



SLOVENSKI STANDARD

SIST EN 13763-5:2004

01-januar-2004

Eksplozivi za civilno uporabo – Detonatorji in zakasnilniki – 5. del: Ugotavljanje odpornosti vodnikov in detonacijskih cevk proti urezu

Explosives for civil uses - Detonators and relays - Part 5: Determination of resistance to cutting damage of leading wires and shock tubes

Explosivstoffe für zivile Zwecke - Zünder und Verzögerungselemente - Teil 5:
Bestimmung der Widerstandsfähigkeit von Zünderdrähten und Zündschläuchen gegen
Schnittbelastung

Explosifs a usage civil - Détonateurs et relais - Partie 5: Détermination de la résistance
du fil d'amorçage et du tube a transmission d'ondes de choc aux dommages par coupes

Ta slovenski standard je istoveten z: EN 13763-5:2003

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 5:
Determination of resistance to cutting damage of leading wires
and shock tubes

Explosifs à usage civil - Détonateurs et relais - Partie 5:
Détermination de la résistance du fil d'amorçage et du tube
à transmission d'ondes de choc aux dommages par coupes

Explosivstoffe für zivile Zwecke - Zünder und
Verzögerungselemente - Teil 5: Bestimmung der
Widerstandsfähigkeit von Zünderdrähten und
Zündschläuchen gegen Schnittbelastung

This European Standard was approved by CEN on 7 September 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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Foreword

This document (EN 13763-5:2003) 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 May 2004, and conflicting national standards shall be withdrawn at the latest by May 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 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
EN 13763-4	Part 4: Determination of resistance to abrasion of leading wires and shock tubes
EN 13763-6	Part 6: Determination of resistance to cracking at 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 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
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 impulse of electric detonators
EN 13763-20	Part 20: Determination of total electrical 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

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- EN 13763-23 Part 23: Determination of the shock-wave velocity of shock tubes
- EN 13763-24 Part 24: Determination of the electrical non-conductivity of shock tubes
- prEN 13763-25 Part 25: Determination of transfer capability of surface connectors 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

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

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Introduction

During usage on site, the insulation on the leading wires of electric detonators and the plastic tubing of shock tube to be used in non-electric detonator assemblies can be subjected to cutting forces when drawn over a sharp edge. In the former, the plastics material is worn away gradually by abrasion to cause failure of the insulation or tubing. In the latter, the sharp edge cuts directly into the material. This standard deals with the latter case by determining the ability of leading wire insulation/shock tube to resist the cutting forces likely to be experienced in normal use.

1 Scope

This European Standard specifies a method for determining the resistance to failure of the plastic materials used in insulation of leading wires of electric detonators, or the tubing of shock tube non-electric detonators, when drawn over a sharp edge under specified loading conditions.

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 13857-1:2003; *Explosives for civil uses – Part 1: Terminology*

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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 13857-1:2003 apply.

4 Apparatus

4.1 Cutting damage apparatus

The cutting damage apparatus shall incorporate the basic principles shown in Figure 1 comprising the following components.

4.1.1 Tungsten carbide edge, having a 90° cutting edge radiused to $(0,07 \pm 0,02)$ mm;

4.1.2 Pulley A, having a diameter of $(43,0 \pm 0,5)$ mm;

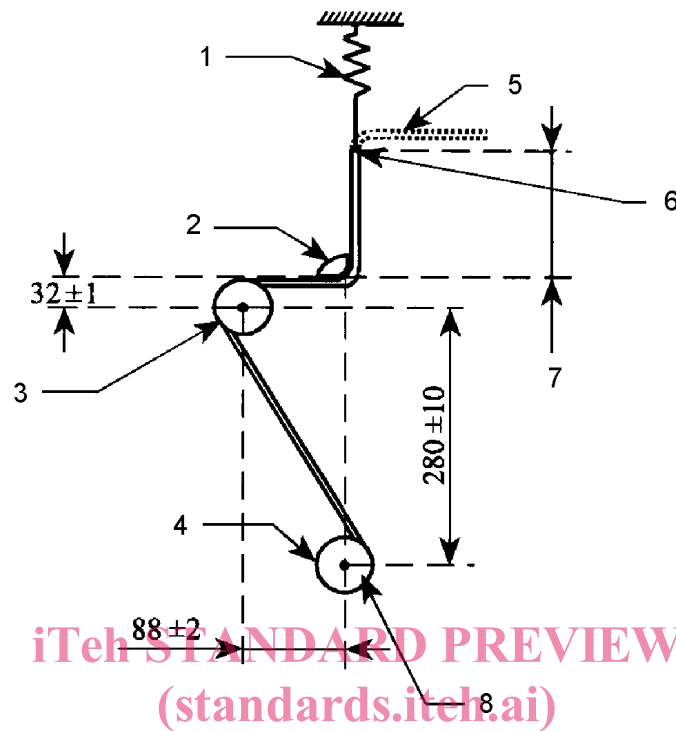
4.1.3 Pulley B, having a diameter of $(33,0 \pm 0,5)$ mm ;

