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Indian Standard
CODE OF PRACTICE FOR
SELECTION, OPERATION AND
MAINTENANCE OF TRAILER FIRE PUMPS,
PORTABLE PUMPS, WATER TENDERS AND
MOTOR FIRE ENGINES
( First Revision )
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Gr 8

October 1983
Indian Standard
CODE OF PRACTICE FOR
SELECTION, OPERATION AND
MAINTENANCE OF TRAILER FIRE PUMPS,
PORTABLE PUMPS, WATER TENDERS AND
MOTOR FIRE ENGINES
(First Revision)

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Indian Standard

CODE OF PRACTICE FOR
SELECTION, OPERATION AND
MAINTENANCE OF TRAILER FIRE PUMPS,
PORTABLE PUMPS, WATER TENDERS AND
MOTOR FIRE ENGINES

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 28 January 1983, after the draft finalized by the Fire Fighting Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Trailer fire pumps and motor fire engines are some of the major appliances used for regular fire fighting. To be effective, these should be available in a serviceable condition at a moment’s notice, and, for this, it is essential that the appliances are correctly handled and regularly maintained. These appliances have certain limitations and each is suitable for a specific purpose. This has been taken note of and necessary guidance for selecting the right appliance to cover a risk has been included. The general principles for the selection, operation and maintenance for any fire pump unit are the same. This standard may, therefore, also be used as a guide for those appliances which are not covered but are similar in general design. No fire fighting appliance can be operated without adequate manpower and extinguishing media. Recommendations for these have, therefore, been included in this standard.

0.3 This Standard was first published in 1971. In this revision requirements with respect to water supply and scale of equipments have been revised.

0.4 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*.

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

1.1 This standard lays down the recommended practices and procedures for the selection, operation and maintenance of trailer fire pumps, portable pumps, water tenders and motor fire engines conforming to:

IS : 942-1982 Functional requirements for 275-l/min portable pump set for fire fighting (second revision)

IS : 943-1979 Functional requirements for 680-l/min trailer pump for fire brigade use (second revision)

IS : 944-1979 Functional requirements for 1 800-l/min trailer pump for fire brigade use (second revision)

IS : 946-1977 Functional requirements for motor fire engine (first revision)

IS : 948-1983 Functional requirements for water tender, type A for fire brigade use (second revision)

IS : 950-1980 Functional requirements for water tender, type B for fire brigade use (second revision)

IS : 2696-1974 Functional requirements for 1125-l/min light fire engine (first revision)

IS : 6067-1983 Functional requirements for water tender, type X, for fire brigade use (first revision)

2. SELECTION

2.1 The appliances covered by this standard are primarily meant for fighting class 'A' fires (see IS : 2190-1979*). These may, however, also be adopted for fighting class 'B' fires to a limited extent by using portable foam producing equipment.

2.2 Water tender, type X, is primarily intended for augmenting the water supply carried on the foam and carbon dioxide crash tender. But, it can also be used for the purpose mentioned in 2.1 and may be very useful in localities where there is a shortage of water supply for fire fighting.

2.3 In localities where the ambient temperature remains below freezing point, it shall be necessary either to mix anti-freeze in the water carried in the service tank and the radiator tank of water tenders.

2.4 The selection of a particular type of fire fighting appliance depends upon several factors. Some of these are: (a) area required to be covered; (b) type of terrain which the appliance may be required to traverse while turning out to a fire; (c) width of roads, streets, lanes, etc, in the area to

*Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers (second revision).
be covered; and (d) water supply available for fire fighting and the source
and mode of such water supply. Table 1 shows the purpose for which
each appliance covered by this standard is best suited.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Type of Appliance</th>
<th>Most Suitable For</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>i) Portable pump set, 275-l/min capacity conforming to IS : 942-1982</td>
<td>a) Small factories</td>
<td>The capacity of these pumps being limited these cannot be relied upon for fighting large fires. But, the advantages are: light mass and portability which enable these pumps to be carried almost any where. Though not qualifying as a pumping unit dealing with large fires these portable pumps can be very useful for emptying basements, static tanks, training, etc, and may be provided as additional equipment where desired</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Railway yards</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) Dock yards</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>d) Towns or areas of towns having very narrow lanes where a trailer pump or a fire engine cannot be taken</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>e) Rural areas where ponds are in abundance and may be reached through ploughed fields only</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>f) Towns where water is scarce, but could be drawn from a river bed where a fire engine cannot be taken</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>g) Upper floors of multi-storeyed buildings for boosting up pressure of water pumped up from street level particularly where internal hydrants on dry risers are not fitted</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>h) Civil defence work after an air-raid, when it may be difficult to reach a fire because of road blocks</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>i) Tea gardens, orchards and hilly tracts</td>
<td></td>
</tr>
</tbody>
</table>

*Functional requirements for 275-l/min portable pump set for fire fighting (second revision)

(Continued)
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Type of Appliance</th>
<th>Most Suitable for</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) ii)</td>
<td>Trailer fire pump, 680-l/min capacity conforming to IS: 943-1979</td>
<td>Same as portable pump sets 275-l/min capacity, except for use at upper floors of buildings</td>
<td>These can be either towed behind a motor vehicle or can be man-hauled.</td>
</tr>
</tbody>
</table>
| (2) iii) | Trailer fire pump, 1800-l/min capacity conforming to IS: 944-1979 | a) Medium and large factories and workshops  
b) Store depots  
c) Dockyards  
d) Small towns where the travelling distances are short, but suitable roads exist  
e) Water relaying  
f) For auxiliary fire service for civil defence towns | These may be either towed behind a motor vehicle or may be man-hauled. Where the distances are short, as in the case of medium-sized factories, workshops and store depots, or where more than one trailer fire pumps are located so as to reduce the hauling distance, these are usually man-hauled. In all other cases, a properly designed towing tender, conforming to IS: 947-1960, is usually provided. |

*Functional requirements for 680-l/min trailer pump for fire brigade use (second revision).*

†Functional requirements of 1800-l/min trailer pump for fire brigade use (second revision).

‡Specification for towing tender for trailer pump for fire brigade engine (first revision).

(Continued)
### TABLE 1 GUIDELINES FOR THE SELECTION OF CORRECT TYPE OF FIRE APPLIANCES — Contd

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Type of Appliance</th>
<th>Most Suitable For</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Motor fire engines, 1800-l/min capacity conforming to IS: 946-1977*</td>
<td>Urban districts where the provision of a pump escape/13.5 m extension ladders with props and large capacity pump is desirable, or where conditions are such that a fast manoeuvrable appliance is more desirable.</td>
<td>This appliance carries 900 litres of water and can move faster than the trailer fire pump and towing tender unit. The two first-aid hose reels used for immediate attack on the fire on arrival, till the hose lines could be laid out. The appliance may be provided with a 10.5 m extension ladder where buildings up to 12 m have to be catered for. For buildings up to 15 m height, provision of pump escape/or 13.5 m extension ladder may be necessary (pump escapes are being replaced with 13.5 m light weight extension ladders with props).</td>
</tr>
<tr>
<td>(2)</td>
<td>Water tender, type A, Rural areas conforming to IS: 948-1983†</td>
<td>This appliance carries 2700 litres of water and a portable pump set which may be used either for working of the water tank of the appliance or may be attached and carried to reach sources of water supply otherwise inaccessible to the appliance. A trailer fire pump of 680-l/min or 1800-l/min may also be towed behind the appliance. The capacity of trailer pump selected for particular areas shall depend upon the water supply sources.</td>
<td></td>
</tr>
</tbody>
</table>

*Functional requirements for motor fire engine (first revision).
†Functional requirements for water tender type A, for fire brigade use (second revision).

(Continued)
### TABLE 1 GUIDELINES FOR THE SELECTION OF CORRECT TYPE OF FIRE APPLIANCES — Cont'd

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Type of Appliance</th>
<th>Most Suitable for</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>vi) Water tender, type B conforming to IS : 950-1980*</td>
<td>a) Towns or parts of towns where the fire risk is such that a high rate of discharge of water is necessary for fire fighting and a high degree of manouvrability is also desired of the fire appliance at the same time</td>
<td>This appliance carries 1800 litres of water, a 1800-l/min pump and a hose-reel service. It is therefore more useful than a motor fire engine of 1800-l/min capacity especially where water for fire fighting is scarce. Most commonly used appliance in all civil and industrial fire brigades in the country</td>
<td></td>
</tr>
<tr>
<td>vii) Water tender, type X conforming to IS : 6067-1983†</td>
<td>a) Replenishing the water tank of crash tender while engaged in fighting an aircraft fire so that the fire fighting operations may continue longer without interruption</td>
<td>This appliance carries 6000 litres of water and a 3200-l/min pump to match the pump on the crash tender conforming to IS : 951-1977‡ so that the rate of replenishment may be the same at which the crash tender consumes it. The appliance may also be adopted for rural or urban fire fighting in areas where water is scarce, because the large capacity tank and the high rate of discharge shall enable the fire to be brought under control quickly. Care shall, however, be necessary to ensure that water is not wasted unnecessarily while fighting a fire</td>
<td></td>
</tr>
<tr>
<td>viii) Light fire engine, 1125-l/min capacity conforming to IS : 2696-1974§</td>
<td>a) Rural areas where water supply is available in ponds or wells which are accessible to a jeep or a similar vehicle</td>
<td>This appliance has been designed for special requirements mentioned in column 3 and, to keep the vehicle light, the hose-reel is not provided</td>
<td></td>
</tr>
</tbody>
</table>

*Functional requirements for water tender, type B, for fire brigade use (second revision).
†Functional requirements for water tender, type X, for fire brigade use (first revision).
‡Functional requirements for combined foam and CO₂ crash tender (second revision).
§Functional requirements for 1125-l/min light fire engine (first revision).
TABLE 1  GUIDELINES FOR THE SELECTION OF
CORRECT TYPE OF FIRE APPLIANCES — Contd

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Type of Appliance</th>
<th>Most Suitable for</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td></td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(4)</td>
</tr>
</tbody>
</table>

b) Hilly terrain where water supply is available for fire fighting and is accessible to a jeep or a similar vehicle.

c) Towns or parts of town or urban districts where the streets are of such width that manoeuvring of a motor fire engine or a water tender shall be difficult, but where water for fire fighting is available.

3. SCALE

3.1 Pumping Unit — For the purpose of calculation of the number of fire appliances required for a particular area of risk, an appliance having a pumping capacity of not less than 1800 l/min at 0.7 MN/m^2 (7 kgf/cm^2) and a lift of 3 m, shall be termed a pumping unit. The aggregate pumping capacity and the minimum number of pumping units shall be determined as given in 3.2 to 3.8. The type of pumping units shall be determined in accordance with the guidelines indicated in 2.1 to 2.4.

3.2 The number of pumping units required for towns, parts of towns and urban districts shall be provided on the basis of population as given in Table 2.

3.3 Fire stations for housing the pumping units should be so located that the response time for fire appliances does not exceed a maximum of 5 minutes, and maximum running distance of fire appliance does not exceed 5 km in any direction. Fire appliances shall actually be run during peak hours to determine the approximate locations of fire stations from where the area allotted to them can be covered within these limits.

3.4 No area(s) having high fire risks or hazardous industries shall be left uncovered by any of the fire stations.

3.5 For large industrial towns and for areas involving high fire risk and hazardous industries, the scale of pumping units shall be determined in consultation with local fire authority on the merits of individual case.

3.6 For rural districts, the pumping units shall be so located that the running distance to the farthest village shall be not more than 15 km. The number of pumping units shall depend upon the terrain over which the appliances have to travel and the frequency of fire calls. But, a minimum of two units shall be provided at each station.
### TABLE 2: SCALE OF PUMPING UNITS FOR TOWNS/CITIES/URBAN DISTRICTS ON THE BASIS OF POPULATION

(Clause 3.2)

<table>
<thead>
<tr>
<th>Population in Lakh</th>
<th>No. of Pumping Units Required</th>
<th>Aggregate Pumping Capacity not Less Than</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>Two* (one as reserve)</td>
<td>1 125-l/min</td>
</tr>
<tr>
<td>1.0</td>
<td>Two</td>
<td>2 600-l/min</td>
</tr>
<tr>
<td>1.5</td>
<td>Three</td>
<td>5 400-l/min</td>
</tr>
<tr>
<td>2.0</td>
<td>Four</td>
<td>7 200-l/min</td>
</tr>
<tr>
<td>2.5</td>
<td>Five</td>
<td>9 000-l/min</td>
</tr>
<tr>
<td>3.0</td>
<td>Six</td>
<td>10 800-l/min</td>
</tr>
<tr>
<td>Above 3.0</td>
<td>One additional pumping unit for every one lakh of population or part thereof</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Extra water tender carrying approximately 9,000 litres of water and a portable pump shall be provided subject to a minimum of one such unit.

*In towns/urban districts where only one pumping unit is authorized as per scales, one additional pumping unit should also be provided as reserve.

---

3.7 For individual factories, tea gardens, railway premises, dockyards, etc, the number of pumping units shall be according to the provisions of relevant Indian Standards for fire safety. Where no such standards exist, the scale shall be determined by a competent authority, taking into account various requirements, like the severity of fire anticipated, expected rate of growth of fire, intensity of heat that may be developed, accessibility of fire appliances, special constructional features and topography, and occupancy hazard.

3.8 **Reserve** — A reserve of 25 percent of the total number of pumping units, subject to a minimum of one pumping unit, at the fire station shall be provided for each of the above areas, in addition to the total number of pumping units calculated in accordance with 3.1 to 3.7 as applicable.

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4. **HOUSING**

4.1 Pumping units shall be housed in properly designed fire station(s) at suitable location(s) to ensure the following:
   a) Adequate protection from the ravages of weather;
   b) Adequate facilities for in-service maintenance; and
   c) Speedy turn out, unobstructed by other road, traffic in front of the fire-station.

4.2 Pumping units shall not be left standing in the open except for the duration of drills or actual usage on fire.
5. MANPOWER

5.1 The number of men required to man each of the appliances covered by this standard shall be determined, taking into consideration the following:

a) Size of the appliance,

b) Design of the appliance and the function(s) it is required to perform,

c) Accessibility to water supply sources,

d) Total number of appliances manned at the station, and

e) Recommendations of standing fire advisory council.

5.1.1 Normally six firemen are required to man each pumping unit conforming to 3.1.

5.2 The crew shall be fully trained in the effective use of the appliance.

5.3 It shall be ensured that the full crew for an appliance is available for speedy turn-out at all times, when the appliance is required.

