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Contract managed by SECTION Eco-claim Validation

EPD - VERIFICATION

Saint-Gobain ISOVER

Information for the verification of Environmental Product Declarations of Saint-Gobain Products

Vilvoorde,
1 August 2014.

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A INTRODUCTION

The Saint-Gobain Group is the world leader in the habitat and construction markets. It designs, manufactures and distributes building materials, providing innovative solutions to meet growing demand in emerging economies, for energy efficiency and for environmental protection.

Driven by its ambition to improve the environmental impact of its products Saint-Gobain has chosen to measure and analyze the environmental impact of its products using Life Cycle Assessment (LCA). For many of its products Saint-Gobain has already published Environmental Product Declarations (EPD's)

Saint-Gobain ISOVER is a division of the Saint-Gobain Group. Saint-Gobain ISOVER produces insulation materials, which are used in buildings as well as in industrial facilities. Saint-Gobain ISOVER has developed EPD's for most of its construction materials.

Vinçotte was appointed by Saint-Gobain ISOVER to independently verify 76 EPD's, divided into 14 product groups:

- Mupan: 120mm;
- Comfortpanel 32: 60mm, 120mm and 140mm;
- Easypan: 50mm, 60mm, 80mm, 100mm, 120mm and 140mm;
- Isoconfort 32: 60mm, 120mm, 160mm, 180mm and 200mm;
- Isoconfort 35: 60mm, 80mm, 100mm, 120mm, 140mm, 160mm, 180mm, 200mm, 220mm and 240mm ;
- Multimax 30 : 45mm, 60mm, 90mm, 120mm and 150mm ;
- Mupan Façade: 50mm, 60mm, 70mm, 80mm, 100mm, 120mm, 140mm and 160mm;
- Partywall: 20mm, 30mm, 40mm and 50mm;
- Rollisol Plus: 60mm, 100mm, 120mm, 150mm, 180mm, 200mm, 220mm and 240mm;
- Sonepal: 40mm, 45mm, 50mm, 60mm, 70mm, 75mm, 90mm and 100mm;
- Systemboard: 28mm;
- System R400: 90mm, 120mm, 140mm, 170mm, 190mm, 220mm and 240mm;
- System R700: 170mm, 190mm, 220mm and 240mm;
- System R1000: 100mm, 120mm, 140mm, 161mm and 180mm.

This verification report consists of:

- The review of the adherence to the Product Category Rules (PCR) which were developed by Saint-Gobain in 2012 to complement the core PCR EN 18504, ref. The Methodological Guide for Construction Products", SOL 11-062.1-L1 dd. 3 December 2012;
- The methodological review of the LCA-study, which was used to calculate the EPD's, ref. "Information for the Environmental Product Declaration of a Saint-Gobain Construction Product Belgium / Netherland, dd. June 2013;
- The data review of the LCA and EPD's for the products of Saint-Gobain ISOVER.

The present report will serve as a basis for the preparation of individual EPD verification fiches, for every EPD that was verified.

This report is at the disposal of Saint-Gobain ISOVER in case there is a question of a third party on the conducted review process.

B REVIEW OF THE LCA-STUDY AGAINST THE PCR

Saint-Gobain developed its own PCR "The Methodological Guide for Construction Products", ref. SOL 11-062.1-L1 dd. 3 December 2012, which complements the core PCR for construction materials, the EN 15804 and the ISO 21930.

This PCR describes the Saint-Gobain analysis and recommendations related to the main points of the International and European standards regarding environmental product declarations for building products. Its aim is to provide, wherever possible, common instructions at the Group level on how to deal with the methodological choices described by these standards in order to get consistent EPD's worldwide.

The PCR was reviewed by Vinçotte and it was verified whether the LCA-study, used to publish the EPD's, was conducted according to this PCR.

The LCA-study starts in his general aspects, making a statement that the document has been conducted according to the requirements of the international standards of construction products and with the LCA-standards and with the PCR-document.
In the goal of the study the reasons for carrying out the study are defined.
The scope of the study starts by naming the raw materials to produce glass wool and gives short information about the insulating aspect of the product. As mineral wool is expected to last for an average building's lifetime, a period of 50 years is set as a default.
To be able to analyze the lifecycle of the product a functional unit (FU) is described as a thermal insulation for a surface of 1m². Wherever possible secondary/additional functionalities should be considered as well.
Furthermore the scope defines product mass required for the functional unit (quantity, thickness, …).

The LCA-study provides all necessary information about the different stages in the life cycle of glass wool:

- The product stage
  The production stage is subdivided into modules A1 to A3 conform to EN15804 and provides information regarding to the these modules: raw material supply, transport and manufacturing. The model used for the calculation of impacts regarding to the transport of raw materials is conform to the PCR.
- The Construction process
  The modules A4, transport to the building site and A5, installation into the building are mentioned in the LCA-study. For the installation into the building a 5% wastage, including the additional production process for this loss is considered.
- The use-stage (building fabric)
  The use stage, subdivided in it's different modules provides information regarding to emission to the environment and technical operations on the product installed. Assuming the reference service life, no emissions or technical operations are attributable to mineral wool insulation.
- The use-stage (operation of the building)
  Although not applicable for the lifecycle analysis of the product, the use phase (operation of the building) the major contribution to the thermal performance of the building and energy savings are mentioned.
- End-of-life
  The end-of-life stage takes into consideration the 4 modules of end-of-life (C1 to C4).
  The environmental impact of insulation products due to the demolition of buildings is assumed to be very small and can be neglected. The waste-stream is considered to be landfilled without reuse, recovery or recycling.

