



**NSAI**  
Standards

Irish Standard  
I.S. EN 12504-4:2021

## Testing concrete in structures - Part 4: Determination of ultrasonic pulse velocity

**I.S. EN 12504-4:2021**

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

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## National Foreword

I.S. EN 12504-4:2021 is the adopted Irish version of the European Document EN 12504-4:2021, Testing concrete in structures - Part 4: Determination of ultrasonic pulse velocity

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EUROPEAN STANDARD

**EN 12504-4**

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2021

ICS 91.100.30

Supersedes EN 12504-4:2004

English Version

## Testing concrete in structures - Part 4: Determination of ultrasonic pulse velocity

Essais pour béton dans les structures - Partie 4 :  
Détermination de la vitesse de propagation des  
ultrasons

Prüfung von Beton in Bauwerken - Teil 4: Bestimmung  
der Ultraschall-Impulsgeschwindigkeit

This European Standard was approved by CEN on 30 May 2021.

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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.

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## EN 12504-4:2021 (E)

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## European foreword

This document (EN 12504-4:2021) 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of an identical text or by endorsement, at the latest by January 2022, and conflicting national standards shall be withdrawn at the latest by January 2022.

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 12504-4:2004.

In comparison with the previous edition, the following changes have been made:

- option to use equipment utilizing transverse waves.

This document is one of a series on testing concrete.

EN 12504, *Testing concrete in structures*, consists of the following parts:

- *Part 1: Cored specimens — Taking, examining and testing in compression;*
- *Part 2: Non-destructive testing — Determination of rebound number;*
- *Part 3: Determination of pull-out force;*
- *Part 4: Determination of ultrasonic pulse velocity.*

This document is based on the International Standard ISO 1920-7, *Testing of concrete — Part 7: Non-destructive tests on hardened concrete*. It is recognized that the ultrasonic pulse velocity determined using this document is a convention in as much that the path length over which the pulse travels is not always strictly known.

The measurement of pulse velocity can be used for the determination of the uniformity of concrete, the presence of cracks or voids, changes in properties with time and in the determination of dynamic physical properties. These subjects were considered to be outside the scope of this document, but some information is given in Annex B and more information can be found in the technical literature. The measurement can also be used to estimate the strength of *in situ* concrete elements or specimens given in EN 13791, *Assessment of in situ compressive strength in structures and precast concrete components*. However, it is not intended as an alternative to the direct measurement of the compressive strength of concrete.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website

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.

## EN 12504-4:2021 (E)

### 1 Scope

This document specifies a method for the determination of the velocity of propagation of pulses of ultrasonic longitudinal waves or ultrasonic transverse waves in hardened concrete, which is used for a number of applications.

### 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 206, *Concrete - Specification, performance, production and conformity*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 206 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

**3.1**  
**transit time**  
time taken for an ultrasonic pulse to travel from the transmitting transducer to the receiving transducer, passing through the interposed concrete

Note 1 to entry: Transit time is referred to as time of flight in EN ISO 5577.

**3.2**  
**onset**  
leading edge of the pulse detected by the measuring apparatus

**3.3**  
**rise time**  
time for the leading edge of the first pulse to rise from 10 % to 90 % of its maximum amplitude

### 4 Principle

A pulse of longitudinal or transverse vibrations is produced by an ultrasonic transducer held in contact with one surface of the concrete under test. After traversing a known path length in the concrete, the pulse of vibrations is converted into an electrical signal by a second ultrasonic transducer and an electronic timing device enables the transit time of the pulse to be measured.



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