



**SLOVENSKI STANDARD**  
**oSIST prEN 13631-10:2021**  
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**Eksplozivi za civilno uporabo – Razstreliva – 10. del: Metoda za overjanje načina aktiviranja**

Explosives for civil uses - High explosives - Part 10: Method for the verification of the means of initiation

Explosivstoffe für zivile Zwecke - Sprengstoffe - Teil 10: Überprüfung der Zündweise

Explosifs à usage civil - Explosifs - Partie 10: Méthode de vérification du moyen d'amorçage

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**ICS:**

71.100.30	Eksplozivi. Pirotehnika in ognjemeti	Explosives. Pyrotechnics and fireworks
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**DRAFT**  
**prEN 13631-10**

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Will supersede EN 13631-10:2003

English Version

## Explosives for civil uses - Explosives - Part 10: Method for the verification of the means of initiation of explosives

Explosifs à usage civil - Explosifs - Partie 10: Méthode de vérification du moyen d'amorçage des explosifs

Explosivstoffe für zivile Zwecke - Explosivstoffe - Teil 10: Überprüfung der Zündweise 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.

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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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<b>Contents</b>	<b>Page</b>
European foreword .....	3
<b>1 Scope</b> .....	<b>4</b>
<b>2 Normative references</b> .....	<b>4</b>
<b>3 Terms and definitions</b> .....	<b>4</b>
<b>4 Principle</b> .....	<b>4</b>
<b>5 Apparatus</b> .....	<b>4</b>
<b>6 Test pieces</b> .....	<b>6</b>
<b>6.1 Cartridged Explosives</b> .....	<b>6</b>
<b>6.2 Bulk explosive</b> .....	<b>6</b>
<b>6.3 Boosters</b> .....	<b>7</b>
<b>6.4 Assembly of the test piece and means of initiation</b> .....	<b>7</b>
<b>6.4.1 General</b> .....	<b>7</b>
<b>6.4.2 Initiation by detonator</b> .....	<b>7</b>
<b>6.4.3 Initiation with detonating cord</b> .....	<b>7</b>
<b>6.4.4 Initiation by detonating cord</b> .....	<b>8</b>
<b>7 Procedure</b> .....	<b>8</b>
<b>7.1 Measurement procedure</b> .....	<b>8</b>
<b>7.2 Testing of cartridged explosives</b> .....	<b>8</b>
<b>8 Test report</b> .....	<b>9</b>
<b>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</b> .....	<b>10</b>
<b>Bibliography</b> .....	<b>11</b>

## European foreword

This document (prEN 13631-10:2021) 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 13631-10:2003.

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) the description of the preparatory steps and for performing the test have been clearly separated;
- d) Annex A, *Range of applicability of the test method*, has been removed and the content has been moved to Clause 1, *Scope*;
- e) Annex ZA has been updated.

This document has been prepared under a Standardization Request (M/562) annexed to the Commission Implementing Decision G(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 13631-10:2021 (E)****1 Scope**

This document specifies a method for the verification of the initiation of an explosive, excluding black powder, by a specified means of initiation.

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

prEN 13631-13:2021, *Explosives for civil uses — Explosives — Part 14: Method for the determination of velocity of detonation*

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

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 apply.

**4 Principle**

The explosive is initiated using the means of initiation foreseen by the manufacturer, e.g. detonator, booster or detonating cord. The test is successful when complete detonation of the explosive is observed.

**5 Apparatus**

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

**5.2 Steel tubes**: the dimensions of the steel tubes 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 10025-2:2005 as "S 235 xx".

In case of cartridge explosives, the internal diameter of the steel tube shall be the smallest where the cartridges still can be inserted into it without difficulty.

In case of bulk explosives, the internal diameter of the steel tube shall be the nearest diameter equal or less to the smallest diameter which the manufacturer specifies for use of the bulk explosive.

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 6.2. 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.

**5.3 Thermometer**, capable of measuring the temperature of the test environment and the temperature of the high explosive with an accuracy of  $\pm 1$  °C.

**5.4 Balance**, with an accuracy to 1 g.

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

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

**5.7 Equipment for determination of density** as specified in prEN 13631-13:2021, 5.1 to 5.4.

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

**5.9 Witness equipment for the verification of the reliability of initiation of detonating cords**, as specified in prEN 13630-7:2021, 5.3.

**prEN 13631-10:2021 (E)****6 Test pieces****6.1 Cartridged Explosives**

For the test with cartridged explosives, cartridges shall be used of the smallest diameter placed on the market by the manufacturer.

The test piece shall comprise a cartridge or column of cartridges of length of at least  $L$ , expressed as formula:

$$L = 5 d + l$$

where:

- $L$  is the length of cartridge or column of cartridges necessary for conducting this test;
- $l$  is the length between sensors as specified for the measuring equipment of velocity of detonation;
- $d$  is the cartridge diameter.

NOTE The length  $5 d$  is larger than the propagation length for the explosives in cartridge form.