According to the EN15804 the LCA-study mentions as well an additional module, called module D: The benefits and loads beyond the system boundary. In this module processing of packaging wastes are taken into account.

The cut-off rules mentioned in the LCA-study are in accordance with the PCR.

In the lifecycle inventory analysis the sources for the data collection, according to the different phases, are described. As required by the PCR-document and the EN 15 804 standard the study mentions that data should be updated as often as possible at least within the last 10 years for generic data and within the last 5 years for producer specific data.

The parameters describing the environmental impacts, mentioned in the LCA-study are:

- Global warming potential
- Depletion potential of the stratospheric ozone layer
- Acidification potential of land and water
- Eutrophication potential
- Formation potential of tropospheric ozone
- Abiotic depletion potential for non-fossil resources
- Abiotic depletion potential for fossil resources

For the life cycle impact assessment parameter unit expressions per declared unit are defined. All procedures and calculations are in accordance with the standard PCR, the EPD Methodological Guide, which refers to the EN 15 804 standard.

The LCA-study state that impact results from the life cycle inventory should be displayed using a standard EPD-format. The chosen parameters are:

- Global warming
- Non-renewable resources consumption
- Energy consumption
- Water consumption
- Waste production

For the impact calculation of these parameters the results obtained by the life cycle impact assessment are used. The relation between both are mentioned in the LCA-study.

Conclusion

The LCA-study is **in full accordance with the PCR standard, the EPD Methodological Guide for Construction Products.**

C METHODOLOGICAL REVIEW

The LCA-study used for the development of the EPD's was produced within the Saint-Gobain Group by Saint-Gobain Gyproc. The LCA digital model was developed using the TEAM 5.1 software.

The LCA-study and model were verified against the ISO 14040 and 14044 on life cycle assessment and against the EN15804 and EN15942, specific for construction materials.

C.1 ISO 14040 & ISO 14044

The LCA-study was verified for adherence against the international standards for Life Cycle Assessment:

- ISO 14040 - Environmental management - Life cycle assessment - Principles and framework;
- ISO 14044 - Environmental management — Life cycle assessment — Requirements and guidelines.

For checking adherence to the ISO 14040 and 14044 requirements information of the following sources were used:

- LCA-report;
- PCR "Methdological guide for construction products";
- Interview with LCA-practitioner (Mr. Michaël MEDARD) on 17/07/2014;
- Information available from the TEAM-model.

The verification against the requirements is reported in Annex 1. It can be concluded that the **LCA was performed in accordance with ISO 14040 and 14044.** It is recommended in the future to provide more information on data sources in the TEAM-model, to provide indications on data uncertainty of foreground data, when available, and to explicitly state missing data, if any.

C.2 NBN EN 15824 & NBN EN 15942

The EPD's were further checked against the norms:

- NBN EN 15804 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products;
- NBN EN 15942 - Sustainability of construction works - Environmental product declarations - Communication format business-to-business.

As shown in chapter B the LCA is in accordance with the PCR "Methodological guide for construction products". Since the PCR is fully compliant with the NBN EN 15804, the **LCA is equivalently in accordance with NBN EN 15804**.

Verification of the EPD against NBN EN 15942 is reported in Annex 2. It can be concluded that the **EPD-format and the data reported are fully compliant with NBN EN 15942**.

D REVIEW OF INPUT DATA AND LCA CALCULATIONS

D.1 Introduction

Saint-Gobain ISOVER developed a general model in the TEAM 5.1 software with all possible relevant processes in the life cycle of their products. By inputting product specific data and running the model an EPD was generated for every product.

The insulation products under consideration can be divided in 14 groups. Because the construction products belonging to the same group are similar in nature and a similar production process is used, a full scope review of the data and the calculations was performed for the reference product of every group. For the other products the scope of the review was reduced so that only input data that were different from the reference products were evaluated.

The following products were selected as the reference product for every product group:

- Mupan 120mm;
- Comfortpanel 32 60mm;
- Easypan 50mm;
- Isoconfort 32 60mm;
- Isoconfort 35 60mm;
- Multimax 30 45mm;
- Mupan Façade 50mm;
- Partywall 20mm;
- Rollisol Plus 60mm;
- Sonepal 40mm;
- Systemboard 28mm;
- System Roll 400 90mm;
- System Roll 700 170mm;
- System Roll 1000 100mm.

D.2 Scope of the data review

The scope of the review for the LCA-study comprises of a review of:

- ✓ Goal and scope;
- ✓ Functional unit;
- ✓ System boundaries;
- ✓ Data quality of economic flows;
- ✓ Life Cycle Inventory (LCI) data collection;
- ✓ LCI-data quality;
- ✓ Allocation procedures;
- ✓ Life Cycle Impact assessment (LCIA);
- ✓ Interpretation.

