SLOVENSKI STANDARD
oSIST prEN 17542-1:2020

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Zemeljska dela - Geotehnični laboratorijski preskusi - 1. del: Preskus razgradljivosti

Earthworks - Geotechnical laboratory tests - Part 1: Degradability test standard

Erdarbeiten - Geotechnische Laborversuche - Teil 1: Prüfung der Abbaubarkeit

Terrassements - Essais géotechniques en laboratoire - Partie 1 : Essai de dégradabilité

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Earthworks - Geotechnical laboratory tests - Part 1: Degradability test standard

Terrassements - Essais géotechniques en laboratoire - Partie 1 : Essai de dégradabilité

Erdarbeiten - Geotechnische Laborversuche - Teil 1: Prüfung der Abbaubarkeit

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (prEN 17542-1:2020) 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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Introduction

The degradability coefficient I_{DG} is an identification parameter adopted in the classification of materials for earthworks (EN 16907-2). This document refers to two methods to define the degradability behaviour, designated as French and Spanish methods in EN 16907-2. Those two methods are described as Method A and Method B, respectively.

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1 Scope

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

The degradability coefficient I_{DG} distinguishes the behaviour of certain rocky material and is used to show the change in the geotechnical characteristics (particle size, clay content, plasticity, etc.) in relation to the characteristics seen immediately following excavation.

Changes in the particle size occur due to the combined action of climatic or geohydrological elements (frost, soaking-drying cycles) and mechanical stress to which it is subjected. In the case of degradable rocky material, this leads to a fairly significant and continuous reduction in the mechanical and geometric characteristics of the works in which they are used.

The two methods developed in this document for the determination of I_{DG} are not equivalent, so any result obtained by this document can refer to the method used.

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*

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

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 http://www.electropedia.org/

4 Symbols – Units

I_{DGa}	Degradability coefficient of a rocky material (in percent) obtained by method A (French test)
I_{DGb}	Degradability coefficient of a rocky material (in percent) obtained by method B (Spanish test)
D_{10}	Particle size below which 10 % of the mass of a grainy material (in millimetres) are found
Material d/D	Ratio reflecting material fraction retained by a sieve of mesh size d over material fraction passed through a sieve of a mesh size D

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5 Method A

5.1 Test principle

The test is conducted by estimating changes in $D_{10\text{-value}}$ of a sample of a given granularity d/D subjected to four conventional soaking-drying cycles.

The degradability coefficient is expressed as:

$$I_{\text{DGa}} = \frac{D_{10} \text{ before 1st soaking} - \text{drying cycle}}{D_{10} \text{ after 4th soaking} - \text{drying cycle}}$$

5.2 Equipment and test material

— Test sieves conforming to ISO 3310-1 or ISO 3310-2, together with appropriate receivers, shall be used.

— The number of sieves used and their aperture sizes shall be sufficient to ensure that any discontinuities in the grading curve are detected.

— 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.

— An adjustable thermostat oven with forced air circulation devices capable of maintaining a uniform temperature of (105 ± 5) °C throughout the drying chamber.

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— Flat metal tray, minimum dimensions (H × L × W): 0,1 m × 0,3 m × 0,5 m.

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— Flat tray, minimum dimensions (H × L × W): 0,25 m × 0,5 m × 0,75 m.

— Scales: 3 000 g range, accuracy ± 1 g.

5.3 Preparing samples

Take a sample that is representative of the nature 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 crushing the sample with a hammer (if required), then by sifting it through the following sieves:

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

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

The oversize particles from the 20 mm and 80 mm sieves which 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.

The sample shall weigh at least 2 kg.

5.4 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.

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Mix all sample fraction and homogenize the d/D fraction after sifting and spread it over the metal tray. Immerse this tray into the large tray then place it in the oven at (105 ± 5) °C. The soaking-drying cycle is carried out four times in succession.

The 1st cycle starts with a soaking action and the 4th cycle ends with a drying action. The duration of the cycle is:

— 8 h ± 1 h for soaking;

— 16 h ± 1 h for drying.

After each soaking action and before placing the sample in the oven, siphon off the water remaining in the metal tray, taking extreme care of not washing away any solid particles.

At the end of the 4th cycle, dry sift the sample through the appropriate column of sieves, to determine the particles size distribution 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.

5.5 Calculation and expression of results

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Using the weight values of the oversize particles from the sieves specified earlier, construct the granulometric curves of the tested fraction before and after carrying out the four soaking-drying cycles (See EN ISO 17892-4).

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From these curves, determine the respective values of D_{10} of the material before and after carrying out the four soaking-drying cycles.

Calculate the degradability coefficient I_{DGa} using the following formula:

$$I_{DGa} = \frac{D_{10} \text{ before 1st soaking} - \text{ drying cycle}}{D_{10} \text{ after 4th soaking} - \text{ drying cycle}}$$

5.6 Test report

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 first and after forth soaking-drying cycle, following the principles in EN ISO 17892-4;

e) the mean value for the degradability coefficient, rounded to one decimal;

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f) any deviation from the specified test procedure, and any other information that could be important for interpreting the test results.

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

6 Method B

6.1 Test principle

The test allows to determine the disintegration resistance of aggregates and rock fragments submerged in water.

The method is based on evaluating of the quality of the aggregates that have to be subjected to the action of atmospheric factors, especially when data on the behaviour of the materials to be used in the climatic conditions existing on the site are not available.

I_{DGb} is the percentage of mass loss of the sample, after been tested, weighed according to the original sample size distribution.

6.2 Equipment and test material

A column of sieves with square opening meshes according to the specifications of the EN ISO 17892-4 standard. The following sieves are required for this test method:

Table 1 — Sieves required

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FINE AGGREGATES Sieve opening (mm)	COARSE AGGREGATES Sieve opening (mm)
0,16	8
0,315	10
0,63	12,5
1,25	16
2,5	20
4	25
5	31,5
	40
	50
	63

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Containers into which the samples of aggregates and rock fragments are immersed in water, in accordance with the procedure described in this method, shall be holed in such a way as to allow the free entry of water so that it can come into contact with the sample, as well as the drainage of the same without loss of particles from the material. The volume of water in which the samples are to be immersed shall be at least five times the volume of the submerged sample.

NOTE Baskets made of wire cloth or perforated sheet metal, with an opening appropriate to the size of the fraction to be contained, are very suitable for use in this test.

A suitable enclosure with devices to regulate the water temperature during the immersion period.

A Balance capable of determining the mass to an accuracy of 0,1 % of the mass of the test sample.