



SLOVENSKI STANDARD

SIST EN 15947-5:2022

01-december-2022

Nadomešča:
SIST EN 15947-5:2016

Pirotehnični izdelki - Ognjemetni izdelki, kategorije F1, F2 in F3 - 5. del: Zahteve za izdelavo in delovanje

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

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

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

Ta slovenski standard je istoveten z: EN 15947-5:2022

ICS:

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

SIST EN 15947-5:2022

en,fr,de

EUROPEAN STANDARD

EN 15947-5

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2022

ICS 71.100.30

Supersedes EN 15947-5:2015

English Version

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 8 August 2022.

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.

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, Türkiye and United Kingdom.

<https://standards.iteh.ai/catalog/standards/sist/06046a08-c30c-401c-a06f-6dc62ad8d282/sist-en-15947-5-2022>



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	4
1 Scope	6
2 Normative references	7
3 Terms and definitions	7
4 Construction	7
4.1 Construction materials (type test and batch test)	7
4.1.1 General requirements	7
4.1.2 Specific requirements	7
4.2 Length of handle and pull string (type test and batch test)	8
4.3 Permitted elements in battery, battery requiring external support, combination and combination requiring external support (type test and batch test)	9
4.4 Dimensions for mini rocket (type test and batch test)	9
4.5 Specific requirements for compound firework (type test and batch test)	10
4.6 Specific requirements for fireworks which eject pyrotechnic units with end closures (type test)	10
5 Pyrotechnic composition (type test)	10
6 Means of initiation	14
6.1 Permitted means of initiation (type test and batch test)	14
6.2 Protection of means of initiation (type test and batch test)	16
6.3 Attachment of means of initiation and resistance to ignition by an abrasive surface (type test and batch test)	16
6.4 Requirements for means of initiation (type test and batch test)	16
6.4.1 General requirements	16
6.4.2 Specific requirements	17
7 Performance	17
7.1 Properties to be checked before functioning tests	17
7.1.1 Loose pyrotechnic composition after mechanical conditioning (type test)	17
7.1.2 Integrity (type test and batch test)	17
7.1.3 Stabilization of flight (type test and batch test)	18
7.1.4 Other requirements (type test)	18
7.2 Properties to be checked during functioning tests (type test and batch test)	18
7.2.1 Principal effects	18
7.2.2 Functioning	18
7.2.3 Angle of ascent or flight	18
7.2.4 Motion	19
7.2.5 Stability during functioning	19
7.2.6 Height of explosion	20
7.2.7 Sound pressure level	20
7.2.8 Explosions and other failures	20
7.2.9 Burning or incandescent matter	21
7.2.10 Extinguishing of flames	21
7.2.11 Debris and projected debris	23
7.2.12 Burning rate of composition	23
7.2.13 Pull-string or strip	24

7.3	Properties to be checked after functioning tests (type test and batch test)	24
7.3.1	Droop	24
7.3.2	Plastics body	24
7.3.3	Tube containing the propellant charge for rocket and report rocket.....	24
8	Primary pack or selection pack (type test and batch test).....	24
9	Type testing	24
9.1	General	24
9.2	Specific requirements for primary packs to be examined.....	26
10	Batch testing.....	26
10.1	General	26
10.2	Sampling plans.....	26
10.3	Unit of product.....	26
10.4	Nonconformities	27
10.5	Acceptance or rejection of a batch	29
10.5.1	Nonconforming units.....	29
10.5.2	Critical nonconforming units	29
10.5.3	Major nonconforming units	29
10.5.4	Minor nonconforming units.....	29
10.5.5	Fireworks supplied in primary packs or selection packs.....	29
Annex ZA	(informative) Relationship between this European Standard and the essential safety requirements of Directive 2013/29/EU aimed to be covered	30

(standards.iteh.ai)

SIST EN 15947-5:2022

<https://standards.iteh.ai/catalog/standards/sist/06046a08-c30c-401c-a06f-6dc62ad8d282/sist-en-15947-5-2022>

EN 15947-5:2022 (E)**European foreword**

This document (EN 15947-5:2022) 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 April 2023, and conflicting national standards shall be withdrawn at the latest by December 2023.

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

This document supersedes EN 15947-5:2015.

In comparison with the previous edition EN 15947-5:2015, the following essential technical modifications have been made:

- new fireworks types “report rocket” in F3 and “senko-hanabi” in F1 added with corresponding requirements;
- requirements for hand-held Bengal flame and Banger with preliminary effect have been added;
- procedure to check the labelling during type testing has been revised;
- measuring of sound pressure level during batch testing is not required, if the measured values during type testing were less than 90 dB (AI) at the respective safety distance;
- for fireworks with whistle elements no plastic tubes shall be ejected from the article during functioning;
- deletion of the requirements regarding “Integrity after function” (earlier 7.3.4);
- type testing was revised;
- requirements on elements in battery, battery requiring external support, combination and combination requiring external support has been revised;
- requirement for end closures breakability has been added;
- the requirement to use a non-metallic base plate to fix the individual fireworks for a compound firework has been removed;
- requirement removed for mounted wheels in category F3 (ex 6.4.2).

This document has been prepared under a Standardization Request (M/583) concerning pyrotechnic articles given to CEN by the European Commission and the European Free Trade Association, and supports Essential Safety requirements of Directive 2013/29/EU.

For relationship with Directive 2013/29/EU, see informative Annex ZA, which is an integral part of this document.

This document 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*

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: 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, Türkiye and the United Kingdom.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 15947-5:2022](https://standards.iteh.ai/catalog/standards/sist/06046a08-c30c-401c-a06f-6dc62ad8d282/sist-en-15947-5-2022)

<https://standards.iteh.ai/catalog/standards/sist/06046a08-c30c-401c-a06f-6dc62ad8d282/sist-en-15947-5-2022>

EN 15947-5:2022 (E)**1 Scope**

This document specifies requirements for construction and performance of firework and primary packs and selection packs. It is applicable to firework of the categories F1, F2 and F3 as defined by Article 6 Paragraph (1) clause (a) subclause (i) to (iii) of Directive 2013/29/EU.

This document is not applicable for fireworks containing detonative explosives other than black powder or flash composition or pyrotechnic composition that includes any of the following substances:

- arsenic or arsenic compounds;
- hexachlorobenzene;
- lead or lead compounds;
- 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 sulphur (these mixtures are allowed for friction heads only);
- mixtures of chlorates with sulphides;
- mercury compounds;
- nitrocellulose with a mass fraction of nitrogen of more than 12,6 %;
- picrates or picric acid;
- potassium chlorate with a mass fraction of bromates greater than 0,15 %;
- sulphur with an acidity, expressed in mass fraction of sulphuric acid, greater than 0,002 %;
- white phosphorus;
- zirconium with a particle size of less than 40 µm.

This document does not apply to fireworks intended to be kept or used at temperatures below -20 °C or above 50 °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.

EN 15947-1:2022, *Pyrotechnic articles — Fireworks, Categories F1, F2 and F3 — Part 1: Terminology*

EN 15947-2:2022, *Pyrotechnic articles — Fireworks, Categories F1, F2 and F3 — Part 2: Categories and types of firework*

EN 15947-3:2022, *Pyrotechnic articles — Fireworks, Categories F1, F2 and F3 — Part 3: Minimum labelling requirements*

EN 15947-4:2022, *Pyrotechnic articles — Fireworks, Categories F1, F2 and F3 — Part 4: Test methods*

ISO 2859-1:1999,¹ *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 15947-1:2022 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp/ui>

4 Construction

4.1 Construction materials (type test and batch test)

4.1.1 General requirements

Conformity to the following requirements shall be verified by visual examination according with EN 15947-4:2022, 6.13, except the last sentence of the second hyphen.

- The body of the firework case, except rocket motors containing only propellant charge, shall be made of paper, cardboard or plastic. The base (end closures) shall be made of non-metallic material. For fixing purposes, wood, staples, nails, aluminium coated foil or binding wires may be used.
- For articles fitted with a friction head: the primary pack shall be fitted with a striking surface. The striking surface on the primary pack shall be covered or the primary pack shall be sealed. The striking surface shall be resistant enough to allow ignition of all the fireworks included within the primary pack when tested in accordance with EN 15947-4:2022, 6.16.
- Any part of a firework that acts as handle shall not contain any pyrotechnic composition.

4.1.2 Specific requirements

Conformity to the following requirements shall be verified by visual examination according with EN 15947-4:2022, 6.13.

¹ As impacted by ISO 2859-1:1999/Cor.1:2001 and ISO 2859-1:1999/Amd.1:2011.

EN 15947-5:2022 (E)

- For banger and flash banger: additionally to 4.1.1 cardboard wrapped in string is permitted as construction material.
- For Bengal match and Bengal stick: the stick shall be made of wood.
- For Christmas cracker and snap: the overlapping strips shall be made of cardboard, paper or string.
- For hand-held sparkler and non-hand-held sparkler: a metal stick is permitted as construction material.
- For jumping cracker: the firework case shall be made of paper only.
- For mini rocket: the tube containing the propellant charge and the effect charge shall be made of cardboard or, when no report charge is present, plastic.
- For novelty match: the stick shall be made of cardboard or wood.
- For party popper: the shape shall not resemble a gun.
- For rocket and report rocket: the tube containing the propellant charge shall be made of cardboard, plastic or sheathed aluminium.
- For Roman candle and shot tube: the case, if any, of the pyrotechnic unit, shall be made of paper, cardboard or plastics.
- For senko-hanabi: natural straw is permitted as construction material.
- For spinner: the aerofoils, if any, shall be made of cardboard or plastics.
- For throwdown: the body shall be made of tissue paper or foil.

