



**BSI Standards Publication**

## **Further guidance on the application of EN 13791:2019 and background to the provisions**

---

## National foreword

This Published Document is the UK implementation of CEN/TR 17086:2020.

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 committee manager.

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

© The British Standards Institution 2020  
Published by BSI Standards Limited 2020

ISBN 978 0 580 96468 8

ICS 91.080.40

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

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 October 2020.

### Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

TECHNICAL REPORT

**CEN/TR 17086**

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

October 2020

ICS 91.080.40

English Version

## Further guidance on the application of EN 13791:2019 and background to the provisions

Guide pour l'application de la norme EN 13791:2019 et  
contexte des spécifications

Weiterführende Anleitung zur Anwendung der EN  
13791:2019 und Hintergrund zu den Regelungen

This Technical Report was approved by CEN on 4 October 2020. It has been drawn up by the Technical Committee CEN/TC 104.

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**

<b>Contents</b>	<b>Page</b>
European foreword.....	4
Introduction .....	5
1 Scope.....	6
2 Symbols and abbreviated terms .....	6
3 General principles adopted for the revision .....	7
4 <i>In situ</i> compressive strength and other concrete properties assumed in the EN 1992-1-1 design process .....	8
4.1 General.....	8
4.2 Concrete compressive strength based on test specimens.....	9
4.3 Concrete compressive strength based on the strength of cores from the structure .....	11
5 Differences between test specimens and concrete in the structure.....	11
5.1 Introduction .....	11
5.2 Reference test specimen.....	12
5.3 Effects of the moisture condition on <i>in situ</i> specimens.....	13
5.4 Effect of maturity on concrete strength .....	14
5.5 Effects of curing.....	14
5.6 Effects of vibration.....	15
5.7 Effects of excess entrapped air.....	15
6 Testing variables that influence core strength .....	15
6.1 Introduction .....	15
6.2 Direction relative to the casting .....	15
6.3 Imperfections .....	15
6.4 Diameter of core.....	16
6.5 Length/diameter ratio .....	16
6.6 Flatness of end surfaces.....	16
6.7 Capping of end surfaces .....	16
6.8 Effect of drilling .....	16
6.9 Reinforcement.....	16
7 Scope in EN 13791:2019, Clause 1 .....	17
8 Terms and definitions, symbols and abbreviations in EN 13791:2019, Clause 3.....	17
9 Investigation objective and test parameters in EN 13791:2019, Clause 4.....	18
10 Test regions and test locations in EN 13791:2019, Clause 5.....	18
11 Core testing and the determination of the <i>in situ</i> compressive strength in EN 13791:2019, Clause 6 .....	18
12 Initial evaluation of the data set in EN 13791:2019, Clause 7.....	19
13 Estimation of compressive strength for structural assessment of an existing structure in EN 13791:2019, Clause 8 .....	20
13.1 Based on core test data only (see EN 13791:2019, 8.1) .....	20
13.2 Based on a combination of indirect test data and core test data (see EN 13791:2019, 8.2).....	25
13.3 Use of indirect testing with selected core testing (see EN 13791:2019, 8.3).....	30

14	Assessment of compressive strength class of supplied concrete in case of doubt in EN 13791:2019, Clause 9 .....	30
14.1	General in EN 13791:2019, 9.1 .....	30
14.2	Use of core test data (see EN 13791:2019, 9.2).....	31
14.3	Indirect testing plus selected core testing (see EN 13791:2019, 9.3) .....	32
14.4	Screening test using general or specific relationship with an indirect test procedure (see EN 13791:2019, 9.4) .....	32
14.5	Procedure where the producer has declared non-conformity of compressive strength in EN 13791:2019, 9.5 .....	36
14.6	Use of comparative testing.....	36
Annex A	(informative) Examples of the calculations .....	39
A.1	Example A1: Calculating the rebound number .....	39
A.2	Example A2: Calculating the <i>in situ</i> strength from core test data .....	41
A.2.1	Example A2.1 .....	41
A.2.2	Example A2.2 .....	41
A.3	Example A3: Assessing the data for a test region to check whether it contains two or more compressive strength classes .....	42
A.4	Example A4: Check for statistical outliers .....	45
A.5	Example A5: Calculation of characteristic <i>in situ</i> compressive strength from core test data .....	47
A.6	Example A6: Establishing a correlation between an indirect test and <i>in situ</i> compressive strength.....	48
A.7	Example A7: Using combined indirect testing and core testing to estimate the characteristic <i>in situ</i> compressive strength and the compressive strength at a location where only an indirect test result is available.....	52
A.8	Example A8: Estimating the characteristic <i>in situ</i> compressive strength using indirect testing and three cores taken from the weaker area.....	55
A.8.1	Example A8.1 .....	55
A.8.2	Example A8.2 .....	55
A.9	Example A9: Screening test using a generic relationship .....	56
A.10	Example A10: Screening test using a rebound hammer that has been calibrated against test specimens made from the same concrete.....	59
A.11	Example A11: Assessment of compressive strength class of concrete as placed using indirect testing and selected core test data .....	63
A.12	Example A12: Assessment of compressive strength class of recently supplied concrete using core test data only .....	64
Bibliography	.....	66

## **European foreword**

This document (CEN/TR 17086:2020) has been prepared by Technical Committee CEN/TC 104 “Concrete and related products”, the secretariat of which is held by Standards Norway.

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 should be read in conjunction with EN 13791:2019.

## Introduction

(1) To achieve a balanced standard, CEN/TC 104/SC 1/TG 11 comprises experts with different backgrounds and affiliations. The membership of TG 11 is given in Table 1.

**Table 1 — Membership of the European Technical Standard Committee,  
CEN/TC 104/SC 1/TG 11, responsible for the revision of EN 13791**

Member	Affiliation
Professor Tom Harrison	Convenor
Dr Chris Clear	Secretary
Vesa Anttila	Rudus, Finland
Prof. Wolfgang Breit (papers only)	Technische Universität Kaiserslautern, Germany
Dr Neil Crook	The Concrete Society, UK
Ir. F.B.J. (Jan) Gijssbers	CEN/TC250/SC2
Bruno Godart	IFSTTAR, France
Dr. Arlindo Gonçalves	Laboratório Nacional de Engenharia Civil, Portugal
Christian Herbst	JAUSLIN + STEBLER INGENIEURE AG, Switzerland
Rosario Martínez Lebrusant	Jefe del Área de Certificación y Hormigones, Spain
Dorthe Mathiesen (papers only)	Danish Technological Institute, Denmark
David Revuelta	Instituto Eduardo Torroja, Spain
Dr.-Ing. Björn Siebert followed by Dr Enrico Schwabach	Deutscher Beton- und Bautechnik-Verein E.V.
Prof. Johan Silfwerbrand	Swedish Cement and Concrete Research Institute, Sweden
Ceyda Sülün followed by Francesco Biasioli	ERMCO
José Barros Viegas (papers only)	BIBM
Dr.-Ing. Ulrich Wöhl	German expert and member of former TG11
Christos A Zeris (papers only)	National Technical University of Athens, Greece

(2) In addition, guidance on rebound hammer and pulse velocity testing was provided by David Corbett of Proceq, Switzerland and statistical help with combining core and indirect test results was provided by André Monteiro of the Laboratório Nacional de Engenharia Civil, Portugal.

(3) Contact and exchange of information was also maintained with RILEM Technical Committee TC ISC 249, which works on onsite non-destructive assessment of concrete strength.

(4) Where a reference is cited to a paragraph without being preceded by a reference to a standard, e.g. EN 13791:2019, Clause 6, the reference is to a paragraph in this document. For example '13.3 (2)' means paragraph (2) in 13.3 of this document.