6. WATER SUPPLY

6.1 The requirement of water supply is given in IS : 9668-1980*.

7. FOAM COMPOUND AND PORTABLE FOAM MAKING EQUIPMENT

7.1 Where any of the fire appliances, covered by this standard, which is capable of producing foam (see Table 3) with the aid of portable foam making equipment is required for fighting class B fires (see IS : 2190-1979†), it shall carry: (a) portable foam making equipment conforming to IS : 2097-1983‡, and (b) an adequate supply of foam compound conforming to IS : 4989-1974§ preferably not exceeding 500 litres in 20 litres capacity polythene jerrycans.

8. SPARE PARTS

8.1 Adequate spare parts for the maintenance of the chassis, engine and pump shall be provided at each station. This is particularly necessary where spare parts are not readily available.

---

*Code of practice for provision and maintenance of water supplies for fire fighting.
†Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers (second revision).
‡Specification for foam making branches (first revision).
§Specification for foam compound for producing/mechanical foam for fire fighting (first revision).
9. OPERATION

9.1 The various operations which are possible to be carried out by each of the appliances covered by this standard are shown in Table 3. The correct operation in each case is given in 9.2 to 9.12, as applicable.

9.2 General — The following shall be checked at the beginning of each tour of duty or at least once a day by the crew on duty:

a) Water tank or hose-reel tank, where fitted, shall be kept full.

b) Engine radiator tank and auxiliary tank for the heat exchanger, where fitted, shall be kept full.

c) Fuel tank shall be kept full.

d) Tyres, except in the case of portable pump sets, 275-l/min capacity. These shall be checked for correct inflation. The correct pressure given in the instruction manual for the chassis appliance shall be painted on the outside of mudguards, above the tyres, in white paint, so as to ensure correct and ready means for checking.

e) Oil level in engine sump shall be up to the mark for correct level on the dip-stick.

f) Battery, where fitted, shall be topped up with distilled water and the specific gravity of the electrolyte shall be checked. Connections between the battery terminals and the electrical circuit(s) shall be checked to ensure that these are tight.

g) First-aid hose-reel, where fitted, shall be checked to ensure that it rotates freely and that the tubing is correctly wound. The tubing shall be kept filled with water up to the shut-off nozzle and the nozzle shall be kept shut.

h) Ancillary equipment shall be checked with the inventory list(s) for correctness of quantity and stowage.

9.2.1 The engine shall be started to ensure that it is capable of starting instantaneously and shall be run for five minutes at the beginning of each tour of duty. All lights, bells and flashing beacon, as applicable, shall also be checked at the same time.

Note — It is desirable that whenever possible the appliance is taken out on the road for running up and its brakes and road performance checked at the same time. Only one appliance should, however, be taken out of the fire station at a time.

9.2.2 Where a radio-telephone is installed on an appliance, its transmission and reception shall be checked at least once daily by giving a test call to the fire station control room.

9.2.3 While fighting a fire, the appliance shall be positioned as close to the fire as the circumstances would permit. While fighting class B fires, the appliance shall be parked on the upwind side of the fire to keep out of the
<table>
<thead>
<tr>
<th>SL No.</th>
<th>Operation</th>
<th>Portable Pump Sars 275 l/min Capacity</th>
<th>Trailer Fire Pumps 680 l/min Capacity</th>
<th>Trailer Fire Pumps 1 800 l/min Capacity</th>
<th>Motor Fire Engines 1 800 l/min Capacity</th>
<th>Water Tender, Type A</th>
<th>Water Tender, Type B</th>
<th>Water Tender, Type X</th>
<th>Light Fire Engine 1 125 l/min Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>i) First-aid hose-reel</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>ii) Delivery of water jets, spray or fog, taking water from the service tank of the appliance</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. The hose-reel tank capacity is only 900 litres</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>iii) Production of foam or foam fog, taking water from the service tank of the appliance</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No. The hose-reel tank capacity is only 900 litres</td>
<td>Yes, but by using the trailer fire pump only</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>iv) Delivery of water jets, spray or fog, taking water from a hydrant</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>v) Production of foam or foam fog, taking water from a hydrant</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>vi) Delivery of water jets, spray or fog, taking from an open static supply or natural source, except well</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>vii) Production of foam or foam fog, taking water from an open static supply or natural source, except well</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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*This operation is possible only with the help of portable foam making equipment and foam compound which shall be carried on the appliance.*

(Continued)
TABLE 3 OPERATION POSSIBLE FOR VARIOUS FIRE APPLIANCES — Contd

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Operation</th>
<th>Portable Pump Set 275-l/min Capacity</th>
<th>Trailer Fire Pump 680-l/min Capacity</th>
<th>Trailer Fire Pump 1 800-l/min Capacity</th>
<th>Motor Fire Engines 1 800-l/min Capacity</th>
<th>Water Tender Type A</th>
<th>Water Tender Type B</th>
<th>Water Tender Type X</th>
<th>Light Fire Engine 1 125-l/min Capacity</th>
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</table>

**viii) Taking water from a well**

- No, unless the water level is within 3 m of surrounding ground level and the retentivity of the water level is satisfactory
- No, unless the water level is within 4.5 m of surrounding ground level and the retentivity of the water level is satisfactory
- No, unless the water level is within 6 m of surrounding ground level and the retentivity of the water level is satisfactory

**ix) Water relaying**

- Yes, as the last pump near the fire, unless the whole relay is made up of these pumps
- Yes, as the last pump near the fire, unless the whole relay is made up of these pumps
- Yes, as the last pump near the fire, unless the whole relay is made up of these pumps
- Yes, as the last pump near the fire, unless the whole relay is made up of these pumps
- Yes, as the last pump near the fire, unless the whole relay is made up of these pumps
- Yes, as the last pump near the fire, unless the whole relay is made up of these pumps
- Yes, as the last pump near the fire, unless the whole relay is made up of these pumps
- Yes, as the last pump near the fire, unless the whole relay is made up of these pumps
- Yes, as the last pump near the fire, unless the whole relay is made up of these pumps
- Yes, as the last pump near the fire, unless the whole relay is made up of these pumps

**x) Filling the service or hose-reel tank of the same appliance**

- Not applicable
- Not applicable
- Not applicable
- Yes
- Yes
- Yes
- Yes
- Not applicable
way of the billowing smoke and heat and to make the application of foam more effective. When it is necessary to lay hose line(s) across a road, hose ramps shall be used and a fireman shall be posted to ensure that vehicular traffic cross over the ramps only.

9.2.4 In addition to the instructions for various operations as applicable, given in 9.3 to 9.12, the following general instructions shall be borne in mind while running the engine or operating the pump:

a) In case of portable pump sets and trailer fire pumps, every effort shall be made to ensure that the appliance is as near level as possible while being operated.

b) When the engine of any appliance has to be run stationary for long duration, either by itself or for pumping, the bonnet shall be opened to allow cool air to circulate around the cylinder block to assist cooling. In vehicles having forward or semi-forward driving control, all windows and doors of the driving cabin shall also be opened.

Notes — 9.2.4 (b) does not apply to portable pump sets which are not fitted with a bonnet.

c) While opening up delivery outlet valve(s) and building up pressure in the hose line(s), the driver/operator shall take all possible care.

d) All pump and engine gauges shall be kept under constant watch and prompt action shall be taken to trace and/or rectify the fault if any gauge shows an unusual reading.

e) The pump gland shall be examined from time to time and adjusted as required.

