



SLOVENSKI STANDARD
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Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method

Nachhaltigkeit von Bauwerken - Bestimmung der umweltbezogenen Qualität von Gebäuden - Berechnungsmethode

Contribution des ouvrages de construction au développement durable - Evaluation de la performance environnementale des bâtiments - Méthode de calcul

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ICS:

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Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method

Contribution des ouvrages de construction au
développement durable - Evaluation de la performance
environnementale des bâtiments - Méthode de calcul

Nachhaltigkeit von Bauwerken - Bestimmung der
Umweltleistung von Gebäuden - Berechnungsmethode

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prEN 15978:2009 (E)

Foreword

This document (prEN 15978:2009) has been prepared by Technical Committee CEN/TC 350 “Sustainability of construction works”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

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Introduction

The purpose of this standard is to provide calculation rules for the assessment of the environmental performance of new and existing buildings.

This document is part of a suite of European standards, technical specifications and reports for the assessment of the environmental performance of the building that will assist in the evaluation of the environmental contribution that buildings make to sustainable development.

The environmental performance of a building is only one aspect of its sustainability, the social and economic performance are the two other aspects of its sustainability. These are described in the General Framework (pr EN 15643 part 1). Note: The environmental assessment at building level requires information from products and services (pr EN15804 – WI350006).

In this standard the assessment methodology is based on a life cycle approach for the quantitative evaluation of the environmental performance of the building. The general requirements, for this standard are described in the General Framework pr EN15643 part 1 and the specific requirements, related to the environmental performance in pr EN 15643 part 2. Other standards in the same area related to this standard are shown as the darkened areas in figure 1.

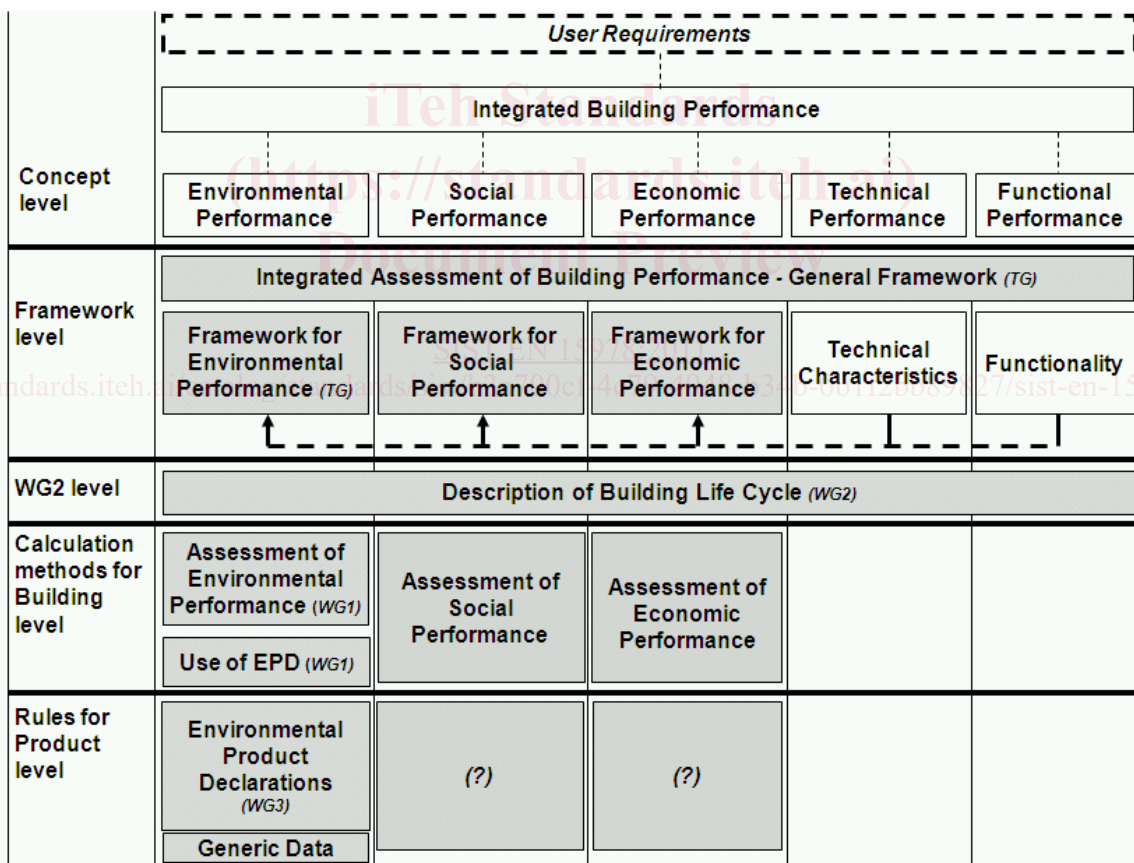


Figure 1. Standards supporting integrated building performance within TC 350.

Note : The darkened boxes represent the work programme as presented in prEN 15643-1

prEN 15978:2009 (E)**1 Scope**

This European Standard is intended for the evaluation and assessment of design options and specifications for new and existing buildings and refurbishment projects.

The standard provides the calculation method, based on Life Cycle Assessment (LCA) to assess the environmental performance of a building and gives the means for the communication of the outcome of the assessment..

The standard gives:

- the description of the object of assessment;
- the system boundary that applies at the building level;
- the procedure to be used for the inventory analysis;
- the indicators and procedures to be used for the impact assessment
- the requirements for presentation of the results;
- and the requirements for the data necessary for the calculation;

The approach to the assessment covers all stages of the building life cycle and is based on data obtained from Environmental Product Declarations (EPD), their "information modules", (prEN 15804) and when appropriate other information related to the environmental performance of the building. as a whole. It includes all building-related construction products, processes and services, over the life cycle of the building.

The interpretation and valuation of the results of the assessment are not within the scope of this standard.

Note: Indicators e.g. climate change, may be declared with reference to this standard without giving the complete list of indicators providing all indicators are calculated in accordance with the methodology developed in this standard.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

prEN 15643-1 : , *Sustainability of construction works — Assessment of buildings — Part 1 General Framework for assessment of buildings.*

prEN 15643-2 : *Sustainability of construction works — Assessment of buildings — Part 2 framework for the assessment of the environmental performance.*

prEN 15804 : , *Sustainability of construction works — Environmental product declarations — Product category rules.*

EN 15603, *Energy Performance of Building — Assessment of energy use and definition of rating..*

ISO 15392, *Sustainability in Building Construction — General Principles.*

ISO 15686-1, *Building and constructed assets — Service Life Planning — General Principles.*

ISO 15686-8, *Building and constructed assets — Service Life Planning — Reference Service Life.*

ISO 14025, *Environmental labels and declaration — Type III environmental declarations.*

ISO DIS 21931, *Sustainability in building construction — Framework for methods of assessment for environmental performance of construction works — Part 1: Buildings*.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

construction product

item manufactured or processed for incorporation in construction works

3.2

design life

Required service life

NOTE Adapted from the definition in ISO 15686-1.

3.3

environmental aspect

Aspect of construction works, part of works processes or services related to their life cycle that can cause change to the environment..

[prEN 15643-1]

3.4

environmental impact

any change to the environment, whether adverse or beneficial, wholly or partially, resulting from environmental aspects.

3.5

Environmental performance

Performance related to environmental impacts and environmental aspects

3.6

functional equivalent

quantified functional requirements and/or technical requirements for a building or an assembled system (part of works) for use as a reference unit.

prEN 15643-1

3.7

functional performance

Performance related to the functionality which is required by the users of a construction works or an assembled system (part of works) or by regulation for a specific activity or function [pr EN15643-2]

3.8

indicator

quantifiable value related to environmental impacts/aspects

[ISO 14044]

3.9

maintenance

combination of all technical and associated administrative actions during the *service life* (3.52) to retain a *building* or an *assembled system (part of works)* in a state in which it can perform its required functions

prEN 15978:2009 (E)**3.10****object of assessment**

The object of assessment is the building, including its foundations and external works within the perimeter of building site over its life cycle)

3.11**recycled resource**

Resource that is recovered from reprocessed materials for further use

NOTE Adapted from the pr EN 15643-2.

3.12**reference study period**

Period over which the time dependent characteristics of the object of assessment are analysed

Note : In some cases, reference study period may significantly differ from the design life of the building

3.13**refurbishment**

modification and improvements to an existing *building* (3.3) in order to bring it up to an acceptable condition

[ISO 6707-1:2004]

3.14**renewable resource**

resource that grows naturally that can be replenished, or cleansed on a human time scale

NOTE A renewable resource is capable of being exhausted, but may last indefinitely with proper stewardship. Examples include: trees in forests, grasses in grassland and fertile soil.

