



# PCR Ceiling Panels

Product Category Rules

## Rules for Environmental Product Declarations

### - Ceiling panels for suspended ceiling systems -

**Product Category Rules confirmed by the Advisory Board (SVA)**

Version: October 2010 (US)

**Institut Bauen und Umwelt e.V.**

[www.bau-umwelt.com](http://www.bau-umwelt.com)

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**PCR confirmed by SVA**

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**Scope of validity of these PCR** These Product Category Rules can be applied for:

- Ceiling panels according to ASTM E1264
- Due to the use of US-specific standards and databases EPD made according to this PCR are only applicable in the USA and Canada. This shall be mentioned in the EPD. Otherwise calculations are the same as the IBU PCR "Mineralplatten für abgehängte Deckensysteme", 2009-06.

**Content**

These PCR specify the rules specific for the product groups as regards:

- the creation of the Environmental Product Declaration (EPD)
- the calculation of the Life Cycle Assessment (LCA) and the creation of a background report on the LCA

**Tracking the versions**

Version	Amendments	Approved by the SVA
1	First version, developed by the product forum	06/2009
1.1 (US)	First USA Version	10/2010

Date of next revision of these PCR: 06/2012

**Part 1: Rules for the Creation of an Environmental Product Declaration for Construction Products**

**Basic information**

The program operator's format template shall be used.

**Cover page**

In line with the IBU style sheet, the cover sheet must include the following elements:

- Reference: "Environmental Product Declaration according to ISO14025"
- Product name
- Name of the manufacturer
- Declaration number
- Full name of the program operator, his logo and web address
- Two adequate images illustrating the product and its application
- For collective EPD e.g. provided by producer associations: name and logo of the association and statement about the Type of EPD. (see Part 2 "General information")

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**Short version, page 1** In line with the IBU style sheet, page 1 of the short version must include the following elements:

According to the program operator's template, page 1 of the short version shall contain the following elements:

- Adequate image
- Name of the program operator, including web address
- Declaration holder, company name, address
- Declaration number
- Description of the declared product; in case of average data, description of the average product
- PCR name, including the version
- Note on the validity of the declaration according to the template; as to the validity of the EPDs,
- Table of contents of the complete declaration according to the template
- Date of issue of the declaration = Date of the background report
- Completed by: Names and signatures of the chairman of the Advisory Board and the verifier of the EPD

**Short version, page 2** In line with the IBU style sheet, page 2 of the short version must include the following elements:

- Product description
  - Description of area of application for product declared
  - Description of the scope of the LCA, including system boundary and relevant allocations, if applicable
- Tabular depiction of the results of the LCA results with reference to the functional or declared unit; a graphical presentation of the LCA (partial) result is inadmissible
- The table with results may only include manufacturing ("cradle-to-gate" plus packaging) and details on the End-of-Life and its total. No other life cycle phases may be presented.
- Tests and verification as per PCR incl. test standard and date

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## Long version of the Environmental Declaration

<b>Header</b>	<p>The header must contain the following elements:</p> <ul style="list-style-type: none"> <li>- PCR name and version</li> <li>- Declaration holder</li> <li>- Declaration number</li> </ul>
<b>Scope of validity</b>	<p>The products for which the LCA data and declaration is valid shall be stated, including the production plants and their location. For average EPD, e.g. EPD for the products of an association, the way the average is calculated shall be described. The companies/plants that contribute their data to the LCA and EPD shall be stated.</p>
<b>1 Product definition</b>	
<b>Product definition</b>	<p>The declared products shall be described:</p> <p><i>Example</i></p> <p><i>According to ASTM E1264 ceiling panels can consist of mineral wool (artificial mineral fibers made of non-directional glassy silicate fibers with a mass content of more than 18% of oxides from sodium, potassium, calcium, magnesium and barium), fillers, binders, etc., that are mixed with water (auxiliary material) to a mash, then flattened into mats and finally dried as plates.</i></p>
<b>Application</b>	<p>The application of the declared products shall be specified.</p> <p><i>Example: Ceiling panels for suspended ceiling systems</i></p> <p><i>Ceiling panels are an insert for suspended ceiling systems.</i></p>
<b>Placing on the market / Codes of practice</b>	<p>The applicable standard or the general approval by building authorities or a comparable national regulation shall be indicated.</p> <p><i>Example:</i></p> <p><i>Must comply with Uniform Building Code or International Building Code.</i></p> <p><i>National Requirement for approval:</i></p> <p><i>Must comply with Material Safety Data Sheet (MSDS) requirements.</i></p>
<b>Quality assurance</b>	<p>Details on quality assurance must be product-related. Existing Quality Management Systems (QMS) can be indicated, if applicable.</p> <p><i>Example:</i></p> <p><i>ISO 9001</i></p>
<b>Delivery condition, properties</b>	<p>The delivery condition, size and surface treatment and decoration of the product shall be described.</p>

