



**PRODUCT MANUAL FOR
THREE-PHASE SQUIRREL CAGE INDUCTION MOTORS FOR
CENTRIFUGAL PUMPS FOR AGRICULTURAL APPLICATION
ACCORDING TO IS 7538: 1996**

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

1.	Product	:	IS 7538: 1996
	Title	:	Three-phase squirrel cage induction motors for centrifugal pumps for agricultural application
	No. of Amendments	:	3
2.	Sampling Guidelines:		
a)	Raw material	:	As per Cl 7 of IS 7538
b)	Grouping guidelines	:	Please refer ANNEX – A
c)	Sample Size	:	1
3.	List of Test Equipment	:	Please refer ANNEX – B
4.	Scheme of Inspection and Testing	:	Please refer ANNEX – C
5.	Possible tests in a day :		
	All tests as per IS 7538		
6.	Scope of the Licence :	Please refer ANNEX – D	

ANNEX A

Grouping Guidelines

1. The parameters as given below shall be considered for grouping of ‘Three-phase squirrel cage induction motors for centrifugal pumps for agricultural application’ as per IS 7538: 1996 for GoL/CSoL:

- i. Rated Output
- ii. Rated Voltage
- iii. Number of Poles: 2, 4, 6
- iv. Insulation Class: B, F
- v. Type of enclosures:
 - IP 21 or IP 22 or IP 23 screen protected
 - IP 44 or superior (totally enclosed)

2. Motors with rated output upto and including 15 kW, having same rated voltage and number of poles are considered as one group. Motors with lowest and highest rated output in the group shall be tested for covering the entire range of motors in that group. If the range consists of more than 10 motors, one intermediate rating of motor shall also be tested.

3. If motors with superior degree of protection is tested, motors with lower degree of protection shall also be covered.

4. To cover all varieties in the scope of the Licence with respect to Insulation Class, at least one variety of a motor of each Insulation Class shall be tested.

5. The Firm shall declare the varieties of various Three- phase squirrel cage Induction Motors they intend to cover in the Licence. The Scope of Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.

6. During the operation of the Licence, BO shall ensure that all the Varieties covered in the Licence are tested in rotation to the extent possible.

ANNEX B**List Of Test Equipment*****Major test equipment required to test as per the Indian Standard***

Sl. No.	Test Equipment	Test used with clause reference
1	Micro ohm meter	Measurement of Stator Resistance, Temperature Rise Test Cl 22.3.1, 22.3.2, 23.1.1, 23.2.1
2	Megger	Insulation Resistance Test Cl 22.3.1, 26
3	HV tester	High Voltage Test Cl 22.3.1, 25
4	3Phase Auto transformer	No Load Test, Locked Rotor Readings of Voltage, Current and Power Input at a Suitable Reduced Voltage, Reduced Voltage Running up Test at no-load, Locked Rotor Test, Full Load Test to Determine Efficiency, Power Factor and Slip Cl 22.3.1, 22.3.2, 23.1, 23.2, 24.1, 24.2, 24.3, 24.4, 24.5, 27
5	3Phase Panel board with Volt meter, Ammeter, Wattmeter, Frequency meter	No Load Test, Locked Rotor Readings of Voltage, Current and Power Input at a Suitable Reduced Voltage, Reduced Voltage Running up Test at no-load, Locked Rotor Test, Full Load Test to Determine Efficiency, Power Factor and Slip Cl 22.3.1, 22.3.2, 23.1, 23.2, 24.1, 24.2, 24.3, 24.4, 24.5, 27
6	Dynamometer with torque transducer	Locked Rotor Test, Full Load Test to Determine Efficiency, Power Factor and Slip Cl 22.3.1, 22.3.2, 23.1, 23.2, 24.1, 24.2, 24.4, 24.5
7	Torque bench with Break drum with load cell	Locked Rotor Test, Full Load Test to Determine Efficiency, Power Factor and Slip Cl 22.3.1, 22.3.2, 23.1, 23.2, 24.1, 24.2, 24.4, 24.5
8	Digital Tachometer	No Load Test, Reduced Voltage Running up Test at no-load Cl 22.3.1, 22.3.2, 23.1, 23.2, 24.1, 24.2, 24.4, 24.5
9	Surface table with Vernier caliper, Micrometer	Dimensions Cl 9.1.1, 22.3.1
10	Temperature indicator	Temperature Rise Test, Cl 23

The above list is indicative only and may not be treated as exhaustive.

