

Technical Bulletin
-To whom it may concern-

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BREEAM conformity of Kaiflex® and Kaifoam® products from Kaimann Germany

General remark: in the following, the relevance of BREEAM for Kaimann products will be discussed in depth. If you just want to find out about credits directly available please see section 3.

1. Basics

Kaimann factory made insulation products are designed to match national and international standards dealing with energy saving, environmental protection, green building, and the like (ASHRAE, BREEAM, DGNB, EnEV, LEED, Minergie etc.). The products' compliance to said standards and regulations mainly derives from their basic nature: insulation foams (especially Kaiflex® products) will save a huge multiple of the energy consumed for their manufacture over their lifespan. Additionally, they are produced according to state-of-the-art procedures in the world's most up-to-date FEF factory in Germany, taking into consideration all most recent trends in polymer chemistry and regulatory affairs (such as ASTM/ISO/EN standards, REACH, and many others). Therefore, Kaiflex® elastomeric foams (FEF) and Kaifoam® expanded thermoplastics (PEF) as well as their supplementary products (such as adhesives, pipe supports etc.) are compliant to BREE(A)M requirements either.

2. The BREEAM rating scheme

BREEAM is trying to take almost any aspect of buildings into consideration, from planning and supervision to waste and health. For this purpose, the rating is done for ten sections, each if it showing subsections:

- management (Man 1 - Man 5)
- health & wellbeing (Hea 1 - Hea 6)
- **energy** (Ene 1 – Ene 9)
- transport (Tra 1 - Tra 5)
- water (Wat 1 – Wat 4)
- **materials** (Mat 1 - Mat 5)
- waste (Wst 1 - Wst 4)
- land use & ecology (LE 1 - LE 6)
- pollution (Pol 1 - Pol 5)
- innovation (Inn 1)

Insulation products are covered by the sections Energy and Materials, which are among the sections with the highest weighting in the BREEAM scheme: 19 and 12.5%, respectively. As the section weighting multiplied with the credits per sections gives the sections score it is clear that achieving credits in these sections is of high importance.

The relevant BREEAM subsections for thermal insulation in general are:

- Energy -Ene 1; reduction of CO₂ emissions no direct credits available
- Materials -Mat1; life cycle impacts not relevant for pipe/ductwork insulation
 - Mat 3; responsible sourcing of materials not relevant for pipe/ductwork insulation
 - Mat 4**; insulation up to 2 credits available

Therefore, only Mat 4 is directly applicable on Kaiflex® and Kaifoam® (see below, section 3). However, FEF and PEF can contribute indirectly to achieve credits especially in Mat 1, but can also support in argumentations for positive evaluation in Ene 1 and Mat 3:

- Ene 1: Kaimann is using very advanced production equipment allowing the most energy efficient production of FEF and PEF currently available. Not only that Kaimann production exhibits the lowest CO₂ footprint per cubic meter weighted by thermal conductivity, but also that e.g. Kaiflex® insulation is saving a huge multiple of CO₂ equivalents used for its manufacture over its lifespan (see below, Mat 1). The superior Kaimann logistics concept minimizes emissions for storage and transport, and finally, Kaimann products can be used to replace materials showing higher environmental impact. The global warming potential (GWP) of Kaiflex® and Kaifoam® is zero, as well as its ozone depletion potential (ODP). Both materials are foamed without using halogenated substances (like fluorocarbons), and no toxic substances, heavy metals etc. are used for their production. They are low/no VOC material over the lifespan, being in accordance with national and international building codes and regulations.
- Mat 1: As said above, Kaimann FEF and PEF are manufactured with best energy saving practice available. A good example for the life cycle impact of our products is an LCA based on 19 mm thick Kaiflex® insulation:

➔ *CO₂ emission*
 Around 1.14 kg of CO₂ are emitted per square meter when producing a 19 mm thick Kaiflex® foam sheet (already including production of raw materials, transport, storage etc.), which is equivalent to 60 kg of CO₂ per cubic meter.
 At an average density of 50 kg/m³ this means a total emission of 1.2 kg CO₂ per kg of Kaiflex®.

➔ *CO₂ saving*
 Based on a calculated average of insulation applications (from cooling to heating) one square meter of 19 mm Kaiflex® material will save around 220 kg of CO₂ over a 10 year period.

➔ *Life cycle result*
 As most Kaiflex® insulation stays on site for 20-30 years the applicant has achieved CO₂ saving of 330 to 660 kg per square meter over the insulation's lifetime. This is 290 to 580 times more CO₂ than had been emitted for its manufacture.

