



SLOVENSKI STANDARD
oSIST prEN 13631-11:2021
01-april-2021

Eksplozivi za civilno uporabo - Razstreliva - 11. del: Ugotavljanje prenosa detonacije

Explosives for civil uses - High explosives - Part 11: Determination of transmission of detonation

Explosivstoffe für zivile Zwecke - Sprengstoffe - Teil 11: Bestimmung der Detonationsweiterleitung

Explosifs à usage civil - Explosifs - Partie 11: Détermination de la transmission de la détonation

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Ta slovenski standard je istoveten z: prEN 13631-11

ICS:

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

DRAFT
prEN 13631-11

April 2021

ICS 71.100.30

Will supersede EN 13631-11:2003

English Version

Explosives for civil uses - Explosives - Part 11: Determination of the transmission of detonation of explosives

Explosifs à usage civil - Explosifs - Partie 11:
Détermination de la transmission de la détonation des
explosifs

Explosivstoffe für zivile Zwecke - Explosivstoffe - Teil
11: Bestimmung der Detonationsübertragung von
Explosivstoffen

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (prEN 13631-11:2021) 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 for the CEN Enquiry.

This document will supersede EN 13631-11:2003.

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

- a) the main element of the document’s title has been changed from “High explosives” to “Explosives”;
- b) the normative references have been updated;
- c) Annex A, *Range of applicability of the test method*, has been removed;
- d) 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 13631, *Explosives for civil uses* — Explosives, is currently composed with the following parts:

- *Part 1: Requirements*
- *Part 2: Determination of thermal stability of explosives*
- *Part 3: Determination of sensitiveness to friction of explosives*
- *Part 4: Determination of sensitiveness to impact of explosives*
- *Part 5: Determination of resistance of explosives to water*
- *Part 6: Determination of resistance of explosives to hydrostatic pressure*
- *Part 7: Determination of safety and reliability of explosives at extreme temperatures*
- *Part 10: Method for the verification of the means of initiation of explosives*
- *Part 11: Determination of transmission of detonation of explosives*
- *Part 13: Determination of density of explosives*
- *Part 14: Determination of velocity of detonation of explosives*

prEN 13631-11:2021 (E)**1 Scope**

This document specifies a test method for the determination of the ability of cartridge explosives to transmit detonation.

The method is applicable to explosives in cartridges, excluding black powder, explosives pre-products and other non-detonating explosives.

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 13630-7:2021, *Explosives for civil uses — Detonating cords and safety fuses — Part 10: Determination of the reliability of initiation of detonating cords*

prEN 13631-14:2021, *Explosives for civil uses — Explosives — Part 14: Method for the determination of the velocity of detonation of explosives*

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

EN 10025-2:2005, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

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3 Terms and definitions

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

3.1**cap-sensitive explosive**

explosive which can be initiated by a single detonator

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4 Principle

The transmission of detonation is determined by testing the ability of two unconfined and coaxially suspended cartridges to transmit the detonation from one to the other, where the cartridges have the same diameter and are separated by an air gap.

While normally the cartridges in a borehole shall be in direct contact with each other, forming an uninterrupted column of explosives, in practice it cannot always be excluded that smaller objects drop in between and generate a small separation. This test adds to the safety in use.

When the manufacturer claims that the explosive will need confinement in order to properly function, the transmission of detonation is determined with the explosive inside a steel tube of suitable dimensions.

The donor cartridge when initiated shall initiate the acceptor cartridge.

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

5 Apparatus

5.1 Means of initiation, as specified by the explosives' manufacturer.

5.2 Support, for holding the cartridges, comprising a thin wooden or metal rod or other device which will not affect the velocity of detonation. When confinement of the explosive is required, the support shall hold the cartridges inside a steel tube (5.3).

5.3 Steel tubes, the dimensions shall be in accordance with Table 1.

The steel quality shall be structural steel with a minimum yield strength of 235 MPa at 16 mm, which is specified in accordance with EN 10025-1:2005 as "S 235 xx".

The internal diameter of the steel tube shall be the smallest where the cartridges still can be inserted into it without difficulty.

In case the start-stop-method (prEN 13631-14:2021, 5.4.1) is used, holes shall be drilled in the tube to allow the insertion of the sensors of the measuring equipment at positions in accordance to Clause 6. The diameter of the holes shall be no larger than to allow the insertion of the sensors (prEN 13631-14:2021, 5.4.1).

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

NOTE The dimensions are in accordance with ISO 4200:1991, Table 1, "range of preferred thickness E", which are commercial steel tubes for general use. To facilitate the use in this standard the outer diameter dimensions given in ISO 4200:1991, Table 1 have been converted to inner diameter values.

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

5.5 Measuring tape, capable of measuring length up to 200 cm with an accuracy of 1 mm.

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5.6 Measuring equipment for velocity of detonation, as specified in prEN 13631-14:2021, 5.4.

5.7 Witness equipment for the verification of the reliability of initiation of detonating cords, as specified in prEN 13630-7:2021.

