भारतीय मानक

पम्प — मल जल और अपशिष्ट निकास — विशिष्टि
(पहला पुनरीक्षण)

Indian Standard

PUMPS — SEWAGE AND DRAINAGE — SPECIFICATION

(First Revision)

ICS 23.080

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Price Group 2

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Pumps Sectional Committee had been approved by the Mechanical Engineering Division Council.

Sewage and drainage pumps are used where sewage and other drainage from buildings is below sewer level and is to be taken into a sump and pumped or ejected from there into the sewer. These pumps are also used in cases where drainage cannot be taken care of by gravity flow.

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 : 1977 'Technical requirements for rotodynamic special purpose pumps (*first revision*)'.

This standard was first published in 1970. In this revision essential design features have been modified to bring it in line with the prevailing practice in the field.

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*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

PUMPS — SEWAGE AND DRAINAGE — SPECIFICATION

(First Revision)

1 SCOPE

This standard specifies the technical requirements for rotodynamic pumps (such as centrifugal, axial flow, etc) for handling sewage and drainage.

2 REFERENCES

The Indian Standards listed below contain provisions which, through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are enouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
210 : 1993	Grey iron castings — Specification (*fourth revision*)
318 : 1981	Specification for leaded tin bronze ingots and castings (*second revision*)
1875 : 1992	Carbon steel billets, blooms, slabs and bars for forgings (*fifth revision*)
5120 : 1977	Technical requirements for rotodynamic special purpose pumps (*first revision*)
6603 : 2001	Stainless steel bars and flats – Specification (*first revision*)
6911 : 1992	Stainless steel plate, sheet and strip (*first revision*)

3 UNITS, TERMINOLOGY AND CLASSIFICATION

Units, terminology and classification relating to pumps for handling sewage and drainage shall be as specified in IS 5120.

4 CHARACTERISTICS OF SEWAGE

Some typical characteristics of sewage are given below:

a)	Total solids	1 000 to 2 200 ppm
b)	Suspended solids	150 to 500 ppm
c)	Four hours oxygen consumption	50 to 120 ppm
d)	BOD (5 days 20°C)	150 to 450 ppm
e)	Alkalinity	350 to 700 ppm
f)	Chloride	120 to 300 ppm
g)	Free nitrogen	15 to 45 ppm
h)	Albuminoid nitrogen	4 to 40 ppm
j)	*p*H value	6.8 to 7.9
k)	Specific gravity	1.05

5 NOMENCLATURE

Nomenclature of the parts commonly used in sewage and drainage pumps shall be as given in IS 5120.

6 MATERIAL OF CONSTRUCTION

It is recognized that a number of materials of construction are available to meet the needs for pumps for sewage and drainage. A few typical materials are indicated below merely for the guidance of the manufacturer and the user:

Component	*Material of Construction*
Casing	Casting grade FG 200 of IS 210
Impeller	Casting grade FG 200 of IS 210 or Bronze grade LTB2 of IS 318 or Stainless steel as per IS 6603 or IS 6911
Casing ring and impeller ring (if provided)	do

Shaft sleeve (if provided)	Bronze grade LTB2 of IS 318 or Stainless steel grades X04 Cr12, X12 Cr12 or X20Cr 13 of IS 6603 or IS 6911
Shaft	Class 3A of IS 1875
Bush	Bronze grade LTB2, 3 or 4 of IS 318 or Nitrile/cutless rubber

NOTES:

1 The materials listed are to be considered as only typical and indicative of minimum requirement of the material properties. The use of materials having better properties is not prejudiced by the details provided above.

2 If the range of pH is between 6.5 and 8.5 and the chloride content exceeds 100 ppm, only bronze fitted impeller or stainless steel impeller shall be used.

3 If any other characteristics of sewage to be handled differ from those specified as above, the material of construction for the pump shall be as agreed to between the manufacturer/supplier and the user and shall be specified in the order.

7 DIRECTION OF ROTATION

7.1 For rotodynamic pumps, the direction of rotation is designated as clockwise or anti-clockwise as observed when looking at the pump shaft from the driving end.

