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

**Part 1:
Buildings**

iTeh STANDARD PREVIEW

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

Partie 1: Bâtiments

ISO/TS 21931-1:2006

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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

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

- *Part 1: Buildings* [Technical Specification]

Construction assets other than buildings is to form the subject of a future part 2.

Introduction

The aim of this part of ISO/TS 21931 is to define a framework for methods of assessment for the environmental performance of buildings.

In order to be able to communicate information to interested parties regarding the potential environmental impact of buildings, in relation to the concept of sustainability, it is important to understand how the buildings themselves perform in this respect and to benchmark their progress towards achieving improved performance.

To this end, assessment methods for environmental performance of buildings have been developed and have been in use worldwide since the early 1990s. These developments have been prompted by

- a shift from single performance measures to a more comprehensive set of environmental considerations,
- a recognition of the benefits of proactive voluntary measures, and
- the need to meet market demands for information on environmental performance.

Assessment methods for the environmental performance of buildings are the basis for demonstrating and communicating the extent of the proactive commitment of a building's suppliers toward achieving higher levels of environmental performance. The methods attempt to establish an objective and comprehensive means of simultaneously assessing a broad range of environmental considerations against explicitly declared criteria, and to offer a summary of environmental performance.

Assessment methods for the environmental performance of buildings

- provide a common and verifiable set of criteria and targets so that building owners striving for higher environmental standards have a means of measuring, evaluating and demonstrating that effort,
- provide a reference as a common basis by which building owners, design teams, contractors and suppliers, can formulate effective environmental performance improvement strategies,
- gather and organize detailed information on the building that it can be used to lower operating, financing and insurance costs, lower vacancy rates and increase marketability, and
- assist the design process by providing a clear declaration of what are considered as the key environmental considerations and their relative importance.

Life-cycle approaches will inevitably play a greater role for setting performance criteria within methods of assessment of overall environmental performance of buildings. However, the collection and maintenance of current data sets for the multitude of systems and elements is not practically achievable at the moment. Consequently, to achieve the practical goals noted above, assessment methods for the environmental performance of buildings need to refer to a limited number of criteria and seek a balance between rigour and practicality. This means that the deployment of LCA within the methods of assessment of overall environmental performance of buildings must consider the significance of the individual performance criterion within the context of the overall building performance.

Considering all these issues, there is a need to formalize an International Standard that will ensure the quality, and comparability, of assessment methods for the environmental performance of buildings.

The purpose of this part of ISO/TS 21931 is to describe the framework and the principles behind the assessment of the environmental performance of both new and existing buildings, taking into account the various environmental impacts these buildings are likely to have.

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This part of ISO/TS 21931 is part of a projected suite of standards (see Bibliography) addressing sustainability in building construction and covering

- general principles (ISO 15392) [1],
- terminology (ISO 21932) [2],
- environmental declarations of building products (ISO 21930), and
- a framework for the development of indicators for buildings (ISO/TS 21929-1) [3].

As with ISO 21930, this part of ISO/TS 21931 deals exclusively with environmental impact and excludes consideration of the social and economic areas that are part of sustainability.

See Figure 1.

