Nationale MILIEUDATABASE

THE DUTCH ENVIRONMENTAL DATABASE

Version 2.0 July 2025

NMD Verification Protocol Inclusion of data in the Dutch Environmental Database

Based on the Assessment Method for
Environmental Performance of Construction Works

STICHTING NATIONALE MILIEUDATABASE
www.milieudatabase.nl

Table of contents

1. Introduction

1.1. General

This version of the NMD Verification Protocol, version 2.0 July 2025, replaces the Verification Protocol version 1.2 August 2024. The Verification Protocol describes the procedure for verifying data for inclusion in the Dutch Environmental Database. The requirements against which the verification is conducted are described in the Environmental Performance Assessment Method for Construction Works[1] (hereinafter referred to as Assessment Method).

The Assessment Method was developed to calculate the material-related environmental performance of construction works throughout their life cycle in an unambiguous and verifiable manner. For more information and definitions of terms used in this Verification Protocol, please refer to the current version of the Assessment Method, also available on the website of Stichting Dutch Environmental Database (Stichting NMD): *www.milieudatabase.nl*.

1.2. Dutch Environmental Database

The Dutch Environmental Database (NMD) was established to enable unambiguous calculation of the environmental performance of construction works in the Dutch context. The NMD contains information about products and activities formulated in accordance with the Assessment Method in the form of Environmental Product Declarations that refer to environmental profiles. These Environmental Product Declarations and environmental profiles are used in calculation tools to calculate the environmental performance of construction works. In combination with the calculation rules, this ensures verifiable, reproducible and unambiguous calculation results.

There are various product information categories in the NMD:

- Category 1: proprietary data, verified by an independent, qualified third party in accordance with the NMD Verification Protocol. For whom: manufacturers/data owners, suppliers.
- Category 2: non-proprietary data, verified by an independent, qualified third party in accordance with the NMD Verification Protocol, including a statement of representativeness, for example, for the Dutch Market or a group of data owners, and mentioning the participating companies. For whom: groups of manufacturers, suppliers, sectors, governments, etc.
- Category 3: non-proprietary data, owned and managed by Stichting NMD and not verified according to the NMD Verification Protocol. All procedures relating to category 3 product information can be found on the website of Stichting NMD. A 30% surcharge factor is applied.
  Public availability: underlying data (structure of Environmental Product Declarations and basic profiles) are publicly available via the website of Stichting NMD: *www.milieudatabase.nl*. For whom: sectors, manufacturers, suppliers and clients.
- Category 3a: External supply of energy (carriers). Non-proprietary data from externally supplied energy carriers, such as electricity, gas, heat and fuels, and from standard data, for the material-related impact of the energy carriers. Data is owned and managed by Stichting NMD. A 30% surcharge factor does not apply. Data complies with the preconditions as described in Appendix II to the Assessment Method.

[1] *In this version of the Verification Protocol, 'construction works' replaces 'buildings and civil engineering structures'. Civil engineering involves earthworks, roadworks and waterway construction. In this context, it refers more broadly to the entire infrastructure sector, including, for example, railway construction and energy infrastructure.*

Categories 1 and 2 data that are included in the NMD are supplied by data owners and construction product sectors. They also remain the owners of the environmental profiles.

The Assessment Method serves as a product category rule (PCR) for the Life Cycle Assessment (LCA) that is carried out in order to be able to produce an Environmental Product Declaration (EPD). This makes the environmental information from the EPDs suitable for inclusion in the NMD as category 1 and category 2 product data. The Assessment Method therefore indicates how EPDs should be formulated as these supply information for the Environmental Product Declarations. EPDs are in line with EN 15804+A2. The Assessment Method is a generic PCR for construction products. In addition to the Assessment Method, sectors draw up product-specific product category rules (PCRs).

Category 3 data are a catch-all solution to provide environmental profiles in the NMD in the absence of, and as a counterpart to, category 1 and category 2 data for a construction product. Stichting NMD is owner of these environmental profiles, which were drawn up under the responsibility of Stichting NMD. A 30% surcharge factor is applied to category 3 environmental profiles as the inventory data are less complete, and to encourage submission of category 1 and 2 data to the database. This surcharge factor is determined by Stichting NMD, which manages the NMD, and is implemented in the calculation tools based on the calculation rules. Appendix II contains an overview of the agreements and procedures for category 3 Environmental Product Declarations.

In addition to the Environmental Product Declarations in the NMD, Stichting NMD also manages the process database. The NMD process database contains category 1 & 2 processes and generic processes (category 3) based on Ecoinvent 'allocation, cut-off by classification' adapted for use in the context of the Assessment Method. The processes (e.g. sand, cement, steel and diesel) are used by LCA practitioners when drawing up LCAs for category 1 & 2 Environmental Product Declarations. The representativeness of the generic processes used should be considered in the LCA report on which the EPD is based. The generic basic processes (category 3) are also used as the basis for the category 3 Environmental Product Declarations in the NMD. These category 3 declarations are therefore updated when changes are made to Ecoinvent or the Assessment Method.

The Assessment Method, the calculation rules, the NMD and the process database are a cohesive package that enable an unambiguous calculation of the environmental performance of construction works. Figure 1 indicates that the Assessment Method serves as a product category rule (PCR) to produce EPDs as well as to determine the calculation rules for the core of the calculation tools.

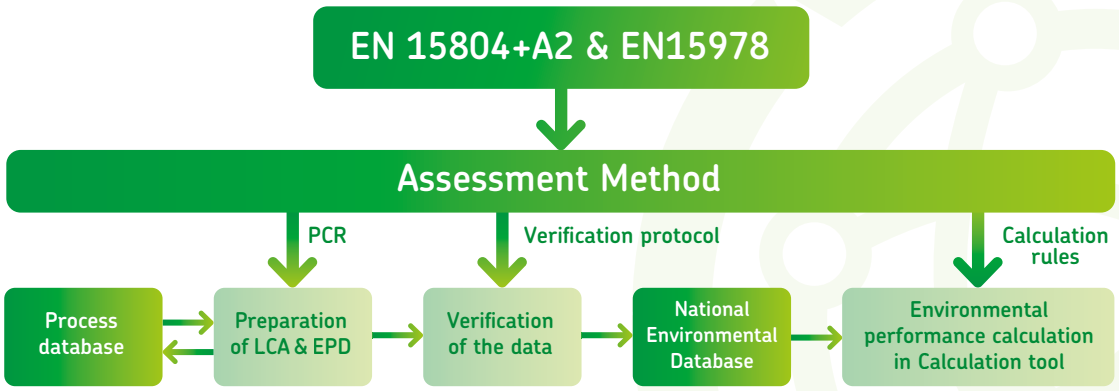

Figure 1: Visualisation of the data flow between the two databases managed by Stichting NMD, the environmental performance, and the elements for which the Assessment Method prescribes requirements.

1.3 NMD Verification Protocol

Environmental data incorporated in the NMD in accordance with this Assessment Method are verified in compliance with the procedure described in this NMD Verification Protocol. The EPD compiler is responsible for checking the latest version of the NMD Verification Protocol. Previous versions can no longer be considered after the expiry of any transition period. To enable the review according to the NMD Verification Protocol, the LCA practitioner should complete the Assessment Tables document stating in the 'comments' column where the requested information can be found in the project file and add this completed document to the project file. The document is available as a Word file on the Stichting NMD website: *www.milieudatabase.nl.*

The subject matter and scope of the Verification Protocol are category 1 and 2 data:
Category 1 and 2 data for inclusion in the NMD concern verified information about the environmental aspects of a construction product that has been compiled on the initiative of the data owner(s) or their representative(s) by means of an environmental life cycle assessment (LCA) and that is suitable for inclusion in the NMD.
Category 1 and 2 data for data inclusion are self-declarations verified by a recognised third party, EPD (Environmental Product Declaration) specifically intended for the Dutch market.

The individual data owner or their representative (trade association, association, holding company)[2] is responsible for providing information about the construction products and the associated services that are provided. The data owner is therefore the person who compiles data for inclusion in the NMD or ensures the data is compiled, and applies for inclusion with Stichting NMD. After successfully completing the verification process, the data can be included in the NMD. This verification must be carried out by a reviewer who complies with the current procedure 'Conditions for NMD accreditation of LCA practitioners and LCA reviewers' and appears on the list of 'List of recognised LCA reviewers'. Both documents are available on *www.milieudatabase.nl*

The verification must be conducted in accordance with the requirements laid down in this Verification Protocol. The verification consists of four steps:

1. A recognised reviewer assesses whether the data for inclusion in the NMD has been prepared in accordance with the applicable Assessment Method;
2. The recognised reviewer assesses whether the data are entered correctly into the NMD Platform;
3. The recognised reviewer submits the verification report to the data owner, who is responsible for payment to Stichting NMD.
4. The recognised reviewer ensures delivery of the final report, verification statement and entry of the Environmental Product Declaration into the NMD.

The Verification Protocol consists of:

- Application procedure for inclusion in the NMD of Stichting NMD (Chapter 2);
- Requirements for inclusion of data in the NMD (Chapter 3);
- Instructions for verification by the verification agency (Chapter 4);

Appendix A contains the assessment tables that must be completed by the verification agency. Appendix B contains the requirements for the project file and the LCA report.

For all terms and abbreviations used, please refer to the Assessment Method.

[2] *hereinafter referred to as 'the data owner'*

1.4 Equivalence

If the requirements of the Assessment Method (Chapter 2) are not met, equivalence may still be possible. See the procedure 'Determining equivalence and verifying data for the NMD', included in Appendix D.

2. Application procedure for inclusion in the NMD

Figure 2 shows the application procedure. The figure shows a detailed breakdown of the elements.

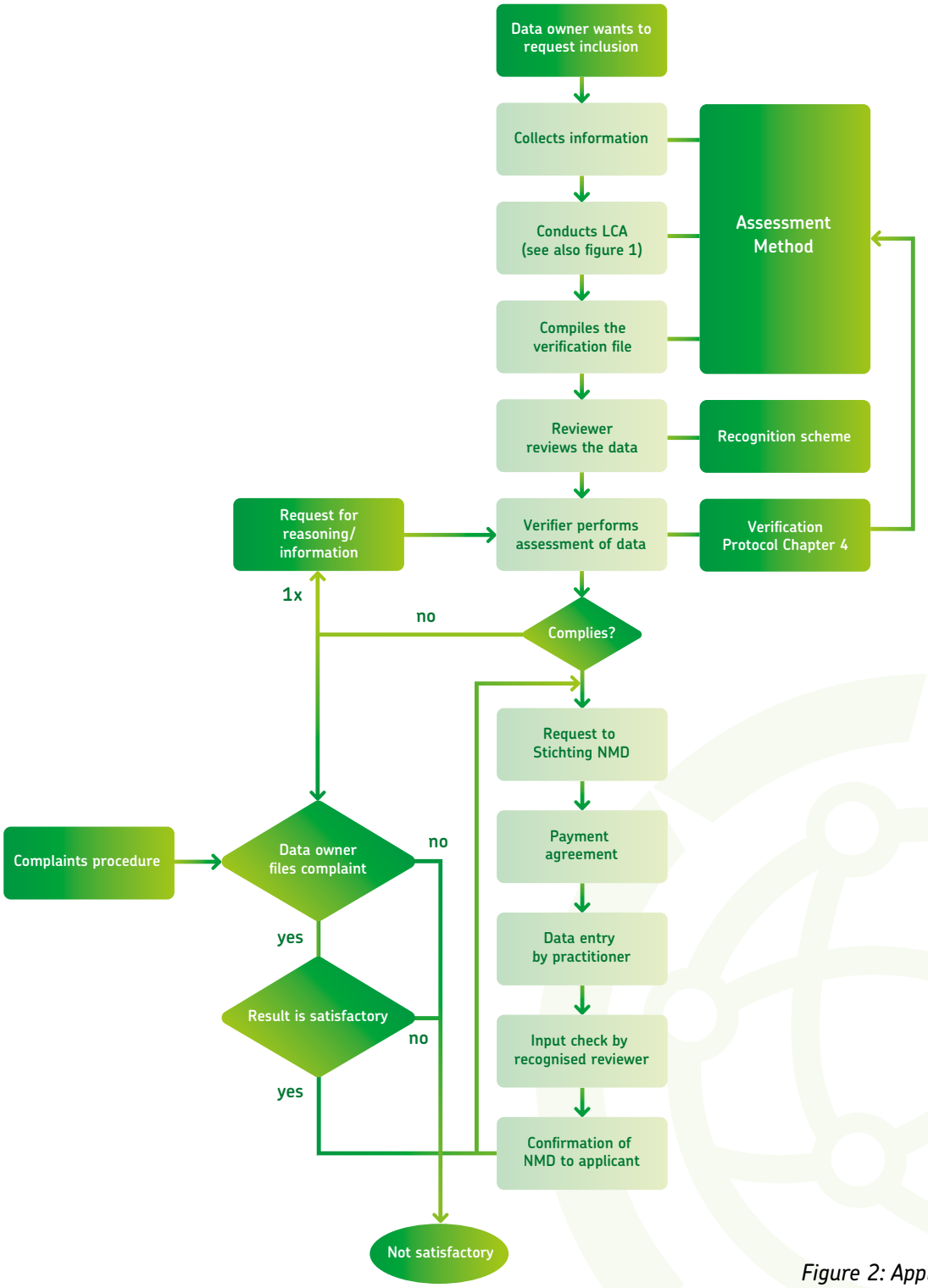

Figure 2: Application procedure

2.1 Information about applying for inclusion in the NMD

Information about applying for inclusion in the Dutch Environmental Database (NMD) can be found in the 'Process diagram for submitting data to the NMD in broad terms', see *www.milieudatabase.nl*.

