SLOVENSKI STANDARD
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Pirotehnični izdelki - Ognjemetni izdelki, kategorije 1, 2 in 3 - 5. del: Zahteve za izdelavo in delovanje

Pyrotechnic articles - Fireworks, Categories 1, 2, and 3 - Part 5: Requirements for construction and performance

Pyrotechnische Gegenstände - Feuerwerkskörper, Kategorien 1, 2 und 3 - Teil 5: Anforderungen an Konstruktion und Funktion

Articles pyrotechniques - Artifices de divertissement, Catégories 1, 2, et 3 - Partie 5 : Exigences de construction et de performances

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Pyrotechnic articles - Fireworks, Categories F1, F2, and F3 - Part 5: Requirements for construction and performance

Articles pyrotechniques - Artifices de divertissement, Catégories F1, F2, et F3 - Partie 5 : Exigences de construction et de performances

Pyrotechnische Gegenstände - Feuerwerkskörper, Kategorien F1, F2 und F3 - Teil 5: Anforderungen an Konstruktion und Funktion

This European Standard was approved by CEN on 26 September 2015.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 15947-5:2015) has been prepared by Technical Committee CEN/TC 212 “Pyrotechnic articles”, the secretariat of which is held by NEN.

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of an identical text or by endorsement, at the latest by June 2016, and conflicting national standards shall be withdrawn at the latest by June 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 15947-5:2010.

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.

Directive 2007/23/EC on the placing on the market of pyrotechnic articles is repealed with effect from 1 July 2015 and replaced by Directive 2013/29/EU on the harmonization of the laws of the Member States relating to the making available on the market of pyrotechnic articles. However, by way of derogation from this, point 4 of Annex I to Directive 2007/23/EC was repealed by Directive 2013/29/EU with effect from 4 July 2013 and the new ESR 4 (a), 4 (b) and 4 (c) of Directive 2013/29/EU are already in force and applicable since 4th July 2013.

This European Standard is one of the series of standards as listed below:

— EN 15947-1, *Pyrotechnic articles — Fireworks, Categories F1, F2 and F3 — Part 1: Terminology;*

— EN 15947-2, *Pyrotechnic articles — Fireworks, Categories F1, F2 and F3 — Part 2: Categories and types of firework;*

— EN 15947-3, *Pyrotechnic articles — Fireworks, Categories F1, F2 and F3 — Part 3: Minimum labelling requirements;*

— EN 15947-4, *Pyrotechnic articles — Fireworks, Categories F1, F2 and F3 — Part 4: Test methods;*

— EN 15947-5, *Pyrotechnic articles — Fireworks, Categories F1, F2 and F3 — Part 5: Requirements for construction and performance.*

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies requirements for construction, performance and primary or selection packaging of fireworks. It is applicable to fireworks in categories F1, F2 and F3 according to EN 15947-2:2015.

This European Standard does not apply for articles containing detonative explosives except for black powder or flash composition.

This European Standard does not apply for articles containing pyrotechnic composition that includes any of the following substances:

— arsenic or arsenic compounds;

— hexachlorobenzene;

— mixtures containing a mass fraction of chlorates greater than 80 %;

— mixtures of chlorates with metals;

— mixtures of chlorates with red phosphorus (except when used in Christmas crackers, party poppers or snaps);

— mixtures of chlorates with potassium hexacyanoferrate(II);

— mixtures of chlorates with sulfur (these mixtures are allowed for friction heads only);

— mixtures of chlorates with sulfides;

— lead or lead compounds;

— mercury compounds;

— white phosphorus;

— picrates or picric acid;

— potassium chlorate with a mass fraction of bromates greater than 0,15 %;

— sulfur with an acidity, expressed in mass fraction of sulphuric acid, greater than 0,002 %;

— zirconium with a particle size of less than 40 µm.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15947-1:2015, *Pyrotechnic articles — Fireworks, Categories F1, F2 and F3 — Part 1: Terminology*

EN 15947-2:2015, *Pyrotechnic articles — Fireworks, Categories F1, F2 and F3 — Part 2: Categories and types of firework*

EN 15947-3:2015, *Pyrotechnic articles — Fireworks, Categories F1, F2 and F3 — Part 3: Minimum labelling requirements*

EN 15947-4:2015, *Pyrotechnic articles — Fireworks, Categories F1, F2 and F3 — Part 4: Test Methods*

EN 16265:2015, *Pyrotechnic articles — Other pyrotechnic articles — Ignition devices*

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15947-1:2015 apply.

