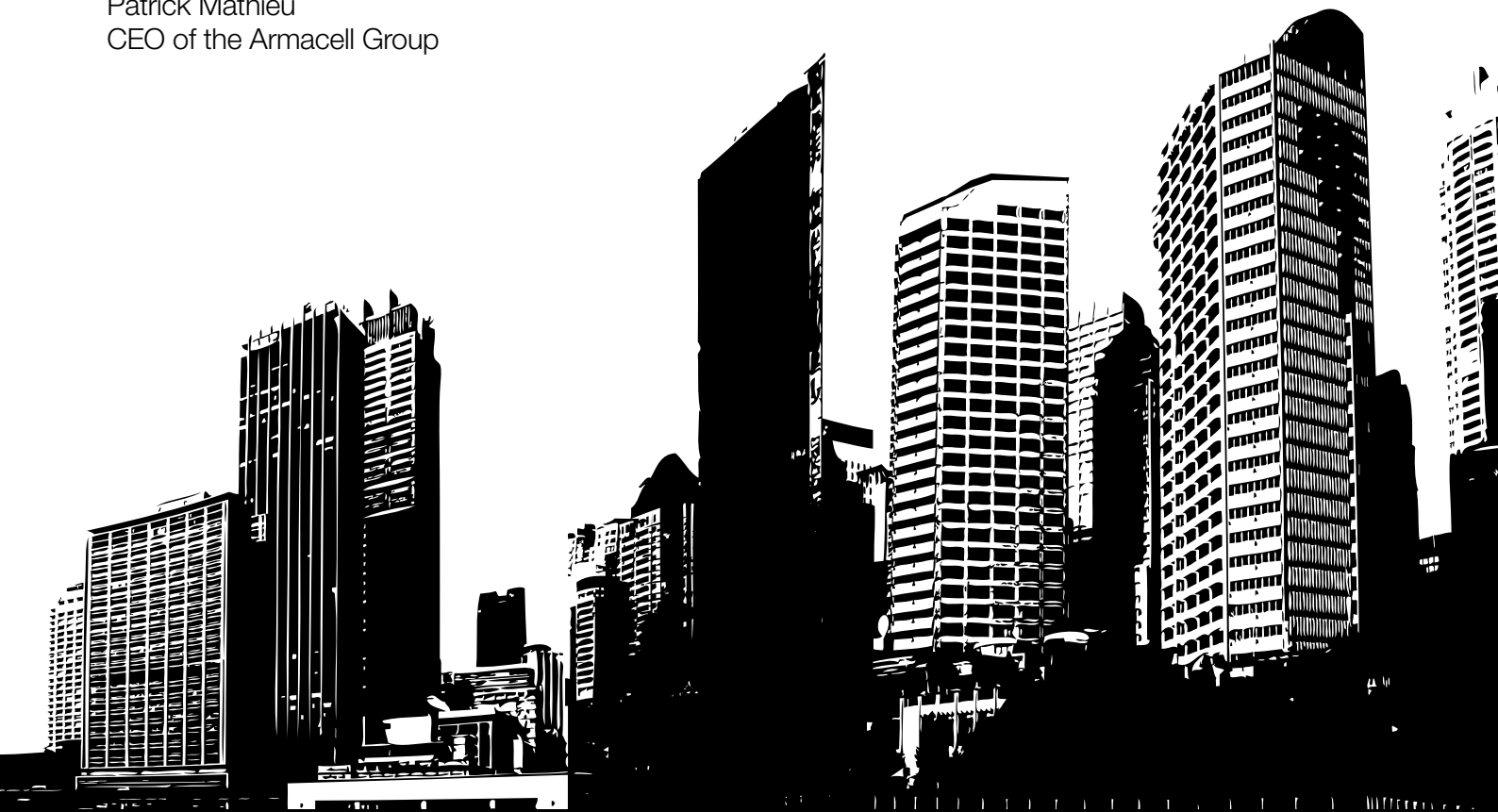
“Whether in the Empire State Building, the Chinese Olympic stadium or your own cellar – Armacell’s products make a difference. They save energy, keep industrial processes running and protect technical equipment against corrosion. The contribution which Armacell’s technical insulation materials make around the world often remains unseen. Yet – year in year out – they prevent the emission of millions of tonnes of CO₂. Our annual output of elastomeric insulation materials saves enough energy to power the city of Las Vegas for a year.

