PRODUCT MANUAL FOR
LINE OPERATED THREE PHASE a.c. MOTORS (IE CODE)
"EFFICIENCY CLASSES AND PERFORMANCE SPECIFICATION"
ACCORDING TO IS 12615:2018

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 12615:2018
	Title	:	Line Operated Three Phase a.c. Motors (IE Code) "Efficiency Classes and Performance Specification"
	No. of Amendments	:	1
2.	**Sampling Guidelines:**		
a)	**Raw material**	:	—
b)	**Grouping guidelines**	:	Please refer ANNEX – A.
c)	**Sample Size**	:	One Motor
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 Routine Tests and Type Tests as per IS 12615:2018		
6.	**Scope of the Licence :**		
	"Licence is granted to use Standard Mark as per IS 12615:2018 with the following scope:		
	"Line Operated Three Phase a.c. motors, upto and including ….V, …Hz, … Duty, 2/4/6/8 Poles, Efficiency Class IE 2 /IE 3 /IE 4, Degree of Protection IPXX, Foot Mounted/Flange Mounted/Vertical Shaft, Insulation Class …….., Rated Outputs……''		

ANNEX A

1. The following parameters are taken into consideration for the purpose of grouping:

   i. Type of mounting : Foot mounted, Flange mounted, Vertical shaft
   ii. Number of Poles : 2,4,6,8
   iii. Efficiency Class : IE2, IE3,IE4
   iv. Degree of Protection : IP44 or Superior
   v. Insulation Class : B, F or higher
   vi. Rated Voltage : upto 1000 V
   vii. Rated Output : 0.12 kW to 1000 kW

   Motors with rated output from 0.12 kW to 1000 kW, having same other classifications as above are considered as one group. Motors with lowest and highest rated output in the group shall be tested for covering the entire range of the motors in that group. If the range consists of more than 10 motors, one intermediate rating of motor shall also be tested.

2. The following relaxation may be given when a variety is tested for all the requirements:

   i. If efficiency class of IE4 is tested, IE3 and IE2 shall also be covered.

   ii. If motors with superior degree of protection than IP44 is tested, motors with lower degree of protection shall also be covered.

   iii. For Foot Mounted, Flange Mounted and Vertical Shaft motors, separate samples may not be drawn for Independent Testing. If motor with any one type of mounting is drawn and tested, motors with other type of mounting may be covered by testing the motor for dimensional requirements as per the applicable Indian Standard(s).

   iv. By testing motors of any one rated voltage, motors with other rated voltages can also be covered.

3. When samples are tested to cover the entire range of motors as per IS 12615:2018, it shall be ensured that at least one sample for each type of pole/insulation shall be tested.

4. For the samples so drawn, if test reports for degree of protection test are available with the manufacturer, which are less than five years old and conforming to the relevant Indian Standard, the test for degree of protection may not be repeated.

5. The Firm shall declare the varieties of various Three Phase Squirrel Cage Energy Efficient 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 all the Varieties covered in the Licence are tested in rotation to the extent possible.

7. A typical example for drawal of samples to cover the entire varieties under the scope of the license is given below for the purpose of general guidance:

    a) **Sample 1**: 0.12 kW, 2 Pole, Efficiency Class IE 2, Insulation Class B, IP 44, Foot mounted.

    b) **Sample 2**: 30 kW, 4 Pole, Efficiency Class IE 3, Insulation Class F, superior degree of protection than IP 44, Flange mounted.

    c) **Sample 3:** 375 kW, 6 Pole, Efficiency Class IE 4, Insulation Class F, IP 44, Vertical Shaft.

    d) **Sample 4:** 1000 kW, 8 Pole, Efficiency Class IE 4, Insulation Class higher than F, IP 44, Foot mounted.