Conformity to the following requirement shall be verified by determination of diameter according to EN 15947-4:2022, 6.1.5:

- For Roman candle: the inside diameter of the tube shall not exceed 30 mm.
- For shot tube: the inside diameter of the tube shall not exceed 30 mm (category F2) or 50 mm (category F3).

Conformity to the following requirement shall be verified by determination of tube angle according to EN 15947-4:2022, 6.18:

- For battery, battery requiring external support, combination and combination requiring external support: the angle of tubes of mines, Roman candles or shot tubes shall not exceed 30° to the vertical.

Conformity to the following requirement shall be verified by conformity to drawings and part lists according to EN 15947-4:2022, 6.2.2 and visual examination according to EN 15947-4:2022, 6.13:

- For battery, battery requiring external support, combination and combination requiring external support: Any technical appliances as an integral part of the firework allowing ignition transmission to other fireworks are not allowed. Reserve fuse is not considered a technical appliance.

4.2 Length of handle and pull string (type test and batch test)

Conformity to the following requirements shall be verified by the test method described in EN 15947-4:2022, 6.1.1.

- For Bengal match: the uncoated end of a Bengal match which acts as the 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 stick: the uncoated end of a Bengal stick which acts as the handle shall have a minimum length of 75 mm.
- For hand-held fountain and hand-held Bengal flame: the end of the firework case which acts as a handle, or if it is a separate component, shall have a minimum length of 40 mm. If the handle is an integral part of the body, the handle section shall be marked in a contrasting colour.
- For hand-held sparkler: 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 match: the uncoated end of a novelty match which acts as the handle shall have a minimum length of 20 mm.
- For senko-hanabi: the handle shall have a minimum length of 80 mm.

Conformity to the following requirements shall be verified by the method described in EN 15947-4:2022, 6.1.4.

- For Christmas cracker and snap: the total length of the pull-strip or -string shall be at least 50 mm.
- For party popper: the length of the pull-string shall be at least 75 mm.

4.3 Permitted elements in battery, battery requiring external support, combination and combination requiring external support (type test and batch test)

Conformity to the following requirements shall be verified by the individual applicable test method described in EN 15947-4:2022, Clause 6.

Elements in a category F2 battery, battery requiring external support, combination and combination requiring external support shall be of category F1 or F2. Elements in a category F3 battery, battery requiring external support, combination and combination requiring external support shall be of category F1, F2 or F3.

Elements in a battery, battery requiring external support, combination and combination requiring external support shall comply with the requirements of 4.1, 4.2, 4.4, 4.6 and Clause 5 applicable to the type and the category of the elements.

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

When tested in accordance with EN 15947-4:2022, 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.

EN 15947-5:2022 (E)**4.5 Specific requirements for compound firework (type test and batch test)**

Compound firework may only consist of the following pyrotechnic articles:

- fireworks of categories F1, F2 and F3 for which an EU-type examination certificate (Module B) has been issued and
- pyrotechnic cords and fuses of category P1 only, which were CE marked.

NOTE 1 Usually pyrotechnic cords and fuses cannot be labelled on account of the nature and size of the pyrotechnic article.

Elements which are designed to ensure the stability of the firework during its functioning as single articles may be omitted, when the firework is fixed on a base plate.

NOTE 2 Such elements can include for example loose attachment bases, metal fixings (loops)/spikes to be inserted in the ground, foldable bases and packaging with fixing functions.

The category of a compound firework shall be determined by the highest category amongst the individual fireworks in the compound firework or the category according to the net explosive content (NEC) limits for compound firework given in Table 1, whichever is the highest.

A base plate is required for compound fireworks. When tested in accordance with EN 15947-4:2022, 6.13 all fireworks which are required to remain upright during functioning according to 7.2.5 shall remain fixed to the base plate during functioning of the compound firework.

When tested in accordance with EN 15947-4:2022, 6.13, every single article in a compound firework shall be oriented as individually type tested.

When tested in accordance with EN 15947-4:2022, 6.13, compound fireworks shall be supplied in a primary pack.

When tested in accordance with EN 15947-4:2022, 6.13, the locations where the initial fuses and/or pyrotechnic cords and fuses are connected with each other within compound fireworks shall be securely covered and not be exposed or directly accessible.

4.6 Specific requirements for fireworks which eject pyrotechnic units with end closures (type test)

End closures of pyrotechnic units having a diameter larger than 20 mm and weighing more than 8,0 g, which are designed to be ejected from a tube or a launcher and to burst in the air, shall be breakable and no fragments shall weigh more than 8,0 g when tested in accordance with EN 15947-4:2022, 6.1.8.

5 Pyrotechnic composition (type test)

When tested in accordance with EN 15947-4:2022, 6.2.2 and 6.2.3, the NECs 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.