# SLOVENSKI STANDARD
# oSIST prEN 13631-7:2021

**01-april-2021**

---

**Eksplozivi za civilno uporabo – Razstreliva – 7. del: Ugotavljanje varnosti in zanesljivosti pri ekstremnih temperaturah**

Explosives for civil uses - High explosives - Part 7: Determination of safety and reliability at extreme temperatures

Explosivstoffe für zivile Zwecke - Sprengstoffe - Teil 7: Bestimmung der Sicherheit und Zuverlässigkeit bei extremen Temperaturen



Explosifs à usage civil - Explosifs - Partie 7: Détermination de la sécurité et de la fiabilité aux températures extrêmes



**Ta slovenski standard je istoveten z:** **prEN 13631-7**

---

**ICS:**

| | | |
|---|---|---|
| 71.100.30 | Eksplozivi. Pirotehnika in ognjemeti | Explosives. Pyrotechnics and fireworks |

**oSIST prEN 13631-7:2021** **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# DRAFT
# prEN 13631-7

April 2021

ICS 71.100.30

Will supersede EN 13631-7:2003

English Version

# Explosives for civil uses - Explosives - Part 7: Determination of safety and reliability at extreme temperatures

Explosifs à usage civil - Explosifs - Partie 7: Détermination de la sécurité et de la fiabilité aux températures extrêmes

Explosivstoffe für zivile Zwecke - Explosivstoffe - Teil 7: Bestimmung der Sicherheit und Zuverlässigkeit bei extremen Temperaturen

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.



CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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.

**Warning** : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

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

# Contents

Page

## European foreword

This document (prEN 13631-7:2021) 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 13631-7:2003.

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) Clause 4, *Principle*, has been added;

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*

# 1 Scope

This document specifies a method for determining safety and reliability of explosives for civil uses, excluding black powder, at extreme temperatures.

NOTE Extreme temperatures are considered to be below −40°C or above + 80 °C.

# 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 13631-6:2021, *Explosives for civil uses — Explosives — Part 6: Determination of resistance to hydrostatic pressure*

prEN 13631-10:2021, *Explosives for civil uses — Explosives — Part 10: Method for the verification of the means of initiation*

prEN 13631-11:2021, *Explosives for civil uses — Explosives — Part 11: Determination of transmission of detonation*

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 verification of reliable functioning of explosives under extreme temperatures picks up all test methods where the reliability can be affected by such temperatures and defines modifications to the procedures described in parts prEN 13631-6:2021, prEN 13631-10:2021, and prEN 13631-11:2021.

It may be necessary that the manufacturer of the explosive specifies a suitable test method for extreme temperatures, if needed.

# 5 Methods

## 5.1 Method for the determination of resistance to hydrostatic pressure

### 5.1.1 Temperatures up to 100 °C

Prepare a watertight container permitting the circulation of water at a given temperature through it. It shall be big enough to hold the steel tube with all accessories as described in prEN 13631-6:2021. Additionally, a thermocouple shall be mounted in the steel tube to measure the temperature of the water within the tube.

Place the steel tube into the container and close the container with an insulating cover.

Turn on the water circulation and adjust the temperature of the water so that the water in the steel tube will reach the desired temperature within 30 min. During the test, the temperature of the circulating water shall be controlled by a suitable thermostat within an accuracy of ± 2 °C.

Proceed as described in prEN 13631-6:2021 by building up the desired pressure within the tube. When the temperature of the water within the tube has reached the desired value maintain at this temperature for 1 h.

Initiate the explosive.

Confirm that complete detonation has occurred as described in prEN 13631-10:2021.

In case of a test result "failure" wait until the temperature of the water has reached ambient temperature before opening the steel tube.

If the explosive detonates completely repeat the test twice more.

#### 5.1.2 Temperatures above 100 °C

Fill the test piece into the steel tube. Fill the tube with water so that the test piece is fully immersed. For the desired temperature, obtain the resulting pressure from tables of vapour pressure. If the pressure claimed by the manufacturer is higher than this value, a connection for pressurized water is needed.

Mount a thermocouple to measure the temperature of the water inside and close the tube as described in prEN 13631-6:2021. No connection for pressurized water is needed, unless the last sentence of the previous paragraph applies.

