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Buildings and constructed assets — Service life planning —

Part 1: General principles

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

Partie 1: Principes généraux

Reference number
ISO 15686-1:2000(E)

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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 3.

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 part of ISO 15686 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 15686-1 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 4: Data requirements*

— *Part 5: Life cycle costing*

Annexes A to F of this part of ISO 15686 are for information only.

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Introduction

Service life planning is a design process which seeks to ensure, as far as possible, that the service life of a building will equal or exceed its design life, while taking into account (and preferably optimizing) the life cycle costs of the building. This part of ISO 15686 provides a methodology for forecasting the service life and estimating the timing of necessary maintenance and replacement of components. It thereby provides a means of comparing different building options. It also allows for checking that performance is not unacceptably reduced to meet budgetary constraints during design development.

This part of ISO 15686 is intended primarily for:

— building owners and users;

— design, construction and facilities management teams;

— manufacturers who provide data on long-term performance of products;

— maintainers of buildings;

— valuers of buildings;

— insurers of buildings;

— technical auditors of buildings;

— those who develop or draft product standards.

It includes an introduction to predictions of long-term performance based on exposure and performance evaluation and estimates based on applying factors to adjust a reference service life, but it does not deal in detail with forecasts based on demonstrated performance or modelling of performance. However, judgements based on either of these techniques may provide important inputs to a factored estimate of service life.

A major impetus for production of this part of ISO 15686 has been concern over industry's need to forecast and control the cost of building ownership, because a high proportion of the life cycle costs of a building may be set by the time the building is complete. Where there is a large stock of older buildings, more than half of all construction expenditure is spent on maintenance and refurbishment (see annex A for details of typical maintenance costs in the UK and USA). For countries currently developing their building stock, the risk is that a similar pattern will occur if long-term performance is not taken into account at the outset.

Service life planning aims to reduce the costs of building ownership. An assessment of how long each part of the building will last, helps to decide the appropriate specification and detailing. When the service life of the building and its parts are estimated, maintenance planning and value engineering techniques can be applied. Reliability and flexibility of use can be increased and the likelihood of obsolescence reduced.

Five parts to this International Standard are planned, and work on drafting these has commenced. They will provide comprehensive guidance on the forecasting and assurance of the service life of building components and assemblies. Figure 1 shows how each part of ISO 15686 relates to the other parts, and to associated topics and other International Standards.

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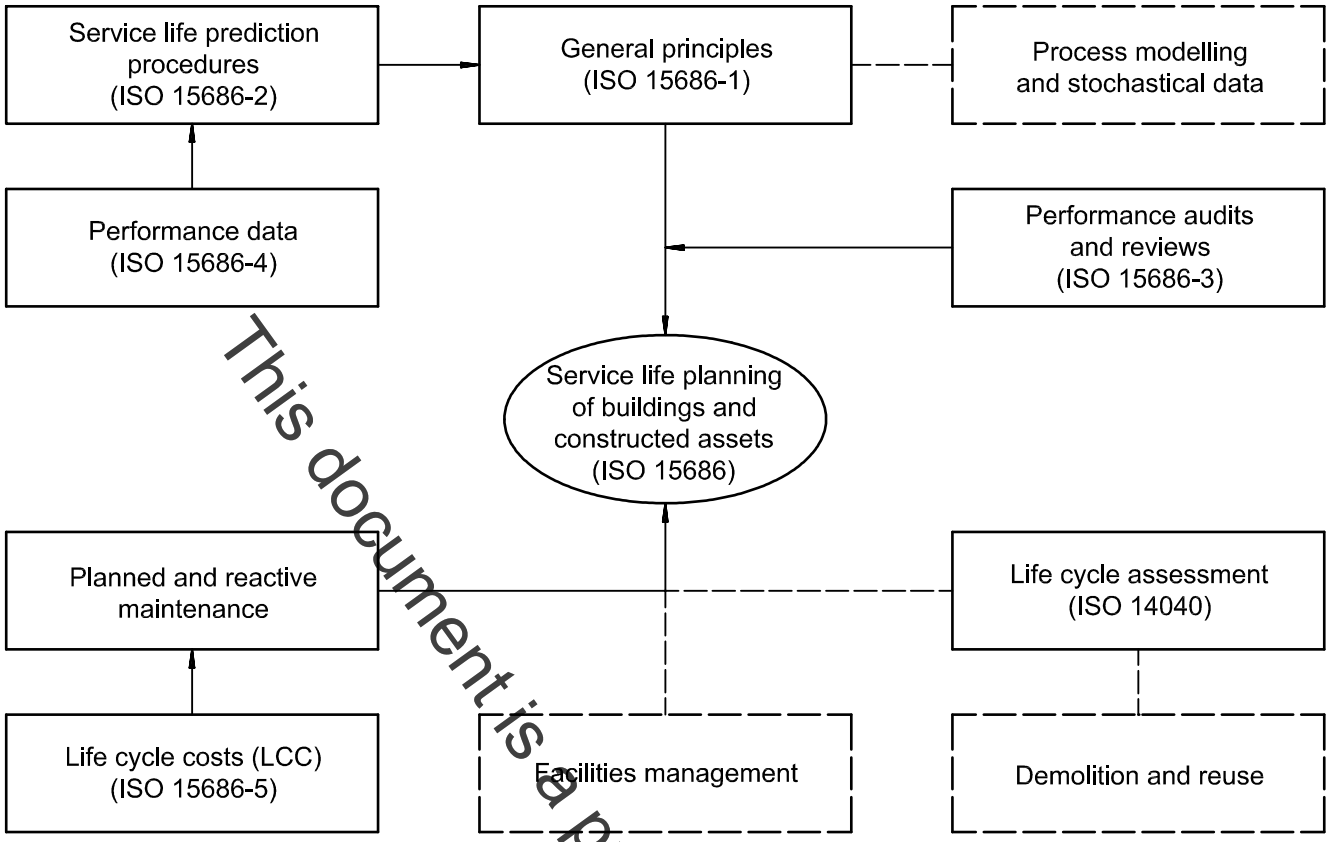

