SLOVENSKI STANDARD
SIST EN 13763-17:2004

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Eksplozivi za civilno uporabo - Detonatorji in zakasnilniki - 17. del: Ugotavljanje odpornosti električnih detonatorjev proti blodečim tokom

Explosives for civil uses - Detonators and relays - Part 17: Determination of no-fire current of electric detonators

Explosivstoffe für zivile Zwecke - Zünder und Verzögerungselemente - Teil 17: Bestimmung der Nichtansprechstromstärke elektrischer Zünder

Explosifs a usage civil - Détonateurs et relais - Partie 17: Détermination du courant maximal de non-amorçage des détonateurs électriques

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This European Standard was approved by CEN on 10 November 2003.

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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 13763-17:2003) 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of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

This document 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 relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

Annex A is informative.

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
EN 13763-3	Part 3: Determination of sensitiveness to impact
EN 13763-4	Part 4: Determination of resistance to abrasion of leading wires and shock tubes
EN 13763-5	Part 5: Determination of resistance to cutting damage of leading wires and shock tubes
EN 13763-6	Part 6: Determination of resistance to cracking in low temperatures of leading wires
EN 13763-7	Part 7: Determination of the mechanical strength of leading wires, shock tubes, connections, crimps and closures
EN 13763-8	Part 8: Determination of the resistance to vibration of plain detonators
EN 13763-9	Part 9: Determination of resistance to bending of detonators
EN 13763-11	Part 11: Determination of resistance to damage by dropping of detonators and relays
EN 13763-12	Part 12: Determination of resistance to hydrostatic pressure
prEN 13763-13	Part 13: Determination of resistance of electric detonators against electrostatic discharge
prEN 13763-15	Part 15: Determination of equivalent initiating capability
EN 13763-16	Part 16: Determination of delay accuracy
EN 13763-18	Part 18: Determination of series firing current of electric detonators
EN 13763-19	Part 19: Determination of firing impulse of electric detonators
EN 13763-20	Part 20: Determination of total electrical resistance of electric detonators
EN 13763-21	Part 21: Determination of flash-over voltage of electric detonators

EN 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 electrical non-conductivity of shock tube

prEN 13763-25 Part 25: Determination of transfer capability of surface connectors, relays 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.

CEN/TS 13763-27 Part 27: Definitions, methods and requirements for electronic initiation systems

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

1 Scope

This European Standard specifies a method for determining the no-fire current of electric detonators.

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

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

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

3 Terms and definitions

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

PBBS test
statistical method used to characterise the sensitivity, to a physical stimulus, of "one shot" pyrotechnical components.

The principle of the test is to measure the firing frequency at predefined levels of the physical stimulus. The physical stimulus in this standard is the firing current. Sensitivity levels corresponding to the required probability and confidence limits are then determined by extrapolation.

A detailed description of the test is given in prEN 13763-1.

4 Test pieces

Depending on the number of levels of the PBBS test, 170 to 250 detonators of the same type are needed (i.e. same bridgewire ignition system and shell). Use 30 detonators for the preliminary test (see 6.2) and 20 detonators for each current level in the determination (see 6.3). If the detonators form part of a series with different delay times, select detonators with delay times distributed as evenly as possible throughout the series.

If the no-fire current claimed by the manufacturer is less than or equal to 2A, bare fuseheads can be used instead of complete detonators.

If the detonators are magnetically coupled, the coupling unit shall be removed.

5 Apparatus

Square pulse current supply, with the following characteristics:

a) a stabilized current with a tolerance on the output of ± 1 % of the specified value (see 6.3.2);

b) a square pulse with a tolerance of ± 1 % of the specified duration (see 6.3.3);

c) a current overshoot of not more than 10 % of the specified current, and duration not greater than 1 ms (on pure resistive load);

d) a rise time for the current of not more than 1 ms (on pure resistive load).

6 Procedure

6.1 Conditioning

Store the samples at ambient temperature for at least 2 h before testing.

6.2 Preliminary testing

Carry out a preliminary test (for example a Bruceton test), using 30 detonators, to obtain an estimate of the current for 50% firing ($I_{0,5}$) and the standard deviation (s). The duration of the square pulse shall be set to 10 s if the no-fire current claimed by the manufacturer is less than or equal to 2A and 5 min if it is greater than 2A.

6.3 Testing to determine the no-fire level

6.3.1 Perform the test at ambient temperature (20 ± 2) °C, as follows :

6.3.2 Choose 7 to 11 current levels covering the interval $I_{0,5}$ ± 2 s.

6.3.3 Connect the current pulse recorder and set the square pulse duration to 10 s if the no-fire current claimed by the manufacturer is less than or equal to 2A, and 5 min if it is greater than 2A.

6.3.4 Set the current to the first level.

6.3.5 Connect one detonator (or fusehead) to the circuit and apply the current pulse.

6.3.6 Record whether the detonator (or fusehead) fires.

6.3.7 Repeat steps 6.3.5 to 6.3.6 using the other 19 detonators (or fuseheads).

6.3.8 Repeat steps 6.3.4 to 6.3.7 for each of the other current levels.

7 Calculation of results

For each level tested, determine the number of firings.

Calculate the no-fire current using the PBBS test. The probability and confidence levels are set at 0,01 % and 95 % respectively.

8 Test report

The test report shall conform to EN ISO/IEC 17025. In addition, the current levels, mean values, standard deviations, number of ignitions, number of non ignitions and the no-fire current for 0,01 % probability and 95 % confidence level shall be given.