IS 9542 (1980): Horizontal centrifugal monoset pumps for clear, cold, fresh water [MED 20: Pumps]

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UDC 621·67·031-111·2 (First Reprint DECEMBER 1990) IS : 9542 -
(Reaffirmed 2003)

Indian Standard

SPECIFICATION FOR HORIZONTAL CENTRIFUGAL MONOSET PUMPS FOR CLEAR, COLD, FRESH WATER

1. Scope — Specifies the technical requirements for horizontal centrifugal monoset pumps for handling clear, cold, fresh water for general purposes other than agricultural purposes.

2. Units, Terminology and Classification — Units, terminology and classification relating to pumps for clear, cold, fresh water shall be as specified in IS : 5120-1977 'Technical requirements for rotodynamic special purpose pumps (*first revision*)'.

3. Characteristics of Clear, Cold, Fresh Water — Characteristics of clear, cold, fresh water are specified below:

a)	Turbidity	50 ppm (silica scale), *Max*
b)	Chlorides	500 ppm, *Max*
c)	Total solids	3 000 ppm, *Max*
d)	*p*H value	6·5 to 8·5
e)	Temperature	33°C, *Max*
f)	Specific gravity	1·004, *Max*

4. Nomenclature — Nomenclature of the parts commonly used in horizontal centrifugal monoset pumps shall be as given in IS : 5120-1977.

5. Material of Construction

5.1 It is recognized that a number of material of construction are available to meet the needs for pumps handling clear, cold, fresh water. A few typical materials are indicated below merely for the guidance of the manufacturer and the user:

Sl No.	*Material of Construction*	*Relevant Specification*
i)	All cast iron	Grade FG 200 of IS : 210-1978 'Specification for grey iron castings (*third revision*)'
ii)	Standard fitted:	Grade FG 200 of IS : 210-1978
	Casing and impeller casing ring, impeller ring and shaft sleeves (if used)	Grade 2 of IS : 318-1962 'Specification for leaded tin bronze ingots and castings'
iii)	Bronze fitted:	
	Casing	Grade FG 200 of IS : 210-1978
	Casing ring, impeller, impeller ring and shaft sleeves (if used)	Grade 2 of IS : 318-1962

Note 1 — If the range of *p*H value of the water pumped is between 6·5 and 7·5 and also the chloride content is less than 100 ppm, the pump may be made of bronze as per Grade 2 of IS : 318-1962. However, if the range of *p*H is between 6·5 and 8·5 and the chloride content exceeds 100 ppm, only zinc free bronze fitted construction or stainless steel fitted construction shall be permitted.

Note 2 — If any other characteristics of the water differ from those specified above, the material of construction for the pump will have to be agreed between the manufacturer/supplier and the user and shall be specified in the order.

5.2 *Gaskets, Seals and Packings* — Gaskets, seals and packings used for clear, cold, fresh water shall conform to those specified in IS : 5120-1977.

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.

Pumps Sectional Committee, EDC 35; Horizontal Spindle Pumps Subcommittee, EDC 35 : 2 [Ref : Doc : EDC 35 (3334)]

Adopted 19 June 1980 Gr 2

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

7. Suction Limitations

7.1 Suction limitations affecting the performance of pumps for clear, cold, fresh water are the same as those specified in **9** of IS :. 5120-1977.

7.2 *Effect of Total Suction Lift* — The effect of total suction lift on performance of pumps for clear, cold, fresh water are the same as those specified in **10.5** of IS : 5120-1977.

7.3 Suction lift is to be reduced for higher altitudes at the rate of 1·15 m for every 1 000 m above mean sea level. The correction for temperature should be obtained from steam tables.

8. Factors Affecting Pump Performance — Factors affecting pump performance are the same as those specified in IS : 5120-1977 except for **10.0** (b) and (e) and **10.2**.

9. Design Features and General Requirements

9.1 The pumps shall have all the features required to ensure specified performance requirements, in particular, the following design features shall be incorporated.

9.1.1 In case of more than one duty point, the performance range is to be indicated and the prime-mover should not get overloaded in entire working range of capacity. Head restrictions shall be indicated on the name plates to avoid overloading of the prime-mover.

9.1.2 For the pumps working in parallel, the operating point of the pump shall lie on the stable portion of the head and volume rate of flow characteristic curve.

9.1.3 Thrust bearing of adequate size should be provided where required.

9.2 *Casing* — The casing should be of such a construction as to be capable of withstanding a hydrostatic test pressure of 1·5 times the maximum discharge pressure.

9.3 *Impeller* — The impeller shall be properly balanced against manufacturing defects along with any other unmachined rotating parts on proper balancing equipment.

9.4 *Motor*

9.4.1 Single-phase motors shall conform to IS : 996-1964 'Specification for single-phase small ac and universal electric motors (*revised*)'.

9.4.2 Three phase motors shall conform to IS : 325-1970 'Specification for three-phase induction motors (*third revision*)'.

9.5 *Shaft* — The shaft shall be of sufficient size as to be capable of transmitting the required power over the entire range.

9.6 *Name Plate* — Pumps shall have a name plate indicating:

a) Manufacturer's name or recognized trade-mark;
b) Type, size and serial number of pump;
c) Speed; and
d) Head, volume rate of flow and power input at the designed duty point.

10. Information to be Supplied by the Purchaser and the Supplier

10.1 The information to be supplied by the purchaser shall be the same as given in **11** of IS : 5120-1977 except **11.1(b)**. In addition, the following information may also be furnished by the purchaser:

a) Working temperature in °C;
b) Vapour pressure (indicate unit); and
c) Whether liquid handled contains particles of sand, silt, etc, if yes, specify:
   i) Turbidity in ppm, and
   ii) Size and content of sand and silt.

10.2 The information to be supplied by the supplier shall be the same as given in **12** of IS : 5120-1977 except **12.1** (h) (3) (iii).

11. Pump Tests, Tolerances and Verification of Guarantees on Pump Performance

11.1 Pump tests, tolerances and guarantees on pump performance shall be as specified in IS: 9137-1978 'Code for acceptance tests for centrifugal, mixed flow and axial pumps—Class C' or 'Indian Standard Code for acceptance tests for centrifugal mixed flow and axial pumps—Class B (*under preparation*)'.

11.2 The purchaser shall clearly specify in his order the relevant Indian Standard for pump performance tests and acceptance.

11.3 Unless otherwise specified, pumps shall be tested and guaranteed for performance according to IS : 9137-1978.

11.4 *Sampling* — For pumps requiring pump input up to and including 75 kW, the scheme of sampling and criteria for conformity shall be as given in Appendix A. However, if the production lot is less than 5 or if the pump input excess 75 kW, then the entire lot shall be tested.

11.5 *Hydrostatic Test* — A standard hydrostatic test on the casing shall be made at 1·5 times the maximum discharge pressure.

11.6 Each deviation from the respective recommendations agreed upon mutually, shall be stated in the supply contract.

12. Certification Marking — Details available with the Bureau of Indian Standards.

APPENDIX A
(*Clause* 11.4)

SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

A-1. Lot

A-1.1 All the pumps for the same pump input manufactured under essentially similar conditions of production shall be grouped together to constitute a lot.

A-1.2 Unless otherwise agreed to between the purchaser and the supplier, the number of pumps to be selected for subjecting to the pump tests shall be according to col 1 and 2 of Table 1 or Table 2.

A-1.3 In case the manufacturer has an elaborate inplant quality control system and produces the records to convince the purchaser about the quality of his products, the scale of sampling shall be according to Table 1 otherwise the scale of sampling shall be according to Table 2.

TABLE 1 SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY (WHERE QUALITY CONTROL IS APPLIED)

No. of Pumps in the Lot (1)	No. of Pumps Selected (2)	Acceptance Number (3)
Up to 100	5	0
101 to 150	8	0
151 to 300	13	0
301 to 500	20	0
501 to 1 000	32	1
1 001 and above	50	1

TABLE 2 SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

No. of Pumps in the Lot (1)	No. of Pumps Selected (2)	Acceptance Number (3)
Up to 25	5	0
26 to 50	8	0
51 to 100	13	0
101 to 150	20	0
151 to 300	32	1
301 to 500	50	1
501 to 1 000	80	2
1 001 and above	125	3

Note — Acceptance number is defined in IS : 2500 (Part I)-1973 'Sampling inspection tables: Part I Inspection by attributes and by count of defects'.

