

Amendment to Schedule 6 for Induction Motor

In the said schedule,

(i) in paragraph 9, for sub-paragraph (i) the following shall be substituted, namely:-

Effective from **1st January 2016 onwards**, a non-refundable registration fee of INR 2000 /- (Two thousand only) per model shall be paid to Bureau, in order to avail the grant of permission to affix the star label on each model of induction motor.

All the terms & conditions other than above said, shall remain same till further orders.

Schedule - 6

Energy Efficient Three Phase squirrel cage Induction Motors

1. Scope

This schedule specifies the requirements for participating in the energy labeling scheme for 3 phase squirrel cage induction motor in 2 Pole, 4 Pole and 6 Pole for continuous duty (S1) operation, suitable for voltage and frequency variation as per IS 12615:2011 having rated output as mentioned in the Tables 1, 2 and 3 of the **Annexure A**.

In particular, this scheme specifies the following:

1. Rated output (rating)
2. Efficiency Class based on IS 12615:2011 i.e. (IE2, IE2(+), IE3, IE3(+) and IE3 (++))
3. Some of the requirements for energy label validity.
4. The performance criteria for energy labeling validity.
5. Test report format.
6. Label design and details to be incorporated on the label.

2. Schedule of Tests:

2.1 Method of Tests:

The method of testing shall be as given in IS/ IEC 60034-2-1/ IS15999-2011, reaffirmed with all amendments.

2.2 Parameters to be tested:

Parameters for initial verification and check testing shall be as given in clause 21.1 of IS 12615:2011.

2.3 Test Report:

The test report shall be submitted as per the performa given in **Annexure B** of this schedule.

3. Pre-Qualification criteria:

- a) The products should conform to minimum performance requirements of IS 12615: 2011 to participate in BEE S&L Programme.
- b) BIS Standard mark or Quality Certification as per IS/ISO 9000 are prerequisite to participate in BEE S&L Programme.

4. Qualification criteria:

The performance of the motor at the rated voltage and rated frequency under the specified conditions shall be as specified in Tables 1, 2 and 3 of **Annexure A** of this schedule.

5. Tolerance limits:

All the performance values are subject to tolerance as specified in clause 12.1 of IS/IEC 60034-1:2004. However, there shall be no tolerance for star rating band, the average products tested must be at par or better than the label threshold without tolerance.

6. Labeling Plan

The star rating plan based on the motor efficiency class as given in tables 1, 2 & 3 for 2 pole, 4 pole and 6 pole motors shall be as given in the following table.

Star Rating	Motor Efficiency Class
1 Star	$\geq \text{IE2} \& < \text{IE2}(+)$
2 Star	$\geq \text{IE2}(+) \& < \text{IE3}$
3 Star	$\geq \text{IE3} \& < \text{IE3}(+)$
4 Star	$\geq \text{IE3}(+) \& < \text{IE3}(++)$
5 Star	$\geq \text{IE3}(++)$

NOTE:

- i. IE2, IE3 values are based on IS 12615:2011
- ii. IE2 (+) is the intermediate value between IE2 and IE3
- iii. IE3 (+) is the intermediate value between IE3 and IE3 (++)
- iv. IE3 (++) is the value equivalent to IE4 Values based on the guideline given in IEC 60034-31
- v. **IE2 values specified in IS 12615:2011 would be the minimum entry level for labeling as per this schedule.**

7. Sampling

For check testing samples shall be picked up by BEE or its designated agency. The sample size for check testing shall be as decided by BEE.

8. Name Plate & Label Content:

- All the contents of the name plate shall confirm to BIS specification as per clause 10.2 of IS/IEC 60034-1:2004. Any other additional information may be furnished if required by the manufacturers.
- The size of the name plate & position of display shall be as per the choice of motor manufacturers.
- The design of Energy star label shall be as given in clause 10.1 of this schedule.
- The manner of display scheme of the Energy star label will be as per clause 10.2 of this schedule

9. Labeling Fees

- i. Registration Fee payable on application (for each model) for authority to affix labels is Rs. 1000/- (Rupees one thousand only)
- ii. Registration Fee payable on application for renewal (of each application) of authority to affix labels is Rs. 500/ (Rupees five hundred only)
- iii. Labeling fee for affixation of label on each General purpose motor is Rs. 5 (five rupees only)
- iv. The time and procedure laid down in the manner of submission of labelling fees has been listed in 'General Instructions' manual (available on BEE website)
- v. For other Terms & Conditions regarding participation in the voluntary programme the BEE scheme for Energy Efficiency Labelling should be referred (available on BEE website)

10. Label design & manner of display:

- 10.1** Detailed label specifications (size, colour scheme, font size, security features, etc), content of the label (parameters displayed on the label) is provided below. The dimensions of the label can be proportionally reduced with respect to the size of the motor, but should be prominently visible.

