SLOVENSKI STANDARD
oSIST prEN 13763-9:2021

01-april-2021

Eksplozivi za civilno uporabo – Detonatorji in zakasnilniki – 9. del: Ugotavljanje odpornosti detonatorjev proti upogibu

Explosives for civil uses - Detonators and relays - Part 9: Determination of resistance to bending of detonators

Explosivstoffe für zivile Zwecke - Zünder und Verzögerungselemente - Teil 9: Bestimmung des Widertandes von Zündern gegen Biegespannung

Explosifs à usage civil - Détonateurs et relais - Partie 9: Détermination de la résistance à la flexion des détonateurs

Ta slovenski standard je istoveten z: **prEN 13763-9**

ICS:

71.100.30	Eksplozivi. Pirotehnika in ognjemeti	Explosives. Pyrotechnics and fireworks

oSIST prEN 13763-9:2021 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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prEN 13763-9

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ICS 71.100.30

Will supersede EN 13763-9:2003

English Version

Explosives for civil uses - Detonators and detonating cord relays - Part 9: Determination of resistance to bending of detonators

Explosifs à usage civil - Détonateurs et relais pour cordeau détonant - Partie 9 : Détermination de la résistance à la flexion des détonateurs

Explosivstoffe für zivile Zwecke - Zünder und Sprengschnurverbinder - Teil 9: Bestimmung des Widertandes von Zündern gegen Biegespannung

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

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

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European foreword

This document (prEN 13763-9:2021) 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 13763-9:2003.

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

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

   1) It now includes electric detonators, non-electric detonators, plain detonators and electronic detonators;

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

b) in Clause 3, *Terms and definitions*, term 3.1 has been added and Figure 2 has been added to term 3.2;

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

d) Clause 6, Preparation and handling of test samples and test pieces, has been revised

   1) it is now specified that detonators shall have the same design and composition according to the manufacturer's specification;

   2) 6.1, *Handling of test samples*, has been added;

e) in Clause 7, *Procedure*, subclause 7.4, *Functional test*, has been added;

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

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

h) 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 use on site, detonators can be subjected to bending during the loading of boreholes. This test assesses the ability of detonators to resist the bending forces likely to be experienced in normal use.

1 Scope

This document specifies a method for determining the resistance of the electric detonators, non-electric detonators, plain detonators and electronic detonators to bending.

This document applies 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*

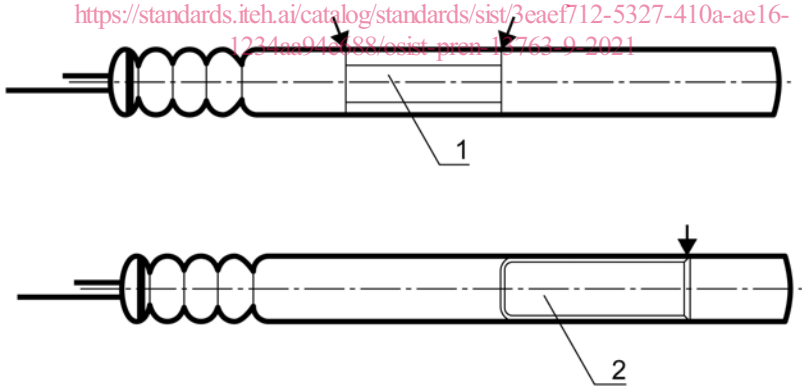
3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 13857-1:2021 and the following apply.

3.1
crack
discontinuity in the shell which can be detected by a visual examination

3.2
weakest point of the detonator
point from where the outer shell will break when subjected to a 90-degree angle pulling force

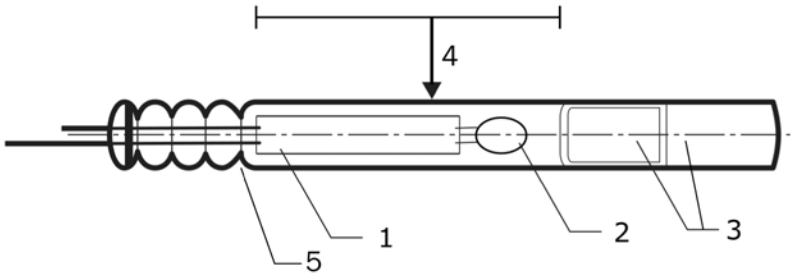
Note 1 to entry: The principle for finding the weakest point is shown in Figure 1 and Figure 2.