3.15**repair**

The (original) product is kept in place but parts of it are adjusted, fixed or replaced

3.16**replacement**

the original product is removed and changed with a product that support same or better technical performances

3.17**re use**

operation by which products or components that are not *waste* are used again for the same purpose for which they were conceived

NOTE Adapted from the EC waste framework directive. [from pr EN15643-2]

3.18**system boundary**

set of criteria specifying which unit processes are part of a product system.

[ISO 14040]

Note: . The system boundary describes the limits of what is included or not included in the assessment

3.19**Technical performance**

Performance related to the capability of a construction works or an assembled system (part of works) to fulfil its required functions under the intended use conditions [prEN15643-2]

3.20**transparency**

open, comprehensive and understandable presentation of information

ISO 14044

3.21**unit process**

smallest element consider in the life cycle inventory analysis for which input and output are quantified.

NOTE Information modules are considered as one or combination of more than one unit process.

ISO 14040

3.22**waste**

substance or object which the holder discards or intends to discards or is required to discard

NOTE Adapted from the EC waste framework directive. [prEN 15643-2]

4 Symbols and Units**Table 1 - Symbols and units**

Symbol	Unit	Symbol definition
f	[-]	
$m_{i,j}$	[kg]	Amount of products / process i used in stage j
m_j	[kg]	Amount of product/ process I used during the life cycle of the building
AP	kg PO ₄ eq	Acidification potential
EPD (j)	-	Matrix representing the Environmental Product Declaration for the whole life cycle of the product j (from cradle to grave)
EDP(j)_k	-	Environmental Product declaration of the functional unit attached to product j for the module k (k = I,II, III, IV)
GWP_k	kg CO ₂ eq	Quantified value of the Global Warming Potential for stage k
GWP(i)_k	kg CO ₂ eq	Quantified value of the global warming potential of product I for stage k
NRE	kg	Mass of Renewable products except energy
TMR_k	kg	Mass of the product used for stage k
TMR(i)_k	kg	Mass of the product i used for stage k

Notation for subscript

j_{product} : refer to product j during the product stage

$j_{\text{construction}}$: refer to product j during the construction stage

j_{use} : refer to product j during the use stage

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$j_end_of_life$: refer to product j during the after use stage

Example: N_j : gross quantity of product j

$$N_j = N_{j_product} + N_{j_construction} + N_{j_use} + N_{j_end_of_life}$$

Abbreviations

EPD- Environmental Product Declaration

ESL - Estimated Service Life of Components

PCR- Product Category Rules

5 The process for setting up the calculations required for the assessment

In order to carry out and complete the calculations necessary for the assessment of environmental performance of buildings the steps illustrated in Figure 2 shall be followed. This ensures that all the essential information is gathered and processed correctly and consistently according to the requirements of this standard. The clauses numbered in the right column that follow the diagram explain in more detail each step specified in the central column of the table below.

