
Eksplozivi za civilno uporabo - Detonatorji in zakasnilniki - 25. del: Ugotavljanje prenosne zmogljivosti površinskih konektorjev, zakasnilnikov in spojnih elementov

Explosives for civil uses - Detonators and relays - Part 25: Determination of transfer capability of surface connectors, relays and coupling accessories

Explosivstoffe für zivile Zwecke - Zünder und Verzögerungselemente - Teil 25: Bestimmung des Übertragungsvermögens von Oberflächenverbindern, Verzögerern und Verbindern
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Explosifs à usage civil - Détonateurs et relais - Partie 25 : Détermination de la capacité de transmission des relais et des manchons d'accouplement
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EUROPEAN STANDARD
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prEN 13763-25

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English Version

Explosives for civil uses - Detonators and detonating cord relays - Part 25: Determination of transfer capability of surface connectors, relays and coupling accessories

Explosifs à usage civil - Détonateurs et relais pour
cordeau détonant - Partie 25: Détermination de la
capacité de transmission des relais et des manchons
d'accouplement

Explosivstoffe für zivile Zwecke - Zünder und
Sprengschnurverbinder - Teil 25: Bestimmung des
Übertragungsvermögens von Oberflächenverbindern,
Verzögerern und Verbindern

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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Contents	Page
European foreword	3
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Principle	6
5 Apparatus	6
6 Preparation and handling of test samples and test pieces	7
6.1 General	7
7 Procedure	7
7.1 Surface connectors and detonating cord relays other than those designed to be hung from near-vertical rock faces	7
7.2 Surface connectors and detonating cord relays designed to be hung from near-vertical rock faces	7
7.3 Coupling accessories other than those designed to be hung from near-vertical rock faces	8
7.4 Coupling accessories designed to be hung from near-vertical rock faces	8
8 Expression of results	8
9 Test report	8
Annex ZA (informative) Relationship between this European Standard and the essential safety requirements of Directive 2014/28/EU relating to the making available on the market and supervision of explosives for civil uses aimed to be covered	9
Bibliography	10

European foreword

This document (prEN 13763-25:2021) 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 13763-25:2004.

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

- a) Clause 1, *Scope*, clarifies that this document applies to explosives for civil uses;
- b) Clause 4, *Principle*, has been added;
- c) Clause 6, *Preparation and handling of test samples and test pieces*, specifies that surface connectors, detonating cord relays and coupling accessories intended for non-electric initiation systems shall have the same design and composition according to the manufacturer’s specification;
- d) Clause 8, *Expression of results*, has been added;
- e) Annex A, *Range of applicability of the test method*, has been removed;
- 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*

prEN 13763-25:2021 (E)

- 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

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Introduction

When using non-electric initiation systems there is a need to transfer the shock wave from one unit to another and/or to delay the signal. The shock wave can be transferred from electric detonators, electronic detonators and non-electric detonators. This can be done by means of surface connectors, detonating cord relays and coupling accessories.

Coupling accessories are not explosives and hence are not regulated by the Directive 2014/28/EU. Coupling accessories have been included in the scope because they are commonly used with detonators and detonating cord relays.

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prEN 13763-25:2021 (E)**1 Scope**

This document specifies methods for determining the transfer capability of surface connectors, detonating cord relays and coupling accessories intended for non-electric initiation systems.

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*

EN 13857-3:2002, *Explosives for civil uses - Part 3: Information to be provided by the manufacturer or his authorised representative to the user*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 60529:1991¹⁾, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

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 consists of a donor and receptors. The maximum number of receptors claimed by the manufacturers are connected. The test piece is conditioned in water or sprayed with water for a certain amount of time. The test piece is removed from the water. The donor is initiated according to the manufacturer's instructions. The number of receptors which did not initiate during the test are recorded.

5 Apparatus

- 5.1 Shock tubes or detonating cords relays for use as donors and/or receptors.
- 5.2 Witness papers to be attached at one end of the shock tube to indicate if a shock wave was transferred through a shock tube. e.g. adhesive tapes.
- 5.3 Initiating device for the donors.
- 5.4 Temperature measuring device, with an accuracy of 1 °C.
- 5.5 Time measuring device with an accuracy of 1 min.
- 5.6 Scale of length to measure the depth of water with an accuracy of 0,01 m.

¹⁾ As amended by EN 60529:1991/A2:2013.