We are now the first manufacturer in our industry to publish environmental product declarations which create a unique degree of transparency for our Armaflex products. In doing so we provide architects, specifiers and those inviting tenders with reliable information for designing green building projects. At the same time we commit ourselves to further improving the sustainability of our products and thus sharpening our competitive edge.

We are all responsible for saving energy and using resources consciously – in this way all of us can make a real difference.”



Patrick Mathieu
CEO of the Armacell Group



EMPIRE STATE BUILDING NEW YORK, MANHATTAN

In 2011, the Empire State Building underwent extensive renovation work and received the LEED Gold® certificate. The air ducts were insulated with Armaflex to ensure a high level of energy efficiency, to protect the indoor air quality and to provide acoustic insulation in the world's best-known building.



BUILDINGS FOR A SUSTAINABLE FUTURE

Building shapes the environment. It is through building that the environment becomes living space for human beings. At the same time buildings represent significant interventions in the environment.

Construction is one of the most raw-material- and energy-intensive industries. The building sector is the single largest consumer of raw materials worldwide and the greatest producer of greenhouse gas emissions. Some 30 % of all raw materials are used to build and maintain buildings. 30 to 40 % of greenhouse gases

result from the construction, use or disposal of buildings. In the industrial nations a huge amount of energy is used in transport and industry, but the building sector accounts for the majority – around 40 % of European energy consumption! In view of advancing climate change, the shortage of finite resources and rapid urbanization throughout the world, it is becoming more and more important that buildings are planned and built with sustainability in mind. Green buildings not only emit less CO₂, they can also be operated more economically and sold more profitably.

An overview of the most important green building schemes:

BREEAM stands for Building Research Establishment Environmental Assessment Method and is the oldest and most widespread certification system for sustainable building. It was developed in Great Britain in 1990.

LEED (Leadership in Energy and Environmental Design) is based on the British BREEAM scheme, was developed by the US Green Building Council (USGBC) and first introduced in 2000.

HQE (Haute Qualité Environnementale) was initiated in 2005 by the French Association pour la Haute Qualité Environnementale (ASSOHQE).

