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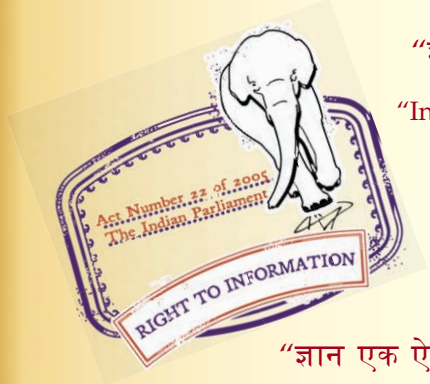

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FUNCTIONAL REQUIREMENTS FOR HOSE LAYING TENDER FOR FIRE BRIGADE USE

(First Revision)

UDC 614·846·63 : 614·843·6

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FUNCTIONAL REQUIREMENTS FOR HOSE LAYING TENDER FOR FIRE BRIGADE USE

(First Revision)

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(*Continued on page* 12)

AMENDMENT NO. 1 SEPTEMBER 1984

TO

IS:2930-1980 FUNCTIONAL REQUIREMENTS FOR HOSE LAYING TENDER FOR FIRE BRIGADE USE

(First Revision)

Alteration

(*Page 4, clause 4.1.1*(a)] - Substitute '4.5 m' *for* '4.35 m'.

(BDC 22)

Reprography Unit, ISI, New Delhi, India

Indian Standard

FUNCTIONAL REQUIREMENTS FOR HOSE LAYING TENDER FOR FIRE BRIGADE USE

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 29 August 1980, after the draft finalized by the Fire Fighting Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Hose laying tender is used for laying of long hose lines in those cases where water is required to be brought quickly from long distances for fire fighting purposes. This standard has been prepared with a view to providing guidance in both the manufacture and the purchase of hose laying tender of proper design and construction and capable of giving the required performance. This standard was first printed in the year 1964. The standard has been revised based on experience gained in the use of this appliance in the past 15 years besides keeping various provisions in line with the 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.

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1. SCOPE

1.1 This standard lays down the requirements regarding material, design and construction, workmanship and finish, accessories and equipment, and performance tests of hose laying tender for fire brigade use.

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

2. GENERAL REQUIREMENTS

2.1 The appliance shall have a total carrying capacity of 2 250 m of hose and other ancillary equipment. The appliance shall be capable of towing a trailer pump.

3. MATERIALS

3.1 The material to be used in the construction of the appliance shall be either mild steel or aluminium.

3.1.1 All the parts which form water-ways or come in contact with water shall be corrosion resisting material or shall be treated for corrosion resistance.

4. DESIGN AND CONSTRUCTION

4.1 Chassis

4.1.1 The chassis shall be designed for carrying a load of not less than 5 000 kg. The chassis shall conform to the following dimensions:

a) Wheelbase not greater than 4·35 m,

b) Overall width not greater than 2·50 m,

c) Road clearance not less than 23 cm, and

d) Turning circle in either direction not greater than 20 m.

4.1.2 The chassis shall be a four-wheeler with rear axle drive only, the rear axle shall be fitted with twin wheels. The lubricating nipples shall be located at accessible and protected positions. 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. Drag hooks or eyes shall be fitted to each chassis member at front and rear, and provisions shall be made at the rear for a towing hitch suitable for a two-wheeled trailer weighing approximately one tonne. The towing hitch shall be mounted on a sub-frame attached to the chassis with height centre at 60 cm above ground level. Forward or semi-forward control driving position shall be preferred, and the scuttle and radiator support shall be designed to permit easy removal of the engine without need to remove any part of the body structure. The engine exhaust shall be arranged to discharge as far away as possible, and shall not cause over-heating of any part of the engine or the chassis.

4.1.3 The gear box shall have a minimum of four 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.

4.2 Engine

4.2.1 The engine, whether petrol or oil fuel type (compression ignition), shall be capable of developing not less than 71 kW brake power at maximum working revolution per minute (that is a continuous duty). In the case of a petrol engine, it shall preferably be provided with dual coil ignition. Means shall be provided to ensure reliable and quick starting-up of the engine, and in addition to an electrically-operated starter of adequate power, preferably a well-designed hand-starting device may be provided. The engine shall be capable of driving the fully-laden appliance at speed from starting-up without any preliminary running period, having immersion heaters in the oil and water circuits when necessary to enable this requirement to be fulfilled. Any immersion heater in oil-sump shall not be of such type or capacity as to cause carbonization. The operating temperature of the engine cooling water shall be thermostatically controlled.

4.2.2 Ignition systems on petrol engines shall be efficiently suppressed, either by special high tension (HT) leads or by other appropriate means.

4.2.3 Suitable temperature indicating gauge for cooling water and oil pressure gauge for lubricating system, appropriately marked with normal operating ratings shall be provided on the instrument panel in the compartment.

4.2.4 The engine lubricating system shall be provided with an external filter and means to gauge with reasonable accuracy the level of the oil in the sump, preferably by a tubed dip-stick.

4.3 Fuel System

4.3.1 The fuel tank shall have a capacity of not less than 90 litres and a fuel tank contents gauge shall be fitted on the instrument-panel in the driving compartment. The filling-orifice shall be of ample size, but not less than 50 mm in diameter, and shall be in an accessible position. The cap shall be clearly marked to show that it is for fuel, and where the fuel is petrol, an anti-flash device shall be incorporated in it.

4.3.2 There shall be one fuel pump which shall be mechanically operated. It shall be preferably provided with a drain plug.

4.4 Electrical Equipment

4.4.1 The electrical system may be either 12 or 24 volts. There shall preferably be a single battery of 12 volts, in the case of 12 volts systems and 2 batteries each of 12 volts fitted in series in the case of 24 volts system. The batteries shall conform to IS : 7372-1974*.

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

The batteries shall be fitted in an accessible position, and trickle type battery charger for re-charging *in situ* from an external electric supply shall be provided. The plug and socket for re-charging shall be different from that of any immersion heater. A red pilot lamp, indicating when the batteries are being changed from an external supply, shall be provided.

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

4.4.3 All important electrical circuits shall have separate fuses suitably indicated, and shall be grouped into a common fuse box located in an accessible position in driver's cab and fitted with means for carrying spare fuses. The wiring shall be single pole.

4.5 Body Work

4.5.1 *General*

4.5.1.1 The body shall provide enclosed accommodation for an officer and the driver in the front and in the rear with a dividing partition which shall form the main body for carrying hose and shall have accommodation for two men immediately behind the partition.

4.5.1.2 The body shall be constructed with 16 gauge mild steel pressed sections frame work with 18 gauge aluminium sheets on the exterior and the interior. Under construction and the flooring of the cabin shall be same as of rear body and shall be made of mild steel or aluminium chequered sheets. Channel sections duly welded and gussetted of the joints. The complete floor plates shall be rigidly fixed to cross members in the G.I. bolts and nuts or rivetted. Adequate number of drainholes shall be provided so that water can be drained out.

4.5.1.3 A signalling system, consisting of bell-push at the rear of the gangway and a bell in the driver's compartment, shall be provided to enable the crew members to give instructions to driver when the hose is run-out from the moving vehicle.

4.5.1.4 There shall be lockers provided underneath the seats in the crew compartment to accommodate hose clamps, bandages, etc. The top of the lockers shall be hinged lid type so that the equipment could be easily placed and removed. Two 150 mm size drop type handles shall be provided on the top of the boxes to open and close.

4.5.1.5 Adequate lighting shall be provided in the driver's cabin and the rear cabin. There shall be minimum one light in the driver's compartment and three lights, at the roof level, in the rear cabin. The lights should have separate switches and the light in the driver's cabin should be capable of switching 'ON' and 'OFF' by opening of the door.

4.5.1.6 Where required, provision for wireless equipment shall be made, the control panel of the wireless equipment shall be located in the driving compartment.

4.5.1.7 The construction of the roof shall be such that it is capable of supporting the weight of one man without damage.

4.5.1.8 Grab-rails and non-slip steps shall be provided wherever required to assist crew to mount and dismount and to give access to the roof of the appliance. Grab-rails shall also be provided inside the hose-compartment on either side with supports from underside the roof to enable the crew to take support when the vehicle is in motion.

4.5.1.9 No part of the body work shall reduce the road clearance to less than 23 cm or increase the width of the vehicle to more than 2·50 m. There shall be sufficient clearance in wheel arches and wings to permit the use of skid-chains, when necessary. The highest part of the appliance shall not exceed 3 m from the ground level.

4.5.1.10 *Ventilators* — Suitable ventilators 15 cm long and three numbers on each side of the rear cabin shall be provided. The ventilators shall be protected internally by fine wire mesh from entry of rodents and insects.

