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Utgåva 1

**Byggnader och byggnadsverk – Livslängds-
planering –**
Del 3: Revision och granskning av prestanda

**Buildings and constructed assets – Service
life planning –**
Part 3: Performance audits and reviews

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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.

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 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.

ISO 15686-3 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*

Annexes A, B and C of this part of ISO 15686 are for information only.

Introduction

Buildings and constructed assets require care from the initial proposals through to design, construction, operation, maintenance and disposal, to ensure they meet the required level of performance. ISO 15686-1 and ISO 15686-2 explain the principles of designing an appropriate service life for different types of constructed assets, components and assemblies. This part of ISO 15686 deals with measures to ensure that the life care of a constructed asset is considered through each stage of decision making from project conception and initial briefing, through design and construction, to occupancy and eventual disposal and reinstatement of the site.

This part of ISO 15686 provides a choice between formal independent audits carried out at key project stages (clauses 5 and 6); and service life performance reviews carried out alongside existing internal project review procedures (clause 7). The advantages of formal external audits can include greater independence and objectivity as well as access to wider experience of auditing procedures. Service life performance reviews benefit from greater familiarity with the specific project and the potential to integrate certain review procedures with other project validation procedures such as designers' quality management system checks.

NOTE There is also scope for integrating service life performance audit and review procedures within a project, such that the documented outcomes of the review process form the inputs into the audit process at a given project stage. The review then becomes the primary means of ensuring effective service life planning and the audit function is limited to that of verifying the outcomes of the review process (see Figure 1).

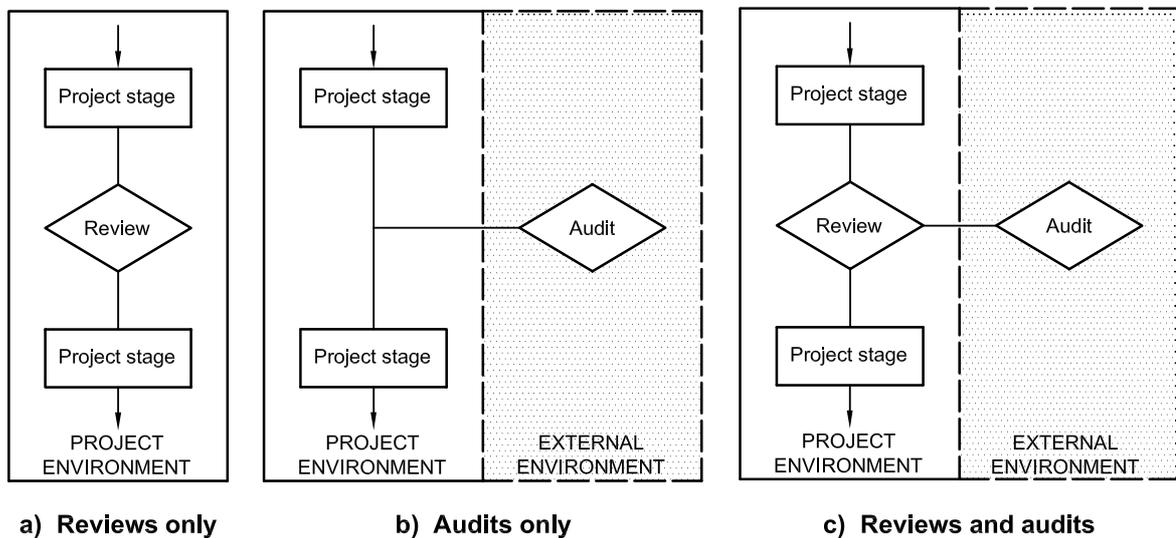


Figure 1 — Three models for integrating performance audits and reviews into the procurement process

Both service life performance audits and reviews emphasize the pre-briefing, briefing and design stages of a construction project. It is the far-reaching decisions made at these early stages that affect what is built, the way it is constructed, its commissioning and operation, how it should be maintained and the options for dealing with the structure at the end of its life cycle. It has been found that more than 50 % of building failures can be traced back to the brief and to information passed on in, or missing from, the design and specification details that the constructor receives. Other failures can result from poor construction, inadequate commissioning, unsuitable use of the building, and inadequate life care. The service life performance audit and review process includes a means of checking back in these later stages to ensure that the original intentions are followed.

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Auditing is a key management tool for ensuring that stated objectives are met. Procedures have been established for auditing quality management systems (ISO 19011) and for environmental auditing (ISO 14010, ISO 14011 and ISO 14012). Many of the techniques described here are similar to those used for quality and environmental auditing and there is an opportunity in service life performance audits and reviews to combine procedures in specific circumstances.