2.2. LCA

The requirements for the LCA are articulated in the Assessment Method.

2.3. Verification file

The data owner provides the verification agency with a file for verification that consists of at least the following:

- the LCA report as described in the Assessment Method;
- the Environmental Product Declaration in accordance with the most recent submission format and other information necessary for proper inclusion in the NMD, as described in the Assessment Method;
- the completed assessment table;
- a statement that the methodological requirements of the Assessment Method have been met and that the input data comply with the requirements of the Assessment Method.

Additional data supporting the data in the LCA report or on the Environmental Product Declaration may be sent along with the application.

2.4. Selection of recognised LCA reviewer

The data owner selects a recognised reviewer/verification agency for the verification from the 'List of recognised LCA reviewers'. Stichting NMD strongly recommends that a recognised reviewer with specific expertise (e.g. asphalt, steel or concrete) be selected. The areas of expertise are listed for each reviewer in the aforementioned list and are periodically (re)determined by Stichting NMD.

The selection options for a recognised reviewer may be restricted by Stichting NMD in order to guarantee the independence of the verification. In other words, the number of options available on the NMD Platform may be smaller than on the 'List of recognised LCA reviewers'. Variation in cooperation between LCA practitioners and recognised LCA reviewers plays a key role in this.

The data owner comes to agreements with the recognised reviewer about the planning and costs of the verification.

2.5. Conducting the data verification

The recognised reviewer assesses the data for inclusion in the NMD in accordance with the procedure set out in Chapter 4 of this Verification Protocol. The recognised reviewer reports their final opinion to the data owner.

2.6. Complaints about the verification

If the data owner disagrees with the final opinion or has other complaints about the verification, this can be reported to Stichting Dutch Environmental Database (Stichting NMD). Complaints can be submitted to *info@milieudatabase.nl*. Stichting NMD will then initiate the Complaints Procedure, as described in Appendix C.

2.7. Application file

The data owner complies with the following when requesting inclusion of the data in the NMD:
the report of a recognised verification agency demonstrating that the LCA and the Environmental Product Declaration comply with the requirements set out in this Verification Protocol and with the requirements set by Stichting NMD for inclusion in the NMD.

2.8. Assessment of the application for inclusion of data in the NMD

Stichting NMD will draw up an invoice based on the application.

2.9. Inclusion of data in the NMD

After completion of the verification, the following will be uploaded to the NMD Platform when entering the Environmental Product Declaration:

1. LCA report according to the NMD Assessment Method/NMD Verification Protocol;
2. The verification report of the LCA report reviewed by an LCA reviewer recognised by Stichting NMD;

Each recognised reviewer has personal access to the NMD Platform.

Basic profiles for inclusion in the Process Database must be submitted to Stichting NMD via *info@milieudatabase.nl*. Please refer to the Process Database Management Protocol at *www.milieudatabase.nl* for more information about this process.

NB. The recognised LCA reviewer can only release the data for entry once parts 1 and 2 have been definitively submitted to Stichting NMD for inclusion in the file.

Stichting NMD has access to the submitted files and the input interface, including the status of the verification process, at all times. Stichting NMD reserves the right of verification and also to allow third parties to inspect the files with regard to items 1 and 2.

3. Requirements for obtaining a positive verification from Stichting NMD for inclusion in the NMD

Figure 3 shows how the LCA project file to be submitted for verification is compiled. The preparation of the LCA project file is part of the complete application procedure for inclusion in the NMD, which is outlined in Chapter 2 (Figure 2).

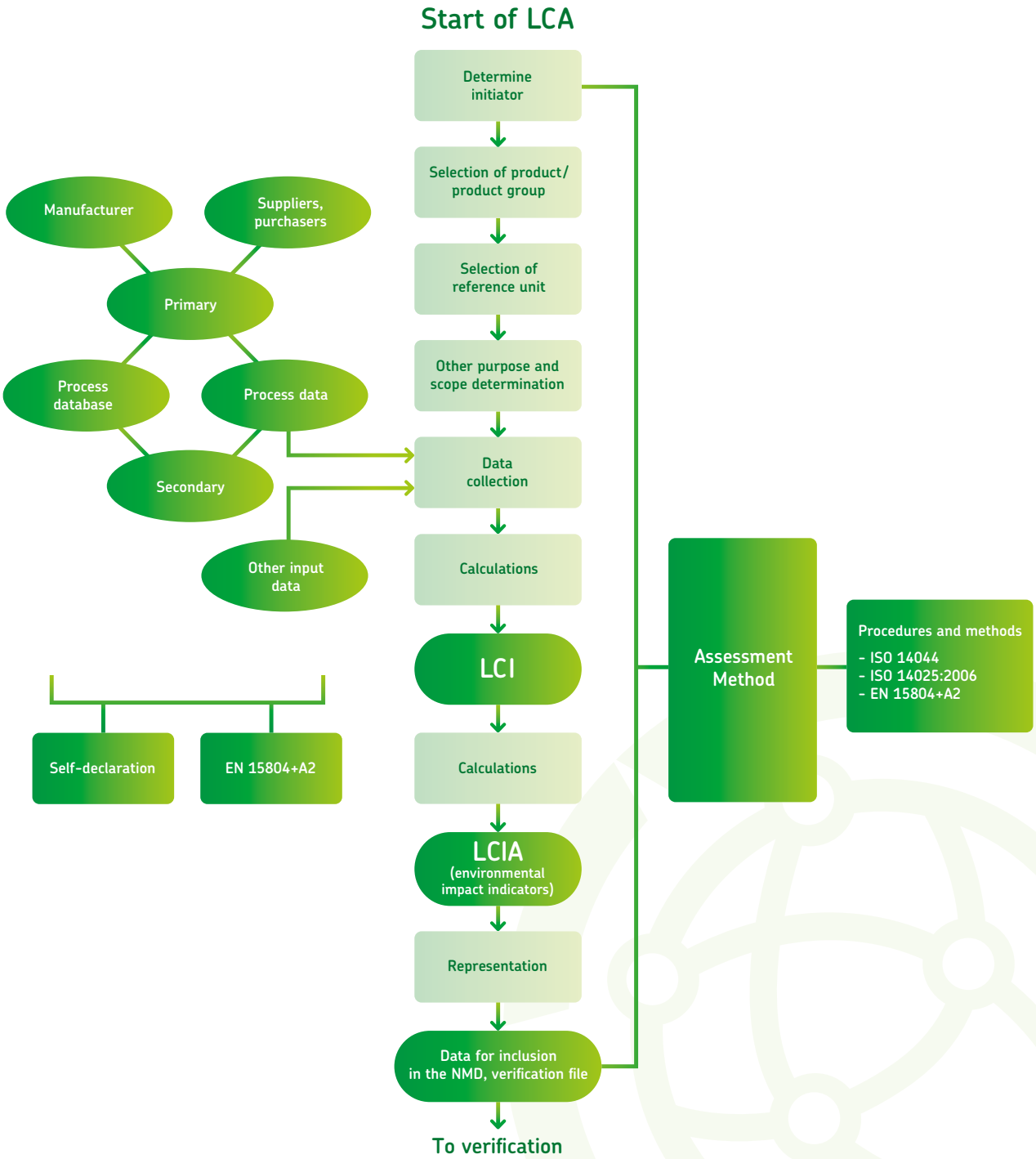

Figure 3: Conducting the LCA and compiling the project file

3.1. Documentation and management of the project file

The project file for the LCA study must comply with the Assessment Method. The project file remains with the data owner. It must be made available for inspection to an independent party designated by Stichting NMD if requested in the context of the verification of the assessment system or in the event of a second opinion or data restoration procedure arising from the complaints assessment procedure referred to in section 2.6.

3.2. LCA report

The LCA report must be prepared in accordance with the Assessment Method. This LCA report contains at least the components specified in section 2.8 of the Assessment Method. An informative checklist is included in Appendix B.2 of this Verification Protocol. The Assessment Method is decisive for the verification. In addition, the LCA report contains the tables from Appendix A of this Verification Protocol, in which the LCA practitioner has entered references in the 'comments' column to the places in the LCA report where the information on the subject in question is mentioned. This also includes completing Appendix F. The verification itself (compliant: yes/no) should not be entered in the tables by the LCA practitioner.

3.3. Verification by the recognised reviewer

The LCA report and the Environmental Product Declaration must comply with the requirements set out in this Verification Protocol. This must be established by a recognised reviewer who meets the conditions formulated by Stichting NMD. The verification must be conducted in accordance with the instructions set out in Chapter 4 of this Verification Protocol and must be recorded in a verification report.

3.4. Second opinion process and data recovery process

Stichting NMD reserves the right to request a second opinion from an independent third party after verification and/or publication of environmental data. This means that an investigation will be conducted on behalf of Stichting NMD to verify whether the data complies with the NMD Verification Protocol. Stichting NMD invokes this right in accordance with the procedure set out in Appendix C. The costs of hiring a third party to conduct a second opinion are borne by Stichting NMD. If the second opinion or other contact with the LCA reviewer, LCA practitioner and/or data owner reveals that the data contains inaccuracies or clearly conflicts with applicable standards, Stichting NMD will request that the data be amended within a specific period of time. This must take place in accordance with the 'Data recovery' process, also included in Appendix C.

4. Instructions for verification by the recognised reviewer

4.1. Documents to be verified

The LCA reviewer verifies the following documents:

- an LCA report that complies with the requirements set out in the Assessment Method;
- the completed assessment table;
- the Environmental Product Declaration(s) as entered in the NMD Platform, including scaling where applicable, for which the data owner (or its representative) wishes to request inclusion.

The verification is conducted for each Environmental Product Declaration. The same LCA report may apply to different Environmental Product Declarations. Practical experience has shown that it is possible to verify large numbers of EPDs from a single data owner at the same time, provided that they are included in a single project file.

4.2. Verification method

The verification must be conducted by completing the tables in Appendix A.
The tables contain the requirements for the data to be included. The corresponding chapter or section from the Assessment Method is listed for each table. The reviewer indicates in the tables whether the data in the LCA report on the subject in question complies with the requirements by means of 'yes' (meaning: complies) or 'no' (does not comply). Non-applicable requirements are indicated by 'n/a'. In the last column, the reviewer can add comments and an explanation if the result of the verification is negative. In the event the result of the verification is negative, the reviewer is not required to provide advice on how the requirement can be met. The reviewer must, however, substantiate the verification.

If, based on their expertise, the reviewer has doubts about input data that must be checked procedurally, the reviewer will state this, together with the reason(s) for the doubt, in a separate letter to the data owner. This letter is not part of the verification report.
The following steps must be followed:

- The reviewer reports the reason for doubt in a separate letter to the data owner.
- If the data owner does not provide a satisfactory response, the reviewer will make a note of this in the verification report.
- The reviewer can submit the confidential letter to Stichting NMD, after which the Technical Committee of Stichting NMD discuss it.

The data owner is free to deviate from the criteria set out in the Assessment Method. Deviations are permitted, provided they are justified and within the parameters set by the Assessment Method. The reviewer must use their own knowledge and expertise to decide whether the deviation is substantively well-founded and plausible. In case of doubt, a 2nd reviewer may be consulted, and their opinion will be included in the verification report. However, the data owner will remain responsible for the data presented.

4.3. Verification per chapter

The final opinion per table/chapter is 'yes' if all topics in the relevant section or chapter are answered with 'yes' or 'n/a'. In all other cases, the final opinion is 'no'.

4.4. Overall verification

The requirements of the Assessment Method are met if the final opinion for each chapter is 'yes'.
An Environmental Product Declaration can only be included in the NMD if the final assessment is positive.

4.5. Contact with the data owner and reporting

The reviewer's report contains:

- the reviewer's findings in the form of tables they completed;
- the final decision on whether or not the standard has been met.

The reviewer reports at least once in draft form to the data owner, who is then given the opportunity to provide additional information that the reviewer will take into account in their final assessment. Additional information from the data owner must be provided as an addendum to the LCA report. The reviewer provides the data owner with the final report.

4.6. Entry of data into the NMD

It is the responsibility of the recognised reviewer to ensure that the Environmental Product Declarations are correctly entered and published.

Appendix A. Assessment tables

Chapter 2 of the Environmental Performance Assessment Method for Construction Works sets out the requirements for compiling and reporting environmental data for construction products and construction elements and for presenting the data in an Environmental Product Declaration. This appendix contains an overview of these requirements in the form of assessment tables. Based on the assessment tables, a verification agency recognised by Stichting NMD can determine whether the requirements for drawing up an EPD for inclusion in the NMD have been met.

The table follows the structure of the Assessment Method and therefore also of EN 15804+A2. This means that the same topics may appear more than once, for example, first in a more general form and later in more detail. If this results in a single requirement, it will be included once.

Verified by (name of agency + practitioner)	
Date	
These assessment tables apply to the following LCA reports	

Methodological requirements

METHODOLOGICAL REQUIREMENTS (sections 2.1 and 2.2 of the Assessment Method; chapters 1 and 2 and section 8.2 of EN 15804+A2)			
Subject	**Criterion**	**Complies with criterion yes / no**	**Comments**
Methodological requirements	The LCA file contains a statement that the methodology used complies with the following standards: ISO 14040 and 14044, EN 15804+A2 and ISO 14025 for EPD. The LCA file contains a statement that the methodology used complies with the additions to the current version of the Assessment Method. Relevant PCRs have been used and are also included in the statement. Any deviations are justified.		
	The ISO and EN standards and versions of the Assessment Method referred to in the above statements are the current versions, or the penultimate version for which the transition period still applies.		
General aspects	The report must include: • the client commissioning the LCA study; • the LCA practitioner; and • the date of publication of the LCA report		
Final opinion	Complies with the methodological requirements and general aspects of the Assessment Method.		

General aspects (section 2.5 of the Assessment Method; chapter 5 of EN 15804+A2)

PURPOSE (section 2.5.1 of the Assessment Method; section 5.1 of EN 15804+A2)			
Subject	**Criterion**	**Complies with criterion yes / no**	**Comments**
Purpose	The purpose of the environmental declaration is to provide reliable and accurate quantitative environmental data on building materials, building products and building elements to the NMD. These serve as a basis for making construction calculations and generating solutions that have a lower environmental impact. The Environmental Product Declaration has one or both of the following applications: 1. Transmitting environmental data within the chain to ensure subsequent links are also able to draw up an Environmental Product Declaration for their product; 2. The use of environmental data in LCA calculations for buildings. To this end, the methodological comparability (additivity) of the environmental data is particularly important.		
Target group	The target group of the EPD (purchasers of the products, NMD) has been defined.		
Final opinion	Complies with the requirements set out in the Assessment Method regarding the purpose.		

TYPE OF EPD AND ASSOCIATED LIFE CYCLE PHASES

(section 2.5.2 of the Assessment Method; section 5.2 of EN 15804+A2)

Subject	Criterion	Complies with criterion yes / no	Comments
Type of EPD	It is clearly indicated whether it concerns: 1. only the production phase as the basic profile, or 2. the entire life cycle		
Life cycle phases	The life cycle phase are included in accordance with the Assessment Method: 1. In case of only the production phase as the basic profile, modules A1-3. 2. In case of the entire life cycle, A to D		
Final opinion	Complies with the requirements of the Assessment Method regarding type of EPD and life cycle phases.		

NB: The additional information requested under section 5.4 EN 15804+A2 is not relevant to the NMD and is not assessed in this table.

COMMUNICATION FORMAT AND FORMAT FOR SUBMITTING DATA TO STICHTING NMD FOR THE NMD

(section 2.5.6 of the Assessment Method; section 5.6 of EN 15804+A2)

Subject	Criterion	Complies with criterion yes / no	Comments
Communication format EN 15804+A2 Assessment Method	The communication format does not need to comply with the EN 15804+A2 requirements if it is only intended for inclusion in the NMD. The most recent Stichting NMD format for submitting Environmental Product Declarations has been used. The file contains a statement that the communication format used is in line with the Assessment Method (2.8.2.2).		
Final opinion	Complies with the communication format requirements set out in the Assessment Method.		

Product Category Rules, calculation rules for the LCA (section 2.6.3 of the Assessment Method; section 6.3 of EN 15804+A2)

FUNCTIONAL UNIT, PRODUCT UNIT AND REFERENCE SERVICE LIFE (sections 2.6.3.1 to 2.6.4.3 of the Assessment Method; sections 6.3.1 to 6.3.4 of EN 15804+A2)			
Subject	**Criterion**	**Complies with criterion yes / no**	**Comments**
Functional unit (section 2.6.3.1 Assessment Method)	Contains a description of the function(s) to be fulfilled and the context of application, such as the type of construction work.		
	Contains the performance requirements applicable to the function(s), including the required service life (Reference Service Life (RSL)).		
	Contains a description of the circumstances and the sphere within which the function(s) must be fulfilled, insofar as relevant to the function.		
	Contains a quantity of the function(s), expressed in an SI unit or a combination of SI units.		
	The functional unit complies with the functional descriptions of Stichting NMD, the most recent list of which can be found on www.milieudatabase.nl. The correct reference to the functional description must be included. It is clear whether it concerns a total product, in which case it has been verified that all mandatory components are actually included in the study. If it concerns a partial product, it must be clearly specified of which total products and which component is a part.		
	Contains a product description of the construction product the Environmental Product Declaration covers.		
Service life (section 2.6.4.3 Assessment Method)	If the entire A-D life cycle is declared, the reference service life (RSL) is based on the reference service life per type of construction product from the SBR publication Service life of construction products [SBR, 2011], which can be downloaded from ISSO Open. This may be deviated from if substantiated. This requires documentation for the calculation of the RSL. The RSL must be representative of the relevant product in the specified application(s).		
	Contains a description of the building product or civil engineering structure's construction element;		

Product unit (section 2.6.3.2 Assessment Method)	Contains a specification of the construction product or construction element		
	Where applicable, includes the possible areas of application, expressed in classes or quality designations, with, where relevant, the empirical service life of the construction product or construction element per area of application		
	Contains the quantity of the construction product, expressed in an SI unit or a combination of SI units.		
	Includes the weight of the construction product		
	Contains the materialisation of the construction product, expressed in material description and weight in kg.		
Final opinion	Complies with the functional unit, product unit and reference service life		

SYSTEM BOUNDARIES AND CRITERIA FOR EXCLUDING INPUT AND OUTPUT

(sections 2.6.3.5, 2.6.3.6 and 2.6.4.3 of the Assessment Method; sections 6.3.5, 6.3.6, 6.4.3.3 and 8.2 of EN 15804+A2)

Subject	**Criterion**	**Complies with criterion yes / no**	**Comments**
Process tree	The life cycle of the construction product must be modelled in the form of a process tree. The process tree must include all input and output flows (both goods (materials, products) and services), both qualitative (names of the processes) and quantitative (quantities), that are necessary for the product unit or to perform the function(s) of the functional unit. If the process tree becomes unclear because it consists of many elements, a process tree containing only the most important elements will suffice. The remaining items can be listed in the form of a table for each information module.		

Phases in the life cycle of the construction product.	The process tree must at least distinguish between the following phases in the life cycle: • production phase (A1-A3); • transport phase (A4); • building and installation process / construction (A5); • use and maintenance phase (B1 -B5); • demolition and waste management process (C1-C4); • environmental costs and benefits recycling/reuse (D).		
System boundary check of the production phase (A1-A3)	Check the system boundaries of the components from the production phase. Streams that lose their waste status and leave the production phase (A1-A3) must be allocated as by-products (see EN 15804+A2 6.4.3.2). The environmental impact and avoided environmental impact of allocated by-products are not included in module D (see EN 15804+A2 6.3.4.6). In the event the by-products cannot be allocated, other methods may be chosen, provided they are substantiated. **PLEASE NOTE: DIFFERENT PROCEDURE, MUST BE APPROVED BY THE TIC**		
System boundary check of the Transport phase (A4)	The transport phase (A4) starts when the construction product or element of the data owner is ready for transport to the purchaser, and ends the moment it arrives at the construction site next to the means of transport.		
System boundary check of the construction and installation process (A5)	These processes (A5) are included in the form of one or more scenarios. Standard values for 'loss in the form of construction waste' are included in section 2.6.3.6. Any deviations from these standard values must be substantiated.		

System boundary check of the use phase (B1 – B5)	Check the system boundaries of the components from the use phase. • B1 - The emissions and leaching from the use phase of the construction product, and concerns its use in the Netherlands. • B2 - Maintenance refers only to material-related maintenance, and not construction-related or location-related maintenance. Cleaning maintenance only if functionally important. • B3 - Recovery • B4 – Replacement of the entire product is specified in the calculation rules at building level by multiplying the Environmental Product Declarations. The replacement of the entire product is therefore not reported separately in the use phase. The replacement of components that do not last as long as the service life of the entire product is included in the use phase. • B5 – Renovation is not part of this Assessment Method.		

System boundary check of the demolition and waste management phase (C1 - C4)	C1 - The demolition phase, which starts when the construction work is taken out of service and ends when the construction work has been demolished or dismantled. This phase therefore concerns the work at the demolition site. C2 EN 15804+A2 applies. Standard values for transport distances to sorting locations, landfill sites and waste incineration plants (WIPs) are included in section 2.6.3.6. C3 EN 15804+A2 applies. C4 EN 15804+A2 applies. For disposal processes, the end point is assumed to be 100 years after disposal (see also 2.6.3.6 under generic data).		
System boundary check module D	EN 15804+A2 applies. Raw material equivalents are clearly described in accordance with the requirements of the Assessment Method (2.6.3.4) and are plausible. Section 2.6.4.3 describes how the net impact of module D should be calculated. The calculation is clearly documented and plausible.		
System boundary check General	System boundary requirements have been adhered to, well documented and are plausible. Deviations are sufficiently justified, insofar as permitted within the Assessment Method.		
Determination of system boundary at end-of-waste status	For the end-of-waste phase, the system boundary has been determined in accordance with Appendix IV of the Assessment Method. If a material, product or element remains in place without fulfilling any further function ('left in place without function'), it will be treated as landfill.		

Determination of environmental impacts in modules C3, C4 and module D	The environmental impacts are calculated based on the most recent version of the 'Standard values for end-of-life processing scenarios' associated with: 'Environmental Performance Assessment Method for Construction Works' as published on www.milieudatabase.nl. The deducted environmental interventions are declared only in module D.		
Criteria for excluding input and output	The basic principle is that all inputs and outputs for which data is available are included in the calculation. • Estimates for missing data are conservative ('worst case'). • Process data includes infrastructure and capital goods (such as the standard Ecoinvent data). Any deviations from the above are substantiated / reported. • The evaluation of the environmental impacts of excluding inputs and outputs must be based on the environmental impacts from set 2 and the environmental impacts from set 1. Within set 2, the contribution of the environmental impacts to climate change is only considered in the aggregate result 'Climate change – total'.		
Average product	The average composition is based on: annual figures or long-term figures for the entire production, weighted based on production; or on a composition covering more than 80% of the production volume in the relevant year.		
Average production (EN 15804+A2 section 8.2)	When product groups (similar products from one manufacturer and/or from different production facilities) are presented as averages, the following guidelines apply: • Calculation rules for determining averages • Explanation of the representativeness of these averages If it concerns multiple locations or products: • Description of the modelling of all locations and products involved • Explanation of the weightings used to determine the average		
Final opinion	Complies with the requirements of the Assessment Method regarding system boundaries, life cycle phases and criteria for excluding inputs and outputs.		

DATA SELECTION AND DATA QUALITY REQUIREMENTS (sections 2.6.3.7 and 2.6.3.8 of the Assessment Method; sections 6.3.7 and 6.3.8 of EN 15804+A2)			
Subject	**Criterion**	**Complies with criterion yes / no**	**Comments**
Representativeness of the processes	The processes in the product system that take place at the data owner of the construction product must provide an up-to-date (for the period or time of the Environmental Product Declaration) geographically and technologically representative picture.		
	Individual production locations must derive their data from that location.		
	If, in the case of horizontal aggregation in the product system, all production locations provide data, the result is automatically representative of the relevant group. If not all production locations within the group provide data, a representative sample must be taken from the group of production locations, insofar as they produce for the Dutch market, with regard to geographical and technical differences that may lead to differences in environmental impact.		
Representativeness of other data	The other processes in the product system must provide a representative or typical picture of the current geographical and technological situation. The area of application to which this standard applies is the Netherlands. *Representative* means that the data provides an accurate picture of the actual distribution within the relevant population. 'Typical' means that the data describe a specific, common situation (also referred to as modal).		
Distinctions	As an exception to the rule of timeliness, a future scenario may be assumed for the end-of-life processing scenarios if the hardship clause that there is a demonstrably working (return) system in place at the time of disposal is met. Any deviation from the timeliness requirement must be transparent. The plausibility thereof is explicitly assessed.		

