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Buildings and building-related facilities — Functional and user requirements and performance — Tools for assessment and comparison

Bâtiments et biens immobiliers associés — Exigences fonctionnelles, exigences de l'utilisateur et performances — Outils pour l'évaluation et la comparaison

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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 11863 was prepared by Technical Committee ISO/TC 59, *Buildings and civil engineering works*, Subcommittee SC 3, *Functional/user requirements and performance in building construction*.

Buildings and building-related facilities — Functional and user requirements and performance — Tools for assessment and comparison

1 Scope

This International Standard specifies how to determine functional performance requirements (demand) for buildings and building-related facilities, and how to check the capability of buildings and facilities to meet identified requirements (supply). It specifies how to determine the relative importance of each requirement, establish thresholds for capability, and evaluate the significance of differences between what is required and actual capabilities.

This International Standard is applicable to any size or scope of assets of buildings and building-related facilities, e.g. to a portfolio of assets at a single site or multiple sites, to assets of a single small building, and to any constituent system, sub-system, component or element thereof. It is applicable to a range of roles, from owners and managers to occupants, tenants, or other users or stakeholders. It is applicable to any asset type within the field of buildings and civil engineering works, including certain public works, equipment and materiel. It is particularly useful for entities having control or occupancy of a portfolio of such assets.

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 15686-10, *Buildings and constructed assets — Service life planning — Part 10: When to assess functional performance*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6707-1 and the following apply.

3.1
aspect
⟨functionality or serviceability⟩ part or set of parts of the **functionality** (3.15) or **serviceability** (3.28) of an **asset** (3.2), building or building-related **facility** (3.10)

NOTE An aspect usually encompasses multiple **topics** (3.33) of functionality or serviceability.

3.2
asset
⟨building or building-related facility⟩ whole building or structure or unit of construction works, or a system or component or part thereof

3.3
behaviour in service
manner in which an **asset** (building or building related facility) (3.2) actually functions in its intended place and use

3.4
calibrate
set the proper intervals between marks or **levels** (3.17) (3.18) (3.19) of a **scale** (3.26) (as a measuring instrument)

3.5
calibration
act of marking the **scale** (3.26) of a measuring instrument used to determine the proper separation between marks or **levels** (3.17) (3.18) (3.19)

3.6
capability
measure of ability to perform and support a **function** (3.12)

3.7
critical level
⟨of functionality⟩ **level** (3.17) (3.18) (3.19) at which resources necessary for work or other **functions** (3.12) are essential or critical

3.8
demand
⟨of a facility⟩ requirement for **functionality** (3.15)

3.9
demand scale
scale (3.26) for use in determining the **level of functionality** (3.17) of a **facility** (3.10) on one **topic** (3.33) of **functional performance** (3.13)

3.10
facility
physical setting used to serve a specific purpose

NOTE 1 A facility can be part of a building, or a whole building, or more than one building, and can include related constructions (such as roads and walkways), which, taken as a whole, serve a specific function.

NOTE 2 The term encompasses both the physical object(s) and its (their) use.

3.11
feature
element or attribute of a **facility** (3.10) which indicates an aspect of its **serviceability** (3.28)

3.12
function
purpose or activity of **users** (3.34) and other **stakeholders** (3.29) for which an **asset** (3.2) or a **facility** (3.10) is designed, used, or required to be used

3.13
functional performance
⟨of a facility⟩ **performance** (3.20) of a **facility** (3.10) to support required **function**(s) (3.12) under specified use conditions

NOTE See also **performance** ⟨of a facility⟩ (3.20).

