

**QUALITATIVE REQUIREMENTS (QRs) OF WATER TANKER 12KL CAPACITY
WITH FIREFIGHTING PUMP**

Sl	Specifications	Qualitative Requirements
A	Scope of Supply	i) The chassis shall be supplied by the manufacturer. ii) A 6x2, full forward control, BS VI/latest version or equivalent with cowl chassis. iii) Fabrication and mounting of 12000 Ltrs capacity water tank as per specifications. iv) Supply and mounting of high & low pressure firefighting pump as per specification. v) Supply and mounting of water monitor.
B	Purpose	The Water Tanker shall be used to carry the water for fire fighting purpose. The pump will be driven by P.T.O
C	Detailed specification	
1	Chassis	The chassis shall be suitable indigenous make as per following specifications suitable for mounting Water Tank having 12000 ltrs. Capacity with pump. The Water Tanker 12 KL Capacity with firefighting Pump shall be equipped with a factory-fitted air-conditioned driver-cum-crew cabin in compliance with GSR 886(E) dated 08 December 2023 and the AC system shall conform to IS 14618:2022 requirements and testing procedures, as amended. 1.1 Make of the chassis: 6x2, 25T, 180 BHP (minimum), full forward control, cowl chassis, BS-VI or latest version emission ratio complaint/ any equivalent latest version chassis. 1.2 Type: 6x2, cowl chassis, full forward control, RHD, wheel base shall not be less than 4600 mm. 1.3 Engine: 6 Inline cylinder, water cooled, direct injection, turbo charged diesel engine developing minimum 180 B.H.P. with Bharat Stage VI/ equivalent latest version chassis. 1.4 GVW: Shall not exceed maximum permissible limit weight of chassis. 1.5 Fuel Tank: As per OEM 1.6 Tyres & Wheels: As per OEM, Spare wheel : 1 No. 1.7 Steering: Integral power steering 1.8 Tools: a) Hydraulic jack 40 Ton with lever b) Wheel spanner with lever c) Standard Tool kit d) Tyre inflation hose. 1.9 Manuals (I copy): a) Workshop manual b) Spare parts catalogue

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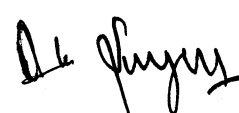
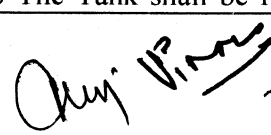
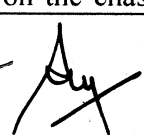
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		1.10 Driver Cabin: The chassis shall be fabricated for accommodation of 06 personnel including driver, Driver view mirror Cabin, windscreen, side windows, doors, adjustable driver seat, fixed Co-driver seat, wiper system, Horn, complete instrument cluster, preferably in PO RED colour. 1.11 The Angles and channels used in the appliance super structure shall be Zinc plated galvanized steel to ensure anti-corrosion protection and long term durability.									
2	Water Tank	2.1 The water tank shall have a capacity of 12000 Its when fully filled and made from SS sheet of grade 304 as per IS 6603, and Rectangular in shape with round corners. The tank shall be mounted on the chassis behind the driver's cabin. The detailed design drawing of the tank with its mounting shall be submitted with tender for scrutiny. 2.2 The water tank shall be mounted behind the driver cabin with a gap of minimum 450 mm. 2.3 The mounting of tank shall be directly on the chassis and as per the design approved by the chassis manufacturer. 2.4 The tank shall be rectangular in shape, with inbuilt forming (reinforced ribs) on both the sides. The sheet thickness shall be as follows:- <table border="0"> <tr> <td>Bottom</td><td>:</td><td>6 mm</td></tr> <tr> <td>Sides/front/Rear/Top</td><td>:</td><td>5 mm</td></tr> <tr> <td>Baffles</td><td>:</td><td>4 mm</td></tr> </table> 2.5 Centre of gravity of the vehicle shall be kept as low as possible under all conditions of loading. 2.6 The tank construction shall be such that there shall be no leakage and shall have overlapped joints of 25.4 mm between the bottom sheet and side sheets. The bottom sheet corner shall be rolled upward up to a minimum of 300 mm height and shall be welded to side sheets. The dimensions of the tank shall be clearly stated in the offer along with detailed volumetric calculation. 2.7 All the welding shall be by MIG welding process only. The welding of the tank shall be in such a manner that the first beading is from inside the shell and subsequent bead from outside the shell. The welded surface shall be cleaned of all slag, scale etc. There shall be minimum joints in the tank shell and hence plates used for fabrication of tank shall be of maximum size. 2.8 The water tank shall be mounted on the chassis on a sub frame using Rubber Metacones with sufficient saddle supports placed as per the availability of bolt holes in the chassis frame. The details shall be submitted along with the offer. These supports shall be fabricated from S.S. plate of minimum 10mm thick with a reinforcement plates of 6mm thick welded to tank shell from outside to the bottom sheet up to with continuous welding. 2.9 S.S. plate of suitable size and thickness shall be welded to the tank mounting pedestal for mounting the tank on mounting brackets provided in the chassis frame. The plates/brackets fitted to chassis frame shall also be provided with suitable gusset plates for reinforcement. 2.10 The Tank shall be fitted on the chassis with the help of 5/8" dia.	Bottom	:	6 mm	Sides/front/Rear/Top	:	5 mm	Baffles	:	4 mm
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Baffles	:	4 mm									





		High tensile bolts with nylock nuts.
		2.11 The tank shall be mounted slightly sloping towards the rear so as to decant the tank completely.
		2.12 There shall be two circular manhole of 600 mm dia. Mounted on top of the tank.
		2.13 The water tight manhole covers of SS with good quality of rubber gasket shall be bolted to the collar of manhole. The manhole covers shall be provided with round threaded blank cap with lugs of 10" dia. with rubber gasket.
		2.14 The tank shall be provided with suitable arrangement of baffle plates to prevent the surge of water when the vehicle is in motion and accelerating, braking in speed and covering. The arrangement of baffle plates shall be clearly shown in the drawing.
		2.15 The baffle shall be arranged in a manner to facilitate the movement of a person throughout the tank for cleaning and welding purposes.
		2.16 Suitable eyes shall provide on the shell of water tank to enable it to be lifted from the vehicle for repairs/replacement as and when required.
		2.17 The tank shall be fitted with 100mm dia. Overflow pipe of 'C' class galvanized taken down below the chassis but without reducing the ground clearance.
		2.18 The tank shall be fitted with four 63 mm instantaneous hydrant connection with non-return valve, closed to pump panel for filling the tank throughout 50mm above galvanized 'C' class pipe.
		2.19 A draw pipe of 100 mm dia. of 'C' class galvanized shall be taken from the tank to the pump suction inlet, incorporating 100 mm butterfly valve of flexible connection (Rubber Bellow) shall be provided to this pipe to take the vibrations. A suitable size sump shall be provided below the tank to connect water draw pipe with SS strainer.
		2.20 A drain cock with 50 mm suitable ball valve shall be provided at the bottom of water tank.
		2.21 A cat ladder shall be provided and fitted at the rear of water tank and fabricated out of 1" dia. M.S. tabular pipe and 2mm thick.
		2.22 The complete top of water tank shall be covered with 10SWG aluminium chequered plate and fixed to the frame fabricated from 40x40x4 mm S.S. angles properly welded to the tank shell. The chequered plates shall be bolted to this frame and shall be removable type.
		2.23 Suction hose brackets of aluminium sheet of 3.15 mm thick with suitable fastening arrangement shall be provided on the top deck to accommodate 4 Nos. 140 mm dia. and 2.5 mtrs. length suction hoses with male and female couplings.
		2.24 The locker of suitable size shall be provided with doors and locking arrangement on both sides. The location and size shall be shown in the drawing. These lockers will be used for keeping delivery hoses, accessories and high pressure hose reel. The structure of the locker shall be made from 40x40x4 mm thick S.S. angles with 16SWG aluminium panelling from outside and 16 SWG aluminium chequered plate from inside. The floor panelling of locker shall be 10 SWG aluminium chequered plates