5.8 Calliper, capable of measuring length up to 200 mm with an accuracy of 0,1 mm.

5.9 Balance, with an accuracy to 1 g.

6 Test pieces

6.1 General

The test pieces shall be cartridges of the same diameter d and having the smallest diameter placed on the market by the manufacturer. The cartridge being initiated is referred to as the “donor”, the cartridge which shall undergo complete detonation caused by the donor is referred to as “acceptor”.

In order to ensure that a stable detonation can be obtained, the length of the donor cartridge shall be at least five times its diameter

The length of the acceptor cartridge shall be at least five times its diameter (d). This length shall be increased as required if the measurement of velocity of detonation, as described in prEN 13631-14:2021, is used to detect proper detonation of the acceptor cartridge.

When the length of the supplied cartridge(s) is less than that required to satisfy the above, prepare donor and acceptor by joining two or more cartridges together. In case of clipped cartridges or cartridges with rounded ends, the end portions of two cartridges shall be cut off to form a flat surface, with the cross section not less than the diameter of the cartridge, and the cartridges shall be joined by butting together and taping securely.

The cartridges are separated by a distance D of 20 mm. The length D of this gap is measured between the ends of flat-ended cartridges (see Figure 1). For cartridges having rounded ends, the following method shall be used: place the ends of the cartridges in contact, without pressure. Then move one cartridge by the required distance of 20 mm along the central axis of the setup (see Figure 2).

Measure the diameter of the explosives using the calliper (5.6). Measure the length of the test piece with measuring tape (5.5). Weigh the mass of test piece using the balance (5.9). Record all the values.

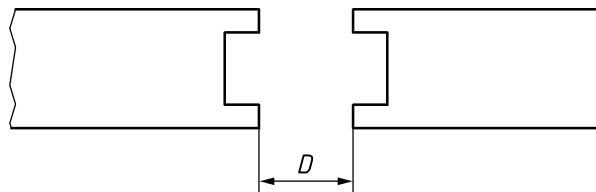


Figure 1 — Gap measurement for flat-end cartridges

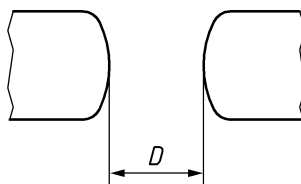


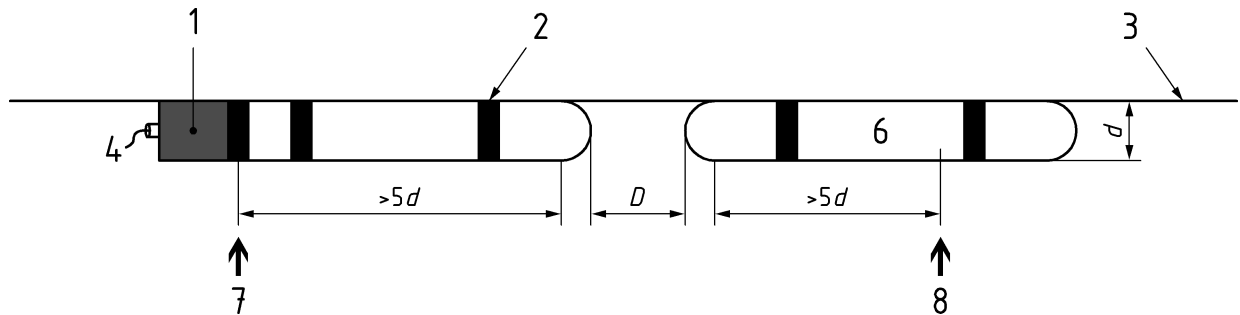
Figure 2 — Gap measurement for cartridges having rounded ends

6.2 Assembly of the test piece and means of initiation

6.2.1 Test set up without confinement

Cartridged explosives for which the manufacturer claims that they will detonate without confinement, shall be assembled as shown in Figure 3 for non-cap-sensitive explosives in round-ended cartridges, or as shown in Figure 4 for cap-sensitive explosives in flat-ended cartridges.

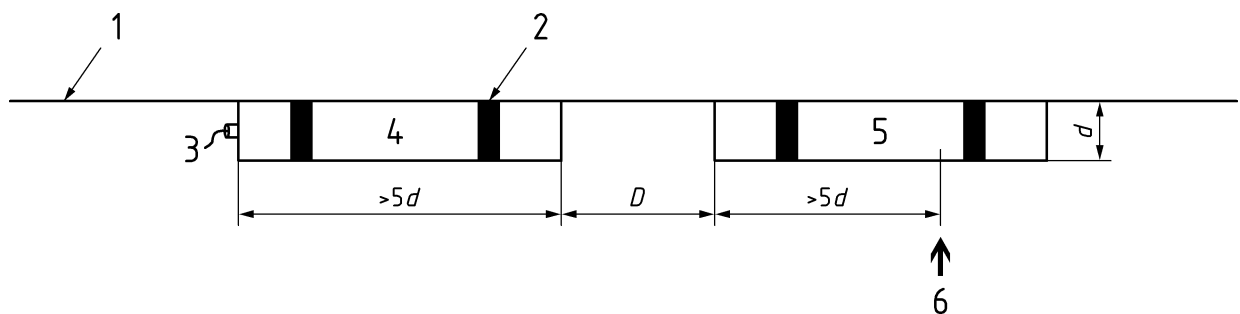
Fasten the cartridges coaxially to the support with adhesive tape or cord and suspend the assembly freely above the ground as shown in Figures 3 and 4.



