SLOVENSKI STANDARD
oSIST prEN 13763-4:2021

01-april-2021

Eksplozivi za civilno uporabo – Detonatorji in zakasnilniki – 4. del: Ugotavljanje odpornosti vodnikov in detonacijskih cevk proti abraziji

Explosives for civil uses - Detonators and relays - Part 4: Determination of resistance to abrasion of leading wires and shock tubes

Explosivstoffe für zivile Zwecke - Zünder und Verzögerungselemente - Teil 4: Bestimmung der Widerstandsfähigkeit von Zünderdrähten und Zündschläuchen gegenüber Abrieb

Explosifs à usage civil - Détonateurs et relais - Partie 4: Détermination de la résistance à l'abrasion des fils d'amorce et des tubes à transmission d'ondes de choc

Ta slovenski standard je istoveten z: **prEN 13763-4**

ICS:

71.100.30	Eksplozivi. Pirotehnika in ognjemeti	Explosives. Pyrotechnics and fireworks

oSIST prEN 13763-4:2021 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 13763-4

April 2021

ICS 71.100.30

Will supersede EN 13763-4:2003

English Version

Explosives for civil uses - Detonators and detonating cord relays - Part 4: Determination of resistance to abrasion of leading wires and shock tubes

Explosifs à usage civil - Détonateurs et relais pour cordeau détonant - Partie 4 : Détermination de la résistance à l'abrasion des fils d'amorce et des tubes à transmission d'ondes de choc

Explosivstoffe für zivile Zwecke - Zünder und Sprengschnurverbinder - Teil 4: Bestimmung der Widerstandsfähigkeit von Zünderdrähten und Zünderschläuchen gegenüber Abrieb

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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword

This document (prEN 13763-4:2021) 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 13763-4:2003

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

a) Clause 1, *Scope*, now includes electronic detonators;

b) Clause 6, *Preparation and handling of test samples and test pieces*, 6.1, *Handling of test samples*, has been added;

c) the specifications in Clause 7, *Procedure*, have been further clarified:

   1) in 7.1, *Conditioning*, the test pieces shall be conditioned in the conditioning chamber at the highest operation temperature claimed by the manufacturer instead of the highest temperature;

   2) in 7.3, *Shock tubes*, a witness paper has been added to the procedure;

d) Clause 8, *Expression of result*, has been added;

e) Annex A, *Range of applicability of the test method*, has been removed;

f) Annex C, *Availability of abrasive strips*, has been removed – instead a footnote has been added to 5.1.2;

g) Annex ZA has been added.

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 plastics tubing for shock tube for non-electric detonators and electronic detonators can be subjected to abrasive forces when drawn over rough surfaces. The plastics material is worn away gradually by abrasion. This document consists of a test method to determine the ability of leading wire insulation/shock tube to resist the abrasive forces likely to be experienced in normal use.

1 Scope

This document specifies a method for determining the resistance to abrasion of plastics used as insulating material for leading wires of electric detonators and electronic detonators or used as base material for the tubing of shock tube for non-electric detonators and electronic detonators.

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 subjected to abrasion by an abrasive surface, moving at a specified speed, while a specified load is applied. For leading wires, the time taken for the insulation to be penetrated is determined. After the abrasion the functioning of the shock tube is tested by immersion in water.

5 Apparatus

5.1 Abrasion test apparatus, as shown in Figure 1, compromising the following main components.

5.1.1 Steel or brass rotor, with the dimensions as shown in Figure 2, with a perimeter of (453 ± 2) mm.

5.1.2 Abrasive strips[1]**,** three pieces approximately 10 mm × 145 mm each, made of grinding steel as specified in Annex A.

5.1.3 Load, to be applied to the test piece through the hinged arm (see 5.1.4).

5.1.4 Hinged arm, made of steel or brass as shown in Figure 3 and with the capacity to carry a load of (8,35 ± 0,05) N.

5.1.5 Pulley, diameter (70 ± 1) mm, with a capacity to carry a tensile load of (8,1 ± 0,5) N.

5.1.6 Motor, capable of maintaining a constant speed of rotation whatever load is applied to the rotor.

NOTE A DC motor with an output power of at least 500 W and with a separate speed control can be used.

