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Buildings and constructed assets — Service-life planning —

Part 9: Guidance on assessment of service-life data

Bâtiments et biens immobiliers construits — Prévision de la durée de vie —

Partie 9: Lignes directrices pour l'évaluation des données de durée de vie

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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 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order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn.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again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.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 15686-9 was prepared by Technical Committee ISO/TC 59, *Building construction*, Subcommittee SC 14, *Design life*.

ISO 15686 consists of the following parts, under the general title *Buildings and constructed assets — Service-life planning*:

— *Part 1: General principles*

— *Part 2: Service life prediction procedures*

— *Part 3: Performance audits and reviews*

— *Part 5: Life-cycle costing*

— *Part 6: Procedures for considering environmental impacts*

— *Part 7: Performance evaluation for feedback of service life data from practice*

— *Part 8: Reference service life and service-life estimation*

— *Part 9: Guidance on assessment of reference service-life data* [Technical Specification]

Data requirements and procedures for considering functionality and serviceability are to form the subjects of a future Part 4 and Part 10.

Introduction

ISO 15686 addresses the issue of service-life planning. The objective of service-life planning is to ensure that the actual service life of a building or other constructed asset will equal or exceed its design life. Reference service-life data are required to enable the service life of a building or other construction works to be predicted. This part of ISO 15686 gives guidance on the provision of reference service-life data for use in service-life planning.

Service-life data are a prediction of future performance under stated in-use conditions and are not a guarantee. The procedure requires knowledge of the intended use of the components to be incorporated in the works and of the expected in-use conditions to which they will be subject. Service life is directly related to the use and the in-use conditions.

It is important to note that this is a voluntary procedure, in that it is not required for compliance with regulatory processes. However, with increasing use of performance specifications (rather than prescriptive specifications), there is an increasing global interest in whole-life or life-cycle issues and increasing client interest in obtaining service-life data.

Buildings and constructed assets — Service-life planning —

Part 9:
Guidance on assessment of service-life data

1 Scope

This part of ISO 15686, a Technical Specification, gives guidance for the derivation and presentation of reference service-life data.

This part of ISO 15686 is applicable to manufacturers or producers that provide reference service-life data for use in service-life planning in accordance with ISO 15686-1, ISO 15686-2, ISO 15686-3, ISO 15686-5, ISO 15686-6, ISO 15686-7 and ISO 15686-8.

NOTE Throughout this part of ISO 15686, unless the context indicates otherwise, the term “building” should be read to mean “building or other construction works or constructed assets”. In addition, unless the context indicates otherwise, the term “component” should be read to mean “material, product, component, assembly or system”.

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 15686-1:2000, *Buildings and constructed assets — Service life planning — Part 1: General principles*

ISO 15686-2, *Buildings and constructed assets — Service life planning — Part 2: Service life prediction procedures*

ISO 15686-3:2002, *Buildings and constructed assets — Service life planning — Part 3: Performance audits and reviews*

ISO 15686-5, *Buildings and constructed assets — Service-life planning — Part 5: Life-cycle costing*

ISO 15686-6, *Buildings and constructed assets — Service life planning — Part 6: Procedures for considering environmental impacts*

ISO 15686-7, *Buildings and constructed assets — Service life planning — Part 7: Performance evaluation for feedback of service life data from practice*

ISO 15686-8:2008, *Buildings and constructed assets — Service-life planning — Part 8: Reference service life and service-life estimation*

3 Terms and definitions

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

3.1
data record
set of **reference service-life data** (3.3) compiled into a prescribed format

3.2
reference service life
RSL
service life (3.4) of a component which is known to be expected under a particular set, i.e., a reference set, of in-use conditions and which may form the basis of estimating the service life under other in-use conditions

3.3
reference service-life data
RSL data
information that includes the **reference service life** (3.2) and any qualitative or quantitative data describing the validity of the reference service life

EXAMPLE Typical data describing the validity of the RSL include the description of the component for which they apply, the reference in-use conditions under which they apply, and their quality.