Key

- 1 booster
- 2 adhesive tape
- 3 support
- 4 booster with detonator
- 5 donor
- 6 acceptor
- 7 contact between the booster and a flat-cut of the cartridge
- 8 starting point of detonation velocity measurement or of fixing of detonating cord for witness plate method

Figure 3 — Test arrangement with non-cap-sensitive explosives in round-ended cartridges without confinement



Key

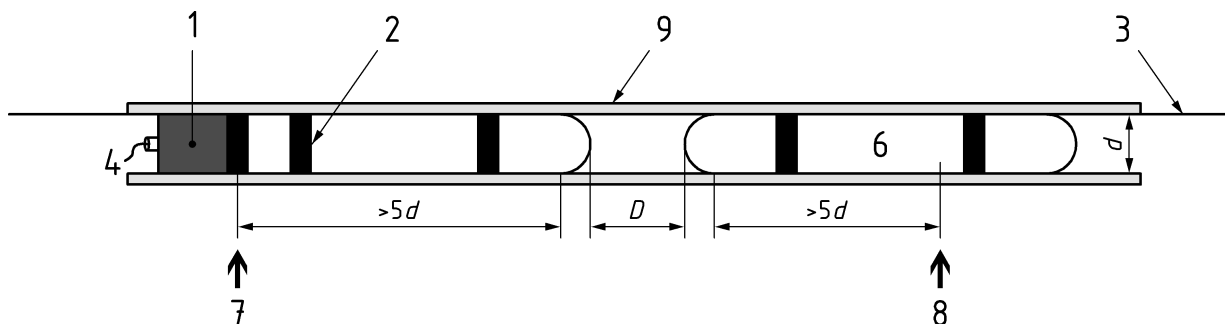
- 1 support
- 2 adhesive tape
- 3 detonator
- 4 donor
- 5 acceptor
- 6 starting point of detonation velocity measurement or of fixing of detonating cord for witness plate method

Figure 4 — Test arrangement with cap-sensitive and flat-ended cartridge explosives without confinement

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6.2.2 Test set up with confinement

Cartridge explosives for which the manufacturer claims that confinement is required, shall be assembled as shown in Figure 5 for non-cap-sensitive explosives in rounded-ended cartridges, or as shown in Figure 6 for cap-sensitive explosives in flat-ended cartridges. Insert the cartridges into the steel tube and suspend the assembly freely above the ground as shown in Figures 5 and 6.



Key

- 1 booster
- 2 adhesive tape
- 3 support
- 4 detonator
- 5 donor
- 6 acceptor
- 7 contact between the booster and a flat-cut of the cartridge
- 8 starting point of detonation velocity measurement or of fixing of detonating cord for witness plate method
- 9 Steel tube

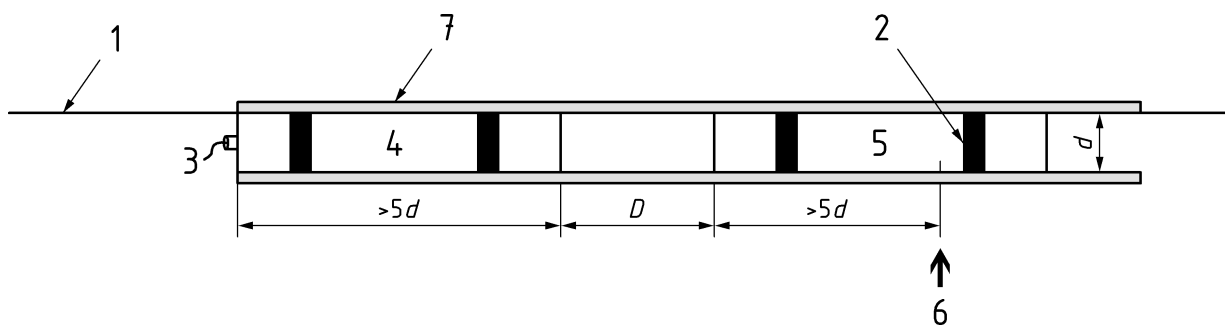
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Figure 5 — Test arrangement with non-cap-sensitive explosives in round-ended cartridges with confinement



Key

- 1 support
- 2 adhesive tape
- 4 detonator
- 5 donor
- 6 acceptor
- 8 starting point of detonation velocity measurement or of fixing of detonating cord for witness plate method
- 9 Steel tube

Figure 6 — Test arrangement with cap-sensitive and flat-ended cartridges explosives with confinement