

**Tsiviilkäibes olevad lõhkeained.
Detonaatorid ja releed. Osa 16: Relee
põlemisaja määramine**

Explosives for civil uses - Detonators and relays -
Part 16: Determination of delay accuracy

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 13763-16:2004 sisaldab Euroopa standardi EN 13763-16:2003 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 13763-16:2004 consists of the English text of the European standard EN 13763-16:2003.</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 for determining the delay time accuracy of detonators and surface connectors with pyrotechnic delay elements. It does not apply to those with an electronic time delay.</p>	<p>Scope: This European Standard specifies a method for determining the delay time accuracy of detonators and surface connectors with pyrotechnic delay elements. It does not apply to those with an electronic time delay.</p>
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ICS 71.100.30

Võtmesõnad: electronic equipment, fidelity, impact strength, magazines, materials testing, mining, precision, resistance, retardants, shock resistance, testing, testing devices, time-delay switches, torsion, torsion loads, torsion tests, torsional strength, vent plugs

ICS 71.100.30

English version

Explosives for civil uses - Detonators and relays - Part 16: Determination of delay accuracy

Explosifs à usage civil - Détonateurs et relais - Partie 16:
Détermination de la précision du retard

Explosivstoffe für zivile Zwecke - Zünder und
Verzögerungselemente - Teil 16: Bestimmung der
Verzögerungsgenauigkeit

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.



EUROPEAN COMMITTEE FOR STANDARDIZATION
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Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (EN 13763-16:2003) 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.

Annexes A and C are informative. Annex B is normative.

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:

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 13763-17	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
EN 13763-20	Part 20: Determination of total electrical resistance of electric detonators
EN 13763-21	Part 21: Determination of flash-over voltage of electric detonators

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- 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

During blasting work, detonators and surface connectors with different delay times are used to ensure that the sequence of initiation of the explosive charges is executed in a controlled way. This test checks that the time interval between adjacent numbers in a manufacturer's series of delay type detonators and surface connectors lies within specified limits designed to reduce the risk of overlapping.

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1 Scope

This European Standard specifies a method for determining the delay time accuracy of detonators and surface connectors with pyrotechnic delay elements. It does not apply to those with an electronic time delay.

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 and the following apply.

3.1 overlapping

detonation out of intended sequence

3.2 outlier

value in a series of measured values significantly outside the normal distribution of the series and causing significant overlapping probability to adjacent interval numbers

4 Test pieces

Select 30 detonators or surface connectors of each interval number (i.e. nominal delay time stated by the manufacturer) from a specific type, having the same chemical composition, charge, dimensions and material of construction. For non-electric types, the length of shock tube attached to the detonator/surface connector during the test shall be specified by the manufacturer.

The detonators to be tested shall have an age of between two weeks and four months after the date of production.

5 Apparatus

5.1 for electric detonators, a power source able to produce a continuous current (i) in accordance with the manufacturer's specification and within $i_S \leq i \leq 2i_S$ (i_S is the series firing current for the type of detonator in question) with an accuracy of $\pm 1,0$ %.

5.2 for non-electric detonators/surface connectors, an initiating device for initiating shock tubes (percussion cap, spark or initiating detonator providing that the shock tube and measuring equipment are protected against fragments from the detonator).

5.3 timer or oscilloscope to measure the delay time between the start pulse and the stop pulse with an accuracy of 0,1 ms.

5.4 means for providing a start pulse to the timer/oscilloscope consisting for example of: