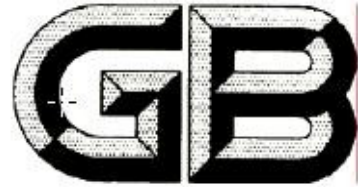


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## National Standards of the People's Republic of China

GB XXXX – 200X

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### Fireworks and Firecrackers Aerial Rockets

(Draft for approval)

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## **Preface**

Appendices A, B and C to this standard are standardised appendices.

This standard was proposed by China National Light Industry Council (CNLIC) and is under the jurisdiction of the National Standardization Technology Committee of Fireworks and Firecrackers.

The organisation in charge of drafting this standard was the National Key Laboratory of Fireworks and Firecrackers (HuNan).

The main drafters of this standard were: TanAiXi, ZhangGuangHui, JiangZiCheng, OuYang, LiuJinBiao, JiangFangMing, XuPeng, XiongHao.

This is the first issue of this national standard.

# **Fireworks and Firecrackers**

## **Aerial Rockets**

### **1 Scope**

This Standard sets the technical terms and definitions, classifications, technical requirements, test methods and regulations, product labelling, packaging, transportation and storage requirements for aerial rockets.

This standard applies to the manufacture, acceptance checks, sales, transportation, storage and launching of aerial rockets.

### **2 Normative References**

The provisions of the following documents become provisions of this standard after being referenced. For dated reference documents, all later amendments (excluding corrigenda) and versions do not apply to this standard; however, the parties to the agreement are encouraged to study whether the latest versions of these documents are applicable. For undated reference documents, the latest versions apply to this standard.

GB 10631–2004      Fireworks and Firecracker Safety and Quality  
GB/T 10632–2004    Fireworks Firecracker Rules of Sampling for Inspection

### **3 Technical terms and definitions**

The following terms and definitions and defined in GB 10631-2004 apply to this standard.

#### **3.1 Rockets**

Rockets assembled with propellant and stabilising devices: the product launches into the sky vertically when set off; once in the sky the rocket releases audible and visual effects.

#### **3.2 Stabilisation equipment**

A stabiliser rod, tail unit and rotor, are implemented to stabilise the direction of the rocket's motion in the sky.

#### **3.3 Projected debris**

Debris pertains to any materials such as stabilisation equipment, scraps of paper and chemical stars that do not detonate that fall from the rockets when set off into the sky.

### **4 Product classifications**

According to the requirements of GB 10631-2004, aerial-rockets are divided into three classifications: A, B, and C.

### **5 Technical requirements**

#### **5.1 Appearance**

**5.1.1** No visible deformation or damage should be found on the external appearance of the products.

**5.1.2** Perforations, splits, leaks or protrusions should not be found on the outer shell of the main body of the product.

**5.1.3** The exterior of the product should appear clean and tidy; no loose pyrotechnic or explosive composition, mould or contaminants should be found.

**5.1.4** The paper displaying the symbol on the outer body of the tube should be pasted smoothly and neatly and should fit perfectly to the product. Writing and images should be clear.

## **5.2 Blasting fuse**

**5.2.1** The surface of the blasting fuse should be dry and clean, unbroken, and without leaks or mould.

**5.2.2** Chlorate blasting fuses may not be used.

### **5.2.3 Durability of the blasting fuse**

The durability of the blasting fuse must conform to the requirements set out in Article 5.4.2 of GB 10631-2004.

### **5.2.4 Fuse protection**

All fuses should pass the side ignition test, with the exception of fuses with inner packing or fuse-cover protection.

### **5.2.5 Main body - ignition timing**

**5.2.5.1** Class C: 3.0s ~ 13.0s.

**5.2.5.2** Class B: 5.0s ~ 15.0s.

These timings do not apply to aerial rockets that are set off by electronic ignition.

## **5.3 Shell materials**

The outer shell of the main body of the rockets (excluding rockets with launch tubes that contain a propellant) should be made of paper, hard cardboard or plastic. Rockets with launch tubes that contain propellants may be made of hard cardboard, plastic or aluminium tubing.

## **5.4 Flight stabilisation equipment**

**5.4.1** Stabilisation equipment products should be:

- fitted with a suitable stabiliser rod;
- assembled with other flight stabilisation components, such as a side unit, tail unit, or bracing loop.

Flight stabilisation equipment should be made of non-metallic materials (with the exception of the nails used to fix the stabilisation rod).

