

# Provisions for assessment of existing structures in the second-generation concrete Eurocode

Craig Cicco examines ways in which the second-generation of Eurocode 2 will facilitate the assessment of existing concrete-framed structures.

**EN 1992-1-1 (2004)** (code of practice for concrete structures) includes additional provisions that enable it to be used for assessment of existing structures. This article outlines some of these provisions, which are likely to be of assistance when using Eurocode 2 to assess concrete-framed structures. These include:

- determining characteristic material properties for assessment
- calculating design loads or factors where testing is used to determine material properties
- determining values of deterioration
- load lifting force and anchorage lengths of bar wires
- dealing with existing structures' capacity to the current standard
- design rules/provisions for assessment of their resistance.

## Material properties

**EN EN 1992-1-1 (2004)** requires characteristic values of material properties to assess the material properties. Annex E provides guidance for how users to obtain relevant values for assessment. It introduces use of **EN EN 12501-1** to determine the self-characteristic concrete strength from testing. It provides a range of factors to calculate its deterioration  $f_{ct}$  from  $f_{ct}$ , making some provision for situations where testing cannot be completed at the region being assessed. Additional

information is provided in the standard to enable characteristic values of self strength or characteristic compressive to be determined from testing should steel grades used in the structure can be available from relevant information.

The UK National Annex committee is presently reviewing this factor for determining  $f_{ct}$  from  $f_{ct}$ . It may incorporate such amendments to the characteristic values to assess agreement with values obtained from **EN EN 12501-1 (2004)** with the UK National Annex, taking into account the ability to adjust design factors for material to Annex A of the new standard. It may also provide different methods of determining  $f_{ct}$  from  $f_{ct}$  where direct concrete test data is not available from testing, such as using the results of laboratory tests made calibrated inter-daily tests, along with relevant provisions in **EN EN 12501-1**.

## Partial material factors

Annex A of the new standard provides new tables for design partial material factors to be applied based on material test results from the structure. This should generally reduce the value of these factors, when a low coefficient of variation of material strength is obtained from testing, which is beneficial for assessed members

generally. The standard permits test data available from records to also be used where suitable and appropriate.

## Deterioration

Provision of provisions of deterioration in the Annex is intended to assist the user of the standard to take all issues associated with deterioration, but to consider it separately to typical types of deterioration and their impact. It also clearly provides guidance on when assessment of deterioration is likely to affect the provision of the test.

## Other items

Other provisions of **EN EN 1992-1-1 (2004)** include the standard introduces the inclusion Eurocode design detailing of concrete structures. The provisions are based on a new extended-member model of joint, type that was developed during the drafting of the standard (Pohlmann et al.). The provisions also cover the variation of load resulting from variable load cases.

Provision of provisions of standard that suggests that conservative values of ultimate lengths must be used using these provisions in design circumstances. Other established methods of assessing the bond of steel bars are available in the UK, including those listed by National Highway (2004). These may more closely with British provisions in **EN**



# Concrete Structures Condition Assessment Guidelines

**Joacim Rocklöv**



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## **Table of Contents Concrete Structures Condition Assessment Guidelines**

1. Understanding the eBook Concrete Structures Condition Assessment Guidelines
  - The Rise of Digital Reading Concrete Structures Condition Assessment Guidelines
  - Advantages of eBooks Over Traditional Books
2. Identifying Concrete Structures Condition Assessment Guidelines
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Concrete Structures Condition Assessment Guidelines
  - User-Friendly Interface
4. Exploring eBook Recommendations from Concrete Structures Condition Assessment Guidelines
  - Personalized Recommendations
  - Concrete Structures Condition Assessment Guidelines User Reviews and Ratings
  - Concrete Structures Condition Assessment Guidelines and Bestseller Lists

5. Accessing Concrete Structures Condition Assessment Guidelines Free and Paid eBooks
  - Concrete Structures Condition Assessment Guidelines Public Domain eBooks
  - Concrete Structures Condition Assessment Guidelines eBook Subscription Services
  - Concrete Structures Condition Assessment Guidelines Budget-Friendly Options
6. Navigating Concrete Structures Condition Assessment Guidelines eBook Formats
  - ePub, PDF, MOBI, and More
  - Concrete Structures Condition Assessment Guidelines Compatibility with Devices
  - Concrete Structures Condition Assessment Guidelines Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Concrete Structures Condition Assessment Guidelines
  - Highlighting and Note-Taking Concrete Structures Condition Assessment Guidelines
  - Interactive Elements Concrete Structures Condition Assessment Guidelines
8. Staying Engaged with Concrete Structures Condition Assessment Guidelines
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Concrete Structures Condition Assessment Guidelines
9. Balancing eBooks and Physical Books Concrete Structures Condition Assessment Guidelines
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Concrete Structures Condition Assessment Guidelines
10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine Concrete Structures Condition Assessment Guidelines
  - Setting Reading Goals Concrete Structures Condition Assessment Guidelines
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Concrete Structures Condition Assessment Guidelines
  - Fact-Checking eBook Content of Concrete Structures Condition Assessment Guidelines
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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