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भारतीय मानक

विस्फोटक और आतिशबाजी संघरन के लिए मैग्नीशियम पाउडर की विशिष्टि

(दूसरा पुनरीक्षण)

Indian Standard

MAGNESIUM POWDER FOR EXPLOSIVE AND PYROTECHNIC COMPOSITIONS — SPECIFICATION

(Second Revision)

ICS 71.060.01; 71.100.30

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Indian Standard

MAGNESIUM POWDER FOR EXPLOSIVE AND PYROTECHNIC COMPOSITIONS — SPECIFICATION

(Second Revision)

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for magnesium powder for use in the explosive and pyrotechnic compositions.

2 REFERENCES

The standards listed below contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revisions and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
264 : 1976	Nitric acid (*second revision*)
265 : 1993	Hydrochloric acid (*fourth revision*)
324 : 1959	Rectified spirit (*revised*)
266 : 1993	Sulphuric acid (*third revision*)
1070 : 1992	Reagent grade water (*third revision*)
1260(Part 1) : 1973	Pictorial markings for handling and labelling of goods: Part 1 Dangerous goods (*first revision*)
4905 : 1968	Methods of random sampling

3 GRADES

There shall be the eleven Grades of the material, based on their apparent density and sieve analysis (*see* Table 1)

4 REQUIREMENTS

4.1 Description

The material shall essentially consist of metallic magnesium powder. It shall be in the form of clean bright powder free from aggregated lumps and foreign matter. It shall also be free from grease and oil.

4.2 Sieve Analysis

The sieve analysis of the material when determined by the method prescribed in Annex A shall be as specified in Table 1. Sieve requirements other than these shall be as agreed to between the purchaser and the supplier.

4.3 Apparent Density

The apparent density of the various Grades of the material shall be as specified in [Table 1, Sl No. (ii)] when determined by the method prescribed in Annex B.

4.4 The material, when tested according to the methods prescribed in Annexes C to M shall also comply with the requirements laid down in Table 2. Reference to the relevant Annexes given in col 4 of Table 2.

5 PACKING AND MARKING

5.1 Packing

Unless otherwise agreed to between the purchaser and the supplier, the material shall be packed in plain steel drums with expandable lids. The drums shall be sound and clean. The interior of the drums shall be free from residual flux and other substances which may react with the material in any foreseeable condition.

5.2 Marking

The drum shall be legibly marked with the following information:

a) Name and Grade of the material;
b) Manufacturer's name and/or his recognized trade-mark, if any;
c) Identification in code or otherwise to enable the lot of manufacture to be traced from records;
d) Tare and net mass of the material in the drum;
e) Year and month of manufacture; and
f) Symbol indicating the flammable nature of the material [*see* IS 1260 (Part 1)].

5.2.1 *BIS Certification Marking*

The material may also be marked with the Standard Mark. The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 SAMPLING

The method of drawing representative samples of the material, number of tests to be performed and the method of determining the criteria of conformity of the material to the requirements of this standard shall be as prescribed in Annex M.

Table 1 Grades of the Materials

(*Clauses* 3, 4.2 *and* 4.3)

Sl No.	Test Parameters	Requirements										
		Grade I	Grade II	Grade III	Grade IV	Grade V	Grade VI[1]	Grade VII	Grade VIII	Grade IX	Grade X	Grade XI
i)	Sieving											
1.	Retained on 500 µm sieve	0.5% (*Max*)	0.5% (*Max*)	0.5% (*Max*)	0.5% (*Max*)	0.5% (*Max*)	–	–	–	–	–	–
2.	Retained on 355 µm sieve	10-18%	–	15.0% (*Max*)	10-18%	12-18	–	–	–	–	–	–
3.	Retained on 212 µm sieve	–	–	–	–	–	–	0.5% (*Max*)	0.5% (*Max*)	0.5% (*Max*)	0.5% (*Max*)	–
4.	Retained on 180 µm sieve	–	60-80%	–	–	–	–	–	–			
5.	Retained on 150 µm sieve	99.0% (*Min*)	–	85.0% (*Min*)	99.0%	80-90	0.5% (*Max*)	–	7.0% (*Max*)	7.0% (*Max*)	7.0% (*Max*)	–
6.	Retained on 125 µm sieve	–	90% (*Max*)	99.0% (*Min*)	–	90-100	–	–	–	–	–	–
7.	Retained on 105 µm sieve	–	–	–	–	99% (*Min*)	–	–	–	30% (*Min*)	–	–
8.	Retained on 75 µm sieve	–	97.0% (*Min*)	–	–	–	99% (*Min*)	–	–	–	–	0.5% (*Max*)
9.	Retained on 75 µm sieve	–	–	–	–	–	–	–	–	–	–	–
10	Retained on 63 µm sieve	–	–	–	–	–	–	85.0% (*Min*)	85.0% (*Min*)	80.0% (*Min*)	85.0% (*Min*)	15.0% (*Max*)
ii)	Apparent Density in g/ml *Min* *Max*	 0.80 0.90	 0.80 0.90	 0.65 0.85	 0.65 0.85	 0.80 0.90	 0.9 –	 0.65 0.85	 0.65 0.85	 0.40 0.50	 0.40 0.60	 0.65 0.85

[1] Atomised.

