



Fermacell

Green Building KPIs

from BREEAM and LEED that are relevant for gypsum fibre board products

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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 gypsum fibre board 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 products considered are gypsum fibre boards, produced at 3 production sites in Germany:

- Münchehof
- Siglingen and
- Wijchen.

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 a 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 gypsum fibre boards. 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's gypsum fibre boards

BREEAM Aspect code	BREEAM Sustainability Aspect Description	Gypsum fibre board - Münchhof	Gypsum fibre board - Siglingen	Gypsum fibre board - Wijchen	Gypsum fibre board – weighted average
Man 03	Construction Site Impacts	✓	✓	✓	✓
Mat 01	Life cycle impacts	✓	✓	✓	✓
Mat 03	Responsible sourcing of materials	✓	✓	✓	✓
Wst 01	Construction waste management	(✓)	(✓)	(✓)	(✓)
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 or its suppliers 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.

Green Guide ratings for the main building elements can be viewed at www.bre.co.uk/greenguide, but a free user registration is required.

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 obtain a “credit uplift” for 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). The amount of uplift will be dependent on the impact of the material with the EPD within the element, the Green Guide rating of the element and the nature of the EPD (cradle to grave or otherwise).

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 EMS system such as ISO 14001 in place covering its key processes (gypsum fibre board production) and key supply chain process (gypsum extraction) this will contribute to the BREEAM credit received under this aspect. Recycled gypsum production from flue gas desulphurisation is considered responsibly sourced by default. A slightly lower contribution can be obtained if only the gypsum fibre board production process has a certified EMS.

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. The credit considers firstly the amount of waste generated per 100 m² gross internal floor area, and secondly the amount of waste diverted from landfill.

If Fermacell products can generate lower amounts of waste (though modular sizing, reduced packing waste or reduced damaged product, and 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 as contractors will be better able to achieve the waste diversion benchmarks.



2.5 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.

2.5.1 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.

2.5.2 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.

2.5.3 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).

3 LEED

The LEED system was developed and is operated by the US Green Building Council as a 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. LEED 2005 has been considered here, LEED v4 has had a positive ballot and is currently being piloted and will be start to be used for new registrations from 2015. There are significant changes to the materials related credits in LEED v4 – for example credits based on recycled content have been dropped and several new credits added focussing on materials specific waste management, undertaking building Life Cycle Assessment, provision of EPDs or other environmental certification, responsible sourcing and ingredient disclosure – these latter three credits can be uplifted if materials are sourced from less than 160 kms.

The sustainability aspects from LEED 2005 listed in Table 3-1 are identified as relevant or potentially relevant for Fermacell’s products. These are then discussed in more detail in the following sections.

Table 3-1: Sustainability aspects listed in LEED v3 that are potentially relevant to Fermacell’s gypsum fibre boards

LEED Aspect code	LEED 2005 Sustainability Aspect Description	Gypsum fibre board - Münchhof	Gypsum fibre board - Siglingen	Gypsum fibre board - Wijchen	Gypsum fibre board – weighted average
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. Pre-consumer waste has 50% of the weighting of post-consumer waste.

Based on these criteria, flue gas gypsum is classified as pre-consumer material (it is generated in power stations). Paper fibres made from waste paper qualifies as post-consumer material as long as this is made from waste paper collected after consumer use. The recycled content for the gypsum fibre boards produced at 3 different sites, as well as the weighted average are provided in Table 3-2. This shows that the gypsum fibre boards easily exceed the 10% threshold and so can positively contribute to attaining this credit.

Table 3-2: Recycled content of gypsum fibre boards by Fermacell

Source	Material	Gypsum fibre board - Münchhof	Gypsum fibre board - Siglingen	Gypsum fibre board - Wijchen	Gypsum fibre board – weighted average
Pre-consumer waste	Flue gas gypsum	55%	28%	77%	57%
Post consumer waste	Paper fibres (from waste paper)	19%	18%	20%	19%
WEIGHTED total recycled content		47%	32%	59%	48%
(Note pre-consumer waste is weighted at 50%)					

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.

In this considered assessment, the gypsum fibre boards by Fermacell exceed 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 increased 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 shows the transport distances for the raw materials used by Fermacell in the three production sites considered in this assessment. All raw materials are sourced from a distance less than the 500 mile limit. Hence, the overall raw material content meeting this criterion for Fermacell’s gypsum fibre boards is 100%.

Table 3-3: Transport distance for raw materials used in Fermacell production sites

Material	Distance to Supplier, Münchehof, km	Distance to Supplier, Siglingen, km	Distance to Supplier, Wijchen, km
Gypsum beta semihydrate (from natural gypsum)	50	30	-
Gypsum beta semihydrate (from FDI, hard coal power plant)	130	355	200
Paper fibres (from waste paper)	50	50	200
Gypsum dihydrate	100	100	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 significant contribution towards attaining this credit. As this credit relates to both the production and the extraction of raw materials, then for some projects where raw materials extraction occurs more than 500 miles from the site, less than 100% of the criteria will be met.

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 significant contribution towards attaining this credit.

3.7 LEED ID CREDIT 1-1.4: INNOVATION IN DESIGN

The aim of this aspect is to 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 high recycled content in gypsum fibre boards 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 ADDITIONAL INFORMATION

In May/June 2013 Fermacell opened a fourth production plant in the North of Spain « Orjeo ». The production process is based on the same technology as at the other plants, thus the environmental performance is expected to be comparable to the obtained results. At the moment there are no reliable primary data available for this plant. An LCA on gypsum fibre boards produced in Orjeo is not performed yet.

Nevertheless, information on the product's composition and about transport distances from raw materials sourced could be collected over a 6 months period:

The gypsum fibre boards produced in Orjeo are made of approximately 28% flue gas gypsum (pre-consumer waste) and about 20% paper fibres from waste paper (post-consumer waste). Since the Pre-consumer waste has 50% of the weighting of post-consumer waste, the weighted recycled content ends up in 34%. This shows that the gypsum fibre boards easily exceed the thresholds given in LEED MR Credit 4.1 & 4.2 and so can positively contribute to attaining these credits.

Transport distances from almost all raw material suppliers to the manufacturing plant are less than 500 miles. About 84% of all raw materials are sourced from a distance less than the 500 mile limit. Hence, the overall raw material content meeting the criterion regarding the LEED MR Credit 5.1 & 5.2 for Fermacell's gypsum fibre boards is 84%.



5 REFERENCES

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 & Major Renovations, Version 3"</i> , US Green Building Council, October 2005
LEED v4	<i>"LEED v4 New Construction"</i> , US Green Building Council, v4 draft, 2013.
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
