SLOVENSKI STANDARD
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Eksplozivi za civilno uporabo – Detonatorji in zakasnilniki – 3. del: Ugotavljanje občutljivosti na udar

Explosives for civil uses - Detonators and relays - Part 3: Determination of sensitiveness to impact

Explosivstoffe für zivile Zwecke - Zünder und Verzögerungselemente - Teil 3: Bestimmung der Schlagempfindlichkeit

Explosifs a usage civil - Détonateurs et relais - Partie 3: Détermination de la sensibilité au choc

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Explosivstoffe für zivile Zwecke - Zünder und Verzögerungselemente - Teil 3: Bestimmung der Schlagempfindlichkeit

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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.

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Foreword

This document (EN 13763-3:2002) 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of an identical text or by endorsement, at the latest by March 2003, and conflicting national standards shall be withdrawn at the latest by March 2003.

This European Standard 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.*

prEN 13763-4 *Part 4: Determination of resistance to abrasion of leading wires and shock tubes.*

prEN 13763-5 *Part 5: Determination of resistance to cutting damage of leading wires and shock tubes.*

prEN 13763-6 *Part 6: Determination of resistance to cracking in low temperatures of leading wires.*

prEN 13763-7 *Part 7: Determination of the mechanical strength of leading wires, shock tubes, connections, crimps and closures.*

prEN 13763-8 *Part 8: Determination of resistance to vibration of plain detonators.*

prEN 13763-9 *Part 9: Determination of resistance to bending of detonators.*

prEN 13763-10 *Part 10: Determination of resistance to torsion of sealing plugs.*

prEN 13763-11 *Part 11: Determination of drop resistance of detonators and relays.*

prEN 13763-12 *Part 12: Determination of resistance to hydrostatic pressure.*

prEN 13763-13 *Part 13: Determination of resistance of electric detonator to electrostatic discharge.*

prEN 13763-14 *Part 14: Determination of resistance of electric detonator to the influence of radio frequency radiation.*

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 pulse of electric detonators.*

prEN 13763-20 *Part 20: Determination of total 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.*

EN 13763-23 *Part 23: Determination of the shock-wave velocity of shock tube.*

EN 13763-24 *Part 24: Determination of the non-conductivity of shock tube.*

prEN 13763-25 *Part 25: Determination of transfer capacity of relay 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.*

prCEN/TS 13763-27 *Part 27: Definitions, methods and requirements for electronic initiation system.*

Annex A is informative and annex B is normative.

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

1 Scope

This European Standard specifies methods for checking that plain detonators, electric detonators, non-electric detonators, surface connectors, shock tubes and detonating cord relays will not explode when subjected to an impact under specified 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).

prEN 13857-1, *Explosives for civil uses — Part 1: Terminology*.

prEN 13763-1, *Explosives for civil uses. Detonators and relays — Part 1: Requirements.*

EN ISO 4957:1999, *Tool steels (ISO 4957:1999)*.

EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:1999).*

ISO 1052:1982, *Steels for general engineering purposes*.

ISO 683-9:1988, *Heat-treatable steels, alloy steels and free-cutting steels — Part 9: Wrought free-cutting steels.*

ISO 683-17:1999, *Heat-treated steels, alloy steels and free-cutting steels — Part 17: Ball and roller bearing steels.*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in prEN 13857-1 and the following apply:

3.1
drop height
distance between the lowest part of the striking head of the drop weight and the uppermost part of the percussion cylinder

3.2
ignition system
electrical resistance heating wire surrounded by an incendiary material

4 Apparatus

4.1 Electric, non-electric and plain detonators

4.1.1 General

The apparatus is a drop hammer (e.g. the BAM fall-hammer), comprising a cast steel block with base, a main anvil and an intermediate anvil, a locating plate, a guide piece, a percussion cylinder, a column, guides and a drop weight with a release mechanism and a striking head.

4.1.2 Drop hammer

A steel anvil is screwed onto the steel block and cast base. The steel used for the intermediate anvil and the main anvil is of the same type as for the striking head of the drop weight (see 4.1.3.). The percussion cylinder is a roller bearing with polished surfaces and rounded edges, and is made of steel of type B1 100Cr6 as defined by ISO 683-17:1999. The support onto which the column is fixed (made from a seamless drawn steel tube) is bolted to the back of the steel block.