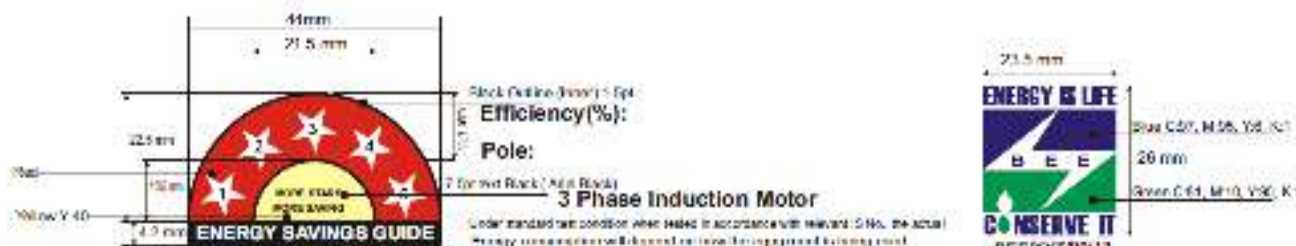


Figure 1: Design Scheme of Label (sample)

10.2 Manner of display of label:

The Label logo including the contents shall be prominently visible on the name plate (as shown in Figure 2). All the contents of the name plate shall confirm to BIS specification as per clause 10.2 of IS/IEC 60034-1:2004. Any other additional information may be furnished if required by the manufacturers.

	Efficiency(%) : XX%	
	Pole : 3 Phase Induction Motor	
Name of the Manufacturer with complete address		
*Under standard test condition when tested in accordance with relevant IS No., the actual energy Consumption will depend on how the equipment is being used.		

Figure 2: Sample label of Induction Motor

Annexure A- Performance figures

Table 1 - Values of Performance characteristics of 2 pole Energy Efficient Induction Motors (based on IS 12615:2011)

Sr No	Rated Output	Frame Size	Full Load Speed (Min.)	Full Load Current (Max.)	Breakaway Torque in terms of full load torque (Min)	Breakaway Current in terms of full load current (equal or below)		Nominal Efficiency %				
								Star 1	Star 2	Star 3	Star 4	Star 5
						For IE2	For IE3	IE2	IE2 (+)	IE3	IE3 (+)	IE3(++)
	KW		RPM	Amps	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
1	0.37	71	2750	1.2	170	650	700	72.2	73.9	75.5	77.7	79.9
2	0.55	71	2760	1.6	170	650	700	74.8	76.5	78.1	80.3	82.4
3	0.75	80	2780	2.0	170	650	700	77.4	79.1	80.7	82.8	84.9
4	1.1	80	2790	2.8	170	650	700	79.6	81.2	82.7	84.7	86.7
5	1.5	90S	2800	3.7	170	650	700	81.3	82.8	84.2	85.9	87.5
6	2.2	90L	2810	5.0	170	700	770	83.2	84.6	85.9	87.5	89.1
7	3.7	100L	2820	8.0	160	700	770	85.5	86.7	87.8	89.0	90.2
8	5.5	132S	2830	11.0	160	700	770	87.0	88.1	89.2	90.4	91.5
9	7.5	132S	2840	15.0	160	700	770	88.1	89.1	90.1	91.1	92.1
10	11.0	160M	2860	21.5	160	700	770	89.4	90.3	91.2	92.1	93
11	15.0	160M	2870	29.0	160	700	770	90.3	91.1	91.9	92.7	93.4
12	18.5	160L	2880	35.0	160	700	770	90.9	91.7	92.4	93.1	93.8
13	22.0	180M	2890	41.5	160	700	770	91.3	92.0	92.7	93.5	94.2
14	30.0	200L	2900	54.0	160	700	770	92.0	92.7	93.3	93.9	94.5
15	37.0	200L	2900	67.0	160	700	770	92.5	93.1	93.7	94.3	94.8
16	45.0	225M	2955	80.0	160	700	770	92.9	93.5	94.0	94.6	95.1
17	55.0	250M	2960	95.0	160	700	770	93.2	93.8	94.3	94.9	95.4
18	75.0	280S	2970	130.0	160	700	770	93.8	94.3	94.7	95.2	95.6
19	90.0	280M	2970	150.0	160	700	770	94.1	94.6	95.0	95.4	95.8
20	110.0	315S	2980	185.0	160	700	770	94.3	94.8	95.2	95.6	96
21	125.0	315M	2980	209.0	160	700	770	94.5	94.9	95.3	95.7	96
22	132.0	315M	2980	220.0	160	700	770	94.6	95.0	95.4	95.7	96
23	160.0	315L	2980	265.0	160	700	770	94.8	95.2	95.6	95.9	96.2
24	200.0	As per manufacturer catalogue	2980	340.0	160	700	770	95.0	95.4	95.8	96.1	96.3
25	250.0		2980	425.0	160	700	770	95.0	95.4	95.8	96.1	96.4
26	315.0		2980	536.0	160	700	770	95.0	95.4	95.8	96.2	96.5
27	355.0		2980	604.0	160	700	770	95.0	95.4	95.8	96.2	96.6
28	375.0		2980	604.0	160	700	770	95.0	95.4	95.8	96.2	96.6

