

SLOVENSKI STANDARD**SIST EN 13763-13:2004****01-september-2004**

Eksplozivi za civilno uporabo - Detonatorji in zakasnilniki - 13. del: Ugotavljanje odpornosti električnih detonatorjev proti razelektritvi

Explosives for civil uses - Detonators and relays - Part 13: Determination of resistance of electric detonators to electrostatic discharge

Explosivstoffe für zivile Zwecke - Zünder und Verzögerungselemente - Teil 13:
Bestimmung der Widerstandsfähigkeit elektrischer Zünder gegen elektrostatische Entladungen

STANDARD REVIEW

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Explosifs a usage civil - Détonateurs et relais - Partie 13: Détermination de la résistance à la décharge électrostatique des détonateurs électriques

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13763-13

March 2004

ICS 71.100.30

English version

**Explosives for civil uses - Detonators and relays - Part 13:
Determination of resistance of electric detonators to electrostatic
discharge**

Explosifs à usage civil - Détonateurs et relais - Partie 13:
Détermination de la résistance à la décharge
électrostatique des détonateurs électriques

Explosivstoffe für zivile Zwecke - Zünder und
Verzögerungselemente - Teil 13: Bestimmung der
Widerstandsfähigkeit elektrischer Zünder gegen
elektrostatische Entladungen

This European Standard was approved by CEN on 2 January 2004.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The STANDARD PREVIEW

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 Central Secretariat has the same status as the official versions.

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

	page
Foreword	3
1 Scope	5
2 Normative references	5
3 Terms and definitions	5
4 Apparatus	5
5 Test pieces.	6
6 Procedure	6
7 Test report	7
Annex A (informative) Range of applicability of the test method	8
Annex B (normative) Adjustment of the electrostatic discharge generator	9
Annex ZA (informative) Clauses of this European Standard addressing essential requirements or other provisions of EU Directives	11

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Foreword

This document (EN 13763-13:2004) 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 September 2004 and conflicting national standards shall be withdrawn at the latest by September 2004

Annex A is informative, annex B is normative.

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 93/15.

For the relationship with EU Directive, 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:

EN 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 <small>https://standards.iteh.ai/catalog/standards/sist/54e0e141-6096-4249-ac61-c77c4ff7598/sist-en-13763-13-2004</small>
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 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
EN 13763-14	Part 14: Determination of resistance of electric detonators to the influence of radio frequency radiation
EN 13763-15	Part 15: Determination of equivalent initiating capability
EN 13763-16	Part 16: Determination of delay accuracy
EN 13763-17	Part 17: Determination of no-fire current of electric detonators
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 13763-13:2004 (E)

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 tubes
EN 13763-24	Part 24: Determination of the electrical non-conductivity of shock tubes
EN 13763-25	Part 25: Determination of transfer capacity of 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 system

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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SIST EN 13763-13:2004

<https://standards.iteh.ai/catalog/standards/sist/54e0ef41-6096-4249-ac61-c77c4fdf7598/sist-en-13763-13-2004>

1 Scope

This European Standard specifies a method for determining whether electric detonators can withstand an electrostatic discharge (ESD) without detonating.

This European Standard is not applicable to magnetically-coupled 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).

EN 13763-17, *Explosives for civil uses - Detonators and relays - Part 17: Determination of no-fire current of electric detonators*.

EN 13763-21, *Explosives for civil uses - Detonators and relays - Part 21: Determination of flash-over voltage of electric detonators*.

EN 13857-1:2003, *Explosives for civil uses - Part 1: Terminology*.

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

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For the purposes of this European Standard, the terms and definitions given in EN 13857-1:2003 and the following apply.

