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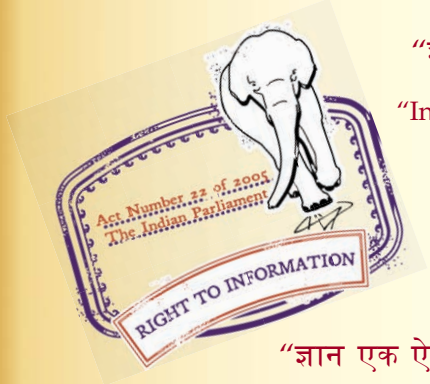

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SPECIFICATION FOR PUMPS FOR PROCESS WATER

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SPECIFICATION FOR PUMPS FOR PROCESS WATER

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Indian Standard

SPECIFICATION FOR PUMPS FOR PROCESS WATER

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 25 March 1970, after the draft finalized by the Pumps Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 Process water is used in different industries, such as chemical, textile, sugar, paper, power houses and steel plants. In this standard, various process waters are described and the requirements for centrifugal and -otodynamic pumps for use with process water are laid down.

0.5 By process water is meant the water which is used in any industrial process directly or indirectly. Pumps for clear, cold, fresh water are already covered in IS: 1520-1960*. In this standard, the requirements are sougt to be laid down for pumps for handling process water other than clear, cold fresh water. The types of water that are to be handled by the pumps covered in this standard will generally be turbid and/or hot and/or corrosive.

0.4 The technical requirements for centrifugal and rotodynamic pumps covering wide range including definitions, units, classes and types of pumps, effect of viscosity, specific gravity and other effects on the performance of pumps, material of construction, salient design features, testing procedures, tolerances and guarantees are already included in IS : 5120-1968†.

0.5 For the purpose *of* deciding whether a particular requirement *of* this standard is complied with, the final value, observed or calculated, expressing the result or a test, shall be rounded off in accordance with IS : 2-1960‡. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard specifies the technical requirements for rotodynamic pumps (such as centrifugal, axial flow, mixed flow, turbo pumps, etc) for handling process water.

*Specification for horizontal centrifugal pumps for clear, cold.fresh water . (Since revised)

†Technical requirement or rotodynamic special purpose pumps (Since revised).

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

1.2 This standard is not intended to cover requirements for rotodynamic pumps handling clear, cold, fresh water.

2. UNITS, TERMINOLOGY AND CLASSIFICATION

2.1 Units, terminology and classifications relating to pumps for process water shall be as specified in IS : 5120-1968*.

3. CHARACTERISTICS OF PROCESS WATER

3.1 Process water is that water having any one of the characteristics specified below:

a) Turbidity — 10000 ppm, *Max*
b) Suspended solid content — 10 to 20 percent by weight
c) Solid size — 3 mm, *Max*
d) *p*H value — 6 to 8
e) Temperature — 4°C to 145°C

3.2 Characteristics of process water met within different industries in India are given in Table 1.

TABLE 1 CHARACTERISTICS OF PROCESS WATER
(*Clauses* 3.2 *and* 5.2)

No.	NATURE OF WATER	FITTING	CHARACTERISTICS			APPLICATION
			Temperature °C	*p*H Value	ppm	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
I)	Acid water	Bronze fitted	< 100°C	6-7	—	Rayon industry
2)	Beater water supply	Bronze fitted	< 80°C	6-8	—	Paper mills
3)	Boiler feed water	Bronze fitted, Standard fitted, All iron	> 95°C	6-8		Oil refineries, gas plants, paper mills, jute mills, sugar factories
4)	Chilled water	All iron	10°-I3°C	7-8	—	Jute mills
5)	Chilled water circulation for press lye cooling, metering dram racket cooling, CS, recovery condensate circulation chilled water	All iron	9°-8°C	6-8		Rayon industry, jute industry

(*Continued*)

*Technical requirements for rotodynamic special purpose pumps. (Since revised).