Standard values	The following standard values apply: • one-way transport distance to the construction site if the construction product is manufactured in the Netherlands: for bulk materials 50 km, for other materials, products and elements 150 km; in civil engineering works the transport distance is calculated in the calculation tool for each construction work. • location to determine transport distance of materials from abroad to and from the construction site or purchaser: Utrecht; • end-of-life processing scenarios as published on https://milieudatabase.nl; • one-way transport distance from demolition site to sorting and/or crushing facility: 50 km; • one-way transport distance for soil disposal: 50 km; • one-way transport distance from demolition or sorting site to landfill site: 50 km; • one-way transport distance from demolition or sorting site to waste incineration plant (WIP): 100 km.		
Standard values for losses in the form of construction waste	For the release of construction waste, the standard values from the Assessment Method are used for: • Prefabricated products; It is assumed that 3% of the materials will be lost (at the construction site or during transport). • In-situ products: It is assumed that 5% of the materials will be lost. • Auxiliary and finishing materials: It is assumed that 15% of the materials will be lost. If so desired, deviation from these standard values is possible provided that it is substantiated by research results.		
Standard values for incineration in a waste incineration plant	In the case of incineration in a waste incineration plant (WIP), the avoided energy production can be offset in module D based on the amount of net exported energy (MJ per energy carrier).		

ILCD format and nomenclature (if available; see Assessment Method)	The documentation format and data sets for the life cycle inventory data used in the LCA modelling must use the current ILCD format and nomenclature as defined in the document 'International Reference Life Cycle Data System (ILCD) Handbook - Nomenclature and other conventions', which can be downloaded from the central website of the European Commission.		
Data quality	Data quality is based on the principle that the data quality of the data from the processes that take place at the data owner of the construction product should be higher than that of the other processes. Furthermore, the principle is applied that economic flows should reflect reality as closely as possible within the limits of what is practicable for the LCA practitioner. If the aforementioned ILCD format has not (yet) been followed, the data quality must be assessed using a data quality system in accordance with Appendix D of this Verification Protocol and any additional instructions laid down by Stichting NMD.		
Product scenarios	If multiple installation options are available for a product (or functional unit) that impact its end-of-life phase and/or its potential for reuse, recovery or recycling, multiple environmental profiles (C1-C4, D) may be provided. This is subject to the following preconditions: — the product delivered is in fact suitable for the application; — additional resources and/or substances are declared in the relevant module D; — specific design conditions that apply are clearly described; — end-of-life processing scenarios are up-to-date, subject to the same exception described above.		
Final opinion	Complies with the requirements of the Assessment Method regarding data selection and data quality.		

Inventory (section 2.6.4 of the Assessment Method; section 6.4 of EN 15804+A2)

INVENTORY: DATA COLLECTION (section 2.6.4.1 of the Assessment Method; section 6.4.1 of EN 15804+A2)			
Subject	**Criterion**	**Complies with criterion yes / no**	**Comments**
Data categories	Environmental interventions of the processes from the product system must be collected within the following data categories: extraction of raw materials, emissions to air, emissions to water and emissions to soil.		
Data collection Interventions	The name, unit and quantity of each intervention must be specified. The name must indicate what has actually been determined.		
	The preferred order for determining emissions is: 1. Methods specified in laws, decrees or ministerial regulations; 2. Methods set out in standard sheets; 3. Methods described in (possibly sector-specific) private law agreements		
	All environmental interventions from the most recent CML-NMD method available via www.milieudatabase.nl for set 1 and those from the International Reference Life Cycle Data System (ILCD) Handbook ('identified by the name EN 15804+A2') must be taken into account. At least the following interventions must at least have a value: — emissions to air when using thermal energy of CO2, CO, NOx (NO2 and N2O), SO2, CxHy and particulates (PM10: particulates < 10 µm); — emissions to water of COD, BOD, P-total, N-total and solid matter (PM10: particulates < 10 µm); — emissions to the soil of PAHs and heavy metals; — other emissions for which the environmental regulations impose requirements on the data owner of the construction product.		

Data collection Biogenic carbon (CO_2, CH_4, etc.)	Both biogenic carbon uptake and emissions are modelled in the modules where they occur.		
Data collection Waste	Has it been determined whether the substances released are waste? Has the end-of-waste status been verified? Has it been determined whether the waste is hazardous?		
Data sources	The data provided by the data owner of the construction product must come from primary sources and be valid (representative) for the period stated in the Environmental Product Declaration.		
	The data for the other processes must be valid (representative) for the period stated in the Environmental Product Declaration.		
	Suppliers and purchasers of the production locations concerned must be asked to provide process data that meets the requirements of this standard.		
	If a supplier or purchaser does not provide (sufficient) information, public sources, industry figures and literature data will be used. In that case, it will be verified whether there are any deviations from the NMD. Any deviations must be specified in the verification report. Thereby, the reviewer must indicate whether the deviation is significant enough to be specified on the NMD Environmental Product Declaration.		

	The public and literature sources used must be common. The following may serve as a guideline (EN 15804+A2 6.3.8): • <10 years for background data • <5 years for data provided by the manufacturer • Manufacturer's data based on 1-year average • Time period of 100 years in the event of a landfill scenario - longer if relevant • The technical background corresponds to the physical reality • The integrity of generic data, validity of system boundaries and cut-off criteria for generic data must be demonstrated If a supplier uses industry average data (cat. 2), it must be demonstrated that the supplier is part of the relevant industry average.		
	If processes or standard values from different regions are available, the following order of priority must be observed: 1) the relevant country; 2) a comparable neighbouring country; 3) the relevant region (e.g. North-West Europe); 4) the relevant (sub)continent; 5) the world.		
Reliability	The value of an environmental intervention must be an average of measurements or calculations over a period of time in which fluctuations due to seasonal influences, measurement methods, etc. are averaged out.		
Representativeness	The values of the environmental interventions must be representative of the process for which the environmental data is collected. The plausibility thereof is assessed.		

Completeness	All procedures from the most recent CML-NMD method must be considered. The interventions are then awarded a value, unless the value is unknown. This creates the following three parts: 1) A positive or negative value; 2) The value 0 (for all interventions the value of which is below the detection limit); 3) A question mark (if it is unknown whether the intervention will take place).		
Sum parameters	Where available, sum parameters (such as NO_x, C_xH_y, COD, BOD, P-total, N-total, PAH10 and heavy metals) should be broken down into individual components to allow for characterisation. The standard list contains a number of sum parameters, for which characterisation factors are also available. The intervention value of the sum parameters can be entered in two ways: a) The intervention value of the sum parameters is known. This value is entered; One or more individual substances are known, but a characterisation factor is available only for the sum parameter. A sum parameter is a representative characterisation value for the sum of a group of substances for a particular environmental impact, for example PAHs. The other substances' intervention values are then entered into the sum parameter pro rata. When data are available for multiple substances from the sum parameter, the sum parameter is calculated for each substance and the results are averaged.		
Data quality of other processes	When requesting data from suppliers and purchasers, the data owner of a construction product must request the same data quality for environmental interventions as required for the data owner's processes. If a supplier or purchaser cannot meet these data quality requirements, this must be clearly stated in the data quality description. (see Assessment Method section 2.6.3.7).		

Data validation (by the EPD compiler)	For the processes that take place at the data owner of the construction product, the energy balance must be determined at the company level and deviations corrected to an accuracy of ≥ 95 %.		
	For the processes that take place at the data owner of the construction product (if different from the data at company level), the mass balance must be determined for each process used (if different from the data at the company level) and deviations corrected to an accuracy of ≥ 95 %.		
	The validity of the other processes must be verified by determining the mass balance for each process and correcting any deviations to an accuracy of ≥ 95 %.		
Recording of the data quality per unit process	Insofar as data are available, the reliability of environmental interventions must be recorded in the process data documentation: • time-dependent representativeness • geographical and technological representativeness of the processes • completeness of economic flows, through accountability for truncated processes • completeness of environmental interventions, through justification of estimated environmental interventions		
Reproducibility	A reference list of all sources, both primary and public sources and literature, must be compiled. This must contain at least: title, author/compiler and year.		
	For the purposes of reproducibility, a project file as referred to in section 2.8.4 of the Assessment Method must be produced.		
Consistency	Consistency must be justified by providing an explanation to the sources used and the adjustments made to ensure that the LCA is consistent.		
Final opinion	Complies with the requirements set out in the Assessment Method regarding inventory and data collection.		

Life cycle inventory: calculation procedures and allocation

LIFE CYCLE INVENTORY: CALCULATION PROCEDURES AND ALLOCATION (sections 2.6.4.2 & 2.6.4.3 of the Assessment Method; sections 6.4.2 & 6.4.3 of EN 15804+A2)			
Subject	**Criterion**	**Complies with criterion yes / no**	**Comments**
Calculation procedure check of module D	The calculation procedure for net output flows of secondary materials or fuel has been conducted in accordance with the Assessment Method. The steps of the calculation procedure are clearly defined and described step by step.		
Declaration check of module D	The module D credits have been declared correctly. Thereby, the following aspects are substantiated: • A mass balance that includes all individual input flows of secondary raw materials and all output flows of materials for recycling. • The quality and quantity must be determined of materials intended for recycling and reuse that are used as secondary materials. • Impacts are calculated for the processes required to make the material suitable for the same application as the primary raw material equivalent. • The quality factor for recycling and reuse is determined and substantiated in accordance with the Assessment Method. • Any waste streams from the recycling process are included. • Module D is calculated based on the sum of the net output of the individual flows of secondary raw materials. • For energy recovery, the standard values from the Assessment Method are used. The LHV used must also be substantiated.		
Final opinion calculation procedures	Complies with the requirements set out in the Assessment Method regarding calculation procedures and allocation.		

Life Cycle Impact Assessment

LIFE CYCLE IMPACT ASSESSMENT (section 2.6.5. of the Assessment Method; section 6.5 of EN 15804+A2)			
Subject	**Criterion**	**Complies with criterion yes / no**	**Comments**
Impact categories	The environmental profile of set 1 (EN 15804+A2/ A1:2013, characterisation factors derived from the 'NMD Assessment Method') consists of the eleven environmental impact indicators referred to in section 2.6.5 of the Assessment Method.		
	The environmental profile of set 2 (EN 15804+A2/ A2:2019) consists of the 19 core and additional environmental impact indicators referred to in section 2.6.5 of the Assessment Method.		
Current set of characterisation factors	Ensure that the most recent complete set of characterisation factors for environmental indicators and environmental impact indicators has been used. Verification via: www.milieudatabase.nl.		
Calculation of environmental profile	The values of the environmental impact categories are calculated by: 1) Allocating the environmental interventions from the inventory to the environmental impact indicators; 2) Multiplying the interventions per environmental impact indicator by the characterisation factors from the CML-NMD method 'NMD Assessment Method; 3) Adding up the values obtained per environmental impact indicator. The calculation steps must be included in the LCA report, or the LCA practitioner must declare that the calculation method as stated here has been followed. Emissions of substance groups. The emissions of substance groups are included in accordance with the Assessment Method.		

Non-characterised interventions	If not all environmental interventions have been characterised: • If the cause is a different name: correct the name so that the substance can still be characterised; • If the cause is a missing characterisation factor: characterisation should take place according to a chemically and physically similar substance. If this is not available, include it in a list of non-characterised interventions, with an indication of when an environmental impact can be expected.		
Aggregation of environmental profiles	When environmental profiles are aggregated, an 'average' environmental profile of a process is obtained. The average environmental profiles are calculated based on a production volume-weighted[3] average of the selected production locations. Production quantities may be estimated in terms of size.		
Final opinion	Complies with the requirements set out in the Assessment Method regarding the life cycle impact assessment.		