4 Construction

4.1 Construction materials (type test and batch test)

4.1.1 General requirements

— The body of the firework case shall be made of paper, cardboard or plastics. The base (end closures) or means of fixing shall be made of non-metallic material. Where technically necessary, wood, staples, nails, aluminium coated foil or binding wires may be used. Conformity to this requirement shall be verified by visual examination.

— For articles fitted with a friction head: the primary pack shall be fitted with a striking surface for safety matches. Conformity to this requirement shall be verified by visual examination.

— The striking surface shall be resistant enough to allow ignition of all the articles included within the primary pack when tested in accordance with EN 15947-4:2015, 6.16. The striking surface on the pack shall be covered or the pack shall be sealed, verified by visual examination.

4.1.2 Specific requirements

— For bangers and flash bangers: cardboard wrapped in cord is permitted as construction material.

— For batteries and batteries requiring external support the tubes of mines, Roman candles or shot tubes shall have a maximum angle of 30° to the vertical, when tested in accordance with EN 15947-4:2015, 6.18. For combinations and combinations requiring external support this requirement applies to the tubes of mines, Roman candles and shot tubes.

— For Bengal matches and Bengal sticks: the stick shall be made of wood.

— For Christmas crackers and snaps: the overlapping strips shall be made of cardboard, paper or string.

— For jumping crackers: the firework case shall be made of paper only.

— For mini rockets: the tube containing the propellant charge shall be made of cardboard or, when no report charge is present, plastics.

— For novelty matches: the stick shall be made of cardboard or wood.

— For party poppers: the shape shall not be confused with a gun.

— For rockets: the tube containing the propellant charge shall be made of cardboard, plastics or sheathed aluminium.

— For Roman candles and shot tubes: the case, if any, of the pyrotechnic unit, shall be made of paper, cardboard or plastics.

— For Roman candles: the inside diameter of the tube shall not exceed 30 mm. Conformity to this requirement shall be verified by the method described in EN 15947-4:2015, 6.1.5.

— For shot tubes: the inside diameter of the tube shall not exceed 30 mm (category F2) or 50 mm (category F3). Conformity to these requirements shall be verified by the method described in EN 15947-4:2015, 6.1.5.

— For spinners: the aerofoils, if any, shall be made of cardboard or plastics.

— For throwdowns: the body shall be made of tissue paper or foil.

Conformity to above requirements shall be verified by visual examination, unless stated otherwise.

4.2 Length of handle (type test and batch test)

— For Bengal matches: the uncoated end of a Bengal match (handle) shall have a length of at least 40 % of the total length of the Bengal match with a minimum of 20 mm.

— For Bengal sticks: the uncoated end of a Bengal stick (handle) shall have a minimum length of 75 mm.

— For hand-held fountains: the end of the firework case of a hand-held fountain which is not filled with pyrotechnic composition and which acts as a handle, or the handle, if the handle is a separate component, shall have a minimum length of 40 mm.

— For hand-held sparklers: a category F1 hand-held sparkler shall have a minimum handle length of 75 mm; a category F2 hand-held sparkler shall have a minimum handle length of 75 mm when the total length does not exceed 450 mm and 150 mm when the total length is more than 450 mm.

— For novelty matches: the uncoated end of a novelty match (handle) shall have a minimum length of 20 mm.

Conformity to above requirements shall be verified by the test method described in EN 15947-4:2015, 6.1.1.2.1 or 6.1.1.2.2.

— For Christmas crackers and snaps: the total length of the pull-strip or -string shall be at least 50 mm.

— For party poppers: the length of the pull-string shall be at least 75 mm.

Conformity to above requirements shall be verified by the method described in EN 15947-4:2015, 6.1.4.

4.3 Permitted elements in batteries, batteries requiring external support, combinations and combinations requiring external support (type test and batch test)

The following elements may be used in batteries and batteries requiring external support: bangers and flash bangers, Bengal flames, crackling granules, fountains, ground spinners, mines, rockets (assembled in a launcher), Roman candles, spinners, shot tubes and wheels; the same limits (mass, composition, etc.) as given in Table 1 apply to these elements.

The following elements may be used in combinations and combinations requiring external support: bangers and flash bangers, Bengal flames, fountains, mines, Roman candles, shot tubes, spinners and wheels; the same limits (mass, composition, etc.) as given in Table 1 apply to these elements.

Conformity to above requirements shall be verified by visual examination.

4.4 Dimensions for mini rockets (type test and batch test)

When tested in accordance with EN 15947-4:2015, 6.1.5 and 6.1.3, mini rockets shall have the following dimensions:

— outer diameter of tube: maximum 10 mm;

— length of tube: maximum 60 mm;

— total length: minimum 250 mm, maximum 350 mm.

4.5 Specific requirements for compound firework (type and batch test)

Only CE marked articles from categories F1, F2, F3 or P1 (pyrotechnic cords and fuses only, as specified in EN 16265:2015) shall be used in compound fireworks.

There shall be no constructional changes of the individually CE marked articles within the compound firework. The connection between the fireworks articles shall be done by the manufacturer only.

The category of a compound firework shall be determined by the highest category amongst the individual fireworks in the compound firework and the NEC limits given in Table 1, whichever is the highest. The requirements for the single fireworks shall comply with the requirements of this standard.

The single fireworks shall be fixed onto a non-metallic base plate to increase stability during functioning. All single fireworks shall remain in their initial position during functioning.

The manufacturer shall provide technical drawings of the compound fireworks and part lists of all incorporated pyrotechnic articles (fireworks category F1, F2, F3 as well as P1). The type and batch tests shall include a check of the documents and outer dimensions. The outer dimensions shall be verified by the method described in EN 15947-4:2015, 6.1.3.

If transmitting fuses are used to connect the individual fireworks articles, only P1 fuses, which do not burn instantaneously, shall be used.

Every single article in a compound firework shall be oriented as individually type tested.

Elements which guarantee the stability of the firework during its functioning as single articles may be omitted if fixing on a base plate is sufficient. Such elements include loose attachment bases, metal fixings (loops)/spikes to be inserted in the ground, foldable bases and packaging with fixing functions.

Compound fireworks shall be supplied in a primary pack.

5 Pyrotechnic composition (type test)

When tested in accordance with EN 15947-4:2015, 6.2.2, the net explosive contents shall comply with Table 1. For report and/or bursting charges with a composition other than black powder, nitrate/metal-based compositions or perchlorate/metal-based compositions the same upper limits as for perchlorate/metal-based compositions apply.

