DIN CEN/TR 17310



ICS 91.100.30

Carbonation and CO₂ uptake in concrete; English version CEN/TR 17310:2019, English translation of DIN CEN/TR 17310:2020-04

Karbonatisierung und CO₂-Aufnahme von Beton; Englische Fassung CEN/TR 17310:2019, Englische Übersetzung von DIN CEN/TR 17310:2020-04 Carbonatation et absorption du CO₂ dans le béton; Version anglaise CEN/TR 17310:2019, Traduction anglaise de DIN CEN/TR 17310:2020-04

Document comprises 49 pages

Translation by DIN-Sprachendienst.

In case of doubt, the German-language original shall be considered authoritative.



A comma is used as the decimal marker.

National foreword

This document (CEN/TR 17310:2019) has been prepared by Technical Committee CEN/TC 104 "Concrete and related products" (Secretariat: SN, Norway).

The responsible German body involved in its preparation was *DIN-Normenausschuss Bauwesen* (DIN Standards Committee Building and Civil Engineering), Working Committee NA 005-07-02 AA "Concrete technology (national mirror committee for CEN/TC 104)".

Technical Reports are not part of the German body of standards.

Please tell us what you think of this Technical Report:

- preferably in a file with a table, e-mailed to nabau@din.de. The template for this table is available for download from www.din.de/stellungnahme;
- or send a hard copy to *DIN-Normenausschuss Bauwesen* (DIN Standards Committee Building and Civil Engineering), 10772 Berlin.

TECHNICAL REPORT RAPPORT TECHNIQUE TECHNISCHER BERICHT

CEN/TR 17310

January 2019

ICS 91.100.30

English Version

Carbonation and CO2 uptake in concrete

Carbonatation et absorption du ${\rm CO_2}$ dans le béton

Karbonatisierung und ${\rm CO_2} ext{-}{\rm Aufnahme}$ von Beton

This Technical Report was approved by CEN on 30 December 2018. 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, 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

© 2019 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. CEN/TR 17310:2019 E

This is a preview. Click here to purchase the full publication.

Con	Contents P		
	European foreword	4	
1	Scope	5	
2	Normative references	5	
3	Terms and definitions	5	
4	Carbonation, the uptake of carbon dioxide		
4.1	Compounds, chemistry and notation		
4.2	Carbonation		
4.2.1	Carbonation reactions		
4.2.2	Process of carbonation		
4.2.3	Degree of carbonation		
4.2.4	Effect of carbonation on cement paste structure		
4.2.5	Carbonation rate		
4.2.6	Carbonation rate controlling factors		
4.2.7	Carbonation rate of concrete with blended cements or with additions		
4.3	CO ₂ binding capacity in concrete, Degree of carbonation	16	
4.3.1	General	16	
4.3.2	Theoretical binding capacity of Portland cement		
4.3.3	Normal binding capacity of Portland cement		
4.3.4	Normal binding capacity of blended cements		
4.4	Carbonation in different environments		
4.4.1	General		
4.4.2	Dry indoor concrete		
4.4.3	Concrete exposed to rain		
4.4.4	Concrete sheltered from rain	20	
4.4.5	Wet or submerged concrete		
4.4.6	Buried concrete	21	
5	Practical experiences of CO ₂ uptake in concrete life stages	21	
5.1	CO ₂ uptake during product stage (module A)	21	
5.2	CO ₂ uptake during use stage (module B)	22	
5.3	CO ₂ uptake during end of life stage	29	
5.3.1	CO ₂ uptake during end of life stage - demolition, crushing and waste handling		
	(module C1-C3)	29	
5.3.2	CO ₂ uptake during end of life stage – landfill (module C4)		
5.4	CO ₂ uptake beyond the system boundary (module D)		
	2 · · · · · · · · · · · · · · · · · · ·		
6	Figures for "direct estimation" of CO ₂ uptake in whole structures during use stage		
6.1	General		
6.1.1	General		
6.1.2	CO ₂ uptake for a portal frame bridge		
6.1.3	CO ₂ uptake for a residential building		
6.2	Average CO ₂ uptake for construction types, strength classes and exposure	36	
7	Additional information	37	

7.1	CO ₂ uptake in the long term, beyond the service life of the structure	37
7.2	CO ₂ uptake of crushed concrete in new applications	38
8	Society perspective - Carbonation and CO ₂ uptake in mortar	38
9	National calculation models and methods	39
9.1	General	39
9.2	Calculation of Carbonation of concrete in use phase (Swiss approach)	39
9.2.1	General	39
9.2.2	Water/CaO	39
9.2.3	CO ₂ concentration, relative humidity and CO ₂ buffer capacity	39
9.2.4	A simple approach of assessing the CO ₂ uptake of concrete components	40
9.2.5	Ratio of CO_2 uptake/ CO_2 emission as a function of thickness of concrete element	43
Biblio	graphy	45