### **5.4.2 Level and resistance of the stabilisation rod**

The maximum bowed level position for the stabilisation rod should not exceed 2.5cm

The maximum bending ratio for the hardness of the stabiliser rod should not exceed 0.25.

### **5.4.3 Durability of the stabilisation equipment**

The stabilisation equipment should not be released from the aerial rocket before the blast.

## **5.5 Launching equipment**

One piece of launching equipment should be provided inside every sales package.

## **5.6 Powder type, powder quantity and safety performance**

Powder types and quantities and safety performance should conform to the safety requirements set out in “Article 5: powder type, powder quantity and safety performance” of GB 10631– 2004.

## **5.7 Launch performance**

### **5.7.1 Launch outcomes**

All outcomes of the launch should conform to the product's design requirements. Fatal defects such as sudden blasts, low explosions and fires must not arise.

### **5.7.2 Launch height**

**5.7.2.1** The launch height of Class C aerial rockets may not be lower than 10m.

**5.7.2.2** The launch height of Class B aerial rockets may not be lower than 30m.

**5.7.2.3** The launch height of Class A aerial rockets may not be lower than 50m.

### **5.7.3 Projected Debris**

Debris resulting from the product launch must not be solid debris.

- For Class C aerial fireworks, projected debris should not drop further than 8.0m away from the ignition area and the weight of the debris should not exceed 100g.

- For Class B aerial fireworks, the weight of debris released over 15.0m away from the ignition area should not exceed 150.0g.

### **5.7.4 Launch deflection angle**

**5.7.4.1** The deflection angle for Class C aerial rockets should not exceed 22.5°; the distance between the ground and the blast should be less than 10m

**5.7.4.2** The deflection angle for Class B aerial rockets should not exceed 22.5°; the distance between the ground and the blast should be less than 30m.

**5.7.4.3** The deflection angle for Class A aerial rockets should not exceed 22.5°; the distance between the ground and the blast should be less than 50m.

## **6 Test methods**

### **6.1 External appearance**

Loose powder test for surfaces: collect loose powder from the product surface and use precision 0.001g scales to measure the amount of powder. A visual estimation should be completed for other tests.

### **6.2 Blasting fuse**

#### **6.2.1 Stability test**

This test procedure should be carried out in accordance with Article 6.3 of GB 10631 – 2004.

#### **6.2.2 Fuse side ignition test**

See Appendix A.

#### **6.2.3 Ignition timing test for the blasting fuse**

Using two different stopwatches, both with a precision of not less than 0.1s, test the timing of the fuse. The average value of the two readings should be taken using a rounding off method, to a precision of 0.1s. If the difference between the readings produced by the two watches does not exceed 0.5s, then the test result is valid.

### **6.3 Outer shell material test**

Visual estimation

### **6.4 Level and resistance test for the stabilisation rod**

See Appendix B.

### **6.5 Launch equipment test**

Visual estimation

## **6.6 Powder type, powder quantity, and safety performance tests**

Test procedures should conform to the rules and regulations stipulated in Article 6.4 of GB 10631-2004.

## **6.7 Launch performance test**

Weigh the debris using a 0.1g precision scale.

Other tests should conform to the procedures and regulations set out in Article 6.5 of GB 10631-2004.

## **7 Test regulations**

### **7.1 Batches**

Products of the same variety and specification, manufactured with the same original materials, produced using the same technology on the same production line, and with the same production time scale, constitute the same batch.

### **7.2 Product testing before leaving factory**

**7.2.1** Products should be tested using a sample survey before leaving factories. Random samples should be taken as test specimens from each batch of products in accordance with the rules and requirements set out in GB/T 10632.

**7.2.2** Before leaving the factory, tests should be carried out on the external appearance, blasting fuse, materials of main body, flight stabilisation equipment and launch performance of the samples.

**7.2.3** Each batch of products must be tested and examined in accordance with the rules and regulations of the manufacturer's testing department, so as to certify the product's quality before leaving the factory.

### **7.3 Product type inspection test**

Type inspection tests should be carried out:

- a) before new products are put into production;
- b) if a certain product line has been discontinued for over six months then put back into production;
- c) if important changes have been made to the original materials or technology;
- d) according to the requests of the supervision and inspection department.

**7.3.1** Type inspection testing items should include all of the technical required items stipulated in this standard.

**7.3.2** Sample survey for type inspection tests: random sampling test specimens from factory-qualified products, the quantity of test specimens should satisfy every related test item.

### **7.4 Acceptance check tests**

Refer to the process stipulated in section 7.2.