Table 2 Requirements for Magnesium Powder for Explosive and Pyrotechnic Compositions

(*Clause* 4.4)

Sl No. (1)	Characteristic (2)	Requirement (3)	Method of Test, Ref to Annex (4)
i)	Moisture, percent by mass, *Max*	0.05	C
ii)	Calcium (as Ca), percent by mass, *Max*	0.15	D
iii)	Iron (as Fe), percent by mass, *Max*	0.5	E
iv)	Manganese (as Mn), percent by mass, *Max*	1.0	F
v)	Zinc (as Zn), percent by mass, *Max*	0.1	G
vi)	Chlorides (as NaCl), percent by mass, *Max*	0.03	H
vii)	Other metallic impurities (as Cu), percent by mass, *Max*	0.05	J
viii)	Oxides (as MgO), percent by mass, *Max:*		K
	a) For Grades I to V	2.0	
	b) For Grades VI to XI	4.0	
ix)	Grit, percent by mass, *Max*	0.1	L

7 QUALITY OF REAGENTS

Unless otherwise specified, pure chemicals and distilled water (*see* IS 1070) shall be used in tests.

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

ANNEX A

(*Clause* 4.2)

SIEVE ANALYSIS

A-1 Assemble the specified sieves in the order of aperture sizes, together with bottom receiver. Place 10.0 g of the material on the uppermost sieve of the largest aperture size. Shake the sieves for 15 min by means of a mechanical sieve vibrator. Alternatively, the assembled sieves may be shaken by hand with frequent tapping at an angle of about 30° to the horizontal on a felt pad, and with occasional rotation, in order to ensure distribution of the powder.

A-1.1 Weigh separately the material retained on each sieve and express it as percentage of the mass of the material taken for the test.

ANNEX B

(*Clause* 4.3)

DETERMINATION OF APPARENT DENSITY

B-1 APPARATUS

B-1.1 Measuring Cylinder — Stoppered and graduated in half millilitres, about 15 cm high and 20 mm in internal diameter.

B-1.2 Stand — Suitable for the measuring cylinder to fall vertically through a distance of 6.5 cm on to a hard leather pad.

B-2 PROCEDURE

Introduce about 10 g of the material into the stoppered measuring cylinder. Drop the cylinder vertically 30 times from a height of 6.5 cm on to the hard leather pad. Level off the material by minimum side tapping and read the volume occupied by the powder.

B-3 CALCULATION

$$\text{Apparent density, g/ml} = \frac{M}{V}$$

where

M = mass, in g, of the material taken for the test, and

V = volume, in ml, occupied by the material.

ANNEX C

[*Table* 2, *Sl No.* (i)]

DETERMINATION OF MOISTURE

C-1 PROCEDURE

Dry a flat-bottomed weighing bottle and lid separately in an oven maintained at about 100 C for 30 min. Cool the bottle with lid over concentrated sulphuric acid in a vacuum desiccator and weigh. Introduce into the bottle about 5 g of the material, weigh accurately and place the bottle, containing the material, and the lid separately over concentrated sulphuric acid in the vacuum desiccator for 18 h under vacuum. Then remove the weighing bottle, cover it with the lid and weigh.

C-2 CALCULATION

$$\text{Moisture, percent by mass} = 100\left(\frac{M_1 - M_2}{M_1}\right)$$

where

M_1 = mass, in g, of the material before drying, and

M_2 = mass, in g, of the material after drying.

ANNEX D

[*Table* 2, *Sl No.* (ii)]

DETERMINATION OF CALCIUM

D-1 REAGENTS

D-1.1 Concentrated Hydrochloric Acid — *see* IS 265.

D-1.2 Sodium Sulphate — free from calcium.

D-1.3 Denatured Spirit — *see* IS 324.

D-1.4 Ammonium Hydroxide — 1 : 4.

D-1.5 Dilute Acetic Acid — approximately 6 percent (*m/v*).

D-1.6 Ammonium Oxalate Solution — saturated.

D-1.7 Dilute Sulphuric Acid — approximately 1 : 6.

D-1.8 Standard Potassium Permanganate Solution — approximately 0.1 N.