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		2.25 Suitable rear mudguards made from 16 SWG M.S. sheet with reinforcing ribs shall be provided and supported on MS. brackets.
		2.26 A suitable towing hook shall be provided at the rear of vehicle.
		2.27 An additional draw pipe of 150 mm dia. of 'C' class galvanized incorporating 150 mm butterfly "Audco" make valve with gun metal, female suction hose coupling shall be provided to the rear side of the vehicle.
3	Fire Pump (Multi Pressure)	3.1 The water pump shall be centrifugal type, multi pressure made of bronze/gunmetal, having output capacity of 4000 LPM at 10 Kg/cm² and 300LPM at 35 Kg/cm² at 3 mtrs suction lift at NTP condition with automatic primer. The low pressure side will be of single stage and the high pressure side also with single stage having regenerative type impeller. 3.2 The pump shall be CE marked meet international standards and conforming to EN-1028 Part-I & II. 3.3 The pump shall comply following performance parameters. a) Normal Pressure output :4000 LPM at 10 kg/cm² b) High pressure output : 300 LPM at 35 kg/cm² c) Maximum pressure in :14kg/cm² (shut off pressure normal pressure mode). d) Maximum pressure in :45 Kgs/cm² high pressure mode. e) Deep lifting capacity of pump: 7mtrs in 36 sec. at NTP condition. 3.4 The overall pump shall be constructed from gunmetal. The normal (low) pressure impeller, volute, and impeller wearing shall be made from gunmetal confirming to Gr. II of IS 318/1981 and the regenerative type high pressure impeller shall be of Stainless steel. The pump shaft shall be made from stainless steel (Grade 04Cr18Ni10 of IS: 6603). The bearing housing will be made of C.I. and all the studs and bolts coming in contact with water shall be of stainless steel. The bearings used in the pump shall be of reputed make. 3.5 The normal and high-pressure impeller shall be mounted on a single shaft and normal (low) pressure impeller shall be dynamically balanced. 3.6 The pump shall be provided with self-adjusting mechanical carbon seal assy. 3.7 The pump shall be provided with an inbuilt filter of easily removable type, which shall filter the water before entering into the high pressure stage impeller. 3.8 Operation of low pressure to high pressure or vice a versa shall be possible by actuation of single lever. 3.9 The pump shall have facility to operate low pressure and high pressure mode simultaneously or individually, While high pressure mode is in operation and delivering 300 LPM at 35 kg/cm², the pressure in low pressure side shall not exceed 8.5 kg/cm². 3.10 The pump shall be provided in built (integrated in the pump outlet manifold) Pressure Relief Valve (PRV) which shall operate automatically and shall not allow the high pressure to increase beyond 45 kg/cm².
		3.11 The size of high-pressure outlet shall be of 35 mm connected to high pressure hose reel.

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		3.12 The thermal relief valve (TRV) shall be provided and fitted in the pump housing, which will open when both deliveries (HP and LP) are shut off for long time to control the temperature of pump water. The Thermal Relief Valve (TRV) should open at 60°C and shall reset automatically when the temperature of water is within limit.
		3.13 The pump design shall be modular type and shall not have gaskets/packing. The arrangement shall be such that the carbon seal can be attended/ removed without removing the pump body. The pump shall be provided deep groove heavy duty dual angular contact bearing immersed in oil bath.
		3.14 The pump shall be provided with one suction inlet of 140 mm dia having round threads confirming to IS:902 of 1974 and four numbers of 63 mm delivery outlets (IS:903) having screw down type quick closing clack valve (IS:4928) fitted with instantaneous couplings as per IS 903:1993. Blank caps fastened with chains and incorporating means to relieve pressure between the valve and the cap shall be provided one for each delivery valve and one 38 mm outlet with ball valve and female instantaneous coupling. The delivery valve screw shall not be with gland. The high pressure outlet shall not less than 25mm and shall either be flange on screw type.
		3.15 The efficiency of the pump shall be such that the power required shall not be more than available with the chassis at safe RPM for stationery and continuous operation.
		3.16 The pump shall be rear mounted connected to P.T.O by propeller shafts and universal and slip joint.
		3.17 If required the pump shall be provided with suitable ratio inbuilt gear box to match the PTO rpm and required pump rpm.
		3.18 All the valves used shall be of any standard make with all the piping of required size of 'C' class Galvanized.
		3.19 The pump shall be fitted with inbuilt twin piston reciprocating type priming system capable of priming the pump from 7 meters in not more than 36 seconds, when tested with the 140 mm suction hose at NTP conditions and considering the allowances as stated in IS: 950-2012. The pump shall attain a dry vacuum of 620 mm of Hg. The entire priming system shall be constructed in stainless steel and shall be actuated by an electromagnetic clutch immersed in oil bath of pump's bearing housing. Arrangement shall be made to actuate the primer in Manual and AUTO modes. When operating in Manual mode primer should be engaged simply by pressing a single button, only when it is needed. When operating in Auto mode, primer must be internally actuated and must automatically re-engage when pressure is lost. However, in both operating modes the primer shall disengage automatically at a pump discharge pressure of 1.5 to 2.0 kg/cm ² . The primer deactivation shall be controlled directly by a pump pressure sensing device. Priming system driven by any external belts/chain is not acceptable.
2		3.20 The pump with its fitment shall be tested hydrostatically to 1.5 times the working pressure at the pump i.e. for low pressure side it shall be tested to 21 Kg/cm ² and high pressure side will be tested to 52 Kg/cm ² . This testing shall be carried out in presence of

