



SLOVENSKI STANDARD

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Trajnostnost gradbenih objektov - Ovrednotenje možnosti trajnostne prenove stavb

Sustainability of construction works - Evaluation of the potential for sustainable refurbishment of buildings

Nachhaltigkeit von Bauwerken - Bewertung des Potentials zur nachhaltigen Sanierung von Gebäuden

Contribution des ouvrages de construction au développement durable - Évaluation du potentiel d'une réhabilitation contribuant au développement durable d'un bâtiment

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Sustainability of construction works - Evaluation of the potential for sustainable refurbishment of buildings

Contribution des ouvrages de construction au développement durable - Évaluation du potentiel d'une réhabilitation contribuant au développement durable d'un bâtiment

Nachhaltigkeit von Bauwerken - Bewertung des Potentials zur nachhaltigen Sanierung von Gebäuden

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European foreword

This document (EN 17680:2023) has been prepared by Technical Committee CEN/TC 350 “Sustainability of construction works”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2024, and conflicting national standards shall be withdrawn at the latest by February 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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Introduction

This document forms a part of a series of European Standards written by CEN/TC 350, that provide a system for the sustainability assessment of buildings using a life cycle approach. The sustainability assessment quantifies impacts and aspects for environmental, social and economic performance of buildings using quantitative and qualitative indicators, both of which are measured without value judgement. The purpose of this series of European Standards is to enable comparability of the results of assessments. This series of European Standards does not set benchmarking or levels of performance. European (and other) countries face big challenges transforming the existing building stock to environmentally, economically and socially feasible buildings for the future within a low carbon society and a higher focus on resource efficiency as a contribution to sustainable development. The transformation and reduction of environmental impacts of existing buildings should be done in a cost-effective manner and hence the refurbishment should be accessible and sustainable in all senses (i.e. environmental, social and economic). The need for refurbishment emerges due to the increasing demands for better-quality housing and the quest for energy efficiency of commercial and industrial buildings.

In concept, the integrated building performance incorporates environmental, social and economic performance as well the technical and functional performance, and these are intrinsically related to each other, as illustrated in Figure 3. This document defines a simple method for qualifying the considerations to be made in relation to evaluating the potential of refurbishing an existing building and serves to determine the most sustainable and cost-effective approach to improve performance to comply with national regulatory requirements, among other things. In the interest of conserving resources, options for extended use and refurbishment are to be examined intensively and, if suitable, are to be given preference over new construction. This document is a part of the framework of standards for sustainability of buildings as shown in Figure 1.

This document is primarily designed to support the strategic decision process on how to refurbish existing building(s) in a sustainable way, taking into consideration that not all buildings should be refurbished if the existing conditions of a building do not permit. A starting point for decisions on (further) handling of existing buildings is a comprehensive analysis. This includes a building diagnosis to determine damage and deficiency as well as an assessment of the current technical and functional performance. The potential for an improvement in building performance and (as far as possible) the effort required for this are assessed. An alignment with requirements and possibilities resulting from future user requirements or possible uses, the changing environment concerning politics and legislation, market situation, environmental conditions and social values, as well as technical progress, is possible. The results of the analysis can be used to make fundamental decisions on how to deal with existing buildings. If refurbishment or repurposing are viable options, these can be investigated using the results of a building diagnosis and being subjected to a sustainability assessment in accordance with EN 15643.

In this document, a procedure is offered to support the methodology for assessing performance characteristics of existing building based on an indicator system and classification levels. Examples are given in an informative annex.

Framework level	Sustainability Assessment			Technical characteristics	Functionality
		EN 15643 Sustainability of Construction Works – Framework for Assessment of Buildings and Civil Engineering Works			Service Life Planning – Principles ISO 15686-1
Works level	EN 15978 Assessment of Environmental Performance of Buildings	EN 16309 Assessment of Social Performance of Buildings	EN 16627 Assessment of Economic Performance of Buildings	EN ISO 52000 Energy Performance of Buildings	
	EN 17680 Assessment of Options for Sustainable Refurbishment of Buildings				
	EN 17472 Sustainability Assessment of Civil Engineering Works				
Product level	EN 15804 + A2 Environmental Product Declarations – Core Rules for Construction Products			Service Life Prediction Procedures ISO 15686-2, Feedback from Practice ISO 15686-7, Reference Service Life & Service Life Estimation ISO 15686-8	
	EN 15942 Communication Format B-to-B				
	EN 15941 Data Quality				
	EN 17672 Rules for B-to-C Communication				
	EN ISO 22057 Data templates for the use of EPDs in BIM				
	CEN/TR 16790 Guidance for EN 15804				
	CEN/TR 17005 Additional Indicators				

Figure 1 — Framework standards for sustainability of buildings

Refurbishment can be seen as an opportunity, not only to modernize a building's aesthetic, but also to enhance its overall technical and functional (usability) performance, and its potential contribution to the surrounding environment and local community.