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**Technical data**

Technical data of the declared products in delivery condition shall be indicated:

- **Fire resistance:** according to ASTM E119
- Surface Burning Characteristics: ASTM E84 pursuant to test certificate.
- **Sound absorption:** sound absorption coefficient data of product and surface according to ASTM C423 and EN ISO 11654.
- **Sound insulation:** product and system related data of sound insulation in accordance to ASTM E1414 and ISO 140-3
- **Thermal conductivity:** [ft<sup>2</sup>·°F·h/Btu] - according to ASTM C518-10

If of relevance for the declared product, the measured value and standard should be indicated and included in the list of references.

**1 Base materials**

**Base materials**  
**Primary products**

The essential base materials or primary products shall be declared in mass-%.

Example ceiling panels

*The relevant raw materials are: mineral wool (10 - 30 mass-%), clay, (10 -70 mass-%), perlites (10 - 70 mass-%). Additionally, up to 10% binders (starch) and 0-20% cellulose.*

**Auxiliary substances / Additives**

Declaration of auxiliary substances and additives.

Example laminations and coatings for ceiling panels:

For laminations and coating the following auxiliary substances are used: emulsion paints, aluminium and paper foil, plastic films, glass mat, fiberglass and veneer.

Indications like "...is free from..." shall not be used.

**Material definitions**

Material designations listed under the previous items shall be explained here.

Example: panel cut offs used as recycled aggregate for the production of ceiling panels:

*Production residues (panel cut offs, grindings), construction site cut offs and materials disassembled at the construction site are used as fillers for new ceiling panels.*

**Raw material extraction and origin**

Information on raw material extraction and on the geographical origin including average hauling distance for the input of base materials or primary products shall be declared.

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**Availability of raw materials** - Information on general and regional availability of the input of raw materials:

- Resources, scarcity or size of reserves
- use of recycled materials (recycled content)

Information on the availability of resources shall be issue-related (not: "...the company's consumption compared to world consumption is negligible...").

Example ceiling panels:

*Mineral wool is made of natural deposits of stones (like basalt) or, slag (waste of steel production) having practically an unlimited availability. Starch is made from potatoes, cereals, manioc or corn that have as quickly renewable resources nearly no limitations in their availability.*

*Cellulose fibers are made of paper production waste or waste paper (carton, newspapers, etc.), which are also available without major limitations.*

**1 Manufacturing of the product**

**Manufacturing of the product** - The manufacturing process shall be described and possibly illustrated with a simple chart. If the EPD applies to several locations, the production processes of all locations shall be described.

Example: ceiling panels

*The products for the described use are produced in the traditional wet felt procedure.*

*The raw materials are mixed with water to get a homogeneous mixture that can be pumped on a belt conveyor. The water is removed mechanically (gravity, negative pressure) and by evaporation in a drying oven. As far as possible the process water is reused. It is treated accordingly and fed back into the process water cycle. Depending on the desired appearance, the panels can be painted, sand coated, patterned, stamped or laminated. Production waste and dust are reused.*

**Health protection during production** - Description of health protection measures taken during the production process that goes beyond national regulations (of the country of production.)

**Environmental protection in manufacturing** - Description of environmental protection measures taken during the production process which go beyond national regulations or system-dependent requirements, e.g. description of especially eco-friendly treatment of exhaust air, waste water and waste, and noise-emissions.

Details on the Environmental Management System (where available)

**1 Product installation**

**Installation recommendations** - Description of the installation method, employment of machinery, tools, dust extraction, etc. and auxiliary substances, as well as noise reduction measures. References to codes of practice, regulations of occupational safety and environmental protection are possible. The printed Ceilings & Interior Systems Construction Association (CISCA) Handbook may be referenced.

**Occupational safety and Environmental protection** - Information on special occupational and environmental safety measures.

