



Fermacell

# Green Building KPIs

from BREEAM and LEED that are relevant for selected fire protection and building board products

31/05/2012

PE INTERNATIONAL



Contact:  
Dr. Peter Shonfield

The Portergate  
Ecclesall Road  
Sheffield  
S11 8NX  
UK

Phone +44 (0)114 209 6008

Fax +44 (0)114 209 6001

E-mail [p.shonfield@pe-international.com](mailto:p.shonfield@pe-international.com)



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## 1 INTRODUCTION

The purpose of this report is to highlight those key performance indicators (KPIs) in both the BREEAM and LEED Green Building Certification schemes that may be relevant for four products supplied by Fermacell.

This assessment has been carried out based on the following documents:

- Technical Manual for BREEAM New Construction [BREEAM 2011]
- LEED for New Constructions and Major Renovations [LEED 2005]

The four products considered are all cement-bound board products and include:

- AESTUVER Fire protection board;
- AESTUVER T Fire protection board;
- Powerpanel HD building board; and
- Powerpanel H<sub>2</sub>O building board.

Both BREEAM and LEED operate at the scale of the construction project, and so these products will, inevitably, only contribute towards a proportion of the total score achieved under any particular sustainability aspect considered by these schemes.



## 2 BREEAM

BREEAM is the UK's Environmental Assessment Method for Buildings, developed by the Building Research Establishment (BRE). The first versions of BREEAM were published in the early 1990's and high performance within BREEAM has been an UK government requirement for publicly funded buildings since around 2000.

BREEAM covers different aspects of the building's impact, including some social and economic criteria, although the main focus is on environmental aspects: Management, Health & Wellbeing, Energy, Transport, Water, Materials, Waste, Land Use & Ecology, and Pollution. The sustainability aspects listed in Table 2-1 are identified to be relevant or potentially relevant for Fermacell's cement-bound products. These are then discussed in more detail in the following sections.

**Table 2-1: Sustainability aspects listed in BREEAM that are potentially relevant to Fermacell cement-bound products**

BREEAM Aspect code	BREEAM Sustainability Aspect Description	AESTUVER Fire protection board	AESTUVER T Fire protection board	Powerpanel HD Building board	Powerpanel H <sub>2</sub> O Building board
Man 03	Construction Site Impacts	✓	✓	✓	✓
Mat 01	Life cycle impacts	✓	✓	✓	✓
Mat 03	Responsible sourcing of materials	✓	✓	✓	✓
Wst 01	Construction waste management	(✓)	(✓)	(✓)	(✓)
Wst 02	Recycled aggregates	✓		✓	✓
Inn 01	Innovation	(✓)	(✓)	(✓)	(✓)

✓ Directly influenced by Fermacell

(✓) Potentially related to properties of Fermacell product

### 2.1 BREEAM CREDIT: MAN 03 – CONSTRUCTION SITE IMPACTS

This aspect is focused on demonstrating that the construction site is being managed in an environmentally sound manner in terms of resource use, energy consumption and pollution.

The construction project can earn a BREEAM credit by demonstrating that transport relating to delivery of a majority of construction materials to site and construction waste from site is monitored and recorded.

If Fermacell monitors and records data on transport resulting from delivery of its products to the project site and makes this available to the project team then they can contribute to this score.



## **2.2 BREEAM CREDIT: MAT 01 – LIFE CYCLE IMPACTS**

This aspect is focused on recognising and encouraging the use of construction materials with a low environmental impact over the full life cycle of the building.

This involves an assessment of the main building elements to provide a score based on the BRE Green Guide ratings achieved for the specifications of each element.

Where an independently verified third-party Environmental Product Declaration (EPD), covering part of, or the whole life cycle, is available for a material/product that forms part of an assessed building element, this can be used to increase the contribution of that element to the building's Mat 01 performance. This EPD must be produced in accordance with the requirements of the ISO 14020 series, particularly ISO 14025 & ISO 21930 (concerning environmental labels and declarations) and ISO 14040 and 14044 (concerning life cycle assessment).