D.3 Results of the data review

For the data review Gyproc Gypsum provided Vinçotte with the following information:

- The LCA-study "Information for the Environmental Product Declaration of a Saint-Gobain Construction Product Belgium/Netherlands", dd. June 2013;
- The EPD of the products;
- The Saint-Gobain ISOVER Data Collection Template "13 06 12 DATA FOR ETTEN LCA OF INSULATION PRODUCT EN" with annual data from 2012;
- The PCR "Methodological Guide for Construction Products, Report SOL 11-062.1-L1", dd. December 2012;
- The LCI-data inventory from the TEAM database;
- Access to the TEAM LCA-model during a meeting on 17/07/2014.

The review of the input data and LCA calculations was performed by reviewing the aforementioned documents, by one working visit at the Saint-Gobain ISOVER office in Kallo in June 2014 and by a meeting with the lead LCA-practitioner of Saint-Gobain in July 2014.

The review was conducted using a checklist, which can be found in Annex 3.
The results of the major checks that were performed are summarized below.

- Goal and scope:
  - ✓ Section 2 of the LCA-report clearly describes the goal of the study. The reasons for carrying out the study, the application and the intended audience are specified.
  - ✓ As shown above the scope of the LCA-study is fully ISO compliant.
- Functional unit:
  - ✓ The functional unit is reported in section 3.2 of the LCA-report. It describes the product, the material and the functions ("WHAT"), the quantity ("HOW MUCH"), the quality ("HOW WELL") and the reference service life ("HOW LONG").
- System boundaries:
  - ✓ The LCA-study describes the system boundaries according to the modules defined in EN15804 (A, B, C and D). The process tree in TEAM 5.1 software is in accordance with EN15804 and is cradle-to-grave.
  - ✓ Impact of deconstruction and demolition was neglected which is reasonable as this is performed manually or with light equipment.
  - ✓ Cut-off levels at the information module level are in accordance with the PCR.
  - ✓ Use of recycled glass (+/-60%) is modeled. Impact of pre-treatment from the end-of-waste stage is included (removal of metals, sieving and crushing).
  - ✓ No co-products are formed.
  - ✓ Packaging is included within the boundaries. 100% recycling is taken into account.
  - ✓ Flows declared in module D are packaging materials: wooden pallet, PE and cardboard.
- Data quality of economic flows:
  - ✓ Foreground data were used from the actual product plant in Etten. The foreground data are at least of equal quality as background data.
  - ✓ For recycling of glass from external flows, background data were used.
- Life Cycle Inventory (LCI) data collection:
  - ✓ Foreground data were sourced from the Saint-Gobain ISOVER plant at Etten. There is a clear data trail from the plant production data to the data used in the TEAM-model. A quality check of the data is performed by the responsible for sustainable development of Saint-Gobain, which is also responsible for collecting and reporting of environmental data. These data are also used for the public reporting of non-financial information in accordance with the "Décret n°2012-557 dd; 24/04/2012" in France. In the context of this reporting the data are third party checked. Furthermore all production plant data are revised by the plant manager.
  - ✓ Sample checks were performed to verify whether or not data from the data collection template are correctly inputted in the TEAM-model: CO_2, water and sand.
  - ✓ For the end-of-life phase 100% landfilling was taken into account as a conservative approach.
- LCI-data quality:
  - ✓ Several sample checks were performed to assess the data reliability, representativeness and accuracy (product losses during installation, transport distances and fuel consumption, used energy mix).

  - ✓ The value used for the product losses during installation (5%) were sourced from the study "Grip op glaswolafval" ref. P015611145, dd. 12/2011, performed by Casteller on behalf of Saint-Gobain.
- Allocation procedures:
  - ✓ Allocation is based on mass (kg of product).
  - ✓ Differences in energy consumption between insulation products due to differences in the applied tissues were equivalently allocated by mass of products. This approach is acceptable since differences are small as compared to the total energy consumption.
- Validation of data and data quality:
  - ✓ Data sources and time dependency of foreground data are available from the production data collection template. It is advised to include this information in the TEAM-model.
- Life Cycle Impact assessment (LCIA):
  - ✓ The LCIA-method is registered in the LCA-study (CML).
  - ✓ Some processes do not have matching characterization factors in the impact methods of the TEAM-model, e.g. sand. For processes with important inputs (such as sand) it is advised to state this explicitly in the LCA-report.
- Interpretation:
  - ✓ The outcomes of the TEAM-model were benchmarked against available EPD's from earlier years (EPD's available from 2009).
  - ✓ The EPD's from products produced at the Etten plant were benchmarked against EPD's from other plants worldwide taking into account the differences between the plants.
  - ✓ Impacts are compared with impact ranges available within the Saint-Gobain Group.
  - ✓ The graphical format of the EPD is also used for comparison of impacts of different life cycle stages of the products.

Additionally to the verifications described above, an EPD of a reference product was benchmarked against the EPD of the same product but produced in another production plant of the Saint-Gobain Group. The EPD was sourced from the publicly available database "INIES"[1] A comparison was made with the EPD of Isoconfort 32 from 2009. From the benchmarking it can be concluded that the impacts at midpoint level are comparable. Differences are probably due to different transport distances, different energy-mixes,…

Using the verified input data of the reference products the input data of the remaining products were verified on their correctness and consistency. All input data could be related back to the data of the reference products taking into account the differences within each product group. Recalculations were performed on a sample basis.

With regard to the LCA-study and the TEAM-model used for generation of the EPD's, it can be concluded that:

- the methods used to carry out the LCA and the LCA-model in the TEAM-software are **scientifically and technically valid**;
- the data used are **appropriate and reasonable in relation to the goal of the study**;
- the **interpretations reflect the limitations identified and the goal of the study**;
- the study report is **transparent and consistent**, and
- the **EPD's are reliable and consistent**.

[1] www.base-inies.fr/

E CONCLUSION

On behalf of Saint-Gobain ISOVER, Vinçotte performed an independent third party review of 76 Environmental Product Declarations (EPD's), which can be divided over 14 product groups:

- Mupan;
- Comfortpanel 32;
- Easypan;
- Isoconfort 32;
- Isoconfort 35;
- Multimax 30;
- Mupan Façade;
- Partywall;
- Rollisol Plus;
- Sonepal;
- Systemboard;
- System Roll 400;
- System Roll 700;
- System Roll 1000.

The review process conducted by Vinçotte comprised of the following phases:

- a verification of the LCA-study against the Product Category Rule (PCR), "The Methodological Guide for Construction Products", ref. SOL 11-062.1-L1 dd. 3 December 2012;
- a methodological review. The LCA-study, LCA-model and EPD's were verified against the ISO 14040 and 14044 on life cycle assessment and against the EN15804 and EN15942, specific for construction materials.
- a review of the input data and the LCA calculations.

Based on our review, it can be concluded that:

- the LCA-study is in full accordance with the PCR standard, the EPD Methodological Guide for Construction Products;
- the LCA-study was performed in accordance with ISO 14040 and 14044;
- the LCA is equivalently in accordance with NBN EN 15804 and the EPD-format is complaint to the NBN EN 15942;
- the methods used to carry out the LCA and the LCA-model in the TEAM LCA-software are scientifically and technically valid;
- the data used are appropriate and reasonable in relation to the goal of the study;
- the interpretations reflect the limitations identified and the goal of the study;
- the study report is transparent and consistent, and
- the EPD's are reliable and consistent.

The present verification report was used as a basis for the preparation of individual EPD verification fiches, issued for every of aforementioned products.

This report is at the disposal of Saint-Gobain ISOVER in case there is a question of a third party on the conducted review process.

ANNEX 1 – ADHERENCE TO ISO 14040 AND ISO 14044

ISO 14040	ISO 14044	Requirement	Check OK/NOK/NA	Comment
		General		
x		Are there four phases (goal and scope definition phase; inventory analysis phase, impact assessment phase; interpretation phase) in the LCA study?	OK	
x		Will the results of the different LCA studies be used for comparing? If yes, are all assumptions and context of each study equivalent?	NA	EPD's are not intended for comparative assertions
x		Is the entire life cycle of a product considered in the LCA?	OK	
x		Is the approach scientific? Is the methodology open to inclusion of new scientific findings and improvements?	OK	
x		Is an iterative procedure used within the phases of the LCA?	OK	
	x	Is there a statement that the study has been conducted according to the ISO requirements?	OK	
		Goal and scope		
x	x	Does the goal state • the intended application, • the reasons for carrying out the study, • the intended audience, • whether the results are intended to be used in comparative assertions?	OK	
x		Is the scope sufficiently well-defined so that the breath, depth and detail of the study are compatible and sufficient to address the stated goal?	OK	
	x	Is the type and format of the report defined in the scope phase?	OK	
x	x	Does the scope include following items: • the product system to be studied; • the functions of the product system or, in the case of comparative studies, the	OK	The product system, functions, functional/declared unit, system boundary, allocation, impact categories, interpretation and assumptions are described in the LCA-study. Data quality requirements are stipulated in the PCR "Methodological guide for construction products". The LCA is

		systems; • the functional unit; • the system boundary; • allocation procedures; • impact categories selected and methodology of impact assessment, and subsequent interpretation to be used; • interpretation to be used (ISO 14044) • data requirements; • assumptions; • limitations; • value choices and optional elements (ISO 14044) • initial data quality requirements; • type of critical review, if any; • type and format of the report required for the study.		subjected to a third party external review.
x	x	Is there a clear definition of functional unit? Does the functional unit define the quantification of the identified functions of the product?	OK	
	x	Is the functional unit consistent with goal and scope of the study?	OK	
	x	Is the functional unit measurable?	OK	
x	x	Does the system boundary define the unit processes to be included in the system?	OK	
	x	Is the selection of the system boundary consistent with the goal of the study?	OK	
	x	Are the criteria used in establishing the system boundary identified and explained?	OK	Described in PCR "Methodological guide for construction products".
	x	In case life cycle stages, processes, inputs or outputs are omitted, the reasons and implications must be explained.	OK	De-construction is omitted. Reasons for omission are described.
x		Is the life cycle of the product modeled as a product system? This means that the essential property of a product system is characterized by its	OK	

		function and not solely in terms of final products?		
x	x	Is a product system divided in elementary flows?	OK	
x		Are the used models described and the assumptions underlying the choice?	OK	
x	x	Are cut-off criteria clearly described?	OK	
	x	Is the effect on the outcome of the study of the cut-off criteria selected assessed and described?	OK	
x	x	Are there data quality requirements described that specify in general terms the characteristics of the data needed for the study? Do these data quality requirements address the following (ISO 14044): • Time related coverage • Geographical coverage • Technology coverage • Precision • Completeness • Representativeness • Consistency • Reproducibility • Sources of the data • Uncertainty of the information	OK	Basic data quality requirements are described in the PCR "Methodological guide for construction products". Improvement is possible by clearly describing sources of the data in the LCA-report and by assessing uncertainty of foreground data.
	x	Is the treatment of missing data documented?	NOK	There is no description of missing data.
	x	Is defined in the scope whether a critical review is necessary?	OK	Critical review was performed. Critical review will become necessary when EPD's will be published on federal EPD-database.
	x	Is determined which impact categories, category indicators and characterization models are included within the LCA study?	OK	
	x	Is the selection of impact categories, category indicators and characterization models consistent with the goal of the study?	OK	
		Life cycle inventory analysis phase (LCI)		
x		Are for each unit process within the systems boundary following data described: • Energy inputs, raw material inputs, ancillary	OK	In the report reference is made to the Etten Data Collection template, and the Ecobilan TEAM database and Ecoinvent database is described. Data were reviewed

		inputs, physical inputs • Products, co-products and waste • Emissions to air, discharges to water and soil • Other environmental aspects		in the TEAM-model.
x		If there are practical constraints on data collection, are they considered in the scope and documented in the study report?	NA	
x		Are there calculation procedures (validation, relating of data to unit processes, relating data to reference flow of the functional unit) to generate the results of the inventory?	OK	Procedures are not described explicitly in the LCA-report. Calculations are clear from the TEAM-model.
	x	In case of data from public sources, is the source referenced?	OK	
	x	Are for data that may be significant for the conclusions of the study, details about the relevant data collection process, the time when data have been collected, and further information about data quality indicators referenced?	OK	
	x	If such data do not meet the data quality requirements, is this stated?	NA	
	x	Are unspecific process flow diagrams avoided?	OK	
	x	Is each unit process described in detail with respect to factors influencing inputs and outputs?	OK	
	x	Is there a list that specifies the units used?	OK	List with units is not explicitly stated in the LCA-report. List is available from TEAM-model.
	x	Are data collection and calculation techniques described?	OK	Not explicitly described in the LCA-report. For data collection, reference is made to the Etten Data Collection template For data calculation, reference is made to methodological guide
	x	Are data classified under following major headings: energy inputs, raw material inputs, ancillary inputs, other physical inputs, products, co-products and waste, releases to air, water and soil, and other environmental aspects?	OK	Not explicitly described in the LCA-report. Information is available from TEAM-model.
	x	Are all calculation procedures explicitly documented and are the assumptions made clearly stated and explained?	OK	

	x	Are all system input and output data referenced to the functional unit?	NA	
	x	Is there documentary evidence of validation of data including data quality assessment and treatment of missing data?	OK	Not explicitly stated in LCA-report. Data collection template was subjected to a triple quality check, based on interview with LCA-practitioner.
	x	Are the results of refining the system boundary and sensitivity analysis documented?	OK	Not stated in the LCA-report. Sensitivity analysis was not conducted by the LCA-practitioner in the TEAM-model. This is because the processes with assumed data (e.g. transport) were shown to have a very low impact. The date used for the processes with high impact (e.g. production stage) are real plant data.
x	x	Are there allocation procedures used when required?	OK	
	Life cycle impact assessment phase (LCIA)			
x	x	Is for each impact category a life cycle impact category indicator selected? And is this indicator calculated by a characterization model?	OK	Not explicitly described in the LCA-report. Information is available from TEAM-model.
	x	Is there an assignment of LCI results to the selected impact categories (classification)?	OK	Done in TEAM-model.
	x	Is there a calculation of category indicator results (characterization)?	OK	Done in TEAM-model.
x		Is there transparency in methodology of LCIA?	OK	Methodology is described in general.
x		Is the relative nature of the LCIA results and their inadequacy to predict impacts on category endpoints described in the report?	OK	
		Life cycle interpretation phase		
x		Is there a systematic procedure to identify, qualify, check, evaluate and present the conclusions based on the findings of an LCA?	OK	
x		Are results consistent with the defined goal and scope?	OK	
	x	Is there an identification of the significant issues based on the results of the LCI and LCIA phases of LCA?	OK	There is no explicit identification of the issues. The graphical presentation of the impact categories in the EPD shows the significant issues.
	x	Is there an evaluation that considers completeness, sensitivity and consistency checks?	OK	Not explicitly stated in the LCA-report. Checks were performed by comparison with other LCA-studies for similar products.