4.5.1.11 *Mudguards* — Suitable type of mudguards on rear wheels shall be provided. The mudguards shall be prepared out of M.S. sheets of 1·6 mm size and shall be supported on suitable mild steel brackets, which shall be rigidly fixed to rear body by means of bolts.

4.5.2 *Driving Compartment* — The design of the driving compartment shall be such that affords maximum possible vision for the driver. The driver's seat shall be adjustable and preferably of the 'bucket' type. Doors shall be provided on both sides of the appliance, giving ready access for driver and crew. Hinged doors and opening outward shall be provided. The doors or door locks shall be so designed as to prevent their being inadvertently opened from the inside. These doors shall have winding type windows fitted with toughened glass, working on mechanical regulators, sliding inside flexible channels.

4.5.2.1 *Rear body* — The rear body shall be fabricated attached to the driver's cabin. There shall be a full partition between these two compartments fabricated out of 1·6 mm mild steel pressed section bolted or welded with gusset plates at joints. Both sides panelling of partition shall be 1·2 mm aluminium sheets. One sliding glass window of not less than 500 × 350 mm approximately shall be provided in this partition panel.

4.5.2.2 *Entrance to the rear compartment* — Entrance to the rear compartment shall be provided from the rear with two full side doors hung

upon 3 numbers stout invisible coach type hinges and fitted with N.P. handles with locking arrangements. (Aldrops may also be provided as per requirements of the purchaser for better protection.)

4.5.3 *Hose Compartment* — Hose compartment shall also form crew's compartment and shall be constructed to suit either of the following two requirements.

a) The compartment shall have not less than 45 cm central passage from the dividing partition to the tail-board for the persons to move about and to stow hose lengths in the two compartments on sides. The side compartment shall be not less than 75 cm wide to take running hose in lengths total carrying capacity being not less than 2 250 m. The side compartments shall be suitably subdivided in three sections and that the lowest compartments on either side are used for the stowage of the hose ramps. Arrangements to prevent the hose ramps from movements shall be provided. The upper compartment shall be sliding one, fixed on screws to the tubular vertical metal bars so that the hose in this compartment shall be brought to the floor, if additional hose is to be laid out the hose lengths shall be so arranged that the couplings remain on ends near the tail-board. The tail-board shall be so designed that when lowered, it forms an inclined ramp down on which the hose can slide as it is laid out on to the ground from the moving vehicle. It shall be faced with steel to prevent the couplings damaging the woodwork as the hose is beir g laid. The tail-board shall be fitted with supports which fall automatically into place as the board is lowered, holding it with the lower edge not more than 60 cm from the ground. The tail-board hinge shall also be guarded with iron so that no sharp edge remains to chafe the hose. On the inner side of the tail-board there shall be a socket fitted more or less centrally located facing the compartment for the purposes of taking in turn tables which shall be utilized for flaking of rolled lengths of hose into the compartment.

b) Alternatively, the side compartments shall be suitably sub-divided in such a manner that the lower compartment is used for stowage of the hose ramps. Arrangements to prevent the hose ramps from sliding shall be provided. There shall be two compartments, the total carrying capacity taking flaked length of hose not less than 2 200 m in length between vertical metal tubes which are so arranged that all the hose couplings lie outside at the rear of the last row of tubes. In order to prevent damage to the couplings as the hose is laid out, it is necessary to maintain sufficient tension on the flaked hose so as to prevent the coupling striking the ground immediately behind the vehicle as it moves

on. The required tension can be provided by facing board about 3·0 m long weighted with a 2·5 m length of old 70 mm canvas hose filled with sand on the top of each section of hose after it has been flaked. The board is prevented from moving with the hose by hooks round the vertical tubes. The weighted board shall fall with the hooks sliding on the metal supports as the hose is laid out.

4.5.3.1 The hose compartment shall be provided with internal electric lighting and a signalling system consisting of a bell-push at the rear of the gangway and a bell in the driver's cab so as to enable the man supervising the running out of the hose to communicate with the driver.

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

4.6 The appliance shall be suitably geared to provide a road speed of at least 70 km per hour on a level road when it is fully laded but without trailer. The acceleration shall be such that with a warm running engine, the fully laden appliance shall be capable of attaining a speed of at least 64 km per hour from standing start, through the gears, in a maximum time of 55 seconds. The appliance shall also be capable of being started from rest up a gradient of 1 in 4 when fully laden.