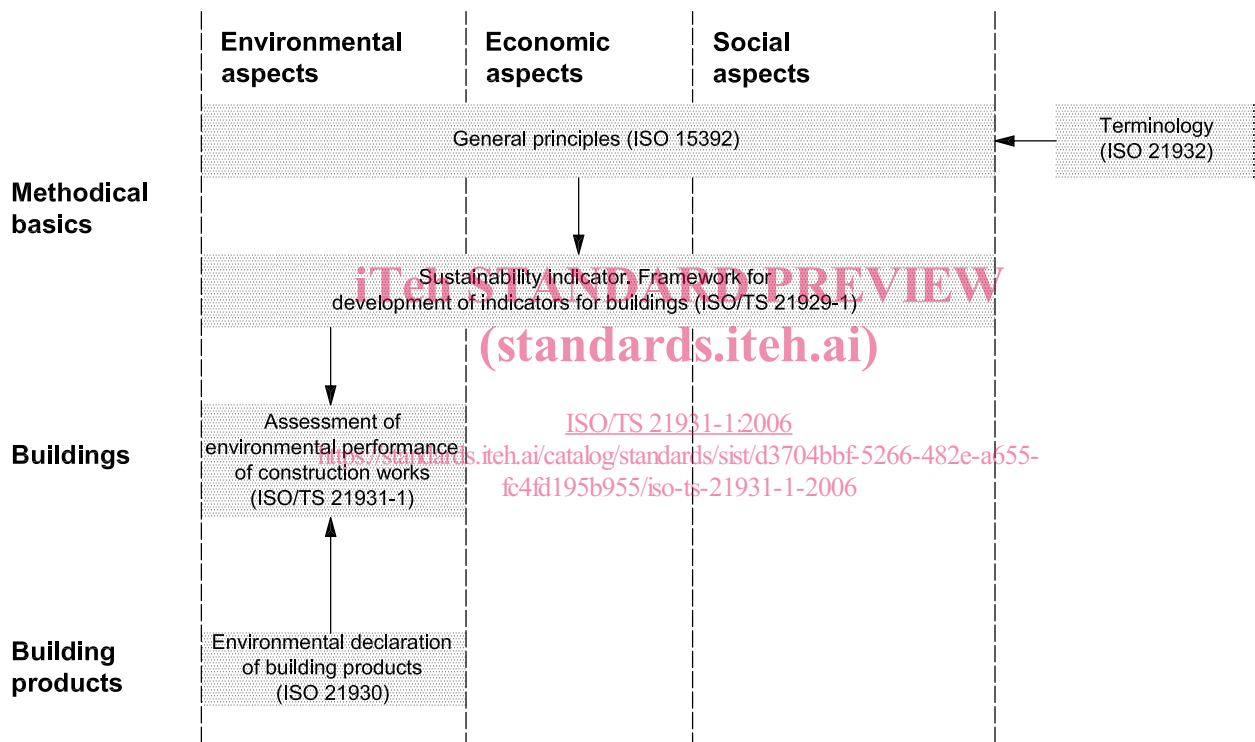


Figure 1 — Subjects covered by the related standards

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

Part 1: Buildings

1 Scope

This part of ISO/TS 21931 provides a general framework for improving the quality and comparability of methods for assessing the environmental performance of buildings. It identifies and describes issues to be taken into account when using methods for the assessment of environmental performance for new or existing building properties in the design, construction, operation, refurbishment and deconstruction stages.

The building is the object of the assessment defined in this part of ISO/TS 21931, and this encompasses the building itself, the site and the associated facilities on the site. It is recognized that environmental performance is only one of a number of significant factors in a building's overall performance.

This part of ISO/TS 21931 is intended be used in conjunction with, and following the principles set out in, the ISO 14000 series of International Standards.

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2 Normative references

The following references 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 references document (including any amendments) applies.

ISO 14001, *Environmental management systems — Specification with guidance for use*

ISO 14020, *Environmental labels and declarations — General principles*

ISO/TR 14025, *Environmental labels and declarations — Type III environmental declarations*

ISO 14031:1999, *Environmental management — Environmental performance evaluation — Guidelines*

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

ISO 14041, *Environmental management — Life cycle assessment — Goal and scope definition and inventory analysis*

ISO 14042, *Environmental management — Life cycle assessment — Life cycle impact assessment*

ISO 14043, *Environmental management — Life cycle assessment — Life cycle interpretation*

ISO 14050:2002, *Environmental management — Vocabulary*

ISO/ TR 14062, *Environmental management — Integrating environmental aspects into product design and development*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14050 and the following apply.

3.1 building environment

surroundings in which a building operates, including air, water, land, natural resources, flora, fauna, human beings and their inter relations

NOTE Surroundings in this context extend from within a building to the boundaries of the building site.

3.2 environmental impact

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

NOTE Construction products in this context include production of building components and onsite construction, operation of the building, refurbishment and deconstruction of buildings.

3.3 environmental benefit

any beneficial factor and/or advantage from a building brought to the environment

EXAMPLE Rehabilitation of the exterior physical environment, such as building on a brown field site.

3.4 environmental performance

measurable (quantitative or qualitative) effect of a building on the environment relative to a scale of values or a benchmark

NOTE 1 A positive effect of a building on the environment can be measured by the degree of the reduction of environmental impacts and by the improvement in the quality of life given to people who utilize buildings during the building life cycle.

NOTE 2 In both ISO 14031:1999 and ISO 14050:2002, environmental performance is defined as “results of an organization’s management of its environmental aspects”. Environmental performance of buildings is the result of processes of management of environmental aspects of buildings including design, construction, operation, refurbishment and deconstruction stages.

NOTE 3 The environmental performance of a building allows comparison between the interested parties’ specific requirements and the building’s environmentally related characteristics and attributes.

3.5 environmental aspect

characteristics of a building, its operation or its services that can interact with the environment

3.6 system boundary

interface between a building and the environment or other product systems

NOTE “Boundary” defines what is included and what is not included.

1) To be published.

3.7**transparency**

open, comprehensive and understandable presentation of information

3.8**interested party**

person or group having an interest in the performance or outcome of a building

NOTE 1 “Outcome” includes agreements and utilization of products.

NOTE 2 This generic definition is neither taken directly nor adapted from any other document. Elsewhere, the concept is defined specifically from the point of view of environmental performance, in ISO 14001 (with an identical definition being given in ISO 14004 and ISO 14031), of type I environmental labelling, in ISO 14024, of type III environmental declaration, in ISO/TR 14025, and of life cycle assessment, in ISO 14040.

3.9**quantitative representation**

representation of an assessment result by quantitative means

4 General aspects of environmental performance assessment**4.1 Overview**

Clause 4 deals with the general aspects of the assessment of the environmental performance of a building that are important for the application of this document.