Example:

*The occupational safety measures in accordance with the MSDS are considered.*

**Residual material** - Processing of the residual materials, e.g. handling of the residuals, sorting, recycling and disposal shall be declared.

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**Packaging**

Information on product-specific packaging is mandatory: type, composition and possible re-use of packaging material (paper, pallets, films etc.).

Example:

*PE shrink film packaging, it should be recycled if recycling infrastructure exists.*

**1 In use condition**

**Constituent parts**

Peculiarities due to the material composition for the use phase should be indicated here:

Example ceiling panels:

*Direct contact with water should be avoided due to the water solubility of the binder (starch). The exposure to temperatures of more than 120°F over a long period can cause yellowing of the surface coating.*

**Effects on environment and health**

References to cause-and-effect relationships between product, environment and health should be supplied. This includes possible contaminant content or emissions. If the declaration of test results refers to a detection limit, the detection limit shall be specified.

**Useful life**

Information on the service life and influences on deterioration when applied according to recognized codes of practice. The typical lifetime for ceiling panels will be 50 years.

Example:

*The useful life of ceiling panels can be as long as the buildings' useful life if properly installed and maintained.*

**1 Extraordinary effects**

**Fire**

Information on fire performance including, if relevant:

- Building Material Class (ASTM E1264)
- Smoke production: ASTM E84

**Water**

Information on product behaviour, including any possible impacts on the environment, during an unforeseen action of water, e.g. floods.

**1 Re-use phase**

**Re-use**

Options for the re-use of the product.

Example ceiling panels:

*If correctly disassembled the panels can be re-installed.*

**Subsequent use**

Options for the subsequent use of the product.

Example ceiling panels:

*If panel is partially damaged the panel can be used as a perimeter panel.*

**Closed-loop recycling**

Options for closed loop recycling of the material.

Example ceiling panels:

Ceiling panels are re-fed into the production if they do not meet production specification or are broken.

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<b>Recycling</b>	Other recycling options of the material. <i>Example ceiling panels:</i> <i>Pulverized panels can potentially be used as an additive/filler in the production of other building materials.</i>
<b>Disposal</b>	Possible disposal routes shall be indicated.

## 1 Life Cycle Assessment

A life cycle assessment, complying with ISO 14040'ff, describing the declared product and based on plausible, transparent and credible data, shall be presented. Modelling assumptions with a relevant influence on the declared results shall be clearly identified in the EPD and in the background report.

For methodical details on calculation and documentation of the LCA see part 2 "Rules for the Creation of the Background Report". Comparative assertions are inadmissible.

### .1 Information on the product system definition and modelling of the life cycle

<b>Declared unit</b>	The declared unit shall be indicated according to part 2.
<b>System boundaries</b>	The system boundary shall be documented according to part 2. <i>Example:</i> <i>The life cycle analysis for the production of ceiling panels comprises the life cycle phases from "cradle to gate". It begins with the consideration of the extraction of raw materials and includes the delivery of the ready-to-dispatch product, plus the recycling and disposal of the packing material. The analysis scope, inclusive of all considered and neglected processes, shall be presented appropriately.</i>
<b>Assumptions and estimates</b>	Assumptions and estimations significant for the LCA interpretation shall be named. <i>Example:</i> <i>The product mix presented is representative for the product range of the plant. For the life cycle assessment each product type was modelled separately and then an average value was established.</i> <i>As to power supply, the energy carriers and energy sources specific for the production site have been considered.</i>
<b>Cut-off criteria</b>	<i>All production waste materials are recycled internally.</i> The cut-off criteria shall be applied and declared according to part 2. <i>Example:</i> <i>In the assessment, all data from the production data acquisition have been considered, i.e. all raw material used as per formulation, utilized thermal energy, internal fuel consumption and electric power consumption, production waste, and all emission measurements available. For all considered inputs and outputs assumptions have been made on the expenditures for transports. Thus also material and energy flows with a proportion greater than 1% have been considered. It can be assumed that the total sum of neglected processes does not exceed 5% of the impact categories. Machines and facilities required during production will be neglected.</i>

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**Transports**

Accounted distances and means of transportation shall be documented, as far as they are relevant (see cut off). In addition, the average hauling distance for the distribution chain in the US (gate to site) can be indicated.

**Period under review**

The period under consideration and hence the resulting temporal average values shall be documented according to part 2.

