



SLOVENSKI STANDARD

SIST EN 13763-24:2002

01-december-2002

Eksplozivi za civilno uporabo – Detonatorji in zakasnilniki – 24. del: Ugotavljanje električne neprevodnosti detonacijskih cevk

Explosives for civil uses - Detonators and relays - Part 24: Determination of the electrical non-conductivity of shock tube

Explosivestoffe für zivile Zwecke - Zünder und Verzögerungselemente - Teil 24: Bestimmung der elektrischen Nichtleitfähigkeit von Zündschläuchen

Explosifs a usage civil - Détonateurs et relais - Partie 24: Détermination de la non-conductivité électrique du tube a transmission d'ondes de choc

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ICS:

71.100.30 Eksplozivi. Pirotehnika Explosives. Pyrotechnics

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ICS 71.100.30

English version

**Explosives for civil uses - Detonators and relays - Part 24:
Determination of the electrical non-conductivity of shock tube**

Explosifs à usage civil - Détonateurs et relais - Partie 24:
Détermination de la non-conductivité électrique du tube à
transmission d'ondes de choc

Explosivstoffe für zivile Zwecke - Zünder und
Verzögerungselemente - Teil 24: Bestimmung der
elektrischen Nichtleitfähigkeit von Zündschläuchen

This European Standard was approved by CEN on 1 August 2002.

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, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 13763-24:2002) 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 March 2003, and conflicting national standards shall be withdrawn at the latest by March 2003.

This European Standard 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 the relationship with EU Directive(s), see informative annex ZA, which is an integral part of this standard.

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.*
- prEN 13763-4 *Part 4: Determination of resistance to abrasion of leading wires and shock tubes.*
- prEN 13763-5 *Part 5: Determination of resistance to cutting damage of leading wires and shock tubes.*
- prEN 13763-6 *Part 6: Determination of resistance to cracking in low temperatures of leading wires.*
- prEN 13763-7 *Part 7: Determination of the mechanical strength of leading wires, shock tubes, connections, crimps and closures.*
- prEN 13763-8 *Part 8: Determination of resistance to vibration of plain detonators.*
- prEN 13763-9 *Part 9: Determination of resistance to bending of detonators.*
- prEN 13763-10 *Part 10: Determination of resistance to torsion of sealing plugs.*
- prEN 13763-11 *Part 11: Determination of drop resistance of detonators and relays.*
- prEN 13763-12 *Part 12: Determination of resistance to hydrostatic pressure.*
- prEN 13763-13 *Part 13: Determination of resistance of electric detonator to electrostatic discharge.*
- prEN 13763-14 *Part 14: Determination of resistance of electric detonator to the influence of radio frequency radiation.*
- prEN 13763-15 *Part 15: Determination of equivalent initiating capability.*
- prEN 13763-16 *Part 16: Determination of delay accuracy.*
- prEN 13763-17 *Part 17: Determination of no-fire current of electric detonators.*
- prEN 13763-18 *Part 18: Determination of series firing current of electric detonators.*
- prEN 13763-19 *Part 19: Determination of firing pulse of electric detonators.*

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prEN 13763-20 *Part 20: Determination of total resistance of electric detonators.*

prEN 13763-21 *Part 21: Determination of flash-over voltage of electric detonators.*

prEN 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.*

prEN 13763-25 *Part 25: Determination of transfer capacity of relay 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.*

prCEN/TS 13763-27 *Part 27: Definitions, methods and requirements for electronic initiation system.*

Annex A is informative.

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, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This European Standard specifies methods of determining the electrical insulation resistance (non-conductivity) and the electrical flash-over distance of shock tubes for use with non-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).

prEN 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)*.

IEC 60093:1980, *Methods of test for volume resistivity and surface resistivity of solid electrical insulating materials*.

IEC 60167:1964, *Methods of test for the determination of the insulation resistance of solid insulating materials*.

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3 Terms and definitions

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

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4 Apparatus

4.1 Determination of electrical insulation resistance

4.1.1 *Meter for measuring electrical insulation resistance*, conforming to the requirements in IEC 60093:1980, clause 5.

4.1.2 *Voltage source*, capable of applying at least 500 V d.c. with no more than 2 % deviation.

4.1.3 *Conditioning chamber*, capable of being maintained at (20 ± 2) °C and (50 ± 5) % relative humidity.