D-2 PROCEDURE

Take about 5 g of the material, accurately weighed, in an 800-ml beaker. Add about 50 ml of water and run in slowly about 50 ml of concentrated hydrochloric acid to dissolve the material. Add 2 g of sodium sulphate. Evaporate the solution on a water-bath just to a point when a solid layer begins to form on the surface of the liquid spirit. Remove the beaker from the water-bath and add 400 ml of denatured spirit. Stir the liquid and allow it to stand overnight. Filter and wash the residual salts with denatured spirit to remove magnesium chloride. Place the filter paper containing the residual salts in the original beaker and warm over hot plate to remove denatured spirit. Dissolve the residual salts in about 50 ml of hot water containing a few millilitres of concentrated hydrochloric acid and filter into a 200-ml beaker. After neutralization with ammonium hydroxide, make the solution just acidic with dilute acetic acid, add 25 ml of cold saturated ammonium oxalate solution. Boil the solution for 10 min and allow to stand for about 2 h. Filter off the precipitate formed on an asbestos padded Gooch crucible and wash with cold water until free from soluble oxalate. Transfer the asbestos with the precipitate to a beaker containing 50 ml of hot dilute sulphuric acid, stir and titrate with standard potassium permanganate solution.

D-3 CALCULATION

$$\text{Calcium (as Ca), percent by mass} = \frac{2\,VN}{M}$$

where

V = volume, in ml, of standard potassium permanganate solution used in the titration;

N = normality of standard potassium permanganate solution; and

M = mass, in g, of the material taken for the test.

ANNEX E

[*Table* 2, *Sl No.* (iii)]

DETERMINATION OF IRON

E-1 REAGENTS

E-1.1 Concentrated Hydrochloric Acid — *see* IS 265.

E-1.2 Concentrated Nitric Acid — *see* IS 264.

E-1.3 Ammonium Chloride

E-1.4 Dilute Ammonium Hydroxide — 1 : 4.

E-1.5 Hydrogen Sulphide — gas.

E-1.6 Dilute Nitric Acid — 1:1.

E-1.7 Concentrated Sulphate Acid — *see* IS 266.

E-1.8 Bromine Water — saturated solution.

E-2 PROCEDURE

E-2.1 Add about 5 g of the material, accurately weighed, to 50 ml of water contained in an 800-ml beaker. Run in 60 ml of concentrated hydrochloric acid from a tap funnel and immediately cover the beaker with a watch glass. When all the material has dissolved, add 10 ml of concentrated nitric acid and gently boil the contents of the beaker for about 15 min. Cool and dilute to twice the volume and filter. Reject the insoluble matter.

E-2.2 Add to the filtrate about 10 g of ammonium chloride and make it just alkaline with dilute ammonium hydroxide. Pass hydrogen sulphide gas through the alkaline solution till precipitation is complete and filter the precipitated sulphides through a filter paper (Whatman No. 40 or its equivalent). Wash the precipitate with water which has been previously saturated with hydrogen sulphide. Reject the filtrate, dissolve the precipitate in dilute nitric acid, add 5 ml of concentrated sulphuric acid and evaporate the solution to fuming for 15 min. Cool the solution and dilute it to exactly 100 ml. Allow to stand over night and filter. Pass hydrogen sulphide gas through the filtrate for 15 min. Filter and wash the precipitate with water which has previously been saturated with hydrogen sulphide gas, adding the washings to the filtrate. Reserve the precipitate for test in Annex J.

E-2.3 Boil the filtrate to remove all hydrogen sulphide, cool and add about 0.5 g of ammonium chloride and a few millilitres of bromine water. Heat on a water-bath and make the solution alkaline by adding dilute ammonium hydroxide. Place the beaker on a water-bath until the precipitate has flocculated, keeping the solution alkaline by addition of more ammonium hydroxide if necessary. Filter and wash the residue with water containing ammonium hydroxide. Reserve the filtrate and washings for determination of zinc in Annex G. Dry the residue, ignite and weigh. Reserve the ignited residue for determination of manganese in Annex F.

E-3 CALCULATION

$$\text{Iron (as Fe), percent by mass} = 70\left(\frac{M}{m}\right) - A,$$

where

M = mass in g of the ignited residue,

m = mass in g of the material taken for the test, and

A = percentage of manganese as determined in Annex F.

ANNEX F

[*Table* 2, *Sl No.* (iv)]

DETERMINATION OF MANGANESE

F-1 REAGENTS

F-1.1 Concentrated Nitric Acid — *see* IS 264.

F-1.2 Hydrogen Peroxide — 5 percent (*m*/*v*).

F-1.3 Sodium Bismuthate —free from manganese and chlorides and having available oxygen corresponding to at least 75 percent sodium bismuthate ($NaBiO_3$).