Figure 1 — Inputs and influences on service life planning of buildings

This part of ISO 15686 deals with the general principles, issues and data needed to forecast service lives, and gives a method of estimating the service life of components or assemblies for use in specific building projects. It can be used as a stand-alone document.

Part 2 of ISO 15686 describes a generic methodology for testing the performance over time of components and assemblies to provide a service life prediction. Wherever possible the reference service life used in producing an estimated service life should be derived from service life predictions as described in ISO 15686-2. Some guidance may also be given on values to assign to factors. It is anticipated that materials specialists and test houses who need to interpret or design performance tests will be the major users of ISO 15686-2.

Part 3 of ISO 15686 will describe the approach and procedure to be applied to prebriefing, briefing design, construction and, where required, the life care management and disposal of buildings and constructed assets to provide a reasonable assurance that the measures necessary to achieve performance over time will be implemented.

Part 4 of ISO 15686 will describe the range of data requirements that will allow the service life to be determined.

Part 5 of ISO 15686 will provide guidance on assessment of the life cycle costs of a building.

Additional parts are being considered.

Figure 2 shows the main topics covered in this part of ISO 15686, and where they are covered. Issues briefly introduced here, such as the calculation of costs over time (see clause 10), and quality control and reliability of estimates and forecasts (in clause 6), will be developed in later parts of ISO 15686. In the long term it is expected that a consistent application of service life planning will encourage the gathering of useful data and allow the development of computer-integrated knowledge systems for building design and maintenance.

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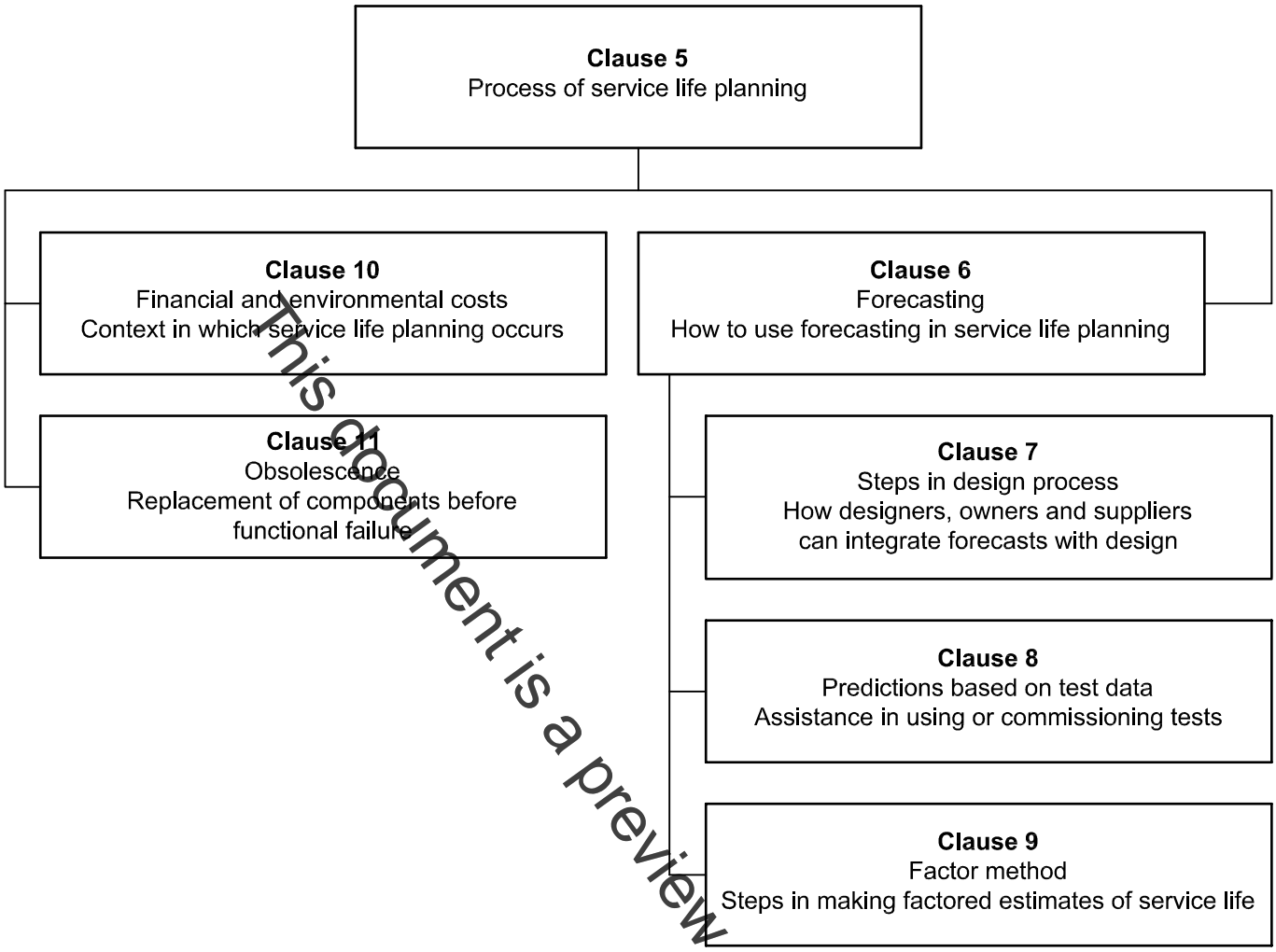

