INTERNATIONAL STANDARD

ISO 21929-1

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Sustainability in building construction — Sustainability indicators —

Part 1: Framework for the development of indicators and a core set of indicators for buildings

Développement durable dans la construction — Indicateurs de développement durable —

Partie 1: Cadre pour le développement d'indicateurs et d'un ensemble d'indicateurs principaux pour le bâtiment

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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.

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 21929-1 was prepared by Technical Committee ISO/TC 59, *Buildings and civil engineering works*, Subcommittee SC 17, *Sustainability in buildings and civil engineering works*.

This first edition of ISO 21929-1 cancels and replaces ISO/TS 21929-1:2006, which has been technically revised.

ISO 21929 consists of the following parts, under the general title *Sustainability in building construction — Sustainability indicators:*

— *Part 1: Framework for the development of indicators and a core set of indicators for buildings*

A part 2 dealing with the framework for development of indicators for civil engineering works is under development.

Introduction

This part of ISO 21929 describes and gives guidelines for the development of sustainability indicators related to buildings and defines the aspects of buildings to consider when developing systems of sustainability indicators.

These guidelines form a basis for the suite of ISO/TC 59 standards intended to address specific issues and aspects of sustainability relevant to construction works. The issue of sustainable development is broad and of global concern, and, as such, involves all communities and interested parties. Both current and future needs define the extent to which economic, environmental and social aspects are considered in a sustainable development process.

The built environment (buildings and civil engineering works) is a key element in determining quality of life, and contributes to cultural identity and heritage. As such, it is an important factor in the appreciation of the quality of the environment in which society lives and works.

The building and construction sector is highly important for sustainable development because

— it is a key sector in national economies;

— it has a significant interface with poverty reduction through the basic economic and social services provided in the built environment and the potential opportunities to engage the poor in construction, operation and maintenance;

— it is one of the single largest industrial sectors and, while providing value and employment, it absorbs considerable resources, with consequential impacts on economic and social conditions and the environment;

— it creates the built environment, which represents a significant share of the economic assets of individuals, organizations and nations, providing societies with their physical and functional environment;

— it has considerable opportunity to show improvement relative to its economic, environmental and social impacts.

Over their life cycle, construction works absorb considerable resources and contribute to the transformation of areas. As a result, they can have considerable economic consequences, and impacts on the environment and human health.

While the challenge of sustainable development is global, the strategies for addressing sustainability in building construction are essentially local and differ in context and content from region to region. These strategies reflect the context, the preconditions and the priorities and needs, not only in the built environment, but also in the social environment. This social environment includes social equity, cultural issues, traditions, heritage issues, human health and comfort, social infrastructure and safe and healthy environments.

It can, in addition, particularly in developing countries, include poverty reduction, job creation, access to safe, affordable and healthy shelter, and loss of livelihoods.

This part of ISO 21929 defines a framework for the development of sustainability indicators for buildings based on the premise that sustainable development of buildings brings about the required performance and functionality with minimum adverse environmental impact, while encouraging improvements in economic and social (and cultural) aspects at local, regional and global levels. This part of ISO 21929 follows the general principles presented in ISO 15392.

Indicators are figures or other qualitative or descriptive measures that enable information on a complex phenomenon, like environmental impact, to be simplified into a form that is relatively easy to use and understand.

The three main functions of indicators are quantification, simplification and communication. Targets can also be set with the help of indicators. Changes in a building over time, and the development of changes in relation to stated objectives, can be monitored with the help of indicators. One of the important functions of an indicator with reference to decision-making is its potential to show a trend.

Sustainability indicators for construction works are required by a number of parties interested in the building and construction sector. Indicators are required in decision-making by

— developers and owners of buildings;

— designers;

— contractors;

— administrative bodies;

— users and property managers.

The building and construction sector requires sustainability indicators both for its own decision-making within design, production and management of buildings, as well as for indicating to the public and to clients the overall economic, environmental or social impact of buildings, building products and related processes.