F-1.4 Dilute Nitric Acid — Boil concentrated nitric acid for 1 or 2 min and dilute it with water 30 times in volume.

F-1.5 Sodium Sulphide Solution — 10 percent.

F-1.6 Phosphoric Acid — 85 percent (*m*/*v*).

F-1.7 Ferrous Ammonium Sulphate Solution — 0.05 N.

F-1.8 Standard Potassium Permanganate Solution — approximately 0.05 N.

F-2 PROCEDURE

Re-dissolve the residue preserved in **E-2.3** in concentrated nitric acid with the aid of a few drops of hydrogen peroxide. Add 0.5 g of sodium bismuthate and boil for a few minutes. A precipitate of manganese dioxide or a pink colour of potassium permanganate should appear. If neither a precipitate nor a colour appears, add more sodium bismuthate. Then add drop-wise sodium sulphide solution until the precipitate or permanganate colour disappears. Boil for 5 min. Cool the solution to approximately 15° C and add 0.5 to 1.0 g of sodium bismuthate; some of the reagent should remain undissolved. Stir for a minute or two, add 50 ml of cold dilute nitric acid and filter through Gooch crucible (or sintered glass crucible) with the aid of suction. Wash the residue with dilute nitric acid. Add 3 ml of phosphoric acid to the filtrate and make up the volume of the filtrate to 250 ml. Pipette out 50 ml of the filtrate and add to it 50 ml of ferrous ammonium sulphate solution from a burette. Then titrate the excess of ferrous ammonium sulphate with standard permanganate solution to the first pink tingle.

F-2.1 Carry out a blank using the same quantities of all the reagents omitting the residue obtained in **E-2.3**

F-3 CALCULATION

$$\text{Manganese (as Mn), percent by mass} = \frac{5.493\,N\,(V_2 - V_1)}{M}$$

where

N = normality of standard permanganate solution;

V_2 = volume, in ml, of the potassium permanganate solution used in the blank;

V_1 = volume, in ml, of the permanganate solution used in test with the material; and

M = mass, in g, of the material taken for the test in **D-2.**

ANNEX G

[*Table* 2, *Sl No.* (v)]

DETERMINATION OF ZINC

G-1 REAGENTS

G-1.1 Concentrated Sulphuric Acid — *see* IS 266.

G-1.2 Dilute Hydrochloric Acid — approximately 6 N.

G-1.3 Ammonium Hydroxide — 20 per cent (*m*/*m*).

G-1.4 Diphenylamine Indicator — Dissolve 1 g of diphenylamine in 100 ml of concentrated sulphuric acid.

G-1.5 Standard Potassium Ferrocyanide Solution — Dissolve 21.12 g of potassium ferrocyanide and 0.3 g of potassium ferrocyanide in one litre of water and standardize as described in **G-1.5.1**

G-1.5.1 *Standardization of Potassium Ferrocyanide Solution* — Weigh accurately 4 to 5 g of pure zinc in a beaker and dissolve in dilute hydrochloric acid. When all the zinc has gone into solution, transfer the solution to a one-litre measuring flask and make up the volume to one litre. Take 20 ml aliquot of this solution and neutralize with ammonium hydroxide. Just acidify with dilute hydrochloric acid and add 3 ml of the acid in excess. Dilute to 200 ml and titrate with potassium ferrocyanide solution using diphenylamine as internal indicator. Calculate the mass of zinc equivalent to one millilitre of potassium ferrocyanide solution.

G-2 PROCEDURE

Acidify the filtrate reserved in **E-2.3** with dilute hydrochloric acid. Boil to remove bromine. Neutralize with ammonium hydroxide, make just acidic with dilute hydrochloric acid and then add 3 ml of the acid in excess. Dilute to 200 ml and titrate with potassium ferrocyanide solution using diphenylamine as internal indicator.

G-3 CALCULATION

$$\text{Zinc (as Zn), percent by mass} = \frac{100\,VF}{M}$$

where

V = volume, in ml, of standard potassium ferrocyanide solution used in the titration,

F = mass, in g, of zinc equivalent to one millilitre of standard potassium ferrocyanide solution, and

M = mass, in g, of the material taken for test in **E-2.1**.

ANNEX H

[*Table* 2, *Sl No.* (vi)]

TEST FOR CHLORIDES

H-1 APPARATUS

H-1.1 Nessler Cylinder — 5.0-ml capacity.

H-2 REAGENTS

H-2.1 Concentrated Nitric Acid — *see* IS 264.

