



SLOVENSKI STANDARD
oSIST prEN 13630-11:2021
01-april-2021

**Eksplzivni za civilno uporabo – Detonacijske in počasi goreče vžigalne vrvice – 11.
del: Ugotavljanje detonacijske hitrosti detonacijskih vrvic**

Explosives for civil uses - Detonating cords and safety fuses - Part 11: Determination of velocity of detonation of detonating cords

Explosivstoffe für zivile Zwecke - Sprengschnüre und Sicherheitsanzündschnüre - Teil 11: Bestimmung der Detonationsgeschwindigkeit von Sprengschnüren

Explosifs à usage civil - Cordeaux détonants et mèches de sûreté - Partie 11: Détermination de la vitesse de détonation des cordeaux détonants

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ICS:

71.100.30	Eksplzivni. Pirotehnika in ognjemeti	Explosives. Pyrotechnics and fireworks
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 13630-11

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ICS 71.100.30

Will supersede EN 13630-11:2002

English Version

Explosives for civil uses - Detonating cords and safety fuses - Part 11: Determination of velocity of detonation of detonating cords

Explosifs à usage civil - Cordeaux détonants et mèches de sûreté - Partie 11: Détermination de la vitesse de détonation des cordeaux détonants

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 321.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 13630-11:2021) has been prepared by Technical Committee CEN/TC 321 “Explosives for civil uses”, the secretariat of which is held by UNE.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13630-11:2002.

In comparison with the previous edition, the following technical modifications have been made:

- a) the normative references have been updated;
- b) Clauses 4, *Principle*, has been added
- c) Clause 7, *Calculation of results*, is now given as 7.3;
- d) 7.4, *Alternative testing method using VOD measuring system*, has been added;
- e) Annex A, *Range of applicability of the test method*, has been removed;
- f) Annex ZA has been updated.

This document has been prepared under a Standardization Request (M/562) annexed to the Commission Implementing Decision C(2019)6634 final as regards Explosives for civil uses given to CEN by the European Commission and the European Free Trade Association, and supports Essential Safety requirements of Directive 2014/28/EU.

For relationship with Directive 2014/28/EU, see informative Annex ZA, which is an integral part of this document.

EN 13630, *Explosives for civil uses — Detonating cords and safety fuses*, is currently composed of the following parts:

- *Part 1: Requirements*
- *Part 2: Determination of thermal stability of detonating cords and safety fuses*
- *Part 3: Determination of sensitiveness to friction of the core of detonating cords*
- *Part 4: Determination of sensitiveness to impact of detonating cords*
- *Part 5: Determination of resistance to abrasion of detonating cords*
- *Part 6: Measurement of resistance to tension of detonating cords*
- *Part 7: Determination of reliability of initiation of detonating cords*
- *Part 8: Determination of resistance to water of detonating cords and safety fuses*
- *Part 9: Determination of transmission of detonation from detonating cord to detonating cord*
- *Part 10: Determination of initiating capability of detonating cords*

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- *Part 11: Determination of velocity of detonation of detonating cords*
- *Part 12: Determination of burning duration of safety fuses*

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1 Scope

This document specifies a method for determining the detonation velocity (VOD) of detonating cords. Applicability of the test method is under environmental conditions of a field test range or blast bunker.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

prEN 13857-1:2021, *Explosives for civil uses — Part 1: Terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 13857-1:2021 apply.

4 Principle

The detonation velocity (VOD) of detonating cords is determined by measurement of the time it takes for the detonation front to travel a known distance.

5 Apparatus

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5.1 Sensors

Two sensors, for detecting the detonation wave: for example, two enamel insulated twisted copper wires or an optical system.

5.2 Time-measuring equipment

Time-measuring equipment, capable of measuring time to an accuracy of $\pm 1 \mu\text{s}$.

5.3 Detonator

A detonator as specified by the manufacturer of the detonating cord, or equivalent, shall be used to initiate the detonating cord.

5.4 VOD measuring system

A system able to measure a detonation velocity by mean of specific probes. A specific probe (VOD probe) can be an electric coaxial cable or a copper sensor of known linear resistance. The VOD measuring system records the variation of resistance when the VOD probe is consumed by the detonation of the detonating cord.

6 Preparation of test sample

Select eight pieces of detonating cords to be tested, each with a length of at least $(1\,500 \pm 50)$ mm.

Seal both ends of all the test samples with the means of sealing compatible with the explosive under test (e.g. adhesive tape) to avoid leakage of explosive during testing.

NOTE The number of test samples to be tested is based on the current sampling practice which is in place for decades and for which there is no evidence supporting a change for more or less samples.

7 Procedure

7.1 General

The temperature during the test shall be within the range of use given by the manufacturer.

7.2 Testing method using time-measuring equipment

Tape the detonator (5.3) to the detonating cord at a distance of (25 ± 5) mm from one end of the detonating cord to be tested (see Figure 1), or in a manner specified by the manufacturer.

Clamp the detonating cord and the detonator horizontally between two supports at a height of at least 200 mm above the ground.

Position the first sensor (5.1) at a distance of (225 ± 15) mm from the end of the detonating cord to which the detonator is attached.

Position the second sensor (5.1) at a distance of $(1\ 000 \pm 5)$ mm from the first sensor.

Connect the sensors to the time-measuring equipment (5.2).

Connect the detonator to the firing system and carry out the firing.

