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SPECIFICATION FOR DRY POWDER FOR FIGHTING FIRES IN BURNING METALS

(First Revision)

(Incorporating Amendment No. 1)

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

Price Group 2

Indian Standard

SPECIFICATION FOR DRY POWDER FOR FIGHTING FIRES IN BURNING METALS

(First Revision)

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Indian Standard

SPECIFICATION FOR DRY POWDER FOR FIGHTING FIRES IN BURNING METALS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 24 February 1984, after the draft finalized by the Fire Fighting Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Dry powder used for fighting fires in burning metal has special characteristics. Whereas, dry powder of a particular composition may extinguish fires in a particular metal only, others may be employed for extinguishing all types of metal fires. This standard does not, therefore, give the exact constituents of each type of dry powder. The dry powder is generally composed of basic material of eutectic chlorides, ammonium phosphate, diamonium phosphate, sodium chloride or a mixture of sodium chloride with ammonium phosphate with additives to make it water repellant, free flowing and confirming to various requirements mentioned in this standard. However, it may be mentioned that chemicals used for the composition should not emit any toxic or irritating vapors on melting or decomposition.

0.3 This standard was first published in 1968. This revision has been prepared based on the studies conducted by Defence Institute of Fire Research in respect of performance requirement.

0.4 The dry powder covered by this standard may be applied in one of the following ways, depending upon the situation:

a) By scoop/shovel,

b) By filling the powder loosely in plastic bags and placing the bag over the burning metal, and

c) By using in dry powder extinguisher with applicator for gentle application for powder.

0.5 This edition 2.1 incorporates Amendment No. 1 (May 1987). Side bar indicates modification of the text as the result of incorporation of the amendment.

0.6 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*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard lays down the requirements of dry powder for fighting fires in burning metals only.

2. REQUIREMENTS

2.0 The sample of powder for testing shall be drawn in such a way that it represents the entire strata of powder from any container and shall be tested for properties mentioned below.

2.1 Apparent Density — The apparent density of the powder when determined by the method given in **2.1.1** shall be between 0.75 g/m and 1.18 g/ml.

2.1.1 A sample of 100 g of dry powder shall be placed in a clean dry 250-ml glass-stoppered graduated cylinder conforming to IS : 878-1975†. The cylinder shall be rotated slowly, end over end, for ten complete cycles and then set upright to let the powder settle for 60 seconds. After shaking it gently to level off the surface of the powder, the volume of the powder in the cylinder shall be noted and the apparent density calculated as follows:

$$\text{Apparent density} = \frac{100}{\text{Volume of powder}}$$

2.2 Particle Size Distribution — The particle size distribution of dry powder shall be such that not less than 99 percent of its total quantity passes through IS sieve 125 μm and not less than 90 percent of its total quantity passes through IS sieve 75 μm. For this purpose 100 g of powder shall be used and the applicable requirements of IS : 1607-1977‡ shall be followed, the duration of sieving shall be 30 min for hand sieving and 110 min for machine sieving.

*Rules for rounding off numerical values (*revised*).

†Specification for graduated measuring cylinders (*first revision*).

‡Method for test sieving (*first revision*).

2.3 Hygroscopicity and Caking — Separately weigh two dry watch-glasses. Place about 5 g of dry powder in each of them and weigh them accurately. Also weigh 100 g of dry powder in a 250-ml beaker. The three samples shall be placed in a desiccator jar containing saturated solution of ammonium chloride in water to produce a relative humidity of 80 percent. The samples in watch-glasses shall be checked for increase in mass after every 7 days for 21 days. The mass should not increase by 0.05 percent at any stage. If this condition is satisfied, then sample in beaker shall be kept in a desiccator containing anhydrous calcium chloride for 2 days and then in a desiccator containing ammonium chloride solution for 2 days and this cycle should be repeated for 20 days. Observe the formation of any caking or lump in the powder. In case there is any caking or lump formation, allow it to drop from a height of 100 cm on a smooth hard surface. The lump shall be friable to pass the requirements given in **2.2**.

