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“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

AMENDMENT NO. 1 AUGUST 1992
TO
IS 12469 : 1988 SPECIFICATION FOR PUMPS FOR FIRE FIGHTING SYSTEM

(Page 1, clause 3.1) — Substitute the following for the existing clause:

*3.1 Standard Capacities — The pumps shall be of 27, 28, 47, 76 and 114 1/s capacities.'

(Page 1, clauses 3.1.1 and 3.1.2) — Delete.

(Page 2, Tables 1 and 2) — Delete.

(Page 3, clauses 3.1.3 to 3.1.7) — Delete.

(HMD 20)

Reprography Unit, BIS, New Delhi, India
Indian Standard

SPECIFICATION FOR
PUMPS FOR FIRE FIGHTING SYSTEM

1. Scope — Covers technical requirements of centrifugal fire fighting pumps intended for installation in and around buildings/plants.

2. Definitions — In addition to terms already defined in IS : 5120-1977 'Technical requirements for rotodynamic special purpose pumps (first revision)', following additional terms shall be applied.

2.1 Corrosion Resistant Material — These are materials having resistance to corrosion equal to or better than that of copper alloy like brass and bronze having minimum copper content of 80 percent.

For sea water application, the materials should have corrosion resistance equal to or better than that of nickel cast iron Grade AFG Ni15Cu6Cr3 in accordance with IS : 2749-1974 'Specification for austenitic iron castings (first revision)'.

2.2 Total Head — For a split case or end suction pump, total head is the algebraic difference in KPa between pressures as measured at the discharge flange and the suction flange, connected to the pump centreline and corrected for changes in velocity head at the points of gauge attachment. For a vertical turbine pump, the total head is the reading of a pressure gauge attached just beyond the discharge flange of the pump in KPa and corrected for the vertical distance from the water level to the centre of the gauge and for the friction losses encountered in the piping between the uppermost bowl and the point of attachment of the gauge and also corrected for velocity head at the point of pressure gauge.

2.3 Shut-Off Head — The total head developed by a pump at rated speed with no water being delivered.

2.4 End Suction Pumps — A horizontal centrifugal pump with suction nozzle axis in line with pump shaft axis and position of nozzle opposite to the stuffing box side of the casing. It is intended that these pumps shall be used on a static suction lift condition only if a special provision for automatic priming of the pump is available. These pumps may have one or more stages.

2.5 Split Case Pump — A centrifugal pump characterized by a casing which is split parallel to the shaft and mounted in the horizontal or vertical position. It is intended that these pumps will be used on a static suction lift condition only if a special provision for separate priming source for the pump is available. These pumps may have one or more stages.

2.6 Vertical Turbine Pump — A vertical axis centrifugal, Francis or mixed-flow type pump comprising stages which accommodate rotating impellers and stationary bowls possessing guide vanes. The discharge from the pump unit is coaxial with the shaft and the pump unit is suspended by the column pipe containing a system of vertical shafting for transmitting power to the impellers, the prime mover being external to the flow stream. A typical vertical turbine pump mainly consists of three assemblies, namely, bowl assembly, column assembly and discharge head assembly.

2.7 Multistage Pump — Pumps in which the total head is developed by more than one impeller.

2.8 Maximum Pump Brake Horse Power — Is the maximum power required by the pump at the rated speed and at any capacity within the operating range of the pump. For the purpose of this standard, operating range would be from 0 flow to 150 percent of the rated flow.

3. General Requirements

3.1 Standard Capacities

3.1.1 The capacity of the pump depends on whether or not tapping(s) for water spray and/or foam protection for tanks/spheres/bullets is(are) taken from hydrant service.

3.1.2 In case there is no tapping from hydrant service, the capacity of the pump shall be determined by the class of occupancy and the size of installation as given in Table 1. Table 2 indicates the various classes of nature of risk.
### TABLE 1  CLASS OF OCCUPANCY AND SIZE OF INSTALLATION
( Clauses 3.1.2 and 3.1.4 )

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Nature of Risk</th>
<th>Number of Hydrants</th>
<th>Pump in l/s ( m³/h )</th>
<th>Delivery Pressure at Rated Capacity kg/cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Light Hazard</td>
<td>a) Not exceeding 20</td>
<td>27 (96)</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Exceeding 20 but not exceeding 55</td>
<td>38 (137)</td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c) Exceeding 55 but not exceeding 100</td>
<td>47 (171)</td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*d) Exceeding 100</td>
<td>47 (171) plus 47 (171) for every additional 125 hydrants or a part thereof</td>
<td>7/8.8</td>
</tr>
</tbody>
</table>

Note — The total pumping capacity need not be greater than 190 (683) irrespective of the number of hydrant points.

