BRITISH STANDARD

BS EN
13631-13:2003

Explosives for civil uses — High explosives —

Part 13: Determination of density

The European Standard EN 13631-13:2003 has the status of a British Standard

ICS 71.100.30

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 13631-13:2003.

The UK participation in its preparation was entrusted to Technical Committee CII/61, Explosives for civil uses, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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This British Standard, was published under the authority of the Standards Policy and Strategy Committee on 31 July 2003

Summary of pages

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

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

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

This European Standard was approved by CEN on 17 January 2003.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Contents

Foreword

This document EN 13631-13:2003 has been prepared by Technical Committee CEN/TC 321 "Explosives for civil uses", the secretariat of which is held by AENOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2003, and conflicting national standards shall be withdrawn at the latest by October 2003.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

Annex A is informative.

This European Standard is one of a series of standards on *Explosives for civil uses – High explosives.* The other parts of this series are:

prEN 13631-1	Part 1: Requirements
EN 13631-2	Part 2: Determination of thermal stability of explosives
prEN 13631-3	Part 3: Determination of sensitiveness to friction of explosives
EN 13631-4	Part 4: Determination of sensitiveness to impact of explosives
EN 13631-5	Part 5: Determination of resistance to water
EN 13631-6	Part 6: Determination of resistance to hydrostatic pressure
prEN 13631-7	Part 7: Determination of safety and reliability at extreme temperatures
prEN 13631-10	Part 10: Verification of the means of initiation
prEN 13631-11	Part 11: Determination of transmission of detonation
prEN 13631-12	Part 12: Specifications of boosters with different initiating capability
EN 13631-14	Part 14: Determination of the velocity of detonation
prEN 13631-15	Part 15: Calculation of thermodynamic properties
prEN 13631-16	Part 16: Detection and measurement of toxic gases

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies methods for determining the density of high explosives for civil uses, in cartridged or bulk form.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN ISO/IEC 17025; *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:1999).*

prEN 13857-1:2001; *Explosives for civil uses — Part 1: Terminology.*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in prEN 13857-1:2001 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 Apparatus

4.1 Tank, containing a suitable inert liquid such as water or paraffin oil in which the cartridge can be immersed.

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

4.3 Weighing machine, capable of weighing to an accuracy of 0,5 g. For cartridged explosives, a hook shall be provided for attaching the cartridge underneath.

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

5 Procedure

5.1 Apparent density

5.1.1 Cartridged explosives

Measure the temperature of the liquid and calculate its density.

Weigh the cartridge in air (mass M_1). Attach the cartridge to the hook and suspend it underneath the weighing machine so that the cartridge is fully immersed, without touching the bottom or sides of the tank, and reweigh (mass M_2).

5.1.2 Free-flowing explosives

Place an empty measuring cylinder on the weighing machine and record its mass (M_3). Introduce a minimum of 50 g 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).

5.1.3 Non-free-flowing explosives

The apparent density of non-free-flowing explosives shall be taken as the true density, determined in accordance with **5.2.1.**

5.2 Explosive density

5.2.1 Cartridged and non free-flowing explosives

Place a measuring cylinder with approximately 100 ml of a suitable inert liquid on the weighing machine, 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).

5.2.2 Free-flowing explosives

The true density of free-flowing explosives shall be taken as the apparent density, determined in accordance with **5.1.2.**

6 Expression of results

6.1 Cartridged explosives - Apparent density

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

$$= \frac{M_1}{(M_1 \quad M_2)} \quad _L$$

where

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);

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

6.2 Free-flowing explosives - Apparent density

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

$$= \frac{M_4 \quad M_3}{V_1}$$

where

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_1 is the volume of the explosive, expressed in millilitre (ml).

6.3 Cartridged and non free-flowing explosives - Explosive density

Calculate the density of the explosive using the following equation:

$$= \frac{M_6 \quad M_5}{(V_3 \quad V_2)}$$

where

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).

7 Test report

The test report shall conform to EN ISO/IEC 17025. In addition the following information shall be given :

a) a reference to this standard;

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 A
(informative)

Range of applicability of the test method

Range of applicability of this test method: - 40 °C to + 90 °C.

Annex ZA
(informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

This European standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential safety requirements of EU Directive 93/15/EEC.

WARNING : Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

The clauses of this standard are likely to support requirements I.2 and II.1(a) of Directive 93/15/EEC.

Compliance with this standard provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

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