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IS 955 (1980): Functional Requirements for Dry Powder
Tender for Fire Brigade Use [CED 22: Fire Fighting]



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(Reaffirmed 2008)

Indian Standard
FUNCTIONAL REQUIREMENTS FOR
DRY POWDER TENDER FOR
FIRE BRIGADE USE
(*First Revision*)

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NEW DELHI 110002

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Indian Standard

FUNCTIONAL REQUIREMENTS FOR DRY POWDER TENDER FOR FIRE BRIGADE USE

(*First Revision*)

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AMENDMENT NO. 1 DECEMBER 1985

TO

**IS : 955- 1980 FUNCTIONAL REQUIREMENTS
FOR DRY POWDER TENDER FOR
FIRE BRIGADE USE**

(*First Revision*)

(*First cover, pages 1 and 3, title*) — Substitute the following for the existing title:

‘ Indian Standard

**FUNCTIONAL REQUIREMENTS FOR DRY
POWDER TENDER FOR FIRE BRIGADE USE
(150 kg CAPACITY)**

(*First Revision*)’

(*Page 3, clause 1.1, line 3*) — Add the words ‘ (150 kg capacity) ’ in the end.

(*Page 5, clause 4.4.1*) — Substitute ‘ IS : 7372-1974* ’ for ‘ IS : 7342-1974* ’.

(*Page 6, clause 4.5.3*) — Substitute ‘ IS : 4308-1982* ’ for ‘ IS : 4308-1967* ’.

(*Page 6, clause 4.5.4, line 2*) — Substitute ‘ IS : 3224-1979† ’ for ‘ IS : 3224-1971† ’.

(*Page 6, foot-notes*) — Substitute the following for the existing foot-notes:

‘ *Specification for dry powder for fire fighting (*first revision*).

†Specification for valve fittings for compressed gas cylinders excluding liquefied petroleum gas (LPG) cylinders (*second revision*).’

[*Page 8, clause 6.2(a)*] — Substitute ‘ IS : 928-1984‡ ’ for ‘ IS : 928-1964‡ ’.

(Page 8, foot-note with ' ‡ ' mark) — Substitute the following for the existing foot-note:

‘ ‡Specification for fire bell (*second revision*). ’

(Page 9, Appendix A, col 2, items No. 2 to 5) — Substitute ‘ IS : 926-1985†, IS : 5505-1985‡ and IS : 274 (Parts I and II)-1981§ ’ for the corresponding Indian Standards ’.

(Page 9, foot-note with ‘ † ’, ‘ ‡ ’ and ‘ § ’ marks) — Substitute the following for the existing foot-notes:

‘ †Specification for fireman’s axe (*second revision*).

‡Specification for multi-edged rescue axe (*non-wedging*) (*first revision*).

§Specification for shovels (*third revision*). ’

Indian Standard
FUNCTIONAL REQUIREMENTS FOR
DRY POWDER TENDER FOR
FIRE BRIGADE USE
(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 30 September 1980, after the draft finalized by the Fire Fighting Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Dry powder tender is one of the special types of fire fighting units which is intended for use on major fires in oils, petroleum products, gaseous substances, and electrical equipment/machinery where dry powder in a large quantity is required for putting out a fire. The articles or the equipment involved in fire on which dry powder is discharged as the powder is likely to eat away the metal if left on it for some time. It is also very essential to clean thoroughly and immediately after extinction. This standard has been prepared with a view to providing guidance in both manufacture and purchase of dry powder tenders of proper design and construction and capable of giving the required performance. This standard was first prepared in 1964. The revision has been formulated based on the use of this appliance in the past 14 years and also to keep in line with other Indian Standards on fire fighting units.

0.3 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 regarding material, design and construction, workmanship and finish, accessories, and acceptance tests of dry powder tender for fire brigade use.

*Rules for rounding off numerical values (revised).

2. GENERAL REQUIREMENTS

2.1 The appliance will be designed to carry 150 kg of dry powder and shall be capable of discharging the powder through hoses.

3. MATERIAL, SELECTION AND TREATMENT

3.1 The choice of materials to be used in the construction of the appliance shall be made with a view to combining lightness with strength and durability.

3.2 All parts which form waterways or come into contact with water shall be of corrosion-resisting material. All metal parts exposed to atmosphere shall either be of corrosion-resisting material or treated in a manner to prevent corrosion.

4. DESIGN AND CONSTRUCTION

4.1 Chassis

4.1.1 The chassis shall be designed for carrying full load in accordance with this specification and it shall conform to the following dimensions :

- a) Wheel base not greater than 3.20 m,
- b) Overall width not greater than 2.0 m,
- c) Road clearance not less than 20 cm, and
- d) Turning circle not greater than 17 m.

4.1.2 The chassis shall be a four-wheeler with drive on all the four wheels. The rear axle shall be fitted with stabilizer. Drag hooks or eyes of adequate strength shall be fitted to all chassis members at front and rear. The lubricating nipples shall be located at accessible and protected position; where nipples are not fitted on or adjacent to their bearings and are connected to them by pipes, plates on the nipples shall be provided to indicate the points which they serve.

4.1.3 The springs shall be of high grade steel (*see IS : 1135-1973**) preferably of elliptical type. Rear axle shall be of the semi-elliptical type and level or hypoid gear driven. Shock absorbers shall be fitted to all the wheels. The driving position shall preferably be forward or semi-forward.

4.1.4 The gear-box shall have at least three speeds forward and one reverse. Means shall be provided to determine with reasonable accuracy the oil level in the gear-box, preferably by a dip-stick, if possible.

*Specification for leaf springs for automobile suspension (*second revision*).

4.2 Engine

4.2.1 The engine whether petrol or oil fuel type (compression ignition) shall be capable of developing not less than 30 kW brake horse power for continuous operation and 52 kW for auto-rating and shall have four or more cylinders. Petrol driven engine, shall be provided with dual coil ignition efficiently suppressed, either by HT loads or by other appropriate means. Means shall be provided to ensure reliable and quick starting of the engine. In addition to an electrically-operated starter of adequate power, preferably a well-designed hand-starting device may also be provided.

4.2.2 The engine shall be capable of driving the fully-laden appliance at speed from starting-up without any preliminary running period even under abnormally cold atmospheric conditions. The operating temperature of the engine cooling water shall be thermostatically controlled.

4.2.3 Suitable temperature indicating gauge for water and oil pressure and indicating gauge for lubricating systems appropriately marked with normal operating ratings shall be provided on the instrument panel in the driving compartment. The engine lubricating system shall be provided with an accessible external filter. Means shall be provided to gauge with reasonable accuracy during running, the level of the oil in the sump, preferably by a tubed dip-stick.

4.2.4 Clutch shall be of heavy-duty type.

4.3 Fuel System

4.3.1 The fuel tank shall have a capacity of not less than 50 litres. A fuel tank content gauge shall be fitted on the instrument panel in the driving compartment.

4.3.2 The filling orifice shall be of size not less than 50 mm and shall be in an accessible position. The cap shall be clearly marked to show that it is for fuel, and an antflash device shall be incorporated in it, in case of petrol driven engine.

4.3.3 There shall be one fuel pump which shall be mechanically operated.

4.4 Electrical Equipment

4.4.1 The electrical system may be 12 volt. Battery shall conform to IS : 7342-1974*.

4.4.2 The dynamo/alternator shall be of heavy duty type.

*Specification for lead-acid storage batteries for motor vehicles.

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4.4.3 Separate fuses shall be provided for all important electrical circuits. These shall be suitably indicated and grouped into a common fuse-box which shall be located in an accessible position. The fuse-box shall have provision for carrying spare fuses in it.

4.5 Dry Powder Fire Extinguishing Equipment — Two dry powder fire extinguishing cylinders each having 75 kg capacity shall be mounted on the chassis. Each cylinder shall be connected to a separate nitrogen gas cylinder (see 4.5.4) having capacity of not less than 1.7 m³ and fitted with reducer valve and 10 m of 25 mm dia pneumatic rubber hose operated one at a time. A suitable pressure regulator shall be provided between the nitrogen cylinder and the dry powder vessel. The discharge rate for the powder shall be not less than 2.5 kg per second and throw shall be not less than 10 m for a minimum period of 25 seconds. The total discharge of the powder shall not be less than 85 percent of total content. The discharge hose shall terminate in a hand control powder nozzle.

4.5.1 One additional connection shall be provided in the inlet end of the hose to flush out the powder in the hose by using the air from outside source.

4.5.2 Dry chemical powder vessel shall be provided with filling orifice having a suitable cover and with diameter not less than 15 cm. It shall also be provided with drain orifice with cover at the base of the extinguishers and of diameter not less than 50 cm. The vessel shall also be fitted with safety valve and blow off valve. The working pressure of the cylinders should not exceed 15 kgf/cm² at 16°C. The body of the cylinders shall be hydraulically tested to a pressure of 30 kgf/cm².

4.5.3 The powder used in the extinguishers shall conform to IS : 4308-1967*.

4.5.4 The nitrogen cylinders shall be provided with wheel type valve. The valve of the cylinder should be made according to IS : 3224-1971†. The cylinders should have approval from the department of explosive, Government of India. Nitrogen cylinders shall be checked for full contents.

4.6 Body Work

4.6.1 The body shall provide closed seating accommodation for two men including the driver. Both the seats will be independent. The cabin shall have two doors, one on either side. The doors shall be hinged in front, opening outward and shall have double catch striking plates. The

*Specification for dry powder for fire fighting.

†Specification for valve fittings for compressed gas cylinders (first revision).

door lock shall be so designed as to prevent their being inadvertently opened from the inside.

The rear body shall provide accommodation for dry powder vessel and equipment as mentioned in Appendix A. The flooring for the rear body shall be provided with chequered plates. The roof of the canopy of the rear body shall be covered with aluminium sheets.

4.6.2 Grab rails and non-skid steps shall be provided, whenever required, to assist the crew to mount and dismount.

4.6.3 If required, provision for wireless equipment to suit requirements shall be made and the control panel of the wireless equipment shall be located in the driver's enclosure.

4.6.4 No part of the body-work shall reduce the road clearance to less than 20 cm when the appliance is fully loaded nor increase the width of the appliance to more than 2.0 m. The highest part of the appliance with the extension ladder mounted on it shall not exceed 3 m from ground level.

4.6.5 All seats shall be fitted with sponge rubber and provided with good quality rexine.

4.6.6 Sponge rubber head protection pads shall also be placed at all points where injury is likely to occur in the event of an accident.

4.6.7 Accommodation provided for the storage of equipment shall be fitted with readily accessible quick release brackets and hanging racks. Racks shall be painted as shadow boards for ready identification of missing equipment.

4.7 Ladder Gallows — Suitable gallows shall be provided to carry a 4.5 m extension ladder (*see* IS : 4571-1977*). The design shall be such that it facilitates easy and quick withdrawal of the ladder by men from the rear of the appliance. The head lock on the gallow shall be positive in action. No equipment shall be so positioned as to interfere with the easy and independent removal of the ladder.

4.8 Tool Kit Container — A specially-fitted recessed tray for the standard kit of tools carried on the appliance shall be provided.

4.9 Performance — The appliance shall be suitably geared to provide a road speed of 95 km/h on a level road without using transfer case. The acceleration shall be such that with a warm running engine, the fully-laden appliance shall attain a speed of not less than 60 km/h from a standing start, through the gears, in a maximum time of 40 seconds.

*Specification for aluminium extension ladders for fire brigade use (*first revision*).

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The appliance shall also be capable of being started from rest up a gradient of 1 in 4 when fully laden.

4.10 Brakes — Brakes shall be fitted on all the four wheels and shall be on hydraulic system (preferably of vacuum or air-assisted type) and shall be capable of stopping the vehicles when travelling at 30 km/h, when fully loaded and manned on dry pavement, within a distance of 6 m from the point at which the brake is applied. The hand brake shall be capable of holding the fully laden appliance on a dry surface gradient of 1 in 4 when in neutral gear.

4.11 Stability — The stability of the appliance shall be such that when under fully equipped and loaded conditions (but excluding crew), if the surface on which the appliance stands is tilted to either side, the point at which overturning occurs is not passed at an angle of 25° from the horizontal.

5. WORKMANSHIP AND FINISH

5.1 All parts of the appliance shall be of good workmanship.

5.2 The appliance shall be painted fire-red (Shade No. 536 of IS : 5-1979*). The paint shall conform to IS : 2932-1974†.

6. INSTRUCTION BOOK, ACCESSORIES AND EQUIPMENT

6.1 Instruction Book — Instruction book(s) for the guidance of the user(s), including both operating and normal maintenance procedures, shall be supplied. The book(s) shall include an itemized and illustrated spare parts list giving reference number to all the wearing parts.

6.2 Accessories — The following accessories shall be provided in addition to those normally fitted on commercial vehicles :

- a) *Fire-Bells, 250 mm, F-Natural Tone Carillon (IS : 928-1964‡)* — mounted externally and capable of being operated from within the driving compartment.
- b) *Fog Lamps* — A lamp suitably situated to assist reversing.
- c) *Reversing Light* — Low mounted and of approved design.
- d) *Trafficators* — With indicating light on instrument panel or in any other prominent position in the driver's enclosure.
- e) *Wind Screen Wipers* — One pair.

*Specification for colours for ready mixed painting (*third revision*).

†Specification for enamel, synthetic, exterior (a) undercoating (b) finishing (*first revision*).

‡Specification for fire bell (*revised*).

- f) *Tools* — All tools required for normal routine maintenance of the appliance, which are not included in the standard kit of tools for chassis.
- g) *Search Light* — Adjustable to give flood or beam light mounted in convenient position but capable of being readily disconnected and mounted on a tripod away from the appliance; complete with not less than 30 m of TRS cable on a reel mounted on the appliance. The capacity of the cable shall be such that the voltage drop shall be not more than 2 volts at the other end.
- h) *Spot Light, Adjustable* — Mounted in convenient position on the near side of the driver's enclosure.
- j) *Inspection Lamp* — protected type on wander lead with plug. A socket shall be provided on the control panel in the driver's enclosure for plugging in the lamp.

6.3 Equipment — The appliance shall be provided with the equipment detailed in Appendix A.

7. MARKING

7.1 Each appliance shall be clearly and permanently marked with the following information:

- a) Manufacturer's name or trade-mark, if any; and
- b) Year of manufacture.

APPENDIX A

(*Clauses 4.6.1 and 6.3*)

SCHEDULE OF EQUIPMENT TO BE CARRIED ON THE APPLIANCE

<i>Item No.</i>	<i>Equipment</i>	<i>Quantity</i>
1.	Extension ladder, 4.5 m (<i>see IS : 4571-1977*</i>)	1
2.	Fireman's axe (<i>see IS : 926-1970†</i>)	2
3.	Axe, large (<i>see IS : 5505-1969‡</i>)	1
4.	Axe, hand (<i>see IS : 5505-1969‡</i>)	1
5.	Shovel [<i>see IS : 274 (Parts I & II)-1966§</i>]	1

*Specification for aluminium extension ladders for fire brigade use (*first revision*).

†Specification for fireman's axe (*first revision*).

‡Specification for multi-edged rescue axe (non-wedging).

§Specification for shovels: Part I General purpose shovels: Part II Heat-treated shovels (*second revision*).

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