5.1.7 Rotor, capable of reaching its specified speed of rotation 0,6 s after starting.

NOTE This requirement can be verified by two electrodes about 20 mm apart, each adjusted to give electrical contact to the tips of the rotor during rotation. The electrodes are connected to a digital counter, counting elapsed

[1] Abrasive strips are available, for example, at: SP – Swedish National Testing and Research Institute, Department of Electronics, Box 857, S-501 15 Borås, Sweden, Tel.: +46 33 16 50 00, Fax: +46 33 13 55 02, Email: info@sp.se. This information is given for the convenience of the user of this European Standard and does not constitute an endorsement by CEN of this provider.

time between the pulses from the two electrodes when they are touching the tips of the rotor. Comparison is made between the elapsed time during a continuous run at the specified speed and the elapsed time 0,6 s after start. First the rotor is rotated manually to an appropriate position in order for a tip of the rotor to reach the second electrode after 0,6 s.

The electrodes can also be used for calibrating the specified speed of rotation, e.g. by measuring the time for one revolution. In this case only one electrode is required.

5.1.8 Digital timer with relay output, capable of:

— being set to a predetermined time in the range of (0 to 10) s ± 0,1 s;

— being started (triggered) when the hinged arm is lifted by the test piece;

— automatically stopping the rotor when the predetermined time has elapsed (only required for shock tube testing);

— automatically stopping the rotor when electrical contact is made between the leading wire and the abrasive strip or the rotor (only required for leading wire testing).

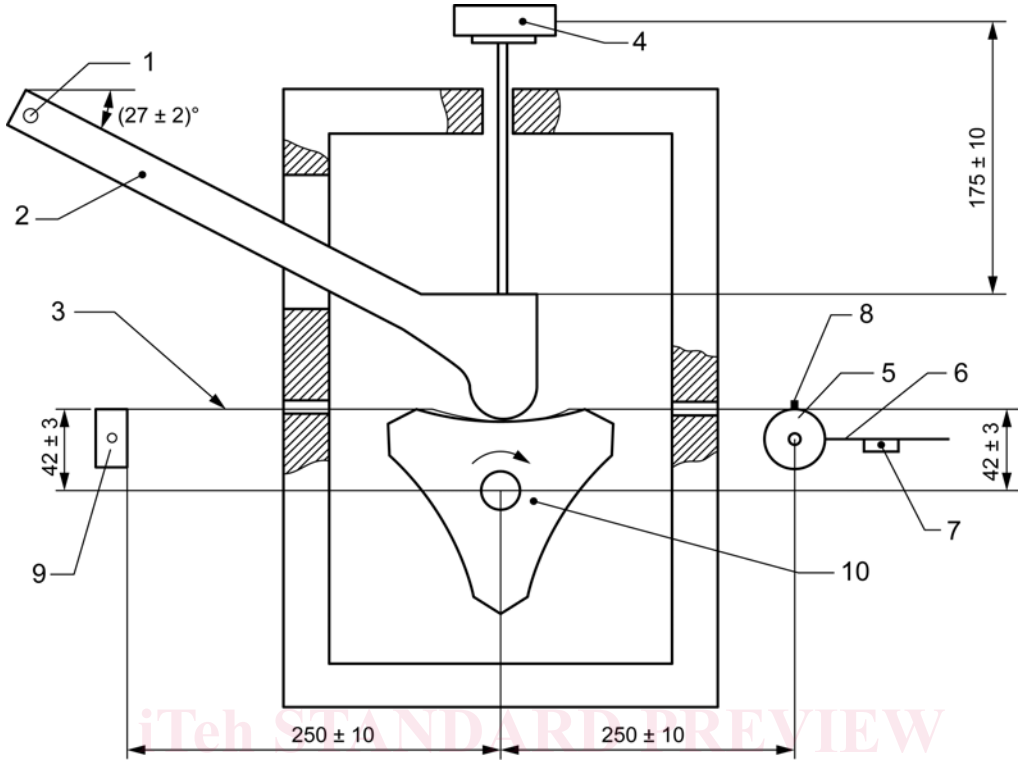
5.2 Immersion test apparatus, as shown in Figure 4, comprising the following components.

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 abraded surface of shock tube to be immersed to (0,50 ± 0,05) m.

5.3 Conditioning chamber, capable of maintaining the highest operation temperature ±2 °C claimed by the manufacturer.

Dimensions in millimetres



Key

1 pivot
2 hinged arm
3 leading wire/shock tube
4 weight
5 pulley
6 rod
7 weight
8 clamp screw for attaching the test piece
9 clamp for attaching the test piece
10 rotor driven by motor

The weight on the rod to the right of the pulley (diameter 70 mm ± 1 mm) may hang down the right side of the pulley.

Figure 1 — Abrasion test apparatus with rotor in starting position