| 2.     | Ordinary Hazard | a) Not exceeding 20 | 38 (137) | 7.0                                      |
|        |                | b) Exceeding 20 but not exceeding 55 | 47 (171) | 7.0                                      |
|        |                | c) Exceeding 55 but not exceeding 100 | 76 (273) | 7.0                                      |
|        |                | *d) Exceeding 100 | 76 (273) plus 76 (273) for every additional 125 hydrants or a part thereof | 7/8.8                                    |

Note — The total pumping capacity need not be greater than 302 (1092) irrespective of the number of hydrant points.

| 3.     | High Hazard (A) | a) Not exceeding 20 | 47 (171) | 7.0                                      |
|        |                | b) Exceeding 20 but not exceeding 55 | 76 (273) | 7/8.8                                    |
|        |                | c) Exceeding 55 but not exceeding 100 | 114 (410) | 7/8.8                                    |
|        |                | *d) Exceeding 100 | 114 (410) plus 114 (410) for every additional 150 hydrants or a part thereof | 7/8.8/10.5                                |

4.     High Hazard (B)

| a) Not exceeding 20 | Two of 47 (171) | 7.0                                      |
| b) Exceeding 20 but not exceeding 55 | Two of 76 (273) | 7/8.8                                    |
| c) Exceeding 55 but not exceeding 100 | Two of 114 (410) | 7/8.8                                    |
| *d) Exceeding 100 | Two of 114 (410) plus one of 114 (410) for every additional 200 hydrants or a part thereof | 8/10.5                                    |

Note — In case of risks under Sl No. 4 where the number of hydrants exceed 500, pumps with a capacity up to 171 l/s (616 m³/h) are acceptable, provided:

a) the aggregate installed pumping capacity is not less than that worked out in accordance with the table above, and  
b) not more than 25 percent of the installed pumping capacity is disrupted when any one pump is inoperative.  
*This provision shall apply in case where the hydrant service has been hydraulically designed so that a minimum running pressure of 3.5 kgf/cm² is available at the hydraulically most remote discharging point at a pumping capacity of half that specified in the chart.

### TABLE 2  VARIOUS CLASSES OF NATURE OF RISK
( Clause 3.1.2 )

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Nature of Risk</th>
<th>Capacity of Static Storage Exclusively Reserved for Hydrant Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Light Hazard</td>
<td>Not less than 1 hour’s aggregate pumping capacity with a minimum of 135 000 litres</td>
</tr>
<tr>
<td>2.</td>
<td>Ordinary Hazard</td>
<td>Not less than 2 hours’ aggregate pumping capacity</td>
</tr>
<tr>
<td>3.</td>
<td>High Hazard (A)</td>
<td>Not less than 3 hours’ aggregate pumping capacity</td>
</tr>
<tr>
<td>4.</td>
<td>High Hazard (B)</td>
<td>Not less than 4 hours’ aggregate pumping capacity</td>
</tr>
</tbody>
</table>
3.1.3 Where pumps are exclusively used for spray or foam system; their capacity shall be governed by the demand of the largest risk.

3.1.4 Where storage tanks containing flammable liquids are protected by a medium velocity water spray system tapped from the hydrant service, the water requirements of the spray system shall be calculated for tanks located in a common dyke which have the largest aggregate shell surface area at a rate of 10 l/min/m² (0.167 l/s/m²) of tank shell surface area.

The water requirement of the spray system worked out as above shall be loaded for supplementary hose stream protection as under:

Where the largest tank in a dyke has a diameter of

a) Up to 10 m .......................... 1 700 l/min
b) More than 10 m and up to 20 m 2 250 l/min
c) More than 20 m ......................... 4 500 l/min

If the total water requirement for spray protection and hose stream protection for storage tanks worked out as above exceeds the requirement in accordance with Table 1, the pumping capacity shall be equivalent to the former.

3.1.5 Where storage tanks are protected by a fixed foam system connected to the hydrant service, water requirement for the foam system shall be equivalent to that required by the largest protected tank at a rate of 5 l/min/m² of liquid surface area.

Other conditions regarding supplementary hose stream protection, pumping capacity, etc, shall remain the same as for water spray protection.

3.1.6 Where spheres/bullets containing LPG are protected by a medium velocity water spray system fed by the hydrant service, water requirements of the spray system shall be calculated for up to 3 spheres/bullets, having the largest aggregate surface area located within 15 m of each other at a rate of 10 l/min/m² of the surface area. Other conditions for supplementary hose stream protection, pumping capacity etc, shall remain the same as for the water spray protection.

