SLOVENSKI STANDARD
SIST EN 17542-2:2022

01-september-2022

Zemeljska dela - Geotehnični laboratorijski preskusi - 2. del: Preskus drobljivosti

Earthworks - Geotechnical laboratory tests - Part 2: Fragmentability test standard

Erdarbeiten - Geotechnische Laborversuche - Teil 2: Prüfung der Zertrümmerbarkeit

Terrassements - Essais géotechniques en laboratoire - Partie 2 : Essai de fragmentabilité

Ta slovenski standard je istoveten z: **EN 17542-2:2022**

ICS:

93.020	Zemeljska dela. Izkopavanja. Gradnja temeljev. Dela pod zemljo	Earthworks. Excavations. Foundation construction. Underground works

SIST EN 17542-2:2022 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 17542-2

June 2022

ICS 93.020

English Version

Earthworks - Geotechnical laboratory tests - Part 2: Fragmentability test standard

Terrassements - Essais géotechniques en laboratoire - Partie 2 : Essai de fragmentabilité

Erdarbeiten - Geotechnische Laborversuche - Teil 2: Prüfung der Zertrümmerbarkeit

This European Standard was approved by CEN on 20 April 2022.

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.

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

Contents

Page

European foreword

This document (EN 17542-2:2022) has been prepared by Technical Committee CEN/TC 396 “Earthworks”, the secretariat of which is held by AFNOR.

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 December 2022, and conflicting national standards shall be withdrawn at the latest by December 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.

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.

Introduction

The fragmentability coefficient I_{FR} is an identification parameter adopted in the classification of materials for earthworks according to EN 16907-2.

1 Scope

This document defines the principle and the methods for the determination of the "fragmentability coefficient" of rocky material.

The fragmentability coefficient I_{FR} distinguishes the behaviour of certain rocky material and is used to show the change in particle size from the moment that the material is excavated through to its subsequent implementation and in certain cases during its whole service life. Changes in the particle size occur due to the structural resistance of the rock being unable to support the mechanical stress to which it is subjected during its implementation and use.

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 16907-2, *Earthworks - Part 2: Classification of materials*

EN 13286-2, *Unbound and hydraulically bound mixtures - Part 2: Test methods for laboratory reference density and water content - Proctor compaction*

EN ISO 17892-4, *Geotechnical investigation and testing - Laboratory testing of soil - Part 4: Determination of particle size distribution (ISO 17892-4)*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

ISO 3310-2, *Test sieves — Technical requirements and testing — Part 2: Test sieves of perforated metal plate*

3 Terms and definitions

No terms and definitions are listed in this document.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Symbols and abbreviated terms

I_{FR}	Fragmentability coefficient of a rocky material (in percent)
D_{10}	Particle size below which 10 % of the mass of a grainy material (in millimeter) are found
d/D	Ratio reflecting material fraction retained by a sieve of mesh size d over material fraction passed through a sieve of mesh size D
$D_{10\,bef}$	D_{10} value of the material before tamping (in millimeter)
$D_{10\,aft}$	D_{10} value of the material after tamping (in millimeter)

5 Test principle

The test principle is based on the determination of the changes in the D_{10}-value of a sample of a given granularity *d/D* subjected to a conventional tamping.

This fragmentability coefficient is expressed as the ratio of the D_{10} values before and after tamping.

6 Equipment and test material

The following equipment should be used in the test:

— Proctor mould B (EN 13286-2);

— standard Proctor hammer (EN 13286-2);

— reaction block (EN 13286-2);

— test sieves conforming to ISO 3310-1 or ISO 3310-2, together with appropriate receivers, shall be used in the test. The number of sieves and the mesh sizes used in the test should ensure detection of any discontinuity in the grading curve. The inclusion of sieves: 10 mm, 16 mm, 20 mm, 40 mm, 50 mm or 63 mm, and 80 mm is necessary as these represent the boundary sizes of the testing;

— balance, with a maximum permissible measurement error less than 0,2 % of the weighed mass.

7 Preparing samples

Take a sample that is representative of the nature and the humidity level of the rocky material to be tested either by extracting a core sample, or by using a hydraulic shovel, or by cropping the surface, or by taking the sample directly from the excavation site. Then prepare the *d/D* fraction to be tested.