NOTE Figure B.1 shows the arrangement of the BAM fall-hammer (the anvil, the steel block and the column)

Figure B.2 shows the arrangement of the lower part of the BAM fall-hammer.

Figure B.3 shows the dimensions of the guide piece and the percussion cylinder.

The two guides which are fixed to the column by means of three cross pieces are fitted with a toothed rack, to limit the rebound of the drop weight, and a moveable graduated scale for adjusting the drop height. The guides shall be vertical.

The drop weight release mechanism is adjustable between the guides and is clamped to them by the operation of a lever mechanism.

The apparatus shall be firmly secured to a concrete block, with minimum dimensions of (0,6 × 0,6 × 0,6) m, by means of four anchoring bolts.

4.1.3 Drop weight

The drop weight has a mass of (2000 ± 2) g and is provided with two locating grooves to hold it between the guides as it drops. A suspension spigot, a removable cylindrical striking head and a rebound catch are screwed onto the drop weight.

NOTE Figure B.4 shows the design of the drop weight of the BAM fall-hammer.

The removable striking head is made from hardened steel conforming to type 90 MnCrV8 in EN ISO 4957:1999 with polished surface and a diameter of 25 mm.

The release mechanism shall be controlled remotely.

4.2 Detonating cord relays, surface connectors and shock tube

Impact testing apparatus, consisting of a (5,0 ± 0,01) kg steel hammer which can be dropped freely from a set height, inside a guide tube onto a steel plate and anvil containing the device to be tested. The anvil shall rest on a concrete floor.

NOTE Figure B.5 shows the arrangement of the impact testing apparatus.

The hammer is made of steel of type B1 100Cr6 as defined by ISO 683-17:1999. The plates are made of steel of type FE 490-2 as defined by ISO 1052:1982. The anvil is made of steel of type 46 S 20 as defined by ISO 683-9:1988.

5 Test pieces

5.1 Electric detonators

Select 50 detonators of a specific type, whose fuseheads or other ignition systems have same composition and construction of relevant parts around the fusehead or other bridgwire ignition system, and whose primary charges (or the element which performs the same function as a primary charge) have the same composition and design. If the detonators form part of a series with different delay times, select 50 detonators with delay times distributed as evenly as possible throughout the series.

5.2 Non-electric detonators

Select 25 detonators of a specific type, whose primary charges (or the elements which perform the same function as a primary charge) have the same composition and design. If the detonators form part of a series with different delay times, select 25 detonators with delay times distributed as evenly as possible throughout the series.

5.3 Plain detonators

Select 25 detonators of a specific type, whose primary charges have the same composition and design.

5.4 Detonating cord relays and surface connectors

Select 25 relays or surface connectors of the same design. If the relays or surface connectors form part of a series with different delay times, select 50 relays or surface connectors with delay times distributed as evenly as possible throughout the series.

5.5 Shock tube

Select 25 pieces, each with a length of at least 200 mm, of a specific type of shock tube.

6 Procedure

6.1 General

Carry out the Bruceton up-and-down test, as described in prEN 13763-1.

If no explosion occurs at the maximum height of the apparatus (2 m for the apparatus described in 4.1 and 12 m for the apparatus described in 4.2), test the next piece at the same height. Continue the procedure until all test pieces have been tested.

6.2 Electric detonators

6.2.1 Impact on the fusehead or other ignition system

Test 25 detonators in this position. Mark the location of the fusehead or other ignition system on the outside of the detonator and place the detonator in the impact testing apparatus (4.1), so that the fusehead or other ignition system is positioned between the percussion cylinder and the intermediate anvil. Drop the hammer from the specified height (with a tolerance of ± 5 mm) and observe whether the detonator explodes.

6.2.2 Impact on the primary charge

Test 25 detonators in this position. Mark the location of the primary charge on the outside of the detonator and place the detonator in the impact testing apparatus (4.1), so that the primary charge is positioned between the percussion cylinder and the intermediate anvil. Drop the hammer from the specified height (with a tolerance of ± 5 mm) and observe whether the detonator explodes.

If the detonator does not have a primary charge, arrange the detonator so that the impact occurs on the element which performs the same function as a primary charge, i.e. initiation of the base charge.

6.3 Non-electric detonators

Follow the procedure described in 6.2.2.

6.4 Plain detonators

Follow the procedure described in 6.2.2.