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Grundläggande dimensioneringsregler för bärverk – Tillståndsbedömning av befintliga bärverk (ISO 13822:2001, IDT)

Bases for design of structures – Assessment of existing structures (ISO 13822:2001, IDT)

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SS-ISO 13822:2008 (E)

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

International Standard ISO 13822 was prepared by Technical Committee ISO/TC 98, *Bases for design of structures*, Subcommittee SC 2, *Reliability of structures*.

Annexes A to H of this International Standard are for information only.

Introduction

The continued use of existing structures is of great importance because the built environment is a huge economic and political asset, growing larger every year. The assessment of existing structures is now a major engineering task. The structural engineer is increasingly called upon to devise ways for extending the life of structures whilst observing tight cost constraints. The establishment of principles for the assessment of existing structures is needed because it is based on an approach that is substantially different from the design of new structures, and requires knowledge beyond the scope of design codes. This document is intended not only as a standard of principles and procedures for the assessment of existing structures but also as a guide for use by structural engineers and clients. Engineers can apply specific methods for assessment in order to save structures and to reduce a client's expenditure. The ultimate goal is to limit construction intervention to a strict minimum, a goal that is clearly in agreement with the principles of sustainable development.

The basis for the reliability assessment is contained in the performance requirements for safety and serviceability of ISO 2394. Economic, social, and sustainability considerations, however, result in a greater differentiation in structural reliability for the assessment of existing structures than for the design of new structures

Bases for design of structures — Assessment of existing structures

1 Scope

1.1 This International Standard provides general requirements and procedures for the assessment of existing structures (buildings, bridges, industrial structures, etc.) based on the principles of structural reliability and consequences of failure. It is based on ISO 2394.

1.2 It is applicable to the assessment of any type of existing structure that was originally designed, analysed and specified based on accepted engineering principles and/or design rules, as well as structures constructed on the basis of good workmanship, historic experience and accepted professional practice. The assessment can be initiated under the following circumstances:

- an anticipated change in use or extension of design working life;
- a reliability check (e.g. for earthquakes, increased traffic actions) as required by authorities, insurance companies, owners, etc.;
- structural deterioration due to time-dependent actions (e.g. corrosion, fatigue);
- structural damage by accidental actions (see ISO 2394).

NOTE 1 This International Standard is applicable to historical structures, provided additional considerations are taken into account concerning the preservation of the historical appearance of the structure and the preservation of its historical materials.

1.3 This International Standard is applicable to existing structures of any material, although specific adaptation can be required depending on the type of material, such as concrete, steel, timber, masonry, etc.

1.4 This International Standard provides principles regarding actions and environmental influences. Further detailed consideration will be necessary for accidental actions such as fire and earthquake.

NOTE 2 Fire resistance requires properties different from those for structural safety and integrity. Also fire hazards can be created by change in use. Special requirements are necessary for seismic hazards, taking the dynamic action and structural response into account.

1.5 This International Standard is intended to serve as a basis for preparing national standards or codes of practice in accordance with current engineering practice and the economic conditions.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard 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 2394:1998, *General principles on reliability for structures*

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3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 2394 and the following apply. (See also annex A.)

3.1

assessment

set of activities performed in order to verify the reliability of an existing structure for future use

3.2

damage

unfavourable change in the condition of a structure that can affect structural performance

3.3

deterioration

process that adversely affects the structural performance, including reliability over time due to

- naturally occurring chemical, physical or biological actions,
- repeated actions such as those causing fatigue,
- normal or severe environmental influences,
- wear due to use, or
- improper operation and maintenance of the structure

3.4

deterioration model

mathematical model that describes structural performance as a function of time, taking deterioration into account

3.5

inspection

on-site non-destructive examination to establish the present condition of the structure

3.6

investigation

collection and evaluation of information through inspection, document search, load testing and other testing

3.7

load testing

test of the structure or part thereof by loading to evaluate its behaviour or properties, or to predict its load-bearing capacity

3.8

maintenance

routine intervention to preserve appropriate structural performance

3.9

material properties

mechanical, physical or chemical properties of structural materials

3.10

monitoring

frequent or continuous, normally long-term, observation or measurement of structural conditions or actions

3.11

reference period

chosen period of time which is used as a basis for assessing values of variable actions, time-dependent material properties, etc.

NOTE The remaining working life or the minimum standard period for safety of an existing structure can be taken as reference period (see annex F).

3.12

rehabilitation

work required to repair, and possibly upgrade, an existing structure

3.13

remaining working life

period for which an existing structure is intended/expected to operate with planned maintenance

3.14

repair, verb

(of a structure) improve the condition of a structure by restoring or replacing existing components that have been damaged

3.15

safety plan

plan specifying the performance objectives, the scenarios to be considered for the structure, and all present and future measures (design, construction, or operation, such as monitoring) to ensure the safety of the structure

3.16

structural performance

qualitative or quantitative representation of the behaviour of a structure (e.g. load-bearing capacity, stiffness) in terms of its safety and serviceability

3.17

target reliability level

level of reliability required to ensure acceptable safety and serviceability

3.18

upgrading

modifications to an existing structure to improve its structural performance

3.19

utilization plan

plan containing the intended use (or uses) of the structure, and listing the operational conditions of the structure including maintenance requirements, and the corresponding performance requirements

4 General framework of assessment

4.1 Objectives

The objective of the assessment of an existing structure in terms of its required future structural performance shall be specified in consultation with the client (the owner, the authority, insurance companies, etc.) based on the following performance levels.

- a) Safety performance level, which provides appropriate safety for the users of the structure.
- b) Continued function performance level, which provides continued function for special structures such as hospitals, communication buildings or key bridges, in the event of an earthquake, impact, or other foreseen hazard.