H-2.2 Standard Sodium Chloride Solution — Dissolve in water 6.00 g sodium chloride, previously dried at 100 to 105° C to constant mass, and make up the solution to 1 000 ml. Pipette out 10 ml of the solution and dilute it further to 100 ml. One millilitre of the final solution contains 0.000 6 g of sodium chloride.

H-2.3 Silver Nitrate Solution — approximately 2 percent (*m/v*).

H-3 PROCEDURE

Stir for 5 min 10.00 g of the material with 40 ml of water. Allow it to stand for about 2 min and filter the supernatant liquid into a 200-ml volumetric flask. Repeat the extraction with three further successive quantities of 40 ml of water adding the filtrates to the same volumetric flask. Dilute the combined filtrate to 200 ml. Pipette out 40 ml of this solution into a Nessler cylinder. Add one mililitre of nitric acid, one millilitre of silver nitrate solution and dilute to the 50-ml mark. Carry out the control test in another Nessler cylinder using one millilitre of standard sodium chloride solution and the same quantities of other reagents and finally diluting to the 50-ml mark. Stir both the solutions with glass rod and compare the turbidity produced after 5 min.

H-3.1 The limit prescribed in Table 1 shall be taken as not having been exceeded, if the turbidity produced in the test with the material is not greater than that produced in the control test.

ANNEX J

[*Table* 2, *Sl No.* (vii)]

DETERMINATION OF OTHER METALLIC IMPURITIES

J-1 PROCEDURE

Dry the precipitate reserved in **E-2.2**. Ignite it in a tared crucible, cool in a desiccator and weigh.

J-2 CALCULATION

$$\text{Other metallic impurities (as Cu), percent by mass} = 80 \times \frac{m}{M}$$

where

m = mass, in g, of the ignited residue, and

M = mass, in g, of the material taken for the test in **E-2.1**.

ANNEX K

[*Table* 2, *Sl No.* (viii)]

DETERMINATION OF OXIDES

K-1 GENERAL

The difference between 100 and the sum of percentages of metallic magnesium and all metallic and other impurities shall be taken as percentage of magnesium oxide. Metallic magnesium content shall be determined as given below.

K-2 APPARATUS

The apparatus shall consist of the following main parts assembled as shown in Fig.1.

K-2.1 Lunge Nitrometer — Provided with water jacket.

K-2.2 Reaction Bottle — Capacity about 60 ml.

K-2.3 Weighing Tube — Closed at one end, about 4 cm long and having an internal diameter of 0.5 cm.

K-3 REAGENTS

K-3.1 Dilute Sulphuric Acid — 10 percent.

K-3.2 Methyl Red Solution — Dissolve 0.3 g of methyl red in water, and dilute it to one litre

K-4 PROCEDURE

Weight accurately about 0.1 g of the material into the weighing tube. Introduce the tube containing the material into the reaction bottle. Add carefully through a funnel 20 ml of 10 percent sulphuric acid to the reaction bottle and connect it with due regard for air-tightness, to the nitrometer, filled with acidulated water. Make sure that the air in the reaction bottle is initially at atmospheric pressure. Expel all the air completely from the nitrometer bulb by bringing up the level of the acidulated water coloured with a drop of methyl red solution. Note the temperature of the water jacket around the nitrometer and water-bath around the reaction bottle, which should be almost the same. Tilt the reaction bottle in such a way that the sulphuric acid finds its way into the weighing tube containing the material, at the same time opening the passage to the nitrometer. When the reaction ceases, adjust the pressure very nearly to the atmospheric and allow it to stand for 1 h. Add a drop or two of methyl red solution in the cup of the nitrometer to serve as an index for the pressure of the gas of the nitrometer. Find out by trial the position at which the liquid in the nitrometer cup does not move up or down the bore of the stopper when the nitrometer is opened to the atmosphere. This operation is to be repeated after putting the gas in the nitrometer in communication with that in the reaction bottle, to ensure that the air shut off in the latter is at atmospheric pressure. Read the volume of the gas. Read the temperature of water in the jacket and the water-bath of the reaction bottle. Note the barometric reading and the temperature.

K-5 CALCULATION

K-5.1 Metallic magnesium, percent by mass =

$$\left[\frac{V \times 273\,(P-p)\,100}{M\,(273+t)\,760} - a\right]\frac{100}{92\ 100}$$

where

V = volume, in ml, of hydrogen gas produced;

P = atmospheric pressure in mm of mercury at the time of measurement of volume of hydrogen gas produced;

p = vapour pressure, in mm, of mercury of sulphuric acid at t °C;

M = mass, in g, of the material taken for the test;

t = temperature in degrees Celsius at the time of measurement of volume of hydrogen gas; and

a = volume, in ml (at NTP) of hydrogen gas produced by other metallic impurities contained in 100 g of the material (*see* Note).

