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**Sustainability in building construction —  
Framework for methods of assessment of  
the environmental performance of  
construction works —**

Part 1:  
**Buildings**

iTeh STANDARD PREVIEW

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*Développement durable dans la construction — Cadre méthodologique  
de l'évaluation de la performance environnementale des ouvrages de  
construction —*

ISO 21931-1:2010  
*Partie 1: Bâtiments*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 21931-1 was prepared by Technical Committee ISO/TC 59, *Building construction*, Subcommittee SC 17, *Sustainability in building construction*.

This first edition of ISO 21931-1 cancels and replaces ISO/TS 21931-1:2006.

ISO 21931 consists of the following parts, under the general title *Sustainability in building construction — Framework for methods of assessment of the environmental performance of construction works*:

— *Part 1: Buildings*

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Civil engineering works (infrastructure) is to form the subject of a part 2.

## Introduction

The ability to measure and understand the environmental performance of buildings is essential for communicating their potential environmental impacts and their influence on sustainable development.

This part of ISO 21931 establishes a framework for methods of assessment of the environmental performance of buildings and related external works, which is a central part of the process. Such assessments can be used for benchmarking performance and monitoring progress towards improvement of performance. This part of ISO 21931 does not set benchmarks or levels of performance relative to environmental impacts and aspects.

The development of methods of assessment of the environmental performance of buildings has been ongoing since the early 1990s. This has been prompted by:

- a) a recognition of impacts of buildings on the environment;
- b) an increased focus on sustainability and sustainable development in the construction sector;
- c) a need to meet the market demand for differentiation between buildings, based on measured environmental performance and environmental information;
- d) a shift from single performance measures to a more comprehensive set of environmental considerations;
- e) a recognition of the benefits of proactive voluntary measures.

The methods of assessment of the environmental performance of buildings provide a basis for demonstrating and communicating the result of efforts to improve environmental performance in construction works. The methods typically establish a means of assessing a broad range of environmental considerations against explicitly declared criteria, and give a summary of environmental performance.

The methods of assessment of the environmental performance of buildings provide:

- a common and verifiable set of references, such that building owners, striving for higher environmental standards, have a means of measuring, evaluating and demonstrating that effort,
- a reference as a common basis by which building owners, design teams, contractors and suppliers can formulate effective strategies in building design and operation, which are intended to improve environmental performance,
- detailed information on the building which is gathered and organized in such a way that it can be used to lower operating, financing and insurance costs, and vacancy rates, and increase marketability,
- a clear description of the factors considered to be the key environmental considerations and their relative importance, thereby assisting the design process.

To achieve the above-mentioned practical goals, methods of assessment of the environmental performance of buildings need to refer to limited criteria and seek a balance between rigour and practicality. Life cycle-based approaches play an increasingly significant role for setting performance criteria within methods of assessment of environmental performance of buildings. However, the collection and maintenance of current data sets for the multitude of building systems and elements might not be practicable. Also, the context of overall building performance is important for considering each environmental criterion.

Considering all of these issues, the purpose of this part of ISO 21931 is to describe the framework and the principles that apply in the assessment of the environmental performance of new and existing buildings and

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their related site works, taking into account the various environmental impacts these buildings are likely to have.

This part of ISO 21931 aims to bridge the gap between regional and national methods for the assessment of the environmental performance of buildings, by providing a common framework for their expression.