ANNEX C

Scheme Of Inspection And Testing

1. LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipment.

2. TEST RECORDS – The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. LABELLING AND MARKING – As per the requirements of IS 7538: 1996.

4. LEVELS OF CONTROL - The tests as indicated in column 1 of [Table 1](#) and the levels of control in column 3 of [Table 1](#), shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

4.1 All the production which conforms to the Indian Standard and covered by the licence should be marked with Standard Mark.

5. REJECTIONS – Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

TABLE 1

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		Clause	Reference				
4.2	Voltage and frequency variation	4.2	IS 7538	R	Each Motor		---
11	Provision for Earthing	11	IS 7538	R	Each Motor		
19	Terminal Box and Terminal Marking	19	IS 7538	R	Each Motor		
22.3.2	No load test	24.1	IS 7538	R	Each Motor		Pl. see Note 1
22.3.2	Locked rotor readings of voltage, current and power input at a suitable reduced voltage	24.3	IS 7538	R	Each Motor		
22.3.2	Reduced voltage running up test at no load	24.2	IS 7538	R	Each Motor		
22.3.2	Measurement of Stator resistance	7	IS 4029	R	Each Motor		
22.3.2	Insulation resistance (before high voltage test)	26	IS 7538	R	Each Motor		
22.3.2	High voltage test	25	IS 7538	R	Each Motor		
22.3.1	Dimensions	9	IS 7538	S	One	Motors of each type & design, manufactured in three months.	Pl. see Note 2
22.3.1	Full load test to determine efficiency, power factor and slip	24.4	IS 7538	S	One	Motors of each type & design, manufactured in one month.	
22.3.1	Efficiency at reduced load	24.5	IS 7538	S	One		
22.3.1	Temperature rise test at rated voltage	23.1	IS 7538	S	One		
22.3.1	Temperature rise test at reduced voltage	23.2	IS 7538	S	One		
22.3.1	Overload test	13.1	IS 7538	S	One		
22.3.1	Insulation resistance after high voltage test	26	IS 7538	S	One		

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		Clause	Reference				
22.3.1	Tests for limit of noise level	16	IS 7538	S	Optional Tests - As per agreement between manufacturer and supplier		
22.3.1	Degree of protection provided by enclosure	5	IS 7538	S			
22.3.1	Test for vibration severity	15	IS 7538	S			
22.3.1	Overspeed test	27	IS 7538	S			

Note-1: If any motor fails, all the motors produced subsequently shall be tested till three consecutive samples pass. For every failure, appropriate steps shall be taken to rectify the defect in subsequent motors and record of the same maintained.

Note-2: If any motor fails, all the motors produced subsequently shall be tested till five consecutive samples pass. For every failure, appropriate steps shall be taken to rectify the defect in subsequent motors and record of the same maintained.

Note-3: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-4: Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification for approval by BO Head.

ANNEX D

“Licence is granted to use Standard Mark as per IS 7538: 1996 with the following scope:	
Name of the product	Three-phase squirrel cage induction motors for centrifugal pumps for agricultural application
Ratings	Rated VoltageV, 50Hz,W,
No. of Poles	2/4/6
Insulation Class	B/F
Type of Enclosure	
Any other aspect required as per the Standard	Declared Values as given below to be obtained from the manufacturer

Declared Values of Three - phase squirrel cage induction motors as per IS: 7538:1996

Rated Output (Watts)	:
Rated Voltage (V)	:
Full Load Current (Max.)	:
Full Load Speed (Min.)	:
Efficiency (Nominal at 100%)	:
Efficiency (Nominal at 75%)	:
Type of Enclosure	:
Breakaway Torque in terms of percent of Full Load Torque (Min.)	: