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Jawaharlal Nehru  
“Step Out From the Old to the New”

IS 12739 (1989): Fireworks Conical Flowerpots [CHD 26: Explosives and Pyrotechnics]

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“Invent a New India Using Knowledge”

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Bhartrhari—Nitisatakam  
“Knowledge is such a treasure which cannot be stolen”
Indian Standard

FIREWORKS CONICAL FLOWERPOTS — SPECIFICATION

UDC 662.113.3

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

February 1990

Price Group 3
FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on 31 July 1989, after the draft finalized by the Explosives and Pyrotechnics Sectional Committee had been approved by the Chemical Division Council.

The 'Fireworks conical flowerpots' are made of pyrotechnic materials and are used chiefly for the purpose of entertainment. They are popularly known as 'ANARS'. They are safe to use when operating under a principle of a well controlled emission of stars and sparkling streams vertically into the air, from a charge of pyrotechnic composition generally filled and sealed either in paper or paper board cones.

The production of fireworks flowerpots in this country is confined to the small scale sector.

Two other types of fireworks flowerpots, namely, cylindrical and spherical (earthen pots), were also considered. However, in view of the lack of data for these types of fireworks flowerpots due to their meagre production, the committee decided not to cover these two types in the standard, for the time being.

In this standard, recommendations of the expert panel which was constituted under the chairmanship of Chief Controller of Explosives, Nagpur to study the safety aspects of fireworks flowerpots have also been taken into consideration.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.
AMENDMENT NO. 1 DECEMBER 1995
TO
IS 12739:1989 FIREWORKS CONICAL FLOWERPOTS — SPECIFICATION

(Page 1, clause 5.5.2, line 5) — Substitute 'plies' for 'plys'.

(Page 1, clause 5.5.2, line 6 and 7) — Delete the words after 'thickness'.

(Page 3, Table 1, col 6, title) — Substitute.
'Base/Height Ratio' for 'Height/Base Ratio.'

(CHD 026)

Reprography Unit, BIS, New Delhi, India
Indian Standard

FIREWORKS CONICAL FLOWERPOTS — SPECIFICATION

1 SCOPE
This standard prescribes the requirements and methods of sampling and test for fireworks conical flowerpots.

2 REFERENCES
The following Indian Standards are necessary adjuncts to this standard:

<table>
<thead>
<tr>
<th>IS No.</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 1070 : 1977</td>
<td>Specification for water for general laboratory use (second revision)</td>
</tr>
<tr>
<td>IS 4905 : 1968</td>
<td>Methods for random sampling</td>
</tr>
</tbody>
</table>

3 TERMINOLOGY
For the purpose of this standard, the following definitions shall apply.

3.1 Fireworks Conical Flowerpot
A fireworks conical flowerpot shall consist of a small shell in the shape of a cone made of paper or cardboard charged with an amount of a composition of pyrotechnic materials, as approved by the statutory authority, in such a way that when ignited by the ignitor provided, emits and showers out bright streamers and stars vertically into the air.

3.2 Ignitor
The ignitor composition consists of strands of cotton or jute yarn dipped and covered with a pyrotechnic composition approved by the Chief Controller of Explosives.

4 GRADES
The fireworks conical flowerpots shall be of the grades 1 to 5 as given in Table 1 according to the nominal mass of the charge of the pyrotechnic composition.

5 REQUIREMENTS
5.1 Description
The fireworks conical flowerpots shall ignite on ignition and emit showers of stars and streamers. The emission may be accompanied by a hissing or a whistling sound.

5.1.1 The emission shall be only through the nozzle provided and shall not be through the wall or the bottom.

5.2 The fireworks conical flowerpots shall not burst or crack at any instance. They shall not form projectiles, or tip over emitting showers along the horizontal direction.

5.2.1 The test for the tilting over shall be done according to the procedure prescribed in Annex A.

5.3 The minimum height of the emitting showers of stars shall be between 2.8 to 5.0 metres depending upon the grade when tested by the method given in Annex B. The minimum duration of the emission shall be between 7 to 12 seconds depending upon the grade, as prescribed in Table 1.

5.4 The Ignitor
The ignitor fuse shall be at least 25 mm in length and shall burn at a constant rate of 6 seconds per 25 mm. The length and burning shall be so appropriated as to provide not less than 6 seconds and not more than 9 seconds before the emission starts.