Indicators, as well as sets and systems of indicators, for the specification, assessment and representation of the contribution of individual buildings to sustainable development can be used in many different ways. For example, among others, their application can support the following:

— design and decision-making process(es) during the planning phase of a building (e.g. design for environment, design for sustainability);

— development and application of assessment methods and certification systems (e.g. labelling);

— indicating the building performance (e.g. signalling, marketing);

— specification and verification of requirements in the context of procurement (e.g. green procurement, sustainability procurement);

— monitoring or evaluating the achievement of objectives over time (i.e. periodic review);

— accepting responsibility for impacts on the environment and society (e.g. social responsibility);

— representation of activities and results in the context of responsibility towards the economy, environment and society (e.g. sustainability reporting).

NOTE The monitoring and evaluation of objectives can contribute to the continual improvement related to a specific building or group of buildings.

This part of ISO 21929 is one in a suite of International Standards dealing with sustainability in building construction that includes the following:

a) ISO 15392, *Sustainability in building construction — General principles*;

b) ISO/TR 21932, *Building construction — Sustainability in building construction — Terminology*;

c) ISO 21929-1, *Sustainability in building construction — Sustainability indicators — Part 1: Framework for the development of indicators and a core set of indicators for buildings*;

d) ISO 21930, *Sustainability in building construction — Environmental declaration of building products*;

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

This part of ISO 21929 deals with sustainability indicators and includes a core system of indicators for buildings. The relationship among the International Standards is elaborated in Figure 1.

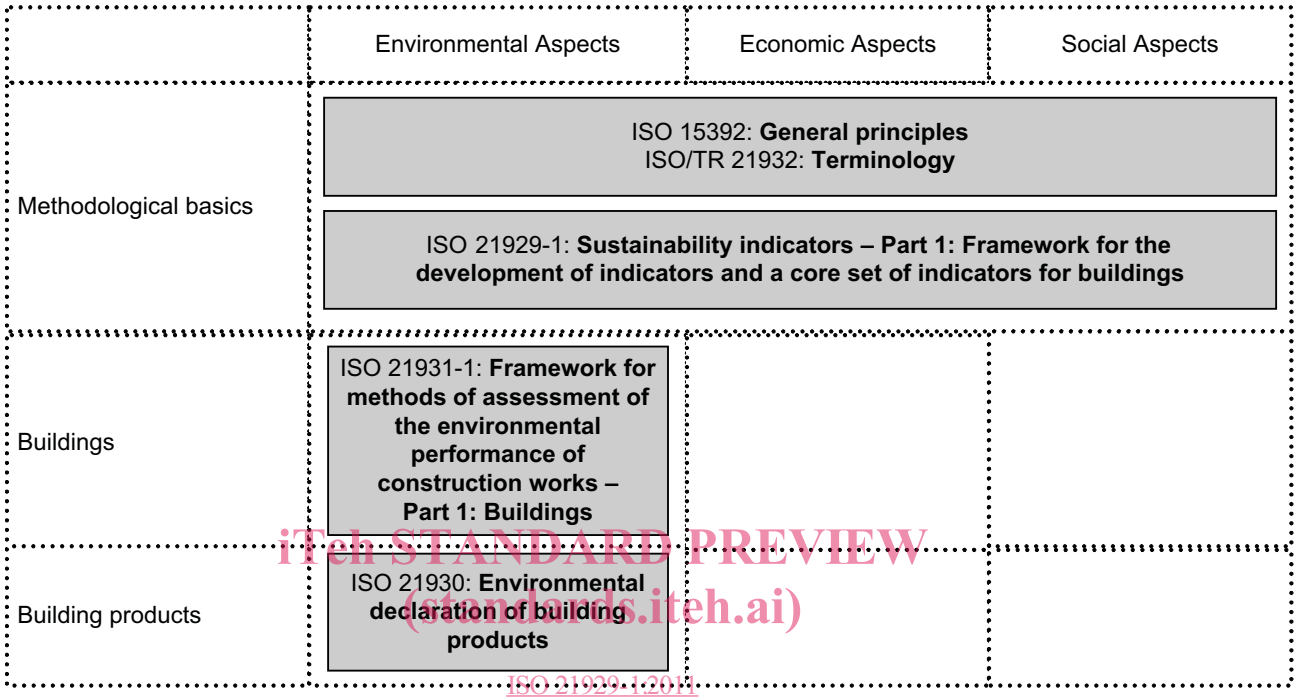

Figure 1 — Suite of related International Standards for sustainability in buildings and civil engineering works