3.14
functional performance requirement
type and level of **functional performance** (3.13) which is required by stakeholders of a **facility** (3.10), building or other constructed **asset** (3.2), or of an assembly, component or product thereof, or of a movable asset, for a specific activity or **function** (3.12)

3.15
functionality
suitability or usefulness for a specific purpose or activity

3.16
gap
difference between the **level of functionality** (3.17) (or other attribute) which is required and the **level of serviceability** (3.19) (capability) which is or will be provided

3.17
level of functionality
number indicating the relative **functionality** (3.15) for a group of **users** (3.34) or other **stakeholders** (3.29) for one **topic** (3.33) on a predetermined **demand scale** (3.9) from the level of the least **functionality** (3.15) to the level of the most **functionality** (3.15)

NOTE Level of functionality can be the consequence of several distinct **functions** (3.12) required to act in combination.

EXAMPLE Scale of integers from 0 to 9.

3.18
level of performance
number indicating the relative **performance** (3.20) required or provided for one topic on a predetermined scale (3.26) ranging from the level of the least **performance** (3.20) to the level of the most **performance** (3.20)

NOTE **Level of performance** can be the consequence of several distinct **performances** [**behaviours in service** (3.3)], of which one can be **functional performance** (3.13), which act in combination.

EXAMPLE Scale of integers from 0 to 9.

3.19
level of serviceability
number indicating the relative capability of a **facility** (3.10) for a group of **users** (3.34) or other **stakeholders** (3.29) for one **topic** (3.33) on a predetermined **supply scale** (3.31) from the level of the least **serviceability** (3.28) to the most **serviceability** (3.28)

NOTE Level of serviceability can be the consequence of several physical **features** (3.11) acting in combination.

EXAMPLE Scale of integers from 0 to 9.

3.20
performance
⟨of a facility⟩ **behaviour in service** (3.3) of a **facility** (3.10) for a specified use

NOTE The scope of this **performance** is of the **facility** (3.10) as a system, including its subsystems, components and materials, and their interactions, such as those of an acoustical, hydro-thermal, or economic nature, and the **relative importance** (3.25) of each **performance requirement** (3.21).

3.21
performance requirement
⟨of a facility⟩ **performance** (3.20) demanded or expected of a **facility** (3.10) for a specified use

NOTE Adapted from ISO 6707-1:2004, definition 9.1.16.

3.22
profile
〈of a facility〉 list of the **levels of functionality** (3.17) required by **stakeholders** (3.29) for a **facility** (3.10), or of the **levels of serviceability** (3.19) provided by a facility, with respect to various **topics** (3.33)

3.23
rater
individual who conducts the **rating** (3.24) of a **facility** (3.10), or of the design of a **facility**, to determine its **profile** (3.22) of **serviceability** (3.28)

3.24
rating
process of determining the **serviceability** (3.28) of a constructed **asset** (3.2), or of an **asset** which has been designed but not yet built

3.25
relative importance
importance of any one **topic** (3.33) of **functionality** (3.15) for the operations or mission of the **users** (3.34)

3.26
scale
single set of statements, in which intervals between statements, from the most to the least, are calibrated according to scalar rules

NOTE When people are asked to select one of the statements in a scale as most closely describing the **level of functionality** (3.17) required, or as best describing the physical features present in a facility, the scale in effect functions as a multiple choice questionnaire.

3.27
service life
period of time after installation during which a **facility** (3.10) or its component parts meet(s) or exceed(s) the **performance requirements** (3.21)

NOTE Adapted from ISO 6707-1:2004, definition 9.3.84.

3.28
serviceability
capability (3.6) of a **facility** (3.10), building or other constructed **asset** (3.2), or of an assembly, component or product thereof, or of a movable asset, to support the **function**(s) (3.12) for which it is designed, used, or required to be used

NOTE Adapted from ISO 6707-1:2004, definitions 9.1.11 (capability) and 9.3.05 (serviceability).

3.29
stakeholder
person or entity with an interest in, or concern about, a **facility** (3.10)

NOTE The interest can include a financial interest, and can be continuing or temporary, as of a visitor.