EXPLANATORY NOTE

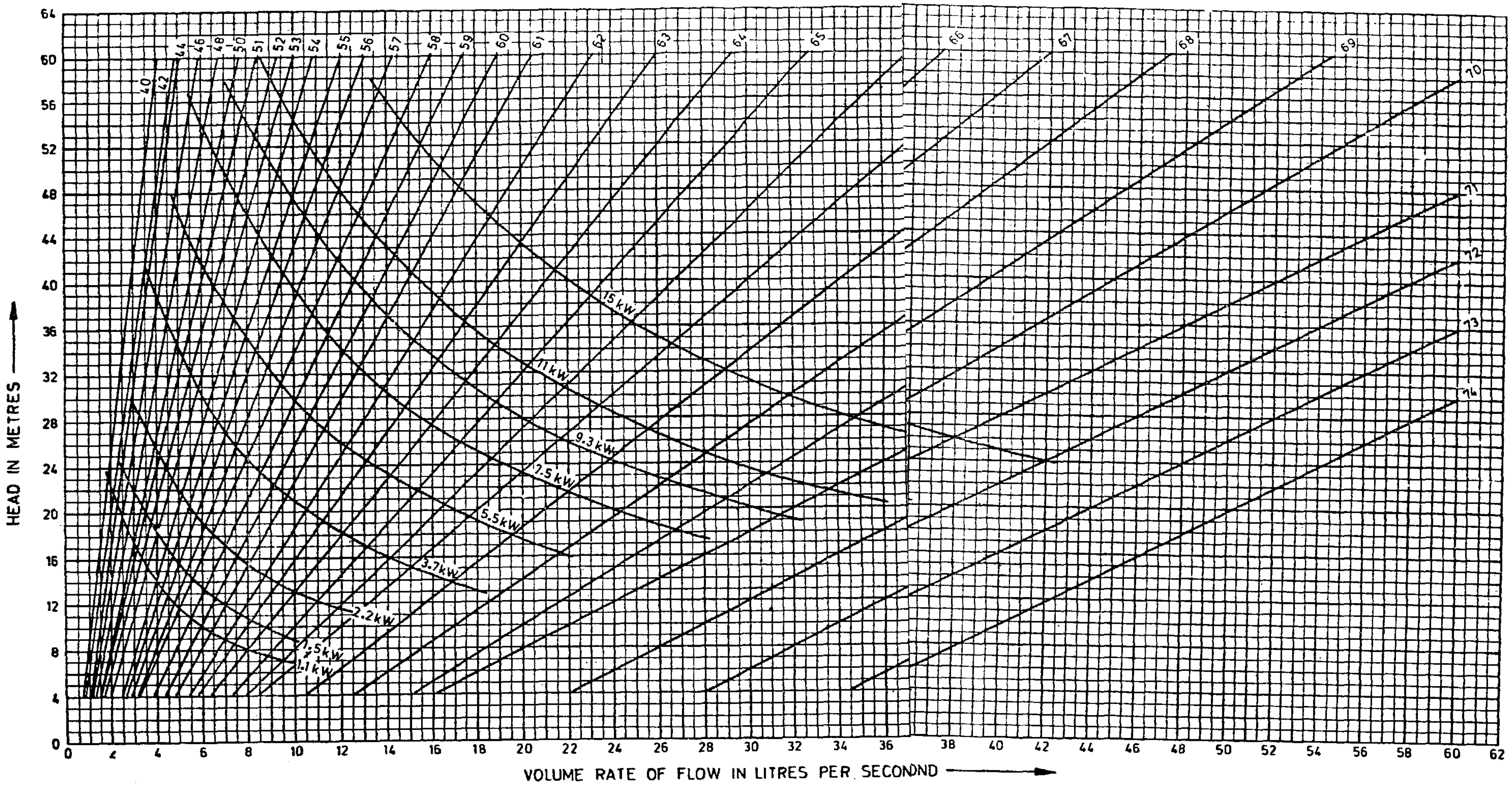
This standard has been prepared specifically to make available a separate specification for monoset centrifugal pumps for handling clear, cold, fresh water for general purposes.

AMENDMENT NO. 1 JULY 1989
TO
IS 9542 : 1980 SPECIFICATION FOR HORIZONTAL CENTRIFUGAL MONOSET PUMPS FOR CLEAR, COLD, FRESH WATER

(*Page* 3, *clause* **11.6**) — Insert the following after **11.6**:

'**11.7** *Efficiency* — The overall minimum efficiency of the monoset pumps at duty point as declared by the manufacturer for 2 pole and 4 pole shall be as given in Fig. 1 and 2 on pages 2 and 3 of this Amendment.'