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		authorized representative of CISF and certificate to this effect from pump manufacture shall be submitted.
4	Power Take Off (PTO)	Split shaft Power Take Off shall be mounted at a suitable location on the chassis. The power take off shall be mounted on minimum two type foundation using rubber/ flexible mounts to isolate the PTO vibrations from the chassis and shall be designed to carry the unit weight and torque reactions, to constrain the PTO so as not to move significantly out of position, to allow chassis flexion. In no case welding/drilling shall be allowed on the chassis while mounting the PTO. Suitable sized U bolts may however be used for this purpose. The PTO alignment shall be in line with the existing drive line as far as possible. The new propeller shafts shall be free from welding defect and a spline and yoke arrangement shall be used. A general layout drawing of the PTO mounting shall be enclosed with the technical offer without which the tender shall not be considered. All the propeller shafts on the throughput side as well as at the pump drive side must be balanced to suitable standards. POWER TAKE OFF UNIT: The power take off unit of make Firehawk/Webster/Vas/Syall/Hale/Rosenbauer shall be able to transfer full torque of the engine to the axle. The PTO shall have an input to output ratio of minimum 1:1.62 so as to keep the engine rpm within the maximum torque range specified by the chassis/ engine manufacturer while the pump is operated at its duty point. The main casing shall be made in light aluminium alloy and shall be heat treated for additional strength, the bearing holders however shall be made in cast iron, and the gears shall be helical and shall be ground for noiseless operation. The gear shifting shall be of single lever type only and multiple linking to engage/disengage the pump side shall not be allowed. There shall be inbuilt self-locking arrangement to keep the unit firmly in the gear selected. The PTO shall have inbuilt water cooling arrangement to enable the usage of PTO in harsh environments on continuous basis. The max. Operating temperature of the oil shall not exceed 85-90°C (at NTP conditions) when the PTO is tested for endurance test with cooling arrangement. The PTO unit shall have provision to judge the oil level reasonably and shall be fitted with a magnetic drain plug along with breather and oil filler cap. Oil seals used shall be of highest quality and rotary seals/ water slingers shall be used over & above the oil seals to prevent dust/water entering into the oil seals. The gear shifting shall be achieved pneumatically with the aid of vehicle's air tank and an illuminated indication shall be given near the driver to indicate the completion of PTO engagement. A cable type flexible manual over ride for gear shifting shall also be provided near the driver's seat in case of loss of air pressure.
5	Control Panel	5.1 An adequately illuminated control panel shall be provided near the pump and easily accessible to the operator for operating different controls. The control panel of required size shall be made from 3.15 mm aluminium sheet (Aluminium sheets /chequered plates IS 737). 5.2 The control panel shall include the following items- 5.2.1 Throttle Control for engine 5.2.2 Pressure gauge : Low pressure 0 to 21 kg/Cm² (Glycerine filled); High pressure: 0 to 70 kg/cm²