9.3 Using the First-Aid Hose-Reel Only — This operation may be necessitated when fighting class A fires (see IS: 2190-1979*) where indiscriminate use of water is likely to cause water damage or where the size of fire is so small that it does not warrant the use of full sized jets. It may also be useful by getting a jet of water to work within a couple of seconds of the arrival of the appliance at the scene of fire till the larger jets could be got to work.

9.3.1 The engine shall be started (if not already running) and the pump shall be engaged (in case of appliance other than the portable pump set, trailer fire pumps and water tender type A) according to the manufacturer's instructions (see maker's instruction manual).

9.3.2 The valve between the appliance service tank/hose-reel tank and the pump suction shall be opened and a pressure of 0.7 MN/m² (7 kgf/cm²) shall be built up at the pump.

*Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers (second revision).
9.3.3 The hose-reel valve shall be opened and the required length of hose-reel tubing shall be pulled out. The hand controlled nozzle shall be opened and the jet directed at the fire.

9.4 Delivery of Water Jets, Spray or Fog, Taking Water from the Service Tank of the Appliance — This operation is necessary when fighting a class A fire (see IS: 2190-1979*) or for cooling down or while carrying out wet drill direct from the water tender (see Table 3 for the type of appliances on which it is possible).

9.4.1 The appliance shall be suitably positioned and the engine started (if not already running). The pump shall be engaged† and the water tank suction valve shall be opened.

9.4.2 Necessary hose line(s) shall be laid out from the pump outlet(s) and branch pipe(s), with required size of nozzle(s), or spray branch(es), or fog nozzle(s) shall be connected as required.

9.4.3 The pump delivery outlet(s) shall be opened after building up adequate pressure at the pump. The actual pressure will depend upon the size of nozzle(s) in use.

9.5 Production of Foam or Foam Fog, Taking Water from the Service Tank of the Appliance — This operation is necessary when fighting a class B fire (see IS: 2190-1979*) or while carrying out wet drill direct from the water tender (see Table 3 for the type of appliances on which it is possible).

9.5.1 The operation shall be the same as given at 9.4.1 to 9.4.3 except that:

a) the portable foam making equipment shall be connected on the delivery hose line in place of the water jet or spray nozzle(s). Fog nozzle shall be connected on one or more branches if fog is also desired to be produced simultaneously.

b) a pressure of 0.7 MN/m² (7 kgf/cm²) plus necessary increase to compensate friction losses shall be built up at the pump before opening the delivery.

c) all hoses through which the water-foam compound solution may have passed and all foam making equipment shall be thoroughly flushed out immediately after the operations are over.

9.6 Delivery of Water Jets, Spray or Fog, Taking Water from a Hydrant — This operation may be necessitated while fighting a class A fire (see IS: 2190-1979*) or during cooling down operations or while carrying out wet drill, when the appliance is entirely dependent upon external source of water supply or, in case of a water tender, when the fire fighting operations have

*Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers (second revision).
†Not applicable to portable pump set fitted to water tender, type A.
to be prolonged beyond the capacity of the service tank, and the external source of water supply is through hydrants (see Table 3 for the type of appliances on which it is possible).

9.6.1 The appliance shall be suitably positioned and connected to the hydrant, using hard or soft suction, as necessary. Care shall be taken to flush out the hydrant before connecting the pump to it.

9.6.2 The engine shall be started (if not already running) and the pump shall be engaged* in accordance with the manufacturer's instructions.

9.6.3 Necessary length(s) of hose(s) and branch(es) shall be connected to each delivery outlet of the pump.

9.6.4 The hydrant shall be opened gradually, taking care that the pressure on the pump compound gauge does not indicate more than $0.3 \text{ MN/m}^2$ ($3 \text{ kgf/cm}^2$) when hard suction is used.

9.6.5 The pump delivery outlet(s) shall be opened after building up adequate pressure at the pump. The actual pressures will depend upon the size of nozzle(s) in use.

9.6.4 The hydrant shall be opened gradually, taking care that the pressure on the pump compound gauge does not indicate more than $0.3 \text{ MN/m}^2$ ($3 \text{ kgf/cm}^2$) when hard suction is used.

9.7 Production of Foam or Foam Fog, Taking Water from a Hydrant — This operation may be necessitated while fighting a class B fire (see IS: 2190-1979*) or while carrying out wet drills under circumstances similar to those given in 9.6 (see Table 3 for the type of appliances on which it is possible).

9.7.1 The operation shall be the same as given in 9.6.1 to 9.6.5 except that:

a) The portable Foam making equipment shall be connected on the delivery hose line(s) in place of the water jet or spray nozzle(s).

b) Fog nozzle(s) shall be connected on one or more hose line(s) if foam fog is also desired to be produced simultaneously.

c) A pressure of $0.7 \text{ MN/m}^2$ ($7 \text{ kgf/cm}^2$) plus necessary increase to compensate friction losses shall be built up at the pump before opening the delivery.

da) All hoses through which the water-foam compound solution may have passed and all foam making equipment used shall be thoroughly flushed out immediately after the operations are over.

9.8 Delivery of Water Jets, Spray or Fog, Taking Water from an Open Static Supply or Natural Source(s) Except Wells — This operation may be necessitated while fighting class A fires (see IS: 2190-1979*) or during

*Not applicable to portable pump set fitted to water tender, type A.

†Code of practice for selection, installation and maintenance of portable first aid fire extinguishers (second revision).
cooling down operations or while carrying out wet drill, when the appliance is entirely dependent upon external source of water supply or, in case of a water tender when the fire lighting operations have to be continued beyond the capacity of the service tank, and the external source of water supply is either an open static supply or a natural source of water supply except wells (see Table 3 for the type of appliances on which it is possible).

9.8.1 The appliance shall be set into the water supply and necessary lengths of suction and delivery hoses connected. The strainer and suction hose shall be secured by a rope and the strainer lowered into water, making sure that it is submerged at least 450 mm below the surface of the water and that the water level is at not more than the distance given against item (viii) in Table 3 for each type of appliance.

9.8.2 Necessary branch(es) shall be connected to the end of the delivery hose line(s).

9.8.3 The engine shall be started (if not already running) and the pump shall be engaged* in accordance with the manufacturer's instructions.

9.8.4 The pump shall be primed and the pump delivery outlet(s) shall be opened after building up adequate pressure at the pump. The actual pressure will depend upon the size of nozzle(s) in use.

9.9 Production of Foam or Foam Fog, Taking Water from an Open Static Supply or Natural Source(s) Except Wells — This operation may be necessitated while fighting a class B fire (see IS: 2190-1979†) or while carrying out wet drills under circumstances similar to those given in 9.8 (see Table 3 for the type of appliances on which it is possible).

9.9.1 The operation shall be the same as given in 9.8.1 to 9.8.4, except that:

a) the portable foam making equipment shall be connected on the delivery hose line(s) in place of the water jet or spray nozzle(s). Fog nozzle(s) shall be connected on one or more line(s) if fog is also desired to be produced simultaneously.

b) a pressure of 0.7 MN/m² (7 kgf/cm²) plus necessary increase to compensate friction losses shall be built up at the pump before opening the delivery(ies).

c) all hoses through which water-foam compound solution may have passed and all foam making equipment used shall be thoroughly flushed out immediately after the operations are over.