Sustainability in building construction — Sustainability indicators —

Part 1: Framework for the development of indicators and a core set of indicators for buildings

1 Scope

This part of ISO 21929 establishes a core set of indicators to take into account in the use and development of sustainability indicators for assessing the sustainability performance of new or existing buildings, related to their design, construction, operation, maintenance, refurbishment and end of life. Together, the core set of indicators provides measures to express the contribution of a building(s) to sustainability and sustainable development. These indicators represent aspects of buildings that impact on areas of protection related to sustainability and sustainable development.

The object of consideration in this part of ISO 21929 is a building or a group of buildings and the external works within the site (curtilage).

This part of ISO 21929 follows the principles set out in ISO 15392 and, where appropriate, is intended for use in conjunction with, and following the principles set out in, ISO 26000, ISO 14040 and the family of International Standards that includes ISO 14020, ISO 14021, ISO 14024 and ISO 14025. Where deviation occurs or where more specific requirements are stated, this part of ISO 21929 takes precedence.

This part of ISO 21929

— adapts general sustainability principles for buildings;

— includes a framework for developing sustainability indicators for use in the assessment of economic, environmental and social impacts of buildings;

— determines the aspects for consideration when defining a core set of sustainability indicators for buildings;

— establishes a core set of indicators;

— describes how to use sustainability indicators;

— gives rules for establishing a system of indicators.

This part of ISO 21929 does not give guidelines for the weighting of indicators or the aggregation of assessment results.

NOTE In addition to the core set of indicators defined in this part of ISO 21929, the use of other sustainability indicators can be relevant in the local context when assessing or setting targets for a building's contribution to sustainability. Examples and information about these other sustainability indicators are given in 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 14020, *Environmental labels and declarations — General principles*

ISO 14021, *Environmental labels and declarations — Self-declared environmental claims (Type II environmental labelling)*

ISO 14024, *Environmental labels and declarations — Type I environmental labelling — Principles and procedures*

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

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

ISO 14050, *Environmental management — Vocabulary*

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

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

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6707-1, ISO 15392, ISO 14040, ISO 14050, and the following apply. Where differences or conflicts occur, the definitions given in 3.1 to 3.39 take precedence.

NOTE 1 Several terms and definitions from these other sources have been repeated below for ease of reference.

NOTE 2 ISO/TR 21932 is another source of terminological data on concepts related to sustainability in buildings and sustainable development that is applicable to the different aspects of both the construction (process) and use of a building and the effect of the building on sustainability.

3.1
access to services
availability and accessibility of services outside the building

NOTE Services can include public transportation, parking, entertainment, health-care, water and energy supply, etc.

[ISO 15392:2008]

3.2
accessibility
ability to enter a space with ease

NOTE 1 Requirements for accessibility depend on the users' requirements, as well as on activities during the life cycle of the building, e.g. construction work, maintenance and deconstruction.

NOTE 2 “Barrier-free use of buildings” relates to requirements for accessibility by users with reduced mobility.

NOTE 3 Adapted from ISO 6707-1:2004, 9.3.80.

3.3
acoustic comfort
reaction of occupants to the indoor acoustical environment, described in terms of sound pressure level and audibility

[ISO 16813:2006]

3.4
adaptability
ability to be changed or modified to make suitable for a particular use

[ISO 6707-1:2004]

3.5
areas of protection
protection area
issue of concern
aspect(s) of the economy, the environment or society that can be impacted by construction works, goods or services

EXAMPLES Asset value, cultural heritage, resources, human health and comfort, social infrastructure.

NOTE Adapted from ISO 15392:2008, 3.3.

3.6
building
construction works that have the provision of shelter for its occupants or contents as one of its main purposes; usually partially or totally enclosed and designed to stand permanently in one place

[ISO 6707-1:2004, 3.1.3]

3.7
built environment
collection of man-made or induced physical objects located in a particular area or region

NOTE 1 When treated as a whole, the built environment typically is taken to include buildings, external works (landscaped areas), infrastructure and other construction works within the area under consideration.