Key

1 delay element
2 primary charge cup
↓ the weakest points

Figure 1 — Principle of finding weakest points of the detonator



Key

1 electronic circuit
2 fuse head
3 mechanically supported area (e.g. initiating element, base charge etc.
4 weakest point (middle of the unsupported area of the shell)
5 crimp

Figure 2 — Principle of finding weakest points of the electronic detonator

4 Principle

The test piece is subjected to a bending force by fixing one end in a steel block and attaching a weight to the other end. Two types of tests are performed, one where the test piece is supported at the base and one where the test piece is supported at the top. It is recorded whether the detonator explodes during the test and if cracking or breaking of the shell occurs. After being subjected to the bending force the test piece is initiated according to the manufacturer's specification. It is recorded whether the test piece detonate or not.

5 Apparatus

5.1 Steel block see Figure 3, with a hole (A) of at least 30 mm in length (*L*). The diameter of the hole shall not exceed the diameter of the detonator by more than 0,1 mm. The radius (*R*) for the edge of the hole shall be (2 ± 0,1) mm.

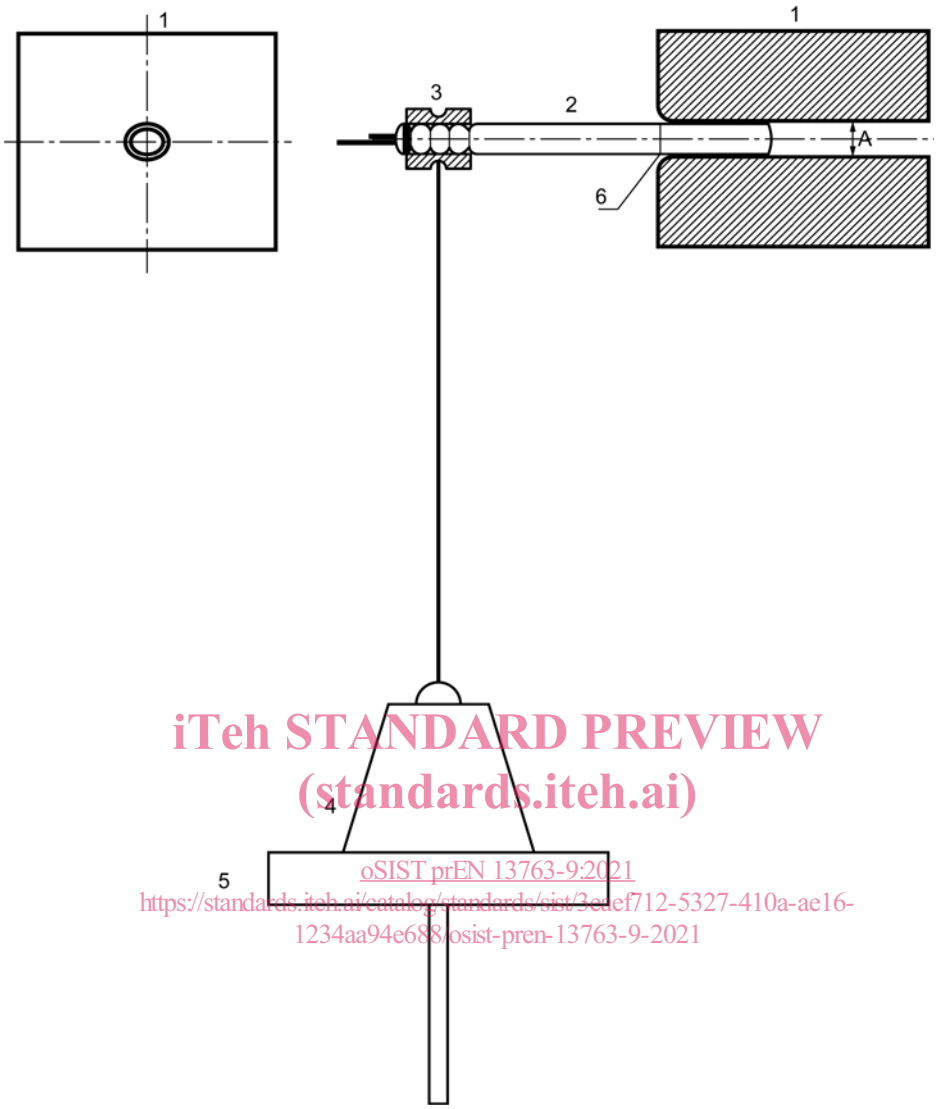
Key

A diameter of the hole
L length of the hole minimum 30 mm
R radius for the edge of the hole

Figure 3 — Steel block

5.2 Weights, capable of applying (50 ± 0,1) N, with wire attachment.

5.3 Movable support table, for supporting the weights as shown in Figure 4 and Figure 5.



Key

1 steel block
2 detonator (shown as an electric detonator)
3 ring
4 weight
5 movable support table
6 approx. position of the end of the delay element or the base charge
A diameter of the hole

Figure 4 — Assembly with detonator supported at the base