7.2 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.

8 ACCESSORIES

The following shall constitute common accessories:

a) Vacuum pump if there is no positive suction,

b) Flanged sluice valve on suction side if there is positive suction,

c) Flanged sluice valve on delivery side,

d) Flanged reflux valve,

e) Pressure relief valve,

f) Coupling,

g) Pressure and vacuum gauge with siphon and cock,

h) Base plate,

j) Foundation bolts and nuts,

k) Ball type air relief valve, and

m) Automatic level operated control switch.

NOTE – Item (b), (c), (d) and (m) are optional.

9 SUCTION LIMITATIONS

Suction limitations affecting the performance of the sewage and drainage pumps are the same as specified in IS 5120.

NOTE — It is always desirable for sewage pumps to operate with positive head on suction or with flooded suction. If the pumps operate with a suction lift, there is a possibility of the gases contained in the sewage being given off resulting in vapour lock and ultimate failure of the pumps.

10 FACTORS AFFECTING PUMP PERFORMANCE

Factors affecting the pump performance are the same as those specified in IS 5120.

11 ESSENTIAL DESIGN FEATURES

The pumps shall have following design features to ensure satisfactory performance.

a) The allowable solid size should not exceed 80 percent of the outlet width of the impeller.

b) Casing and impeller should be so designed as to allow free passage of the specified maximum size of solids.

c) An inspection hole with suitable cover of the same material as that of casing should be provided on the casing either on suction side or near to casing throat so as to permit the inspection of the impeller whenever necessary.

d) The pump should be preferably of end suction type with vertical and/or horizontal delivery nozzle orientation.

e) On account of the abrasive nature of sewage, provision should be made on the stuffing boxes to ensure clear water supply or grease lubrication to the glands shall be provided from external sources according to the requirements of use. Alternatively, there should also be provision of replacing gland packing without major overhaul of the pump.

12 INFORMATION TO BE SUPPLIED BY THE PURCHASER AND THE SUPPLIER

The information to be supplied by the purchaser and the supplier shall be as specified in IS 5120.

13 PUMP TESTS

Pump tests shall be the same as those specified in IS 5120.

14 DETERMINATION OF PUMP PERFORMANCE

The determination of the performance of the sewage and drainage pumps shall be in accordance with the method specified in **14** of IS 5120.

15 GUARANTEES

15.1 Guarantee of Workmanship and Material

The pump 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.

15.2 Guarantee of Performance

The supplier shall indicate the working range of the pump and the efficiency of the pump shall 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 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 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 given in IS 5120. However, in these cases, the manufacturer shall guarantee for the performance of the pumps with water for the specified range.

15.3 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.

15.4 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.

16 TOLERANCES

16.1 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.

16.2 A tolerance of ±2.5 percent shall be permissible on the discharge. However, for small discharges up to 900 l/min, a tolerance of +2.5 percent or +24 l/min whichever is higher, is allowed while the negative tolerance of 2.5 percent is maintained.

16.3 The percentage pump efficiency shall be not less than the specified value by more than 2.5.

17 GENERAL REQUIREMENTS

The general requirements covering the pumps for process water shall be as given in IS 5120.

18 MAINTENANCE

18.1 A maintenance schedule shall be provided by the manufacturer/supplier with each pump to the user for the guidance. The maintenance schedule may also include trouble shooting of problems generally encountered in operation and maintenance of the pumps.

18.2 A set of maintenance tools required for day-to-day maintenance of sewage pumps shall be provided.

19 MARKING

19.1 Pump shall be marked with the following:

a) Manufacturer's name or recognized trade-mark;

b) Type, size and serial No. of pump;

c) Speed;

d) Head, volume rate of flow and efficiency at the specific duty point;

e) Head range for overloading requirements;

f) Recommended prime-mover rating; and

g) Arrow to indicate direction of rotation.

19.2 BIS Standard Mark

19.2.1 The pump may also be marked with the Standard Mark.

19.2.2 The use of Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which a license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act,* 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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