



**SLOVENSKI STANDARD**  
**SIST EN 14035-3:2004**  
**01-november-2004**

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Fireworks - Part 3: Aerial wheels - Specification and test methods

Feuerwerkskörper - Teil 3: Steigende Kronen - Anforderungen und Prüfverfahren

Artifices de divertissement - Partie 3: Soucoupes volantes - Spécifications et méthodes d'essai

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**Ta slovenski standard je istoveten z: EN 14035-3:2004**

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English version

## Fireworks - Part 3: Aerial wheels - Specification and test methods

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Spécifications et méthodes d'essai

Feuerwerkskörper - Teil 3: Steigende Kronen -  
Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 14 June 2004.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

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

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## Foreword

This document (EN 14035-3:2004) has been prepared by Technical Committee CEN/TC 212 "Fireworks", 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of an identical text or by endorsement, at the latest by February 2005, and conflicting national standards shall be withdrawn at the latest by February 2005.

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

This European Standard is one of a series of standards as listed below.

EN 14035-1, *Fireworks - Part 1: Terminology.*

EN 14035-2, *Fireworks - Part 2: Categorisation.*

EN 14035-3, *Fireworks - Part 3: Aerial wheels - Specification and test methods.*

EN 14035-4, *Fireworks - Part 4: Bangers and banger batteries - Specification and test methods.*

prEN 14035-5, *Fireworks - Part 5: Batteries and combinations - Specification and test methods.*

EN 14035-6, *Fireworks - Part 6: Bengal flames - Specification and test methods.*

EN 14035-7, *Fireworks - Part 7: Bengal matches - Specification and test methods.*

EN 14035-8, *Fireworks - Part 8: Bengal sticks - Specification and test methods.*

EN 14035-9, *Fireworks - Part 9: Crackling granules - Specification and test methods.*

EN 14035-10, *Fireworks - Part 10: Double bangers - Specification and test methods.*

EN 14035-12, *Fireworks - Part 12: Flash bangers and flash banger batteries - Specification and test methods.*

EN 14035-13, *Fireworks - Part 13: Flash pellets - Specification and test methods.*

EN 14035-15, *Fireworks - Part 15: Fountains - Specification and test methods.*

EN 14035-17, *Fireworks - Part 17: Ground spinners - Specification and test methods.*

prEN 14035-18, *Fireworks - Part 18: Hand-held fountains - Specification and test methods.*

EN 14035-19, *Fireworks - Part 19: Hand-held sparklers - Specification and test methods.*

prEN 14035-20, *Fireworks - Part 20: Jumping crackers - Specification and test methods.*

prEN 14035-21, *Fireworks - Part 21: Jumping ground spinners - Specification and test methods.*

EN 14035-22, *Fireworks - Part 22: Mines - Specification and test methods.*

EN 14035-23, *Fireworks - Part 23: Non-hand-held sparklers - Specification and test methods.*

EN 14035-24, *Fireworks - Part 24: Novelty matches - Specification and test methods.*

prEN 14035-25, *Fireworks - Part 25: Party poppers - Specification and test methods.*

EN 14035-27, *Fireworks - Part 27: Rockets - Specification and test methods.*

EN 14035-28, *Fireworks - Part 28: Roman candles - Specification and test methods.*

EN 14035-29, *Fireworks - Part 29: Serpents - Specification and test methods.*

prEN 14035-31, *Fireworks - Part 31: Shell-in-mortars - Specification and test methods.*

prEN 14035-32, *Fireworks - Part 32: Snaps - Specification and test methods.*

prEN 14035-33, *Fireworks - Part 33: Spinners - Specification and test methods.*

EN 14035-34, *Fireworks - Part 34: Table bombs - Specification and test methods.*

prEN 14035-35, *Fireworks - Part 35: Throwdowns - Specification and test methods.*

EN 14035-36, *Fireworks - Part 36: Wheels - Specification and test methods.*

prEN 14035-37, *Fireworks - Part 37: Whistlers - Specification and test methods.*

prEN 14035-38, *Fireworks - Part 38: Shot tubes - Specification and test methods.*

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## 1 Scope

This document specifies requirements for the construction, performance, primary packaging and labelling of aerial wheels and the corresponding test methods. It is applicable to fireworks which are classified as aerial wheels in category 3 in EN 14035-2 and which are supplied together with a launching device.

It is not applicable to aerial wheels containing pyrotechnic composition that includes any of the following substances:

- arsenic or arsenic compounds;
- mixtures containing a mass fraction of chlorates greater than 80 %;
- mixtures of chlorates with metals;
- mixtures of chlorates with red phosphorus;
- mixtures of chlorates with potassium hexacyanoferrate(II);
- mixtures of chlorates with sulfur;
- 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  $\mu\text{m}$ .

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NOTE In EN 14035-2, aerial wheels are classified as follows:

- brief description: tubes containing propellant charges, sparks, flame and/or noise producing pyrotechnic compositions, the tubes being fixed to a support ring;
- principal effects: rotation and ascent, with emission of sparks and flames, producing a visual and/or aural effect in the air.

Schemes for type testing of aerial wheels and batch testing of aerial wheels are specified in annex A and annex B respectively.



## 2 Normative references

The following referenced documents are indispensable for the application 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 14035-1:2003, *Fireworks — Part 1: Terminology*.

EN 14035-2, *Fireworks — Part 2: Categorisation*.

EN 61672-1, *Electroacoustics - Sound level meters - Part 1: Specifications (IEC 61672-1:2002)*

EN 61672-2, *Electroacoustics - Sound level meters - Part 2: Pattern evaluation tests (IEC 61672-2:2003)*

EN ISO 845, *Cellular plastics and rubbers — Determination of apparent (bulk) density (ISO 845:1988)*.

EN ISO 868, *Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:2003)*.

EN ISO 2439, *Flexible cellular polymeric materials - Determination of hardness (indentation technique) (ISO 2439:1997, including Technical Corrigendum 1:1998)*.

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

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## 3 Terms and definitions

SIST EN 14035-3:2004

For the purposes of this document, the terms and definitions given in EN 14035-1:2003 apply.

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## 4 Construction

### 4.1 Means of ignition

The means of ignition shall be identified by a protruding fuse.

Conformity to this requirement shall be verified by visual examination.

### 4.2 Attachment of protruding fuse

The attachment of the protruding fuse to the aerial wheel shall be secure when tested in accordance with 8.1.

### 4.3 Protection of initial fuse

#### 4.3.1 General

The initial fuse shall be protected in one of the ways specified in 4.3.2, 4.3.3 or 4.3.4.

#### 4.3.2 Initial fuse protected by fuse cover

An orange fuse cover shall be in place over the initial fuse.

Conformity to this requirement shall be verified by visual examination.

### 4.3.3 Initial fuse protected by primary pack or selection pack

The aerial wheel shall be contained in a primary pack or selection pack complying with clause 6.

Conformity to this requirement shall be verified by visual examination.

### 4.3.4 Protruding fuse designed to resist side ignition

When tested in accordance with 8.4, the protruding fuse shall not ignite.

## 4.4 Materials of firework case

The body of the firework case shall be made of paper, cardboard or plastics. The other components in the assembly, excluding staples, launching device and means of attaching to the support, shall be made of paper, cardboard, wood or plastics.

Conformity to these requirements shall be verified by visual examination.

## 4.5 Integrity

There shall be no holes, splits, dents or bulges in the body of the firework case, except those technically necessary for the correct functioning of the aerial wheel. There shall be no holes or splits in the end closures. If the end closures are separate components, they shall be securely in place.

Conformity to these requirements shall be verified by visual examination.

## 4.6 Net explosive content

When determined in accordance with 8.3, an aerial wheel shall have a net explosive content of not more than 160,0 g and shall not contain more than 8 pyrotechnic units.

A pyrotechnic unit shall have a net explosive content of not more than 20,0 g.

No report charge, if any, shall have a net explosive content of not more than 10,0 g of black powder or 10,0 g of nitrate/metal-based report composition or 5,0 g of perchlorate/metal-based report composition.

# 5 Performance

## 5.1 Initial fuse

When tested in accordance with 8.2, the protruding fuse of an aerial wheel shall ignite within 10 s and the ignition shall be visible.

The duration of the initial fuse burning shall be 5,0 s to 13,0 s, when tested in accordance with 8.2.

