



BSI Standards Publication

# Tests for mechanical and physical properties of aggregates

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Part 2: Methods for the determination of resistance to fragmentation

## National foreword

This British Standard is the UK implementation of EN 1097-2:2020. It supersedes BS EN 1097-2:2010, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/502/6, Test methods.

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

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English Version

## Tests for mechanical and physical properties of aggregates - Part 2: Methods for the determination of resistance to fragmentation

Essais pour déterminer les caractéristiques  
mécaniques et physiques de granulats - Partie 2 :  
Méthodes pour la détermination de la résistance à la  
fragmentation

Prüfverfahren für mechanische und physikalische  
Eigenschaften von Gesteinskörnungen - Teil 2:  
Verfahren zur Bestimmung des Widerstandes gegen  
Zertrümmerung

This European Standard was approved by CEN on 24 February 2020.

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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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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## European foreword

This document (EN 1097-2:2020) has been prepared by Technical Committee CEN/TC 154 “Aggregates”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by October 2020, and conflicting national standards shall be withdrawn at the latest by October 2020.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 1097-2:2010.

The main technical changes compared to EN 1097-2:2010 are the following:

- All annexes are presented in the Scope.
- The definition of  $LA_{RB}$  has been added in Clause 3.
- Reference to the test sieves in Annex B has been added in Table 1.
- Guard sieves are introduced in 4.1 General apparatus.
- Figure 1 describing a typical Los Angeles testing machine has been modified.
- Notes with normative text have been transformed into main text (Note in 4.2.2.1, Note 3 in 5.2 and Note in 6.2.2).
- Explanations about ball load have been added as notes in 4.2.2.2.
- The test procedure in 5.3 has been clarified.
- The texts about masses in 6.2.4 and 6.3.4 have been clarified.
- Annex A is completed to contain full text, not only the clauses expressing additions or modifications to main text clauses.
- The text about ball load in A.1.2.2 has been completed.
- The test procedure for aggregates for railway ballast has been completed (A.2.3).
- Formula (A.1) has been changed.
- The test report content has been adopted to the current rules (5.5, 6.5, A.2.5 and A.3.5).
- The principle and the test procedure for impact test of aggregates for railway ballast have been completed (A.3.1 and A.3.3).
- Annex B has been modified to include both LA test and impact test and is completed with alternative narrow range classifications for the impact test.

- The texts about determination of impact effect have been removed (D.3.2, D.4.7 and the last point of the checklist in D.2).
- A new Annex H with an additional sieve for evaluation of the Los Angeles test for railway ballast is added.
- The Bibliography is supplemented.
- All references (except for the normative) are dated.

This European standard forms part of a series of tests for mechanical and physical properties of aggregates. Test methods for other properties of aggregates are covered by the following European standards:

- EN 932, *Tests for general properties of aggregates*
- EN 933, *Tests for geometrical properties of aggregates*
- EN 1367, *Tests for thermal and weathering properties of aggregates*
- EN 1744, *Tests for chemical properties of aggregates*
- EN 13179, *Tests for filler aggregate used in bituminous mixtures*

EN 1097 consists of the following parts, under the general title *Tests for mechanical and physical properties of aggregates*:

- *Part 1: Determination of the resistance to wear (micro-Deval)*
- *Part 3: Determination of loose bulk density and voids*
- *Part 4: Determination of the voids of dry compacted filler*
- *Part 5: Determination of the water content by drying in a ventilated oven*
- *Part 6: Determination of particle density and water absorption*
- *Part 7: Determination of the particle density of filler — Pyknometer method*
- *Part 8: Determination of the polished stone value*
- *Part 9: Method for the determination of the resistance to wear by abrasion from studded tyres — Nordic test*
- *Part 10: Water suction height*
- *Part 11: Determination of compressibility and confined compressive strength of lightweight aggregates*

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

## 1 Scope

This document describes the reference method, the Los Angeles test, used for type testing and in case of dispute (and an alternative method, the impact test) for determining the resistance to fragmentation of coarse aggregates (main text) and aggregates for railway ballast (Annex A). For other purposes, in particular factory production control, other methods are possible provided that an appropriate working relationship with the reference method has been established.

This document applies to natural, manufactured or recycled aggregates used in building and civil engineering.

Annex A describes a method for the determination of resistance to fragmentation of aggregates for railway ballast.

Annex B gives alternative narrow range classifications for the Los Angeles test and the impact test.

Annex C contains construction, operation and safety requirements for the impact tester.

Annex D describes a method for checking of the impact tester.

Annex E gives precision data.

Annex F contains a worked example of calculation of impact value *SZ*.

Annex G gives an alternative narrow range classification for the Los Angeles test of 16/32 mm recycled aggregates.

Annex H proposes an additional sieve for the evaluation of the Los Angeles test for railway ballast.

Annex A is normative and Annexes B to H are informative.

## 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 932-2, *Tests for general properties of aggregates — Part 2: Methods for reducing laboratory samples*

EN 932-5, *Tests for general properties of aggregates — Part 5: Common equipment and calibration*

EN 933-1, *Tests for geometrical properties of aggregates — Part 1: Determination of particle size distribution — Sieving method*

EN 933-2, *Tests for geometrical properties of aggregates — Part 2: Determination of particle size distribution — Test sieves, nominal size of apertures*

EN 1097-6, *Tests for mechanical and physical properties of aggregates — Part 6: Determination of particle density and water absorption*

EN 10025-2:2004, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*