	x	Are there conclusions, limitations, and recommendations?	OK	The study was conducted to generate an EPD, as such no conclusions and recommendations were described. Limitations are described.
x		Does this phase reflect that the LCIA results are based on a relative approach, that they indicate potential environmental effects and that they do not predict actual impacts on category endpoints, the exceeding of thresholds or safety margins or risks	OK	
x		Are the results of the LCA readily understandable, complete and consistent?	OK	

ANNEX 2 – VERIFICATION AGAINST NBN EN 15942 - CHECKLIST

Table A.1 — Declaration of general information

Declaration of general information		Check OK/NOK/NA	Comment
a	The name and address of the manufacturer(s)	OK	
b	The description of the construction product's use	OK	
	The functional unit	NA	
	The declared unit	OK	
c	Construction product identification by name (including any. product code)	OK	
	A simple visual representation of the construction product to which the data relates	OK	
d	A description of the main product components and or material NOTE This description is intended to enable the user of the EPD to understand the composition of the product in delivery condition and also support a safe and effective installation, use and disposal of the product.	OK	
e	Name of the programme used and the programme operator's name and address and, if relevant the logo and website	OK	
f	The date the declaration was issued	OK	
	The end of the 5 year period of validity	OK	
g	Information on which stages are not considered, if the declaration is not based on an LCA covering all life cycle stages	OK	
h	A statement that EPDs of construction products may not be comparable if they do not comply with this European Standard	OK	
i	In the case where an EPD is declared as an average environmental performance for a number of products a statement to that effect shall be included in the declaration:	NA	
	range/ variability of the LCIA results if significant	NOK	No estimates on foreground data uncertainty
j	For whom the EPD is representative: The site(s)	OK	
	The manufacturer	OK	
	The group of manufacturers or those representing them	NA	
k	The declaration of material content of the product shall list as a minimum substances contained in the product that are listed in the "Candidate List of Substances of Very High Concern for authorisation" when their content exceeds the limits for registration with the European Chemicals Agency NOTE The source location of any safety data sheet can be provided.	NA	
l	Information on where explanatory material may be obtained NOTE Guidance on safe and effective installation, use and disposal of the product is supplied by the manufacture.	NA	
	http//: or contact for product safety sheet	NA	
	http//: or contact for product related substances considered under REACH	NA	
	Linked scenarios	NA	
	FprEN 15804:2011, Figure 3 shall be completed and reproduced	NA	

Table A.2 — Parameters describing environmental impacts

Declaration of environmental parameters derived from LCA									
Parameters describing environmental impacts									
			Global warming potential; GWP	Depletion potential of the stratospheric ozone layer; ODP	Acidification potential of soil and water sources; AP	Eutrophication potential; EP	Formation potential of tropospheric ozone; POCP	Abiotic depletion potential (ADP-elements) for non fossil resources	Abiotic depletion potential (ADP-fossil fuels) for fossil resources
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2equiv.	Kg SO_4equiv	kg Ethene equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	OK	OK	OK	OK	OK	OK	OK
	Transport	A2							
	Manufacturing	A3							
	Total (of product stage)	Total	OK	OK	OK	OK	OK	OK	OK
Construction process stage	Transport	A4	OK	OK	OK	OK	OK	OK	OK
	Construction installation process	A5	OK	OK	OK	OK	OK	OK	OK
Use stage	Use	B1	OK	OK	OK	OK	OK	OK	OK
	Maintenance	B2	OK	OK	OK	OK	OK	OK	OK
	Repair	B3	OK	OK	OK	OK	OK	OK	OK
	Replacement	B4	OK	OK	OK	OK	OK	OK	OK
	Refurbishment	B5	OK	OK	OK	OK	OK	OK	OK
	Operational energy use	B6	OK	OK	OK	OK	OK	OK	OK
	Operational water use	B7	OK	OK	OK	OK	OK	OK	OK
End of life	De-construction, demolition	C1	OK	OK	OK	OK	OK	OK	OK
	Transport	C2	OK	OK	OK	OK	OK	OK	OK
	Waste processing	C3	OK	OK	OK	OK	OK	OK	OK
	Disposal	C4	OK	OK	OK	OK	OK	OK	OK
Benefits and loads beyond the system boundaries	Re-use, recovery, recycling potential	D	OK	OK	OK	OK	OK	OK	OK

