BS EN 13791:2019

BSI Standards Publication

Assessment of in-situ compressive strength in structures and precast concrete components

National foreword

This British Standard is the UK implementation of EN 13791:2019. It supersedes BS EN 13791:2007 and BS 6089:2010, which are withdrawn.

The background to EN 13791:2019, as well as further guidance and worked examples, is given in CEN/TR 17086 (publication anticipated in 2020).

All the relevant content of BS 6089:2010 is now covered by BS EN 13791:2019, including its national annex; PD CEN/TR 17086 (publication anticipated in 2020); and BS EN 12504-1:2019, including its national annex.

This British Standard should be used in conjunction with BS EN 12504-1:2019 and its national annex.

The UK participation in its preparation was entrusted to Technical Committee B/517/1, Concrete production and testing.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2020

ISBN 978 0 580 96061 1

ICS 91.080.40

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2020.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13791

August 2019

ICS 91.080.40

Supersedes EN 13791:2007

English Version

Assessment of in-situ compressive strength in structures and precast concrete components

Évaluation de la résistance à la compression sur site des structures et des éléments préfabriqués en béton

Bewertung der Druckfestigkeit von Beton in Bauwerken oder in Bauwerksteilen

This European Standard was approved by CEN on 7 July 2019.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 13791:2019 E

Contents

Page

European foreword

This document (EN 13791:2019) has been prepared by Technical Committee CEN/TC 104 “Concrete and related products”, the secretariat of which is held by SN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2020, and conflicting national standards shall be withdrawn at the latest by February 2020.

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 supersedes EN 13791:2007.

The main changes compared to EN 13791:2007 are:

a) the standard is fully revised but for continuity the methodological approaches and scope is retained as well as much of the previous layout;

b) the primary focus is on the determination of the characteristic *in situ* compressive strength for application with EN 1990 and EN 1992-1-1;

c) more comprehensive guidance is provided on applying the procedures, particularly with respect to defining a test result, a measurement, volume of concrete, test location, small test region and test region;

d) requirements to set out the purpose of the investigation, procedures to be adopted, test methods, test locations and test regions to be defined prior to commencing the testing, are included;

e) Clause 8, "Estimation of compressive strength for structural assessment of an existing structure", covers the previous requirements for assessment of characteristic *in situ* compressive strength by either testing cores or indirect methods;

f) Clause 9, "Assessment of compressive strength class of concrete in case of doubt", covers previous requirements for the assessment where conformity of concrete based on standard tests is in doubt;

g) approaches A and B in EN 13791:2007 are no longer valid;

h) EN 13791 is aligned with the requirements of EN 206.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: 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

(1) This document covers two applications of *in situ* strength assessments. These are:

— to estimate *in situ* characteristic compressive strength of a test region and/or *in situ* strength at specific locations;

— assessment of compressive strength class of concrete supplied to a structure under construction where there is doubt about the compressive strength based on results of standard tests or doubt about the quality of execution.

(2) Both applications have a number of common steps as shown in Table 1, but the assessment methods differ. The reason for this difference is that with the estimation of the *in situ* strength (Clause 8) there is no presumption as to what this should be and the uncertainty associated with the number of data are taken into account when estimating the value. The *in situ* strength determined in accordance with Clause 8 is a value based on testing a finished structure or element, as referred to by EN 1992-1-1:2004, A.2.3.

NOTE Information may be available on the original quality of the supplied concrete, but the *in situ* strength may have changed over time.

(3) Most of the procedures in Clause 9 apply where there is verification that the concrete supplied is in accordance with the producer's declaration of performance for compressive strength but test results from samples taken on site indicate non-conformity, and where this difference cannot be resolved by other means. As the procedures given in CEN standards for the verification of the declaration of performance are regarded as being reliable, the assumption is that the concrete conforms to the specified characteristic strength and the applied statistical tests check the validity of this hypothesis.

Where a Clause 9 assessment indicates non-conformity of compressive strength then the 9.5 procedure should be adopted by the producer and other involved parties.

(4) The Clause 8 and Clause 9 procedures have different approaches that may lead to significantly different outcomes.

(5) Unless indicated otherwise, the provisions given in this document apply to concrete structures made from normal-weight, lightweight or heavyweight concrete.

(6) This document only covers the use of a single relationship between an indirect test method (UPV or rebound hammer) and compressive strength. The combined use of both UPV and rebound hammer techniques with core strength is a useful technique, but the procedures are not detailed in this document.

(7) This document was developed with the expectation that it will be used with EN 1992-1-1. If it is used in conjunction with other design standards, some of the factors may need modification. In addition, this document uses the EN 1992-1-1:2004, 3.1.6, recommended value of 1,0 for the factor α_{cc} and EN 1992-1-1:2004, A.2.3, recommended value of 0,85 for the factor η. Where national provisions adopt different values for these coefficients then adjustments to the appropriate formula within this Standard may be required.

(8) Techniques outside the range of those specified in this document may be given in provisions valid in the place of use. For example, these include:

— combining two indirect test methods with core testing;

— use of cores of diameter less than 50 mm;

— use of pull-out testing;