In view of limiting damage to the environment, noise and impact on work safety it is acceptable to use test pieces of length  $L$  only but in some cases the test piece may be longer than length  $L$ .

When the length of an individual cartridge is less than  $L$ , prepare each test piece 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.

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 (5.4). Record all the values.

**6.2 Bulk explosive**

The test piece shall be prepared up by filling a steel tube (5.2) with the bulk explosives.

The length of the steel tube shall be at least of length  $L$ , expressed as formula:

$$L = 5 d + l$$

where:

- $L$  is the length of cartridge or column of cartridges necessary for conducting this test;
- $l$  is the length between sensors as specified for the measuring equipment of velocity of detonation;
- $d$  is the cartridge diameter.

NOTE The length  $5 d$  is larger than the propagation length for the explosives in bulk form.

In view of limiting damage to the environment, noise and impact on work safety it is acceptable to use test pieces of length  $L$  only but in some cases the test piece may be longer than length  $L$ .



In the case of bulk explosives, where the density may be changing over time, the density shall lie within the bounds specified by the manufacturer for correct functioning of the explosive and be determined either:

- in accordance with prEN 13631-13:2021, or
- by determining the mass  $m$  of the explosive in the steel tube, and the volume  $V$  inside the steel tube filled with the explosive, and calculating the density as:

$$\rho = m/V$$

where:

$m$  is the mass;

$V$  is the volume.

Record all the values.

### 6.3 Boosters

Boosters are tested singly as supplied by the manufacturer.

NOTE This means that boosters are not merged to a longer column, they are tested on its own.

### 6.4 Assembly of the test piece and means of initiation

#### 6.4.1 General

If the verification of detonation is done by measuring the velocity of detonation (VOD), the provisions of prEN 13631-14:2021, 6.3.1 on how to install the measurement equipment shall be followed.

If the alternative method for the verification of detonation with a witness plate (5.9) is being used, attach the detonating cord to the test piece at one end and initiate the test piece at the other end.

If the test piece is a single booster, it may be the case that the length of the booster is insufficient to measure VOD (minimum length  $l$  as referred to in prEN 13631-14:2021, 5.4.1 and 5.4.2 larger than the length of booster). Then the alternative method with a witness plate shall be used. Attach a detonating cord with adhesive tape to the booster at the other end, where the detonator for initiation is not connected, taking into account the required length of overlap as specified by the manufacturer of the detonating cord.

#### 6.4.2 Initiation by detonator

Assemble the test piece with the detonator inserted at one end and the equipment for the measurement of velocity of detonation (5.8) at the other end as specified in prEN 13631-14:2021, 6.3.2.

If or where the alternative method with a witness plate (5.9) is being used, insert the detonator at one end and attach the detonating cord at the other end.

#### 6.4.3 Initiation with detonating cord

Assemble the test piece with the detonator and the booster attached at one end and the equipment for the measurement of velocity of detonation (5.9) at the other end as specified in prEN 13631-14:2021, 6.3.2.

If the alternative method with a witness plate (5.9) is being used, assemble the test piece with the detonator and the booster attached at one end and attach the detonating cord at the other end.

**prEN 13631-10:2021 (E)****6.4.4 Initiation by detonating cord**

Assemble the test piece with the detonator and the detonating cord used for initiation attached at one end and the equipment for the measurement of velocity of detonation (5.9) at the other end as specified in prEN 13631-14:2021, 6.3.2.

If the alternative method with a witness plate (5.9) is being used, assemble the test piece with the detonator and the detonating cord used for initiation attached at one end and attach the detonating cord for verification of detonation at the other end.

The overlap between the detonating cord(s) and the cartridge shall be at least that specified by the manufacturer of the detonating cord.

The detonating cord(s) shall be held in contact with the explosive by means of adhesive tape.

This method of initiation shall not be used in conjunction with the method of verification of detonation with a witness plate, when the test piece is not of sufficient length to allow that both detonating cords are attached without overlap.

**7 Procedure****7.1 Measurement procedure**

Measure the temperature of the explosive by putting the thermometer (5.3) in contact with the explosive.

Measure the temperature of the environment, where the test is conducted (air temperature).

When conducting the test the temperature of the explosive shall be within the range of use given by the manufacturer.

NOTE Since the test addresses reliability, it may be necessary to perform the test also at the lowest or also at the highest use temperature, if the explosive is known to change its physical properties within the bounds of the temperature range for use.

Carry out three tests on three separate test pieces for each means of initiation foreseen by the manufacturer. Initiate the explosive and verify detonation by either measuring the velocity of detonation in accordance with prEN 13631-14:2021 or by confirming complete detonation by the alternative method using a witness plate (5.9) in accordance with prEN 13630-7:2021.

**7.2 Testing of cartridged explosives**

In case the test has failed at least once out of three tests with cartridged explosives without steel confinement, the tests shall be repeated three times with new test pieces. The steel tubes (5.2) shall be used and the test pieces shall be prepared in accordance with 6.1 and 6.4, however with the explosive being inside the steel tube.