A service life performance audit or review of the pre-briefing stage and of the project brief should reveal where client requirements for service life are missing or inadequately defined. The requirements can then be defined before work starts on the detailed design. An audit or review of the detailed design will report on nonconformities, i.e. where the design does not meet the requirements of the brief. The design can then be amended, or the requirements redefined, before construction.

Further audits or reviews of the construction, commissioning, and future operation, refurbishment, adaptation and disposal of the constructed asset can be undertaken to ensure that the required service life performance is not compromised by such activities.

Figure 2 summarizes the main topics covered in this part of ISO 15686.

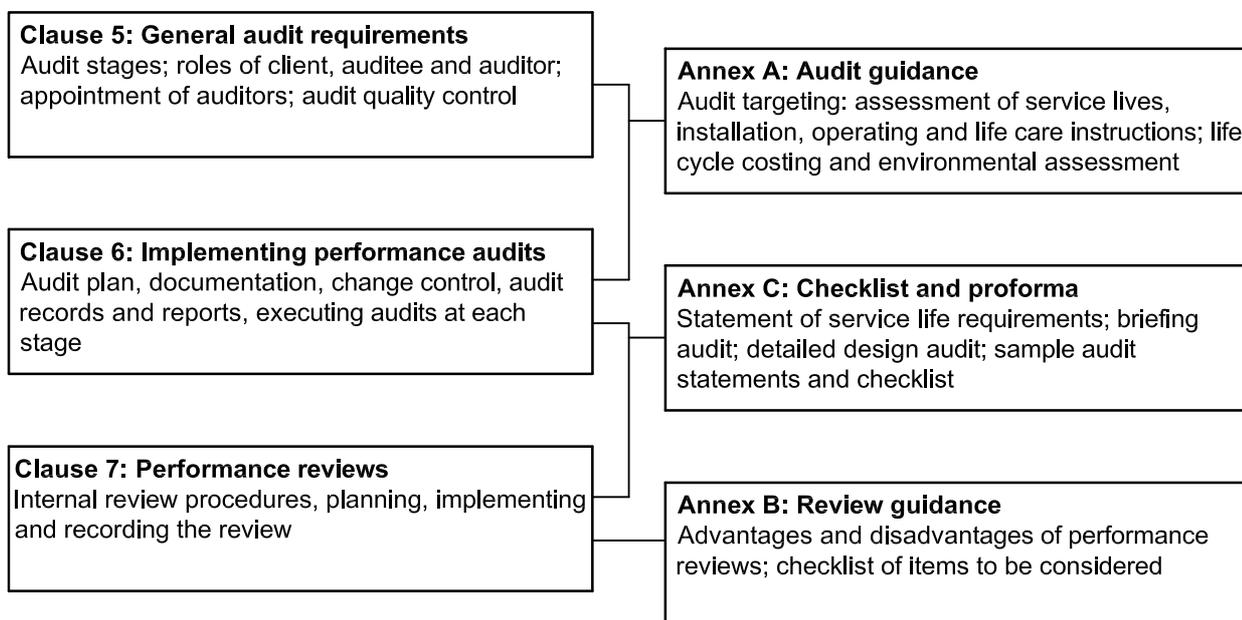


Figure 2 — Overview of this part of ISO 15686

The provisions of this part of ISO 15686 are intended primarily for

- construction clients,
- persons appointed to carry out service life performance audits (auditors),
- designers, and
- operational and maintenance personnel.

They are also relevant to the work of constructors, project managers, inspectors, asset and facilities managers, insurers and valuers.

In addition to this part of ISO 15686, six other parts are published or are in the course of preparation, as follows.

- Part 1 deals with general principles, issues and data needed to forecast service lives and provides a method for estimating the service lives of components and assemblies.
- Part 2 describes generic procedures for testing the performance of components, materials and assemblies to provide service life predictions.
- Part 4 will provide guidance on methods of presenting data and evidence to support forecasts and predictions.
- Part 5 will provide guidance on assessment of whole life costing.
- Part 6 will provide a procedure for considering environmental impacts.
- Part 7 will provide guidance on the performance evaluation and feedback of service life data from existing construction works.
- Part 8 will provide guidance on the provision of reference service life for use in the application of ISO 15686-1.

A major impetus for the production of ISO 15686 has been concern over the construction industry's need to control the cost of ownership of constructed assets, since a high proportion of the life cycle cost may be set by the time the facility is complete. In addition to reducing unnecessary expenditure, the use of ISO 15686 can contribute to the aim of "sustainable" development by promoting a less wasteful use of natural resources and to consequential protection of the environment.

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Buildings and constructed assets — Service life planning —

Part 3: Performance audits and reviews

1 Scope

This part of ISO 15686 is concerned with ensuring the effective implementation of service life planning. It describes the approach and procedures to be applied to pre-briefing, briefing, design, construction and, where required, the life care management and disposal of buildings and constructed assets to provide a reasonable assurance that measures necessary to achieve a satisfactory performance over time will be implemented.

The cost implications of service life planning and the broader issues of sustainability (e.g. embodied energy, land use) are not developed in this part of ISO 15686.

NOTE Throughout this part of ISO 15686 the term “constructed asset” is used to include buildings; infrastructure works such as roads, bridges and pipelines; structural works such as communications masts; and other engineering works such as power stations and chemical plants.

2 Conformance

Conformance with this part of ISO 15686 requires service life performance audits to be undertaken in accordance with clauses 5 and 6 and/or reviews to be carried out in accordance with clause 7. It shall be stated in all relevant documentation which of these clauses applies. Audits or reviews of the pre-briefing, briefing and detailed design stages of a project are the minimum “core” activities that shall be carried out whenever compliance with this part of ISO 15686 is required prior to construction. Further audits or reviews of the initial design, construction, commissioning, operation, alteration and/or disposal of the facility are discretionary but, where carried out, shall conform with this part of ISO 15686.

3 Normative references

The following normative documents contain 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 editions of the normative documents 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, *Building and civil engineering — Vocabulary — Part 1: General terms*

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

ISO 19011, *Guidelines for quality and/or environmental management systems auditing*

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4 Terms and definitions

For the purposes of this part of ISO 15686, the terms and definitions given in ISO 6707-1, ISO 15686-1, ISO 19011 and the following apply.

4.1

service life performance audit

systematic examination by an independent party of requirements, initial and detailed design proposals, and instructions for installation, commissioning and life care, to determine their adequacy in relation to service life performance

NOTE 1 In this context, an “independent party” is an individual or organization that is not directly accountable or responsible for the project activities being audited.

NOTE 2 A service life performance audit is not concerned with early failures (within the normal contractual warranty period) that are caused by faulty design, manufacture, handling or installation.

4.2

service life performance review

systematic second-party examination of requirements, initial and detailed design proposals, and instructions for installation, commissioning and life care, to determine their adequacy in relation to service life performance

4.3

pre-briefing

earliest stage in the consideration of a construction project when the need for constructed works is assessed and the suitability of sites is assessed

4.4

initial design

early stage in the development of a design before many of the materials, components or assemblies have been selected

4.5

detailed design

drawings, data, calculations and specifications from which constructed works, components and assemblies can be constructed

4.6

life care

measures that promote achievement of the design life, including cleaning, maintenance, servicing, repair, refurbishment, protection, control of use and avoidance of neglect

4.7

recovery management

planning and control procedures designed to maximize the economic reuse of resources committed to a constructed works project

4.8

reference document

project document and other supporting evidence, provided for auditing and/or review purposes, that demonstrate the project team’s response to the service life performance requirements in the project brief

4.9

reliability

probability that a component, assembly or system will perform its intended function under stated conditions for a stated period of time

4.10

serviceability

ability to meet or exceed relevant performance requirements

4.11

availability

periods during which a facility or service is serviceable

4.12

nonconformity

non-fulfilment of specified requirements

4.13

observation

statement of fact made during an audit or review and substantiated by objective evidence

5 General audit requirements and responsibilities

5.1 General

Service life performance audits are undertaken to ensure that performance over time has been adequately considered in the pre-briefing, briefing, design, construction, life care management (including refurbishment, alteration) and disposal of a constructed asset, and to provide a reasonable assurance that the required service life performance will be achieved. To ensure objectivity, consistency and reliability, service life performance audits are distinct activities carried out by qualified auditors that are independent of the project activities being audited.

Service life performance audits shall be conducted in accordance with clauses 5 and 6 of this part of ISO 15686. Audits shall be conducted according to documented and well-defined methodologies and systematic procedures. For any type of service life performance audit, the methodologies and procedures adopted shall be consistent and shall aim to ensure comparability and repeatability. Where possible, standard audit checklists, statements and proformas shall be used as a means of ensuring consistency and reliability in the audit process. Guidance and examples are provided in informative annexes A and C.

The scope and purpose of each audit shall be clearly defined before work on that audit starts. The detail and extent of the audit and its documentation shall reflect the specific context (e.g. legal, financial, environmental, health and safety) within which the findings are likely to be used. Where a particularly onerous reliance is likely to be placed on audit findings, the audit and its documentation shall be subject to an enhanced level of robustness and details. Records shall be kept of all reference documents and other documentation used in arriving at the audit findings. Following examination of the reference documents by the auditor, the output from the audit is a report to the client and/or auditee. The auditor may later be asked to assess the adequacy of corrective action taken to redress the nonconformities listed in the audit report.

The specific purpose of the audit will depend upon the stage in the asset life cycle at which it is undertaken and on the audit scope and extent as defined by the project client. Table 1 provides an overview of the service life performance auditing process related to specific stages in the asset life cycle.