Figure 2 — Overview of this part of ISO 15686

Although not dealt with in any detail in this part of ISO 15686, the issues of performance of buildings and safety are clearly linked. When assessing future performance, priority should be given to ensuring performance at all times continues to meet national building legislative requirements for safety. It should also be noted that many local building codes already require inaccessible components or assemblies to remain functional throughout the service life of the building. In the European Community, the Construction Products Directive includes a requirement that the "essential requirements" of construction products should be retained for an “economically reasonable working life”, if necessary by maintenance.

Service life planning can be applied to both new and existing buildings. However, in existing buildings the assessment of components and detailing will apply principally to the residual service life of items that are already installed. The selection of components and detailing will only apply to repairs and new work.

The informative annexes to this part of ISO 15686 are intended to provide supplementary information and to illustrate the use of methods described in the normative clauses. The range of climatic conditions and building techniques throughout the world requires that separate factors for service life planning are developed for specific circumstances. It may be necessary to have factors that apply regionally within countries and to modify these figures to take account of locality and micro-climate.

NOTE The factor method of forecasting service life is an empirical means of methodically estimating the effect on service life of variables, using the information available. It therefore is not as precise or objective as a prediction based on scientific observations of performance over time, but it will frequently be the only means of taking all relevant factors into account within the project timescale. National development will highlight any difficulties with applying this methodology, which is innovative, and it will be reviewed in future versions of this International Standard.

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The approach to service life planning adopted in this International Standard is based on the work of CIB and RILEM, and on practical studies in many countries, in particular standards published in the UK, Japan, Canada and the USA.

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Buildings and constructed assets — Service life planning —

Part 1:
General principles

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1 Scope

This part of ISO 15686 describes the principles and procedures that apply to design when planning the service life of buildings and constructed assets. It is important that the design stage includes systematic consideration of local conditions to ensure, with a high degree of probability, that the service life will be no less than the design life.

This part of ISO 15686 is applicable to both new constructions and the refurbishment of existing structures. However, additional considerations may apply to existing buildings.

NOTE 1 In historic buildings even new work may be ruled by the need to preserve authenticity and certain options may not be available or advisable. They are therefore excluded from specific consideration within this part of ISO 15686.

NOTE 2 The skill and expertise of the person or organization undertaking the service life planning will be crucial to the reliability of the planning. Ideally a team of people who have the necessary skills in service life forecasting, design, construction and maintenance management will be represented within the project team. Familiarity with in-use conditions and construction conditions for the type of project will be of great assistance in determining typical conditions. Familiarity with the area will assist in identifying environmental factors which may not occur to strangers to the area. It is particularly important to consider local agents. These may include agents of degradation (e.g. emissions from a local power station).

NOTE 3 Wherever the term “buildings” is used in the text it should be read as “buildings and constructed assets”. Constructed assets covers everything that is constructed or results from construction operations.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this part of ISO 15686. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 15686 are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 6707-1:1989, *Building and civil engineering — Vocabulary — Part 1: General terms*.

3 Terms and definitions

For the purposes of this part of ISO 15686, the terms and definitions given in ISO 6707-1 (some of which are repeated below for convenience) and the following apply. The following list is ordered by concepts, for the assistance of users of this part of ISO 15686. An alphabetical index of terms is included.

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