[3] *Or production volume if that is a common unit.*

LIFE CYCLE INTERPRETATION (section 2.6.6 of the Assessment Method)			
Subject	**Criterion**	**Complies with criterion yes / no**	**Comments**
Sensitivity analysis	Includes the influence of the most important choices and assumptions made and implemented in the LCA.		
	Includes the influence of geographical and technological distribution within a group of production locations. Use the highest and lowest values in the sensitivity analysis.		
	Includes the distribution resulting from the distribution in an average composition. Use the highest and lowest values in the sensitivity analysis.		
	Includes the distribution due to averaging when establishing a group average. Use the highest and lowest values in the sensitivity analysis.		
	Includes the distribution resulting from uncertainty in assumptions within the allocation for recycling. If method 1) or 2) from 2.6.4.3 of the Assessment Method has been applied, use method 3) in a sensitivity analysis. If method 3) has been applied, perform a sensitivity analysis for the variation in values.		
	The differences do not exceed 20% for any of the environmental impacts compared to the average value. If the sensitivity analysis shows that the differences exceed 20%, separate Environmental Product Declarations must be drawn up in order to remain within the 20% limit. A deviation greater than 20% may be accepted if all the conditions in paragraph 2.6.6.2 are met. It may also be decided to report the worst-case environmental profiles. This will allow dealing with variations in environmental impacts with very low values. The interpretation and sensitivity analyses requested in section 2.6.6.2 must be based on the environmental impacts from set 2, as well as on the environmental impacts from set 1. Within set 2, the contribution of the environmental impacts to climate change is only considered in the aggregate result 'Climate change – total'.		

Comparison with category 3 Environmental Product Declaration	The ECI results of the LCA were compared with comparable category 3 data for the following modules: A1-A3, A4-A5, B, C and D. The service life of the LCA was also compared with this category 3 data. The reasons for choosing the relevant category 3 Environmental Product Declaration have been substantiated. The differences are substantiated by completing the table in Appendix F (see also a completed example here). Differences smaller than 10% (per phase) do not require substantiation. If no representative category 3 data is available, this comparison is not required. It is for the reviewer to determine whether this is the case. If inaccuracies are found in category 3 data, this must be discussed with the reviewer and reported to Stichting NMD via info@milieudatabase.nl, stating the name and ID number of the category 3 Environmental Product Declaration.		
Final opinion	Complies with the requirements set out in the Assessment Method regarding the life cycle interpretation.		

Contents of the EPD (section 2.7 of the Assessment Method; chapter 7 of EN 15804+A2)

DECLARATION OF GENERAL INFORMATION, REQUIREMENTS FOR EXTERNAL PRESENTATION VIA AN ENVIRONMENTAL PRODUCT DECLARATION AND/OR BASIC PROFILE(S) (sections 2.7.1 to 2.7.5 of the Assessment Method; sections 7.1 to 7.5 of EN 15804+A2)			
Subject	**Criterion**	**Complies with criterion yes / no**	**Comments**
General (section 2.7.1)	The following must be declared in an EPD. a) The name and address of the manufacturer(s); b) the description of the use to which the data relate; c) identification of construction product by name (including any product code); d) a description of the product; e) the name of the programme operator; f) the date on which the declaration was issued and its period of validity of 5 years; g) information on which phases are not considered, if the declaration is not based on an LCA covering all life cycle phases; h) a statement that EPDs for construction products cannot be compared if they do not comply with the Assessment Method; i) in the event that an EPD describes an average of a number of products, a statement that this does not lead to a deviation of more than 20% from the average per environmental impact indicator. j) the site(s), manufacturer or group of manufacturers or those representing them, for whom the EPD is representative; l) information on where further information can be obtained. In addition, it also states the recognised reviewer who performed the independent review.		
Rules for declaring LCA information per module (sections 2.7.2 + 2.7.2.3)	The environmental impacts from set 2 and the environmental impacts from set 1 (see also 2.8.2.2), the use of raw materials (Table 3), waste categories (Table 4) and output flows (Table 5) have been used.		
Scenarios and additional technical information (section 2.7.3)	Complies with EN 15804+A2.		

Additional information use phase (section 2.7.4)	Information on the emission of hazardous substances to indoor air, soil and water during the use phase has been provided.		
Aggregation of information modules (section 2.7.5)	The input format for the Environmental Product Declaration and basic profile has been used.		
Final opinion	Complies with the requirements for 'Contents of the EPD'		

Project report

PROJECT REPORT (the project report is not part of public communication) (section 2.8 of the Assessment Method; chapter 8 of EN 15804+A2)			
Subject	**Criterion**	**Complies with criterion yes / no**	**Comments**
Project file	The project file contains at least the information specified in section 2.8 of the Assessment Method.		As an aid for the reviewer, Appendix B.1 of this Verification Protocol contains a checklist of topics that must be included in the project file.
LCA report	The LCA report must contain at least the information described in section 2.8 of the Assessment Method.		As an aid for the reviewer, Appendix B.2 of this Verification Protocol contains a checklist of topics that must be covered in the LCA report.
Scaling	Where applicable, the scaling on the Environmental Product Declaration complies with the provisions of section 2.8.2.2. of the Assessment Method.		
Final opinion	Complies with the report requirements set out in the Assessment Method.		

Verification and validity of the data for the Dutch Environmental Database

VERIFICATION BY A THIRD PARTY AND VALIDITY OF AN EPD (section 2.9 of the Assessment Method; chapter 9 of EN 15804+A2)			
Subject	**Criterion**	**Complies with criterion yes / no**	**Comments**
Verification agency report	Contains the findings of the reviewer.		
	Contains the final decision on whether or not this standard has been met.		
Quality declaration	The reviewer declares to be an expert and reviewer recognised by Stichting NMD		
Final opinion	Complies with the requirements set out in the Assessment Method regarding critical assessment by a third party.		

Informative Appendix B. Reporting requirements

This appendix contains the topics that must be included in the project file and the LCA report. The requirements are based on the requirements set out in the Assessment Method. The reviewer can use these lists as a check-list. It should be noted that the checklists below do not claim to be exhaustive.

B.1 Project file (based on the Assessment Method section 2.8.4)

A project file must be created for the LCA study of the construction product, which must include at least the following:

- the input and output environmental flows (environmental interventions) of the unit processes (process data) that have been used as input for the LCA calculations;
- the documentation (measurements, calculations, estimates, sources, correspondence, traceable references to origin, etc.) based on which the process data for the LCA have been compiled. This includes documentation on the recipe used to determine the composition of the data owner's construction product, energy consumption figures, emission data and waste production, as well as data substantiating completeness. In specific cases, reference may be made to, for instance, standards or quality requirements;
- documentation demonstrating that the materials, products or elements (reference flow) can fulfil the desired function(s) and performance;
- documentation demonstrating that the processes and scenarios selected in the process tree meet the requirements set out in the Assessment Method;
- documentation substantiating the selected service life of the construction product;
- the data used to conduct the sensitivity analyses and the internal verification of the collected data. The internal verification includes a mass balance per process step, a mass balance at company level and an energy balance at company level;
- documentation and substantiation of the percentages used for calculations in the end-of-life processing scenario;
- documentation and substantiation of the percentages and figures (number of cycles, prices, etc.) used for calculations in the allocation procedure;
- in the case of an Environmental Product Declaration based on a weighted average for more than one production site or data owner:
  - the unweighted values;
  - documentation from which the weighting factors (production quantities) used have been derived; documentation substantiating any qualitative information in the Environmental Product Declaration;
- information demonstrating that all suppliers and any relevant purchasers have been approached for the LCA study. If this has not been done, information must show that data has been used that can be considered equivalent to data from suppliers (e.g. when suppliers have jointly published data for use in LCAs);
- procedures according to which the data was collected (questionnaires, instructions, information materials confidentiality agreements, etc.);
- the characterisation factors used and, insofar as they were used for the calculation of environmental impact indicators, normalisation factors and weighting factors;
- the criteria and substantiation used for determining system boundaries and selecting input and output flows;
- documentation substantiating other choices, scenarios and assumptions.

B.2 LCA report

The LCA study of a construction product must be documented in an LCA report that is available for external review. This LCA report contains at least (where applicable):

- the name(s) of the issuer(s) of the Environmental Product Declaration;
- the name(s) of the LCA practitioner;
- the date of the LCA report;
- a statement that the LCA has been carried out in accordance with the requirements of the Environmental Performance Assessment Method for Construction Works;
- a description and substantiation of the geographical and technological representativeness of the relevant production location(s) of the issuer(s) of the Environmental Product Declaration and the influence of any geographical and technological distribution on the final results;
- the time period during which the LCA was conducted;
- the purpose for which the intended Environmental Product Declaration is being drawn up;
- the target group for which the intended Environmental Product Declaration is being drawn up;
- the functional unit;
- the construction product (reference flow) that is the subject of the LCA and for which an Environmental Product Declaration is being drawn up. The description must be such that it is clear which product(s) from the product range are concerned;
- a bill of materials (the composition does not need to be specified by name, but the structure of the construction product does);
- any additional functions not included in the functional unit and relating to the application of the construction product in construction works;
- a description of how the composition of all materials, products or elements in the bill of materials has been determined (e.g. via definitions in standards);
- a description of the process tree and the demarcation of the process tree, including substantiation;
- the assumed service life of the construction product, including substantiation and/or the number of times replacements have been included in the LCA calculations;
- a description and substantiation of the scenarios used;
- information demonstrating that the system boundaries set out in the Assessment Method have been followed, any deviations from this and the reason therefore, and how this affects the final results;
- the data categories;
- the procedures for data collection (questionnaires, checklists, etc.);
- the calculation procedures (e.g. for estimates);
- which data originate from primary sources and which data from secondary sources;
- a substantiation of the choice made for generic data (NMD, Ecoinvent, other data);
- a source reference for literature information, including at least the title, author and year of publication;
- if standard values have not been used: a description of the conversion efficiency of energy sources, the method used for the extraction and transport of fuels, the combustion values of energy carriers, the fuel mix for electricity production and the distribution of the energy flow;
- a description of how the degree of completeness per data category has been determined and how deviations have been handled;
- a list of process emissions that are part of the environmental permit;
- a list of contacted suppliers;
- the validation method;
- the results of mass and energy balances, corrections and explanations for deviations;
- a qualitative description of the data quality;

- the allocation method used;
- the specification of the processes to which allocation has been applied;
- the percentages and other data used in the allocation calculations;
- information demonstrating that the allocation requirements of this standard have been met;
- the environmental profiles and other environmental impact indicators;
- the method used to calculate a weighted average;
- the characterisation factors used and, insofar as they were used for the calculation of environmental indicators, normalisation factors and weighting factors (not just a reference, but the factors themselves);
- the non-characterised substances;
- the results of the sensitivity analyses, including the analyses prescribed in this standard and other choices and assumptions that, according to the LCA practitioner, have an impact on (the variations in) the result (if available).

Appendix C. Complaints procedure, 'Second opinion' process and 'Data recovery' process

Complaints procedure

In case of doubt about the accuracy of the data, please contact Stichting NMD. It is the task of Stichting NMD to collect the necessary information and assess whether these doubts are justified. If there is uncertainty about the accuracy of data, Stichting NMD will compile a case file. In this case, the LCA reviewer is the first point of contact, but the LCA practitioner and data owner will also be contacted. The doubts about the data will be presented to these parties and they will be asked to respond in the short term (within two weeks) in order to address the doubts. After this step, Stichting NMD will determine whether there are still doubts about the accuracy of the data. This prevents the need for second opinions for reasons of competition.

If there are still doubts about the accuracy of the data after this contact, for instance, due to a deviation from the standard and/or comparisons with reference products, Stichting NMD will always have the right, in accordance with section 3.4 of the NMD Verification Protocol, to request a second opinion from an independent third party after verification and/or publication of category 1 and 2 data. This will initiate the 'Second opinion' process, as described below.

If the second opinion or other contact with the LCA reviewer, LCA practitioner and/or data owner reveals that the data contains inaccuracies or clearly conflicts with applicable standards, Stichting NMD will request that the data be amended within a specific period of time. To this end, the 'Data recovery' process described below will be followed.

Stichting NMD also strives to conduct random checks each year on a limited number of Environmental Product Declarations. These Environmental Product Declarations will be selected based on complaints and/or internal analyses. This will also take place in accordance with the 'Second opinion' process.

'Second Opinion' process

If a second opinion is conducted, the following steps will be taken:

- Stichting NMD informs the data owner, LCA practitioner and LCA reviewer by email that their Environmental Product Declaration(s) will be subject to a second opinion. This will cover the following topics:
    - The reason to have a second opinion conducted;
    - The ID number and product name of Environmental Product Declaration(s) to which it relates (if available);
    - Planning and progress of the process;
    - Possible consequences;
- Stichting NMD engages an independent recognised reviewer (hereinafter referred to as the 'second reviewer') and provides the overall context for the second opinion.
    - The second reviewer has no interest in the outcome of the second opinion. This party has knowledge of the product or related product group in question and is listed by the NMD as a recognised reviewer to guarantee this knowledge.
    - As referred to in section 3.4, the costs of engaging a second reviewer to conduct a second opinion are borne by Stichting NMD. Any costs incurred by the other parties involved will not be reimbursed.

