

Explosives for civil uses — Detonators and relays —

Part 7: Determination of the mechanical strength of leading wires, shock tubes, connections, crimps and closures

The European Standard EN 13763-7:2003 has the status of a
British Standard

ICS 71.100.30

National foreword

This British Standard is the official English language version of EN 13763-7:2003.

The UK participation in its preparation was entrusted to Technical Committee CII/61, Explosives for civil uses, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 10, an inside back cover and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Amendments issued since publication

| Amd. No. | Date | Comments |
|----------|------|----------|
| | | |
| | | |
| | | |
| | | |
| | | |

This British Standard, was published under the authority of the Standards Policy and Strategy Committee on 19 November 2003

© BSI 19 November 2003

ISBN 0 580 42936 9

ICS 71.100.30

English version

Explosives for civil uses - Detonators and relays - Part 7: Determination of the mechanical strength of leading wires, shock tubes, connections, crimps and closures

Explosifs à usage civil - Détonateurs et relais - Partie 7:
Détermination de la force mécanique des fils d'amorçage,
tubes à transmission d'onde de choc, liaisons, sertissages et
fermetures

Explosivstoffe für zivile Zwecke - Zünder und
Verzögerungselemente - Teil 7: Bestimmung der
mechanischen Festigkeit von Zünderdrähten,
Zündschläuchen, Verbindungen, Anwürgung und
Verschluss

This European Standard was approved by CEN on 1 September 2003.

CEN members are bound to comply with the CEN/GENELEC 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 Management Centre or to any CEN member.

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.

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



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

page

| | |
|---|----|
| Foreword..... | 3 |
| Introduction | 5 |
| 1 Scope | 5 |
| 2 Normative references | 5 |
| 3 Terms and definitions | 5 |
| 4 Apparatus | 5 |
| 5 Test pieces | 6 |
| 6 Procedure | 7 |
| 7 Test report | 8 |
| Annex A (informative) Range of applicability of the test method | 9 |
| Annex ZA (informative) Clauses of this European Standard addressing essential requirements or other provisions of EU Directives | 10 |

Foreword

This document (EN 13763-7:2003) 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 May 2004, and conflicting national standards shall be withdrawn at the latest by May 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 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 |
| 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 at low temperatures of leading wires |
| 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 |
| prEN 13763-13 | Part 13: Determination of resistance of electric detonators against electrostatic discharge |
| 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 impulse of electric detonators |
| EN 13763-20 | Part 20: Determination of total electrical 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 13763-7:2003 (E)

- EN 13763-23 Part 23: Determination of the shockwave velocity of shock tubes
- EN 13763-24 Part 24: Determination of the electrical non-conductivity of shock tubes
- prEN 13763-25 Part 25: Determination of transfer capability of surface connectors 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

Annex A is informative.

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.

Introduction

During normal use on site, the crimps/closures of detonators and their leading wires or shock tubes can be subjected to pulling forces. Such forces can cause a pullout of internal components of the detonator. For example:

- the shock tube can be pulled out of the detonator through the sealing plug;
- the leading wires, fusehead and sealing plug can be pulled out of the shell as one unit;
- the leading wires with fusehead connected to them can pull out through the sealing plug;
- the leading wires can break, or the joint between fusehead and wires break inside the sealing plug, so that the wires pull out leaving the fusehead loose inside the shell.

A pullout would either cause the detonator to explode, or would render it incapable of functioning.

1 Scope

This European Standard specifies a method for determining the ability of detonator leading wires/shock tubes, and their connections into the crimp/closure or sealing arrangement, to withstand a pullout when subjected to a pulling force.

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 13857-1:2003; *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 13857-1:2003 apply.

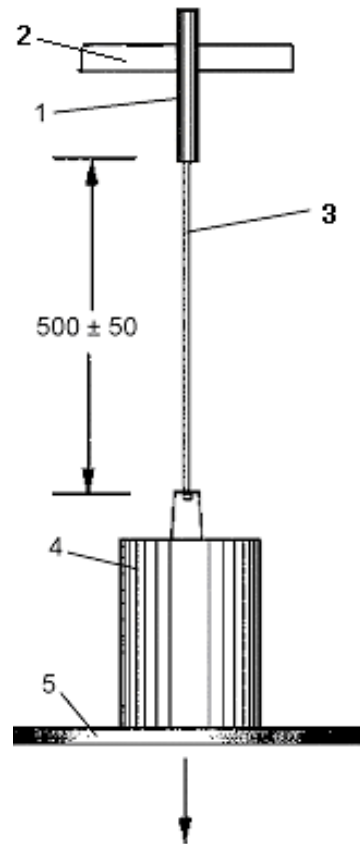
4 Apparatus

The apparatus comprises the following components as shown in Figure 1:

4.1 Fixing point for the detonator.

4.2 Weight(s) to be attached to the leading wires or shock tubes, suitable for applying forces of 40 or 100 N.

4.3 Moveable support table.



Key

- 1 Detonator
- 2 Fixing point for detonator
- 3 Leading wires or shock tube
- 4 Weight(s)
- 5 Movable support table

Figure 1 – Test apparatus

5 Test pieces

5.1 Electric detonators

Select 40 assemblies of each specific type, whose dimensions, shell material, leading wires, construction and crimp/closure are of the same design, but primary charge/base charge, delay compositions and fuseheads may vary.

5.2 Non electric detonators

Select 20 assemblies of each specific type, whose dimensions, shell material, shock tube, construction and crimp/closure are of the same design, but primary charge/base charge and delay composition may vary.

6 Procedure

6.1 General

The tests shall be carried out at the highest operating temperature claimed by the manufacturer.

6.2 Sudden release test

6.2.1 Electric detonators

Test 20 assemblies. Attach the detonator shell to the fixing point and attach the leading wires to weights of total mass corresponding to a force of $(40 \pm 0,1)$ N. Let the weights rest on the supporting table, in such a manner that a slight tension, of about 5 N, is applied and so that the distance between the detonator and the attachment to the weights is (500 ± 50) mm.

Ensure that the leading wires are attached to the weights in such a manner that the force will be evenly distributed between them. Release the weights so that the full load is applied instantly and maintain the load for (120 ± 5) s.

Record whether or not the detonator fires during the test. Record whether or not the leading wires break and/or whether a pullout has occurred.

6.2.2 Non electric detonators

Test 20 assemblies. Attach the detonator shell to the fixing point and attach the shock tube to weights of total mass corresponding to a force of $(40 \pm 0,1)$ N. Let the weights rest on the supporting table, in such a manner that a slight tension, of about 5 N, is applied and so that the distance between the detonator and the attachment to the weights is (500 ± 50) mm. Release the weights so that the full load is applied instantly and maintain the load for (120 ± 5) s.

Record whether or not the detonator fires during the test. Record whether or not the shock tube breaks and/or whether a pullout has occurred.

6.3 Slow release test (electric detonators only)

Test 20 assemblies. Attach the detonator shell to the fixing point and attach the leading wires to weights of total mass corresponding to a force of (100 ± 1) N. Let the weights rest on the supporting table, in such a manner that a slight tension of about 5 N is applied, and so that the distance between the detonator and the attachment to the weights is (500 ± 50) mm. Ensure that the leading wires are attached to the weights in such a manner that the force will be evenly distributed between them. Release the weights slowly until the full load is applied and maintain that load for 10 s. Record whether or not the detonator fires during the test. Record whether or not the leading wires break or whether a pullout has occurred.

6.4 Functioning test after sudden release test

After tests carried out as specified in 6.2.1 and 6.2.2, fire each remaining detonator of which the leading wires or shock tube are intact and no pullout has occurred, in accordance with the manufacturer's instructions. Record whether the detonators fire or not.

7 Test report

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

- a) the temperature at which the tests are carried out;
- b) any detonation recorded in the sudden release test or the slow release test;
- c) number of detonators where leading wires or shock tube break and/or a pullout occurs in the sudden release test;
- d) number of wires that break and/or number of pullouts in the slow release test;
- e) number of detonators that do not fire in the functioning test.

Annex A
(informative)

Range of applicability of the test method

Range of applicability of the test method: - 30 °C to + 80 °C.

Annex ZA
(informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives.

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/EEC.

WARNING : Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

The clauses of this standard are likely to support requirements support requirements. I.1, I.2, II.1.(g), II.1.(i), II.1.(j) and II.2C.(f) of Directive 93/15/EEC..

Compliance with this standard provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover.
Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001.
Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at <http://www.bsi-global.com>.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre.
Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration.
Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001.
Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at <http://www.bsi-global.com/bsonline>.

Further information about BSI is available on the BSI website at <http://www.bsi-global.com>.

Copyright

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI.

This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained.

Details and advice can be obtained from the Copyright & Licensing Manager.
Tel: +44 (0)20 8996 7070. Fax: +44 (0)20 8996 7553.
Email: copyright@bsi-global.com.