Table A.3 — Parameters describing resource use, primary energy

Declaration of environmental parameters derived from LCA								
Parameters describing resource use, primary energy								
			Use of renewable primary energy excluding renewable primary energy resources used as raw materials	**Use of renewable primary energy resources used as raw materials**	**Total use of renewable primary energy resources (primary energy and primary energy resources used as raw**	**Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials**	**Use of non renewable primary energy resources used as raw materials**	**Total use of non renewable primary energy resources (primary energy and primary energy resources used as raw**
			MJ Net calorific value	MJ Net calorific value	MJ Net calorific value	MJ Net calorific value	MJ Net calorific value	MJ Net calorific value
Product stage	Raw material supply	A1	OK	OK	OK	OK	OK	OK
	Transport	A2						
	Manufacturing	A3						
	Total (of product stage)	Total	OK	OK	OK	OK	OK	OK
Construction process stage	Transport	A4	OK	OK	OK	OK	OK	OK
	Construction installation process	A5	OK	OK	OK	OK	OK	OK
Use stage	Use	B1	OK	OK	OK	OK	OK	OK
	Maintenance	B2	OK	OK	OK	OK	OK	OK
	Repair	B3	OK	OK	OK	OK	OK	OK
	Replacement	B4	OK	OK	OK	OK	OK	OK
	Refurbishment	B5	OK	OK	OK	OK	OK	OK
	Operational energy use	B6	OK	OK	OK	OK	OK	OK
	Operational water use	B7	OK	OK	OK	OK	OK	OK
End of life	De-construction, demolition	C1	OK	OK	OK	OK	OK	OK
	Transport	C2	OK	OK	OK	OK	OK	OK
	Waste processing	C3	OK	OK	OK	OK	OK	OK
	Disposal	C4	OK	OK	OK	OK	OK	OK
Potential benefits and loads beyond the system boundaries	Re-use, recovery, recycling potential	D	OK	OK	OK	OK	OK	OK

Table A.4 — Parameters describing resource use, secondary materials and fuels, and use of water

Declaration of environmental parameters derived from LCA						
Parameters describing resource use, secondary materials and fuels, and use of water						
			Use of secondary material	**Use of renewable secondary fuels**	**Use of non renewable secondary fuels**	**Net use of fresh water**
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	OK	NA	NA	OK
	Transport	A2				
	Manufacturing	A3				
	Total (of product stage)	Total	OK	NA	NA	OK
Construction process stage	Transport	A4	OK	NA	NA	OK
	Construction installation process	A5	OK	NA	NA	OK
Use stage	Use	B1	OK	NA	NA	OK
	Maintenance	B2	OK	NA	NA	OK
	Repair	B3	OK	NA	NA	OK
	Replacement	B4	OK	NA	NA	OK
	Refurbishment	B5	OK	NA	NA	OK
	Operational energy use	B6	OK	NA	NA	OK
	Operational water use	B7	OK	NA	NA	OK
End of life	De-construction, demolition	C1	OK	NA	NA	OK
	Transport	C2	OK	NA	NA	OK
	Waste processing	C3	OK	NA	NA	OK
	Disposal	C4	OK	NA	NA	OK
Benefits and loads beyond the system boundaries	Re-use, recovery, recycling potential	D	OK	NA	NA	OK

Table A.5 — Other environmental information describing waste categories

Declaration of environmental parameters derived from LCA					
Other environmental information describing waste categories					
			Hazardous waste disposed	Non hazardous waste disposed	Radioactive waste disposed
			kg	kg	kg
Product stage	Raw material supply	A1	OK	OK	OK
	Transport	A2			
	Manufacturing	A3			
	Total of product stage	Total	OK	OK	OK
Construction process stage	Transport	A4	OK	OK	OK
	Construction installation process	A5	OK	OK	OK
Use stage	Use	B1	OK	OK	OK
	Maintenance	B2	OK	OK	OK
	Repair	B3	OK	OK	OK
	Replacement	B4	OK	OK	OK
	Refurbishment	B5	OK	OK	OK
	Operational energy use	B6	OK	OK	OK
	Operational water use	B7	OK	OK	OK
End of life	De-construction /demolition	C1	OK	OK	OK
	Transport	C2	OK	OK	OK
	Waste processing	C3	OK	OK	OK
	Disposal	C4	OK	OK	OK
Benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	OK	OK	OK

Table A.6 — Other environmental information describing output flows

Other environmental information describing output flows		Check OK/NOK/NA
Components for re-use	kg	NA
Materials for recycling	kg	OK
Materials for energy recovery	kg	NA
Exported energy	MJ per energy carrier	NA