3.30
suitability
〈of a facility〉 appropriateness for supporting the **functions** (3.12) or activities of **users** (3.34) or **stakeholders** (3.29)

3.31
supply scale
scale (3.26) for use in determining the **level of serviceability** (3.19) of a facility on one **topic** (3.33) of **capability** (3.6)

3.32
threshold level
number indicating the **level of functionality** (3.17) which, if not provided, would significantly or completely impair the ability of **users** (3.34) to carry out their intended activities or operations

3.33
topic
single attribute of a **facility** (3.10) for which **level of functionality** (3.17), **level of serviceability** (3.19), **threshold level** (3.32) and **relative importance** (3.25) can be determined

3.34
user
organization, person, animal or object which uses, or is intended to use, a building or other construction works

NOTE 1 Includes any person or entity who uses a **facility** (3.10), whether as occupant, visitor, member of the public, or other **stakeholder** (3.29).

NOTE 2 Adapted from ISO 6707-1 2004, definition 8.1.

3.35
whole life
period of time commencing with the process of definition of need, before a project is explicitly launched, continuing through the process of acquisition and including the end of life period, decommissioning, deconstruction or disposal

NOTE 1 Whole life cycle includes all factors considered in whole life costing.

NOTE 2 Life cycle is less inclusive. It is the period of time from completion of construction or from a selected date to the end of life of the **asset** (3.2), including the end of life period, decommissioning, deconstruction or disposal, or to termination of a period of analysis.

4 How to determine levels of functional performance requirements and levels of serviceability

4.1 Requirements for functional performance

The requirement for each topic (or aspect) of functionality of an asset building or building-related facility shall incorporate either one specific function or several specific functions which act in combination for that topic. Each such requirement shall be expressed as a level of demand. The level of demand for each function shall be identified using a demand scale.

Typically, the level of demand is a minimum level. If the level of demand is a maximum value, that shall be so indicated, as an exception.

Each demand scale shall contain a set of statements of functional performance requirements, one statement for each level from the lowest requirement to the highest requirement and one statement for “no requirement” or “shall not have” (which shall be level 0).

Demand scales for any functional type (category) of building or building-related facility shall be written in language (terms and concepts) which are familiar to the users of that functional type. The scales shall enable any occupant, owner, manager, user, visitor or other stakeholder — without guidance or technical assistance — to select a block of text from a demand scale that best describes what they need to be able to do, see, feel, hear or experience while in or near a facility.

Demand scales shall use statements of requirements for functionality that will apply to many users of a functional category of facilities. A demand scale shall not be used to comply with this International Standard if a requirement in it is unique to a single stakeholder. This is because comparing requirement levels of different

stakeholders is only possible when each set of levels of demand is determined using the same scales, which are suitable for the same functional category.

If a suitable set of demand scales is not available, it shall be created.

Examples of the format for such scales are included in Annex B, and in References [1], [2], [3], [13], and [14] in the Bibliography.

4.2 Serviceability

The serviceability for each topic of functionality shall be indicated by one feature or by a combination of features which act in combination for that topic. The level of supply for each feature shall be indicated using one supply scale. The level of supply for a topic shall be indicated by the level of supply for the feature or combination of features

Each supply scale shall contain a set of statements of serviceability, one statement for each level from the lowest serviceability to the highest serviceability and one statement for “not present” (which shall be level 0).

Supply scales shall use, as indicators of serviceability, descriptions of features for serviceability that will apply to many facilities of a functional category. A supply scale shall not be used to comply with this International Standard if the indicator in it is unique to a single unique asset. This is because comparing rating levels of different buildings or building-related facilities is only possible when each set of levels has been determined using the same scales, which are suitable for the same functional category.

If a suitable set of supply scales is not available, it shall be created.

Supply scales for any functional type of building or building-related facility shall be written in language (terms and concepts) which can be understood by individuals who work in or are qualified in the field of providing or managing facilities and related constructed assets, but who are not experts. The levels within each scale shall offer indicators of what is likely to be physically present in that functional category of facility. The indicators shall be observable, easily noted without instrumentation, and suitable as a consistent indicator of serviceability, that is the capability of a facility to meet a given functional performance requirement at a specific level of demand.

