SLOVENSKI STANDARD
oSIST prEN 17542-2:2020

01-september-2020

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

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ICS:

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

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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

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

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oSIST prEN 17542-2:2020

Contents

Page

iTeh STANDARD PREVIEW
(standards.iteh.ai)
oSIST prEN 17542-2:2020
https://standards.iteh.ai/catalog/standards/sist/3e88a3ef-a503-4508-9291-395857209876/osist-pren-17542-2-2020

oSIST prEN 17542-2:2020

European foreword

This document (prEN 17542-2:2020) has been prepared by Technical Committee CEN/TC 396 “Earthworks”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

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oSIST prEN 17542-2:2020
https://standards.iteh.ai/catalog/standards/sist/3e88a3ef-a503-4508-9291-395857209876/osist-pren-17542-2-2020

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Introduction

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

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oSIST prEN 17542-2:2020
https://standards.iteh.ai/catalog/standards/sist/3e88a3ef-a503-4508-9291-395857209876/osist-pren-17542-2-2020

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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 than 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 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*

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3 Terms and definitions

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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 — Units

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 millimetres)
Material 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

5 Test principle

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

This fragmentability is expressed as:

$$I_{FR} = \frac{D_{10} \text{ of the material before tamping}}{D_{10} \text{ of the material after tamping}}$$

oSIST prEN 17542-2:2020

6 Equipment end test material

The following equipment specific to the Proctor test should be used in the test (EN 13286-2):

— Proctor mould B,

— standard Proctor hammer,

— reaction block.

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, 16, 20, 40, 50 or 63, and 80 mm is necessary as these represent the boundary sizes of the testing.

Scales: 3000 g range, accuracy ± 1 g.

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.

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

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

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

The oversize particles from the 20 and 80 mm which respectively correspond to the dimensions D of the two particle size fractions tested, may be retumed 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.

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 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 CBR 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 which now contains the sample on the reaction block used for the Proctor tests (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.

oSIST prEN 17542-2:2020

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

The following columns of sieves can be use:

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

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

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 earlier, plot the granulometric curves of the tested fraction before and after tamping (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:

$$I_{FR} = \frac{D_{10} \text{ of the material before tamping}}{D_{10} \text{ of the material after tamping}}$$

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10 Test report

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The test report shall affirm that the test was carried out in accordance with this part of EN 17542 and shall contain the following information:

a) method of test used;

b) 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;

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

d) the test results, 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;

e) the mean value for the fragmentability coefficient (rounded to on decimal);

f) any deviation from the specified test procedure, and any other information that could be important for interpreting the test results, e.g. difficulties of disintegration after tamping.

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

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Annex A
(informative)

Test report – Fragmentability coefficient of rocky material
(in accordance with EN 17542-3)

Table A.1

Sites:		*Sampling date:*	
Survey:		*Test date:*	
Depth:		*Petrographic nature:*	*Fragmentable clay rock, marl type*

Table A.2

Sieves (mm)	***80***	***63***	***40***	***20***	***16***	***10***	***5***	***2***	***1***	***0,63***
Sample fraction passed (%) before tamping				*100,0*	*30,0*	*0,0*				
Sample fraction passed (%) after tamping				*100,0*		*60,0*	*30,0*	*17,0*	*12,0*	*8,0*

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oSIST prEN 17542-2:2020
https://standards.iteh.ai/catalog/standards/sist/3e66a5cf-a503-4508-9291-3958572098 76/osist-pren-17542-2-2020

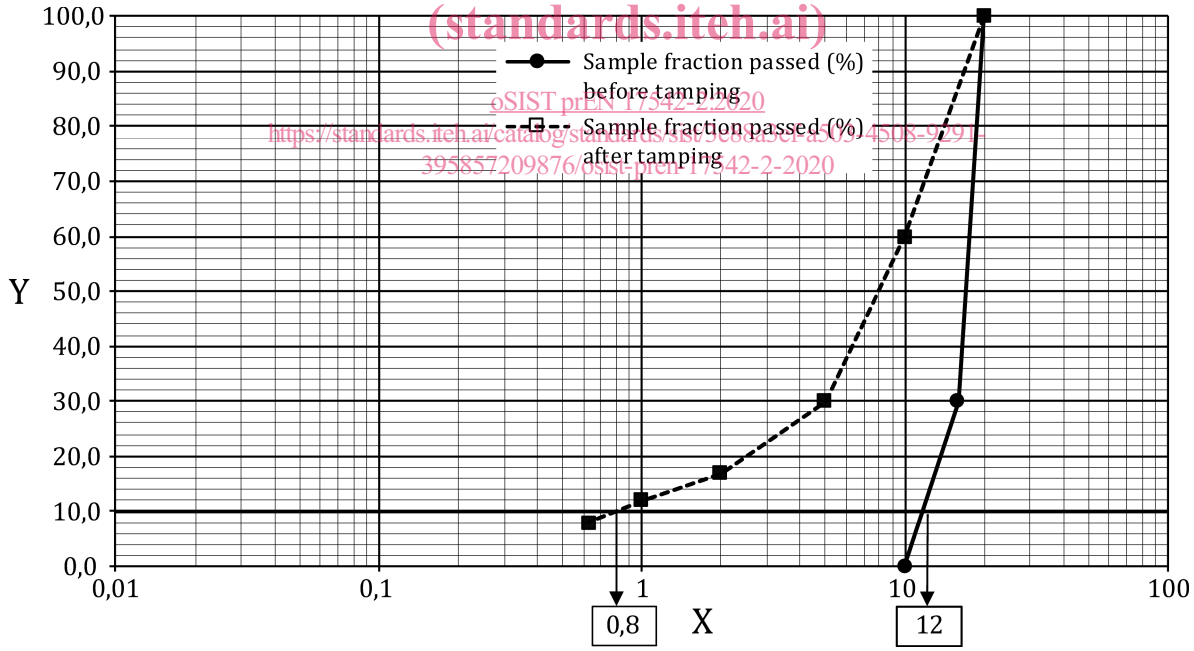

Figure A.1