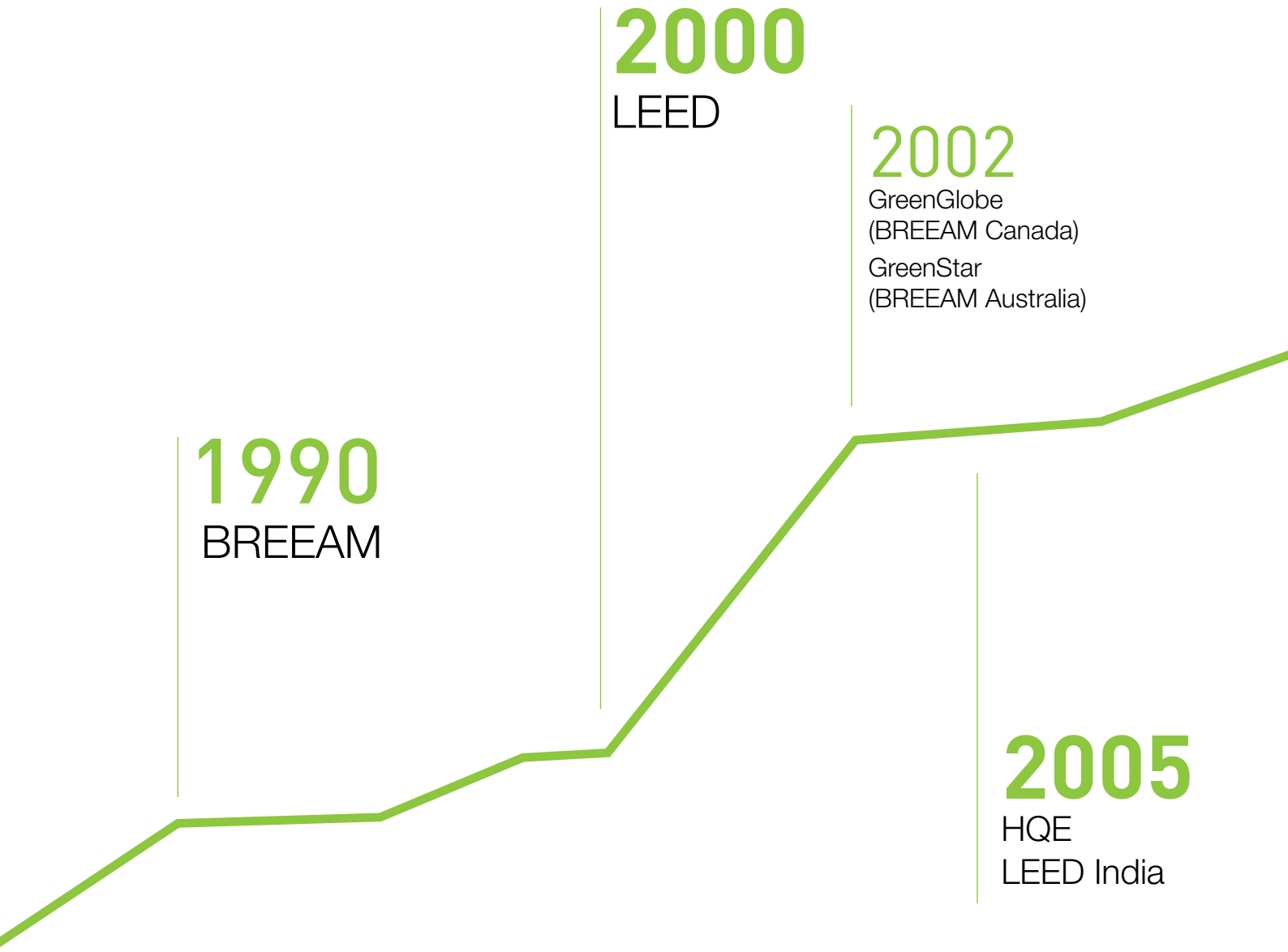
DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen) is a joint project of the Germany Ministry of Transport, Building and Urban Development (BMVBS) and the German Sustainable Building Council (DGNB). It was introduced in 2009.

Alongside the internationally recognized certificates, there are numerous other public and private initiatives on both a national and international level. BREEAM and LEED in particular have gained significance throughout the world in recent years and in many countries have become the recognized standard with national chapters and country-specific versions. Especially for larger construction projects of international companies, endeavours are now made to attain LEED certification, sometimes in combination with a national assessment.

GREEN BUILDING IS GAINING GROUND WORLDWIDE

The triumph of the green building schemes is reflected in the rapidly increasing number of certified construction projects. In future green building certification will play an ever greater role in the construction and real-estate sector. Many architects and specifiers already take the aspect of sustainability into

account in their invitations to tender as a matter of course. Nowadays, not only the ease of installation and technical properties of the building materials used count, but also their environmental compatibility and their energy and economic efficiency.



2006

LEED Emirates

2008

BREEAM Netherlands
LEED Brazil (Brazilian GBC)