5.5 Physical Parameters
5.5.1 Base to Height Ratio
The height of fireworks conical flowerpots shall not exceed 150 mm maintaining the base to height ratio as 0.4 and mouth diameter to height ratio of 0.1.

5.5.2 Thickness and Strength of the Wall
The thickness and strength of the wall shall be such as to withstand the internal pressure produced by the burning pyrotechnic composition inside it. The cone shall be made of cardboard and/or paper board of two plys resulting in 2.5 mm overall shell thickness instead of 2.5 mm thick shell per single ply.

5.5.3 The body of the fireworks conical flowerpot shall have no holes, splits, dents or bulges.

5.6 Filling
The filling shall contain no cavities or sections of loose powder. They shall be properly loaded to contain uniformly dense powder.
5.7 Composition of the Pyrotechnic Charge

The charge shall normally contain a mass of a mixture of pyrotechnic materials approved by the Chief Controller of Explosives.

The mixture shall consist of the following chemicals:

a) Barium nitrate
b) Potassium nitrate not exceeding 15 percent when tested by method given in Annex C;

c) Aluminium powder 50 percent passing through 325 mesh;
d) Aluminium flakes;
e) Aluminium magnesium alloy powder;
f) Charcoal powder; and
g) Iron chip and/or dust.

5.7.1 The material shall not contain chlorate or sulphur when tested by the methods prescribed in Annexes D and E.

5.7.2 The mass of the pyrotechnic charge shall be determined by the method prescribed in Annex F.

5.8 Construction

5.8.1 Shell

The shell shall be rolled from cardboard into cones; or shall be moulded from suitable pulp material. The finishing bottom shall be concave type.

5.8.2 Seal

The bottom of the conical fireworks flowerpots shall be closed with cardboard and gum firmly forming a dished end thereafter and a mixture of fine sand, dust and gum may be applied for final sealing of the bottom, if required, so as to allow no seapage of the composition.

5.8.3 Filling

While filling pyrotechnic composition in the fireworks conical flowerpots, care shall be taken to avoid formation of cavities or sections of loose powder or air bags which may cause explosion. They shall be properly loaded by tapping to contain uniformly dense powder.

5.9 Stability Against Spontaneous Combustion

The explosive composition used in the manufacture of fireworks conical flowerpots shall pass the stability test at 100 ± 2°C for 2 hours when tested by the method given in Annex G.

6 PACKING AND MASKING

6.1 Packing

The conical fireworks flowerpots shall be placed on their sides inside the suitable cardboard boxes. They shall fit tightly into the boxes. They shall be packed in tens in boxes. Ten such boxes shall be packed in packets.

6.2 Marking

Each box and packet shall be legibly marked with following information:

a) Name and grade of the material;
b) Name of the manufacturer and/or his recognised trade-mark, if any;
c) Batch number in code or otherwise to enable the lot of manufacture to be traced from records.

6.2.1 In addition to the above, the following cautionary note shall also appear on the label and a small caution slip with the same information shall be placed inside the smallest box:

'FOR OUTDOOR USE ONLY. USE UNDER ADULT SUPERVISION. EMITS SHOWERS OF SPARKS. DO NOT HOLD IN HAND. PLACE ON LEVEL SURFACE. LIGHT FUSE FROM A DISTANCE WITH EXTENDED ARM AND GET AWAY. DO NOT TOUCH AFTER BURNING. DO NOT EXPERIMENT WITH FAILED SHELLS.'

6.2.2 The pictorial view of the functions and process of the fireworks conical flowerpots shall also be printed on the smallest packet.

6.2.3 The packets may also be marked with the Standard Mark.

7 TEST METHODS

7.1 The tests for the requirements laid down in 5.2.1, 5.3, 5.7, 5.7.1, 5.7.2 and 5.9 shall be carried out as prescribed in Annexes A to F of this standard.

7.2 Quality of Reagents

Unless specified otherwise, pure chemicals and distilled water (see IS : 1070-1977) shall be employed in the tests.

NOTE — Pure chemicals shall mean chemicals that do not contain impurities which affect the results of analysis.