9.10 Taking Water From a Well — Any of the operations given in 9.8 and 9.9 are possible while taking water from a well if the water level is at not

*Not applicable to portable pump set fitted to water tender, type A.
†Code of practice for selection, installation and maintenance of portable first aid fire extinguishers (second revision).
more than the distances specified against item (viii) in Table 3. In addition, it is also possible to pump water from a well for feeding the appliance pump of the small fire engine, by using a submersible pump, when the lift is beyond the capacity of the pump. In that case, the instructions given in 9.10.1 to 9.10.2 shall be carried out.

9.10.1 The submersible pump shall be lowered into the well, over its tripod, so that it is fully submerged. The delivery hose of the pump shall be connected before lowering it.

9.10.2 The submersible pump electric cable shall be plugged into the generator and the generator shall be started. The water coming out through the delivery hose of the submersible pump shall be used for feeding the appliance pump or the portable pump set, as necessary, by any one of the methods for water relaying described in 9.11 and the pump operated normally.

9.11 Water Relaying — The appliances covered by this standard can be used for water relaying ( both open and closed relay ), subject to certain limitations. The limitations are the following:

a) The largest capacity pump in the relay shall be used as the lifting pump.

b) Other pumps in the relay shall be arranged in decreasing order of capacity from the lifting pump to the fire.

c) If all pumps in the relay are of equal capacity, these could be arranged in any order.

9.11.1 While carrying out relay pumping, multiple lines of the largest available diameter hose shall be used. The hose shall preferably be rubber-lined. All these contribute towards reducing the friction losses and thus increase the distance at which the pumps can be spaced out.

9.11.2 The spacing of the pumps shall depend to a large extent upon the capacity of the pumping unit, number of hose lines used and the diameter and the type of hose.

9.12 Filling the Service Tank or Hose-Reel Tank of the Appliance — The service or hose-reel tank can be filled either from a hydrant or from an open static source of water supply (see Table 3 for the type of appliances to which it is applicable).

9.12.1 While filling from hydrant, the appliance is suitably positioned and connected to the hydrant, using hard or soft suction, as necessary. The tank filling operation is then carried out in any one of the following ways:

a) From hydrant to pump and pump to tank through the 5-way control valve in the case of hose reel tank where fitted. This is not practicable in the case of water tenders, type A.
b) From hydrant to tank through the 5-way control valve in the case of hose reel tank where fitted. This is not practicable in the case of water tenders, type A.

c) From hydrant to tank through the filling orifice of the tank.

9.12.2 While filling from an open static source of water supply, the appliance is set into the water supply and operated as in 9.8.1 to 9.8.4 except that the delivery hose is not laid out. The tank filling operation is then carried out in any one of the following ways:

a) From pump to tank through the 5-way control valve in the case of hose reel tank where fitted, except in the case of water tenders, type A.

b) From pump to tank through the filling orifice of the tank by connecting a short length of delivery hose to one of the pump deliveries.

NOTE — The pump pressure during these operations should not exceed 0.05 MN/m² (0.5 kgf/cm²).

10. FAULTS

10.1 Mechanical Faults — If instructions given in 11 and 12 are followed carefully and regularly, there should be no major mechanical defect or breakdown on the fire-ground. However, minor defects may sometimes occur and the driver/operator should be able to trace the fault and rectify it on the spot.

10.1.1 The driver/operator shall thoroughly study the electrical, fuel and lubrication systems of the engine, with particular reference to the fault-tracing chart, normally given in the instruction manual, till he becomes fully conversant with these.

10.1.2 Mechanical fault may not always be the cause of failure of the engine to start. It may be due to faulty handling also. It is, therefore, essential that the driver/operator is fully familiar with the operating instructions for the vehicle/appliance, as supplied by the manufacturer and is given adequate practice in its driving/operation under supervision of a competent person.

10.2 Pump Faults — Centrifugal pump itself is very reliable and shall give trouble-free service throughout the effective life of the appliance. The difficulty may arise only in case of mechanical breakdown of the prime mover or defect in primer, when taking water from an open static supply, or because of faulty operation. Almost all operational faults can be detected by keeping a careful watch on and correctly interpreting the variations in the reading of the pump gauges, that is, the pump pressure gauge and the compound gauge. In actual practice, there may be innumerable minor faults which should not be difficult for a well trained driver/
operator to trace and rectify himself. The interpretation of some commonly encountered variations in the readings on the pump gauges is given in 10.2.1 to 10.2.4.

10.2.1 General (Applicable to All Cases) — The following variations in pump gauge readings may be encountered in all cases where water is pumped through hose lines. The remedy is self evident in each case.

a) Sudden increase in the pressure reading on the pressure gauge may be due to some obstruction in the delivery line, between the pump and the branch. The driver/operator shall immediately reduce pump speed and investigate the cause. It may be due to any one of the following:

1) Kinks in the delivery hose; or
2) Vehicle standing on the hose; or
3) Debris of collapsed wall, fallen on the hose; or
4) Shutting off hand controlled branch or changing the discharge pattern of a hand controlled branch from jet to spray or fog; or
5) Shutting off dividing breeching with control; or
6) Blockage of the nozzle at the branch by a small stone which might have passed through the pump.

Note — If (6) is suspected to be the cause, the pump delivery shall be shut down and pressure from the hose line released, by disconnecting any one of its couplings before attempting to check or remove the stone. Failure to take this precaution may result in serious injury to the person checking the defect.

b) Sudden decrease in the pressure reading on the pressure gauge may be due to any one of the causes given below (before investigating, the driver/operator shall try to maintain pump pressure by increasing the pump speed):

1) Bursting of any of the hoses in the delivery line; or
2) Delivery hose couplings getting disconnected; or
3) Opening of a hand controlled branch or changing its discharge pattern from spray or fog to jet; or
4) Opening of a dividing breeching with control; or
5) While pumping from a hydrant, the flow in the mains might have decreased. In this case, the compound gauge shall start showing a vacuum reading. When this happens, the driver/operator shall reduce the pump speed.

c) Pressure gauge needle dropping to zero may be due to water supply to the pump being cut off, as in the cases given below:

1) When taking water from the service tank or the hose-reel tank, where applicable, the water in the tank may be exhausted; or
2) When taking water from a pressure fed supply, that is, a hydrant or another pump, as in relay pumping, the source of supply may have stopped delivery; or

3) When taking water from an open static water supply, the water at the source may be exhausted, or the water level may have gone down to below the suction, strainer or any of the faults given at 10.2.3(a) for failure of pump priming, may occur.

10.2.2 When taking Water from the Service Tank or Hose-Reel Tank of the Appliance (see Table 3 for appliances to which this is applicable) — The pressure gauge may:

a) show a sudden increase in pressure reading. For interpretation, see 10.2.1(a).

b) show a sudden decrease in pressure reading. For interpretation, see 10.2.1(b).

c) show a zero pressure reading. For interpretation, see 10.2.1(c)(1).

d) show an erratic reading. This is due to the water in the service/hose-reel tank going down to a level where air is sucked into the pump through the water tank and is an indication that the water in the tank is nearing exhaustion.