Record the time taken for the detonation wave to traverse the distance between the two sensors. If the detonation is interrupted before then end, record the result as “failed”.

Perform the test with each of the eight test samples.

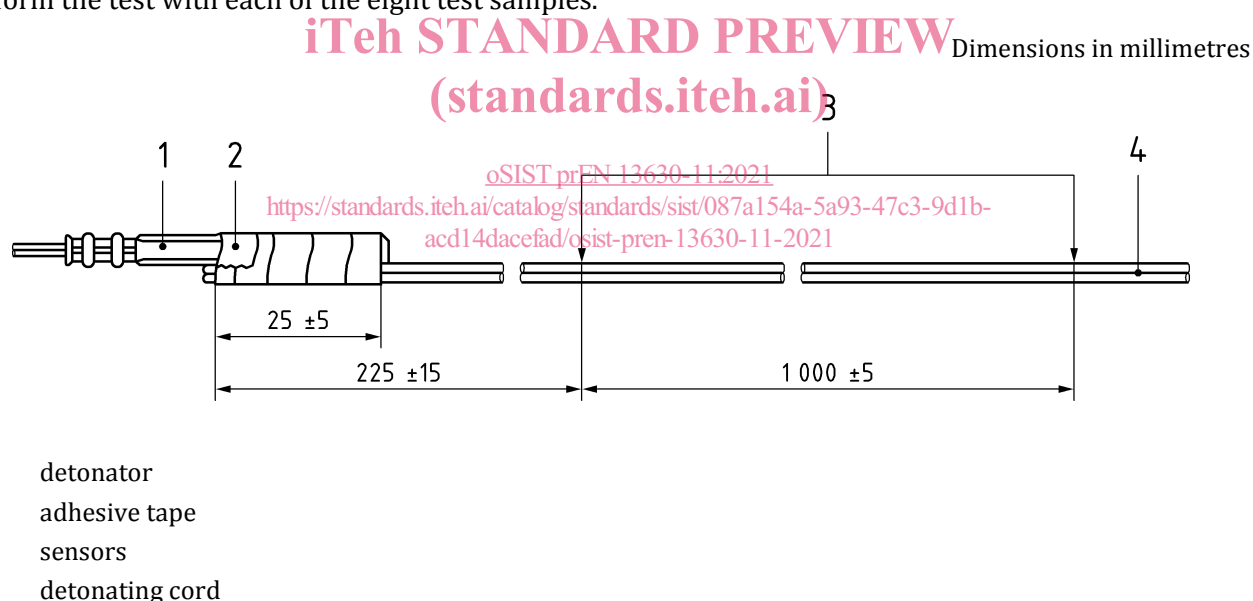


Figure 1 — Example of test arrangement

7.3 Calculation of results

The detonation velocity is given by the formula:

$$v = \frac{10^6}{t}$$

where

v is the detonation velocity, expressed in meter per second (m/s)

t is the recorded time, expressed in microseconds (μs), for the detonation wave to travel between the two sensors

7.4 Alternative testing method using VOD measuring system

Tape the detonator (5.3) to the detonating cord at a distance of (25 ± 5) mm from one end of the detonating cord to be tested (see Figure 2), or in a manner specified by the manufacturer.

Clamp the detonating cord and the detonator horizontally between two supports at a height of at least 200 mm above the ground.

Position the VOD probe of the VOD measuring system along the cord at the opposite end of the detonating cord to which the detonator is attached.

Connect the VOD probe to the VOD measuring system (5.4).

Connect the detonator to the firing system and carry out the firing.

Record the detonation velocity with the VOD measuring system. If the detonation is interrupted before then end, record the result as “failed”.

Perform the test with each of the eight test samples.



Key

- 1 detonator
- 2 adhesive tape
- 3 VOD probe and its cable
- 4 detonating cord

Figure 2 — Example of test arrangement

8 Test report

The test report should conform to EN ISO/IEC 17025:2017, 7.8.2 and 7.8.3. In addition, the following information shall be given:

- a) reference to this document (i.e. EN 13630-11:202X);
- b) reference to the procedure used (i.e. 7.2 or 7.4 of this document);
- c) the detonation velocity claimed by the manufacturer;
- d) the results of all eight tests in the form of each detonation velocity (v) and deviation from the detonation velocity claimed by the manufacturer.

Annex ZA (informative)

Relationship between this European Standard and the essential safety requirements of Directive 2014/28/EU relating to the making available on the market and supervision of explosives for civil uses aimed to be covered

This European Standard has been prepared under a standardization request M/562 annexed to Commission Implementing Decision C(2019)6634 final as regards explosives for civil uses to provide one voluntary means of conforming to essential safety requirements of Directive 2014/28/EU relating to the making available on the market and supervision of explosives for civil uses.

Once this standard is cited in the Official Journal of the European Union (OJEU), under Directive 2014/28/EU, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential safety requirements of that Directive 2014/28/EU, and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 2014/28/EU

Essential Safety Requirements ¹⁾ of Directive 2014/28/EU Annex II	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
I.2.	Clauses 5 to 8	The detonation velocity is an important performance characteristic for the user of the detonating cord with regards to the intended use defined by the manufacturer.
II.2.	Clauses 5 to 8	The test has been designed to provide a detonation velocity result that is as close as possible to what it could be in the conditions of use.

¹⁾ The Essential Safety Requirements are fulfilled together with the requirements in prEN 13360-1:2021.

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.