## **2.3 BREEAM CREDIT: MAT 03 – RESPONSIBLE SOURCING OF MATERIALS**

The aim of this aspect is to recognise and encourage the specification of responsibly sourced materials for key building elements.

BREEAM credits are awarded based on a points system that determines how many materials are responsibly sourced and the degree of rigour of supporting information that is provided to demonstrate this. To achieve points for any given building element, at least 80% of the materials that make-up that element must be responsibly sourced. The calculation is relatively complicated but a worked example is given in the BREEAM Technical Manual.

If Fermacell can demonstrate that it has a certified supply chain EMS system in place covering its key processes and supply chain activities this will contribute to the BREEAM credit received under this aspect.

## **2.4 BREEAM CREDIT: WST 01 – CONSTRUCTION SITE WASTE MANAGEMENT**

The aim of this aspect is to promote resource efficiency via the effective management and reduction of construction waste.

If Fermacell products are recyclable and recycling infrastructure is in place to accept this material and divert it from landfill then this will contribute to the credits received under this aspect.

## **2.5 BREEAM CREDIT: WST 02 – RECYCLED AGGREGATES**

The aim of this aspect is to recognise and encourage the use of recycled and secondary aggregates, thereby reducing the demand for virgin material and optimising material efficiency in construction.

To receive a credit structural frame applications must contain a minimum of 25% recycled and/or secondary aggregate. If this content is greater than 50% then the project may qualify for an innovation credit (see Section 1.6 below).

The recycled and/or secondary aggregate content of the Fermacell products considered in this assessment are given in Table 2-2. It is clear that Power Panel HD Building Board and Power H<sub>2</sub>O Building Board can both contribute to meeting this target. Aestuver Fire Protection Board has a very high recycled/secondary content (>50%) and this can also contribute to meeting the target for receiving an additional innovation credit.



**Table 2-2: Material specification of selected Fermacell products**

Source	Material	AESTUVER Fire protection board	AESTUVER T Fire protection board	Powerpanel HD Building board	Powerpanel H <sub>2</sub> O Building board
Virgin Source	Cement	43%	71%	36%	34%
	Expanded clay	0%	0%	35%	40%
	Expanded perlite	0%	25%	0%	0%
	Glass fiber	2%	4%	2%	0%
	Glass fiber mat	0%	0%	0%	1%
Recycled/secondary Source	Fly ash	24%	0%	21%	19%
	Foam glass (from cullet)	30%	0%	6%	5%
<b>TOTAL recycled/secondary</b>		<b>54%</b>	<b>0%</b>	<b>27%</b>	<b>24%</b>

## 2.6 BREEAM CREDIT: INN 01 – INNOVATION

The aim of this aspect is to support innovation within the construction industry through the recognition of sustainability related benefits that are not rewarded by standard BREEAM issues. Additional credits can be awarded if the project achieves “exemplary” performance in certain aspects.

Of relevance to the Fermacell products considered in this assessment the following BREEAM categories are potentially eligible for these additional credits.

### 2.6.1 Mat 01 – Life cycle impacts

To receive an innovation credit the following criteria must be met:

- Where assessing four or more applicable building elements, the building achieves at least two points additional to the total points required to achieve maximum credits under the standard BREEAM criteria; or
- Where assessing fewer than four applicable building elements, the building achieves at least one point additional to the total points required to achieve maximum credits under the standard BREEAM criteria.

### 2.6.2 Mat 03 – Responsible sourcing of materials

An innovation credit can be received when 70% of the available responsible sourcing points have been achieved. Essentially this requires that a large proportion of the materials used in the project can be shown to be responsibly sourced and that evidence is available to demonstrate a high level of rigour in these claims.



### **2.6.3 Wst 01 Construction waste management**

To receive an innovation credit the following criteria must be met:

- Non-hazardous construction waste generated by the building's design and construction is no greater than the exemplary level resource efficiency benchmark (85% volume or 90% by mass is diverted from landfill);
- The percentage of non hazardous construction and demolition waste (if relevant) diverted from landfill meets or exceeds the exemplary level percentage benchmark (85% volume or 95% by mass is diverted from landfill); and
- All key waste groups are identified for diversion from landfill in the pre-construction stage Site Waste Management Plan (SWMP).