2.4 Water Repellency — Weigh 50 g of dry powder in a tared beaker and gradually fill it with 50 ml of distilled water. After 2 minutes the dry powder and the water from the beaker shall be carefully poured out and the beaker with wet powder, if any, dried in an oven at 60°C for 2 hours and then cooled in a desiccator containing dry calcium chloride for 1 hour. The beaker shall be weighed and the mass of dry residue calculated. The mass of the dry powder residue shall not exceed 0.75 g (1.5 percent).

2.5 Free Flowing Characteristics (Efficient Fluidity) — Transfer 100 g of dry powder to a glass funnel of 7.5 cm diameter with its outlet plugged with thumb. The powder should be released by removing the thumb into a cylindrical flask of 250-ml capacity. The powder should flow freely from the funnel. If this condition is satisfied, then transfer this powder in conical flask and plug it with a cork. This should be then put in a mechanical vibrator having a frequency of 200 vibrations per minute. Allow it to vibrate for 2 hours and examine its flow again. The powder should flow down smoothly.

2.6 Heat Test — Weigh 200 g of dry powder in a tinned steel cup, 75 mm in diameter and 50 mm deep with a closely fitted cover. Place the cup in a thermostatically controlled oven at a temperature of 60°C for a week. The sample shall then be examined for caking or lump formation. The lump or cake, when dropped from a height of 100 cm on a smooth hard surface, shall be firable to pass the requirement laid down in **2.2.**

NOTE — This requirement ensures that the dry powder is stable and neither decomposes at normal ambient temperature nor any of its additives melt at an elevated temperature of 60°C and hence render the same an effective extinguishing agent when used in locations having higher temperatures.

2.7 Fire Extinguishment Test — A square metal tray shall be used for the test. The tray shall have a base of 1 × 1 m. Three of its vertical

sides shall be each 55 mm high and the fourth side shall be 40 mm high. The tray shall be constructed out of steel plates having a thickness of not less then 6 mm. Its upper edges shall be reinforced by suitable angle iron. The reinforcing angle shall be continuous along three equal sides of the tray to produce a turned out flush edge with the top of the tray. The top edge so formed shall be not less than 45 mm in width. The tray shall be placed on a metal stand so that its bottom is not less than 45 cm from the ground. A 25 mm thick layer of dry sand shall be spread uniformly inside the tray so as to cover its bottom completely. Turnings or chips of 500 g magnesium shall be spread over uniformly on 0.10 m^2 area in the tray and set alight. When the whole area covered by metal chips turnings is well alight, 2 kg of dry powder shall be applied gently within a period of 60 seconds. The fire should be completely extinguished. Leave it for 30 minutes undisturbed and remove the upper crust. Fire should be considered effectively extinguished if there is no unburnt powder left over.

3. PACKING

3.1 The powder to be used in the fire extinguisher and for scooping shall be packed in quantities of 10 kg and 25 kg in plastic bags and 50 kg in jute bag.

3.2 The powder for application in plastic bags shall be packed in plastic bags having the following measurement:

a) 300 × 300 mm,

b) 450 × 450 mm, and

c) 600 × 600 mm.

3.2.1 The bags shall be filled to three-fourths of their capacity.

3.3 The strength of the plastic container mentioned in **3.1** and **3.2** shall be such that no distortion or failure of the container shall occur when it is kept on a flat surface under a mass of 10 kg. The container shall also not disintegrate to any extent when dropped from a height of 1 m on a concrete surface after being packed.

3.4 The jute bags shall conform to IS : 7406 (Part 2) - 1980*.

4. MARKING

4.1 Each pack containing dry powder shall be labelled with the following:

a) Manufacturer's name or trade-mark,

b) Quantity of the powder,

*Specification for jute bags for packing fertilizers: Part 2 Laminated bags manufactured from 380 g/m^2 ; 68 × 39 tarpaulin fabric.

c) Suitability for the metal fires, and

d) Date of manufacture.

4.1.1 The packing may also be marked with Standard mark.

4.1.2 The use of the Standard Mark is govered 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 Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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