Example:

*The data used refer to the production processes of the financial year 2007. The quantities of raw materials, energies, auxiliary materials and supplies used have been assessed as average annual values.*

Geographical quality

*The LCA was calculated for the reference area "United States".*

**Generic data**

The source of the applied generic data shall be indicated. The generic data (average or site specific) shall comply with the data quality rules set forth by the IBU PCR. The use of pre-verified generic data should be stated. The possible reference databases are stated in part 2.

**Data quality**

An assessment of data quality shall be done, see Part 2.

Example:

*The data used are less than 5 years old.*

Example:

*The data were collected under consistent time and methodological boundary conditions. The data represents the declared information appropriately in terms of time, location and technology.*

**Allocation**

Allocations of inputs and outputs to different products that are relevant for the calculation shall be indicated, at least:

- Allocation for the use of recycled and secondary raw materials, e.g. calculation of the use of waste glass for the production of glass wool and glass foam
- Allocation of iron output during the production of mineral wool
- Allocation of the energy input, auxiliary materials and supplies to the individual product of a plant
- Credits for thermal recycling of packing material and production wastes

Example for energy recovery from incineration of wastes and packaging:

*Credits for electricity (US electricity mix) and heat (natural gas US) gained from thermal recycling of wastes and packaging in a solid waste incineration plant have been considered.*

**Information on use stage**

If relevant.

**Choice of the end-of-life scenario**

Optional.

**8.2 Description of the assessment results and analysis**

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Aggregation factors of the life cycle inventory analysis and categories of the life cycle impact assessment shall be clearly assigned to the functional or declared unit. The data shall be interpreted, e.g. to what extent the LCA information depends on certain product characteristics or plant characteristics. If a product range is declared, it shall be described with the specific parameters. Comparative descriptions of different building materials without involvement of the respective construction and the use stage are inadmissible.

**Primary energy**

The following aggregated values of the life cycle inventory analysis, referring to consumption of primary energy, shall be presented in tabular form and optionally in graphical form and the most important contributions of the processes to each assessment value shall be discussed:

- Primary energy, non-renewable
- Primary energy, renewable
- Energy from secondary fuels

The composition of non-renewable primary energy is expressed as MJ % Lignite, bituminous coal, fossil oil, natural gas, uranium. The composition of renewable primary energy is expressed as MJ % Hydropower, wind power, solar energy.

**Water utilization**

Water consumption shall be indicated (including upstream chains).

**Wastes**

The following aggregated values of the life cycle inventory analysis, referring to waste production, shall be presented in tabular form and optionally in graphical form with respect to the declared unit, and shall be interpreted in reference to the most important contributions to each assessment value:

- Secondary material,
- Overburden/stockpile dump,
- Household-type commercial waste,
- Hazardous waste,
- Radioactive waste.

**Impact assessment**

The following impact assessment indicators shall be presented in tabular form and optionally in graphical form with respect to the declared unit, and shall be interpreted in reference to the most important contributions to each assessment value:

- Global Warming Potential (GWP)
- Ozone Depletion Potential (ODP)
- Acidification Potential (AP)
- Eutrophication Potential (EP)
- Photochemical Ozone Creation Potential (POCP)

Optionally, information can be given in the long version on further environmental impacts, e.g. abiotic resource depletion, eco-toxicity or human toxicity, land use, etc. Further aggregation of the impact categories is inadmissible.

**1 Evidence, test certificates**

**.1 Bio-persistence of mineral wool fibres** Information on the Bio-persistence of mineral wool fibers.  
*Example:*

*The product's MSDS describing the Bio persistence of mineral wool fibers can be found under the following web address: \_\_\_\_\_*

**.1 VOC emissions** Determination of VOC emissions in accordance to "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers - Version 1.1"

**1 PCR document and verification**

The verification of the Environmental Product Declaration shall be documented according to the IBU template and in compliance with the requirements of ISO 14025. The Product Category Rules underlying the Environmental Product Declaration shall be indicated, including the version.

Example:

*This document is based on the Mineral Panels PCR, version dated October 2010.*

PCR document reviewed by the IBU Advisory Board (SVA) Chairman of the SVA: Prof. Dr.-Ing. Hans-Wolf Reinhardt (University of Stuttgart, IWB, Germany)
Independent inspection of the Declaration as per ISO 14025:  <input type="checkbox"/> internal <input checked="" type="checkbox"/> external
Validation of the Declaration: <i>[name of verifier]</i>

**1 Literary references**

The literature used in the Environmental Declaration must be quoted in full (please refer also to the references in this document).

**Standards and laws**

The standards and legal texts used in this Environmental Declaration must be quoted (see, e.g. [www.beuth.de](http://www.beuth.de) or references in this document):

Example:

**ISO 14040**

ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO 14040:2006); German and English version EN ISO 14040:2006

**CA Specification 01350**

"Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers - Version 1.1" California Department of Public Health (CDPH) 2010 California Specification 01350

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## **Part 2: Regulations governing calculation of the Eco Balance and generation of the background report**

### **General**

For the respective product an LCA complying with ISO 14040ff and based on plausible, transparent and credible data shall be submitted. All model assumptions with a decisive influence on the result should be specified. The report structure complies with the structure of this document, following ISO 14040.

The background report shall address all building material-specific stages of the life cycle. The stages, which are taken into account in the assessment, shall be precisely presented in relation to the considered processes. That is to say, the production (cradle to gate) shall always be precisely presented.

If use and/or end-of-life are part of the analysis, these stages shall also be addressed. If use and/or end-of-life are not considered, this fact shall be justified. In this case the processes shall not be documented in detail. As the use stage generally depends on the construction and is not taken into account, illustrative optional information may be given here.

This LCA shall be representative of the products and the reference area, which are described in the declaration.

The EPD can be developed for:

- Single, individual products
- Product groups
- Average products

A single product is unambiguously described by its construction or composition data (e.g. relevant product standard, trade name, product code)

A product group contains a number of single/individual products with similar characteristics (e.g. similar and comparable production processes, same classification, etc.). The variation for the environmental impact shall be described and the minimum and maximum level for the product's environmental performance (e.g. environmental impact) shall be given.

An average product covers an average, hypothetical ceiling panel whose characteristics (like material content of the product, weight or production processes) are calculated based on e.g. market shares or geographical coverage.

### **1 Aim and scope of the study**

#### **Aim of the study**

The aim of the study is to describe:

- the reasons for the execution of the study
- intended use
- target audience
- use of the study for public comparisons

#### **Declared unit**

Declared unit is 1 ft<sup>2</sup>. Other declared units are admissible if the conversion to 1 ft<sup>2</sup> and 1 m<sup>2</sup> is clearly stated.

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**Product description**

The product to be assessed shall be described in reference to its technical and functional properties and its application ranges.

At a minimum, with average EPD the following should be designated:

- type of averaging
- representativeness of the average

**Application range**

The application range of the declared product shall be described.

**System boundaries**

**1. Production**

For production the system boundaries are set from raw materials production to the delivery of the product ready for dispatch (factory gate). The assessment scope including all considered and neglected processes shall be described appropriately and should preferably be presented as a flow diagram. In addition, packaging and its disposal after installation of the product shall be taken into account as part of the production.

Production process steps shall be described and, if available, illustrated with a flow diagram.

The electricity mix used, including the base year, shall be indicated. The following applies:

- For production locations in the United States, electricity shall be assessed based on the current average "electricity U.S." or eGrid data,
- For a production location outside of the United States equivalent country specific processes shall be used, as far as they are state-of-the-art,
- For averages on production locations in several U.S. regions, the appropriate electricity mixes shall be taken into account region by region or shall be mixed weighted by the production volume of the respective region. If the assessment is carried out only up to the factory gate (with or without disposal), transports from factory gate to construction site will not be included but can be indicated separately.

**2. Disposal**

Assessing a disposal scenario is optional. If disposal is assessed as a separate information module, the disposal processes shall be taken into account up to final deposition.

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**Cut-off criteria**

Processes whose total contribution to the final result, with respect to their mass and in relation to all considered impact categories, is less than 1% can be neglected. The sum of the neglected processes may not exceed 5% by mass of the considered impact categories. For that a documented assumption is admissible.

For hazardous substances as defined by the U.S. Occupational Health and Safety Act the following requirements apply:

The LCI of hazardous substances will be included if the inventory is available.

If the LCI for a hazardous substance is not available, the substance will appear as an input in the LCI of the product, if its mass represents more than 0.1% of the product composition. The substance will also be identified in the comments of the "raw materials section" of the EPD.

If the LCI of a hazardous substance is approximated by modelling another substance, a comment documenting this will be provided in the background report and in the full version of the EPD.

The compliance of the cut-off criteria shall be satisfactorily proven. Any neglected processes shall be identified in the background report and if relevant to the overall results (> 1% of the respective impact) in the EPD..