4.1.4 Electric motor, with a gearbox capable of rotating pulley B at $0,125_0^{+0,008}$ r/s and maintaining its final position when the power to the motor is switched off;

4.1.5 Electrical device, to detect when electrical contact is made between the conductor in the leading wire and the cutting edge (see 4.1.1);

4.1.6 **Spring balance**, or similar alternative arrangement, capable of applying a gradually increasing force and indicating its value.

Dimensions in millimetres



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Key

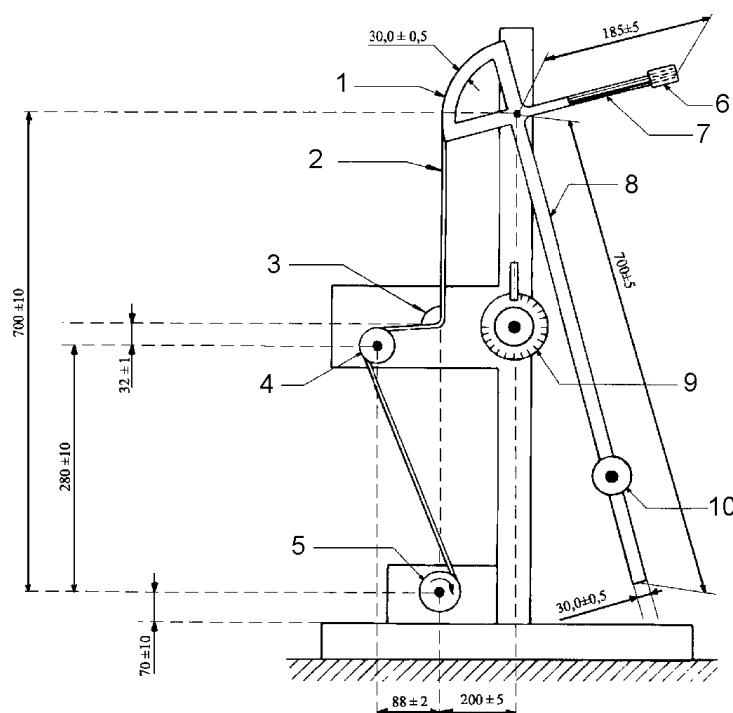
- 1 Spring balance
- 2 Tungsten carbide edge
- 3 Pulley A
- 4 Pulley B
- 5 Remaining shock tube/leading wire
- 6 Suitable attachment to shock tube/leading wire
- 7 (375 ± 20) mm at start of test
- 8 Suitable attachment to shock tube/leading wire (remainder not shown).

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Figure 1 – Principle of test apparatus

Figure 2 shows an example of an apparatus, with equivalent alternative arrangements for applying and recording the maximum value of applied force.

Dimensions in millimetres

**Key**

- 1 Internal radius 200 mm
- 2 Shock tube/leading wire
- 3 Tungsten carbide edge
- 4 Pulley A
- 5 Pulley B
- 6 Movable balance-weight of (860 ± 10) g
- 7 Diameter $(12 \pm 0,2)$ mm
- 8 Arm of a lever on steel with thickness of $(8,5 \pm 0,2)$ mm
- 9 Protractor
- 10 Movable load

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Figure 2 – Example of a test apparatus

4.2 Immersion test apparatus

Immersion test apparatus, as shown in Figure 3, comprising the following components:

4.2.1 Cylindrical bending rig, capable of bending and maintaining the test pieces of shock tube in a "U"-form with a bending radius of $(1,6 \pm 0,1)$ times the diameter of the shock tube.

4.2.2 Tank of water, deep enough to allow the cut portion of shock tube to be immersed to $(0,50 \pm 0,05)$ m.