- Mat 3: Kaimann as a company related to energy saving and environmental protection applications has a clear mission in its company policy and compliance code to source from renowned and reliable suppliers applying sustainable technologies and to convince suppliers about responsibility and care for the environment. We are ourselves certified ISO 9001, 14001 and 50001 and regularly ask and evaluate our suppliers to follow.

3. BREEAM applied on Kaiflex® and Kaifoam®

As shown above, Section Materials – Subsection Mat 4 “Insulation” is most relevant for Kaimann products. Two credits are available for:

- **Embodied Impact**
- **Responsible Sourcing**

Embodied Impact means that the thermal insulation material shows a high insulation level and/or low environmental impact. Kaiflex® and Kaifoam® materials show both: Kaiflex® KKplus, KK, ST and EF are equivalent to a Green Guide Rating of A+ (= 3 points), Kaiflex® HF, EP, EPDM and Kaifoam® at least are A (= 2 points). As a consequence, together with the low thermal conductivities (=high insulation level, see data sheets) of a.m. materials, the so-called Insulation Index is at least 2 or greater, which means that the first credit will be awarded.

Example calculation for the Insulation Index:

Insulation weighting formula: weighting = area of insulation(m²) x thickness(m)/thermal conductivity (W/mK):

→for an installation with 3 m² of Kaiflex® ST, 25 mm thickness: $\text{weighting} = 3 \text{ m}^2 \times 0.025 \text{ m} / 0.033 \text{ W/mK} = 2.27$

→for an installation with 2 m² of Kaiflex® EPDM, 19 mm thickness: $\text{weighting} = 2 \text{ m}^2 \times 0.019 \text{ m} / 0.038 \text{ W/mK} = 1$

Multiply the weighting with the points according to A+/A classification (Kaiflex® ST = 3 points, EPDM = 2 points):

→for the ST installation: $2.27 \times 3 = 6.81$

→for the EPDM installation: $1 \times 2 = 2$

Summarize the single values and divide them by the sum of the weightings to get the Insulation Index:

→ $(6.81 + 2) / (2.27 + 1) = 2.69$

→*Insulation Index of total Kaiflex® used is at least 2 or greater, means: credit awarded.*

Responsible Sourcing means that the respective products are traceable concerning their raw materials, manufacturing etc. and that –proved- efforts are made to ensure that their environmental and social impact is as low as possible. A certified environmental management system for the manufacturing process is therefore required. Kaimann is certified ISO 14001 (environmental) and even ISO 50001 (energy), meaning that Kaiflex®/Kaifoam® products are superseding the requirements of Mat 4 subsection which leads to the second credit being awarded.

4. Special requirements

Kaimann offers a variety of service and system products that are not entirely covered by BREEAM specifications, as they are too special. Nevertheless, we would like to give some comments on their individual green building properties:

- **Pipe supports:**
Kaiflex® and Kaifix® pipe supports comprise Kaiflex® insulation and some additional materials (A+ rated polyurethane foam, plastic foil). They can therefore be considered as part of the total insulation and be evaluated accordingly.
- **Adhesives:**
The adhesives Kaiflex® 414, 494 HHF and EPDM comply to BREEAM requirements on glues, means, that substances like bisphenol A, DEHP, BBP, DBP phthalates, chloroparaffins, chromium, octylonylphenols are not used for their manufacturing. Kaiflex® and Kaifoam® materials in general are not manufactured using SVHC, CMR substances, heavy metals (like lead, cadmium) or polyhalogenated diphenyls (like Deca-BDE).
The a.m. adhesives are solvent based, because such systems still are the only reliable glue for elastomeric and plastic foams. The solvents (i.e. VOC), however, will evaporate in very short time and there will be no VOC emission left after latest 3 days (ISO 16000). Even if not required, though, according to BREEAM standards, the use of self-adhesive foam insulation can reduce total VOC significantly.
- **Kaifinish® Corrosion Protection System and insulation protection paint:**
Same as for the a.m. adhesives Kaifinish® products are free from banned substances. The corrosion protection components are solvent based (no significant contribution to VOC in air after 3 days, see above), the protection paint is water based.

5. Conclusion

Kaimann insulation foams are in fact “BREEAM friendly” as they are low energy consuming in production but extremely energy saving during their use. Two credits can be awarded directly, and getting further credits is facilitated by the nature of Kaiflex® and Kaifoam® material. Further documentation upon our materials is available upon request.

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Disclaimer: The information provided in this document is representing our best knowledge and is subject to revision. The BREEAM edition referred hereto is from 2011. Changes in standards and their interpretation and/or application may lead to mismatch with the information provided herein.