TÄITEMATERJALIDE MEHAANILISTE JA FÜÜSIKALISTE OMADUSTE KATSETAMINE. OSA 1: KULUMISKINDLUSE MÄÄRAMINE (MIKRO-DEVAL)

Tests for mechanical and physical properties of aggregates - Part 1: Determination of the resistance to wear (micro-Deval)

EESTI STANDARDIMIS- JA AKREDITEERIMISKESKUS
ESTONIAN CENTRE FOR STANDARDISATION AND ACCREDITATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 1097-1:2023 sisaldab Euroopa standardi EN 1097-1:2023 ingliskeelset teksti.	This Estonian standard EVS-EN 1097-1:2023 consists of the English text of the European standard EN 1097-1:2023.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 20.12.2023.	Date of Availability of the European standard is 20.12.2023.
Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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English Version

Tests for mechanical and physical properties of aggregates - Part 1: Determination of the resistance to wear (micro-Deval)

Essais pour déterminer les caractéristiques mécaniques et physiques des granulats - Partie 1 : Détermination de la résistance à l'usure (micro-Deval)

Prüfverfahren für mechanische und physikalische Eigenschaften von Gesteinskörnungen - Teil 1: Bestimmung des Widerstandes gegen Verschleiß (Micro-Deval)

This European Standard was approved by CEN on 27 November 2023.

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.

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

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European foreword

This document (EN 1097-1:2023) 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 June 2024, and conflicting national standards shall be withdrawn at the latest by June 2024.

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 1097-1:2011.

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

a) The European foreword, the Scope, the Terms and definitions and the Test report content have been updated according to the current rules;

b) Lightweight aggregates have been included in the *Scope;*

c) The Normative references have been extended with EN 933-2, and ISO 3290-1 has been moved to the Bibliography;

d) The definition of M_{DE} or $M_{DE,RB}$ has been added in Clause 3;

e) In Clause 5, the description of the micro-Deval apparatus has been clarified. In addition, the requirement on steel balls to comply with ISO 3290-1 has been deleted since it was too sharp compared with the specified diameter tolerance. A new Note with reference to ISO 3290-1 has been added. A new Note about the hardness of steel ball diameters has been added. Two optional apparatus, a gauge and a magnet, have been added;

f) In the test procedure, amount of water is expressed in mass instead of volume. Subsequently, EN ISO 4788 *Laboratory glassware* has been deleted from Clause 2, Graduated glass cylinder has been deleted from Clause 5 Apparatus, and B.2 Apparatus has been deleted;

g) The formulae for calculation of M_{DE} and $M_{DE,RB}$ have included the actual initial masses instead of 500 g resp. 10 000 g;

h) The tested size fraction of the aggregate has been moved from optional data to required data;

i) Annex A has been completed to contain full text, not only the clauses expressing additions or modifications to main text clauses. Formula (A.1) has been changed and instructions to report the mean value have been added in A.6;

j) In Annex C, the term “range classification” has been replaced by the term “size fraction”;

k) New informative Annexes D and E have been added and specify methods for determination of the wear of fine aggregates.

l) In addition, the Principle and Annex C have been simplified and the Bibliography has been supplemented.

This document 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 (all parts), *Tests for general properties of aggregates*

— EN 933 (all parts), *Tests for geometrical properties of aggregates*

— EN 1367 (all parts), *Tests for thermal and weathering properties of aggregates*

— EN 1744 (all parts), *Tests for chemical properties of aggregates*

— EN 13179 (all parts), *Tests for filler aggregate used in bituminous mixtures*

The other parts of EN 1097 include:

— *Part 2: Methods for the determination of resistance to fragmentation*

— *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: Determination of the resistance to wear by abrasion from studded tyres — Nordic test*

— *Part 10: Determination of water suction height*

— *Part 11: Determination of the compressibility and of the compressive strength of lightweight aggregates*

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, Türkiye and the United Kingdom.

1 Scope

This document specifies the reference method used for type testing and in case of dispute, for determining the resistance to wear of coarse aggregates (main text) and aggregates for railway ballast (Annex A) by abrasion in the micro-Deval apparatus. Other methods can be used for other purposes, such as factory production control, provided that an appropriate working relationship with the relevant reference method has been established.

This document applies to natural, manufactured, recycled or lightweight (LWA) aggregates.

NOTE This document does not apply to all types of LWA.

The reference test is performed with the addition of water. Annex B gives details of how the test can be performed without the addition of water.

Annex A specifies the method to determine the resistance to wear of aggregates for railway ballast without abrasive charge.

Annex C specifies the test performed with alternative narrow size fractions.

Annexes D and E specify methods for determining the wear of fine aggregates.

Precision data for the reference test method are given in Annex F.

Annex A is normative and Annexes B, C, D, E and F are informative.

WARNING – The use of this part of EN 1097 can involve hazardous materials, operations and equipment (such as dust, noise and heavy lifts). It does not purport to address all of the safety or environmental problems associated with its use. It is the responsibility of users of this document to take appropriate measures to ensure the safety and health of personnel and the environment prior to application of this document, and fulfil statutory and regulatory requirements for this purpose.

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*