

**Tsiviilkäibes olevad lõhkeained.
Detonaatorid ja releed. Osa 21:
Elektridetonaatorite ülelöögipinge
määramine**

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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| <p>Käesolev Eesti standard EVS-EN 13763-21:2004 sisaldab Euroopa standardi EN 13763-21:2003 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 18.05.2004 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p> | <p>This Estonian standard EVS-EN 13763-21:2004 consists of the English text of the European standard EN 13763-21:2003.</p> <p>This document is endorsed on 18.05.2004 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p> |
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| <p>Käsitlusala: This European Standard specifies a method of determining the flash-over voltage of electric detonators.</p> | <p>Scope: This European Standard specifies a method of determining the flash-over voltage of electric detonators.</p> |
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ICS 71.100.30

Võtmesõnad: explosives storage, fidelity, flash-overs, igniters, impact strength, magazines, materials testing, measurement, mining, precision, resistance, retardants, shock resistance, sparkover voltage, testing, testing devices, voltage, voltage measurement

ICS 71.100.30

English version

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

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

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

This European Standard was approved by CEN on 10 November 2003.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.



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Foreword

This document (EN 13763-21:2003) has been prepared by Technical Committee CEN/TC 321 "Explosives for civil uses", the secretariat of which is held by AENOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

Annex A is informative.

This European Standard is one of a series of standards with the generic title *Explosives for civil uses – Detonators and relays*. The other parts of this series are listed below:

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| prEN 13763-1 | Part 1: Requirements |
| EN 13763-2 | Part 2: Determination of thermal stability |
| EN 13763-3 | Part 3: Determination of sensitiveness to impact |
| EN 13763-4 | Part 4: Determination of resistance to abrasion of leading wires and shock tubes |
| EN 13763-5 | Part 5: Determination of resistance to cutting damage of leading wires and shock tubes |
| EN 13763-6 | Part 6: Determination of resistance to cracking in low temperatures of leading wires |
| EN 13763-7 | Part 7: Determination of the mechanical strength of leading wires, shock tubes, connections, crimps and closures |
| EN 13763-8 | Part 8: Determination of the resistance to vibration of plain detonators |
| EN 13763-9 | Part 9: Determination of resistance to bending of detonators |
| EN 13763-11 | Part 11: Determination of resistance to damage by dropping of detonators and relays |
| EN 13763-12 | Part 12: Determination of resistance to hydrostatic pressure |
| prEN 13763-13 | Part 13: Determination of resistance of electric detonators against electrostatic discharge |
| prEN 13763-15 | Part 15: Determination of equivalent initiating capability |
| EN 13763-16 | Part 16: Determination of delay accuracy |
| EN 13763-17 | Part 17: Determination of no-fire current of electric detonators |
| EN 13763-18 | Part 18: Determination of series firing current of electric detonators |
| EN 13763-19 | Part 19: Determination of firing impulse of electric detonators |

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| EN 13763-20 | Part 20: Determination of total electrical resistance of electric detonators |
| EN 13763-22 | Part 22: Determination of capacitance, insulation resistance and insulation breakdown of leading wires |
| EN 13763-23 | Part 23: Determination of the shock-wave velocity of shock tube |
| EN 13763-24 | Part 24: Determination of the electrical non-conductivity of shock tube |
| prEN 13763-25 | Part 25: Determination of transfer capability of surface connectors, relays and coupling accessories |
| prEN 13763-26 | Part 26: Definitions, methods and requirements for devices and accessories for reliable and safe function of detonators and relays |
| CEN/TS 13763-27 | Part 27: Definitions, methods and requirements for electronic initiation systems |

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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, it is usually necessary to apply voltages of several hundred volts, 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 d.c. voltage which causes flash-over between the detonator leading wires and the detonator shell.

1 Scope

This European Standard specifies a method of determining the flash-over voltage of electric detonators.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 13857-1, *Explosives for civil uses - Part 1: Terminology*.

EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:1999)*.

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 13857-1 apply.

4 Test pieces

Select 30 detonators of each specific type, having the same design and chemical composition of fusehead, primary charge, and secondary charge. 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.

5 Apparatus

5.1 A high voltage source, capable of applying a d.c. 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 An ammeter, to detect a voltage flash-over.

6 Procedure

6.1 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.

6.2 Repeat the procedure described in 6.1 for each of the remaining detonators.

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).