

English Version

## Explosives for civil uses - Propellants and rocket propellants - Part 2: Determination of resistance to electrostatic discharge

Explosifs à usage civil - Poudres propulsives et propergols pour fusées - Partie 2 : Détermination de la résistance à l'énergie électrostatique

Explosivstoffe für zivile Zwecke - Treibladungspulver und Raketentreibstoffe - Teil 2: Bestimmung der Widerstandsfähigkeit gegen elektrostatische Energie

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

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## European foreword

This document (prEN 13938-2:2021) has been prepared by Technical Committee CEN/TC 321 “Explosives for civil uses”, the secretariat of which is held by UNE.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13938-2:2004.

In comparison with the previous edition, the following technical modifications have been made:

- a) the normative references have been updated;
- b) Clause 4, *Principle*, has been added;
- c) Annex A, *Range of applicability of the test method*, has been removed;
- d) Annex ZA has been updated.

This document has been prepared under a Standardization Request (M/562) annexed to the Commission Implementing Decision C(2019)6634 final as regards Explosives for civil uses given to CEN by the European Commission and the European Free Trade Association, and supports Essential Safety requirements of Directive 2014/28/EU.

For relationship with Directive 2014/28/EU, see informative Annex ZA, which is an integral part of this document.

EN 13938, *Explosives for civil uses — Propellants and rocket propellants*, is currently composed of the following parts:

- *Part 1: Requirements*
- *Part 2: Determination of resistance to electrostatic discharge*
- *Part 3: Determination of deflagration to detonation transition*
- *Part 4: Determination of burning rate under ambient conditions*
- *Part 5: Determination of voids and fissures*
- *Part 6: Solid rocket propellants — Guide for the determination of integrity of inhibitor coatings*
- *Part 7: Determination of safe and reliable ignition and complete deflagration of black powder*

## 1 Scope

This document specifies a method for the determination of resistance to electrostatic energy for propellants containing a mass fraction of at least 5 % of particles which pass through a 1 mm sieve. This method does not apply to black powder.

NOTE If the mass fraction of particles smaller than 1 mm size is less than 5 % the propellant is considered to be insensitive to electrostatic energy and this test is not performed.

## 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.

prEN 13857-1:2021, *Explosives for civil uses — Part 1: Terminology*

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

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 13857-1:2021 and the following apply.

### 3.1 reaction

occurrence of report, crackling, sparkling and/or flame

### 3.2 partial reaction

change of colour, opening of the cell or heat traces at the surface of the cell

## 4 Principle

Sudden and momentary electric current that flows in a sample at an electrical potential. During the handling operation, the particles could charge and an electrostatic discharge might occur, posing a risk of fire and explosion an also for people.

## 5 Apparatus

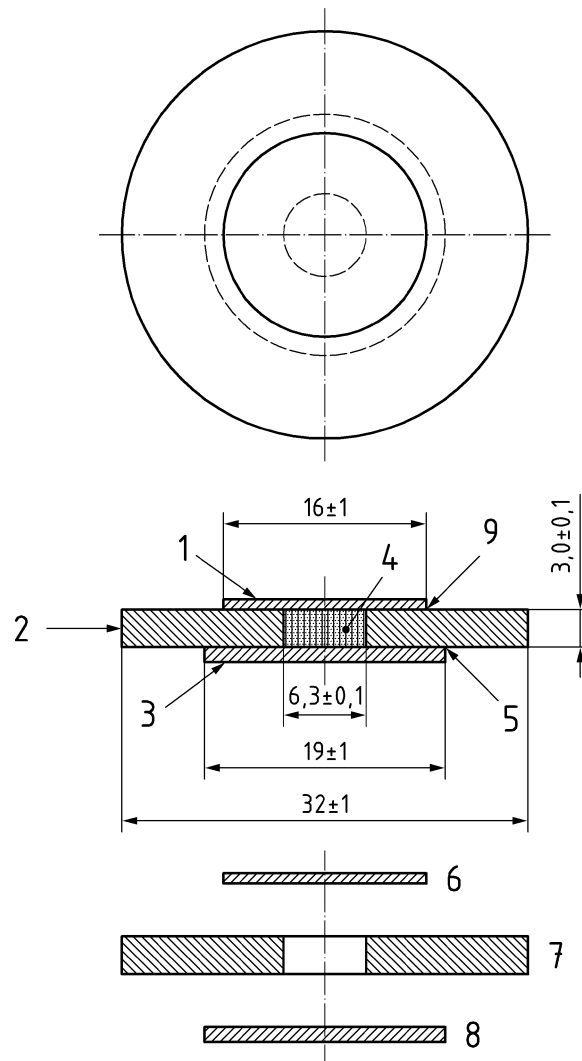
### 5.1 Cells and covers (see Figure 1). The cell consists of:

- a plastics disc, e.g. polyvinylchloride, thickness  $(3,0 \pm 0,1)$  mm, diameter  $(32 \pm 1)$  mm, with a centred drilled hole, diameter  $(6,3 \pm 0,1)$  mm;
- a copper disc, thickness approximately 1 mm, diameter  $(19 \pm 1)$  mm, which forms the cell base.

The plastics disc is fixed to the copper disc by means of a bead of adhesive around the outer edge.

The cover consists of a copper disc, thickness approximately 0,1 mm, diameter  $(16 \pm 1)$  mm which is fixed to the upper part of the plastics disc by means of a double-sided adhesive tape.

Dimensions in millimetres



# Key

- 1 upper copper disc
- 2 plastics disc
- 3 lower copper disc
- 4 substance under test
- 5 adhesive bead
- 6 upper copper disc (cover)
- 7 plastics disc
- 8 lower copper disc (base)
- 9 double-sided adhesive tape

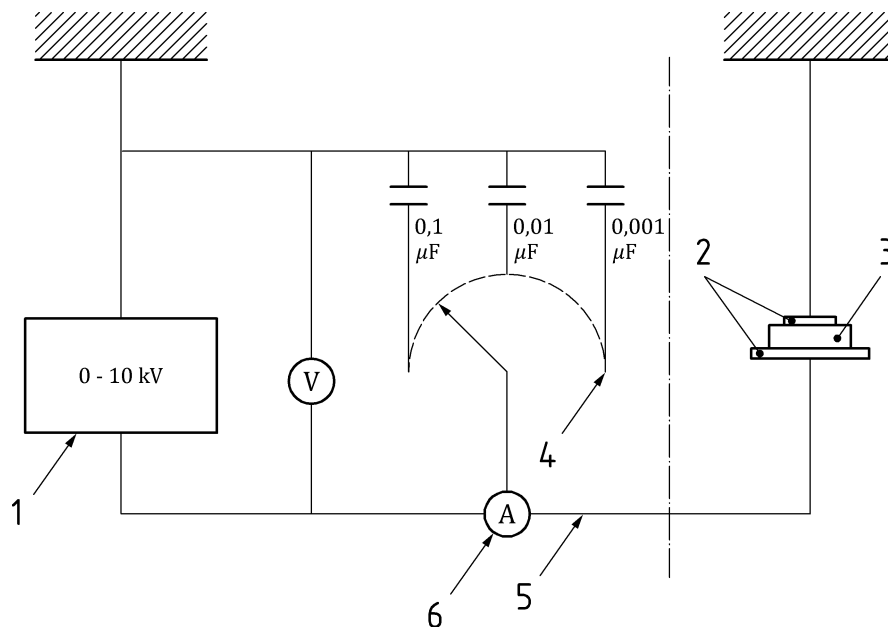
Figure 1 — Cell and cover

**5.2 Electrostatic energy supply** (see Figure 2). The electrostatic energy supply consists of:

- generator capable of applying a 10 kV continuous voltage;
- three capacitors: capacitance 0,001  $\mu\text{F}$ , 0,01  $\mu\text{F}$  and 0,1  $\mu\text{F}$ , each with a relative tolerance of  $\pm 10\%$ ;
- coaxial cable, length 1,85 m, characteristic impedance 50  $\Omega$ , capacitance 100 pF/m, attenuation  $95 \times 10^{-3}$  dB/m at 200 MHz;
- two brass electrodes;

and, if necessary:

- selector switch;
- change-over relay (in vacuum).



**Key**

- 1 generator
- 2 electrodes
- 3 cell and cover
- 4 selector switch
- 5 coaxial cable
- 6 discharge switch

**Figure 2 — Electrostatic energy supply**

**5.3 Sieves.** The sieves shall comply with Annex A.

**5.4 Conditioning chamber** for maintaining a temperature of  $(20 \pm 5)^\circ\text{C}$  and a relative humidity of not greater than  $(60 \pm 10)\%$ .

**5.5 Balance** capable of determining the sample weight to  $\pm 0,1$  g.