

RAIL COACH FACTORY KAPURTHALA
 SPECIFICATION FOR OIL PUMP WITH MOTOR
 AND STARTING CAPACITOR

1.0 SCOPE :

This specification covers the technical requirements, manufacture, testing and supply of capacitor start and run, oil pump with single phase induction motor for cooling of transformer oil of 25KV AC traction transformer installed in main line electric multiple units .

2.0 SERVICE CONDITIONS :

2.1 Environmental Conditions :

- Ambient temperature 0 deg.C to 55 deg.C
- Maximum relative humidity 95%
- Altitude Maximum 1000 metres

2.2 Working Conditions :

- Train speed (max) 160 Kmph
- Vibration and shocks
 - a) Maximum vertical acceleration 1.0 g
 - b) Maximum lateral acceleration 0.5 g
 - c) Maximum longitudinal 3.0 g
 - d) Frequency and amplitude :

Sinusoidal form of vibration, the frequency 'f' lies

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between 1 Hz and 100 Hz and their amplitude 'a' expressed in mm is given as function of 'f' by the equation :

$a=25/f$ for values of 'f' between 1 Hz and 10 Hz

$a=250/f^2$ for values of 'f' between 10 Hz & 100 Hz

3.0 GOVERNING STANDARDS/SPECIFICATIONS :

References shall be made to following standards/specifications :

- IS:996-79, : Single phase small ac and universal
Amendment-2 electric motors.
- IS:2993-98 : AC motor capacitors.
- IS:1271-85 : Thermal evaluation and classification of
electrical insulation.
- IS:4889-68 : Method of determination of efficiency of
Amendment-2 rotating electrical machines.
- IS:5120-77 : Technical requirements for rotodynamic
Amendment-4 special purposes pumps.
- IS:4691-85 : Degree of protection provided by
enclosure for rotating electrical
machinery.
- IS:306-83 : Tin bronze ingots and castings.
Amendment-1
- IS:13730-93 : Particular types of winding wires-

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Part-13 Polyester or polyestermide overcoated with polyimide-imide enamelled round copper wire, class 200.

IS:7572-74 Guide for testing single phase ac and universal motors.

IS:4905-68 Methods for random sampling.
Amendment-1.

IS:1364-92 Hexagon head bolts, screws and nuts of part-1, 2, 3 & 4 product grade A & B.

IS:5-94 Colours for ready mixed paints and enamels.

IS:8662-93 Enamels, synthetic, exterior (a) undercoating (b) finishing for railway coaches.

4.0 TECHNICAL REQUIREMENTS :

Oil pump shall be of compact monoblock type construction. The impeller shall be hydraulically balanced. Sizes on Inlet and outlet connecting flanges as well as overall dimensions and mounting dimensions shall be as per enclosed drawing no. EM71011.

4.1 PUMP :

Pump shall be single stage centrifugal type of integral construction (with driving motor), conforming to IS:5120-77 and shall have following technical details:

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- i) Discharge capacity : 400 ltrs/minutes
- ii) Total head : 7.3 mtrs. (Velocity head 5.48mtrs. & Static head 1.82mtrs.)
- iii) Pumping medium : Transformer oil
- iv) Pump efficiency : 50% min at 240V nominal voltage
- v) Material of construction : As per IS:5120-77, Clause-5.1, Selection no.1.
- vi) Material of Impeller: Tin Bronze as per IS:306

4.2 MOTOR :

Motor shall be conforming to IS:996-79 and shall have following technical parameters :

- i) Rated voltage : 240V+/-22.5V AC, single phase.
- ii) Frequency : 50 Hz +/- 3 %
- iii) Type : Capacitor start and run, Induction motor.
- iv) Speed : 2850 rpm
- v) Continuous rating : 1.5 HP
- vi) Rated current : 6.5 Amp. at 240V AC
- vii) Efficiency : 75% min at 240V AC
- viii) Power factor at full load : 0.92
- ix) Insulation of winding : Class 'H'
- x) Type of enclosure : Totally enclosed. Motor shall be hose proof conforming to IP55 of IS:4691-1985.
- xi) Type of winding wire : Dual coated super enamelled as per IS:13730, Part-13.
- xii) Type of bearings : SKF 6305 ZZ.
- xiii) Duty class : S1

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- xiii) Method of cooling : By circulating transformer oil to the motor case and windings shall be totally submerged in oil.
- xiv) Overall dimensions : Sizes on inlet & outlet connecting flanges as well as mounting dimensions shall be as per drawing no. EM71011

- 4.3 Terminals for supply connection shall be brought in a terminal box. Terminals shall be clearly marked R Y B (embossed) on the terminal block to obtain correct direction of rotation. Adequate creepage distances and clearances should be ensured between the terminals. The terminal box should have degree of protection of IP55 to IS:4691. Terminal block should be made of epoxy reinforced glass conforming to BS:3815.
- 4.4 Silver brazed joints/fused joints for connecting terminal leads and winding wires shall only be used. Soldered joints are not permitted.
- 4.5 Oil pump casing shall be provided with two independent earth terminals suitable for M6 screws for earthing with coach body.
- 4.6 Size of the cable entry hole shall be 32mm dia with conduit threads to IS:9537-Part-II.