## 5.2 Principal effects

When tested in accordance with 8.2, the principal effects of the aerial wheel, as given in EN 14035-2, shall be rotation and ascent, with emission of sparks and flames, producing a visual and/or aural effect in the air.

## 5.3 Functioning

When tested in accordance with 8.2, all pyrotechnic units of the aerial wheel shall function completely.

## 5.4 Height of explosions

When tested in accordance with 8.2, no explosion shall occur below a height of 20 m.

## 5.5 Stabilization of flight

When tested in accordance with 8.2, the means for stabilization of flight shall not become detached before the principal effects, other than ascent, occur.

## 5.6 Sound pressure level

When tested in accordance with 8.2, an aerial wheel shall produce a maximum A-weighted impulse sound pressure level ( $L_{AImax}$ ) of not higher than 120 dB (AI), at a horizontal distance of 15,0 m from the testing point and a height of 1,0 m above the ground.

## 5.7 Burning matter

When tested in accordance with 8.2, any burning or incandescent matter resulting from any effect produced by the aerial wheel, other than effects concomitant with ascent, shall be extinguished at least 10 m above ground.

## 5.8 Angle of ascent

When tested in accordance with 8.2, the angle of ascent of the aerial wheel shall not exceed 15°.

## 5.9 Projected debris

When tested in accordance with 8.2, no debris from an aerial wheel, other than debris resulting from effects concomitant with ignition and ascent, shall be projected laterally more than 15,0 m from the testing point.

## 5.10 Mass of debris

When tested in accordance with 8.2, any particle of debris from an aerial wheel shall not exceed a mass of 150,0 g.

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## 6 Primary pack or selection pack

If a primary pack or selection pack is required to protect the initial fuse(s) of the aerial wheel(s) (see 4.3.3), the pack shall completely enclose the aerial wheel(s). There shall be no holes or splits in the pack, except those which are intended to enable the pack to be opened and those which are otherwise technically necessary.

Conformity to these requirements shall be verified by visual examination.

## 7 Minimum labelling requirements

### 7.1 General

Aerial wheels and their primary packs, if any, shall be marked with the information specified in 7.2 to 7.5 and 7.7.

The specified information shall be given in the language(s) of the country in which the aerial wheels or primary packs are offered for retail sale. For each language, it shall be presented as a whole and shall not be interrupted by other text. Additional text given in another language shall not conflict with the specified information.

Conformity to the requirements specified in 7.1 to 7.5, 7.6.1 and 7.7 shall be verified by visual examination.

NOTE Examples of typical labels for bangers, for which many of the marking requirements are similar to those specified for aerial wheels in this standard, are given in EN 14035-4.

## 7.2 Type name and category

The type name shall be marked, in upper case, as 'AERIAL WHEEL'. If a trade name is used in addition to the type name, it shall not conflict with the principal effects of an aerial wheel or with the name of another type of firework.

The category shall be marked, in upper case, as 'CATEGORY 3' or 'CAT 3'.

## 7.3 Safety information

### 7.3.1 General

Safety information shall be emphasized by use of a heading, or bold type, or similar. If necessary, instructions in addition to those specified in 7.3.2 to 7.3.3 may be given.

### 7.3.2 Aerial wheels

Labelling shall include at least the following safety information in the order as given:

- 'For outdoor use only';
  - 'Avoid overhead obstructions';
  - 'Place singly on launching device provided the correct way up';
  - 'Remove orange fuse cover<sup>1)</sup>;
  - 'Standing sideways, light fuse at its outermost end and retire immediately';
  - 'Spectators must be at least 25 m away';
  - 'Operator must retire at least 15 m'.
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### 7.3.3 Identification of top side

The top side of the aerial wheels shall be marked with

- 'This side up'.

## 7.4 Name, address and telephone number of manufacturer or distributor or importer

Labelling shall include:

- the name or trade mark, the address and the telephone number of the manufacturer; or
- an abbreviation or a code allowing the identification of the manufacturer, and the name or trade mark, the address and the telephone number
  - of his authorized distributor; or
  - if the manufacturer is not established in a CEN member country, of the importer in a CEN member country.

The address shall comprise at least the town and the country. On the aerial wheel at least the abbreviations allowing the identification of

- the manufacturer; or
- the distributor or importer, with an additional code or abbreviation for the manufacturer

shall be marked.

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<sup>1)</sup> If applicable.