Wind an electric heating ribbon around the tube in a way that the ribbon covers the surface of the tube regularly. The power consumption of the heating ribbon shall be at least 2 000 W per five litres steel tube volume.

For thermal insulation, cover the test arrangement for example with dry sand.



Start heating the steel tube until the temperature has reached the desired value. The heating rate should be such that the desired temperature is obtained within 30 min. Maintain this temperature for 1 h.

Initiate the explosive within the entire test setup.



Confirm that complete detonation has occurred as described in prEN 13631-10:2021.

In case of a test result "failure" wait until the temperature of the water has reached ambient value before opening the steel tube.

If the explosive detonates completely repeat the test twice more.

### 5.2 Method for the verification of the means of initiation

#### 5.2.1 Apparatus

**5.2.1.1 Conditioning chamber**, consisting of a suitable oven or refrigerator, depending on the required test temperature, and thermostatically controlled with an accuracy of ± 2 °C.

**5.2.1.2 Thermocouple or equivalent**, for monitoring test piece temperature.

**5.2.1.3 Means of initiation**, as specified by the explosive's manufacturer and suitable for use at the test temperature.

**5.2.1.4 Thermally insulated container.**

#### 5.2.2 Preparation of test pieces

Prepare the test pieces according to prEN 13631-10:2021. In the case of bulk explosives close the tubes to prevent loss of substance.

### 5.2.3 Procedure

Place the thermocouple or equivalent inside the test piece.

Place the test piece in the conditioning chamber and adjust the thermostat to a test temperature, which is 5 °C lower than the minimum temperature or 5 °C higher than the maximum temperature for which the explosive is designed.

After the test piece has reached the required test temperature, it shall be maintained at the test temperature for at least 1 h.

Remove the test piece from the oven or refrigerator and place it immediately in a thermally insulated container.

Immediately before initiating remove the test piece from the container.

Initiate the test piece by using the initiation method recommended by the manufacturer.

At the time of initiating the temperature of the test piece shall not differ by more than 5 °C from the conditioning temperature.

Perform the test three times.

Confirm that complete detonation has occurred as described in prEN 13631-10:2021.

Before testing explosives at high temperatures, it should be checked that the explosive is not too dangerous for handling after being exposed to those high temperatures.

## 5.3 Method for the determination of transmission of detonation



The test shall be carried out as described in prEN 13631-11:2021 with the following modifications:

a) before initiating the whole test arrangement (see prEN 13631-11:2021, Figure 1), shall be conditioned by means of a conditioning chamber as described in 5.2.1.1, depending on the temperature range claimed by the manufacturer.



b) the test procedure shall be followed according to 5.2.3.

# 6 Test report

The test report should conform to EN ISO/IEC 17025:2017, 5.10.2 and 5.10.3. In addition, the following information shall be given:

a) a reference to this document;

b) in case of tests according to 5.1:

1. time used to raise the temperature to the desired value;
2. temperature;

c) in case of tests according to 5.2:

1. length of the cartridge column;
2. diameter of the cartridges or tubes;
3. material of the wrapping of cartridges;
4. type of detonation witness;
5. density of explosive;
6. means of initiation;
7. time during which the temperature is sustained;
8. method of temperature measurement;
9. temperature;



d) in case of tests according to 5.3:

1. length and diameter of the donor cartridge;
2. length and diameter of the acceptor cartridge(s);
3. material of the wrapping of cartridges;
4. type of detonation witness;
5. density of explosive;
6. means of initiation;
7. time during which the temperature is sustained;
8. method of temperature measurement;
9. temperature;
10. maximum air gap for which transmission was observed.

In all cases, the test results shall be given as described in the corresponding standards.

# 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.1. | 7 | |
| I.2. | 7 | |
| II.1.(b) | 7 | |
| II.1.(d) | 7 | |
| II.1.(g) | 7 | |
| II.1.(j) | 7 | |
| II.2. | 5 | |
| II.3.1. (a) | 7 | |

[1)] The Essential Safety Requirements are fulfilled together with the requirements in prEN 13631-1:2021.



**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.