SLOVENSKI STANDARD
SIST-TS CEN/TS 17693-2:2022

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Zemeljska dela - Preskusi obdelave zemljin - 2. del: Preskus vrednotenja zmožnosti suhega materiala za emitiranje prahu

Earthworks - Soil treatment tests - Part 2: Test of evaluation of the aptitude of a dry material to emit dust

Erdarbeiten - Prüfungen zur Bodenbehandlung - Teil 2: Prüfung zur Bewertung der Staubemissionsfähigkeit eines trockenen Materials

Terrassements - Essais de traitement de sol - Partie 2 : Essai d'évaluation de l'aptitude d'un matériau sec à émettre de la poussière

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English Version

Earthworks - Soil treatment tests - Part 2: Test of evaluation of the aptitude of a dry material to emit dust

Terrassements - Essais de traitement de sol - Partie 2 : Test d'évaluation de l'aptitude d'un matériau sec à émettre de la poussière

Erdarbeiten - Prüfungen zur Bodenbehandlung - Teil 2: Prüfung zur Bewertung der Staubemissionsfähigkeit eines trockenen Materials

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (CEN/TS 17693-2:2021) has been prepared by Technical Committee CEN/TC 396 “Earthworks”, the secretariat of which is held by AFNOR.

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Introduction

This document describes a laboratory test method making it possible to determine the aptitude of a material coming from a dry mineral treatment, to emit dust at the time of various stages during an operation of soil treatment for earthworks (stocking and destocking of the product on jobsite, spreading, mixing).

The Index of dust emission (I_{DE}) determined by this laboratory test is not directly comparable to the real rate of dust emitted on the jobsite.

1 Scope

This document describes the reference method for the determination of the Index of dust emission (I_{DE}) in soil treatment for earthworks.

This test concerns more particularly:

— limes in conformity with EN 459-1, *Building lime - Part 1: Definitions, specifications and conformity criteria*;

— cements in conformity with EN 197-1, *Cement - Part 1: Composition, specifications and conformity criteria for common cements*;

— road binders in conformity with EN 13282-1, *Hydraulic road binders - Part 1: Rapid hardening hydraulic road binders - Composition, specifications and conformity criteria*;

— road binders in conformity with EN 13282-2, *Hydraulic road binders - Part 2: Normal hardening hydraulic road binders - Composition, specifications and conformity criteria*;

— fly ashes in conformity with EN 14227-4, *Hydraulically bound mixtures - Specifications – Part 4: Fly ash for hydraulically bound mixtures*;

— siliceous fly ashes in conformity with EN 450-1, *Fly ash for concrete - Part 1: Definition, specifications and conformity criteria*;

— ground-granulated blastfurnace slag in conformity with EN 15167-1, *Ground granulated blast furnace slag for use in concrete, mortar and grout - Part 1: Definitions, specifications and conformity criteria*.

2 Normative references

There are no normative references in this document.

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:

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

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

4 Abbreviations and symbols

Symbols for quantities

I_{DE}	Index of dust emission	dimensionless (%)
m_1	initial mass of the sample put on the sieve and submitted for testing	g
m_2	remaining mass of the sample on the sieve at the end of the test	g

5 Principle of the test

The test consists in determining the percentage of dust carried by air passing through a widespread layer of the product on the sieve. It is carried out in air jet siever equipped with a vacuum system able to provide a drive of the particles by a flow of ascending air. A dust trap is inserted between the air jet siever and the vacuum system, in order to limit the filling in of the system.

6 Equipment

The equipment necessary to the test (Figure A.1) includes:

6.1 Specific equipment

— an air jet siever whose rotary tube of distribution of air presents a slit of 105 mm ± 1 mm length and 1,95 mm ± 0,05 mm width; the number of rotations of this tube is equal to 20 r/min ± 1 r/min (Figure A.1, 12);

— a polycarbonate column (Figure A.2) to replace the lid of the air jet siever; a system (attaches and tensioners) allows its connection and ensures its sealing, this part is also named “bell”;

— a sieve of 45 µm, 200 mm in diameter according internal shoulder provided with its O ring (Figure A.3);

— a vacuum system ensuring a minimum flow of 60 m³/h, equipped with a dust trap and a water trap; this device is connected to the polycarbonate bell (Figure A.4);

— a valve of air inlet of 25 mm nominal of passage, coupled with the entry of the dust trap; this valve makes it possible to regulate the value of the depression (vacuum);