ANNEX B

List Of Test Equipment

Major test equipment required to test as per the Indian Standard

Sl. No	Test Equipment	Tests Used in with Clause reference
1	Resistance Meter	Cl. 16.1.2
2	Digital Tachometer	Cl. 16.1.3, Cl. 16.1.4, Cl. 16.1.5
3	Stand Vernier	Cl. 16.2.1
4	HV Test Meter	Cl. 16.1.6
5	Megger Meter (Insulation tester)	Cl. 16.1.1
6	Test Bench comprising of cradle mounted dynamometer for torque method testing purpose	Cl. 16.4.1, Cl. 16.2.3
7	Weighing Load cell	Cl. 16.2.3
8	Digital Power Panel	Cl. 16.1.3, Cl. 16.1.4, Cl. 16.1.5
9	Digital Multimeter	Cl. 16.1.3, Cl. 16.1.4, Cl. 16.1.5
10	Contact type Digital Tachometer	Cl. 16.1.3, Cl. 16.1.4, Cl. 16.1.5
11	Micrometer & Vernier Caliper	Cl. 16.2.1
12	Stop Watch	Cl. 16.2.3

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 12615 : 2018.

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.

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				
8	Earthing	—	IS 15999(Part 1)	R	Each Motor	—	—
9	Terminal Marking	—	IS/IEC 60034-8	R	Each Motor		
16.1.1	Insulation Resistance Test	16.1.1	IS 12615:2018	R	Each Motor		
		—	IS 7816				
16.1.2	Measurement of Resistance of Windings of Stator	8.6	IS 15999(Part 1)	R	Each Motor		
		5.7	IS 15999(Part 2/Sec 1)				
16.1.3	No Load Test	9.1	IS 15999(Part 1)	R	Each Motor		
		—	IS 15999(Part 2/Sec 1)				
16.1.4	Locked Rotor Readings of Voltage, Current and Power Input at a suitable reduced voltage	16.1.4	IS 12615:2018	R	Each Motor		
16.1.5	Reduced Voltage running up test at no-load	16.1.5	IS 12615:2018	R	Each Motor	—	For squirrel cage motor up to 37kW only
16.1.6	High Voltage Test	9.2	IS 15999(Part 1)	R	Each Motor	—	—

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				
16.2.1	Dimensions	16.2.1	IS 12615:2018	S	One Motor	Motors of each type & design manufactured at the first instance or whenever there is a change in dimension.	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.
		—	IS 1231, IS 2223, IS 2254, IS 8223				
16.2.4	Temperature Rise Test	16.2.4	IS 12615:2018	S	One Motor	Motors of each type & design, manufactured in three months.	
16.2.3	Full Load Test to determine Efficiency, Power Factor and Slip	—	IS 15999(Part 2/Sec 1)	S	One Motor		
16.2.5	Momentary Overload Test	16.2.5	IS 12615:2018	S	One Motor	Motors of each type & design, manufactured in a month.	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.
12.2	Pull-up Torque	12.2	IS 12615:2018	S	One Motor		
16.2.2	Locked Rotor Test	16.2.2	IS 12615:2018	S	One Motor		—

TABLE 1

<table>
<tr><th colspan="4">(1)</th><th>(2)</th><th colspan="3">(3)</th></tr>
<tr><th colspan="4">Test Details</th><th>Test equipment requirement</th><th colspan="3">Levels of Control</th></tr>
<tr><th rowspan="2">Cl.</th><th rowspan="2">Requirement</th><th colspan="2">Test Methods</th><th rowspan="2">R: required (or) S: Sub-contracting permitted</th><th rowspan="2">No. of Sample</th><th rowspan="2">Frequency</th><th rowspan="2">Remarks</th></tr>
<tr><th>Clause</th><th>Reference</th></tr>
<tr><td>16.3.1</td><td>Vibration Severity of Motor</td><td>—</td><td>IS 12075</td><td rowspan="6">As per the mutual agreement between the manufacturer & the purchaser</td><td rowspan="6"></td><td rowspan="6"></td><td rowspan="6">—</td></tr>
<tr><td>16.3.2</td><td>Noise Levels of Motor</td><td>—</td><td>IS 12065</td></tr>
<tr><td>16.3.3</td><td>Degree of Protection by Enclosure</td><td>—</td><td>IS/IEC 60034-5</td></tr>
<tr><td>16.3.4</td><td>Over Speed Test</td><td>9.7</td><td>IS 15999(Part 1)</td></tr>
<tr><td rowspan="2">16.3.5</td><td rowspan="2">Temperature rise at Limiting Values of Voltage & Frequency variation</td><td>16.3.5</td><td>IS 12615:2018</td></tr>
<tr><td>8</td><td>IS 15999(Part 1)</td></tr>
</table>

Note- 1: 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.
Note- 2: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau.