SLOVENSKI STANDARD
SIST EN 13631-14:2003

01-junij-2003

Eksplozivi za civilno uporabo - Razstreliva - 14. del: Ugotavljanje hitrosti detonacije

Explosives for civil uses - High explosives - Part 14: Determination of velocity of detonation

Explosivstoffe für zivile Zwecke - Sprengstoffe - Teil 14: Bestimmung der Detonationsgeschwindigkeit

Explosifs a usage civil - Explosifs - Partie 14: Détermination de la vitesse de détonation

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71.100.30	Eksplozivi. Pirotehnika	Explosives. Pyrotechnics

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EUROPEAN STANDARD

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English version

Explosives for civil uses - High explosives - Part 14: Determination of velocity of detonation

Explosifs à usage civil - Explosifs - Partie 14: Détermination de la vitesse de détonation

Explosivstoffe für zivile Zwecke - Sprengstoffe - Teil 14: Bestimmung der Detonationsgeschwindigkeit

This European Standard was approved by CEN on 17 January 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.

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

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Contents

Foreword

This document EN 13631-14:2003 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of an identical text or by endorsement, at the latest by October 2003, and conflicting national standards shall be withdrawn at the latest by October 2003.This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association,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 on *Explosives for civil uses – High explosives.* The other parts of this series are:

prEN 13631-1 Part 1: Requirements

EN 13631-2 Part 2: Determination of thermal stability of explosives

prEN 13631-3 Part 3: Determination of sensitiveness to friction of explosives

EN 13631-4 Part 4: Determination of sensitiveness to impact of explosives

EN 13631-5 Part 5: Determination of resistance to water

EN 13631-6 Part 6: Determination of resistance to hydrostatic pressure

prEN 13631-7 Part 7: Determination of safety and reliability at extreme temperatures

prEN 13631-10 Part 10: Verification of the means of initiation

prEN 13631-11 Part 11: Determination of transmission of detonation

prEN 13631-12 Part 12: Specifications of boosters with different initiating capability

EN 13631-13 Part 13: Determination of density

prEN 13631-15 Part 15: Calculation of thermodynamic properties

prEN 13631-16 Part 16: Detection and measurement of toxic gases

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 velocity of detonation of an explosive. The method is applicable to explosives for civil uses in cartridged or bulk form.

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 13857-1:2001; *Explosives for civil uses — Part 1:Terminology.*

prEN 13631-10; *Explosives for civil uses — High explosives — Part 10: Verification of the means of initiation.*

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

ISO 4200:1991; *Plain end steel tubes, welded and seamless — General tables of dimensions and masses per unit length.*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in prEN 13857-1:2001 apply.

4 Principle

The time taken for the detonation front to pass between two sensors a known distance apart is measured.

5 Apparatus

5.1 Means of initiation, as specified by the explosive manufacturer in accordance with prEN 13631-10.

5.2 Steel tubes

The dimensions of the steel tubes shall be in accordance with ISO 4200:1991, Table 1, range of preferred thickness E, an extract from which is given in Table 1 of this standard.

Table 1 – Dimensions of steel tubes

Internal diameter (mm)	Wall thickness (mm)
17,3	2,0
22,9	2,0
29,1	2,3
37,2	2,6
43,1	2,6
54,5	2,9
70,3	2,9
82,5	3,2
107,1	3,6
131,7	4,0
159,3	4,5
206,5	6,3
260,4	6,3
309,7	7,1

Suitable holes shall be drilled in the tube to allow insertion of the sensors of the measuring equipment used.

5.3 Thermometer

Thermometer capable of measuring the temperature of the test environment and the temperature of the explosive with an accuracy of ± 1 °C.

5.4 Measuring equipment

The measuring equipment with two sensors shall be capable of measuring the velocity of the detonation front to an accuracy of 100 m/s.

Examples of sensors are optical fibres, self-shorting pins, ionisation pins and piezoelectric pins.

6 Preparation of test pieces

6.1 Test piece

The test piece shall comprise a cartridge or column of cartridges of length L, which is at least the length necessary for the measurement of the velocity of detonation l, plus five times the cartridge diameter d, i.e.

$L \geq 5\,d + l$

When the length of an individual cartridge is less than L, prepare each test piece by joining two cartridges together. In case of clipped cartridges, the end portion of two cartridges should be cut off to form a flat surface not less than the diameter of the charge and the cartridges joined by butting together and taping securely.