NOTE 2 Adapted from ISO 6707-1:2004, 10.3.

3.8
disposal
⟨status change⟩ transfer of ownership of, or responsibility for, the object of consideration

3.9
disposal
⟨end of life⟩ transformation of the state of a building or facility that is no longer of use

NOTE Transformation can include, either individually or in some combination, the decommissioning, deconstruction, recycling and demolition of the object of consideration.

3.10
economic indicator
sustainability indicator related to an economic impact

3.11
environmental indicator
sustainability indicator related to an environmental impact

3.12
functional performance
type and level of functionality that is required by stakeholders of a facility, building or other constructed asset, or of an assembly, component or product thereof, or of a movable asset, for a specific function

[ISO 15686-10:2010]

3.13
functionality
suitability or usefulness for a specific purpose or activity

[ISO 15686-10:2010]

3.14
heat island effect
phenomenon of elevated temperatures in urban and suburban areas compared to their outlying rural surroundings

NOTE The temperatures can be influenced by various aspects, including the presence of denuded landscaping, impermeable surfaces, massive buildings, heat-generating vehicles and machines and pollutants.

3.15
impact category
class representing an economic, environmental or social issue(s) of concern (areas of protection) to which analysis (assessment) results may be assigned

NOTE 1 Issues of concern can involve either impacts or aspects related to the economy, the environment or society.

NOTE 2 Adapted from ISO 14040:2006, 3.40.

3.16
indicator
quantitative, qualitative or descriptive measure representative of one or more impact categories

NOTE 1 Periodic evaluation and monitoring using indicators can show direction of any impact.

NOTE 2 Adapted from ISO 14040:2006, 3.40.

3.17
indoor air quality
quality of air inside a building, described in terms of odour, chemical and biological pollutants

NOTE 1 Indoor air quality is directly related to the ventilation rate, air distribution patterns and pollution sources.

NOTE 2 Indoor air quality is important in ensuring human health, olfactory comfort and perceived comfort.

NOTE 3 Adapted from ISO 16813:2006, 3.21. The definition has been simplified to refer to a building in general, versus only non-industrial buildings, and the non-essential but relevant characteristics are now referenced in notes.

3.18
interested party
person or group concerned with or affected by the environmental performance of a building

[ISO 21931-1:2010]

3.19
level of functionality
number indicating the relative functionality required for a user group or customer for one topic on a predetermined demand scale from the level of the least (functionality) to the level of the most (functionality)

NOTE The level of functionality can be the consequence of several distinct functions required to act in combination.

EXAMPLE Scale of integers from 0 to 9.

[ISO 15686-10:2010]

3.20
level of serviceability
number indicating the relative serviceability (capability of a facility) for a user group or customer for one topic on a predetermined supply scale from the level of the least (serviceability) to the most (serviceability)

NOTE The level of serviceability can be the consequence of several distinct physical features acting in combination.

EXAMPLE Scale of integers from 0 to 9.

[ISO 15686-10:2010]

3.21
life cycle
consecutive and interlinked stages of the object of consideration

NOTE 1 For consideration of environmental impacts and environmental aspects, the life cycle is comprised of all stages, from raw material acquisition or generation of natural resources to final disposal.

NOTE 2 For consideration of economic impacts and economic aspects, in terms of costs, the life cycle is comprised of all stages from construction to decommissioning. A period of analysis can be chosen to be different from the life cycle; see ISO 15686-5.

NOTE 3 Adapted from ISO 14040:2006, 3.1.

3.22
life-cycle cost
LCC
cost(s) of an asset or its parts throughout its life cycle, while fulfilling its performance requirements

[ISO 15686-1:2000]

3.23
life-cycle costing
methodology for systematic economic evaluation of life-cycle costs over a period of analysis, as defined in the agreed scope

NOTE Life-cycle costing can address a period of analysis that covers the entire life cycle or (a) selected stage(s) or periods of interest thereof.

[ISO 15686-5:2008]

3.24
maintainability
ability to retain a building in a state in which it can perform its required functions or to restore a building to such a state when a fault occurs

NOTE Adapted from ISO 6707-1:2004, 9.3.89. The definition has been simplified to refer to a building in general, versus specific components or construction.