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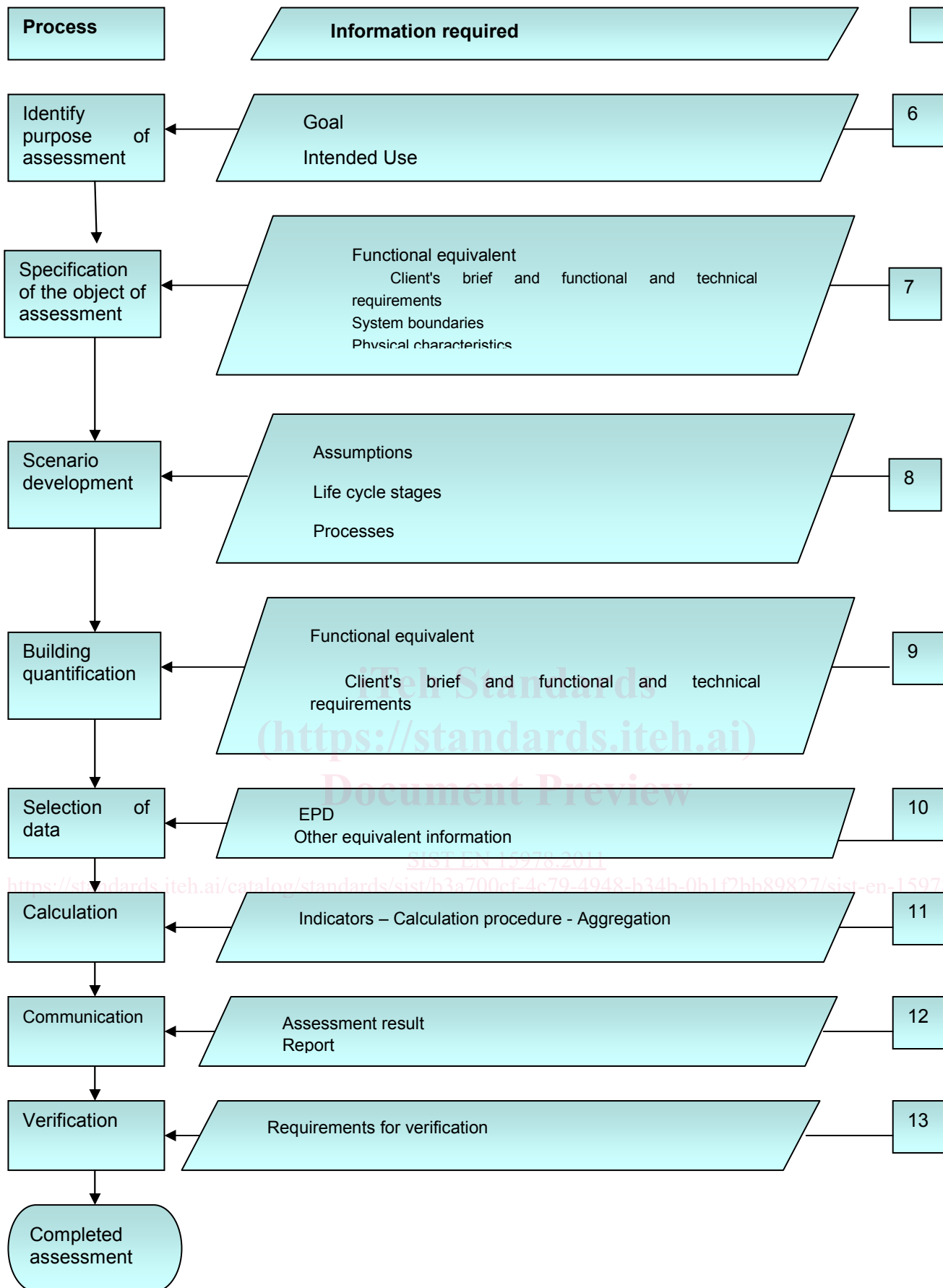


Figure 2 — Flowchart of the process for the assessment of the environmental performance

6 Purpose of the Assessment

The purpose of the assessment is defined by the goal, the scope and the intended use of the assessment.

The goal of the assessment, based on the calculation method described in this standard, is to quantify the environmental performance of the object of assessment by means of the compilation and summation of environmental data

In order to calculate the environmental performance of a building in terms of environmental impacts and aspects, the scope, and intended use of the assessment, shall be defined, agreed and documented in accordance with the requirements of this standard before an assessment is carried out.

How to define the scope of the assessment is reflected in the clauses 7, 8 9 and 10. Depending on the context, the intended use of the assessment may be any one, or more, of the following:

- assistance in the decision making process, for example:
 - comparison of the environmental performance between different design options;
 - comparison of the environmental performance between refurbishment, reconstruction and/or new construction;
 - identification of potential for environmental performance improvements
- policy making;
- documenting the environmental performance of a building for use in, for example:
- labelling,
- marketing,
- certification,
- declaring environmental performance
- declaring performance with respect to legal requirements.

The scope and intended use determine the level of detail required in the environmental impact data, and other data used in the calculations. However the calculation method remains the same.

7 Specification of the object of assessment

The object of assessment is the building, including its foundations and external works within the perimeter of building site over its life cycle.

If the assessment is restricted to a part of a building or to an assembled system (part of works) or to a part of the life cycle, or if any relevant impacts are not addressed, this shall be documented, reported and reasons explained.