- The data owner, LCA practitioner and/or original LCA reviewer submit the complete verification file to Stichting NMD, which then shares it with the second reviewer.
    - If necessary, the second reviewer and Stichting NMD will sign a Non-Disclosure Agreement (NDA).
    - The complete verification file must be provided to the second reviewer within three weeks of notification of the start of the second opinion process. If this period is exceeded, Stichting NMD may decide to (temporarily) deactivate the Environmental Product Declaration(s).
- The second reviewer reviews the entire file based on the Assessment Method, the Verification Protocol and PCRs that were applicable at the time the LCA was drawn up, if necessary, with a focus on the points of concern that gave rise to doubts. The verification consists of two rounds:
    - Round 1 – The second reviewer reviews the entire file and shares their findings with the data owner, LCA practitioner and/or original LCA reviewer.
      The data owner, LCA practitioner and/or original LCA reviewer must respond to the initial findings of the second reviewer within two weeks. If this period is exceeded, Stichting NMD may decide to (temporarily) deactivate the Environmental Product Declaration(s). If necessary, consultation between the second reviewer, the data owner, the LCA practitioner and/or the original LCA reviewer may also take place. If so desired, Stichting NMD will also be present.
    - Round 2 – The second reviewer considers the response of the data owner, LCA practitioner and/or original LCA reviewer and forms a final opinion.
- The second reviewer advises Stichting NMD by summarising the findings of the verification in a concise report. In this report, it is indicated for each component whether these findings have a significant impact on the overall ECI_4 of the Environmental Product Declaration.
    - Within two weeks of the written response by the data owner, LCA practitioner and/or original LCA reviewer, the second reviewer delivers the report to Stichting NMD.
- Stichting NMD assesses the accuracy of the data based on its findings.
    - If there are still doubts after the second opinion, Stichting NMD is free to engage other experts and/or the TIC to advise on taking an appropriate decision.
- Stichting NMD will inform the data owner, LCA practitioner and original LCA reviewer of the conclusion and any consequences:
    - If data recovery is required, the 'Data recovery' process described below will be followed. Stichting NMD determines whether the original LCA reviewer may approve the changes. The data recovery assessment is not part of this procedure and will not be reimbursed by Stichting NMD.
    - If Stichting NMD deems this necessary, it may immediately deactivate the relevant Environmental Product Declaration(s). This decision will be communicated to the data owner, stating reasons.
- If necessary, an evaluation will take place between the parties involved and Stichting NMD. No objection can be lodged against the decision of Stichting NMD.

Only the management of Stichting NMD can grant postponement of the aforementioned deadlines.

[4] *This applies to set A1 as well as set A2.*

'Data recovery' process

Once it has been determined that the data in an Environmental Product Declaration needs to be corrected, the following steps will be taken:

- Stichting NMD will inform the data owner, LCA practitioner and LCA reviewer about the process by email. The email will cover the following topics:
    - A (brief) description of the correction that needs to be made;
    - The ID number and product name of Environmental Product Declaration to which it relates (if available);
    - The action required and by whom (data owner, LCA practitioner and/or LCA reviewer);
    - Deadline by which the data must be restored;
    - The consequences if data recovery has not taken place within the specified period.
- Stichting NMD determines the deadline for data recovery based on the impact and significance of the change:
    - Correction within two weeks if the change is expected to have a significant impact on the overall ECI and offers a competitive advantage;
    - Correction within four weeks if the change is expected to have some impact on the overall ECI[5] and offers a competitive advantage;
    - Correction within six weeks if the change affects only the text or if the change offers no competitive advantage;
- Stichting NMD can immediately deactivate the Environmental Product Declarations if the impact on ECI[5] is almost certain to give a significant competitive advantage.
- Failure to update the data in a timely manner will result in deactivation of the entire Environmental Product Declaration. An Environmental Product Declaration can only be reactivated once the changes have been implemented and it has been re-assessed.

Only the management of Stichting NMD can grant postponement of the aforementioned deadlines.

[5] *This applies to set A1 as well as set A2.*

Appendix D. 'Determining equivalence and verifying data for the NMD' procedure

D.1 Status of the procedure

This procedure, 'Determining equivalence and verifying data for NMD', hereinafter referred to as the 'Equivalence' procedure, serves as an appendix to the 'NMD Verification Protocol for the inclusion of data in the Dutch Environmental Database'. The Dutch Environmental Database Foundation (Stichting NMD) is therefore the responsible party. The procedure was drawn up by the NMD Technical Committee (TIC) and adopted by the Dutch Policy Committee on environmental performance (BMNL).

Proposals for improving the procedure can be submitted to NMD at any time. If the importance and urgency of the matter so require, the Technical Committee (TIC) will be asked to draft a text proposal. A change to the procedure may also be published in the form of an amendment sheet or supplement.

This is the first version, version 1.0, of the procedure. Any interim updates to the procedure may be implemented without changing the version number of the NMD Verification Protocol itself.

D.2 Delimitation of the 'Equivalence' procedure'

Environmental Performance of Construction Works
The aim is to reduce the material-related environmental impact of construction works. This procedure refers to improving environmental performance.
To this end, a system has been established that enables quantifying this environmental impact. This system, managed by Stichting NMD, consists of an Assessment Method, including calculation rules and an Environmental Database. The system contributes to raising awareness in the construction industry of the environmental performance of construction works and enables this to be managed. This applies to both private and public law environments.
Since 1 January 2012, Article 5.9 of the 2012 Building Decree stipulates that quantification must be carried out in accordance with the Environmental Performance Assessment Method for Construction Works. However, the Equivalence Procedure also applies to the private sphere.

When it comes to equivalence, a number of levels can be distinguished:
1. The unambiguous determination of the environmental performance of construction works
   This is an equivalent alternative to the total Assessment Method.
2. Ensuring the quality of data for the Dutch Environmental Database (NMD)
   This is an equivalent alternative for determining and reviewing data, aimed at obtaining the status of reviewed information (category 1 or 2).

So far, there has been a particular need for a procedure focused on level 2. There are product rating systems based on different processes. It is also expected that EPDs will be offered from abroad that do not strictly comply with Dutch standards. The procedure therefore focuses on this second level.

Alternative route
The Assessment Method and the standard Verification Protocol are aimed at a single LCA, focusing on one product or a number of products. The Equivalence Procedure allows for other formats.
Examples:

- Foreign EPD
- Tool for generating LCA data

In summary
The Equivalence Procedure focuses on an equivalent route for determining and reviewing data as category 1 or 2 in the NMD. The route can focus on a single LCA, but also on the generation and delivery via a process or tool. These data can be applied in both private and public law environments.

D.3 Equivalence assessment

Basic idea
The requirements laid down in the Assessment Method and the Verification Protocol must guarantee that the quality of the data in the NMD is assured. The definition of quality is a direct derivative of the objectives pursued by the requirements. An alternative route for determining and/or reviewing the data is only equivalent if the objectives are achieved to at least the same extent. An alternative route will only be approved if the applicant has sufficiently demonstrated that this is the case.

The above is the basic requirement for the alternative route. The decision not to adopt a detailed set of requirements or criteria was deliberate. The reason therefore is to provide sufficient scope to arrive at equivalent solutions within the framework. The requirements set out in the Assessment Method and the Verification Protocol will serve as guidelines for the assessment of the alternative route. The applicant must indicate where and why deviations are made and demonstrate that this is not at the expense of the objectives described below.

In addition to the basic requirement, the involvement of an external reviewer is required in all cases. An external review will always have to be part of an alternative route.

Assessment Method objectives
The main objectives are:

1. Environmental performance of construction works
   The underlying objective is to reduce the material-related environmental impact of construction works.
   This relates to the performance of the entire structure, not the individual products.
   This means, among other things, that it must be possible to add up the products.
2. Level playing field
   The environmental performance of products in a construction work can influence the market positions of the supplying building materials industry. The system must be such that it guarantees an environment of fair competition.

The resulting sub-objectives are:

1. Consistency

   The fact that the data can be added up places even higher demands on consistency than an EPD for individual products. It is also important that products are assessed according to exactly the same requirements to ensure a level playing field. This means that:

   a) Entire life cycle

      This concerns the environmental impact throughout the entire life cycle of a building or structure. Determining this requires product-level information covering the entire life cycle. It must also be possible to assemble a complete building or structure using the products in the database. In other words, the products must be able to deliver the functionality as specified in the element descriptions. If parts are missing, this can be resolved, for example, by using a worst-case approach or by supplementing with defaults found in the NMD.

   b) Calculation results

      Using different calculation rules is only permitted if they result in the same environmental performance per unit of product as the use of the calculation rules linked to the Assessment Method. This can be demonstrated, for example, by calculating a case study. Another option is to demonstrate that the most relevant components have been determined in accordance with the method.

   c) Environmental impacts

      The relevant inputs and outputs of all processes during the life cycle. It must be guaranteed that at least the processes and emissions are included as would have been the case had the Assessment Method been used.

      In order to be addable, the environmental performance must be expressed in terms of the environmental impacts specified in the Assessment Method. If the information for some impacts is missing, it will need to be added. For instance, based on a worst-case approach.

      Environmental data (EPDs) in accordance with EN 15804+A2, without the deviating environmental impact categories from the Assessment Method, are therefore not eligible for equivalence.

   d) Representativeness

      The construction work is located in the Netherlands. The environmental product information must be representative of the relevant product on the Dutch market. For instance, the actual transport distances must be used as a basis for production abroad.

2. Reliability

   It must be prevented that the alternative route is used to gain a competitive advantage.

   This imposes strict requirements on reliability, and therefore on:

   a) Transparency

      This requires an adequate level of reporting. This does not always have to be in the form of text or tables; insightful tools, for example, can also be used.

   b) Reproducibility

      The results must be reproducible. In the event of deviations from the calculation rules, for example, by submitting a spreadsheet with the calculation and results.

   c) Dealing with uncertainties

      Any uncertainties or missing information must be clearly indicated. At least a sensitivity analysis is required. Unless it has been clearly demonstrated that a worst-case approach has been applied.

   d) Accuracy, completeness

      The Assessment Method sets extensive requirements for primary data collection from suppliers and the verification thereof (balance sheets, requirement to consider all purchased materials, etc.). Is it guaranteed that no incomplete or incorrect data has been obtained from the data owner? For instance: is maintenance of a machine that generates substantial waste included or not? Are all emissions (even if they are not measured) included? The requirements listed under 'Data validation' (mass and energy balance) in Appendix A Assessment Tables of the Verification Protocol apply.

D.4 Equivalence Procedure

Stichting Dutch Environmental Database Procedure

The environmental performance calculation is included in the Building Decree. This makes the Ministry of Housing, Spatial Planning and the Environment (VRO) responsible for the procedure aimed at ensuring compliance with the principle of equality. In relation to the Building Decree, the Equivalence Committee has been established to this end. To date, this committee has limited itself to fire safety; they have not yet addressed the environmental performance calculation (level 1, as defined in Chapter 1). Therefore, no procedure has been developed yet for level 1. Requests have been, however, submitted at level 2, the data in the NMD. Given the relationship with the NMD, this has been transferred to Stichting NMD. The Equivalence Procedure described in this document has been drawn up for this purpose. Level 2 is detailed in the diagram below.