10.2.3 When Taking Water from an Open Static Source of Supply — Some of the common faults may be the following:

a) Failure of pump to prime may be due to either a leak or an obstruction on the suction side. The compound gauge shall indicate a zero reading in case of a leak and a high vacuum reading in case of an obstruction. When there is a zero reading on the compound gauge, the following shall be checked in the order given below:

1) Suction strainer shall be submerged approximately 450 mm below the surface of the water.

2) Joints between the suction hose and the pump inlet and between the suction hoses, where more than one lengths are used. These shall be tight and washers in female couplings shall be intact and serviceable.

3) Pump casing drain plug, or drain cock, if fitted, shall be tightly closed.

4) Pump delivery valves shall be opened and then fully closed.

5) Heat exchanger/cooling system by-pass valve shall be closed.

6) Service/hose-reel tank suction valve, when the tank is empty, shall be closed.
7) Shut-off cock on the compound gauge connection shall be open. Occasionally, a leak may develop in the connection(s) between the pressure and compound gauges and the pump. When this is suspected, both shut-off cocks on gauge connections shall be closed and the pump shall be worked by other indications, such as change of engine sound when the pump is primed, flow of a constant stream of water through the primer waste pipe, etc.

8) Where the primer is not fully automatic, the priming valve may not have been opened.

9) Where the primer is fully automatic, the engine speed may not be correct.

10) Slow running of engine in case of exhaust ejector, and other primers requiring high speed operation.

11) Primer not engaged properly.

12) Leaking pump gland.

13) Air leak in suction hose. Change of suction hose, in which air leak is suspected, is the remedy because air leak in the suction hose cannot be detected or rectified on the spot.

b) When there is a high vacuum reading on the compound gauge, the following shall be checked in the order in which each is given:

1) Basket strainer, metal strainer and the strainer at the pump inlet. The basket/metal strainer shall not be bogged in mud and none of the strainers shall be choked.

2) If the strainer(s) is (are) clean, the suction hose(s) shall be changed, because in that case the obstruction could be due to a fault in the internal lining or inner walls of the suction hose which collapses as soon as the primer is operated.

c) Sudden increase in pressure gauge reading. For interpretation, see 10.2.1(a).

d) Sudden decrease in pressure gauge reading. For interpretation, see 10.2.1(b).

e) Pressure gauge reading dropping to zero. For interpretation, see 10.2.1(c) (3).

f) Increase in vacuum reading on the compound gauge whilst working. It may be due to any of the following:

1) Drop in water level at the supply source because of pumping. This is no cause for anxiety, unless the supply is nearing exhaustion.
2) Increase in the rate of delivery of the pump. This is also no cause for anxiety.

3) Partial blocking of the strainer(s). If (1) and (2) are eliminated, the strainer(s) shall be cleaned before recommencing pumping. At times, shaking the strainer by the rope attached to it clears it of obstruction.

g) Decrease in vacuum reading on the compound gauge whilst working. It may be due to any of the following:

1) Rise in the water level at the supply source because of the rate of its replenishment being more than the pump off-take.

2) Decrease in the rate of delivery of the pump, when the rate of replenishment of the static supply remains unaltered.

Erratic reading on the pressure gauge is an indication that air is being sucked in from the suction side through the strainer. The suction strainer shall be checked and submerged at least 450 mm below the water level.

j) Complete loss of vacuum on the compound gauge may be due to any of the faults mentioned at 10.2.3(a) for zero reading on the compound gauge.

10.2.4 When Taking Water from a Pressure Fed Supply, that is, a Hydrant or Another Pump, as in Relay Pumping — Some of the variations in the pump gauge reading may be the following:

a) Sudden increase in the pressure gauge reading. For interpretation, see 10.2.1(a).

b) Sudden decrease in the pressure gauge reading. For interpretation, see 10.2.1(b).

c) Pressure gauge needle dropping to zero. For interpretation, see 10.2.1(c)(2).

d) Tendency towards decreased reading on the pressure gauge with a vacuum reading on the compound gauge. This means that the pump is trying to deliver more water than it is receiving. The driver/operator shall reduce the pump speed till the compound gauge needle returns to zero.

e) A pressure reading on the compound gauge. This means that the pump is delivering less water than what it is receiving and, if necessary, more deliveries can be worked from the pump or its delivery pressure can be raised. There is no cause for worry, unless the pressure reading rises above 0.3 MN/m² (3 kgf/cm²) in which case the hydrant shall be partially closed/the supply pump delivery pressure shall be reduced, as the case may be.
11. MAINTENANCE

11.1 Daily Routine — In addition to the general operating instructions given in 9.2 to 9.2.2, the appliance shall be cleaned thoroughly every day. The following tasks shall be carried out:

a) The following shall be cleaned and polished to a shine:
   1) All painted parts shall be polished by soft rags or polishing cloth. Colourless wax polish shall be applied, if necessary.
   2) All unpainted parts, using metal polish and soft rags.
   3) All unpainted chromium plated parts shall be cleaned with soap and water and polished with polishing cloth after drying.
   4) All unpainted steel, using kerosene oil and fine grade emery cloth and wiping clean with soft cotton rags.

b) All scratched paint shall be retouched as necessary with correct shade of good quality paint.

c) Chafed parts of wooden ladders shall be revarnished.

d) All dull finished parts shall be burnished.

e) All cutting edges of tools shall be sharpened as necessary and all gear shall be re-stored correctly.

f) Delivery and suction hoses shall be maintained according to the instructions contained in relevant Indian Standard.

g) Locker, doors, hinges, locks, lids and covers on the appliance shall be checked for proper functioning, where applicable.

h) All parts of body work coming in contact with water shall be checked for signs of rust or corrosion and shall be cleaned and repainted as necessary.

i) In appliances fitted with service/hose-reel tank, all plumbing shall be checked for leaks and leaks rectified as necessary. It shall be ensured that all pipe-work is firmly supported. Standing on pipe-work or control rods and linkage shall be avoided while working in pump compartment.

k) Where portable fire extinguishers are carried on the appliance, these shall be cleaned, polished and retouched with paint of appropriate shade as necessary.

m) In appliances fitted with service/hose-reel tank, all drain cocks and water tank suction valves shall be checked to ensure that these are functioning properly and are in the closed position.
n) All lever and wheel type valves shall be checked to ensure correct functioning and closed.

p) The auxiliary throttle(s) shall be checked, where fitted, for correct functioning after engaging the pump.

q) Engine shall be cleaned with rags using used engine oil and kerosene oil in equal parts. Care shall be taken not to disturb connections.

r) The following shall be lubricated:
   1) Centrifugal pump;
   2) Valve spindles, including pump outlet valves, all lever type valves and linkages, auxiliary throttle; and
   3) Primer, if it is of the rotary type.

11.2 Weekly Routine — In addition to the general operating instructions given in 9.2 to 9.2.2 and the daily routine instructions given in 11.1, the tasks shown in Table 4 shall be carried out, as applicable, at the fire station, once a week.

11.3 Monthly Routine — The maintenance tasks shown in Table 5 shall be carried out at the fire station or at the workshop as stated in the table. These shall be in addition to the general operating instructions given in 9.2 to 9.2.2, the daily routine maintenance tasks given in 11.1 and weekly routine maintenance tasks given in Table 4.