### **2.6.4 Wst 02 Recycled aggregates**

To receive an innovation credit the following criteria must be met:

- The total amount of recycled and/or secondary aggregate specified is greater than 35% (by weight or volume) of the total high-grade aggregate specified for the project; and
- To contribute to the total amount, the percentage of high-grade aggregate specified per application (where present) that is recycled and/or secondary aggregate, must meet the exemplary minimum levels (this varies according construction element but for structural frame applications this is set at 50% by mass or volume).



### 3 LEED

The LEED system was developed and is operated by the US Green Building Council as voluntary certification system to assess environmental friendly buildings.

LEED (Leadership in Energy and Environmental Design) is the most widely used green building assessment scheme globally. It addresses the following topics: Sustainable Sites, Water Efficiency, Energy & Atmosphere, Material & Resources, Indoor Environmental Quality, Innovation & Design Process.

The sustainability aspects listed in Table 3-1 are identified as relevant or potentially relevant for Fermacell’s cement-bound products. These are then discussed in more detail in the following sections.

**Table 3-1: Sustainability aspects listed in LEED that are potentially relevant to Fermacell cement-bound products**

BREEAM Aspect code	BREEAM Sustainability Aspect Description	AESTUVER Fire protection board	AESTUVER T Fire protection board	Powerpanel HD Building board	Powerpanel H <sub>2</sub> O Building board
MR 2.1 & 2.2	Construction waste management	(✓)	(✓)	(✓)	(✓)
MR 4.1 & 4.2	Recycled content	✓		✓	✓
MR 5.1 & 5.2	Regional materials	✓	✓	✓	✓
ID 1-1.4	Innovation in design	(✓)	(✓)	(✓)	(✓)

- ✓ Directly influenced by Fermacell
- (✓) Potentially related to properties of Fermacell product

#### 3.1 LEED MR CREDIT 2.1: CONSTRUCTION WASTE MANAGEMENT – DIVERT 50% FROM DISPOSAL

The aim of this aspect is to:

- Divert construction, demolition and land-clearing debris from disposal in landfills and incinerators;
- Redirect recyclable recovered resources back to the manufacturing process; and
- Redirect reusable materials to appropriate sites.

To achieve the LEED credit the construction project must recycle and/or salvage at least 50% of non-hazardous construction and demolition debris.

If Fermacell products are recyclable and recycling infrastructure is in place to accept this material and divert it from landfill then this will contribute to the total required under this aspect.



### 3.2 LEED MR CREDIT 2.2: CONSTRUCTION WASTE MANAGEMENT – DIVERT 75% FROM DISPOSAL

In addition to the credit received in MR Credit 2.1, an additional credit can be received if a total of at least 75% of non-hazardous construction and demolition debris is recycled and/or salvaged.

### 3.3 LEED MR CREDIT 4.1: RECYCLED CONTENT: 10% (POST-CONSUMER + 1/2 PRE-CONSUMER)

The aim of this aspect is to increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.

A LEED credit can be earned if the sum of the post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project.

**Post-consumer material** is defined as waste material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose.

**Pre-consumer material** is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

Based on these criteria, fly ash is classified as pre-consumer material (it is generated in power stations). Foam glass made from cullet qualifies as post-consumer material as long as this is made from glass collected after consumer use. The overall *weighted* recycled contents for the four Fermacell products are provided in Table 3-2. This shows that the Power Panel HD Building Board, Power H<sub>2</sub>O Building Board and Aestuver Fire Protection Board easily exceed the 10% threshold and so can positively contribute to attaining this credit.