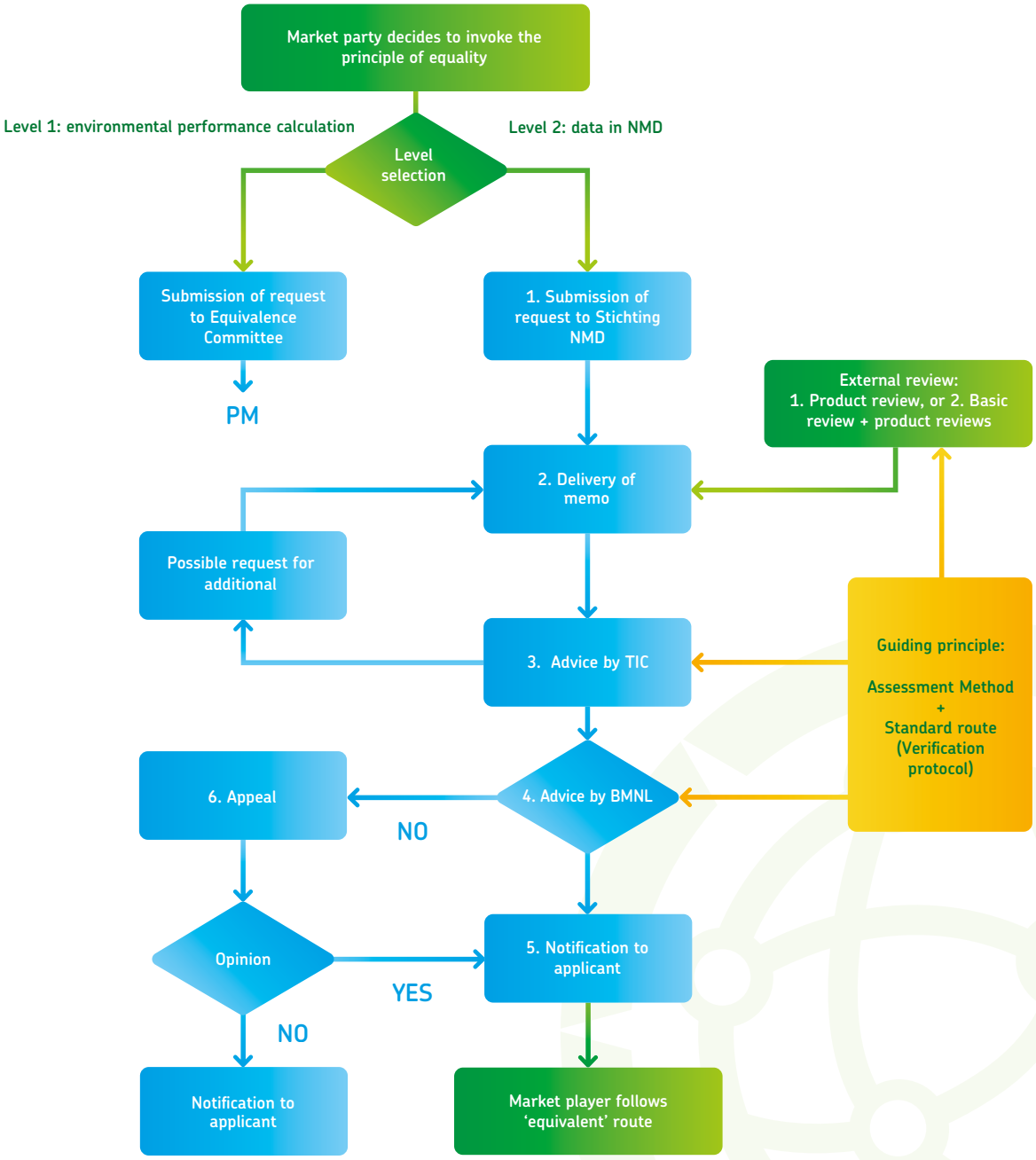

Figure: Schematic representation of the Equivalence Procedure

Routing 'Equivalence Verification Protocol NMD':

1. The data owner informs Stichting NMD of its intention to invoke the equivalence clause (the 'Equivalence Verification Protocol NMD' procedure can be downloaded from the website of Stichting NMD).
2. The data owner submits a memo to Stichting NMD, indicating how they have complied with the objectives described in the procedure. The Assessment Method and the standard route of the Verification Protocol are guiding principles in this regard. An external review is always part of the memo to be submitted. This external review may consist of a combination of a basic review and a product review. The basic review checks a specific system or working method for equivalence and indicates what still needs to be reviewed for each individual product. After this, the product review can be conducted in a very short time, depending in part on the basic review.
3. Stichting NMD submits this memo for review to the Technical Committee (TIC) operating under the auspices of Stichting NMD. The TIC assesses whether the correct topics have been addressed and argued by the reviewer. If necessary, the TIC will request missing information from the data owner. The TIC issues a binding recommendation, which is submitted for approval to the BMNL, which also operates under the auspices of Stichting NMD. Any TIC member involved in the application may not participate in the consultation to determine equivalence.
4. The MBG (Committee for Environmental impact of building and civil engineering works) may or may not adopt the advice and communicates its reasoned decision to Stichting NMD.
5. Stichting NMD will communicate this decision to the data owner within 3 weeks of delivery of the memo.

If the decision is positive, the data owner will continue to follow the same process as when following the standard route of the Verification Protocol. This includes a verification by a recognised external party.

File

When Stichting NMD receives a request, it immediately opens a file. All relevant correspondence, as well as the information provided by the applicant, including the results of the external review, are recorded in this file. The TIC recommendation and the decisions of the MBG and any appeals board are also included in the file.

Costs

The procedure is in the interest of the data owner. It is therefore logical that they contribute to the costs. This includes administrative costs and the review by the TIC.

Appendix E. Data quality system for the assessment of processes

"This appendix will be used until the ILCD documentation format for data quality becomes available."

Changes were made based on the MRPI data quality assessment system developed in 2003, to allow assessing agreed processes in the database. The data quality of process data is now determined based on a data quality system for three categories:

- Unit processes (section 1).
- Horizontal aggregated processes (section 2).
- Vertical aggregated processes (section 3).

It is possible for a process to be classified into multiple categories. Therefore, it has been agreed to always follow the schedule below:

Is it a vertical aggregated process? If the answer is yes, complete assessment table 3; if not:
Is it a horizontal aggregated process? If the answer is yes, complete assessment table 2; if not:
Complete assessment table 1 for unit processes.

The assessor should indicate the main considerations for the quality assessment alongside the score.
The three corresponding empty data quality assessment tables are included in Appendix D.4.

E.1 Unit processes

UNIT PROCESSES						
To be assessed		The totality of inputs and outputs (economic flows, excluding the product, and environmental interventions) of a physical individual process, or a set of processes within an individual production location; or the characterisation of a physical individual process in relation to the LCA in which it is used.				
Use for		Data provided by individual companies; or assessment of process data from individual companies when used in an LCA.				
Indicator	Pedigree score	**1**	**2**	**3**	**4**	**5**
COMPLETENESS						
Completeness of environmental interventions		All environmental interventions from the LCA-2 list* have a value	All environmental interventions that can reasonably be expected have a value	Interventions are missing that could reasonably be expected, but which are expected to be less relevant to the environmental profile of the process	Interventions are missing that could reasonably be expected, which are expected to be relevant to the environmental profile of the process, or whose relevance cannot be assessed in advance	
Example		The value can also be zero. The value may be set to zero if justified.				Missing interventions unknown
Completeness of economic flows (flows = raw materials, energy, emissions, waste.)		All flows are qualified and quantified	All flows are qualified. The flows that are expected to be relevant to the environmental profile of the process are quantified	All flows are qualified. The main material and energy flows are quantified	The economic flows for which data were available are quantified	The completeness of the economic flows is unclear / unknown
Example		E.g. Each additive is listed and the quantity used is specified.	E.g. Additives that are similar in production and composition to the main material are not quantified.E.g. water emissions are not quantified			

Mass balance at process level	Balanced >95%	Balanced 90-95%	Balanced 80-90%	Balanced 70-80%	Balanced <70% or unknown
Example	Mass balance = total mass of input raw materials compared to the total of products + emissions + waste				
Mass balance at company level	Balanced >95%	Balanced 90-95%	Balanced 80-90%	Balanced 70-80%	Balanced <70% or unknown
Example	Mass balance = total quantity of raw materials used compared to total production + waste + emissions (purchasing/sales, adjusted for inventories)				
Energy balance at company level	Balanced >95%	Balanced 90-95%	Balanced 80-90%	Balanced 70-80%	Balanced <70% or unknown
Example	Total energy consumption of individual processes compared to the energy bill				
REPRESENTATIVENESS					
Time-dependent representativeness of the process relative to year of assessment	<2 year difference; or (select the most appropriate option): The process is common for the period studied in the LCA	2-5 year difference; or (select the most appropriate option): The process has changed at detail level. This is estimated to lead to changes of less than 5% in the material flows	5-10 year difference; or (select the most appropriate option): Part of the process has changed. This is estimated to lead to changes of between 5-20% in material flows	10-15 year difference; Or (select the most appropriate option): The process has largely changed. This may lead to changes of >20% in some of the material flows	>15 year difference or unknown; or (select the most appropriate option): The process is no longer used in the period under review Or: The process has largely changed. This may lead to changes of >20% for all material flows
Example	Data are from 2018 and are provided in 2020 as valid for the period 2018 – 2020	Data are from 2016 and are provided in 2020			
Geographical representativeness	The location of the process is directly related to the desired area.	The location of the process covers a larger area, within which the desired area lies	The production conditions at the location of the process are equivalent to those in the desired area	The production conditions at the location of the process are partly equivalent	The production conditions at the location(s) of the process are completely different/ the geographical representativeness is unknown
Example	Data from a Dutch manufacturer, intended to be provided as Dutch data. Data from a German producer of the lines that produce specifically for the Netherlands	Data from a German producer that supplies both the German and Dutch markets, with NL being the preferred area			

Technological representativeness	Data from the company, process and product of the study.	Data from the process / product of the study, but from another company	Data from the process / product of the study, but a different technology	Data from similar processes / products, but the same technology	Data from similar processes and materials, but a different technology
Example	Specific company				
CONSISTENCY AND REPRODUCIBILITY					
Uniformity and consistency	not applicable, because uniformity and consistency between processes in the LCA are by definition not assessed for unit processes. It is assessed for aggregated processes				
Reproducibility by third-parties	fully reproducible	Process description fully and quantitatively reproducible with the environmental interventions used	Process description fully and quantitatively reproducible	Process description qualitatively and broadly reproducible	not reproducible at all

E.2 Horizontal aggregated processes

HORIZONTAL AGGREGATED PROCESSES						
To be assessed	The totality of inputs and outputs (economic flows, excluding the product, and environmental interventions) of a group process; or the characterisation of a group process in relation to the LCA in which it is used.					
Use for	A process presented as the 'average' of a similar process from different production locations; or the verification of process data from a group when used in an LCA.					
Indicator Pedigree score	**1**	**2**	**3**	**4**	**5**	
COMPLETENESS						
Completeness of environmental interventions	All environmental interventions from the LCA-2 list* have a value	All environmental interventions that can reasonably be expected have a value	Interventions are missing that could reasonably be expected, but which are expected to be less relevant to the environmental profile of the process	Interventions are missing that could reasonably be expected, which are expected to be relevant to the environmental profile of the process, or whose relevance cannot be assessed in advance	Missing interventions unknown	
Example	The value can also be zero. The value may be set to zero if justified.					
Completeness of economic flows	All flows are qualified and quantified	All flows are qualified. The flows that are expected to be relevant to the environmental profile of the process are quantified	All flows are qualified. The main material and energy flows are quantified	The economic flows for which data were available are quantified	The completeness of the economic flows is unclear / unknown	
Example	Flows = raw materials, energy, emissions, waste. E.g. Each additive is listed and the quantity used is specified.	E.g. Additives that are similar in production and composition to the main material are not quantified. E.g. water emissions are not quantified.				
Mass balance at process level	Balanced >95%	Balanced 90-95%	Balanced 80-90%	Balanced 70-80%	Balanced <70% or unknown	
Example	Mass balance = total mass of input raw materials compared to the total of products + emissions + waste					

Mass balance at company level	Of the companies that together account for more than 80% of production volume, the mass balance per company is balanced for >95%	Of the companies that together account for more than 80% of production volume, the mass balance per company is balanced for >90%	Of the companies that together account for more than 80% of production volume, the mass balance per company is expected to be balanced for >80%	Of the companies that together account for more than 80% of production volume, the mass balance per company is balanced for >70%	Of the companies that together account for more than 80% of production volume, the mass balance per company is balanced for <70% or unknown
Example	Mass balance = total quantity of raw materials used compared to total production + waste + emissions (purchasing/sales, adjusted for inventories)				
Energy balance at company level	Of the companies that together account for more than 80% of production volume, the energy balance per company is balanced for >95%	Of the companies that together account for more than 80% of production volume, the energy balance per company is balanced for >90%	Of the companies that together account for more than 80% of production volume, the energy balance per company is expected to be balanced for >80%	Of the companies that together account for more than 80% of production volume, the energy balance per company is expected to be balanced for >70%	Of the companies that together account for more than 80% of production volume, the energy balance per company is balanced for <70% or unknown
Example	Total energy consumption of individual processes compared to the energy bill				
REPRESENTATIVENESS					
Time-dependent representativeness of the process relative to year of assessment	<2 year difference; or (select the most appropriate option): All underlying processes are common for the period studied in the LCA	2-5 year difference; or (select the most appropriate option): One of the underlying processes has changed at detail level. This is estimated to lead to changes of less than 5% in the average material flows	5-10 year difference; or (select the most appropriate option): Part of the underlying processes has changed. This is estimated to lead to changes of between 5-20% in the average material flows	10-15 year difference; Or (select the most appropriate option): The underlying processes have largely changed. This may lead to changes of >20% in some of the material flows	>15 year difference or unknown; or (select the most appropriate option): The process is no longer used in the period under review Or: The underlying processes have largely changed. This may lead to changes of >20% for all material flows
Example	Data are from 1999 and are provided in 2000 as valid for the period 1999 – 2001	Data are from 1999 and are provided in 2003			

Completeness of number of locations / geographical representativeness	All companies in the group have provided data	Representative cross-section of the group in terms of geographical differences in flows (e.g. transport distance, temperature dependence, regulations). Differences are evenly represented in the average.	Cross-section from the group representing geographical differences.	Random cross-section from the group	Geographical differences not taken into account
Geographical representativeness	The area covered by the group is directly related to the desired area.	The area covered by the group covers a larger area, within which the desired area lies	The production conditions in the area covered by the group are equivalent to those in the desired area	The production conditions in the area covered by the group are partly equivalent	The production conditions in the area covered by the group are completely different / the geographical representativeness is unknown
Example		Western European data, which is used in the Netherlands	Data of products that are produced in the Netherlands, for which German data are used.		
Completeness of number of locations / technological representativeness	All companies in the group have provided data	Representative cross-section of the group in terms of technological differences. Differences are evenly represented in the average.	Cross-section from the group representing technological differences	Random cross-section from the group	Technological differences not taken into account
Technological representativeness	Data from the companies, process and product of the study.	Data from the process/product of the study, but from another company than those represented by the group	Data from the process/product of the study, but a different technology	Data from similar processes / products, but the same technology	Data from similar processes and materials, but a different technology
Example		German gravel for which Dutch data are used	For a PVC product, data from another PVC manufacturing process is used.		