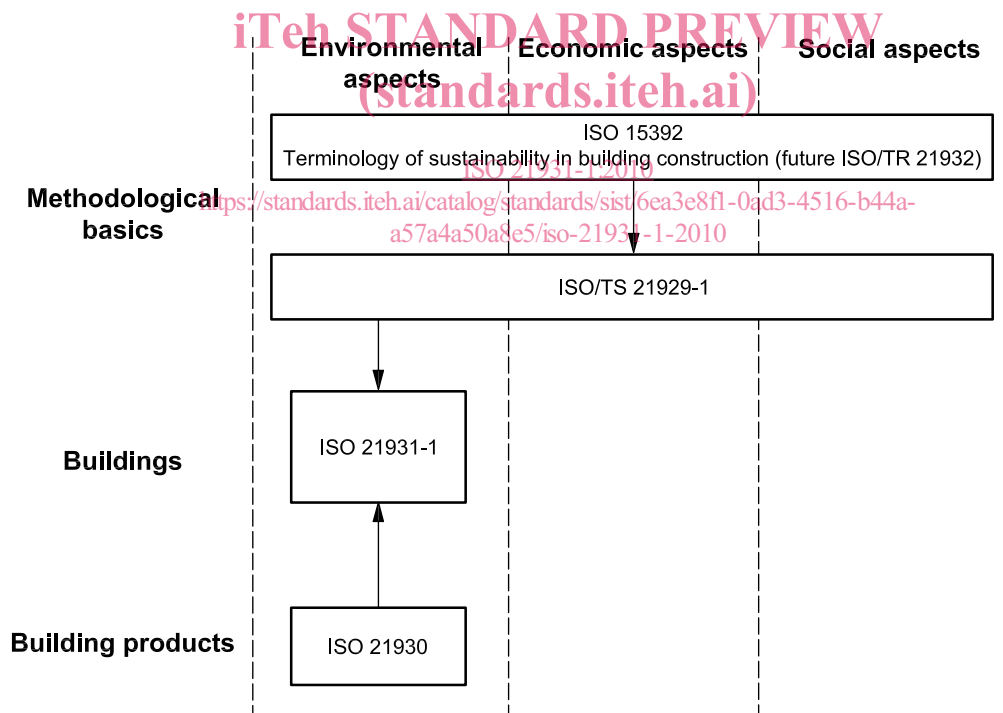
Practical relevant rules and recommendations concerning methods for the assessment of the environmental performance of buildings, which can exist on either a national or regional basis, can be examined and improved by the use of the framework of assessment, which is the basis of this part of ISO 21931.

An improvement of the environmental performance of a building requires an appropriate operation of the building over its lifetime. In existing buildings, it can be enhanced through the use of an environmental policy and the implementation of an environmental management system.

This part of ISO 21931 is one in a suite of International Standards dealing with sustainability in building construction, which includes ISO/TS 21929-1, ISO 21930 and ISO 15392, along with the terminology of sustainability in building construction (future ISO/TR 21932).

This part of ISO 21931 deals with environmental performance related to environmental impacts and aspects. Social aspects related to the indoor and local outdoor environment are discussed in Annex A.

The relationship among the International Standards is illustrated in Figure 1.



**Figure 1 — Suite of related International Standards for sustainability in buildings and construction works**

# Sustainability in building construction — Framework for methods of assessment of the environmental performance of construction works —

## Part 1: Buildings

### 1 Scope

This part of ISO 21931 provides a general framework for improving the quality and comparability of methods for assessing the environmental performance of buildings and their related external works.

It identifies and describes issues to be taken into account in the development and use of methods of assessment of the environmental performance for new or existing buildings related to their design, construction, operation, maintenance and refurbishment, and in the deconstruction stages.

The object of assessment in this part of ISO 21931 is the building and the external works within its site (curtilage).

This part of ISO 21931 is intended to be used in conjunction with, and following the principles set out in the "ISO 14020 family of International Standards", which includes ISO 14020, ISO 14021, ISO 14024 and ISO 14025, as well as ISO 14040 and ISO 15392. Where deviation occurs, this part of ISO 21931 takes precedence.

This part of ISO 21931 deals only with methods of assessment of environmental performance and excludes methods of assessment of social and economic performance, which are also part of sustainability and sustainable development.

NOTE 1 It is recognized that environmental performance is only one of a number of significant factors in a building's overall performance.

NOTE 2 In many cases, methods of assessment of the environmental performance of buildings include consideration of social aspects related to the indoor and local outdoor environment (see Annex A).

### 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.

ISO 6707-1, *Building and civil engineering — Vocabulary — Part 1: General terms*

ISO 14025, *Environmental labels and declarations — Type III environmental declarations — Principles and procedures*

ISO 14040:2006, *Environmental management — Life cycle assessment — Principles and framework*

ISO 14050, *Environmental management — Vocabulary*

ISO 15392:2008, *Sustainability in building construction — General principles*

ISO 15686-1:—<sup>1)</sup>, *Buildings and constructed assets — Service life planning — Part 1: General principles and framework*

ISO 21930:2007, *Sustainability in building construction — Environmental declaration of building products*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6707-1, ISO 14025, ISO 14040, ISO 14050, ISO 15392 and ISO 21930 and the following apply.

NOTE See the terms and definitions in the terminology of sustainability in building construction (future ISO/TR 21932).

#### 3.1 design life

required service life

#### 3.2 downstream process

process (3.11) that is carried out after the designated process in the stream of relevant processes

#### 3.3 environmental aspect

aspect of buildings, part of buildings, processes (3.11) or services related to their life cycle that can cause a change to the environment

#### 3.4 environmental impact

change to the environment, whether adverse or beneficial, wholly or partially, resulting from environmental aspects (3.3)

NOTE Adapted from ISO 15392:2008, definitions 3.13 and 3.13.2.

#### 3.5 environmental performance

performance of a building related to its environmental impacts (3.4) and environmental aspects

NOTE 1 The environmental performance is influenced by all processes (3.11) related to the life cycle of the building.

NOTE 2 Environmental performance can be expressed either quantitatively or qualitatively with reference to performance requirements or possibly relative to a scale of values or a benchmark.

#### 3.6 estimated service life

service life that a building or parts of a building would be expected to have in a set of specific in-use conditions, determined from reference service life data after taking into account any differences from the reference in-use conditions

[ISO 15686-1:—, definition 4.8]

#### 3.7 functional equivalent

quantified functional requirements and/or technical requirements for a building for use as a reference basis for comparison

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1) To be published.



**3.8****gate**

point at which the building product or material leaves the factory before it becomes an input into another manufacturing **process** (3.11) or before it goes to the distributor, a factory or building site

[ISO 21930:2007, definition 3.6]

**3.9****interested party**

person or group concerned with or affected by the **environmental performance** (3.5) of a building

**3.10****non-renewable resource**

resource that exists in a fixed amount that cannot be replenished on a human timescale

[ISO 21930:2007, definition 3.8]

**3.11****process**

series of operations performed to achieve a desired result

**3.12****renewable resource**

resource that is grown, naturally replenished or cleansed on a human timescale

EXAMPLES Trees in forests, grasses in grasslands and fertile soil.

NOTE A renewable resource is capable of being exhausted but can last indefinitely with proper stewardship.

[ISO 21930:2007, definition 3.13]

[ISO 21931-1:2010](https://standards.iteh.ai/catalog/standards/sist/6ea3e8f1-0ad3-4516-b44a-a57a4a50a8e5/iso-21931-1-2010)

**3.13****system boundary**

interface between a building and the environment or other product systems

NOTE 1 System boundary defines what is included and what is not included in an assessment.

NOTE 2 Adapted from ISO 14040:2006, definition 3.32.

**3.14****transparency**

open, comprehensive and understandable presentation of information

[ISO 14040:2006, definition 3.7]

**3.15****upstream process**

**process** (3.11) carried out before the designated process in the stream of relevant processes

## 4 Principles for assessment of the environmental performance of buildings

### 4.1 General

This clause deals with the principles for the assessment of the environmental performance of buildings that are important for the application of this part of ISO 21931.

The environmental performance of a building is related to its characteristics and functions, where the building is

- a) an end-use product and an integrated assembly of products,
- b) a place in which to live, work or socialize (a place for living, working or doing other activities), and
- c) a system in operation.

Methodologies for the assessment of the environmental performance of buildings and their related external works need to explicitly define the methods used to take account of the environmental impacts and aspects of the building.

#### 4.1.1 A building as an end-use product and an integrated assembly of products

A building physically consists of various elements, such as construction products and components, which are parts of a building and its technical systems. Therefore, a building can be considered as an integrated assembly of construction products, which are manufactured, used and disposed of, according to their service life. It follows that buildings and the choice of construction products used in them take into consideration, and are based on, the project-specific requirements.

For the assessment of the environmental performance that relates to the characteristics of a building as an assembly of components and products, it is necessary to give a clear indication of the system boundary, such that the extent to which the different aspects, parts, processes and services of the building are involved in the assessment is clearly defined.

The environmental performance of a building involves issues that relate to the characteristics of the building, as an end-use product, as well as issues that relate to the characteristics of the building as an integrated assembly of components and products. During use, some products need to be maintained. The environmental performance of a building is directly related to impacts caused by the maintenance of the building components or products during their service life, and also includes consideration of refurbishment and end-of-life scenarios.

Because a building is an assembly of components and products, the environmental impacts of such components and products, which can occur at any time during their life cycle, have relevance for the assessment of environmental performance of the complete building.

The assessment of buildings may utilize environmental product declarations (EPD), as established on the basis of the same product category rules (PCRs), defined in ISO 21930. For the summations of EPD, data shall be derived in accordance with ISO 21930.

NOTE The environmental performance of a building that relates to the characteristics of a building as an assembly of products has relevance to the issues described in ISO 21930.

#### 4.1.2 A building as a place in which to live, work or socialize

Over the use stage, a building provides for its users conditions appropriate for living, working, studying, or undertaking leisure or other social activities.

These conditions are expressed as technical and functional requirements, which include aspects related to the indoor environment of the building. These requirements become fixed when they are prescribed in the client's brief or in the project specification. Indoor environment requirements influence the results of the assessment of environmental performance and, therefore, need to be taken into account in the prescription of the functional equivalent given in 5.8.5.

The user's behaviour has an influence on environmental performance.

Location-related aspects of a building used as a place in which to live, work or socialize may be part of the assessment of the environmental performance of the building. When location-related aspects, such as those resulting from transportation of the users, are considered within the method of assessment, the environmental aspects of the building extend beyond the area of the building site.

NOTE 1 When the method is used for a design stage assessment, scenarios of buildings in operation provide information on the influence of the user behaviour. In the case of existing buildings, monitoring data of buildings in operation can provide relevant information, although in the absence of such data, it is possible to use scenarios as for design stage assessment.

NOTE 2 Methods of assessment of the environmental performance of a building can include consideration of social aspects, such as health and comfort, related to the indoor and local outdoor environment (see Annex A).

#### 4.1.3 A building as a system in operation

Throughout its operation during the use stage, a building provides a number of services to its users, as well as conditions appropriate for living, working, studying, the provision of health care and leisure activities. The provision of these services results in environmental impacts due to input and output flows that are a consequence of the operation of the building services.

The environmental performance of the building depends on the resources, including materials, energy, water, etc., that it uses. When resources are used, emission flows occur, including atmospheric emissions, waste water, waste, etc. In addition to this, a building is linked to infrastructure both upstream and downstream, which requires energy, water and transport, and generates environmental impacts. The impacts related to these links, including those upstream and downstream, should be considered within the defined system boundary (see 5.4).

NOTE For these purposes, life-cycle analysis of energy, water and wastewater services can be used.

#### 4.2 Purpose of assessment

The reasons for the assessment of the environmental performance of a building can vary, depending on the particular circumstances. A method for the assessment of the environmental performance of a building provides a means for the measurement and evaluation of the environmental impacts of a building. Such information may be used to support the decision-making process for a number of different scenarios, such as:

- the procurement of a building;
- the design and construction of a new building;
- improving the operation of an existing building during the operating phase;
- designing for retrofit and refurbishment during the operating phase;
- the deconstruction and disposal of the building at the end of the operating phase;
- the analysis of the environmental performance of an existing building.

Such an assessment may also be used for communicating environmental performance to third parties, the benchmarking of environmental performance and monitoring the progress towards the improvement of performance.

NOTE For examples of the possible relationships between the options listed, the life-cycle stages and the perspective of interested parties, see Annex B.

#### 4.3 Relevance of local contexts

The environmental performance of a building is influenced by the characteristics of the climatic, social, economic and cultural context of the nation, region and site in which the building is located.

Subject to the aims and objectives of the assessment, the environmental performance of a building shall be expressed by absolute values. In addition, relative values may be used alongside the absolute values. Relative values refer to given contexts and should reflect regionally relevant benchmarks, as appropriate (see 5.8.6).

NOTE The characteristics and relevance of local contexts make the co-existence of regional and national methods for the assessment of the environmental performance of buildings possible, provided the methods align with the framework described in this part of ISO 21931.

## 5 Framework for methods of assessment of environmental performance of buildings

### 5.1 General

This clause gives minimum requirements and additional recommendations for consideration in the development, understanding, implementation and improvement of the methods of assessment of the environmental performance of buildings.

### 5.2 Assessment method documentation

The documentation of the assessment method shall identify

- the body responsible for the development and the maintenance of the method,
- details of stakeholder involvement in the development and validation of the method,
- national/regional/organizational means of recognition of the method and/or its accreditation, and
- processes and procedures for the delivery of the assessment (e.g. workflow, training, communication).

The method shall include and the documentation shall clearly describe

- the purpose of the method (5.3),
- the system boundary (5.4),
- a statement of the assumptions and scenarios (5.5),
- a structured list of the issues for assessment (5.6),
- the life-cycle stages of the building covered (5.7),
- the method(s) for the quantification of the environmental performance of the building (5.8),
- all sources of information (generic and specific databases, etc.) (5.9),
- an evaluation and interpretation process (5.10), and
- a report of results of the assessment (5.11).

In addition to the description of the method, statements regarding the assessment-specific assumptions, methods for the quantification and sources of information shall be recorded in the report containing the assessment result.