NOTE — The volume of hydrogen gas produced by the metallic impurities already determined in Annex D, to Annex G (neglecting the gas produced by copper and other impurities which have not been determined) shall be calculated from the following factors:

Metallic Impurity	*Volume in ml, at* NTP *of Gas produced by,* 1 g
(1)	(2)
Calcium (as Ca)	559
Iron (as Fe)	400
Manganese (as Mn)	407
Zinc (as Zn)	343

K-5.2 Oxides (as MgO), percent by mass = 100 – (M + S)

where

M = percentage of metallic magnesium (*see* **K-5.1**), and

S = sum of percentages of all other characteristic as determined in Annex C to Annex J and L.

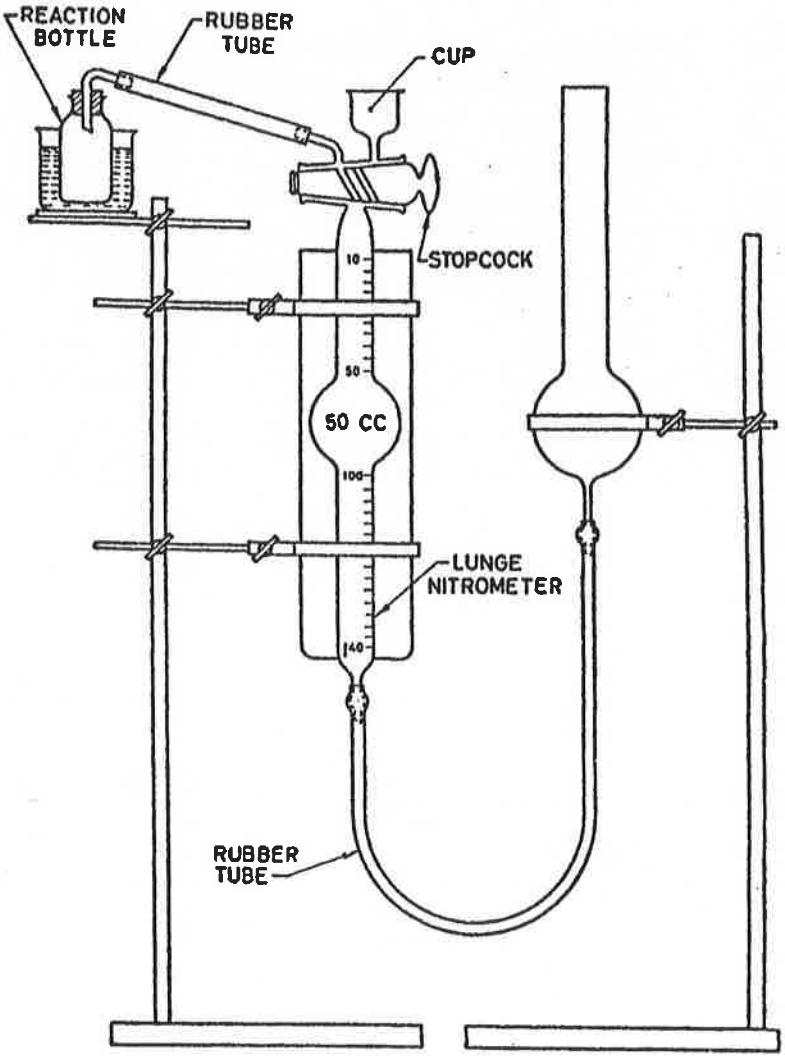

FIG. 1 ASSEMBLY OF APPARATUS FOR DETERMINATION OF MAGNESIUM

ANNEX L

[*Table* 2, *Sl No.* (ix)]

DETERMINATION OF GRITTY MATTER

L-1 OUTLINE OF THE METHOD

The fraction of magnesium powder retained on 75-micron IS Sieve is digested with dilute hydrochloric acid. The residue obtained after hydrochloric acid treatment is boiled with aqua regia. The residue obtained after digestion with aqua regia is dried. The dried residue is then sieved through 125-micron IS Sieve and the portion retained on the sieve is weighed. If the residue (retained on 125-micron IS Sieve) scratches soda glass then the mass previously obtained is expressed as percentage grit.

L-2 APPARATUS

L-2.1 Sieves — 75-micron and 125-micron IS Sieves.

L-2.2 Glass Slides — soda glass.

L-3 REAGENTS

L-3.1 Dilue Hydrochloric Acid — 1 : 3 (*v/v*).

L-3.2 Aqua Regia — Prepared by mixing 3 volumes of concentrated hydrochloric acid with one volume of concentrated nitric acid.

L-4 PROCEDURE

L-4.1 Sieve 5 g of magnesium powder through 75-micron IS Sieve with a 25-mm brush. Take the portion retained on the sieve in a 250-ml beaker and add to it slowly and carefully about 100 ml of dilute hydrochloric acid. After the initial reaction has subsided, boil it for about half and hour. Cool the beaker and decant the diluted acid carefully without losing any residue remaining at the bottom of the beaker.

L-4.2 Boil the residue obtained in **L-4.1** with about 50 ml of aqua regia in a 150-ml beaker (covered with a watch glass) for about 30 min. Cool the beaker, dilute the acid with water and then decant the diluted acid carefully without losing any residue remaining at the bottom of the beaker. Wash the residue three times with water and dry the residue in an air-oven.

L-4.3 Sieve the dried residue obtained in **L-4.2** through 125-micron IS Sieve with a light camel hair brush. Weigh accurately the portion retained on the sieve and carry out the soda glass scratching test as prescribed in **L-5.** If the residue scratches soda glass, express the mass (previously obtained) as percentage grit.

L-5 SODA GLASS SCRATCHING TEST

Take a portion of the residue, retained on 125-micron IS Sieve, in between two clean glass slides and press the slides by hand along the length and breadth of the glass. Examine whether any scratch on the glass is obtained. If there is a scratch on the glass then the residue is termed as grit.

L-6 CALCULATION

$$\text{Grit, percent by mass} = 100 \times \frac{M}{M_1}$$

where

M = mass, in g, of the residue scratching soda glass, and

M_1 = mass, in g, of the material taken for the test.

ANNEX M

(*Clause* 6)

SAMPLING OF MAGNESIUM POWDER FOR EXPLOSIVE AND PYROTECHNIC COMPOSITIONS

M-1 GENERAL REQUIREMENTS

M-1.1 In drawing, preparing, storing and handling test samples, the following precautions and directions shall be observed.

M-1.2 Samples shall not be taken in an exposed place.

M-1.3 The sampling instrument shall be clean and dry.

M-1.4 Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from adventitious contamination.

M-1.5 To draw a representative sample, the contents of each container selected for sampling shall be mixed as thoroughly as possibly by suitable means.

M-1.6 The samples shall be placed in clean, dry, air-tight glass or other suitable containers which have no action on the material.

M-1.7 The sample containers shall be of such a size that they are almost completely filled with the sample.

M-1.8 Each container shall be sealed air-tight with a stopper after filling, and marked with all particulars of the material (*see* 5.2) and the date of sampling.

M-1.9 Samples shall be stored in such a manner that the temperature of the material does not vary unduly from the normal temperature.

M-2 SCALE OF SAMPLING

M-2.1 Lot

All containers in a single consignment of the material of the same Grade and belonging to the same batch of manufacture shall constitute a lot.

M-2.2 For ascertaning the conformity of material to the requirements of the standard, samples shall be tested from each lot separately.

M-2.3 The number of containers to be selected shall depend on the size of the lot and shall be in accordance with Table 3.

M-2.3.1 These containers shall be selected at random. In order to ensure that randomness of selection procedures given in IS 4905 may be followed.

M-3 TEST SAMPLES AND REFEREE SAMPLES

M-3.1 From each of the containers selected according to M-2.3 draw portions of material from different parts of each container. The quantity of material so drawn shall be sufficient for triplicate determination of all characteristics given in 4.

M-3.2 Thoroughly mix portions of material drawn from each container. Out of each of these portions, approximately equal quantity of material shall be taken and mixed thoroughly to form a composite sample. The composite sample shall be divided into three equal parts, one for the purchaser, another for the supplier and the third to be used as referee sample. Each of these parts of composite sample shall be immediately transferred to thoroughly dried bottles which are sealed air-tight with stoppers. These shall be labelled with all the particulars of sample given under 5.2.

M-3.3 The referee sample bearing the seals of purchaser and supplier shall be kept at a place agreed to between the purchaser and the supplier, to be used in case of any dispute between the two.

M-4 NUMBER OF TESTS

M-4.1 All characteristics given in 4 shall be tested on the composite sample.

M-5 CRITERIA FOR CONFORMITY

M-5.1 The lot shall be declared as conforming to the requirements of the standard if all the test results on the composite sample meet the corresponding requirements given in 4.

Table 3 Scale of Sampling

(*Clause* M-2.3)

Sl No. (1)	Lot Sizes (2)	No. of Containers to be Selected (3)
i)	Up to 25	3
ii)	26 " 50	4
iii)	51 " 100	5
iv)	101 " 150	6
v)	151 " 300	7
vi)	301 " 500	8
vii)	501 " 1 000	9
viii)	1 001 and above	10

ANNEX N

(*Foreword*)

COMMITTEE COMPOSITION

Explosives and Pyrotechnics Sectional Committee, CHD 26

Organization	*Representative(s)*
Chief Controller of Explosives, Nagpur	Shri R. H. Bhalekar (*Chairman*) Shri K. N. Ghosh (*Alternate*)
Central Mining Research Institute, Dhanbad	Dr M. M. Bhattacharya Shri R. R. Singh (*Alternate*)
Central Mine Planning & Design Institute Limited, Ranchi	Representative
Coal India Limited, Kolkata	Shri C. P. Bansal Shri D. K. Jain (*Alternate*)
Consumer Guidance Society of India, Mumbai	Shri N. G. Wagle Shrimati Renu Talwani (*Alternate*)
Development Commissioner (Small Scale Industries), New Delhi	Shri N. K. Guha Shri Y. S. Bhatnagar (*Alternate*)
Directorate General of Mines Safety, Dhanbad	Director, MSE Deputy Director (*Alternate*)
Defence Research & Development Organization (DRDO), CEES, Ministry of Defence, Delhi	Dr H. L. Yadav
Directorate General Ordnance Factories (DGOF), Ministry of Defence, Kolkata	Shri C. Mridha Shri P. Velunayil (*Alternate*)
Directorate General of Quality Assurance (DGQA), Ministry of Defence, New Delhi	Shri N. V. Pillai Dr C. Nesamani (*Alternate*)
Directorate of Standardization (DSTD), Ministry of Defence, New Delhi	Lt-Col. S. K. Lohani Shri S. B. Mehru (*Alternate*)
Federation of Corrugated Box Manufacturers of India, Mumbai	Shri Deepak Killawala Capt M. L. Mehra (*Alternate*)
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IDL Industries Limited, Hyderabad	Dr A. K. Mukherjee Shri M. Ramakrishna (*Alternate*)
IEL Explosives Ltd, Kolkata	Shri R. N. Sinha Dr V. Ramanna Rao (*Alternate*)
Indian Institute of Packaging, Mumbai	Shri A. A. Joshi Shri Manik Koli (*Alternate*)
Khadi and Village Industries Commission, Mumbai	Shri J. L. Choudhuri Shri G. K. Ghosh (*Alternate*)
National Mineral Development Corporation Ltd, Hyderabad	Shri A. D. Tripathi Shri A. K. Gupta (*Alternate*)
Noble Explochem Ltd, Nagpur	Representative
Standard Fireworks, Sivakasi	Shri Subha Singh Chelladhurai Shri Raja Singh (*Alternate*)
Tamil Nadu Industrial Explosives Limited, Vellore	Shri R. P. Sinha Shri T. K. Varedarajan (*Alternate*)
The Tamil Nadu Fireworks & Amores Manufacturers Association, Sivakasi	President Secretary (*Alternate*)
The All India Chamber of Match Industries, Sivakasi	President Secretary (*Alternate*)
WIMCO Limited, Mumbai	Shri J. Vaidyanathan
Bharat Dynamics Ltd, Hyderabad	Shri R. N. Desai Shri M. Prabhakaran (*Alternate*)
High Energy Material Research Laboratory, Pune	Dr B. K. Athawale Shri M. Prabhakaran (*Alternate*)
Arasan Fire Works, Sivakasi	Shri G. Parthasarthi
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Sri Katiswani Fire Works, Sivakasi	Shri A. P. Selvarajan Shri Siva Sannugam (*Alternate*)
Coronation Fireworks, Sivakasi	Shri P. Kanagavel Shri K. Jayakumar (*Alternate*)

Organization	*Representative(s)*
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Member Secretary
Shri P. Ghosh
Director (CHD), BIS

Explosives, Method of Tests and Packaging Sub-committee, CHD 26 : 1

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The Tamil Nadu Fireworks & Amorces Manufacturers Association, Sivakasi	President Secretary *(Alternate)*
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Deepak Nitrate, Vadodara	Shri D. P. Gupta Shri H. R. Shah *(Alternate)*
Federation of Corrugated Box Manufacturers of India, Mumbai	Shri Deepak Killawala Capt M. L. Mehra *(Alternate)*
Hindustan Zinc Ltd, Rajasthan	Shri Kabir Ghosh Shri Raj Rathan Kumar *(Alternate)*
Solar Explosives, Nagpur	Representative
Initiating Explosives (IES), Gomia	Dr. Anil V. Mukholatha Shri Rajesh Sharma *(Alternate)*
United Prosphores Ltd, Mumbai	Representative
RCF, New Delhi	Representative
High Energy Mineral Research Laboratory, Pune	Dr B. K. Athawale Shri K. Prabahkaran *(Alternate)*
Transport Corporation of India, Delhi	Representative

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