Capital items for the production processes (machines, buildings etc.) will not be taken into consideration.

**Period under consideration**

The used quantities of raw materials, energies, auxiliary materials and supplies shall be considered for the involved plants as average values for a period of 12 months.

The period under consideration underlying the LCA shall be documented.

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### Generic data

As a matter of principle, consistent and equivalent generic data shall be used e.g. for background processes to support comparability of results. Datasets taken from databases (i.e. that are not specific data from the manufacturer) shall be indicated in the background report, including the source and the year at which the dataset was last updated or pre-verified. The data quality of the datasets, e.g. the representativeness with respect to time, location and technology shall be documented.

The relevant background data and their sources shall be summarized in the EPD on a general basis.

IBU as a program operator defines the European Life Cycle Database (ELCD), the *GaBi database* and *Oekobaudat* as reference databases for EPD issued by IBU. When other databases are used in an EPD issued by IBU, or in an EPD from a mutually recognised program based on this PCR, the sensitivity of the declared LCA based indicators to the application of different datasets to the overall results shall be documented.

Data pre-verified in compliance with the data quality requirements of prEN 15804 (also of IBU) are considered equivalent to the reference databases.

Example for documentation:

When dealing with data sets where consistency cannot be verified in principle the same philosophy as for the exclusion of inputs and outputs applies.

1. Where the sum of data sets from not pre-verified databases, and sourced from other than from the reference databases, contribute more than 5 % to the result of renewable and non-renewable primary energy usage and 5% of the total mass input compliance with the data quality requirements of this PCR shall be documented or the equivalence to the data quality of the reference data base shall be shown with respect to the available meta data of the reference data base.
2. If the consistency of such data with the PCR can be shown otherwise, e.g. by documenting modelling back to the elementary flows this is also acceptable.
3. The total sum of not equivalent impacts per module, shall be a maximum of 5 % of energy usage and mass. This applies particularly to material and energy flows known to have the potential to cause significant emissions into air and water or soil during the life cycle of the product; it also applies to processes that are known to be resource intensive. Conservative assumptions in combination with plausibility considerations and expert judgement can be used to demonstrate compliance with the criteria of data quality.

When data sets from different databases contribute as a sum more than 5 % to the above defined results the following rules shall be applied:

- databases other than the IBU reference database, from other international regions but based on ISO 14040ff, can serve as reference databases in those regions. However the restriction in validity to that region shall be stated.
- the quality of such databases shall be made transparent e.g. by sufficient meta data documented, credible data quality management reported or by reviews based on ISO 14040ff.

#### Examples:

*E.g. the US LCI Database (<http://www.nrel.gov/lci/>) for Energy, Transport and Auxiliary Substances, e.g. U.S. based companies. Data on auxiliary substances can also be taken from Franklin Associates or other recognized database. EPD based to more than 5% on the US LCI database as de-*

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<b>Data quality</b>	<p>Recent data shall be used as a basis for the LCA calculation, i.e. data that has been updated within at maximum the recent 10 years. The specific requirements (e.g. temporal, geographical and technological quality) shall be documented according to ISO 14044 and the IBU Guideline for PCR development.</p> <p>The representativeness of the data used shall be discussed. Handling of data gaps and models shall be explained. To guarantee representativeness, technological compliance shall be documented when using comparable processes e.g. as substitutes for data gaps.</p>
<b>Transport</b>	<p>Transports together with allocated distances shall be documented, as far as they are relevant.</p> <p>In addition, the average hauling distance for the distribution chain in the U.S. (gate to site) can be indicated.</p>
<b>Attribution of plant data to the declared products</b>	<p>If further products besides the ones declared are manufactured in a plant, then the attribution of the plant data (production energy, raw material, additives and auxiliary substances, wastes, etc.) shall be described.</p> <p>Energies, auxiliary substances and fuels used in the production plant (e.g. insulation), which cannot be unambiguously allocated to a specific product in terms of processes or a formulation, shall be allocated by mass (e.g. per ton of insulation product). The attribution of the plant data to the declared products shall be documented.</p>
<b>Allocation of co-products</b>	<p>Allocations (assignments of inputs and outputs to several products) should be avoided as much as possible. In principle allocations shall reflect the aim of the process.</p> <p>Metallic iron is produced during the melting of mineral wool raw materials. Different approaches of allocation do not lead to any significant differences in the results. A specific determination is therefore not necessary. The chosen approach however shall be documented.</p>
<b>Allocation of multi-input processes</b>	<p>Various products are processed simultaneously within one process e.g. in a solid waste incineration plant, a biomass power plant or a landfill. The allocation is carried out on the basis of a physical classification of the material flows. Where appropriate, the environmental impacts linked to the inputs are distributed according to how they influence the subsequent production process.</p>
<b>Allocation at open and closed-loop recycling on the input side</b>	<p>When recycling material is used in manufacturing, the current plant specific situation shall be assessed. The system boundary for recycling material shall be set at collection. Internally re-used production waste is modelled as closed-loop recycling. In parallel, a recycling potential can be presented (see below).</p>
<b>Information on the use phase</b>	<p>Consideration of the use stage in the LCA is optional (see below). If considered, weathering and biological availability shall be indicated. References to the assessment of the product in a building assessment can be given in the appropriate section of the EPD.</p>
<b>Choice of the waste management method</b>	<p>The choice of the waste management method, e.g. for the packaging or as end of life scenario, shall be based on the state of the art. The assessed waste management methods shall be documented.</p>