Examples of the format for such scales are included in Annex B, and in References [1], [2], [3], [13], and [14] in the Bibliography.

4.3 Number of statements and of levels in a scale

The demand and supply scales are matched so that the statement in a supply scale at any level indicates that the serviceability meets the performance requirement in the demand scale at that level.

There is not a mandatory count of levels or statements in a pair of scales (demand and supply scales on a topic). Five statements is the recommended count of statements in a demand scale and in the matching supply scale, plus a statement for level 0. If for a particular topic it is not possible to define five statements which are significantly different from each other, then it is recommended that the count be reduced to four or to three statements, or in exceptional and rare cases to two statements, one of which shall be at what would be taken as the middle level if there were five statements.

It is recommended that each level be designated by a single-digit integer, from 9 to 1, plus 0. If another count is used, for instance 5 to 1 plus 0, or 99 to 1 plus 0, or 9,99 to 1,00 plus 0, then provide guidance on how to compare such levels to scales in which the levels do conform to the recommendation. When there are five statements plus zero, and the levels are expressed as single-digit integers; the recommended numbering of statements in a scale is 1, 3, 5, 7 and 9, with 1 being the statement for least of that topic, and 9 being the statement for most of that topic. This enables the in-between even levels to be used when the individual choosing a level considers that the correct level is in between two statements. For some topics, it can be helpful to also provide a statement at level 2.

If five statements is the normal count, but less than five statements are used, then the statements shall be numbered so as to represent what their positions would be if there were five statements. For instance, if there are only three statements, then one shall be numbered 5 for typical, one shall be numbered 9 for most, and one shall be numbered 1 for least.

4.4 Calibration and normalization of scales

In each of the supply scales, one of the statements, typically the middle supply statement, shall describe the indicators of the feature which is actually most typically provided or installed in that region, country or locality, for that topic. The demand statement at that typical level shall be the demand (requirement) statement which would require that typical supply level of serviceability. Therefore, this demand statement is not automatically what is typically required. Instead, it can actually be more or less demanding than what is most typically provided or installed.

4.5 Complex topics with multiple functions

For a complex topic, for which the functional performance requirement involves several functions which act in combination to define that requirement, a separate demand scale shall be created for each function, and the scales shall then be grouped under one topic.

The demand level for a complex topic, involving several functions which act in combination, shall be taken as the whole number (integer) closest to the arithmetic mean (average) of the demand levels for the various functions. If the average is at the mid-point between two whole numbers (e.g. $\times$ 0,5), the level shall be reported as the nearest odd whole number.

For a complex topic, for which the serviceability is indicated by a combination of features which act in combination for that topic, a separate supply scale shall be created for each feature, and the scales shall then be grouped under one topic.

The supply level for a complex topic, involving several features which act in combination, shall be taken as the whole number (integer) closest to the arithmetic mean (average) of the supply levels for the various features. If the average is at the mid-point between two whole numbers (e.g. $\times$ 0,5), the level shall be reported as the nearest odd whole number.

4.6 Relative importance of requirements

When people are setting requirement levels for a topic, they shall be asked to indicate whether that requirement is “exceptionally important”, “important”, or of “minor importance” compared to other topics being considered.

For individual stakeholders or groups of stakeholders, at a specific time, requirements on some topics are more important than requirements on other topics. Setting more fine-grained distinctions of relative importance is discouraged, because experience shows that asking for more than three possible responses leads to results which are not sufficiently replicable.

4.7 Threshold or critical level

When identifying a demand level on each demand scale, the respondent shall be given the opportunity to indicate a critical level of functionality which, if not provided, would significantly or completely impair the ability of users or other stakeholders to carry out their intended activities or operations or mission. This level can be the same as, or can be quite different from, the level of demand. This level shall be designated as the “threshold level”.

Typically, the threshold level is a minimum level of demand. If the threshold level is a maximum value, that shall be so indicated, as an exception.

NOTE Threshold levels are often indicated for “exceptionally important” topics, and less frequently for “important” topics or topics of “minor importance”.