11.4 After Use — Immediately after returning from a fire and after using the appliance for fire drills or testing, the following instructions shall be carried out:

   a) In all cases:
      1) the water tank/hose-reel tank, where fitted, the radiator tank and the fuel tank shall be replenished.
      2) Lubricating oil level in the engine pump shall be checked and topped up, if necessary.
      3) If a heat exchanger is fitted, the by-pass filter shall be cleaned whenever the heat exchanger has been used.
      4) In case of reciprocating primer, water in the primer crank case shall be allowed to settle and then drained out if the primer has actually been used. The primer crank case shall then be topped up with lubricating oil of the correct grade.
      5) In case of rotary primer, it shall be run for a short time to eject all water. It shall then be lubricated and turned by hand.
      6) The appliance, including the ancillary equipment, shall be thoroughly cleaned and polished as necessary.
### Table 4 Weekly Maintenance Tasks

*(Clauses 11.2 and 11.3)*

<table>
<thead>
<tr>
<th>DAY</th>
<th>DETAILS OF TASKS</th>
<th>APPLIANCE TO WHICH APPLICABLE</th>
</tr>
</thead>
</table>
| **Monday** | i) Inspect tyres, including spare wheel and inner tyres of twin rear wheels, where applicable. Remove flints from tyre treads and from between twin tyres, as applicable. Test pressures and if necessary inflate to correct pressure. Check for uneven wear  
ii) Clean engine/chassis, as applicable, thoroughly  
iii) Check and, if necessary, adjust fan belt, where fitted  
iv) Check road wheel nuts. Tighten as necessary  
v) Get a radio technician to clean and test the radio telephone, where fitted | Portable Pump Sets, 275-l/min Capacity | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Tuesday** | i) Check all engine joints  
ii) Check fuel, oil and water connections on engine for leakage  
iii) Oil and grease chassis with particular attention to swivel pins, steering linkages, nipples, across shafts, etc  
iv) Grease fan, if fitted  
v) Adjust gland of water circulation pump, if fitted  
vi) Check and clean cooling system filter  
vii) Lubricate pump shaft bearing, where fitted and provided with means of lubrication | Trailer Fire Pumps, 600-l/min Capacity | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Wednesday** | i) Check clutch pedal for free play — it shall be not less than 20 mm at pedal pad. Report, if defective  
ii) Oil bonnet hinges  
iii) Oil door and locker hinges, catches and window winder mechanism, where possible  
iv) Lubricate reciprocating and rotary primers, where fitted, with engine oil and grease metal to metal valves  
v) In case of reciprocating primers only, drain out water, if any, from primer crank case and refill to correct level with proper grade of oil | Motor Fire Engine, 1 800-l/min Capacity | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
|  |  | Water Tender Type | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
|  |  | Water Tender Type | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
|  |  | Water Tender Type | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
|  |  | Light Fire Engine | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*IS : 6070 - 1983*
### TABLE 4 WEEKLY MAINTENANCE TASKS — Contd

<table>
<thead>
<tr>
<th>DAY OF WEEK</th>
<th>DETAILS OF TASKS</th>
<th>APPLIANCE TO WHICH APPLICABLE</th>
<th>✓ = APPLICABLE</th>
<th>X = NOT APPLICABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Wednesday</td>
<td>vi) Check road spring anchorages and spray or brush springs with penetrating or engine oil</td>
<td>Portable Fire Pump Sets, 275-l/min Capacity</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>(2) Wednesday</td>
<td>vii) Check search/spot lights for free movement and lubricate as necessary. Also check light cables</td>
<td>Portable Fire Pump Sets, 600-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trailer Fire Pumps, 1800-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Motor Fire Engine, 1800-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type A</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type B</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type X</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light Fire Engine</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Thursday</td>
<td>i) Check hand and foot brakes for correct functioning</td>
<td>Portable Fire Pump Sets, 275-l/min Capacity</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ii) Check manual towing bar and lubricate folding hinges</td>
<td>Portable Fire Pump Sets, 600-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>iii) Examine suspension/shock absorbers including spring fixing bolts</td>
<td>Trailer Fire Pumps, 1800-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>iv) Clean engine/chassis thoroughly as applicable</td>
<td>Motor Fire Engine, 1800-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type A</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type B</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type X</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light Fire Engine</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Friday</td>
<td>i) Check engine controls, e.g. accelerator, throttle, choke and ignition connections as applicable</td>
<td>Portable Fire Pump Sets, 275-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ii) If battery is fitted, check ammeter reading to ensure dynamo is charging correctly</td>
<td>Portable Fire Pump Sets, 600-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>iii) Clean spark plugs (for petrol engines only). See maker's instruction book for setting spark plug gap</td>
<td>Trailer Fire Pumps, 1800-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>iv) Lay out all delivery hoses for airing and replace these with fresh stock from the store. Also clean, make up and return to store all hoses after airing</td>
<td>Motor Fire Engine, 1800-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type A</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type B</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type X</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light Fire Engine</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Saturday</td>
<td>i) Check steering wheel for slackness. Check oil level in steering well and top up, if necessary</td>
<td>Portable Fire Pump Sets, 275-l/min Capacity</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ii) Check first-aid hose-reel tubing for cracks/physical damage and treat with French chalk externally before rewinding</td>
<td>Portable Fire Pump Sets, 600-l/min Capacity</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>iii) Replace all delivery hoses and test the ones which are removed</td>
<td>Trailer Fire Pumps, 1800-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Motor Fire Engine, 1800-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type A</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type B</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type X</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light Fire Engine</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Sunday</td>
<td>i) Repair all hoses, tested on Saturday as necessary</td>
<td>Portable Fire Pump Sets, 275-l/min Capacity</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>ii) Complete weekly summaries in the vehicle log book/hose card</td>
<td>Portable Fire Pump Sets, 600-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trailer Fire Pumps, 1800-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Motor Fire Engine, 1800-l/min Capacity</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type A</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type B</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Tender, Type X</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light Fire Engine</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Sl. No.</td>
<td>Task</td>
<td>Where to be Carried Out</td>
<td>Details of Task</td>
<td>Appliance to Which Applicable</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>-------------------------</td>
<td>----------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>i)</td>
<td>Fire fighting equipment</td>
<td>Fire fighting Station</td>
<td>Monthly output test of the centrifugal pump shall be carried out according to the instructions given in 12.1.2(a)</td>
<td>All appliances, except the portable pump sets</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Once in six months, the deep lift test shall be carried out in accordance with instructions given in 12.1.2(c)</td>
<td>Every appliance fitted with a 1800-l/min pump or a larger pump</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Vacuum test shall be carried out for the pump according to the instructions given in 12.1.2(b) and for the suction hoses according to the instructions given in 12.1.3</td>
<td>All appliances, except the portable pump sets</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The first-aid hose-reel tubing shall be subjected to a pressure test of 1.05 MN/m² (10.5 kgf/cm²) for 24 minutes</td>
<td>Motor fire engines, 1800-l/min capacity water tenders, types B and X and light fire engines</td>
</tr>
<tr>
<td>ii)</td>
<td>Body work shop, and engine, etc</td>
<td>1) All body bolts and screws shall be checked and tightened as necessary. At the same time, necessary repairs shall also be carried out</td>
<td>All appliances, except the portable pump sets</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2) All lockers shall be checked for signs of rust and corrosion and cleaned and repainted as necessary. All locker hinges and catches shall also be checked at the same time</td>
<td>All appliances, except the portable pump sets</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3) The engine shall be checked, tuned, if necessary, and all self propelled appliances shall be checked for road performance. All defects noticed shall be rectified</td>
<td>All appliances</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4) Complete lubrication of engine and chassis shall be carried out and engine oil changed, if necessary</td>
<td>All appliances</td>
</tr>
</tbody>
</table>
b) After pumping water only — The pump shall be thoroughly flushed out with clean water and all used hoses shall be flushed, cleaned and dried. Hoses shall be replenished with fresh hoses. This shall be in addition to 11.4(a).

c) After foam production — The pump, hoses and all foam producing equipment shall be thoroughly flushed out with clean water. The hoses shall be cleaned, dried and replenished with fresh hoses. This shall be in addition to 11.4(a).