3.1

bridgewire ignition system

internal components of an electric detonator that convert electrical energy into the first pyrotechnical output by the mean of a resistive bridgewire heated by Joule effect

3.2

«pins-to-case» configuration

configuration in which the electrostatic discharge occurs between the two short-circuited leading wires ends and the detonator casing

3.3

«pin-to-pin» configuration

configuration in which the electrostatic discharge occurs through the bridgewire of the ignition system

4 Apparatus

4.1 Electrostatic discharge generator (ESD generator), with capacitance ranging from 500pF to 3 500pF and voltage sufficient to give the required impulse.

4.2 Equipment to record the ESD current and calculate the ESD impulse delivered to the detonator.

4.3 Conditioning chamber for maintaining a temperature of $(20 \pm 2)^\circ\text{C}$ and a relative humidity of not greater than 60%.

EN 13763-13:2004 (E)

5 Test pieces

Select 50 detonators of a specific type, having a bridgewire ignition system and charge composition ignited by a fusehead of the same design.

Note: Protective elements added to the bridgewire ignition system to increase resistance to mechanical, electrostatic or electromagnetic stress, such as a plastics sleeve on the fusehead, are regarded as part of the bridgewire ignition system.

Test 25 detonators in each configuration (see 6.4.2 and 6.4.3). The detonators selected for testing in the “pins-to-case” configuration shall have leading wires of length $(3,50 \pm 0,05)$ m.

If only shorter lengths are available from the manufacturer, these may be used at a fixed length $\pm 0,05$ m.

If the detonators form part of a series with different delay times, use 25 detonators with delay times distributed as evenly as possible throughout the series, with at least one from each delay time, in each configuration.

6 Procedure

6.1 Preparation of the test pieces

If necessary, remove between 10 mm and 20 mm of insulation from the ends of the leading wires to allow them to be connected to the ESD generator.

6.2 Adjustment of the ESD generator

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Adjust the ESD generator for each type of detonator in accordance with annex B.

The ESD impulse to be applied to the detonator shall be in accordance with Table 1.

SIST EN 13763-13:2004

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Class of the detonator ¹⁾	Class I	Class II	Class III	Class IV
No-fire current stated by the manufacturer, in amperes (A)	$0,18 < I_{nf} < 0,45$	$0,45 \leq I_{nf} < 1,20$	$1,20 \leq I_{nf} < 4,00$	$4,00 \leq I_{nf}$
Minimum ESD impulse for the “pin-to-pin” configuration, mJ/ Ω	0,3	6	60	300
Minimum ESD impulse for the “pins-to-case” configuration, mJ/ Ω	0,6	12	120	600
1) based on the manufacturer's stated value of the no-fire current				

For the pins-to-case configuration, the applied voltage shall be greater than the 99% flash-over voltage level determined in accordance with EN 13763-21.

6.3 Test conditions

Carry out the test at ambient temperature and at a relative humidity not greater than 60%.

The leading wires shall be coiled as produced by the manufacturer.

Ensure that the leading wires and cables (if any) are kept at a distance of at least 100 mm from the ground and from any conductive objects that might cause leakage paths to earth.

Ensure that the leading wires and all measuring equipment are kept in the same positions as they were when adjusting the ESD generator in accordance with annex B.

6.4 Application of the electrostatic discharge

6.4.1 General

Monitor the ESD impulse applied each time. If it deviates from the specified value, adjust it as described in annex B before continuing with the test.

6.4.2 Pin-to-pin configuration

Apply the ESD between the two separate ends of the leading wires.

Observe whether the detonator detonates.

Repeat the operation five times successively for each detonator, allowing at least 10 s between each pulse.

Repeat these operations with all the detonators to be tested in this configuration.

6.4.3 Pins-to-case configuration

Twist together the ends of the two leading wires.

Apply the ESD between the ends of the leading wires and the metal shell of the detonator.

Observe whether the detonator detonates.
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Repeat the operation five times successively for each detonator, allowing at least 10 s between each pulse.

Repeat these operations with all the detonators to be tested in this configuration
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7 Test report

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

- for every tested detonator: class of the detonator, configuration and detonation / no detonation;
- length of the leading wires if shorter than 3,5 m.