



SLOVENSKI STANDARD
oSIST prEN 13763-21:2021
01-april-2021

Eksplzivni za civilno uporabo – Detonatorji in zakasnilniki – 21. del: Ugotavljanje prebojne napetosti električnih detonatorjev

Explosives for civil uses - Detonators and relays - Part 21: Determination of flash-over voltage of electric detonators

Explosivstoffe für zivile Zwecke - Zünder und Verzögerungselemente - Teil 21: Bestimmung der Überschlagsspannung elektrischer Zünder

Explosifs à usage civil - Détonateurs et relais - Partie 21: Détermination de la tension de claquage des détonateurs électriques

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Ta slovenski standard je istoveten z: prEN 13763-21

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71.100.30	Eksplzivni. Pirotehnika in ognjemeti	Explosives. Pyrotechnics and fireworks
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 13763-21

April 2021

ICS 71.100.30

Will supersede EN 13763-21:2003

English Version

Explosives for civil uses - Detonators and detonating cord relays - Part 21: Determination of flash-over voltage of electric detonators

Explosifs à usage civil - Détonateurs et relais pour
cordeau détonant - Partie 21: Détermination de la
tension de claquage des détonateurs électriques

Explosivstoffe für zivile Zwecke - Zünder und
Sprengschnurverbinder - Teil 21: Bestimmung der
Überschlagsspannung elektrischer Zünder

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 321.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (prEN 13763-21:2021) 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 13763-21:2003.

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

- a) in Clause 1, *Scope*, it is specified that the document applies to explosives for civil uses;
- b) Clause 4, *Principle*, has been added;
- c) Clause 5, *Apparatus*, has been updated;
- d) Clause 6, *Preparation and handling of test samples and test pieces*, has been updated;
- e) Clause 8, *Expression of results*, has been added;
- f) Annex A, *Range of applicability of the test method*, has been removed;
- g) 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 13763, *Explosives for civil uses — Detonators and detonating cord relays*, is currently composed with the following parts:

- *Part 1: Requirements*
- *Part 2: Verification of thermal stability*
- *Part 3: Determination of sensitiveness to impact*
- *Part 4: Determination of resistance to abrasion of leading wires and shock tubes*
- *Part 5: Determination of resistance to cutting damage of leading wires and shock tubes*
- *Part 6: Determination of resistance to cracking in low temperatures of leading wires*
- *Part 7: Determination of the mechanical strength of leading wires, shock tubes, connections, crimps and closures*
- *Part 8: Determination of resistance to vibration*

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- Part 9: Determination of resistance to bending of detonators
- Part 11: Determination of drop resistance of detonators and relays
- Part 12: Determination of resistance to hydrostatic pressure
- Part 13: Determination of resistance of electric detonator to electrostatic discharge
- Part 15: Determination of equivalent initiating capability
- Part 16: Determination of delay accuracy
- Part 17: Determination of no-fire current of electric detonators
- Part 18: Determination of series firing current of electric detonators
- Part 19: Determination of firing pulse of electric detonators
- Part 20: Determination of total resistance of electric detonators
- Part 21: Determination of flash-over voltage of electric detonators
- Part 22: Determination of capacitance, insulation resistance and insulation breakdown of leading wires
- Part 23: Determination of the shock-wave velocity of shock tube
- Part 24: Determination of the non-conductivity of shock tube
- Part 25: Determination of transfer capacity of relay and coupling accessories
- Part 26: Definitions, methods and requirements for devices and accessories for reliable and safe function of detonators and relays
- Part 27: Definitions, methods and requirements for electronic initiation system

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Introduction

When blasting work is performed with electric detonators, they are usually connected in series. Depending on the number of detonators used in a firing round, their electrical resistance, the amount of energy needed to ignite the fuse heads and the resistance of the connected shot firing cable, usually voltages of several hundred volts need to be applied, often exceeding 1 kV, to the circuit to ensure correct initiation.

Detonators can also be subjected to the application of high voltages caused by electrostatic charging of the firing circuit.

To determine the ability of detonators to withstand these applied high voltages without misfiring or initiating prematurely. It is essential to determine the value of applied DC voltage which causes flash-over between the detonator leading wires and the detonator shell.

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prEN 13763-21:2021 (E)**1 Scope**

This document specifies a method of determining the flash-over voltage of electric detonators. This document applies to explosives for civil uses.

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*

3 Terms and definitions

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

4 Principle

The test piece is subjected to a high voltage source, to evaluate if a flash-over occurs and at what voltage level it occurred. The high voltage is applied to the test piece between the shorted pins and the shell. The flash-over voltage level is detected by a sudden increase of the current from the high voltage source.

5 Apparatus

5.1 High voltage source, capable of applying a DC voltage of up to 10 kV with an accuracy of ± 50 V and not more than 3,0 % distortion. The voltage shall be continuously adjustable. The current output of this voltage source shall be limited to a maximum of 5 mA to prevent the build-up of an electric arc.

5.2 Ammeter, with a resolution of at least 0,1 mA, to detect a voltage flash-over.

6 Preparation and handling of test samples and test pieces¹⁾

Test samples for detonators should be handled according to EN ISO/IEC 17025:2017, 7.4.

Select 30 detonators of each specific type, having the same design and chemical composition according to the manufacturer's specification and whose fuse head has the same design and chemical composition.

If the detonators form part of a series with different delay times, select 30 detonators with delay times as evenly distributed throughout the series as possible.

7 Procedure

Connect the detonator shell to one terminal of the voltage source.

Short circuit both leading wires of the detonator and connect them to the second terminal.

Increase the voltage continuously at a rate between 50 V/s and 200 V/s until a flash-over is detected by a sudden increase in the circuit current. Record the voltage at which the flash-over occurs.

Repeat this procedure for each of the remaining detonators.

¹⁾ The choice of sample size is based on acceptable failure rate for the kind of defects that have to be avoided. The defects have been classified according to ISO 2859-1, ISO 2859-2, ISO 2859-3, ISO 2859-4 and ISO 2859-5.

8 Expression of results

Calculate the mean value and the standard deviation of the flash-over voltage.

Calculate the sum of the mean value and 2,33 times the standard deviation (upper value) and the sum of the mean value and -2,33 times the standard deviation (lower value).

9 Test report

The test report should conform to EN ISO/IEC 17025:2017, 7.8. In addition, the following information shall be given:

- a) the mean value of the flash-over voltage, the standard deviation, the upper value and the lower value;
- b) the number of detonators exploded by the flash-over.

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Annex ZA (informative)

Relationship between this European Standard and the essential safety requirements of Directive 2014/28/EU relating to the making available on the market and supervision of explosives for civil uses aimed to be covered

This European Standard has been prepared under a standardization request M/562 annexed to Commission Implementing Decision C(2019)6634 final as regards explosives for civil uses to provide one voluntary means of conforming to essential safety requirements of Directive 2014/28/EU relating to the making available on the market and supervision of explosives for civil uses.

Once this standard is cited in the Official Journal of the European Union (OJEU), under Directive 2014/28/EU, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential safety requirements of that Directive 2014/28/EU, and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 2014/28/EU

Essential Safety Requirements ¹⁾ of Directive 2014/28/EU Annex II	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
II.1.(a)	7	This test of the flash-over voltage secure a certain safety distance for initiation. It is a feature intended to prevent untimely or inadvertent initiation or ignition.
¹⁾ The Essential Safety Requirements are fulfilled together with the requirements in prEN 13763-1.		

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.