TABLE 1 CHARACTERISTICS OF PROCESS WATER - *Contd*

No.	NATURE or WATER	FITTING	CHARACTERISTICS			APPLICATION
			Temperature °C	*p*H Value	ppm	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
6)	Condensate extraction	Bronze fitted	< 100°C	6-8	—	Sugar factories
7)	Condensate from evaporator (vacuum pan)	Bronze fitted	70° to 105°C	6-8	—	Sugar factories
8)	Condensate from juice heater	Bronze fitted	70° to 105°C	6-8	—	Sugar factories
9)	Condensate from paper machines	Bronze fitted	> 95°C	7	—	Paper mills
10)	Drain water	Bronze fitted	40° to 60°C	6-8	10000	Sugar factories
11)	Fire fighting	Special fitting, Bronze fitted	40°C	6-8	10 000	Paper mills
12)	Hot water	Bronze fitted	95°C	6-8	—	Buildings
13)	Hot water with lime	Bronze fitted	55°C	6-8	10000	Paper mills
14)	Imbibittonal water	Bronze fitted	60°C	6-8	—	Sugar factories
15)	Injection water for evaporator (vacuum pan)	Bronze fitted	60°C	6-8	—	Sugar factories
16)	Macervation water	Bronze fitted	60°C	6-8	—	Sugar factories
17)	Mine drainage water	Special metals	60°C	6-8	10000	Mines and quarries
18)	Raw water	Bronze fitted	60°C	—	10 000	Water works
19)	Rind water	Bronze fitted	60°C	6-8	5000	Sugar factories
20)	Salt service water	All bronze	60°C	7-8	10000	Chemical industry
21)	Simplex charge water	All iron	60°C	6-8	—	Rayon industry
22)	Storm water	Bronze fitted All iron	60°c		10000	Sewage pumping and treatment plants
23)	Subsoil water	Bronze fitted	I5°C	6.8	—	Chemical industry
24)	Supet heated wash water	Bronze fitted	100°to 125°C	6.8	—	Sugar factory
25)	Wash water	Bronze fitted	100°to 125°C	6-8		Water works, sugar factory, jute mills, rayon industry

4. NOMENCLATURE

4.1 Nomenclature of the parts commonly used in rotodynamic pumps for process water shall be as given in IS : 5120-1968*.

3. MATERIAL OF CONSTRUCTION

5.1 It is recognized that a number of materials of construction are available to meet the needs for pumps handling process water. A few materials are illustrated below for the guidance of the manufacturer and the user.

Wrought materials, sush as shafts may be either of similar composition to the castings used or suitable shaft protection should be provided against corrosion. Most of the parts are primarily castings.

Sl No.	*Material of Construction*	*Relevant Specification*
1)	Bronze fitted†	Grave V of IS : 318-1962‡
2)	All cast iron	Grade 20 of IS:210-1962§
3)	Standard fitted	—
4)	Rubber lining	Specification for this has not yet been formulated and whenever this and other material not included in the list are required, they shall form the subject of a separate agreement between the supplier and purchaser
5)	Stainless steel	IS: 1570-1961‖

The materials of construction indicated above are merely for guidance and are not necessary to be considered as exhaustive.

5.2 Recommended materials of construction for process water pumps used in different industries are given in Table I.

5.3 Gaskets, Seals and Packings — Gaskets, seals and packings used for process water pumps shall conform to those specified in IS: 5120-1968*.

6. DIRECTION OF ROTATION

6.1 The direction of rotation of pumps is designated clockwise or anti-clockwise as observed when looking at the pump shaft from the driving end.

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*Technical requirement! for rotodynamic special purpose pumps (Since revised).

†*Bronze Fitted Pump* — A pump in which the casing is of cast iron, the impeller, thef casing ring, the impeller ring and shaft sleeves are of bronze, and the shaft is of steel.

‡Specification for leaded tin bronze ingots and castings (*revised)*.

§Specification for grey iron castings (*revised)* (Since revised).

‖Schedules for wrought steels for general engineering purposes.

6.2 The direction of rotation shall be clearly marked either by incorporating an arrow in the casting or by a separate metal plate arrow securely fitted to the pump.

7. ACCESSORIES

7.1 In addition to essential and optional accessories specifred in IS : 5120-1968*, provision shall be made for fitting the auxiliary piping such as indicated below:

a) Stuffing box cooling connections shall be provided when temperature of the process water exceeds 95°C.

b) Bearings shall be provided with cooling connections to maintain their temperature below 50°C.

c) Vacuum equalizer connections shall be provided when pumping from suction vessels under vacuum.

d) Sealing connections should be provided to lantern rings in stuffing boxes when pumping turbid and aggressive waters.

e) Where the water is turbid, connections should be provided on the stuffing boxes for independent clear water supply and the pressure of this water supply should be specified by the manufacturers.

f) If required, provisions like centre supports, etc, shall be made for effects due to exposure clue to high temperature (above 140°C) of the water.