4.7 Brakes shall be fitted on all the four wheels and shall be on hydraulic system (preferably of vacuum or air-assisted type). Brakes shall be capable of stopping the vehicle when travelling at 30 km per hour (fully laden and manned on dry pavement) within a distance of 6 m from the point at which the brake is applied. The service (foot-operated) braking system shall be such as to stop the fully laden appliance within 17 m from the point at which the brake is applied when travelling at 48 km per hour along a level, dry road (this being equivalent to a brake efficiency of 55 percent).

4.7.1 If the chassis is fitted with air or air-hydraulic brakes which derive their power from a high pressure reservoir, a warning device shall be fitted in the driving compartment, which will operate when the pressure in the reservoir drops below 3·5 kg/cm^2. The rate at which the pressure loss occurs shall not exceed 0·07 kg/cm^2 for the first 12 hours after the reservoir has been charged to its maximum working pressure. Where air-hydraulic or full air-pressure brakes are fitted, a satisfactory anti-freezer shall be provided.

4.8 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 in fire red colour conforming to Shade No. 536 of IS : 5-1978*. The paint shall conform to IS : 2932-1974†.

6. INSTRUCTION BOOK, ACCESSORIES AND EQUIPMENT

6.1 Instruction Book or Books — An instruction book or books including both operating and normal maintenance procedures for the guidance of the user shall be supplied. The book or books 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 modern commercial vehicles:

a) ‡*Fire Bells, 250 mm Diameter, F-Natural Tone Carillon* — Fire bell shall be mounted externally and shall be capable of being operated from within the driving compartment.
b) *Head Lamps* — two, of not less than 20 cm in diameter.
c) *Fog Lamps* — low mounted.
d) *Reversing Light* — a lamp suitably situated to assist reversing.
e) *Twin Amber Blinker Lights* — situated on the head of the driving compartment.
f) *Trafficators* — illuminated with indicating lights on instrument-panel or in any other prominent position in the driving compartment.
g) *De-frosting Device* — for wind screens.
h) *Wind Screen Wipers*
j) *Tools* — all tools required for normal routine maintenance of the appliance which are not included in the kit for the chassis.
k) *Connection for Tail Light of Trailer* — an efficient twin-wire socket and plug for connecting the cable for the tail light of trailer.
m) *Search Light* — adjustable to give flood or beam light, mounted in a convenient position but capable or being readily disconnected and mounted on a tripod away from the appliance; complete with tripod and 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 percent at the other end.

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*Specification for colours for ready mixed paints (*third revision*).
†Specification for enamel, synthetic, exterior (a) under-coating, (b) finishing (*first revision*).
‡Specification for fire bell (*revised*).

n) *Spot Light* — adjustable, mounted in a convenient position on the near side of the driving compartment.

p) *Inspection Lamp* — protected type on wander lead with plug. A socket shall be provided on the control panel in the driver's cab for plugging-in the lamp.

q) Three electric swivelling type fan running on the vehicle battery shall be provided one in the driver's cabin and two in the rear cabin.

6.3 The list of the equipment to be provided in the appliance is given in Appendix A.

7. MARKING

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

a) Manufacturer's name and trade-mark, and

b) Year of manufacture.

APPENDIX A

(*Clause* 6.3)

SCHEDULE OF EQUIPMENT TO BE PROVIDED WITH THE APPLIANCE

Item No.	*Description*	*Quantity*
1.	Hose, delivery 70 mm, rubber lined as per Type II of IS : 636-1979* in 30 m lengths or controlled percolating as per IS : 8423-1977† duly fitted with hose couplings (*see* IS : 903-1975‡)	75 Numbers
2.	Clamps, hose [*see* IS : 5612 (Part I)-1977§]	24 Numbers
3.	Bandages, [*see* IS : 5612 (Part II)-1977‖]	24 Numbers
4.	Ramps, hose (wooden or sand filled)	12 pairs
5.	Torches, electric	4 Numbers
6.	Canvas, folding cams, each of 4 500 litres capacity	2 Numbers

*Specification for fire fighting hose (rubber lined woven-jacketed) (*second revision*).

†Specification for controlled percolating hose for fire fighting.

‡Specification for fire hose delivery couplings, branch pipe, nozzles and nozzle spanner (*second revision*).

§Specification for hose-clamps and hose-bandages for fire brigade use: Part I Hose clamps (*first revision*).

‖Specification for hose-clamps and hose-bandages for fire brigade use: Part II Hose bandages (*first revision*).

(*Continued from page* 2)

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Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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