2007

GreenStar SA

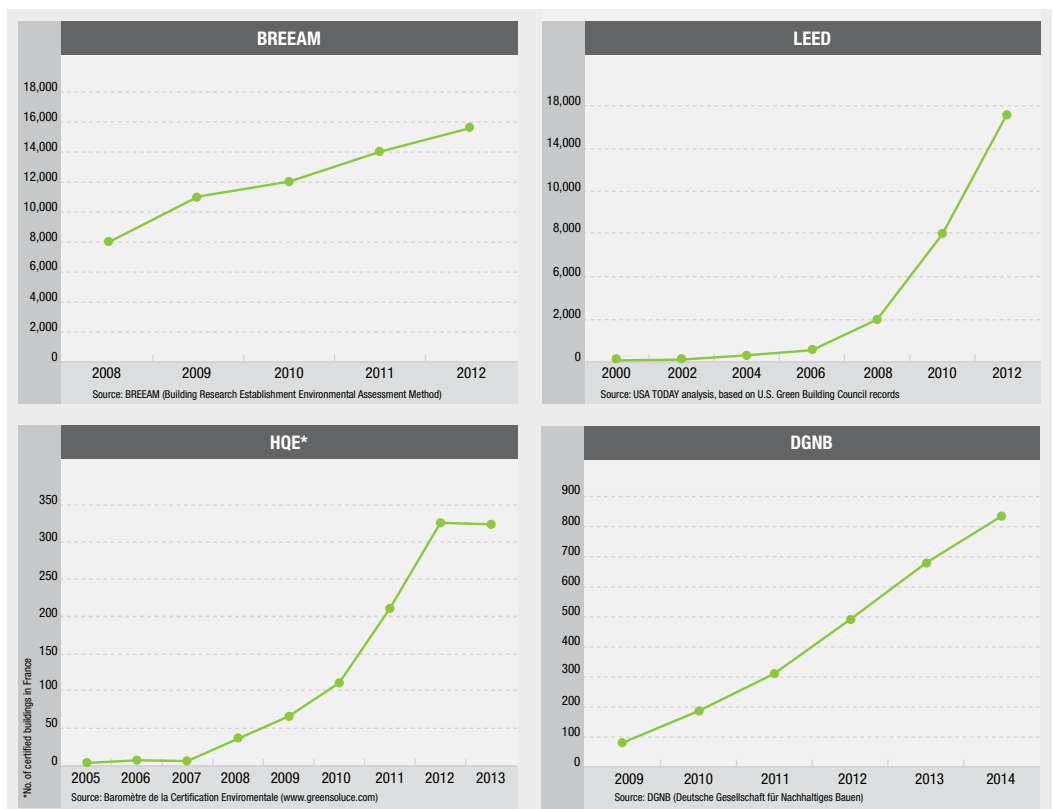
2009

DGNB German
GBC

2011

BREEAM
Norway

Development of the green building schemes (certified projects)



LIFE CYCLE ASSESSMENT PROVIDES RELIABLE DATA

Sustainability in the building sector

Sustainable building takes an integrated and holistic view of the economic, ecological and social impacts of building activity on human beings and the environment. At building level sustainable construction includes all life cycle phases: planning, construction, operation, demolition. Of course the same also applies at the level which forms an important basis for the overall assessment of a building: the product level. Green building requires that the individual components of the building (i.e. the construction elements and products used) can also be described as being sustainable – compatible with the environment, energy efficient and economical. To prevent them getting lost in the jungle of advertising messages, green washing and numerous very different eco marks, specifiers need the greatest possible transparency – independent, standardized facts covering all aspects of the life cycle.

EPDs must be based on LCA

In order to evaluate construction products in all their complexity and impacts, a life cycle assessment (LCA) needs to be carried out. Only an LCA can take into account all the individual aspects which viewed cumulatively or sequentially allow a relative evaluation of the product. The basis for this assessment is ISO 14044, which together with ISO 14040 is the standard for an ISO-compliant, generally accepted LCA. In principle an LCA is simply the analysis and interpretation of material flows during the manufacturing of a product and the environmental impacts in the course of its use and disposal. The outcome of an LCA are data sets which describe the various environmental impacts, such as global warming, ozone depletion, acidification, etc.

The data resulting from an LCA are recorded according to special rules and then made available in the structured and validated form of environmental product declarations (EPDs).

In the European standard EN 15804, the rules for Type III environmental declarations are described which should be used as the basis for EPDs in Europe.



End of life

Use

EPDs in accordance with EN 15804 describe the sustainability performance of a product related to 17 life cycle modules. A distinction is made between EPDs which only take into account the product stage (raw materials supply, transport and manufacturing) and EPDs which cover all stages of the life cycle (from the cradle to the grave). However, only the stage from the cradle to the gate must be considered for compliance with EN 15804.

Drawing up EPDs in accordance with EN 15804 is an integrated method for making core environmental statements on construction products which can in turn be used to assess the building as a whole. The results provided in EPDs create a high level of transparency and data security. They therefore represent an optimal basis for assessing buildings.



FIRST EPDS FOR ELASTOMERIC INSULATION MATERIALS

Armacell is the first manufacturer of elastomeric insulation materials (FEFs) to create a comprehensive LCA and have the sustainability of its main products assessed independently. As an LCA can only provide very specific information on an individual manufacturer's products, the results cannot be transferred to the products of other FEF manufacturers. Deviations in the raw materials used or the production process as well as the very different manufacturing footprints of the providers have a significant impact on the data. The system of the LCA and EPDs inevitably requires information to be restricted to specific products and/or the manufacturer.

IBU is currently the only EPD programme operator in Germany

As product category rules (PCRs) for technical insulation materials do not exist yet, the interpretative document (PCR) of a programme operator such as the Institut Bauen und Umwelt e.V. (IBU) can be used. Furthermore, the pro-

gramme operator ensures that the important steps for drawing up an EPD in agreement with the ISO standards are followed. The IBU is currently the only EPD programme operator in Germany which has the required know-how and consistently certifies in accordance with the internationally agreed regulations. For insulation materials made of foam plastics such as FEFs (flexible elastomeric foams) the IBU has defined calculation methods and requirements.

Armacell began the complex project in March 2014: on the basis of EN 15804 and ISO 14025 and according to the guidelines provided by the IBU all material flows from the extraction of raw materials to disposal were determined at the European sites. The company received support in the analysis of several thousand data sets from PE International (now thinkstep), the market leader in strategic consulting, software solutions and comprehensive services in the field of sustainability. The results were compiled for the products

The Armacell environmental product declarations have been independently validated and are freely accessible. They can be viewed and downloaded at www.armacell.com/epd.



ARMAFLEX ULTIMA

The first low smoke flexible insulation for increased people safety.



AF/ARMAFLEX

Armacell's flexible insulation system for reliable condensation control, trusted for 40 years.



AF/ARMAFLEX CLASS O

The insulation system engineered to prevent condensation and energy losses.

AF/Armaflex, NH/Armaflex, SH/Armaflex, HT/Armaflex, Armaflex Ultima and AF/Armaflex Class O. On the basis of this data it was then possible to draw up environmental product declarations for the Armaflex premium products. These EPDs contain information on the life cycle of the respective products, LCA reference values and test results for detailed interpretation. 1m³ was chosen as the functional unit (the product-specific factor to which the environmental impacts are related). In addition to this, the thermal conductivity of the respective products was used. Armaflex products are long-lasting products. Results show that when installed and used correctly it is possible to assume a reference service life (RSL) of 50 years and more. The RSL is practically only restricted by the service life of the equipment or building.

EPDs do not allow direct comparisons

The environmental performance of building products can only be assessed against the backdrop of the building concept and use. For an ecological assessment it is always necessary to evaluate the materials in context, for example in connection with the structural element or the entire construction. The planning and design of the building, the concept behind the structure

and equipment and the standard of workmanship achieved are decisive.

Only in individual cases is it possible to decide whether construction product A is preferable to construction product B from an ecological point of view. LCAs and EPDs do not provide a practical approach for classifying or systematizing building materials. As materials are used in different applications in buildings, general recommendations cannot be derived from EPDs.

Construction products are neither 'good' nor 'bad'. Their performance – whether technical, aesthetical or ecological – must always be viewed in the complete system. The proper use of building construction materials in the building, their performance, ease of installation and long-term behaviour are decisive for the planning, construction and maintenance of sustainable buildings.



NH/ARMAFLEX

The protective halogen-free insulation to reduce corrosive effects and smoke toxicity in a fire.



HT/ARMAFLEX

Armacell's flexible expert for increased efficiency in high-temperature applications.



SH/ARMAFLEX

The high performance insulation for long term energy saving in heating and plumbing applications.



ARMACELL PLANT MÜNSTER, GERMANY

In 2014 Armacell optimized the already very efficient air emission treatment unit (RTO 20), reducing emissions still further.

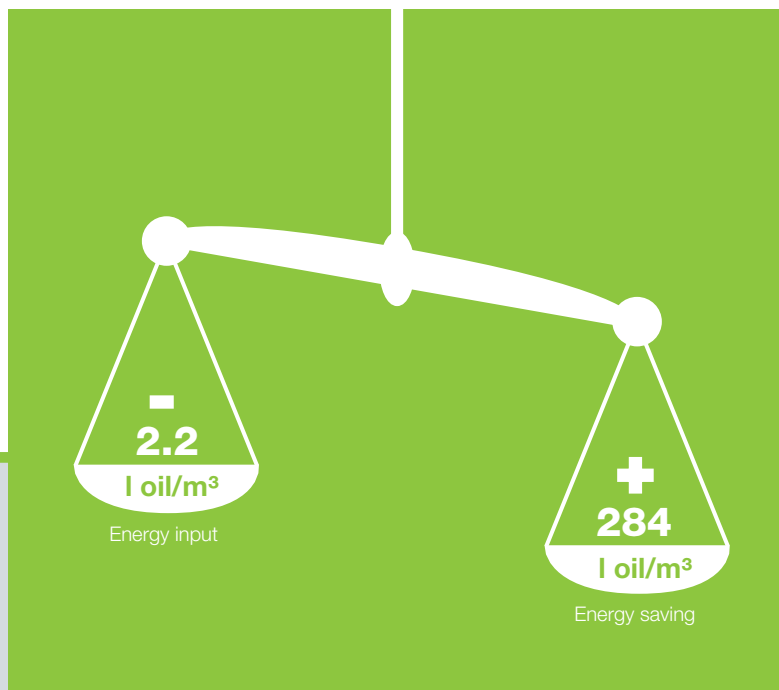
BRILLIANT ENVIRONMENTAL BALANCE

Insulation materials are among the few industrially made products which save more energy over the product life cycle than is needed in their manufacturing. So they are per se 'ecologically valuable'. For manufacturing 1 kg of Armaflex insulation material the average primary energy consumption is 80 MJ. That is just a fraction of the energy which Armaflex has been saving all over the world for over 60 years. Comparing the energy input with the energy saving results in a ratio of 1:140. Armaflex saves 140 times more energy than is required for its production, the transport and disposal of the products.¹ The energy input needed to manufacture Armaflex has paid off after just 50 days. If the CO₂ emissions are considered, a similar picture emerges: during its use Armaflex prevents the emission of 150 times more greenhouse gases than are released during its production.

This can also be expressed in terms of cost benefits or cost savings over the entire service life of Armaflex insulation materials. Amortization calculations for typical applications have shown that the cost of the insulation material used has been recovered after just one to two years.

The environmental product declarations certified by the Institut für Bauen und Umwelt e.V. (IBU) not only make statements on the primary energy requirement, they also contain information about the extent to which the products contribute to the greenhouse effect, acidification, over-fertilization, damage to the ozone layer and smog.

¹ With a service life of 20 (cold applications) and 30 years (heating applications), very conservative assumptions have deliberately been made here.



Armaflex **saves 140 times more energy** than is needed in its production!

YOUR BENEFITS

Armacell is the first manufacturer of flexible technical insulation materials to carry out a comprehensive life cycle assessment (LCA) and on this basis publish environmental product declarations certified by the Institut Bauen und Umwelt e.V. (IBU). With this 'sustainability passport' for construction products Armacell supports the trend towards green building and commits itself to a level of product transparency which is currently unique in the industry.

The Armaflex environmental product declarations have a binding, universally valid basis, were drawn up by experts in cooperation with Armacell and have been independently verified.

In this way the company provides architects, specifiers and those inviting tenders with reliable information for planning sustainable building projects. The benefits of EPDs for all those involved in the construction process are obvious:

ARCHITECTS, SPECIFIERS AND THOSE INVITING TENDERS use EPDs as the basis for calculating the ecobalance, which is a prerequisite for green certification for buildings. Alongside the technical performance, costs, acceptance and aesthetics, environmental aspects are key criteria when selecting construction products. Ultimately EPDs are part of invitations to tender and the method by which environment-related requirements for planning the building are managed.

REAL-ESTATE COMPANIES AND BUILDER-OWNERS evaluate their investments and property higher when EPDs and green certification are presented. It is now becoming easier to market property which is designed and certified as sustainable.

WHOLESALEERS, RETAILERS AND USERS find verified environment-relevant product information in EPDs. They benefit from the added value resulting from sustainability in the building sector.

All parties involved in the construction process benefit equally.





ARMAFLEX IN THE GREEN BUILDING SCHEMES

The connection between the EPDs and the green building schemes is often not clear at first glance. It is necessary to go deeper into the subject to understand the relevance of EPDs for the green building schemes. Therefore, to support its business partners, Armacell has created specific documents (fact sheets) for the most renowned green building schemes. Some general information is given here:

BREEAM

Although there is as yet no system for technical insulation materials among products assessed under BREEAM, many of the results declared with the EPD can be used. According to the BREEAM technical manual (2014) the chapters 'Management', 'Health and Wellbeing', 'Energy and Materials' with their respective issues are addressed. In this scheme validated LCA and EPD data lead to credits which have a positive impact on the classification of the product.

