SLOVENSKI STANDARD
oSIST prEN 13763-5:2021

01-april-2021

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 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

Ta slovenski standard je istoveten z: **prEN 13763-5**

ICS:

71.100.30	Eksplozivi. Pirotehnika in ognjemeti	Explosives. Pyrotechnics and fireworks

oSIST prEN 13763-5:2021 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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prEN 13763-5

April 2021

ICS 71.100.30

Will supersede EN 13763-5:2003

English Version

Explosives for civil uses - Detonators and detonating cord 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 Sprengschnurverbinder - Teil 5: Bestimmung der Widerstandsfähigkeit von Zünderdrähten und Zündschläuchen gegen Schnittbelastung

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.

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

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European foreword

This document (prEN 13763-5:2021) 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 13763-5:2003.

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

a) Clause 1, *Scope*, has been revised:

   1) leading wires and shock tubes for electronic detonators have been included;

   2) it has been added that the document applies to explosives for civil uses;

b) Clause 4, *Principle*, has been added;

c) in Clause 6, *Preparation and handling of test samples and test pieces*, it is now specified that leading wires shall have the same construction, design and composition according to the manufacturer's specification;

d) Clause 7, *Procedure*, has been further detailed and clarified;

e) Clause 8, *Expression of results*, has been added;

f) 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*

— *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*

Introduction

During usage on site, the insulation on the leading wires of electric detonators, electronic detonators and the plastic tubing of shock tube to be used in non-electric detonators and electronic detonators can be subjected to cutting forces when drawn over a sharp edge which cuts directly into the material. This document consists of a test method to determine the resistance to cutting damage of leading wire insulation/shock tube likely to be experienced in normal use.

1 Scope

This document specifies a method for determining the resistance to cutting damage of the plastic materials used in insulation of leading wires of electric detonators, electronic detonators and the tubing of shock tube for non-electric detonators and electronic detonators, when drawn over a sharp edge under specified loading conditions.

This document is applicable 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 drawn by a motor over the tungsten carbide cutting edge and subjected to a gradually increasing load. When the spring balance reads a specific load, the apparatus is stopped, and the test piece removed. For leading wires, a record is made whether there has been an electrical contact between the test piece conductor and the tungsten carbide cutting edge. For shock tubes the test pieces are stored in water after the test and are initiated within 1 h. A record is made whether or not the shock tubes initiates.

5 Apparatus

5.1 Cutting damage apparatus

The cutting damage apparatus shall incorporate the basic principles shown in Figure 1 comprising of a tungsten carbide edge, two pulleys, an electric motor, electrical device and a spring balance.

5.1.1 Tungsten carbide edge, having a 90° cutting edge radiused to (0,07 ± 0,02) mm;

5.1.2 Pulley A, having a diameter of (43,0 ± 0,5) mm;

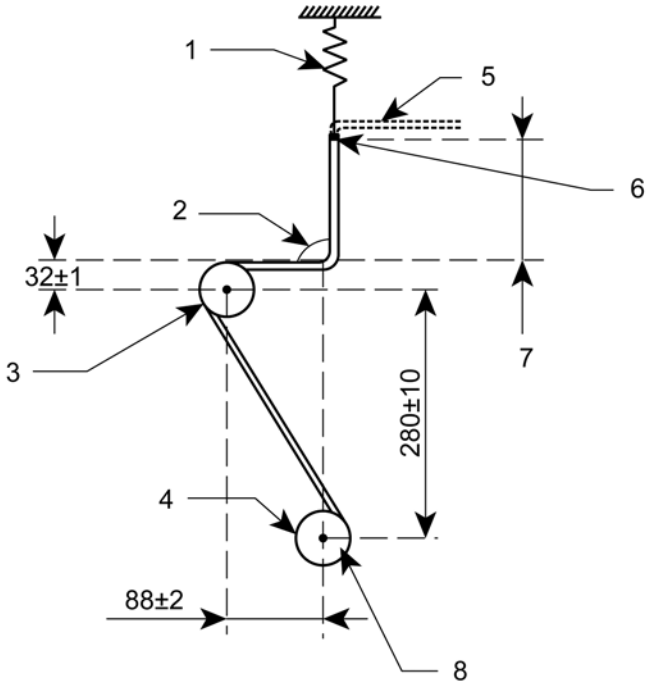
5.1.3 Pulley B, having a diameter of (33,0 ± 0,5) mm;

5.1.4 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;

5.1.5 Electrical device, to detect when electrical contact is made between the conductor in the leading wire and the cutting edge (see 5.1.1);

5.1.6 Spring balance, or similar alternative arrangement, capable of applying a gradually increasing load and indicating its value.

Dimensions in millimetres

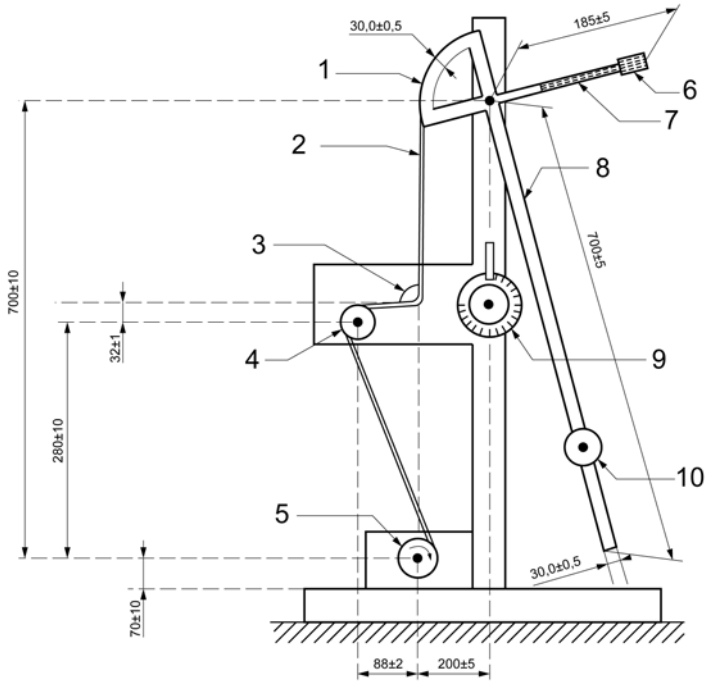


Key

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)

Figure 1 — Principle of test apparatus

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 ± 0,2) mm
8 Arm of a lever on steel with thickness of (8,5 ± 0,2) mm
9 Protractor
10 Movable load

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

Figure 2 — Example of a test apparatus

5.2 Immersion test apparatus

Immersion test apparatus, as shown in Figure 3, shall comprise of a cylindrical bending rig and a tank of water.

5.2.1 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 ± 0,1) times the diameter of the shock tube.

5.2.2 Tank of water, deep enough to allow the cut portion of shock tube to be immersed to (0,50 ± 0,05) m.