



BSI Standards Publication

## Fertilizers — Crushing strength determination on fertilizers grains

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## National foreword

This Published Document is the UK implementation of CEN/TR 12333:2021.

The UK participation in its preparation was entrusted to Technical Committee CII/37, Fertilisers and related chemicals.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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TECHNICAL REPORT

**CEN/TR 12333**

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

June 2021

ICS 65.080

Supersedes CR 12333:1996

English Version

## Fertilizers - Crushing strength determination on fertilizers grains

Engrais - Détermination de la résistance à l'écrasement  
des engraisDüngemittel - Bestimmung der Krümmfestigkeit auf  
Düngemittelkörnern

This Technical Report was approved by CEN on 23 May 2021. It has been drawn up by the Technical Committee CEN/TC 260.

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## European foreword

This document (CEN/TR 12333:2021) has been prepared by Technical Committee CEN/TC 260 "Fertilizers and liming materials", the secretariat of which is held by DIN.

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 CR 12333:1996.

Significant changes between this document and CR 12333:1996 are as follows:

- a) 24/8/8, 13/13/21 and 0/10/20 changed to NPK 24+8+8, NPK 13+13+21 and PK 10+20, respectively;
- b) adaption to current principles and rules for structure and drafting.

The present report arises from work done by CEN/TC 260/WG 2 under the work item "Crushing strength determination" with the view of producing a European Standard.

Unfortunately, after several ring tests, results appeared to be so randomly distributed that a statistically significant interpretation showing good reproducibility and repeatability could not be obtained.

Tests on correlation have also shown that no significant correlation as to the causes of the dispersion of the results could be obtained within the proposed time scale and probably not without expending too much effort, time and money.

Therefore, since the results obtained may be added to those of past publications in the literature, CEN/TC 260 decided the results obtained should not be ignored by the scientific community.

## Introduction

The resistance to crushing (crushing strength) of fertilizer is an important property used in quality control of fertilizer production. It influences the storage and handling as well as spreading properties of fertilizer.

However, crushing strength of fertilizer grains is not a constant property *stricto sensu*. Crushing strength is significantly influenced by the content of free water in the fertilizer, humidifying and drying during storage, as well as by temperature changes. Time dependent processes in the grain and bulk during the lifetime of the grains may also affect the crushing strength.

Nevertheless, there are several “in house” methods used for the measurement of crushing strength of fertilizer grains which give different results. There is also a need for a standardized method.

This document reports the results of the international ring test, organized by CEN/TC 282/WG 2 (physical properties), carried out 1992, with the purpose of standardizing the measurement technique of crushing strength.

## 1 Scope

This document is applicable to crushing strength measurement as applied to grains of fertilizer obtained in prilling or wet-granulation process. Compacted or crystalline materials were not considered.

## 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.

ISO 565:1990, *Test sieves — Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings*

ISO 5725:1986, *Precision of test methods — Determination of repeatability and reproducibility for a standard test method by inter-laboratory tests*<sup>1</sup>

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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/>

### 3.1

#### crushing strength of grains

force necessary to destroy the grain as such

## 4 Principle

The measurement of the force applied for the destruction of the grains may be carried out by constant load or constant speed.

NOTE Not all manufacturers of the apparatus can give information about the principle (constant speed or constant load) used.

It is not known which of the first “peak” or maximum of force applicable on the grain is measured.

The grains undergoing the measurement were of the same size.

## 5 Apparatus

### 5.1 Sieves

The sieves in accordance with ISO 565:1990 for the grain size chosen. In this ring test, the grain size was 2,0 mm (retained in the mesh of the sieve).

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<sup>1</sup> ISO 5725:1986 has been withdrawn and replaced by the ISO 5725 (series) released between 1994 and 1998.