NOTE The RSL data are reported in a **data record** (3.1).

3.4
service life
period of time after installation during which a building or its parts meets or exceeds the performance requirements

[ISO 15686-1:2000, definition 3.1.1]

NOTE Adapted from ISO 6707-1.

4 Estimation of service-life data

4.1 General

An estimate of the service life of a whole building should be built up from estimates of the service life of all the relevant components that comprise the building. Estimates should be based on a reference service life, as defined in 3.2 and described in detail in ISO 15686-8.

Estimated service life should take account of the aspects that will influence the performance and degradation of the components throughout their service life and will therefore modify the reference service life, including:

a) inherent performance of the component;

b) design level of the works;

c) standards of workmanship (or work execution level);

d) indoor environment;

e) outdoor environment;

f) usage conditions;

g) maintenance level.

NOTE These aspects are based on the factor categories defined in ISO 15686-8.

The manufacturer or producer only has a direct influence on the first of these aspects, the inherent performance of the component. However, the manufacturer or producer normally holds key data on the performance of the component and should also be able to provide information or give guidance on the influence of several of the other aspects on the service life of the component.

This information or guidance may include:

a) manufacturer's or producer's data on the quality of the component, including any special properties;

b) critical design requirements, including, for example, a minimum angle of slope and minimum overlaps for the installation of a clay or concrete roof tile. Below this angle or overlap the roof may be subject to driving rain penetrating upwards between overlapping tiles;

c) requirements for installation to be carried out by a particular method or by operatives with specialized skills, such as the need for an installer of roof-mounted photovoltaic panels to be trained to install the flashings to prevent rain penetration;

d) information about suitability for installation or use in certain internal environmental conditions. For example, some decorative coatings should not be used in kitchens or bathrooms;

e) suitability for installation in certain outdoor environments, such as a marine environment where anodized aluminium is not suitable. Manufacturers or producers should indicate any unsuitable indoor or outdoor environments;

f) guidance relating to intensity of use, for example a flooring product may be designed for volumes of traffic found in a home, or an office, or retail premises. Again, this can be stated by the manufacturer or producer;

g) maintenance requirements, for example an external wood stain may require re-treatment every two years to continue to provide the stated performance.

When producers give the reference service life, they shall describe the intended use and assumed reference in-use conditions.

4.2 Sources of data

4.2.1 General

Service-life data may be obtained from several sources. Wherever possible, service-life data should be based on well-documented practical experience of performance in service in known in-use conditions. These may include feedback data in accordance with ISO 15686-7 or data resulting from prediction procedures in accordance with ISO 15686-2.

4.2.2 Service-life data from performance in use

Wherever possible, performance data that have been obtained from practical experience of actual performance under clearly documented in-use conditions should be used for service-life prediction. Evidence of performance in use should be documented to ensure transparency.

NOTE ISO 15686-7 gives further guidance on the use of feedback data from actual performance.

4.2.3 Service-life data from testing

4.2.3.1 Where actual performance data under clearly documented in-use conditions are not available, test data should be used for service-life prediction. If properly documented test data are already available, they should be used without further testing. Where further testing is required, it should be performed in accordance with ISO 15686-2.

4.2.3.2 There are two categories of testing, direct and indirect.

— Direct testing: the achievement of a certain level of performance in a test of a particular property is recognized as being direct evidence of expected service life (e.g. abrasion, fatigue, closing and impact tests).

— Indirect (proxy) testing: the measurement of "proxy" characteristics that can be correlated to actual performance and hence service life (e.g. porosity for freeze-thaw resistance and hardness for abrasion resistance).

4.2.3.3 Tests may be long-term, short-term or a combination of both. They may be carried out using small-scale or full-scale specimens, or a combination of both.

a) Long-term tests may include:

   — field exposure;

   — exposure in experimental buildings.

b) Short-term tests may include:

   — accelerated short-term tests;

   — short-term in-use exposures.