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**Allocation at end-of-life recycling**

The recycling potential reflects the functionality of the product after treatment (recycled material) - e.g. expressed through the economic value of the recycled material in comparison to primary material. The product share needed for current secondary production shall be subtracted first.

Explanatory example:

To produce 1000 kg of metal product, 80% primary material and 20% secondary material are used today. The production therefore comprises 800 kg metal from primary production and 200 kg metal from secondary production. Based on the assumption that for the secondary production 10% more scrap will be required (220 kg), 780 kg scrap is still available as recycling potential for the secondary production, of which 702 kg secondary material will be produced. Thus, the recycling potential is calculated from the "avoided production" of 702 kg of primary material.

Credits gained from recycling may only be designated if the disposal of the entire functional/declared unit is assessed.

**Allocation of thermal utilisation**

Energies gained from thermal recycling of packaging (and production waste) or as an end-of-life scenario, can be offset by an equivalence process. For production locations in the U.S., electricity shall be assessed based on the current average "electricity US" or eGrid and heat based on "thermal energy from natural gas", with reference to the base year.

Credits gained from thermal recycling of packaging and other production waste (for external recycling) shall be allocated to the life cycle phase "production". For production locations outside of the US, the location where the energy is provided shall be taken into account, e.g. "electricity France" or "electricity UCTE" for average data on electricity from the UCTE.

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## 2 Life Cycle Inventory Analysis

**Quantitative and qualitative description of the unit processes** Modelling of the unit processes underlying the LCA shall be documented in a transparent way. This can be done e.g. in tabular form or with the help of flow-charts (e.g. screenshots from LCA software). The attribution of company data to LCA software data sets shall be transparent.

The attribution of process data to life cycle (sub-) sections shall be transparent. Handling of data gaps and models shall be explained. If several products are declared in one EPD or if one product is produced at several locations, modelling shall be done for each product or location, and weighting of the data sets shall be documented.

**Data acquisition and data processing**

Data acquisition and data processing methods shall be documented.

**Indicators of the life cycle inventory analysis**

The life cycle inventory analysis shall be provided in the format that is specified in the appendix. This specific life cycle inventory analysis is not required to be published.

The following aggregation factors of the life cycle inventory analysis (energy and wastes) shall be calculated and assigned to the declared unit:

Primary energy consumption (input side)

- Primary energy, non-renewable,
- Primary energy, renewable,
- Energies from secondary fuels.

Wastes (output side)

- Secondary material,
- Overburden/stockpile dump,
- Household-type commercial waste,
- Hazardous waste,
- Radioactive wastes.

The following rules apply to the documentation of the life cycle inventory analysis:

Primary energy of non-renewable resources (MJ), subdivided into (%):

- lignite
- bituminous coal
- natural gas
- fossil oil
- uranium

Primary energy of renewable resources (MJ), subdivided into (%):

- hydropower
- wind power
- solar utilization (solar energy)
- biomass (energy content)

Secondary fuels (to be specified) (MJ)

Non-renewable material resources (lbs), differentiated according to individual resources e.g. bauxite, iron ore, limestone, etc.