### **7.5 Test outcomes/conclusions**

Product faults resulting from acceptance check tests that are carried out before leaving the factory should be dealt with as according to the conditions stipulated in Appendix C. Results should be determined in accordance with the requirements stipulated in GB/T 16032-2004. Any products

that do not satisfy the terms and conditions of this standard during type inspection testing shall be considered as unqualified products.

## **8 Labelling, packaging, transportation and storage**

### **8.1 Labelling**

Refer to the conditions stipulated in GB 10631-2004, “Fireworks and firecracker safety and quality”.

### **8.2 Packaging**

Product packaging must conform to the rules and requirements of technical documents that are permitted by the rules and regulations of this standard, must be suitable in terms of product quality protection and convenient for transportation and storage.

#### **8.2.1 Inner packaging**

Inner packaging should completely cover the aerial rockets. With the exception of opening and technical requirements, no sign of perforation or breakage must be evident on the packaging. Inner packaging must be damp-proof and shockproof. The product should be lined with damp-proof paper and products should be separated by partition cardboard. Partition and securing cardboard or fine paper dividers should also separate the different levels within the packaging.

#### **8.2.2 Outer packaging**

Outer packaging must be sturdy and complete. Marks and symbols must be complete. Packaging boxes must satisfy the requirements of GB 10631-2004, and the total weight of each box must not exceed 30kg. The symbols and marks found on the packing boxes are:

- product name;
- product number and batch number;
- product quantity and specification;
- gross weight;
- size;
- name and address of manufacturer;
- date of leaving factory;
- standard code name;
- writing or marks such as “fire-proof”, “damp-proof”, “explosive”, “fragile”.

### **8.3 Transportation**

Transportation of the products should be carried out in accordance with the rules and regulations stipulated in GB10631-2004, and must conform to the national rules and regulations for transporting dangerous goods.

### **8.4 Storage**

Storage of the products should be carried out in accordance with the rules and regulations stipulated in GB10631-2004. Under normal conditions, the expiry date should be three years.

## **Appendix A** **(Standardised Appendix)**

### **Blasting fuse side ignition test**

#### **A. 1 Materials**

##### **A. 1.1 Cigarette**

No filter tip, length  $70\text{mm} \pm 4\text{mm}$ , diameter  $8.0\text{mm} \pm 0.5\text{mm}$ , mass  $1.0\text{g} \pm 0.1\text{g}$ .

##### **A. 1.2 Testing site**

The testing site must be level; inside the ventilating cabinet should be a non-flammable platform or a sealed, airtight space, which is shielded from any wind movement. If an air pump is installed, switch off while testing.

#### **A.2 Test instruments**

##### **A.2.1 Metal stand**

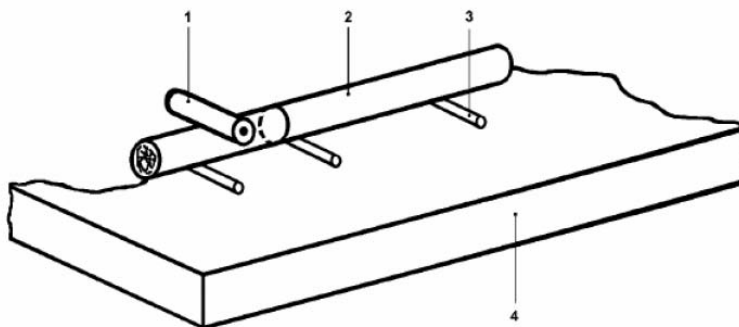
3 metal stands: diameter  $2.0\text{mm} \pm 0.1\text{mm}$ , length 50mm.

##### **A.2.2 Test specimen**

Dissected fuse may be used as the test specimen.

#### **A.3 test procedure**

Light the cigarette (A.1.1) and place horizontally across the metal stands (A.2.1), then place inside the ventilating cabinet at the testing site (A.1.2). Place the dissected fuse (A.2.2) onto the cigarette. The distance from the cross-point of the dissected fuse and the cigarette to the lighted cigarette butt should be 15mm - see diagram A.1. Allow the cigarette to carry on burning until the burning point beyond the fuse and cigarette cross-point reaches about 10mm, and then record whether or not the fuse became lit.