8. SUCTION LIMITATIONS

8.1 Suction limitations affecting the performance of process water pumps are the same as those specified in IS : 5120-1968*.

8.2 The net positive suction head (NPSH) available should be adequate and be always greater than the NPSH required.

9. FACTORS AFFECTING PUMP PERFORMANCE

9.1 Factors affecting pump performance are the same as those specified in IS : 5120-1968*.

10. DESIGN FEATURES

10.1 The pumps shall have suitable features properly designed to ensure satisfactory performance. In particular, the design features such as the

*Technical requirements for rotodvnamic special purpose pumps (Since revised).

following shall be incorporated:

a) In case of more than one duty point, the performance range is to be indicated and the prime mover should be of sufficient power to take the entire load in this range. Head restrictions shall be indicated on the name plates to avoid overloading the prime mover.

b) For working in parallel, pumps should be with stable head-capacity characteristic.

c) To prevent overheating of the boiler feed pumps (at full close pressure) an orifice, suitably designed, is recommended on the discharge side to maintain minimum flow.

d) Arrangement for cooling and sealing of stuffing boxes.

e) Arrangement for cooling of bearings.

f) Balancing water leakage connection should be provided in case of multistage pumps with balancing disc.

11. INFORMATION TO BE SUPPLIED BY THE PURCHASER AND THE SUPPLIER

11.1 The information to be supplied by the purchaser and the supplier shall be same as those specified in IS:5120-1968*.

12. PUMP TESTS

12.1 Pump tests shall be the same as those specified in IS:5120-1968*.

13. DETERMINATION OF PROCESS WATER PUMPS PERFORMANCE

13.1 The determination of performance of the process water pumps shall be in accordance with the method specified in **14** of IS: 5120-1968*.

14. GUARANTEES

14.1 Guarantee of Workmanship and Material — The pumps shall be guaranteed by the manufacturer against defects in material and workmanship, under normal use and service, for a period of at least one year.

14.2 Guarantee of Performance — The supplier shall indicate the working range of the pump and the efficiency of the pump shall be guaranteed at a specified point of rating only and shall not be guaranteed to cover the performance of the pump under conditions varying therefrom or for **a** sustained performance for any period of time. If the purchaser

*Technical requirements for rotodynamic special purpose pumps (Since revised).

so desires, the manufacturer shall guarantee the non-overload of the prime mover for variations in the head in the working range. In the case of pumps where acceptance tests cannot be conducted on the liquid for which the pump is designed, the manufacturer shall indicate the liquid performance of the pump based on the results of the tests conducted by him on the pump with water and interpolated as explained in IS : 5120-1968*. However, in these cases, the manufacturer shall guarantee the performance of the pump with water for the specified range.

14.3 Unless specified otherwise, pump performance figures shall be deemed to be applicable for 4.5 m suction lift at mean sea level and at a water temperature of 30°C.

14.4 Suction lift is to be reduced for higher altitudes at the rate of 1.5 m for every 1 000 m above mean sea level and for higher temperature at the rate of one metre for every 5°C rise above 50°C

15. TOLERANCES

15.1 In all commercial acceptance tests of pumps, a certain tolerance shall be allowed to the manufacturer on his guarantee to cover inaccuracies of the equations for discharge, errors of observation and unavoidable minor inaccuracies of the instruments employed.

15.2 A tolerance of ±2.5 percent shall *he.* permissible on the discharge. However, for small discharges up to 900 litres per minute, a tolerance of + 2.5 percent or +1.24 litres per minute whichever is higher, is allowed, while the negative tolerance of 2.5 percent is maintained.

15.3 The percentage pump efficiency shall be not less than the specified value by more than 2.5. This tolerance may be raised to 5 percent in case the prime mover does not get overloaded.

16. GENERAL REQUIREMENTS

16.1 The general requirements for the pumps for process water shall be as given in IS: 3120-1968*.

*Technical requirements of rotodynamic special purpose pumps (Since revised).

(*Continued from page* 2)

Processed Water Pumps Panel, EDC 35:5:1

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