CONSISTENCY AND REPRODUCIBILITY					
Uniformity and consistency	The data that together determine >80% of the environmental impacts were collected in a similar manner and with the same accuracy.	The data that together determine >80% of the environmental impacts were determined in a similar manner.	The data that together determine >80% of the environmental impacts were collected using the same approach and are based on the best available and validated data.	The data that together determine >80% of the environmental impacts are based on available data and were collected following the same procedure.	The data that together determine >80% of the environmental impacts are based on different sources with varying degrees of accuracy, without validation of mutual deviations.
Uniformity and consistency	The data that together determine >80% of the environmental impacts were collected in a similar manner and with the same accuracy	The data that together determine >80% of the environmental impacts were determined in a similar manner	The data that together determine >80% of the environmental impacts were collected using the same approach and are based on the best available and validated data.	The data that together determine >80% of the environmental impacts are based on available data and were collected following the same procedure	The data that together determine >80% of the environmental impacts are based on different sources with varying degrees of accuracy, without validation of mutual deviations.
Example	Energy and emission data according to the same registration systems.	Energy and emission data based on measurements	A combination of measured and estimated values with explainable mutual deviations, collected following the same procedure	Companies c ompleted the same questionnaire. Mutual differences not investigated further	A combination of literature data from different companies from different years, containing different data
Reproducibility by third-parties	fully reproducible	Process description fully and quantitatively reproducible with the environmental interventions used for the processes that determine >80% of the environmental impacts.	Process description fully and quantitatively reproducible	Process description qualitatively and broadly reproducible	not reproducible at all

E.3 Vertical aggregated processes

VERTICAL AGGREGATED PROCESSES					
To be assessed	The totality of inputs and outputs (economic flows, excluding the product, and environmental interventions) of a vertical aggregated process (LCI); and the consistency and reproducibility of a vertical aggregated process.				
Use for	Assessment of a vertical aggregated process				
Indicator Pedigree score	**1**	**2**	**3**	**4**	**5**
COMPLETENESS					
Completeness of environmental interventions	All environmental interventions from the LCA-2 list* have a value	All environmental interventions that can reasonably be expected have a value	Interventions are missing that could reasonably be expected, but which are expected to be less relevant to the environmental profile of the process	Interventions are missing that could reasonably be expected, which are expected to be relevant to the environmental profile of the process or whose relevance cannot be assessed in advance	Missing interventions unknown
Example	The value can also be zero. The value may be set to zero if justified.				
Completeness of economic flows	Transparent, environmental impact-related cut-off criteria, used consistently	Transparent, non environmental impact-related cut-off criteria, used consistently	Cut-off criteria not used consequently	Cut-off criteria are unclear, but the processes included are specified	Unclear which processes are and which are not included
Example	ALL PROCESSES THAT CONTRIBUTE LESS THAN 15% TO THE TOTAL ENVIRONMENTAL IMPACT OF THE AGGREGATED PROCESS HAVE BEEN OMITTED				
Mass balance at process level	Balanced >95%	Balanced 90-95%	Balanced 80-90%	Balanced 70-80%	Balanced <70% or unknown
Example	Mass balance = total mass of input raw materials compared to the total of products + emissions + waste				
Mass balance at company level	Is currently not being determined for vertical aggregated processes (currently impracticable to determine for the underlying processes, as this is generally not documented and is not a documentation requirement in ISO 14048)				
Energy balance at company level	Is currently not being determined for vertical aggregated processes (currently impracticable to determine for the underlying processes, as this is generally not documented and is not a documentation requirement in ISO 14048)				

REPRESENTATIVENESS					
Time-dependent representativeness of the process chain relative to year of assessment	<2 year difference; or (select the most appropriate option):	2-5 year difference; or (select the most appropriate option):	5-10 year difference; or (select the most appropriate option):	10-15 year difference; Or (select the most appropriate option):	>15 year difference or unknown;or (select the most appropriate option):
	The processes that together determine >80% of the environmental impacts are common for the period studied in the LCA	Of the processes that together determine >80% of the environmental impacts, a number have changed in detail. This is estimated to lead to changes of less than 5% in the average material flows	Of the processes that together determine >80% of the environmental impacts, a number have changed. This is estimated to lead to changes of between 5-20% in the average material flows	Of the processes that together determine >80% of the environmental impacts, a number have largely changed. This may lead to changes of >20% in some of the material flows	Of the processes that together determine >80% of the environmental impacts, a number are no longer being used or have changed to such an extent that this could lead to changes of >20% for all material flows
Example	LCA in 2020 with data from 2018		An LCA in 2020 uses data from 2002 as its main processes		
Geographical representativeness	The geographical area of the processes that determine >80% of the environmental impacts is directly related to the area the aggregated process represents	The geographical area of the processes that determine >80% of the environmental impacts covers a larger area, within which lies the area that the aggregated process represents	The production conditions in the geographical area of the processes that determine >80% of the environmental impacts are equivalent to those in the area that the aggregated process represents	The production conditions in the geographical area of the processes that determine >80% of the environmental impacts are partly equivalent	The production conditions in the geographical area of the processes that determine >80% of the environmental impacts are completely different/ the geographical representativeness is unknown
Example	The Netherlands for a Dutch LCI or all Western European processes for an LCI presented as Western European	Western European processes for a Dutch LCI			

Technological representativeness	For the processes that determine >80% of the environmental impacts, the data originate from actual companies, processes and products	For the processes that determine >80% of the environmental impacts, the data originate from a comparable technology	For the processes that determine >80% of the environmental impacts, the data originate from the relevant product / process, but a different technology	For the processes that determine >80% of the environmental impacts, the data originate from a comparable product / process, but the same technology	For the processes that determine >80% of the environmental impacts, the data originate from a comparable product / process, but a different technology
Example		German gravel for which Dutch data are used	For a PVC product, data from another PVC manufacturing process is used		
CONSISTENCY AND REPRODUCIBILITY					
Uniformity and consistency	The processes that together determine >80% of the environmental impacts, have approximately the same quality level and are applied consistently	The processes that together determine >80% of the environmental impacts originate from the same database or have been drawn up by the same organisation and are applied consistently	The processes that together determine >80% of the environmental impacts are based on the best available/ common data and are made consistent where necessary	The processes that together determine >80% of the environmental impacts are based on common data	The processes that together determine >80% of the environmental impacts are based on different sources with varying degrees of accuracy and/or are not applied consistently
Example	The main processes are based on primary, verified data		The main processes are adapted to make sure they all use the same source of energy data	LCIs published in literature with own energy data that cannot be adjusted	
Reproducibility by third-parties	fully reproducible	process tree fully and quantitatively reproducible with the environmental interventions used for the processes that determine >80% of the environmental impacts	process tree fully and quantitatively reproducible	process tree qualitatively and broadly reproducible	not reproducible at all

E.4 Empty scoring tables for data quality assessment

1. Unit processes

Product	Product X
Additional information	This concerns ... LCA was drawn up by agency x in x
Assessor	Jan Jansen MilieuBureau X
General (subjective) assessment by assessor of usefulness in library (A = good; B = reasonable; C = poor) and explanation	B e.g. Although not all quality criteria can be assessed with a high quality score (because the assessor was not the one who elaborated the LCA), it can be stated with sufficient certainty that the process is of sufficient quality for use. However, ... may still require some attention.
Date of review	22-03-2020
UNIT PROCESSES	
COMPLETENESS	
Completeness of environmental interventions	
Completeness of economic flows	
Mass balance at process level	
Mass balance at company level	
Energy balance at company level	
REPRESENTATIVENESS	
Time-dependent representative-ness of the process relative to year of assessment	
Geographical representativeness	
Technological representativeness	
CONSISTENCY AND REPRODUCIBILITY	
Uniformity and consistency	not applicable, because uniformity and consistency between processes in the LCA are by definition not assessed for unit processes. It is assessed for aggregated processes
Reproducibility by third-parties	

2. Horizontal aggregated processes

Product	
Additional information	
Assessor	
General (subjective) assessment by assessor of usefulness in library (A = good; B = reasonable; C = poor) and explanation	
Date of review	
HORIZONTAL AGGREGATED PROCESSES	
COMPLETENESS	
Completeness of environmental interventions	
Completeness of economic flows	
Mass balance at process level	
Mass balance at company level	
Energy balance at company level	
REPRESENTATIVENESS	
Time-dependent representative-ness of the process relative to year of assessment	
Completeness of number of locations / geographical representativeness	
Geographical representativeness	
Completeness of number of locations / technological representativeness	
Technological representativeness	
CONSISTENCY AND REPRODUCIBILITY	
Uniformity and consistency Reproducibility by third parties	

3. Vertical aggregated processes

Product	
Additional information	
Assessor	
General (subjective) assessment by assessor of usefulness in library (A = good; B = reasonable; C = poor) and explanation	
Date of review	
VERTICAL AGGREGATED PROCESSES	
COMPLETENESS	
Completeness of environmental interventions	
Completeness of economic flows	
Mass balance at process level	
Mass balance at company level	
Energy balance at company level	
REPRESENTATIVENESS	
Time-dependent representative-ness of the process chain relative to year of assessment	
Geographical representativeness	
Technological representativeness	
CONSISTENCY AND REPRODUCIBILITY	
Uniformity and consistency	
Reproducibility by third-parties	

Appendix F. Comparison with category 3 Environmental Product Declaration

Name of category 3:	*[to be completed by the LCA practitioner]*
ID number of category 3:	*[to be completed by the LCA practitioner]*
Substantiation of why this is a representative product:	*[to be completed by the LCA practitioner]*

Service life of category 3:	*[to be completed by the LCA practitioner]*	*Year*
Service life of own LCA:	*[to be completed by the LCA practitioner]*	*Year*
Substantiation of difference in service life:	*[to be completed by the LCA practitioner]*	

	Production phase			**Construction phase**		**Use phase**							**Demolition and waste management phase**				**Environmental costs and benefits outside the system boundary of the construction work**
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Extraction of raw materials	Transport	Production	Transport	Building and installation process, construction	Use	Maintenance	Repairs	Replacements	Renovation	Operational energy consumption	Operational water consumption	Demolition	Transport	Waste processing	Final waste processing	Options for reuse, recovery and recycling
Own LCA	*[to be completed by the LCA practitioner]*			*[to be completed by the LCA practitioner]*		*[to be completed by the LCA practitioner]*							*[to be completed by the LCA practitioner]*				*[to be completed by the LCA practitioner]*
Cat 3 (excl. 30% surcharge)	*[to be completed by the LCA practitioner]*			*[to be completed by the LCA practitioner]*		*[to be completed by the LCA practitioner]*							*[to be completed by the LCA practitioner]*				*[to be completed by the LCA practitioner]*
Substantiation of differences	*[to be completed by the LCA practitioner]*			*[to be completed by the LCA practitioner]*		*[to be completed by the LCA practitioner]*							*[to be completed by the LCA practitioner]*				*[to be completed by the LCA practitioner]*

Example:

	Production phase			Construction phase		Use phase							Demolition and waste management phase				Environmental costs and benefits outside the system boundary of the construction work
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Extraction of raw materials	Transport	Production	Transport	Building and installation process, construction	Use	Maintenance	Repairs	Replacements	Renovation	Operational energy consumption	Operational water consumption	Demolition	Transport	Waste processing	Final waste processing	Options for reuse, recovery and recycling
Own LCA	15.8.			1.24.		1.4.							4.3				-5.7
Cat 3 (excl. 30% surcharge)	32.1			1.26.		n.a.							4.1				-1.1.
Substantiation of differences	This can be explained by optimised production, the use of green electricity and a higher percentage of recycled materials			Minimal difference		No maintenance has been included in category 3. According to the manufacturer, this is not justified because maintenance is carried out in most cases.							Minimal difference				Module D is higher because the manufacturer offers a take-back guarantee

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