Table 1 — Pyrotechnic composition

Firework types	Cat. F	Net explosive content
aerial wheels	3	Not more than 160 g, shall not contain more than eight pyrotechnic units. A pyrotechnic unit shall have a net explosive content of not more than 20 g. A report charge, if any, shall have a net explosive content of not more than 10,0 g of black powder or 4,0 g of nitrate/metal-based report composition or 2,0 g of perchlorate/metal-based report composition.
bangers	2	Not more than 6,0 g black powder.
	3	Not more than 10,0 g black powder.
batteries, batteries requiring external support, Combinations and Combinations requiring external support	2	A battery, battery requiring external support, combination or combination requiring external support, except a combination and combination requiring external support containing fountains, shall have a net explosive content of not more than 500 g; the net explosive content of a combination and combination requiring external support containing fountains shall have a net explosive content of not more than 600 g, of which not more than 500 g shall be contained in elements other than fountains; the net explosive content of a battery and a battery requiring external support containing fountains shall have a net explosive content of not more than 600 g. Bangers used in batteries, batteries requiring external support, combinations or combinations requiring external support shall have a total net explosive content of not more than 100 g. Flash bangers used in batteries, batteries requiring external support, combinations or combinations requiring external support shall have a total net explosive content of not more than 25 g.
	3	A battery, battery requiring external support, combination or combination requiring external support, except a combination and combination requiring external support containing fountains, shall have a net explosive content of not more than 1 000 g; a combination and a combination requiring external support containing fountains shall have a net explosive content of not more than 3 000 g, of which not more than 1 000 g shall be contained in elements other than fountains; a battery and a battery requiring external support containing fountains shall have a net explosive content of not more than 3 000 g. Bangers used in batteries, batteries requiring external support, combinations or combinations requiring external support shall have a total net explosive content of not more than 1 000 g. Flash bangers used in batteries, batteries requiring external support, combinations or combinations requiring external support shall have a total net explosive content of not more than 250 g.
Bengal flames	1	Not more than 20 g.
	2	Not more than 250 g.
	3	Not more than 1 000 g.
Bengal matches	1	Not more than 3,0 g.
Bengal sticks	1	Not more than 7,5 g.
	2	Not more than 50 g.
Christmas crackers	1	Not more than 16,0 mg report composition based on potassium chlorate and red phosphorous, or not more than 1,6 mg silver fulminate as report composition.
Compound fireworks	2	Not more than 2 000 g; the respective NEC limits of the included fireworks types apply independently.

Firework types	Cat. F	Net explosive content
	3	Not more than 4 000 g; the respective NEC limits of the included fireworks types apply independently.
crackling granules	1	Not more than 3,0 g.
	2	Not more than 15 g.
double banger	2	Not more than 10,0 g black powder.
flash bangers	2	Not more than 1,0 g for nitrate/metal-based report composition or not more than 0,5 g for perchlorate/metal-based report composition.
	3	Not more than 10,0 g for nitrate/metal-based report composition or not more than 5,0 g for perchlorate/metal-based report composition.
flash pellet	1	Not more than 2,0 g.
	2	Not more than 30 g.
fountains	1	Not more than 7,5 g (for indoor use: pyrotechnic composition that is based on nitrocellulose with a mass fraction of not more than 12,6 % of nitrogen, with no additional oxidizing substances).
	2	Not more than 250 g, each whistle unit, if any, not more than 5,0 g.
	3	Not more than 1 000 g, each whistle unit, if any, not more than 20 g.
ground movers	2	Not more than 25 g, each pyrotechnic unit not more than 3,0 g, no report charge allowed.
ground spinners	1	Not more than 5,0 g.
	2	Not more than 25 g and each pyrotechnic unit not more than 8,0 g.
jumping crackers	2	Not more than 10,0 g black powder.
jumping ground spinners	2	Not more than 25 g, each pyrotechnic unit not more than 5,0 g.
mines	2	Not more than 50 g; shall not contain more than five pyrotechnic units containing report composition and each of these pyrotechnic units shall not contain more than 5,0 g of black powder or 2,0 g of nitrate/metal-based report composition or 1,0 g of perchlorate/metal-based report composition. For mines with non-pyrotechnic objects not more than 8,0 g nitrocellulose, with a mass fraction of nitrogen of not more than 12,6 %.
	3	Not more than 200 g; shall not contain more than 25 pyrotechnic units containing report composition and each of these pyrotechnic units shall not contain more than 5,0 g of black powder or 2,0 g of nitrate/metal-based report composition or 1,0 g of perchlorate/metal-based report composition.
mini rocket	2	Not more than 1,5 g, not more than 0,13 g report composition.
novelty matches	1	Not more than 50,0 mg; shall only contain one report charge, if any; the report charge shall have a mean net explosive content of not more than 2,5 mg silver fulminate.
party poppers	1	Not more than 16,0 mg of pyrotechnic composition that is based on potassium chlorate and red phosphorous.
rockets	2	Not more than 75 g; report and/or bursting charge, if any, shall be not more than 10,0 g of black powder or 4,0 g of nitrate/metal-based composition or 2,0 g of perchlorate/metal-based composition.
	3	Not more than 200 g; report and/or bursting charge, if any, shall be not more than 50 g of black powder or 20,0 g of nitrate/metal-based composition or 10,0 g of perchlorate/metal-based composition.