SLOVENSKI STANDARD
oSIST prEN 13631-13:2021

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Eksplozivi za civilno uporabo - Razstreliva - 13. del: Ugotavljanje gostote

Explosives for civil uses - High explosives - Part 13: Determination of density

Explosivstoffe für zivile Zwecke - Sprengstoffe - Teil 13: Bestimmung der Dichte

Explosifs à usage civil - Explosifs - Partie 13: Détermination de la masse volumique

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ICS:

71.100.30	Eksplozivi. Pirotehnika in ognjemeti	Explosives. Pyrotechnics and fireworks

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EUROPEAN STANDARD

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Will supersede EN 13631-13:2003

English Version

Explosives for civil uses - Explosives - Part 13: Determination of density

Explosifs à usage civil - Explosifs - Partie 13: Détermination de la masse volumique

Explosivstoffe für zivile Zwecke - Explosivstoffe - Teil 13: Bestimmung der Dichte

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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European foreword

This document (prEN 13631-13:2021) 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 13631-13:2003.

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 A, *Range of applicability of the test method*, has been removed;

e) 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 methods for determining the density of boosters and explosives, including black powder.

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 and the following apply.

3.1
free-flowing explosive
solid, liquid or pasty material in such a form that it is readily transferred from one container to another by pouring to give one continuous, homogenous mass

4 Principle

The density is determined by measuring the mass of a given volume of the explosive and calculating the quotient.

Density is one of the parameters used to characterize an explosive.

5 Apparatus

5.1 Tank, containing a suitable inert and non-dissolving liquid such as water or paraffin oil in which the cartridge can be immersed.

5.2 Thermometer, capable of measuring the temperature of the liquid to an accuracy of ± 1 °C.

5.3 Balance, capable of weighing to an accuracy of ± 0,5 g. For cartridged explosives, the balance is equipped with a density determination kit where a hook shall be provided to be able to suspend the cartridge underneath the surface of the liquid.

5.4 Graduated measuring cylinder, of capacity 250 ml (or greater) capable of measuring to an accuracy of ± 1 ml.

5.5 Liquid for density determination of cartridged explosives, water, and only in case of a casing which dissolves or takes up water, oil.

6 Procedure

6.1 General

The test method is applied at ambient laboratory conditions. The explosive and equipment shall have the same temperature as present in the laboratory. Record the ambient temperature using the thermometer (5.2).

6.2 Apparent density

6.2.1 Cartridged explosives

Measure the temperature of the liquid (5.5) and determine its density ρ_L. in accordance with 6.3.2.

Weigh the cartridge in air (mass m_1). Attach the cartridge to the hook and submerge it in the liquid, without touching the bottom or sides of the tank, and reweigh (mass m_2).

6.2.2 Free-flowing explosives

Place an empty measuring cylinder on the balance and record its mass (m_3). Introduce an amount of 200 ml of the explosive substance, tamp lightly (for solid explosives), record the volume of the product in the cylinder (V_1), reweigh the cylinder and contents (m_4).

6.2.3 Non-free-flowing explosives

The apparent density of non-free-flowing explosives shall be taken as the true density, determined in accordance with 6.3.1.

6.3 Explosive density

6.3.1 Cartridged and non-free-flowing explosives

Place a measuring cylinder with approximately 100 ml of a suitable inert and non-dissolving liquid on the balance, record the volume (V_2) and the mass (m_5). In case the explosive is wrapped or cartridged, remove the explosive from the wrapping. Introduce a minimum of 50 g of the explosive substance, ensure it is completely immersed, and record the volume of the explosive with liquid (V_3). Reweigh the cylinder and contents (m_6).

6.3.2 Free-flowing explosives

The true density of free-flowing explosives shall be taken as the apparent density, determined in accordance with 6.2.2.

7 Expression of results

7.1 Cartridged explosives - Apparent density

Calculate the apparent density of the explosive using the following equation:

$$\rho = \frac{m_1}{(m_1 - m_2)} \times \rho_L$$

where

ρ is the apparent density of the explosive, expressed in grams per millilitre (g/ml);

m_1 is the mass of the cartridge measured in air, expressed in grams (g);

m_2 is the mass of the cartridge measured while immersed in liquid, expressed in grams (g);

ρ_L is the density of the liquid used at the measured temperature, expressed in grams per millilitre (g/ml).

7.2 Free-flowing explosives - Apparent density

Calculate the apparent density of the explosive using the following equation:

$$\rho = \frac{m_4 - m_3}{V_1}$$

where

ρ is the apparent density of the explosive, expressed in grams per millilitre (g/ml);

m_3 is the mass of the empty cylinder, expressed in grams (g);

m_4 is the mass of the cylinder and the explosive, expressed in grams (g);

V is the volume of the explosive, expressed in millilitre (ml).

7.3 Cartridged and non-free-flowing explosives - Explosive density

Calculate the density of the explosive using the following equation:

$$\rho = \frac{m_6 - m_5}{(V_3 - V_2)}$$

where

ρ is the density of the explosive, expressed in grams per millilitre (g/ml);

m_5 is the mass of the cylinder with the liquid, expressed in grams (g);

m_6 is the mass of the cylinder with the liquid and the explosive, expressed in grams (g);

V_2 is the volume of the liquid, expressed in millilitre (ml);

V_3 is the volume of the liquid with the explosive, expressed in millilitre (ml).

8 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) the temperature during testing;

c) the liquid used (if applicable);

d) the temperature of the liquid (if applicable);

e) the apparent density;

f) the explosive density.

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
II.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.