The transformation should be done in a cost-effective manner and hence the refurbishment should be sustainable. This document gives a simple method for which buildings to be given first priority for a sustainable refurbishment also taking into consideration that not all buildings should be refurbished.

Benefits of sustainable refurbishment in comparison to deconstruction and redevelopment are:

- reduced landfill disposal;
- contribution to extending whole building lifetime;
- reduced environmental footprint through greater conservation and reuse of materials;
- contributing to lower life cycle costs;
- reduction in overall embodied environmental impact relative to new building.

Other benefits may include:

- retention of community infrastructure;
- additional benefits of local economic development;
- neighbourhood renewal and well-being for all stakeholders;
- protection for built cultural heritage;
- better adaptation to climate change (e.g. limiting the solar gain in summer).

EN 17680:2023 (E)**1 Scope**

This document provides a strategy and methodology for sustainable refurbishment of an existing building and evaluation of the potential of sustainable refurbishment, as a means of contributing to the circular economy, to support the decision-making process. Sustainable refurbishment aims to close the gap between current performance and current requirements fulfilling national regulations, and contribute to meet sustainability goals which maximize the environmental, social and economic performance. It also aims to allow the adaptability to fulfil future needs. It can be used for a building or part(s) of a building, as well as a portfolio of buildings. This document gives a methodology for assessing performance characteristics of existing buildings in terms of:

- a) technical aspects;
- b) adaptability;
- c) usability;
- d) social aspects;
- e) energy and water (operational impacts);
- f) quality of indoor environment (including health aspects);
- g) economic feasibility;
- h) climate change resilience;
- i) embodied environmental impacts.

The document describes the work to be done in main applicable categories of a 6 steps process:

- Step 0: Establish brief of the object of the assessment
- Step 1: Evaluating the building
- Step 2: Sustainable deconstruction
- Step 3: Sustainable construction process
- Step 4: Sustainable commissioning
- Step 5: Sustainable in use

NOTE In this document, the users are people and organizations using the building, including the facility management. In some buildings, visitors are also important users and need to be taken in to account.

This approach is generic for all types of buildings. At present this document does not cover civil engineering work and it does not give benchmarks for the evaluation.

This document enables a strategy to be made for sustainable refurbishment of the whole building, part of a building or a portfolio of buildings.

Assessment of the impacts of sustainable refurbishment of buildings is covered by calculation methods described in EN 15978, EN 16309 and EN 16627.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 12464-1, *Light and lighting — Lighting of work places — Part 1: Indoor work places*

EN 15804, *Sustainability of construction works — Environment product declarations — Core rules for the product category of construction products*

EN 15978, *Sustainability of construction works — Assessment of environmental performance of buildings — Calculation method*

EN 16309, *Sustainability of construction works — Assessment of social performance of buildings — Calculation methodology*

EN 16627, *Sustainability of construction works — Assessment of economic performance of buildings — Calculation methods*

EN 17037, *Daylight in buildings*

EN 17210:2021, *Accessibility and usability of the built environment — Functional requirements*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1 Terms and definitions

3.1.1

accessibility

provision of buildings, parts of buildings, or outdoor built environments for people, regardless of disability, age or gender, to be able to gain access to them, into them, to use them and exit from them

Note 1 to entry: Accessibility includes ease of independent approach, entry, evacuation and/or use of a building and its services and facilities, and outdoor spaces by all of the potential users with an assurance of person health, safety and welfare during the course of those activities.

[SOURCE: EN 17210:2021]

3.1.2

adaptability

ability of the object of assessments or parts thereof to be changed or modified to make suitable for a particular use

Note 1 to entry: adaptability can be subdivided into function of flexibility, versatility and elasticity of the building, part of or group of buildings

[SOURCE: EN 15643:2021, 3.2, modified – Note 1 to entry has been added.]

EN 17680:2023 (E)**3.1.3****core business**

entity from which needs are derived

Note 1 to entry: Need: expectation, specific or abstract, from the demand organization which is essential to enable the achievement of the core purpose and key objectives

[SOURCE: EN ISO 41011:2018, 3.1.7, modified – Note 1 to entry has been added.]