4.2 Aim of assessment

The aim of an assessment of the environmental performance of a building is to examine the ability of the building to contribute to sustainable development with regard to the environmental dimension. It also aims to communicate and/or to improve the building's environmental performance. This can be achieved by supporting the decision-making process in design, construction, transfer, operation, refurbishment and demolition.

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

The intended use of the assessment and the life-cycle stages covered by the methods of assessment can be varied by the aim of the assessment (see 5.2).

4.3 Interested party's understanding of environmental performance**4.3.1 General**

The environmental performance of a building is related to its characteristics, and will be understood differently by interested parties depending on their viewpoints, for example:

- a building as an end-use product and integrated assembly of products (4.3.2);
- a building as a support for an active process (4.3.3);
- a building as a place to live and work, as a place of activity (4.3.4).

Methods for assessing environmental performance need to explicitly define declared criteria that account for building characteristics.

4.3.2 Buildings as end-use products and integrated assemblies of products

A building can be considered as an end-use product of itself.

A building physically consists of various elements, such as construction materials and components, which are parts of a building and its technical systems. Therefore, a building can be considered as an integrated assembly of component products, which are manufactured, used and disposed of, according to their service life. The manner of assembly is customized having regard to the project-based specific requirements of the building.

As a consequence, 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 relates to the characteristics of the building as an integrated assembly of component products. During their use, the products need to be maintained and some parts will need to be replaced. In this way, the environmental performance, which relates to the characteristics of the building as an assembly of elemental products, is subject to systematic maintenance management of the component products during their service lifetime.

For the assessment of the environmental performance that relates to the characteristics of a building as an assembly of component products, it is necessary to give a clear system boundary by which the extent of processes involved in the assessment may be clearly defined.

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

Because a building is an assembly of component products, impact assessments of building products have relevance for the assessments of environmental performance of the complete building. Some assessments of the environmental performance of buildings can be based on the aggregation of the impact assessments of the major component products and services, assuming the availability of life cycle inventory (LCI) or life cycle assessment (LCA) data for the components over the entire life cycle. The basic data for such summations should be derived in accordance with ISO 21930. Environmental product declarations (EPD) may be utilized in the assessment of buildings as established on the basis of agreed product category rules (PCR) according to ISO/TR 14025.

4.3.3 Buildings as supports for active processes

According to systemic analysis, a building can be considered as supporting an active process. Through its operation during the utilization stage, a building provides a number of services to its users as well as conditions appropriate for living, working, studying, provision of health-care, leisure activities, etc. The provision of these services involves input and output flows to make this process function. It can also be considered as an active process when, combined with other buildings or industrial equipment, it performs, for example, as part of an ecosystem (when pollution or waste from another building or equipment can be used as resources).

Therefore, the environmental performance of the building relates to the quality of services to users as well as to relevant conditions that a building generates when perceived as an active process. As an active process and in order to function, the building is provided with energy, water and various resources. Under these circumstances, a building yields the services for which it was intended and flows are incurred, including atmospheric emissions, wastewater and other waste. In addition to this, a building is linked to infrastructures both upstream and downstream, which also require energy, water and transportation energy and which generate wastes. These processes also have input and output flows.

Consequently, the environmental performance of a building relates to input and output flows that a building generates as a process.

4.3.4 Buildings as places of activity

A building can also be considered as a place of activity, such as place to live and work, where it makes an effective contribution to the creation and the life of the urban context.

Therefore, the environmental performance of the building relates to the comfort and health of its users, such as occupants, site workers, maintenance staffs and neighbours and interested parties, over the building's life cycle.

4.4 Relevance to local context

The environmental performance of a building depends on the characteristics of the climatic, social, economic and cultural context of the nation and region where the building is located.

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

Practical, relevant rules and recommendations concerning the environmental performance, existing on a national or regional basis, can be examined and improved by the use of the framework of assessment that is the basis of this part of ISO/TS 21931 (see Clause 5).

According to the objective of the assessment, the environmental performance of a building may be expressed by absolute and/or relative results. Relative results refer to local contexts. Benchmarking based on local contexts may be used for the expression by relative rules.

For comparison purposes between countries or regions, transparency is required and, as far as possible, standardized calculation methods shall be used.

NOTE The characteristics and relevance of local contexts make possible the co-existence of regional and national methods for the assessment of the environmental performance of buildings, providing that the methods are within the framework given in this part of ISO/TS 21931.

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5 Framework for assessment of environmental performance

5.1 General

Clause 5 gives the minimum requirements for the development, understanding, implementation and improvement of methods for the assessment of the environmental performance of a building.

- a) The documentation of the assessment method shall identify
 - responsible body,
 - national/regional/organizational means of recognition,
 - the process of development and revision of the method, and
 - interested party involvement.
- b) The assessment method shall involve the following elements:
 - intended use of the method (5.2);
 - definition of the system boundary (5.3);
 - statement of assumptions (5.4);