8 SAMPLING

Representative samples of the material shall be drawn and conformity of the material to the requirements of the specification shall be determined according to the procedure prescribed in Annex H.
Table 1 Parameters for Fireworks Conical Flowerpots

(Clause 5.3)

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Grade</th>
<th>Nominal Mass of Charge Per Shell (g)</th>
<th>Base Diameter (mm)</th>
<th>Height of the Shell (mm)</th>
<th>Height/Base Ratio</th>
<th>Duration, Min</th>
<th>Height of Streamers, Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>1</td>
<td>45 ± 5</td>
<td>50 ± 2</td>
<td>125 to 150</td>
<td>0.4</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>ii)</td>
<td>2</td>
<td>20 ± 2</td>
<td>26 ± 2</td>
<td>65 ± 2</td>
<td>0.4</td>
<td>10.5</td>
<td>4.8</td>
</tr>
<tr>
<td>iii)</td>
<td>3</td>
<td>10 ± 1</td>
<td>22 ± 2</td>
<td>55 ± 2</td>
<td>0.4</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>iv)</td>
<td>4</td>
<td>7 ± 1</td>
<td>10 ± 2</td>
<td>45 ± 2</td>
<td>0.4</td>
<td>7</td>
<td>3.3</td>
</tr>
<tr>
<td>v)</td>
<td>5</td>
<td>5 ± 0.5</td>
<td>14 ± 2</td>
<td>35 ± 2</td>
<td>0.4</td>
<td>7</td>
<td>2.8</td>
</tr>
</tbody>
</table>

ANNEX A

(Clause 5.2.1)

TEST FOR THE TILTING OVER OF THE FIREWORKS CONICAL FLOWERPOT

A-1 PROCEDURE

A-1.1 The fireworks flowerpot is placed on its base on the tilt test device. An illustration of the tilt test device is given in Fig 1. The inclined surface is covered with a grit paper to prevent sliding down of the flowerpot. The unlit flowerpots when placed on the test device shall not tip over on the test device's 10° inclined surface.

FIG. 1 TILT TEST DEVICE

ANNEX B

(Clause 5.3)

DETERMINATION OF HEIGHT OF EMITTED SHOWERS OF STARS

B-1 APPARATUS

A pole of suitable length graduated at intervals of 25 cm with an adjustable frame of size 0.5 × 0.5 m capable of holding paper.

B-2 PROCEDURE

Place the fireworks conical flower pot in front of the graduated pole under the frame holding the paper and fixed at the minimum height specified for the sample. Ignite the sample and observe the paper afterwards. The sample shall be considered as passing if burn marks caused by the emitted showers of stars are observed on the paper.
ANNEX C
(Clause 5.7)
DETERMINATION OF POTASSIUM NITRATE

C-0 GENERAL
First the combined percentage of potassium nitrate and barium nitrate is obtained. From this the percent by mass of barium nitrate precipitated as barium sulphate is subtracted to obtain the percent by mass value of potassium nitrate.

C-1 PROCEDURE
C-1.1 Take 2.0 g of the composition in a sintered glass crucible G 4, which is previously washed, dried and weighed accurately (M₁). Let the mass of the crucible with the composition be M₂.

Wash the composition with 25 ml water with stirring by a glass rod and allow the composition to soak for one hour. Collect about 200 ml of filtrate by this process. Remove all water from the crucible by suction and dry the crucible in an oven at 100 ± 2°C for one hour and cool in a desiccator and weigh accurately. Repeat the process till constant mass (M₃).

C-1.2 Transfer the filtrate into a 500-ml beaker, add about 10 ml of dilute hydrochloric acid and digest on a sand-bath for about 20 minutes. To this solution add about 50 ml of 4 N sulphuric acid with constant stirring and digest the precipitate formed for another 30 minutes. Remove the beaker from the sand-bath and keep overnight. Filter it through a previously dried, muffled and weighed gooch crucible. Wash the precipitate 3-4 times by water. Remove water completely by suction and then dry the crucible in an oven and then heat in a muffle furnace for 30 minutes at 800 to 1000°C then find the mass of the precipitated barium sulphate (M).

C-2 CALCULATION
Total percentage of potassium nitrate and barium nitrate (A) = \( \frac{(M₂ - M₃) \times 100}{\text{mass of sample taken}} \)

Percent by mass of barium nitrate (B) = \( \frac{M \times 261.36 \times 100}{233 \times \text{mass of sample taken}} \)

Percent by mass of potassium nitrate = A - B

ANNEX D
(Clause 5.7.1)
TEST FOR CHLORATE

D-1 REAGENTS
D-1.1 Aniline Hydrochloride
Dissolve 18 g of redistilled aniline in 375 ml of concentrated hydrochloric acid and make up the volume to 500 ml with water. Add 2 drops of saturated potassium chlorate solution, shake and allow to stand overnight. Filter off the blue sediment, store the reagent in a glass stoppered bottle in the dark.