Table 3-2: Weighted recycled content of selected Fermacell products

Source	Material	AESTUVER Fire protection board	AESTUVER T Fire protection board	Powerpanel HD Building board	Powerpanel H <sub>2</sub> O Building board
Pre-consumer waste	Fly ash	12%	0%	11%	10%
Post consumer waste	Foam glass (from cullet)	30%	0%	6%	5%
<b>WEIGHTED total recycled content</b>		<b>42%</b>	<b>0%</b>	<b>17%</b>	<b>15%</b>



### 3.4 LEED MR CREDIT 4.2: RECYCLED CONTENT: 20% (POST-CONSUMER + 1/2 PRE-CONSUMER)

In addition to the credit received in MR Credit 4.2, an additional credit can be received if the sum of the post-consumer recycled content plus on-half of the pre-consumer content constitutes at least 20% (based on cost) of the total value of the materials in the project.

Of the four Fermacell products considered in this assessment, only the Aestuver Fire Protection Board exceeds the 20% threshold and can positively contribute to attaining this credit.

### 3.5 LEED MR CREDIT 5.1: REGIONAL MATERIALS: 10% EXTRACTED, PROCESSED & MANUFACTURED REGIONALLY

The aim of this aspect is the increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

A LEED credit can be earned by using building materials or products that have been extracted, harvested or recovered, as well as manufactured within 500 miles (805 km) of the project site for a minimum of 10% (based on cost) of the total materials value. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.

**Table 3-3: Transport distance for raw materials used in Fermacell products**

Material	Distance to Supplier, km
Cement	95
Fly ash	70
Foam glass	250
Expanded perlite	500
Expanded clay	330
Glass fiber mat	240
Glass fiber (type 1)	2,300
Glass fiber (type 2)	ca. 20,000

Table 3-3 shows the transport distances for the raw materials used by Fermacell in the four products considered in this assessment. Glass fiber is the only material that is sourced from a distance greater



than the 500 mile limit, and this is not used in large quantities in Fermacell's cement-bound products. Hence, the overall raw material content meeting this criterion for each product is:

- Aestuver Fire Protection Board (98%);
- Aestuver T Fire Protection Board (96%);
- Power Panel HD Building Board (98%); and
- Power H<sub>2</sub>O Building Board (100%).

This means that for construction projects occurring within 500 miles of the Fermacell production site the use of these Fermacell products can make a large contribute towards attaining this credit.

### **3.6 LEED MR CREDIT 5.2: REGIONAL MATERIALS: 20% EXTRACTED, PROCESSED & MANUFACTURED REGIONALLY**

In addition to the credit received for in MR Credit 5.1, an additional credit can be received if by using building materials or products that have been extracted, harvested or recovered, as well as manufactured within 500 miles of the project site for a minimum of 20% (based on cost) of the total materials value.

Again, for construction projects occurring within 500 miles of the Fermacell production site the use of these Fermacell products can make a large contribute towards attaining this credit.

### **3.7 LEED ID CREDIT 1-1.4: INNOVATION IN DESIGN**

The aim of this aspect is the reward design teams and projects for achieving exceptional performance above the requirements set by LEED and/or innovative performance in Green Building categories not specifically addressed by LEED.

The exceptionally high recycled content in Aestuver Fire Protection Board may be an example where using Fermacell products will help a project to greatly exceed the LEED requirements for recycled content and therefore qualify for additional credits under this aspect.



## 4 REFERENCES

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BREEAM 2011	<i>"BREEAM New Construction (Non-domestic Buildings) Technical Manual SD5073 – 2.0: 2011"</i> , Building Research Establishment, 2011
LEED 2005	<i>"LEED for New Construction &amp; Major Renovations, Version 2.2"</i> , US Green Building Council, October 2005
ISO 21930 : 2007	ISO 21930 Sustainability in building construction – Environmental declaration of building products, 2007
ISO 14020 : 2000	ISO 14020 Environmental labels and declarations – General principles, 2000
ISO 14025 : 2006	ISO 14025 Environmental labels and declarations — Type III environmental declarations — Principles and procedures, 2006
ISO 14040 : 2006	ISO 14040 Environmental Management – Life Cycle Assessment – Principles and Framework, 2006
ISO 14044 : 2006	ISO 14044– Environmental management -- Life cycle assessment -- Requirements and guidelines, 2006

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