3.1.7 When the premises are protected by sprinkler installation having elevated tank(s) as one of the main sources of water supply and where the arrangement for filling the tank(s) is taken from the hydrant service, the connection shall be taken directly from the pump to the top of the tank (through stop valve) and not through the hydrant mains.

3.2 Castings — Castings shall be smooth, free from scales, lumps, cracks, blisters, sand holes and defects of any nature which could make them unfit for the use for which they are intended. A casting shall not be salvaged by filling or plugging; however, impregnation may be employed to remove porosity.

3.3 Fasteners — Fasteners exposed to corrosion shall be of corrosion resistant material.

4. Horizontal Split Case and End Suction Pumps

4.1 Pump Casing — The pump casing shall be axially split or radially split with back pullout features to permit examination of impeller(s) and other interior parts without disturbing suction or discharge piping.

4.2 A drain opening shall be provided so that all the water in pump casing can be drained. Minimum size of drain shall be Nb 15 mm, as specified in IS : 554-1985 'Dimensions for pipe threads where pressure tight joints are required on the threads (third revision).

4.3 Wearing Rings and Other internal Components — Impellers and wearing rings shall be of corrosion and abrasion resistant material. Shaft sleeve, sealing cage, gland, gland nut and drain plug shall be of corrosion resistant material.

4.4 The impeller(s) shall be secured in an axial direction preventing contact with the casing under operating conditions.

4.5 Shaft(s) — Shaft(s) shall be of stainless steel or of carbon steel with corrosion resistant shaft sleeve(s) at stuffing box(es).
4.6 Sleeve Bearing(s)

4.6.1 The removable shell, if provided shall be accurately machined to achieve uniform cylindrical fits and shall be replaceable.

4.6.2 Sleeve bearings shall be oil lubricated.

4.6.3 The oil chamber shall be provided with 15 mm nominal pipe size drain to be threaded in accordance with IS : 554-1985 and fitted with a plug of corrosion resistant material.

4.6.4 Each bearing shall have a provision to fill the oil.

4.6.5 Water deflectors of corrosion resistant material shall be provided to seal the bearing at its end facing the stuffing box.

4.7 Antifriction Bearings

4.7.1 Antifriction bearings shall be designed to have a minimum L 10 life (basic rating life) of 20 000 hours under maximum operating conditions.

4.7.2 Suitable means such as water deflector, oil seals, felt etc, shall be provided to limit the entrance of water and foreign matter into the antifriction bearings.

4.8 Shaft Sealing Arrangement — The shaft shall be provided with a sealing arrangement consisting of a stuffing box having adequate depth to accommodate required number of packings and a seal cage, if required. The gland shall exert a uniform pressure on the packings. The stuffing box at the suction side of the pump shall be water sealed.

4.9 Flexible Couplings — The pump shaft and drive shaft shall be connected with the help of suitable type of flexible coupling. Guard shall be provided to cover rotating flexible coupling.

5. Vertical Turbine Pumps

5.1 The rated speed of vertical turbine pumps shall not exceed 2 100 rpm.

5.2 Vertical turbine pump shall be designed to be driven by a vertical solid or hollow shaft electric motor or an approved vertical hollow shaft right angle gear drive.

5.3 Discharge Heads

5.3.1 The discharge head may be of either the above (surface) ground type or the underground type.

5.3.2 The discharge head shall support the driver, the pump column assembly and the oil tube tension nut or stuffing box.

5.4 Pump Column — The column for a pump shall be furnished in sections not exceeding a nominal length of 3 m. It shall be of material and thickness specified in IS : 1710-1972 'Specification for vertical turbine pumps for clear, cold fresh water (first revision)', and shall be connected by threaded sleeve type couplings or provided with other methods of connection.

5.5 Bowl Assemblies — Pump bowl shall be provided with bronze wearing ring of composition dissimilar to that of the impeller.

5.6 Impeller(s)

5.6.1 Impeller shall be of suitable corrosion resistant material.

5.6.2 Impeller(s) shall be statically and dynamically balanced and securely fastened to the impeller shaft. Impeller shall not contact the bowl under operating condition.

5.6.3 A suitable mechanism to adjust the proper axial position of the impeller(s) with respect to the bowl(s) shall be provided.

5.6.4 Water passages shall be designed to minimize the possibility of foreign materials being lodged in them.
5.7 Impeller Shafts — The impeller shafts shall be of stainless steel of Grade 04Cr13 of IS : 6527-1972 'Specification for stainless steel wire rod' or material having equivalent strength, rigidity and resistance to corrosion.

5.8 Line Shafts

5.8.1 Line shafts of water lubricated type pumps shall be stainless steel (Grade 04Cr13 of IS : 6527-1972 ) or of carbon steel with corrosion resistant shaft sleeves at bearings and at stuffing boxes.