6 Preparation and handling of test samples and test pieces²

6.1 General

Test samples for detonators, detonating cord relays, surface connectors and shock tubes should be handled according to EN ISO/IEC 17025:2017, 7.4.

Select 25 surface connectors, detonating cord relays or coupling accessories of the same type, having the same composition, base charges, dimensions and construction according to the manufacturer's specification.

Select the amount and type of receptors recommended by the manufacturer to be used with the surface connectors, detonating cord relays or coupling accessories.

7 Procedure

7.1 Surface connectors and detonating cord relays other than those designed to be hung from near-vertical rock faces

Connect the maximum number of receptors claimed by the manufacturer to the surface connector or to the detonating cord relay in accordance with the manufacturer's instructions.

Condition the donor/surface connector and the receptors or the donor/detonating cord relay and the receptors by submerging them in water at a depth of $(0,5 \pm 0,1)$ m for 48^{+1}_0 h at a temperature of (20 ± 5) °C, ensuring that the ends of the receptors, shock tubes or detonating cord are kept out of the water and not wetted.

NOTE The purpose of submerging the piece in water is to simulate that surface connectors and detonating cord relays can lay on the ground and be exposed to a puddle of water.

Unless otherwise specified by the manufacturer, ensure that the free end of the donor, surface connector or detonating cord relay remains submerged during conditioning.

After conditioning, remove the surface connector with connected receptors or detonating cord relay from the water.

When the receptors are a shock tube attach a witness paper to the end of each receptor.

Initiate the donor using the initiating device.

Record whether or not the shock wave has been successfully transferred from the surface connector or detonating cord relay to all of the receptors.

For detonating cord as receptors record whether they detonate.

For shock tubes as receptors record whether or not the shock wave has been successfully transferred by checking if the witness paper has been affected by a shock wave.

7.2 Surface connectors and detonating cord relays designed to be hung from near-vertical rock faces

For surface connector or detonating cord relay designed to be hung from a near-vertical rock face the procedure described in 7.1 shall be performed with the surface connector or detonating cord relay

² The choice of sample size is based on acceptable failure rate for the kind of defects that have to be avoided. The defects have been classified according to ISO 2859-1, ISO 2859-2, ISO 2859-3, ISO 2859-4 and ISO 2859-5.

prEN 13763-25:2021 (E)

subjected to the ingress of water test for IPX4 (spray test) as described in EN 60529:1991, instead of total immersion in water.

7.3 Coupling accessories other than those designed to be hung from near-vertical rock faces

Connect the maximum number of receptors claimed by the manufacturer to the coupling accessory in accordance with the manufacturer's instructions. Condition the donor/coupling accessories and the receptors by submerging them in water at a depth of $(0,5 \pm 0,1)$ m for 48^{+1}_0 h at a temperature of (20 ± 5) °C, ensuring that the ends of the receptors are kept out of the water.

After conditioning, remove the coupling accessory with the connected receptors from the water.

When the receptors are a shock tube attach a witness paper to the end of each receptor.

Initiate the donor using the initiating device.

Record whether or not the shock wave has been successfully transferred from the surface connector or detonating cord relay to all of the receptors.

For detonating cord as receptors record whether they detonate.

For shock tubes as receptors record whether or not the shock wave has been successfully transferred by checking if the witness paper has been affected by a shock wave.

7.4 Coupling accessories designed to be hung from near-vertical rock faces

For coupling accessories designed to be hung from a near-vertical rock face the procedure described in 7.3 shall be performed with the coupling accessory subjected to the ingress of water test for IPX4 (spray test) as described in EN 60529:1991), instead of total immersion in water.

All type of transfers for coupling accessories shall be tested according to 7.3 and 7.4, which are specified in the information to be provided by the manufacturer or his authorized representative to the user according to EN 13857-3:2002.

NOTE Other coupling accessories, not well known, could be tested but it could be necessary to adjust the test method depending on the design for the coupling accessories.

8 Expression of results

Record the number of receptors to which the shock wave has not been successfully transferred during the test.

9 Test report

The test report should conform to EN ISO/IEC 17025:2017, 7.8. In addition, the following information shall be given:

- a) reference to this document;
- b) for shock tubes as receptors record whether or not the shock wave has been successfully transferred by checking if the witness paper has been affected by a shock wave;
- c) for detonating cord relays as receptors record whether they detonate.