LEED

In the LEED v4 assessment categories there are special points for Armaflex insulation materials in the categories 'Materials and Resources', 'Indoor Environmental Quality', 'Energy and Atmosphere' and 'Innovation in Design'.

DGNB

Sustainability-relevant information on Armaflex insulation materials for assessment in accordance with the German DGNB certification system refers to the areas 'Environmental Quality' (ENV), 'Economic Quality' (ECO), 'Sociocultural and Functional Quality' (SOC), 'Technical Quality' (TEC) and 'Process Quality' (PRO).

HQE

For the assessment of Armaflex insulation materials in accordance with the French HQE certification system the following areas apply: HQE target no. 2: Integrated choice of construction materials, systems and processes, sections 2.3.1 'Knowledge of the environmental impacts of the product' and 2.4.1 'Knowledge of impact on interior air-quality' and/or 2.4.2 'Choice of products for a better interior air-quality' as well as HQE target no. 3: Construction with low environmental impact, section 3.2 'Avoidance of nuisance and pollution at the construction site'.

Armacell has created special fact sheets on BREEAM, LEED, DGNB and HQE for its Armaflex products. They can be downloaded at www.armacell.com/epd





Armaflex EPDs online on
www.armacell.com/epd



A PROVEN TRACK RECORD OF SUSTAINABLE EXCELLENCE

All over the world major engineering companies have specified Armaflex insulation materials for green building projects

Here are just a few of the successful projects realized with Armaflex:

EUROPE

Germany

- "Am Zirkus 1" (office and commercial building incl. hotel), Berlin-Mitte – DGNB Silver
- Einkaufszentrum am Neumarkt (shopping centre), Solingen – DGNB Gold
- Sparkassenakademie (savings bank academy) Stuttgart – LEED
- Rewe Logistics Centre Neu-Isenburg – DGNB Gold
- "Bikini Berlin" (shopping mall) – LEED Gold
- HUGO BOSS Distribution Centre, Filderstadt – DGNB Gold
- Thales Deutschland new company headquarters, Ditzingen – LEED Gold
- Exhibition hall 3a, Nürnberg Messe – DGNB Gold
- Office complex Swiss Life AG, Garching – DGNB Silver
- "Quartier S" (shopping centre with offices, apartments and underground car park), Stuttgart – DGNB Silver
- "TRIAS" (office and business premises), Leipzig – DGNB Silver
- AOK Berlin main building – DGNB Silver
- Nord-Micro AG office building, Frankfurt am Main – LEED
- Office building of Von Ardenne Anlagentechnik GmbH, Dresden – DGNB & LEED
- Business premises at Clayallee 342, Berlin – DGNB
- "Mathematik" and Campus Hotel, Heidelberg – DGNB Gold
- Kontorhaus Arnulfpark (office complex), Munich – DGNB Gold
- "Trikot Office" (office complex), Munich – DGNB Gold
- "MAX 13" office building, Munich – DGNB Silver
- Mönchengladbach Arcarden – DGNB Gold
- Office building of the software company Amadeus Germany, Bad Homburg – DGNB Silver
- "Theresienhof" (office building), Munich – DGNB Silver
- "Fleet Office" (office complex), Hamburg – DGNB Silver
- "Arabeska" (office complex), Munich – DGNB Gold
- Vodafone Campus in Düsseldorf – LEED Gold
- "LEO" (formerly Poseidon-Haus, company headquarters of ING-DiBa), Frankfurt am Main. – LEED Gold
- Business premises Elcknerplatz Berlin-Köpenick – DGNB Gold
- Hotel Adagio and Motel One in the new urban development "Am Waidmarkt", Cologne – DGNB Silver
- Office building in „Le Quartier Central“, Düsseldorf – DGNB Silver
- Extension to the University of Applied Sciences in Deggendorf – DGNB
- "Kristall", new administration building of the insurance company LVM-Versicherungen, Münster – DGNB Gold
- Mercedes-Benz Distribution Centre in Berlin – DGNB Silver
- GIZ Haus 5, Frankfurt-Eschborn – DGNB Silver
- "Urbane Produktion der Zukunft" (production facilities of WITTENSTEIN bastian GmbH), Fellbach – DGNB Gold
- Kö-Bogen Düsseldorf (Libeskind Building) – LEED Platin
- "LVM 5", new office tower with underground car park, Münster – DGNB Gold