3.1.4**demand profile**

set of parameters and their classes coming from regulations or the client's brief as demand levels

EXAMPLE Load bearing capacity, floor to ceiling height.

3.1.5**elasticity**

adaptability related to changing the volume of the building space either outside the existing building unit or addition of a new building(s) within the site

EXAMPLE To add extra floor(s) or horizontal extension or remove part of a building.

3.1.6**energy retrofit**

installation and/or implementation of energy conservation measure in an existing building or civil engineering works

[SOURCE: ISO 6707-3:2018, 3.4.15]

3.1.7**environmental aspect**

aspect of construction works, part of works, processes or services related to their life cycle that can change to environment

[SOURCE: EN 15643:2021, 3.33]

3.1.8**environmental impact**

result of a change to the environment, whether adverse, neutral or beneficial, wholly or partially resulting from environmental aspects

[SOURCE: EN 15643:2021, 3.34]

3.1.9**environmental performance**

performance related to environmental impacts and environmental aspects

[SOURCE: EN 15643:2021, 3.35]

3.1.10**flexibility**

adaptability related to changing space distribution within the existing building unit

EXAMPLE To change from cell offices to open landscape.

3.1.11**functional performance**

performance related to the functionality of a construction works or part of works, which is required by the client, users or by regulations

[SOURCE: EN 15643:2021, 3.43]

3.1.12**functional requirement**

type and level of functionality of a building, civil engineering works or an assembled system which is required by the client, users and/or by regulations

[SOURCE: EN 15643:2021, 3.44]

3.1.13**functionality**

suitability or usefulness for a specific purpose or activity

[SOURCE: EN 15643:2021, 3.46]

3.1.14**versatility**

adaptability related to changing the use of the building

EXAMPLE To change use from offices to school area or divide for different users (core business).

3.1.15**maintenance**

combination of all technical and associated administrative actions during the service life to retain a building, or its parts, in a state in which it can perform its required functions

[SOURCE: ISO 15686-1:2011, 3.13]

3.1.16**maintenance (planned)**

combination of planned technical and associated administrative actions during the service life to retain a building, or its parts (functional units), in a state in which they can perform their required functions

Note 1 to entry: Preventive (planned) maintenance covers cleaning, servicing, lubrication, changing wearing parts, testing, inspection, condition monitoring, done on a periodic basis and done before a failure would occur.

[SOURCE: EN 15643:2021, 3.60, modified – “construction works or part of works” has been replaced with “building, or its parts” in the definition]

3.1.17**performance profile**

set of parameters and their classes coming from the actual object of assessment

Note 1 to entry: Calculation methods as per EN 15978, EN 16309 and EN 16627.

EN 17680:2023 (E)**3.1.18****performance classes**

division of performance based on criteria

Note 1 to entry: Can be specified through reference to authority requirements (legal/regulatory requirements), client requirements, user requirements, functional requirements, or other requirements.

3.1.19**recycling**

any recovery operation by which waste materials are reprocessed into products, materials or substances

Note 1 to entry: This can be done by “upcycling or high-level-recycling or recycling in closed cycles” or “low-level-recycling or downcycling in open cycles”.

[SOURCE: ISO 21928-2:2023, 3.33]

3.1.20**refurbishment**

large scale (substantial) modification and improvements to an existing building in order to bring it up to an acceptable condition

Note 1 to entry: Refurbishment can be undertaken to facilitate continuation of the current function, including technical modernisation (renovation) and a change of space plan or a change of function to new use.

[SOURCE: EN 15643:2021, 3.76, modified – “construction works” has been replaced with “building” in the definition; “in order to bring it up to an acceptable condition” has been added in the definition; “(renovation)” has been added in the Note 1 to entry]

3.1.21**sustainable refurbishment**

refurbishment to a condition that maximizes the environmental, social and economic performance

Note 1 to entry: Sustainable refurbishment shall fulfil authority’s sustainability regulations and contribute to meet sustainability goals.

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Note 2 to entry: Sustainable refurbishment aims to allow the adaptability to fulfil future needs.

3.1.22**renovation**

upgrade of components, elements or systems including energy efficiency upgrading (technical modernization)

Note 1 to entry: This also applies when upgrading is required by e.g. changed regulations.

3.1.23**repair**

actions outside planned maintenance to return component or assembled system to an acceptable condition through the renewal, replacement or mending worn, damaged or degraded parts, but not changing its original parameters

Note 1 to entry: Repair refers to unplanned action because the component or assembled system has lost its function, this can happen because of a lack of correct planned maintenance.

[SOURCE: EN 15643:2021, 3.79]