Water utilization (gal)

## 3 Impact Assessment

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**Indicators of the impact assessment**

The following impact assessment indicators shall be calculated and assigned to the declared unit:

- Global Warming Potential (GWP)
- Ozone Depletion Potential (ODP)
- Acidification Potential (AP)
- Eutrophication Potential (EP)
- Photochemical Ozone / Summer smog Creation Potential (POCP)

Optionally, information on further environmental impacts, e.g. abiotic resource depletion, eco-toxicity or human toxicity, land use, etc. can be given in the long version.

**1 Interpretation**

**Interpretation**

The aggregation factors of the life cycle inventory analysis and the categories of the life cycle impact assessment should be interpreted by assigning them to the declared unit and stating any specifications, which have a significant effect on the result.

To check the declaration, a dominance analysis should be carried out. Primary energy and impact categories are to be divided up according to the relevant influences.

The influence of assumptions due to data gaps or other uncertainties should be assessed with a sensitivity analysis, as far as the assumptions are relevant to the result.

Comparative descriptions of different building materials within one EPD are inadmissible.

**References**

- IBU 2006** Environmental Product Declaration Guidelines (issued on 20.01.2006) for formulating the product group-specific requirements of Environmental Product Declarations (Type III) for construction products, Institut Bauen und Umwelt e.V., [www.bau-umwelt.com](http://www.bau-umwelt.com)
- Oekobaudat 2010** [www.nachhaltigesbauen.de/baustoff-und-gebaeuedaten/oekobaudat.html](http://www.nachhaltigesbauen.de/baustoff-und-gebaeuedaten/oekobaudat.html)
- Publicly available LCA database for construction products, provided by the German Federal Ministry of Traffic, Construction and Urban Planning. This database is based on GaBi 4.3
- SimaPro** SimaPro 7.2.3, Software for Life Cycle Engineering, PRé Consultants, Amersfoort, Netherlands 2010
- GaBi 2009** GaBi 4.3: Software and Database for Life Cycle Engineering, Abteilung Ganzheitliche Bilanzierung (GABI) Lehrstuhl für Bauphysik, University of Stuttgart and PE International GmbH, Leinfelden-Echterdingen, 2009
- US LCI SimaPro** LCI Database for Life Cycle Engineering, National Renewable Energy Laboratory, Lakewood, CO, 2008 SimaPro 7.2.3, Software for Life Cycle Engineering, PRé Consultants, Amersfoort, Netherlands 2010
- US LCI** LCI Database for Life Cycle Engineering, National Renewable Energy Laboratory, Lakewood, CO, 2008

**Standards and laws**

- ISO 14025** DIN ISO 14025: 2007-10, Environmental Labelling and Declarations – Type III - Environmental Declarations – Principles and Procedures (ISO 14025:2006); German and English version
- ISO 14040** DIN EN ISO 14040:2006-10, Environmental management – Life cycle assessment – Principles and framework (ISO 14040:2006); German and English version EN ISO 14040:2006

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<b>ISO 14044</b>	DIN EN ISO 14044:200610, Environmental management - Life cycle assessment - requirements and guidelines (ISO 14044:2006); German and English version EN ISO 14044:2006	
<b>ISO 9001</b>	DIN EN ISO 9001:2008-12, Quality management systems - Requirements (ISO 9001:2008); Trilingual version EN ISO 9001:2008, Corrigendum to DIN EN ISO 9001:2008-12; Trilingual version EN ISO 9001:2008/AC:2009	
<b>ISO 14001</b>	DIN EN ISO 14001:2009-11, Environmental management systems - Requirements with guidance for use (ISO 14001:2004 + Cor. 1:2009); German and English version EN ISO 14001:2004 + AC:2009	
<b>ISO 11654</b>	DIN EN ISO 11654:1997-07, Acoustics - Sound absorbers for use in buildings - Rating of sound absorption (ISO 11654:1997); German version EN ISO 11654:1997	
<b>ASTM E1264</b>	Classification for Acoustic Ceiling Products	
<b>ASTM E84</b>	Test Method for Surface Burning Characteristics of Building Materials	
<b>ASTM E119</b>	Fire Test of Building Construction and Materials	
<b>ASTM C636</b>	"Std Practice for Installation of Metal Ceiling Suspension Systems for Acoustic Panel and Lay-in Panels"	
<b>ASTM C423</b>	Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method	
<b>CA Specification 01350</b>	Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers - Version 1.1 - California Specification 01350	
<b>ASTM E1414</b>	ASTM E1414 – Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum	

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