Table A.7 — Scenarios and technical information

Additional technical information (FprEN 15804:2011, Table 7-12)			
Scenario title	**Parameter**	**Units**	**Check OK/NOK/NA**
Use stage related to the building fabric (FprEN 15804:2011, Table 7) A4 Transport to the building site	Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat	Litre of fuel type per distance or vehicle type, Commission Directive 2007/37/EC (European Emission Standard)	OK
	Distance	km	OK
	Capacity utilisation (including empty returns)	%	OK
	Bulk density of transported products	kg/m^3	OK
	Volume capacity utilisation factor (factor: = 1 or < 1 or ≥ 1 for compressed or nested packaged products)	Not applicable	OK
	Description of scenario 1	Text	NA
	Description of scenario n	Text	NA
Use stage related to the building fabric (FprEN 15804:2011, Table 8) A5 Installation in the building	Ancillary materials for installation (specified by material);	kg or other units as appropriate	OK
	Water use	m³	OK
	Other resource use	kg	NA
	Quantitative description of energy type (regional mix) and consumption during the installation process	kWh or MJ	NA
	Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	kg	OK
	Output materials (specified by type) as result of waste processing at the building site e.g. of collection for recycling, for energy recovery, disposal (specified by route)	kg	OK
	Direct emissions to ambient air, soil and water	kg	NA
	Description of scenario 1	Text	NA
	Description of scenario n	Text	NA
Use stage related to the building fabric (FprEN 15804:2011, Table 9) B2 Maintenance	Maintenance process	Description or source where description can be found	NA
	Maintenance cycle	Number per RSL or year*	NA
	Ancillary materials for maintenance (e.g. cleaning agent, specify materials)	kg / cycle	NA
	Wastage material during maintenance (specify materials)	kg	NA
	Net fresh water consumption	m^3	NA
	Energy input during maintenance (e.g. vacuum cleaning), energy carrier type e.g. electricity, and amount, if applicable and relevant	kWh	NA
	Description of scenario 1	Text	NA
	Description of scenario n	Text	NA

Table A.7 — *(continued)*

Use stage related to the building fabric (FprEN 15804:2011, Table 9) B3 Repair	Repair process	Description or source where description can be found	NA
	Inspection process	Description or source where description can be found	NA
	Repair cycle	Number per RSL or year	NA
	Ancillary materials, (e.g. lubricant, specify materials)	kg or kg / cycle	NA
	Wastage material during repair, (specify materials)	kg	NA
	Net fresh water consumption	m^3	NA
	Energy input during repair (e.g. crane activity), energy carrier type e.g. electricity, and amount	kWh / RSL, kWh / cycle	NA
	Description of scenario 1	Text	NA
	Description of scenario n	Text	NA
Use stage related to the building fabric (FprEN 15804:2011, Table 9) B4 Replacement	Replacement cycle	Number per RSL or year	NA
	Energy input during replacement (e.g. crane activity), energy carrier type, (e.g. electricity) and amount if applicable and relevant	kWh	NA
	Exchange of worn parts during the product's life cycle, (e.g. zinc galvanised steel sheet), specify materials	kg	NA
	Description of scenario 1	Text	NA
	Description of scenario n	Text	NA
Use stage related to the building fabric (FprEN 15804:2011, Table 9) B5 Refurbishment	Refurbishment process	Description or source where description can be found	NA
	Refurbishment cycle	Number per RSL or year	NA
	Energy input during refurbishment (e.g. crane activity), energy carrier type e.g. electricity, and amount if applicable and relevant	kWh	NA
	Material input for refurbishment (e.g. bricks), including ancillary materials for the refurbishment process (e.g. lubricant, specify materials)	kg or kg / cycle	NA
	Wastage material during refurbishment, (specify materials)	kg	NA
	Further assumptions for scenario development (e.g. frequency and time period of use, number of occupants)	units as appropriate	NA
	Description of scenario 1	Text	NA
	Description of scenario n	Text	NA

Table A.7 — *(continued)*

Reference service life(FprEN 15804:2011, Table 10)	Reference service life	Years	OK
	Declared product properties (at the gate) and finishes, etc.	Units as appropriate	OK
	Design application parameters (if instructed by the manufacturer), including the references to the appropriate practices	Units as appropriate	OK
	An assumed quality of work, when installed in accordance with the manufacturer's instructions	Units as appropriate	OK
	Outdoor environment, (for outdoor applications), e.g. weathering, pollutants, UV and wind exposure, building orientation, shading, temperature	Units as appropriate	NA
	Indoor environment (for indoor applications), e.g. temperature, moisture, chemical exposure	Units as appropriate	OK
	Usage conditions, e.g. frequency of use, mechanical exposure	Units as appropriate	NA
	Maintenance e.g. required frequency, type and quality and replacement of replaceable components	Units as appropriate	NA
	Description of scenario 1	Text	NA
	Description of scenario n	Text	NA
Use stage related to the operation of the building **(FprEN 15804:2011, Table 11)** **B6 and B7 use of energy and use of water**	Ancillary materials specified by material	kg or units as appropriate	NA
	Net fresh water consumption	m^3	NA
	Type of energy carrier (e.g. electricity, natural gas, district heating)	kWh	NA
	Power output of equipment	kW	NA
	Characteristic performance (e.g. energy efficiency, emissions, variation of performance with capacity utilisation)	units as appropriate	NA
	Further assumptions for scenario development, (e.g. frequency and time period of use, number of occupants)	units as appropriate	NA
	Description of scenario 1	Text	NA
	Description of scenario n	Text	NA
End of life of the product **C1-C4** **(FprEN 15804:2011, Table 12)**	Collection process specified by type	kg collected separately	OK
		kg collected with mixed construction waste	
	Recovery system specified by type	kg for re-use	OK
		kg for recycling	
		kg for energy recovery	
	Disposal specified by type	kg product or material for final deposition	OK

	Assumptions for scenario development (e.g. transportation)	units as appropriate	OK
	Description of scenario 1	Text	NA
	Description of scenario n	Text	NA

ANNEX 3 – DATA VERIFICATION - CHECKLIST