6.2 Assembly of the test piece and means of initiation

6.2.1 General

If the test piece comprises more than one cartridge, fit the sensors to the cartridge at one end and initiate the cartridge at the other end.

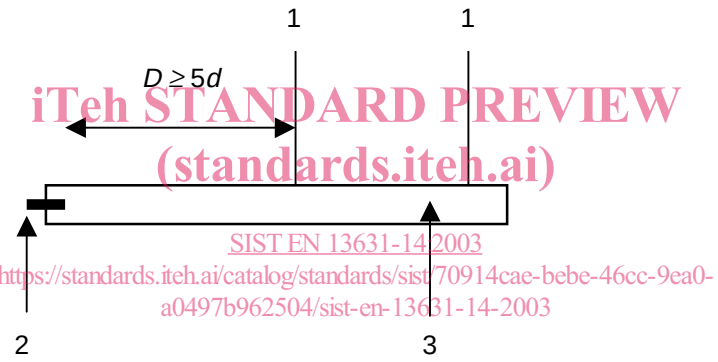
Confinement with steel tubes shall be used when the (unconfined) explosive does not support stable detonation at the test diameter.

The internal diameter of the steel tube should be such that the cartridge can be inserted into it without leaving an unnecessarily large annular space between the cartridge and the tube, in order to avoid channel effect.

The minimum distance between the sensors shall be 100 mm and the distance between the first sensor and the initiating device shall be at least five times the diameter of the charge.

6.2.2 Initiation by detonator

Assemble the test piece with the detonator inserted at one end and the sensors at the other end, as shown in Figure 1.



Key

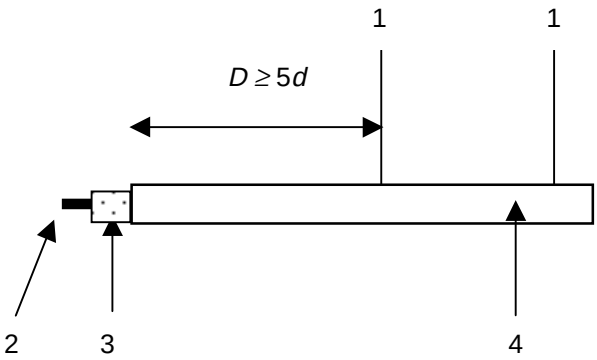
D distance between the end of the detonator and the first sensor
d diameter of the explosive under test
1 Sensors
2 Detonator
3 Explosive under test

Figure 1 – Test piece assembly for initiation by detonator

6.2.3 Initiation by booster

Assemble the test piece with the detonator and the booster attached at one end and the sensors at the other end, as shown in Figure 2.

In the case of clipped cartridges, the end portion of the cartridge shall be cut off to form a flat surface and the booster attached (for example by adhesive tape).



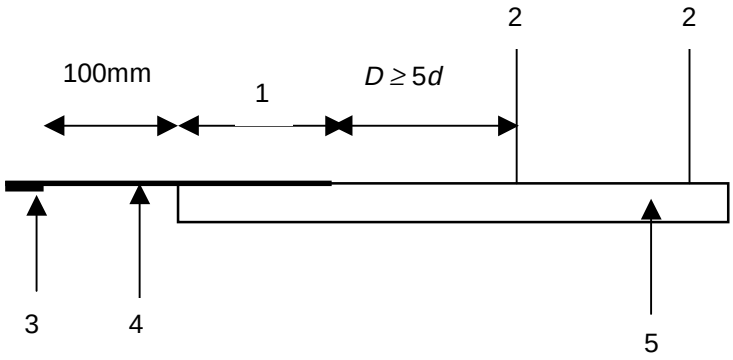
Key

D distance between the end of the booster and the first sensor
d diameter of the explosive under test
1 Sensors
2 Detonator
3 Booster
4 Explosive under test

Figure 2 – Test piece assembly for initiation by booster

6.2.4 Initiation by detonating cord

Assemble the test piece with the detonator and the detonating cord attached at one end and the sensors at the other end, as shown in Figure 3.



Key

D distance between the end of the detonating cord and the first sensor
d diameter of the explosive under test
1 Overlap
2 Sensors
3 Detonator
4 Detonating cord
5 Explosive under test

Figure 3 – Test piece assembly for initiation by detonating cord