4.2.3.4 Tests may be either:

— natural weathering/aging tests, which either give a direct indication of service life (e.g. corrosion tests) or enable normal performance tests to be carried out after treatment, thus allowing the likely degradation under in-use conditions to be determined, or

— accelerated weathering/aging tests, in which the normal aging process is speeded up to reduce the duration of the test. Care should be taken to ensure that degradation mechanisms are accelerated and not significantly altered in such tests.

4.3 Performance characteristics

Where it is considered appropriate to undertake testing or assessment to derive the required data for service-life prediction, the performance characteristics relevant to the test or assessment programme should be defined.

The relevant characteristics should be defined by producers, specifiers or a technical committee producing a product standard.

4.4 Specification of the service-life environment

The environment or range of environmental conditions in which the product component, material or assembly is intended to be used should be stated. Any test or assessment regime that is developed should ensure that the performance is characterized for the whole range of environmental conditions in which the product, component, material or assembly is intended to be used.

Where appropriate, different environmental exposure conditions should be stated, in order to differentiate anticipated performance under the anticipated range of in-use conditions. For example, plastics may be expected to last longer if not exposed to UV radiation.

The relevant characteristics should be defined by producers, specifiers or a technical committee producing a product standard.

4.5 Specification of degradation agents and intensities

The appropriate and relevant degradation agents likely to influence each performance characteristic over time under the anticipated service conditions should be identified.

The relevant characteristics should be defined by producers, specifiers or a technical committee producing a product standard.

4.6 Testing

Where testing or assessment is the chosen route to providing service-life data, tests or assessment procedures that establish performance over time for the range of anticipated service conditions should be used.

5 Provision of reference service-life data

5.1 General

The information described in 5.2 to 5.4 should be included with reference service-life data.

5.2 Material/component

A detailed description of the product, component, material or assembly, its intended uses and any limits on in-use conditions for which it is suitable should be provided.

Components may have several possible applications or intended uses. Each end use may be addressed separately, and guidance may be given on the end uses to which the service-life data provided are relevant.

5.3 Methodology used to derive reference service-life data

The methodology used to derive the reference service life should be reported.

NOTE See ISO 15686-8:2008, 5.2.

The data sources used and a brief explanation of the reasons for their use should be provided.

5.4 Reference in-use conditions

The reference service (in-use) conditions and degradation agents to which the component is expected to be exposed in service should be given. Where the reference (in-use) conditions assume specific provisions for particular measures, these should be stated. Such measures may include:

— use of a protective coating or cover;

— use of a given (minimum) thickness of material;

— recommendations on installation conditions in the works;

— recommended maintenance requirements.

Assessment or testing under particular conditions provides a reference service life under the prescribed conditions. This may be stated as either a single value (e.g. a mean value) or a statistical distribution.

The reference in-use conditions, as well as the reference service life, should be stated so that users of the data can judge the possible differences between the reference in-use conditions and the likely actual in-use conditions in a particular case.

NOTE 1 For further information on reference service life, see ISO 15686-8. Guidance on the recording of reference service-life data is given in ISO 15686-8:2008, 5.4 and Annex B.

NOTE 2 Common sets of reference in-use conditions may be defined by producers or users of products, in order to facilitate comparison of service-life data for a number of products within the same product family.

5.5 Data quality and reliability of data

Sources of data and any third party assessment or test results should be provided to enable the data user to assess the quality of the data.

NOTE 1 This is essential to enable them to judge the quality of the service-life prediction they are undertaking, and to enable risk of error to be adequately considered.

NOTE 2 For further consideration of data quality, see ISO 15686-3:2002, Table 1.

Bibliography

[1] ISO 6707-1:2004, *Building and civil engineering — Vocabulary — Part 1: General terms*

[2] European Commission. *Construction Products Directive Guidance Paper F — Durability and the Construction Products Directive* [online]. [Brussels, Belgium]: European Commission, 1999 (revised 2004) [cited 17 March 2006] Available from the World Wide Web: <http://europa.eu.int/comm/enterprise/construction/internal/guidpap/guidpap_en.htm>

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