Benelux

- TNT Green Office, Hoofddorp – Europe's first LEED Platinum office building
- Beta Campus, University Leiden (Faculty of Mathematics and Natural Sciences) – BREEAM-NL Very Good
- "The Edge" (Deloitte headquarters), Amsterdam – BREEAM-NL Outstanding
- Stadskantoor Rotterdam – BREEAM-NL Excellent
- Fluor Headquarters, Hoofddorp – BREEAM-NL Excellent
- Capgemini Headquarters, Utrecht – BREEAM-NL Very Good
- Stadskantoor Utrecht – BREEAM-NL
- "De Monarch 1" (office building), Den Haag – BREEAM-NL Excellent

Sweden

- Karolinska University Hospital, Solna – LEED Gold
- Mobilia Shopping Center, Malmö – BREEAM
- Landvetter airport terminal, Gothenburg – BREEAM "In-Use"
- Crown & East Tower, Gothenburg – BREEAM Very Good
- Point Hyllie Complex, Malmö – BREEAM

Norway

- Statoil Fornebu new office building, Oslo – BREEAM-NOR
- Kuben Upper Secondary School, Oslo – BREEAM-NOR
- Fornebu S shopping mall, Oslo – BREEAM-NOR
- Profilbygget (office building of the IT Fornebu Group), Oslo – BREEAM-NOR
- Aker Brygge - Stranden 1 (offices, shopping mall, restaurants), Oslo – BREEAM-NOR

United Kingdom

- Battersea Power Station commercial and residential development, London – BREEAM "Domestic Refurbishment"
- The Shard, London – BREEAM Excellent
- KPMG offices, One St Peter's Square, Manchester – BREEAM Excellent
- One Angel Square, Manchester – BREEAM Outstanding

Republic of Ireland

- Apple Ireland (European headquarters), Cork – BREEAM Excellent

Hungary

- Capital Square office building, Budapest – LEED Gold
- Dorottya udvar office building, Budapest – BREEAM Excellent
- ING irodaház (Dózsa György út), Budapest – LEED "Commercial Interiors" Gold
- R70 office building, Budapest – LEED Gold

USA

- Marlins Park Stadium, Miami, Florida – LEED
- Rosa Parks Elementary School, Mankato, Minnesota – LEED
- Wesley Long Cancer Center, Greensboro, North Carolina – LEED Silver
- Print Works Bistro, Greensboro, North Carolina – LEED Platinum
- Rocky Mount High School, North Carolina – LEED "Schools"
- Allan Hancock College, Santa Maria, California – LEED Silver
- Empire State Building, New York City, New York – LEED Gold "Existing Buildings: Operations & Maintenance"

APAC

India

- Hindustan Unilever Corporate Office, Mumbai – LEED Gold
- L&T Office, Hazira – LEED Platinum
- JSW Headquarters – Pre-certified LEED Platinum
- Shapath 5 Office, Ahmedabad – LEED Gold
- Blue Ridge IT Park, Pune – LEED Platinum
- L'Oreal plant, Pune – LEED Gold
- ITC office, Gurgaon – LEED Gold
- AECOM office, Noida – LEED Platinum
- BG House, Mumbai – LEED Platinum
- Cii pharmaceutical plant, Hyderabad – LEED Platinum
- Enercon, Mumbai – LEED Gold
- Vikas IT Park, Bengaluru – LEED Gold
- Olympia Tech Park, Chennai – LEED Gold
- Nvidia (IT company), Pune – LEED Gold
- Godrej One, Mumbai – LEED Platinum

China

- Ascott Raffles, Chengdu – LEED Gold
- Shanghai Tower – LEED Gold
- 100 KK100 (previously known as Kingkey Financial Center), Shenzhen – LEED Gold
- Guangzhou International Financial Centre (ICF) – LEED Gold
- Shanghai Jin Mao Tower – LEED Gold "Existing Buildings"
- China World Trade Centre Tower Phase III, Beijing – LEED Gold

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