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CEN/TS 17440

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Assessment and retrofitting of existing structures

Évaluation et rénovation des structures existantes

Bewertung und Ertüchtigung von bestehenden Tragwerken

This Technical Specification (CEN/TS) was approved by CEN on 3 May 2020 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (CEN/TS 17440:2020) has been prepared by Technical Committee CEN/TC 250 "Structural Eurocodes", the secretariat of which is held by BSI. CEN/TC 250 is responsible for all Structural Eurocodes and has been assigned responsibility for structural and geotechnical design matters by CEN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under Mandate M/515 issued to CEN by the European Commission and the European Free Trade Association.

This document has been drafted to be used in conjunction with relevant execution, material, product and test standards, and to identify requirements for execution, materials, products and testing that are relied upon by this document.

This document recognizes the responsibility of each Member State and has safeguarded their right to determine values related to regulatory safety matters at national level through the use of National Annexes.

The presentation, in Notes to clauses, of national choice in this Technical Specification, does not everywhere accord with the guidance established by CEN/TC 250 for use in the Eurocode ENs. The presentation of National choice will be in accordance with the TC's guidance in formal ENs.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

General

The Eurocodes comprise rules that are primarily intended for the design of new structures, although the principles of EN 1990 can also be applied for existing structures, with additional or amended provisions. CEN/TS 17440 is intended to supply those additional or amended provisions that can enable EN 1990 to be applied to the structural assessment of existing structures.

Extending the life of existing structural assets is a key challenge for structure owners worldwide. Investment in accurately assessing the resistance of structures can deliver substantial environmental, economic and socio-political benefits. In order to fully realize these benefits, it is often necessary in assessment to go beyond the simple, conservative methods typically used for design, so that reliability of structures can be more accurately assessed.

In the design of new structures, it is generally necessary to use conservative values for basic variables, and it is typical to use conservative models for structural analysis. However, when assessing an existing structure, there is an opportunity to obtain updated data regarding the structure, including its geometry, its material properties, the actions and environmental influences, and measures relating to its structural behaviour. There can be significant benefits to be gained from using updated data in the assessment, and by considering alternative structural analysis models that represent more accurately the limit states being assessed. CEN/TS 17440 includes provisions related to using updated data and updated structural models in assessment.

Older structures were often designed and constructed in a way that would not conform with modern standards for structural design, material products or execution. They can often exhibit deterioration or damage. A particular challenge in assessment is therefore how to accurately assess structures taking account of the actual detailing arrangements, material properties, execution tolerances, and the structural condition. CEN/TS 17440 includes principles for the assessment of structural resistance.

Often, an older structure could need to be modified, extended, repurposed, strengthened or retrofitted in a way that reuses retained structural elements in combination with new structural elements. In such schemes, there will be a need to assess the retained elements of the structure, which might not conform to all the requirements for new design. CEN/TS 17440 includes provisions for the assessment of retained elements, as well as for the assessment of complete structures.

This document is based on the recommendation of JRC Science and Policy Report on assessment and retrofitting of existing structures. Upon the agreement of CEN/TC 250, this document can be converted into a new Eurocode Part.

Verbal forms used in this Technical Specification

The verb “shall” expresses a requirement strictly to be followed and from which no deviation is permitted in order to comply with the Eurocodes.

The verb “should” expresses a highly recommended choice or course of action. Subject to national regulation and/or any relevant contractual provisions, alternative approaches could be used/adopted where technically justified.

The verb “may” expresses a course of action permissible within the limits of the Eurocodes.

The verb “can” expresses possibility and capability; it is used for statements of fact and clarification of concepts.

National annex for CEN/TS 17440

This document gives values within notes indicating where national choices can be made. Therefore, a national document implementing CEN/TS 17440 can have a National Annex containing all Nationally Determined Parameters to be used for the assessment of buildings and civil engineering works in the relevant country.

National choice is possible in CEN/TS 17440 through the following clauses:

4.1(1), 4.1(3), 4.4(2), 4.6(3), 5.3(1), 5.3(2), 5.3.(3), 6.1(2), 6.3(2), 7.1(5), 7.3.1(4), 7.3.8(1), 7.3.9(1), 7.3.9(2), 7.4.1.4(1), 9.2(1), 9.3(2), 9.3(3), 9.4(4), 9.4(5), 9.5(2), 10(1), D.3.1(1).

National choice is possible in CEN/TS 17440 on the application of the following informative annexes:

- Annex A,
- Annex B,
- Annex C,
- Annex D.

1 Scope

1.1 Scope of CEN/TS 17440

(1)This document provides additional or amended provisions to EN 1990 to cover the assessment of existing structures (see EN 1990:2002, 1.1(4)), and the retained parts of existing structures that are being modified, extended, strengthened or retrofitted.

NOTE 1 The assessment of an existing structure is, in many aspects, different from the design of a new structure, see Introduction.

NOTE 2 There can be some aspects of EN 1990 that are required for design but are not applicable for assessment. The definition of those aspects of EN 1990 that are not applicable can be included in the definition of the assessment objectives and the approach to the assessment, see Clause 5.

NOTE 3 This document is based on the general requirements and principles of structural reliability provided in Eurocodes EN 1990 and EN 1991.

(2) This document covers general principles regarding actions for assessment complementing EN 1991.

NOTE Supplementary provisions for seismic actions due to earthquake are provided in EN 1998.

(3) This document includes general principles for the assessment of the structural resistance of existing structures.

NOTE The specific models used to assess resistance are not provided in this document and will depend on the materials and structure types.

(4) This document does not provide specific rules for initiation of assessment.

(5) This document does not provide specific rules on how to undertake interventions that can be carried out as a result of an assessment.

(6) This document does not cover the design of new elements that will be integrated into an existing structure.

NOTE For the design of new elements, see EN 1990.

1.2 Assumptions

(1) The general assumptions of CEN/TS 17440 are:

- the assessment of the structure is made by appropriately qualified and experienced personnel;
- adequate supervision and quality control is provided during the assessment process;
- the structure will be used in accordance with the assessment assumptions;
- the structure will be maintained in accordance with the assessment assumptions.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 1990:2002, *Eurocode —Basis of structural design*

EN 1991, *Eurocode 1: Actions on structures*