11.5 During Winters — Where winters are severe, the following instructions shall be carried out, as applicable, in addition to what is given in 11.1 to 11.4:

a) As far as possible, the appliances shall be housed under cover and out of draughts.

b) The cooling water and the water in the service/hose-reel tank when fitted, shall be treated with anti-freeze mixture and a warning notice shall be fixed on the appliance in a prominent position. All leaks shall be carefully checked and eliminated before adding the anti-freeze mixture and routine inspection for leaks shall be carried out at regular intervals, not exceeding 24 hours.

   Note — Anti-freeze mixture should not be used in engines fitted with direct cooling system.

c) Appliance engines shall be protected with muffs.

   Note — Serviceable muffs can be made out of straw-filled sacking. It is desirable that all cold air shall be prevented from reaching the engine parts to ensure a quick start in very cold weather.

d) If the battery is fitted in exposed position, it shall be protected with sacking in severe weather.

12. TESTING

12.1 Periodical tests of equipment fitted/carried on each appliance shall be carried out as given in 12.1.1 to 12.1.3.

12.1.1 Ancillary Equipment — Ancillary equipment shall be tested in accordance with the relevant Indian Standards.

12.1.2 Pump — The pump shall be subjected to the tests given below:

   a) Monthly output test — The pump shall be operated for not less than 15 min from an open static water supply with a suction lift of 3 m, delivering water through the number of deliveries given in Table 6 through 30 m of rubber lined hose, conforming to Type II of IS 636-1979*.

   "Specification for fire fighting hose (rubber lined or rubberised fabric lined woman jacketed) (second revision)."

* A pressure of 0.6 MN/m² (6 kgf/cm²)
shall be maintained. If the pump fails to sustain this pressure for the full 15 min, the reason shall be investigated and rectified at the workshop. The pump gland shall be checked for excessive leakage, if necessary, at the same time.

Note — While adjusting the pump gland, care shall be taken to ensure that water does not cease to drip when the pump is working under pressure. It is advisable to make the adjustment with the pump working at a pressure of 0.7 MN/m² (7 kgf/cm²). A drip of 30 drops per minute shall be allowed.

**TABLE 6 NUMBER OF DELIVERIES AND SIZE OF NOZZLES FOR THE MONTHLY OUTPUT TEST FOR PUMPS**

<table>
<thead>
<tr>
<th>Capacity of Pump</th>
<th>Number of Deliveries to be Used</th>
<th>Size of Nozzle to be Used on Each Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>680-l/min</td>
<td>One</td>
<td>20 mm</td>
</tr>
<tr>
<td>125-l/min</td>
<td>One</td>
<td>25 mm</td>
</tr>
<tr>
<td>1 350-l/min</td>
<td>Two</td>
<td>20 mm</td>
</tr>
<tr>
<td>1 800-l/min</td>
<td>Three</td>
<td>20 mm</td>
</tr>
<tr>
<td>3 200-l/min</td>
<td>Three</td>
<td>25 mm</td>
</tr>
</tbody>
</table>

b) Monthly vacuum test — This test shall be carried out immediately after the test given in 12.1.2(a). The suction blank cap shall be tightened on the suction inlet of the pump after ensuring that its washer is intact and serviceable. All blank caps from the pump delivery outlets shall be removed. With the compound gauge cock fully open, the primer shall be operated for 45 seconds or till a vacuum of 600 mm (Hg) is obtained, whichever is earlier. The priming shall then be stopped and the compound gauge needle watched. If it falls back to 250 mm (Hg) in less than one minute it is an indication that an excessive leak is present and it shall be looked into. The excessive leak may be due to the following:

1) Loose or defective pump glands;
2) Leakage in the pump gauge connections;
3) Leakage in the delivery outlet valves; and
4) Leakage in the heat exchanger valve.

c) Six monthly deep lift test — This test shall be carried out once in six months for every pump having a capacity of 1 125-l/min and over. The method of test shall be the same as given in 12.1.2(a), except that size of nozzle shall be as per Table 7 and the pump shall maintain a pressure of 0.6 MN/m² (6 kgf/cm²) for 15 minutes with a suction lift of minimum 6 m in case of pump...
of 1 125-l/min and 1 350-l/min and 7 m in case of pump of 1 800-l/min capacity.

Note — If pump passes satisfaction on the monthly output and vacuum test, a deep lift test need not be done.

12.1.3 Suction Hose — The suction hoses shall be tested immediately after the vacuum test given in 12.1.2(b). If the pump performance is found satisfactory during the vacuum test, all lengths of suction hose shall be connected to the pump and the blank cap tightened at the end of the last length. The vacuum test shall then be repeated. If excessive leak is detected, all lengths of suction shall be connected individually or together, either to a pump delivery or to a hydrant and subjected to an internal pressure of not more than 0·3 MN/m² (3 kgf/cm²). Any leak present will be visible by the water spurting of the suction hose.

### TABLE 7 SIZE OF NOZZLES

[Clause 12.1.2(c)]

<table>
<thead>
<tr>
<th>CAPACITY OF PUMP</th>
<th>NO. OF DELIVERIES TO BE USED</th>
<th>SIZE OF NOZZLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 125-l/min</td>
<td>one</td>
<td>15 mm</td>
</tr>
<tr>
<td>1 350-l/min</td>
<td>one</td>
<td>15 mm</td>
</tr>
<tr>
<td>1 800-l/min</td>
<td>one</td>
<td>20 mm</td>
</tr>
<tr>
<td>3 200-l/min</td>
<td>one</td>
<td>25 mm</td>
</tr>
</tbody>
</table>

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Codes of Practice for Fire Fighting Equipments
Subcommittee, BDC 22 : 4

<table>
<thead>
<tr>
<th>Convenor</th>
<th>Representing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shri V. B. Nikam</td>
<td>Municipal Corporation of Greater Bombay (Bombay Fire Brigade), Bombay</td>
</tr>
</tbody>
</table>

**Members**

Shri S. N. Bandyopadhyay
Shri J. N. Vakil (Alternate)
Shri Edwin D’Souza
Shri Eustace D’Souza (Alternate)
Shri P. N. Ghosh
Shri K. K. Das Gupta
Shri G. B. Menon
Shri J. Prakash
Shri Parmod Prakash (Alternate)
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Shri Mohendra Prasad (Alternate)
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Shri B. V. Wagle

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Electronic Control Devices, Bombay
Institution of Fire Engineers (India), New Delhi
West Bengal Fire Services, Calcutta
Ministry of Home Affairs
Prakash Security Devices (India), Allahabad
Ministry of Defence (R & D)
Municipal Corporation of Delhi (Delhi Fire Service), Delhi
Urban Development and Public Health Department, Bombay