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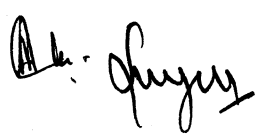
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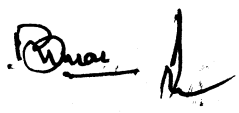
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		5.2.3 Compound gauge: Vacuum: 0 to 680 mm of Hg in Red. Pressure 0 to 10 kg/cm² in Black. 5.3 The pressure gauges shall be Glycerine filled with min 3" dia. Panel mounted. 5.4 High pressure hose reel circuit control 5.5 Change over lever from LP to HP mode located at convenient position. 5.6 LED level gauge/Clear acrylic glass tube, unbreakable type water level indicator calibrated on full, $\frac{3}{4}$, $\frac{1}{2}$, $\frac{1}{4}$ and empty.
6	High Pressure Hose Reel with Gun	6.1 Two high pressure hose reel 60 mtrs. shall be provided and fixed at suitable location preferably in lockers. These hose reels shall be connected to H.P. out let of pump with ball valve of suitable size. 6.2 The hose reel shall be made from carbon steel/Aluminium/Stainless steel/material with bearings/ bush made from gunmetal. 6.3 The design and size of hose reel shall be such that, it shall accommodate 60 mtrs. H.P. hose having 19.0 mm bore with quick connect couplings. The hose reel shall have 40kg /cm² working pressure and bursting pressure shall not be less than 120kg/cm² 6.4 Additional 60 mtrs hose with quick connect coupling (male & female) of above specifications shall be supplied loose, to connect the hose reel whenever required. The loose hose shall be stored in one of the locker during hose reel in winded condition. 6.5 The HP hose reel shall be provided with High Pressure fog/ Jet trigger type gun connect by quick connecting couplings. The gun shall be made from aluminium alloy with rubber grip handle. The inlet connection shall be of $\frac{3}{4}$ BSP (British Standard Pipe) and shall have leak proof rotating type hose connector. The gun shall be of constant flow type and shall have discharge capacity of 150 LPM approx. The gun shall have facility to set of either spray or jet pattern preferably in pistol grip. The gun shall have ability to work on pressure from 20 kg /cm² to 40 kg / cm² without affecting the discharge pattern. The weight of the gun assembly shall not be more than 3.0 kg.
7	Pump Test	The pump fitted on the vehicle shall be subjected to various tests as detailed below:- 7.1 The pump with its all fitments will be subjected to Hydrostatic testing on a pressure of 21 Kg/cm² to detect leakage, perforation etc. 7.2 The pump shall be run dry for a period of minimum two minutes at 2000 RPM to check the integrity of mechanical carbon seal. After this test there shall not be any leakage of water through carbon seal. 7.3 The pump performance test will be carried out by running the pump at rated RPM and measuring the discharge at various pressures. 7.4 The pump will be subjected to Endurance test for a period of FOUR hours continuous running. The first three hours the pump shall deliver rated output of 4000 LPM at 8kg /cm² and next one hour will be 300 LPM at 35 Kg/cm²









		7.5 During the endurance test the water shall not be replenished in the cooling system and the temperature of the cooling water and engine oil should not exceed the manufacturer's standard recommendations for the continuous operation and engine should not show any sign of stresses. 7.6 The primer shall be capable of lifting water at least 7.0 m, in not more than 36 seconds and preferably be fully automatic
8	Water Monitor	8.1 A water monitor of 2000 LPM capacity conforming to IS 8442 shall be mounted on the top of the vehicle between the driver cabin and water tank. 8.2 The monitor shall be of standard make. The output shall be set to three ranges varying from 900 to 2000 LPM. 8.3 The monitor shall be rotated 360° left and right and also move up and down. 8.4 The monitor shall be made from light alloy and shall be hard coated from inside to avoid abrasion and corrosion. 8.5 The monitor shall have horizontal reach of minimum 50 mtrs when supplied with water at pressure of 8 kg/cm² 8.6 The monitor shall be flange mounted with 80 mm butterfly valve provided at the bottom of monitor 8.7 The monitor pipeline shall be 'C' class galvanized pipe of 80 mm dia with suitable flanges. 8.8 The monitor shall be hydrostatically tested to the pressure of 16 kg/cm² 8.9 The monitor pipeline shall be supported suitably to avoid vibrations and cracking.
9	Electrical System	9.1 All the important electric circuit shall have separate fuses suitably indicated and shall be grouped into a common fuse box at an accessible position. The wiring shall be single pole with negative earth. In addition, all electrical wiring shall be made of flame retardant automotive wires and routed through conduit piping to minimize the risk of short circuits, enhance safety against accidental damage and facilitate easy inspection and maintenance during fault rectification or routine servicing. 9.2 Suitable sized wire shall be selected for different circuits considering the current consumption for that circuit. 9.3 All other light, dashboard light, cabin light, lockers lights shall be approved mark. 9.4 All the controlling switches of lights fitted on dashboard shall be of approved mark. 9.5 Two new Fog Lamps of approved make shall be provided and fitted on front bumper with controlling switch on dashboard. 9.6 Two rotating revolving beacon lamps of 24 volts, Amber colour lens duly mounted over the roof of cabin. 9.7 24 volts DC one mile range electric siren of standard make mounted on suitable place and heavy duty push button on driver and cleaner side. 9.8 Two-tone hooter cum P.A. System having 25 watt capacity with speaker mounted on the cabin roof and amplifier in the cabin. 9.9 Illuminated sign board with letter "FIRE" over the cabin.