Gr 1



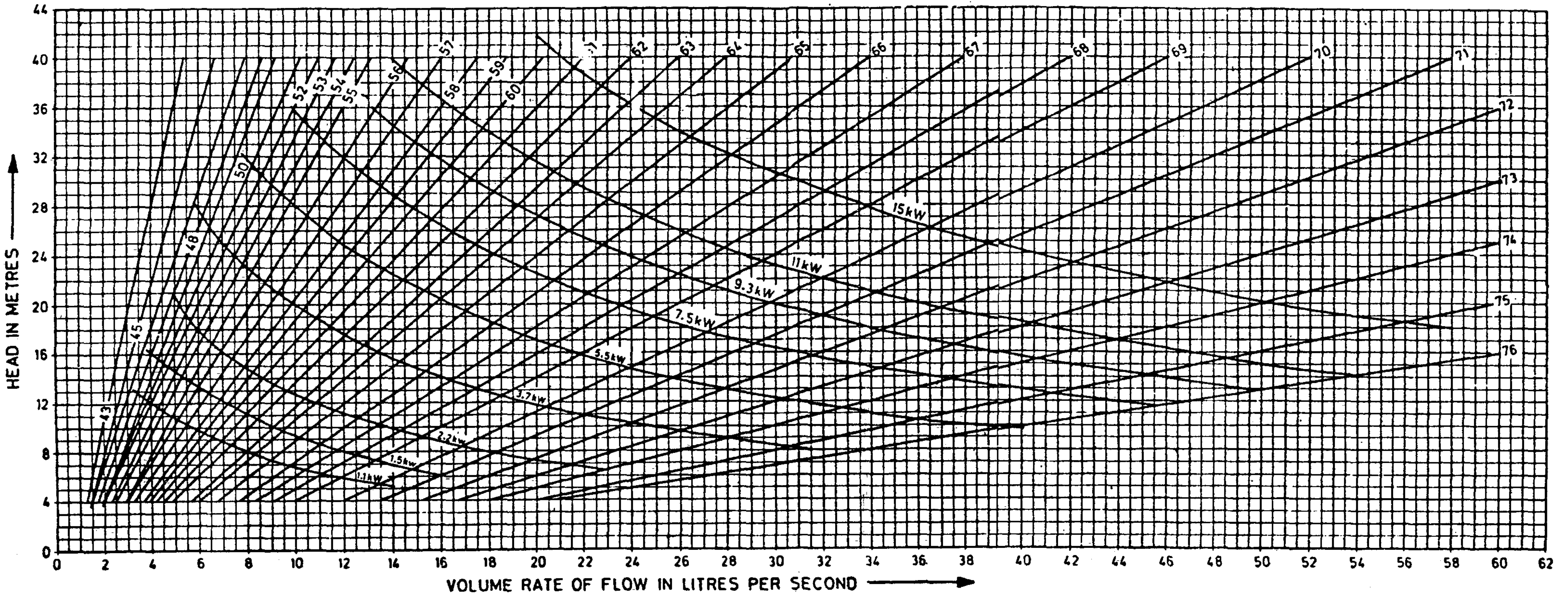
FOR MONOSETS		
Motor Ratings kW	Motor Efficiency (%) *Min*	
	Single Phase	Three Phase
0·37	54	—
0·75	63	—
1·1	68	73
1·5	70	74
2·2	—	78
3·7	—	79
5·5	—	80
7·5	—	81
9·3	—	81·5
11·0	—	82
15·0	—	83

NOTES

1 The chart be used to arrive at overall efficiency of monoset pumps without reduction for margin.

2 The primemover ratings have a 10% margin over the power consumed at the specified efficiency point of pump. This will by and large ensure trouble free operation of the pump over the operation range.

FIG. 1 MINIMUM EFFICIENCY IN PERCENT FOR MONOSET PUMP FOR AGRICULTURAIL PURPOSES (2 POLE 50 Hz)



FOR MONOSETS		
Motor Ratings kW	Motor Efficiency (%) *Min*	
	Single Phase	Three Phase
0·37	56	—
0·75	66	—
1·1	70	76
1·5	72	77
2·2	—	77·5
3·7	—	80
5·5	—	82
7·5	—	83
9·3	—	85
11·0	—	85·5
15·0	—	86·0

NOTES

1 The chart be used to arrive at overall efficiency of monoset pumps without reduction for margin.

2 The primemover ratings have a 10% margin over the power consumed at the specified efficiency point of pump. This will by and large ensure trouble free operation of the pump over the operation range.

FIG. 2 MINIMUM EFFICIENCY IN PERCENT FOR MONOSET PUMPSETS FOR AGRICULTURAL PURPOSES (4 POLE 50 Hz)

AMENDMENT NO. 2 MAY 2006
TO
IS 9542 : 1980 SPECIFICATION FOR HORIZONTAL CENTRIFUGAL MONOSET PUMPS FOR CLEAR, COLD, FRESH WATER

[*Page* 1, *clause* **5.1**, *Notes*] — Delete Note 1 and renumber the subsequent Note.

(MED 20)