— a manometric indicator with coloured liquid of density 0,88 (“U” shaped tube) allowing to measure a total depression of at least 200 mm ± 2 mm of this liquid (corresponds to a pressure level of 17,25 hPa); it is connected to the air jet siever by a polyvinyl chloride pipe of 1,50 m ± 0,10 m length and interior nominal diameter of 6 mm;

— two flexible pipes connecting the bell to the dust trap and the dust trap with the vacuum system; their respective lengths are 1 m ± 0,20 m and 2 m ± 0,20 m;

— a stopper (cork) to seal the below opening from the air jet siever;

— a stop watch or timer to control the starting and the stop of the complete installation (accuracy of 1 s);

— a balance with a maximum permissible measurement error less than 0,3 % of the weighed mass;

Figures of the equipment are given in Annex A.

6.2 Other material and tools

— a small plastic based hammer;

— a distribution of pressurized air;

— an ultrasound bath for the cleaning the sieve;

— anti-static liquid to apply to the walls of the column;

— a skin soft duster to clean without striping the interior of the column;

— a bottle brush 50 mm in diameter and 1,10 m minimum length allowing to clean the pipes of dust trap;

— acidified water.

7 Procedure

7.1 General

After sampling, the sample to be submitted for testing will be placed in a hermetic packing. The reliability of measurement being primarily related on the cleanliness and the sealing of the system, it is significant not to neglect them and to ensure their maintenance of it. It is essential to empty and clean, at least after each series of tests, the dust trap to avoid any filling in (use also acidified water to eliminate the deposits). Also clean the sieve of 45 µm with ultrasounds.

To ensure the repeatability and the reproducibility of the test, it is necessary to respect the scheduling of the various actions listed hereafter.

7.2 Preparation of the test

— Close the opening of the air jet siever;

— connect the electric vacuum system to the input socket of the air jet siever;

— if required, connect the air jet siever to the electronic timer;

— connect the manometric tube to the opening of depression of the air jet siever;

— put the switch of the vacuum system on;

— place the sieve of 45 µm on the air jet siever by taking care that the O ring of the sieve suits perfectly with it;

— place the bell, treated beforehand with the anti-static product, on the internal shoulder of the sieve and fix it with the tensioners;

— insert, between the vacuum system and the exit of the bell, the dust trap containing 2 cm of water (or 1,5 l); to make sure that the inlet pipe of the dust trap connected to the bell is at 3,5 cm of the water surface;

— connect the water trap on the outlet of the dust trap and to the entry of the vacuum system.

7.3 Preparation, execution of the test, cleaning and maintenance operations

7.3.1 Presetting

— Open the valve of air inlet, check by gradually closing the valve if a total depression level of 200 mm ± 2 mm of manometric coloured liquid (17,25 hPa) (this checking will be carried out every 10 tests);

— regulate and stabilize the depression for measurement with 64 mm ± 2 mm of manometric coloured liquid (5,52 hPa);

— remove the column of the sieve.

7.3.2 Execution

— Before taking a sample, transfer the sample to a container of volume adapted to ensure, by manual agitation, a good homogeneity;

— place the sieve on the balance, tare (put at zero of the balance) then weigh 50 ± 1 g (m_1) of the product to be tested ; distribute it uniformly on the sieve using a dry spatula (without packing);

— carefully replace the sieve on the air jet siever;

— pose the column on the sieve and fix it;

— check visually the quality of the assembly and ensure the sealing;

— start the system of suction and vacuum during 4 min, with a 1 s accuracy while stabilizing, using the valve, depression air inlet at 64 ± 2 mm of manometric coloured liquid (5,52 hPa). In order to eliminate the possible deposits (sticking), tap on the edge of the sieve, the column walls and the exit elbow with the plastic hammer.

7.3.3 At the end of the test

— Separate carefully the column from the sieve;

— determine the mass of the sample remaining on the sieve by weighing it (m_2); do not collect the possible deposits in the column, those fines should have normally passed through sieve.

7.3.4 After each test

— Clean the sieve with the dry pressurized air;

— carefully clean the column and the elbow with soft duster;

— scrub the inlet pipe of the dust trap with the bottle brush to eliminate the residue.

8 Expression of the results

The Index of dust emission (I_{DE}) is calculated according to the following equation:

$$I_{DE} = \frac{m_1 - m_2}{m_1} \times 100$$

where

m_1 is the initial mass of the sample in powder form put on the sieve,

m_2 is the mass of the powder form remaining on this sieve at the end of the test,

I_{DE} will be the average value on 3 tests and will be rounded with the closest round number.

9 Test report

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