1 test specimen

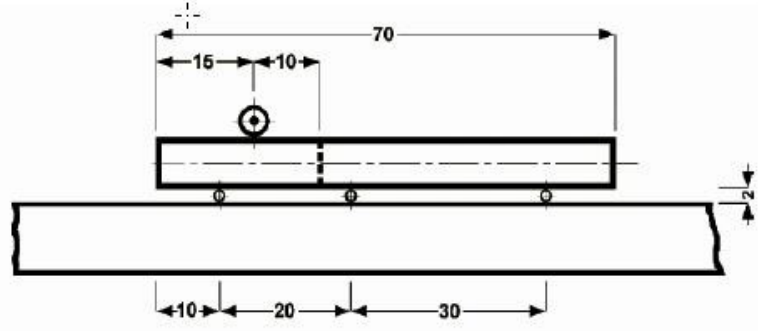
2 cigarette

3 metal stand

4 non-flammable platform



a) test equipment unit: mm



b) test equipment dimension (mm)

## Appendix B

### (Standardised Appendix)

#### Level, straightness and resistance testing method

##### B.1 Stabilisation rod level and resistance test

###### B.1.1 Test instruments

A self-made wood or plywood rod testing board should be made. Mark out the required spaces (example 6.35mm) according to the design standard, or stick curve diagram papers onto the board, as in diagram B.1.

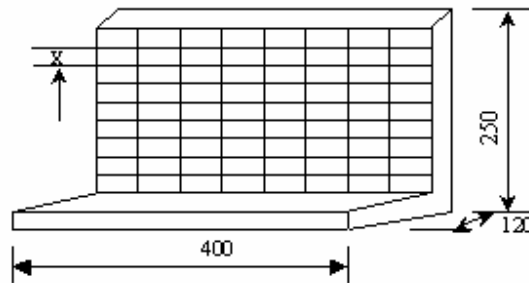


Diagram B.1 Rod testing board

###### B.1.2 Testing

Place the flight stabiliser rod on the testing board and let it spin once. Measure the maximum bowed height and record whether or not the bowed height exceeds than standard required value.

###### B.2 Rod resistance test

Clamp one end of the rod onto the testing board and measure the perpendicular distance from the opposite end of the rod to the board. Using this value to divide the total length of the aerial rocket, the quotient is the maximum perpendicular curvature; record whether or not the perpendicular curvature is lower than the required standard.

**Appendix C**  
**(Standardised Appendix)**  
**Fault categories of aerial rockets**

See Table C for fault categories of aerial rockets.

**Table C Faulty Rocket Categories**

Tested items	Technical Requirements	Test Methods	Description of Fault	Fault Category
Labelling	8.1	Test procedures carried out in accordance with requirements of GB XXXX- 200X	No labels or marks on product (inner packaging); no instructions for setting the rockets off	a <sub>2</sub>
			Incomplete labels and marks; unclear information on labels and marks; covering damaged	b <sub>1</sub>
Packaging	8.2	Test procedures carried out in accordance with the requirements in Article 6.1 of GB10631-2004	Inner packaging and outer packaging do not meet standard requirements	b <sub>1</sub>
Appearance	5.1	6.1	Main body badly damaged by severe mould, and split	a <sub>1</sub>
			Main body slightly damaged, loose powder on surface	b <sub>1</sub>
			Contaminated: some mould visible on top and bottom; white colour	c <sub>2</sub>
Blasting fuse	5.2	6.2	t < required minimum value; used chlorate fuse	a <sub>1</sub>
			t > required maximum value; not able to pass side ignition test;	b <sub>1</sub>
			Mouldy; damaged;	

			empty fuse; insufficient powder - trapped air in fuse	
			Unstable installation; incorrectly installed - wrong place; ignition point not clearly labelled.	c <sub>1</sub>
Materials of outer shell	5.3	6.3	Metal materials used for tube	a <sub>1</sub>
Flight stabilisation equipment	5.4	6.4	No flight stabilisation equipment provided	a <sub>2</sub>
			The level, straightness and rigidity of the rod do not meet standard requirements; stabilisation equipment falls off	b <sub>1</sub>
Launch equipment	5.5	6.5	Launch equipment is not provided inside the sales packaging	b <sub>1</sub>
Powder type and quantity	5.6	6.6	Used prohibited powder; powder quantity exceeds required quantity	a <sub>1</sub>
Launch performance	5.7	6.7	Sudden blast; low explosion; danger of fire	a <sub>1</sub>
			Angle of deflection for launch: launch height does not meet standard requirements	b <sub>1</sub>
			The fire of the lit firecracker goes out; launch results do not conform to design requirements due to the weight of the product	b <sub>2</sub>