The *d/D* fraction is obtained by splitting the sample with a hammer (if required), then by sifting it through the following sieves:

— 10 mm and 20 mm for material derived from weak clay rocks such as marl, shale, pelite, etc.

— 40 mm and 80 mm for material derived from strong clay rocks such as sedimentary schist, and degraded magmatic and metamorphic rocks.

The oversize particles from the 20 mm or 80 mm that respectively correspond to the dimensions *D* of the two particle size fractions tested, may be returned to the sample after they have been crushed with a hammer and sifted once more through the 10/20 mm and 40/80 mm sieves respectively.

Alternative size fractions are given in Annex B for the preparation of the test sample. Testing other size fractions may produce results different from those obtained using the reference size fractions. The size fraction used and the reference to Annex B should then be given in the test report.

The sample shall weigh at least 2 kg. If the fragmentability test is not carried out immediately after the *d/D* fraction has been prepared, the sample shall be stored so that is protected from evaporation.

8 Testing

ln order to draw the initial three point granulometric curve, sift the 10/20 mm or 40/80 mm fraction (prepared earlier) through 16 mm and 50 mm or 63 mm sieves respectively then weigh and note down the oversize particles from these sieves.

Mix all sample fraction again and homogenize again the *d/D* fraction after sifting and place it in the Proctor mould. The elements are manually arranged, with occasional shaking of the mould effected by lightly tapping the sides with the mallet. The top surface of the sample shall be as even as possible.

Place the mould that now contains the sample on the reaction block used for the Proctor tests (according to EN 13286-2) and hit the surface of the sample 100 times using the Proctor hammer, the blows distributed in accordance with the compaction method described for layer compaction in the Proctor test.

After tamping, take off the mould and, by hand, disintegrate any elements that may remain stuck together, then sift the sample trough the appropriate column of sieves, to determine the particles size distribution (according to EN ISO 17892-4) and the D_{10} values.

The following columns of sieves can be used :

— 1 mm, 2 mm, 5 mm, 10 mm if the tested fraction is a 10/20 mm fraction,

— 5 mm, 10 mm, 20 mm, 40 mm if the tested fraction is a 40/80 mm fraction.

A different set of sieves conforming to ISO 3310-1 or ISO 3310-2 can be used, if the sieves above and below D_{10} value have a ratio less or equal to 2,5.

Next, weigh the oversize particles from each sieve.

If manual disintegration is difficult due to the forming of a “cake” which traps the granules in a more or less plastic and claylike matrix, the test shall be interrupted and this behaviour shall be mentioned as indicated on the example of test report of Annex A.

9 Calculation and expression of results

Using the weight values of the oversize particles from the sieves specified in Clause 9, plot the granulometric curves of the tested fraction before and after tamping (according to EN ISO 17892-4).

From these curves, determine the respective values of D_{10} of the material before and after tamping.

Calculate the fragmentability coefficient I_{FR} using the following formula:

$$I_{FR} = \frac{D_{10\ bef}}{D_{10\ aft}}$$

Where:

$D_{10\ bef}$ is the D_{10} value of the material before tamping

$D_{10\ aft}$ is the D_{10} value of the material after tamping

NOTE D_{10} values can be determinated graphically or mathematically with a logarithm formula from the granulometric curve.

10 Test report

The test report shall affirm that the test was carried out in accordance with this document and shall contain the following information:

a) the standard reference used: EN 17542-2:2022;

b) method of test used;

c) identification of the specimen tested, e.g. by borehole number, sample number and sample depth and any other relevant details required, e.g. depth of specimen within a sample, method of sample selection, if relevant (see Table A.1);

d) visual description of the specimen including any observed features noted after testing, following the principles in EN 16907-2;

e) alternative sieves used, if relevant (see Annex B);

f) the test results (see Table A.2), presented as continuous curves of percentage of total dry mass passing on a semi-logarithmic plot, before and after tamping, following the principles in EN ISO 17892-4 (see example in Figure A1);

g) the mean value for the fragmentability coefficient, rounded to one decimal (see Table A.3);

h) any deviation from the specified test procedure, and any other information that can be important for interpreting the test results, e.g. difficulties of disintegration after tamping (see Table A.4).

An example of test report is given in the model test sheet of Annex A.