4.2 Determination of electrical flash-over distance

4.2.1 *Voltage source*, capable of applying 10 kV d.c. with no more than 3 % deviation and with the current output limited to no more than 5 mA.

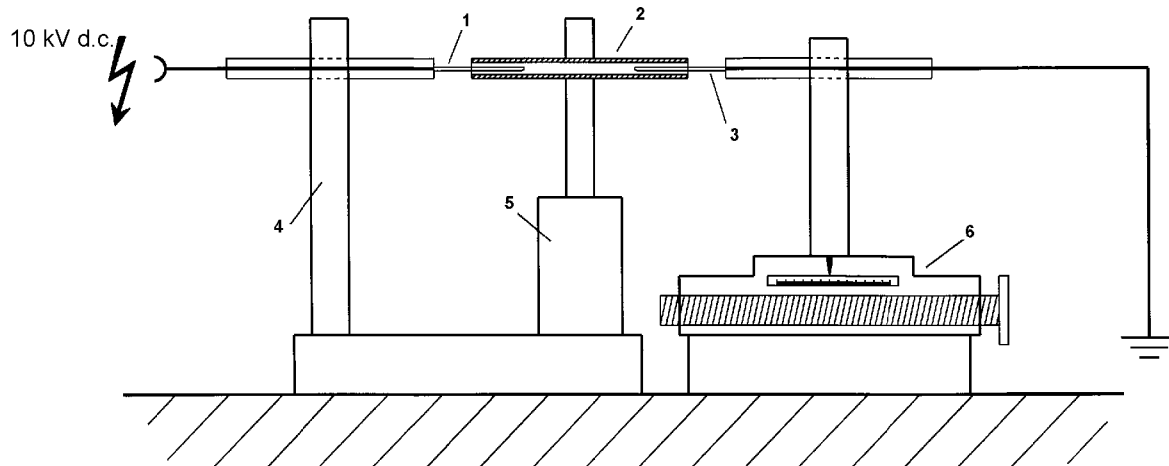
4.2.2 *Sensing device*, to detect when an electrical flash-over has occurred.

4.2.3 *Two needle electrodes*, with a diameter of 60 % to 80 % of the shock tube's internal diameter, made from stainless steel and having rounded ends.

NOTE The rounded ends are needed to avoid corona discharges, but do not need precise specification.

4.2.4 *Test rig*, comprising an electrically insulated mounting arrangement to hold the test piece in position, a fixed support for one needle electrode and a moveable support with a linear measuring scale for the other needle electrode, as shown in Figure 1.

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**Key**

- 1 Fixed electrode
- 2 Test piece
- 3 Movable electrode
- 4 Electrode support
- 5 Test piece support
- 6 Movable electrode support

Figure 1- Test rig
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5 Test pieces

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5.1 Determination of electrical insulation resistance

Select 30 lengths of shock tube each of (100 ± 10) mm. If the shock tubes are assembled with detonators, the lengths shall be taken from 30 detonators of the same specific type. If the detonators form part of a series with different delay times, select the test pieces from 30 detonators with delay times as evenly distributed throughout the series as possible.

5.2 Determination of electrical flash-over distance

Select 30 lengths of shock tube each of (100 ± 10) mm. If the shock tubes are assembled with detonators, the lengths shall be taken from 30 detonators of the same specific type. If the detonators form part of a series with different delay times, select the test pieces from 30 detonators with delay times as evenly distributed throughout the series as possible.

NOTE Alternatively, the length of the test piece can be determined by a preliminary test to determine the maximum flash-over distance, in which case the length of the test piece should be at least 10 mm longer than this distance.

6 Procedure**6.1 Preparation of test pieces**

Condition the test pieces for 24 h at (20 ± 2) °C and (50 ± 5) % relative humidity.

6.2 Determination of electrical insulation resistance

Measure the insulation resistance of the test pieces according to IEC 60167:1964 by using conducting paint electrodes and by applying a voltage of at least 500 V d.c.

6.3 Determination of electrical flash-over distance

Place the test piece in the mounting arrangement and insert a needle electrode at least 5 mm into each end as shown in Figure 1. Apply the test voltage of 10 kV to the needle electrodes. Slowly decrease the distance between the needle electrodes by inserting the movable electrode further into the test piece. Stop moving the needle electrode as soon as electrical flash-over occurs. Record the "flash-over distance" between the inserted ends of the needle electrodes in millimetres.

7 Test report

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

- a) the insulation resistance, in ohms;
- b) the flash-over distance, in millimetres.

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