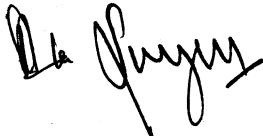
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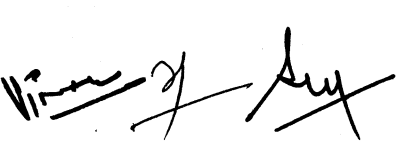
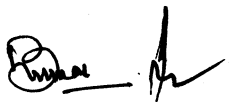
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10	Painting	10.1 The complete super structural members shall be painted with two coats of Red Oxide primer, and two coats of chassis Grey paint. 10.2 The complete external and internal aluminium panelling lockers shall be painted with two coats of Zinc Chromate paint. 10.3 The complete exterior of the vehicle shall be painted with two finish coats of "PO RED" Polyurethane" paint. The paint shade shall be similar to cabin shade. 10.4 The complete under chassis painting shall be carried out. 10.5 The words "Central Industrial Security Force" Fire Service Training Institute "in English shall be painted on both sides of vehicle on the water tank in a suitable size letters in Golden Yellow paint with Black colour shading. NOTE: The name of "Central Industrial Security Force, Fire Service Training Institute." is given as example, the names of respective organisation will be incorporated accordingly.
11	Accessories	11.1 Quick removable type wire mesh guard shall be provided to wind screen glass. 11.2 Four aluminium hooks for keeping the uniform clothing shall be provided in driver's cabin. 11.3 A wireless set box made from 14 SWG aluminium sheet with lid shall be provided just behind the fireman seat with ½" wooden plank for fitting the wireless set. The design and mounting will be shown at the time of fabrication work.
12	Ladder Gallows	Gallows shall be provided to carry a 10.5 m, aluminium trussed type extension ladder. The design shall be such that the ladder can be released without difficulty from a reasonably accessible position and shall embody rollers to permit easy withdrawal by one man. Means shall also be provided for locking the ladder when stowed.
13	Ladder	Trussed type ladder one no. as per approved specifications.
14	Stability	The stability of the vehicle shall be such that when fully laden and equipped (but excluding crew), the surface on which the vehicle stands is tilted to either side, the point at which overturning occurs shall not be less than 25 degree angle from horizontal.

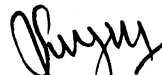



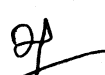
15	Vehicle With Laden	Test Fully	a) Gross vehicle weight shall be less than 25000 kg including crew, water and equipment. b) Maximum speed on level road, fully laden, 80 km/h. c) The appliance shall be capable of being started from rest on a gradient of 1 in 4. d) When travelling at 48 km/h on a level dry surface the foot brake shall be capable of stopping the vehicle within a distance of 15 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.
16	Workmanship & Finish		The vehicle shall be fabricated, painted with standard workmanship.


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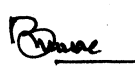

Sh. Sanjay Singh
(AC/NSG)

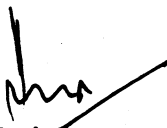

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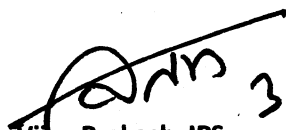

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