D-1.2 Concentrated Hydrochloric Acid

D-2 PROCEDURE
D-2.1 To 5 g of the sample taken in a spot plate add few drops of aniline hydrochloride in hydrochloric acid. The material shall be considered chlorate free if there is no bluish green precipitation or colouration.

ANNEX E
(Clause 5.7.1)
TEST FOR SULPHUR

E-1 REAGENTS
E-1.1 Carbon Disulphide, freshly distilled.
E-1.2 Barium Chloride, 10 percent solution.
E-1.3 Nitric Acid
E-1.4 Hydrochloric Acid

E-2 PROCEDURE
Extract about 10 g of the material in a Soxhlet extractor with carbon disulphide for 12 hours. Evaporate the extract to dryness adding 10 ml of bromine-carbon tetrachloride (1:1) mixture together with 15 ml of nitric acid. Take up the residue with 10 ml of hydrochloric acid diluted with 150 ml of water. Add 10 percent barium chloride solution and heat to boiling. The material shall be considered passing if no precipitate of barium sulphate is formed.
IS 12739 : 1989

ANNEX F
( Clause 5.7.2 )

DETERMINATION OF THE MASS OF THE CHARGE

F-1 PROCEDURE
The mass of the charge of explosive and pyrotechnic composition in the firework flowerpot shall be determined by carefully cutting open the shell, collecting the charge and weighing it on a tared dish or a glazed paper. The cutting shall be done with the use of a non-ferrous, non-spark-producing knife or shear. This operation shall be carried out of the reach of naked flames and bare and live electric conductors.

ANNEX G
( Clause 5.9 )

TEST FOR STABILITY AGAINST SPONTANEOUS COMBUSTION

G-1 PROCEDURE
Heat slowly 2 g of the composition mixture in a dish on a sand-bath to a temperature of 100±2°C for 2 hours. It shall not ignite spontaneously if it is moistened with water and again dried.

ANNEX H
( Clause 8 )

SAMPLING OF CONICAL FIREWORKS FLOWERPOTS

H-1 SAMPLING
H-1.1 Lot
All the boxes of conical fireworks flowerpots belonging to the same batch of manufacture shall constitute a lot.

H-1.1.1 For ascertaining the conformity of the material with the requirements of the specification, samples shall be tested from each lot separately.

H-1.2 The number of packets to be selected from a lot shall depend on the size of the lot and shall be according to Table 2.

H-1.2.1 The packets from the lot and also the boxes from the selected packets shall be selected at random. In order to ensure randomness of selection procedures given in IS : 4905-1968 may be followed.

H-2 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY
H-2.1 The packets selected according to col 2 of Table 2 and the boxes in them shall be examined for packing requirements as well as precautionary label. All the packets and boxes shall fulfill these requirements.

H-2.2 The number of boxes according to col 4 shall be selected at random from each of the sample packets for all other requirements. The required number according to col 5 of fireworks conical flowerpots shall be selected approximately in equal numbers from each of the boxes. These flowerpots shall be individually tested for the requirements given in 5.1 to 5.9. Any item failing in one or more of the requirements shall be termed as defective. The number of defective flowerpots shall not exceed permissible number of defectives in col 6, if the lot is to be accepted under this clause.

H-2.3 The lot shall be finally considered to be conforming to the requirements of the specification if the criteria for conformity given in H-2.1 and H-2.2 are satisfied.

<table>
<thead>
<tr>
<th>No. of Packets in the Lot</th>
<th>No. of Packets to be Selected</th>
<th>No. of Boxes to be Selected</th>
<th>No. of Flowerpots to be Selected</th>
<th>Permissible No. of Defectives</th>
<th>Sample Size for Testing Chlorate and Sulphur</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>Up to 50</td>
<td>2</td>
<td>5</td>
<td>13</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>51 to 100</td>
<td>3</td>
<td>8</td>
<td>20</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>101 to 300</td>
<td>5</td>
<td>13</td>
<td>32</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>301 to 500</td>
<td>7</td>
<td>20</td>
<td>60</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>501 and above</td>
<td>10</td>
<td>32</td>
<td>80</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>
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