5.8.2 The line shafts of oil lubricated type pumps shall be of carbon steel or material having equivalent strength and rigidity.

5.8.3 The computed; shear stress in shafting shall not exceed 30 percent of the yield strength of 18 percent of the ultimate tensile strength, whichever is lower.

5.9 Line Shaft Couplings — The line shaft sections shall be connected by a threaded coupling or a muff or a sleeve coupling.

5.10 Line Shaft Bearings

5.10.1 Water lubricated line shaft bearings shall consist of cutless rubber moulded in corrosion resistant metal shells.

5.10.2 When the static water level exceeds 15.2 m below ground level oil lubricated pump shall be used.

Oil lubricated line shaft bearings for the enclosed line shaft shall be of corrosion resistant material.

5.11 Shaft Enclosing Tube — It shall be of adequate size and shall conform to the requirements specified in IS : 1710.

5.12 Oil Lubrication to Line Shaft Bearings — An automatic lubricator shall be installed for electric motor driven pumps and other type of lubricator for engine driven pumps.

6. Performance

6.1 General

6.1.1 Performance characteristic shall be of the continuously rising type.

6.1.2 Any pump may be designed to meet more than one of the rated capacities by the use of suitable size of impeller(s).

6.1.3 The pump shall furnish not less than 150 percent of the rated capacity at a total head of not less than 65 percent of the total rated head.

6.1.4 The shut-off head developed by vertical turbine pumps shall not exceed 140 percent of the rated head.

6.1.5 In case of the split case, multistage and end suction type pumps, the shut-off head shall not exceed 120 percent of the rated head.

6.1.6 Tolerances on performance parameters shall be as specified in IS : 9137-1978 'Code for acceptance tests for centrifugal mixed flow and axial pumps—Class C'.

6.2 Operation Tests

6.2.1 All pumps shall be subjected to an operation test at a speed of rotation within the limits specified in 5.8 of IS : 9137-1978.

6.2.2 Performance curve shall be plotted showing the efficiency brake horse power (kW) and total head developed at shut-off at rated capacity, at 150 percent of the rated capacity and at selected intermediate capacities between the shut-off and 150 percent of the rated capacities. Test for NPSHR shall be conducted if agreed to between the manufacturer and the purchaser.
6.2.3 **Proof of design test** — Split case pumps with the shaft in vertical position shall be subjected to an additional endurance test for 24 hours at rated speed and rated capacity. During this test the bearings shall not exhibit wear as indicated by an increase in horse power required by the pump. The water shall not enter the lower bearings during running or standstill condition.

6.3 **Hydrostatic Pressure Test** — All the pressure containing parts, that is, pump casings and discharge casings of split case and end suction pumps, pump bowls and discharge head of vertical turbine pumps shall withstand hydrostatic pressure test for a period of 10 minutes without sweating and rupture. Hydrostatic test pressure shall be minimum 1.5 times the shut-off pressure or twice the rated pressure considering positive suction pressure, if any, whichever is higher.

6.3.1 Multistage pump shall be segmentally tested at the appropriate suction pressure.

7. **Selection of Drive Rating**

7.1 **Motor-Driven Pumps** — Motor shall not be overloaded in the entire range of operation, that is, between zero capacity to 150 percent of the rated discharge.

7.2 **Diesel Engine Driven Pumps** — Engines, after correction for altitude and ambient temperature, shall have bare engine horse power rating equivalent to the higher of the following two values.

   a) 20 percent in excess of the maximum brake horse power required to drive the pump at its duty point, or
   
   b) The brake horse power required to drive the pump at 150 percent of its rated discharge.

8. **Marking** — Each pump shall be provided with a name plate of suitable size and made of corrosion resistant metal, securely attached to the pump and visible after installation.

8.1 For all pumps, the nameplate shall include the following information:

   a) Manufacturer's name or identifying mark,
   
   b) Rated discharge,
   
   c) Rated speed,
   
   d) Model or type designation,
   
   e) Serial number,
   
   f) Rated head,
   
   g) Net head at 150 percent of rated discharge,
   
   h) Number of stages,
   
   j) Maximum brake horse power required at rated speed at any discharge condition, and
   
   k) Impeller diameter.

8.2 A directional arrow shall appear on each pump indicating the direction of rotation.

8.3 **Standard Marking** — Details available with the Bureau of Indian Standards.

**EXPLANATORY NOTE**

This standard contains basic requirements for products — split case and end suction pumps and vertical turbine pumps. These requirements are based upon sound engineering principles, research records of tests and field experience, and appreciation of the problems of manufacture and installation.