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4.7 An arrow indicating the correct direction of rotation with the supply phases RYB connected to the corresponding terminals marked on the terminals box shall be permanently fixed on the motor body.

4.8 The equipment shall be treated suitably for rust removal and painted with two coats of primer and finished with silver grey shade no.628 of IS:5-94 paint conforming to IS:8662-93.

5.0 COMBINED EFFICIENCY :

Combined efficiency of pump and motor at full load shall not be less than 40% as per IS:9137-78.

6.0 CAPACITOR :

Capacitor required for the motor shall be electrolytic type of capacity 50 Mfd, 440V rating of reputed make and shall be supplied along with the oil pump.

7.0 TEST AND INSPECTION :

The following type, acceptance and routine test shall be carried out at manufacturer's premises as per IS:7572-74 for guide for testing single phase AC and universal motors, IS:996-79 for specification for single phase small AC and universal electric motors and IS:5120-77 for technical requirements for rotodynamic special purpose pumps.

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7.1 TYPE TESTS :

All the type tests mentioned in table given in clause 7.6 shall be carried out on a prototype unit.

7.2 ACCEPTANCE TEST :

Acceptance tests mentioned in table given in clause 7.6 shall be carried out by an inspecting authority nominated by the purchaser at the works of the manufacturer on the sample picked up at random as per IS:4905-68. Lot size sampling for test may be decided by the inspecting authority.

7.3 ROUTINE TESTS :

Routine tests mentioned in table given in clause 7.6 shall be carried out on each unit by the manufacturer at his works to ensure compliance with the specification and drawings.

7.4 The accuracy of measuring instruments used in testing shall be class-1.

7.5 All the tests shall be carried out at firms premises at manufacturer's cost. Inspecting officer will witness the tests. A copy of the internal tests conducted by the firm shall be supplied to inspecting/purchasing authority.

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7.6 TABLE FOR TESTS :

S.NO.	DESCRIPTION	TYPE	ACCEPTANCE	ROUTINE
1.	Visual & dimensional checks as per drawing no.EM71011.	Yes	Yes	Yes
2.	No load performance test at 186V,240V & 294V (With motor fitted to pump).	Yes	Yes	No
3.	Load performance test at 186V,240V & 294V.	Yes	Yes	No
4.	Discharge capacity test of pump at 186V,240V & 294V.	Yes	No	No
5.	Short circuit test.	Yes	No	No
6.	Measurement of cold resistance.	Yes	Yes	No
7.	Insulation resistance test.	Yes	Yes	Yes
8.	High voltage test.	Yes	Yes	Yes
9.	Temperature rise test at 186V & 294V.	Yes	No	No
10.	Measurement of starting torque.	Yes	Yes	No
11.	Over speed test.	Yes	No	No
12.	Hydraulic pressure test.	Yes	Yes	No
13.	Pull out torque test.	Yes	No	No
14.	Heat run test.	Yes	No	No
15.	Hot resistance measurement after heat run test at 186V,240V & 294V.	Yes	No	No
16.	Overall efficiency test	Yes	Yes	No

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7.6.1 Test at Sr.no. 2,3,5,6,7,8,9,10,11,13,14 and 15 shall be carried out as per IS:7572-74 for guide for testing single phase AC and universal motors and IS:996-79 for specification for single phase small AC and universal electric motors.

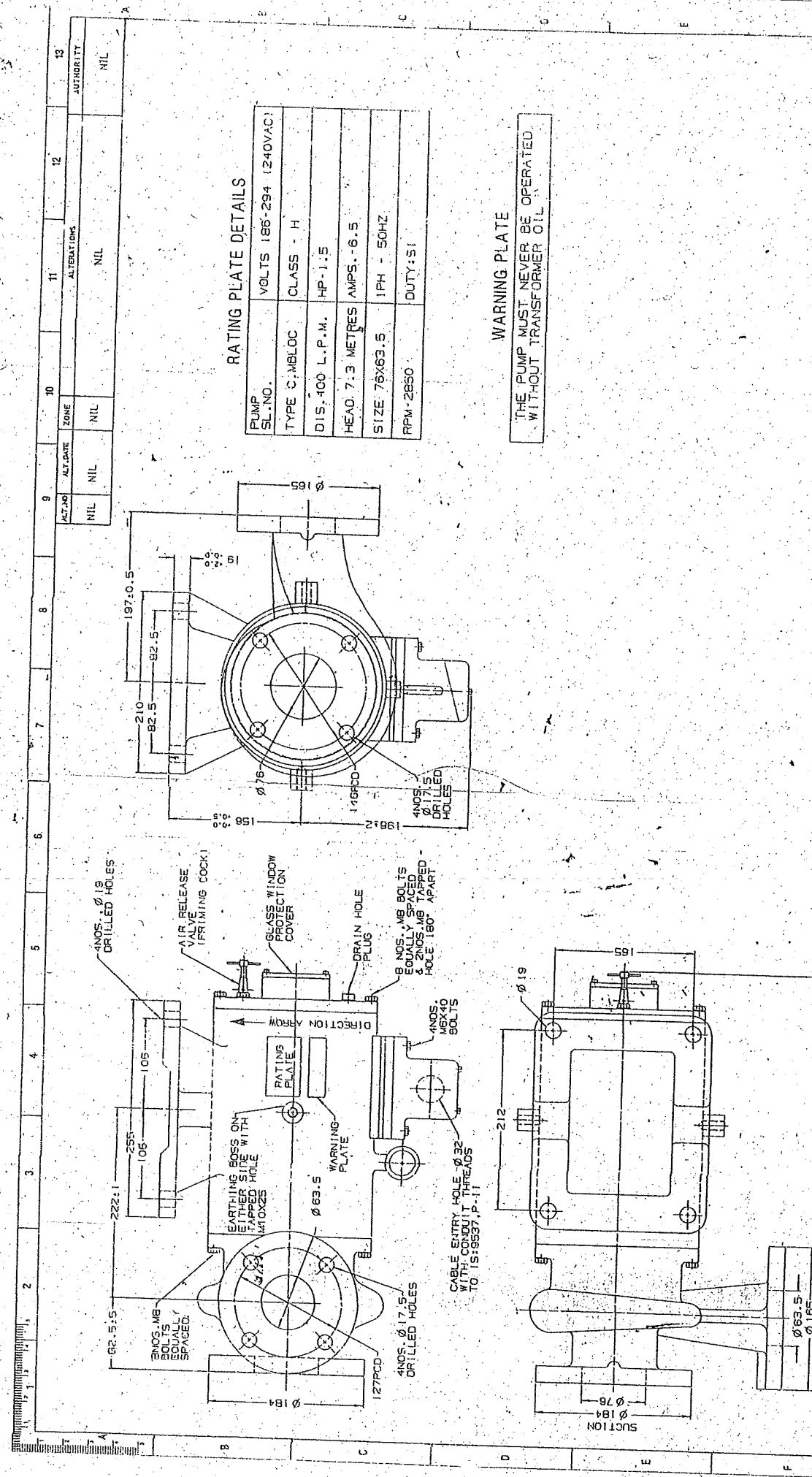
7.6.2 Test at Sr.no. 4 & 12 shall be carried out as per IS:5120-77 for technical requirements for rotodynamic special purpose pumps.

7.6.3 Test at Sr.no.16 shall be carried out as per IS:9137-78 for code for acceptance tests for centrifugal, mixed flow and axial pumps - class 'C'.

8.0 ENCLOSURES:

Drawing no.EM71011 : Outlines of oil pump with motor & starting capacitor (for MEMU/DMC).

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RATING PLATE DETAILS

PUMP SL. NO.	VOLTS 186-294 (240VAC)
TYPE C.M.BLOC	CLASS - H
DIS. 100 L.P.M.	HP - 1.5
HEAD. 7.3 METRES	AMPS. - 6.5
SIZE 75X63.5	1PH - 50HZ
RPM - 2850	DUTY - S1

WARNING PLATE

THE PUMP MUST NEVER BE OPERATED WITHOUT TRANSFORMER OIL

WELD LENGTH	WTD	DESCRIPTION & DIMENSIONS	PASSY	DETAIL DRG	MAT. & SPEC.	REMARKS
NIL	H	ELECTRICAL				
NIL	KG	FILE / users/1/s1/bc/kojs/bm71011.prt				
NIL	M	OUTLINES OF OIL PUMP WITH MOTOR & STARTING CAPACITOR (FOR MEMU/DMC)				
NIL	M	RAIL COACH FACTORY, KAPURTHALA				
NIL	M	INDIAN RAILWAYS STANDARD				
NIL	M	PL NO. NIL				
NIL	M	DRG. NO. EW71011				
NIL	M	BY: CEE/040				

NOTE: 1. ALL DIMENSIONS IN MM.

DETAIL DRG. STARTING WITH "L1" ARE INTERNAL REFERENCE LISTS ONLY AND ARE NOT FOR ISSUE

ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID.

FOR UNCORRECTED DIMENSIONS REFER MDG0008

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