Table 2 - Values of Performance characteristics of 4 pole Energy Efficient Induction Motors (based on IS 12615:2011)

Sr No	Rated Output	Frame Size	Full Load Speed (Min.)	Full Load Current (Max.)	Breakaway Torque in terms of full load torque (Min)	Breakaway Current in terms of full load current (equal or below)		Nominal Efficiency %				
						For IE2	For IE3	Star 1	Star 2	Star 3	Star 4	Star 5
								IE2	IE2 (+)	IE3	IE3(+)	IE3(++)
	KW		RPM	Amps	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
1	0.37	71	1330	1.4	170.0	600	650	70.1	71.6	73.0	74.5	76.0
2	0.55	80	1340	1.7	170.0	600	650	75.1	76.6	78.0	79.5	81.0
3	0.75	80	1360	2.2	170.0	600	650	79.6	81.1	82.5	84.1	85.6
4	1.1	90S	1370	2.9	170.0	600	650	81.4	82.8	84.1	85.8	87.4
5	1.5	90L	1380	3.8	170.0	600	650	82.8	84.1	85.3	86.7	88.1
6	2.2	100L	1390	5.1	170.0	700	750	84.3	85.5	86.7	88.2	89.7
7	3.7	112M	1410	8.1	160.0	700	750	86.3	87.4	88.4	89.6	90.7
8	5.5	132S	1420	11.4	160.0	700	750	87.7	88.7	89.6	90.9	92.1
9	7.5	132M	1430	15.4	160.0	700	750	88.7	89.6	90.4	91.5	92.6
10	11.0	160M	1440	22.0	160.0	700	750	89.8	90.6	91.4	92.5	93.6
11	15.0	160L	1440	30.0	160.0	700	750	90.6	91.4	92.1	93.1	94.0
12	18.5	180M	1440	36.0	160.0	700	750	91.2	91.9	92.6	93.5	94.3
13	22.0	180L	1440	43.0	160.0	700	750	91.6	92.3	93.0	93.9	94.7
14	30.0	200L	1450	56.0	160.0	700	750	92.3	93.0	93.6	94.3	95.0
15	37.0	225S	1450	69.0	160.0	700	750	92.7	93.3	93.9	94.6	95.3
16	45.0	225M	1460	84.0	160.0	700	750	93.1	93.7	94.2	94.9	95.6
17	55.0	250M	1460	99.0	160.0	700	750	93.5	94.1	94.6	95.2	95.8
18	75.0	280S	1470	134.0	160.0	700	770	94.0	94.5	95.0	95.5	96.0
19	90.0	280M	1470	164.0	160.0	700	770	94.2	94.7	95.2	95.7	96.2
20	110.0	315S	1480	204.0	160.0	700	770	94.5	95.0	95.4	95.9	96.4
21	125.0	315M	1480	234.0	160.0	700	770	94.6	95.1	95.5	96.0	96.5
22	132.0	315M	1480	247.0	160.0	700	770	94.7	95.2	95.6	96.1	96.5
23	160.0	315L	1480	288.0	160.0	700	770	94.9	95.4	95.8	96.2	96.5
24	200.0	As per manufacturer catalogue	1480	348.0	160.0	700	770	95.1	95.6	96.0	96.3	96.6
25	250.0		1480	435.0	160.0	700	770	95.1	95.6	96.0	96.4	96.7
26	315.0		1480	548.0	160.0	700	770	95.1	95.6	96.0	96.4	96.8
27	355.0		1480	618.0	160.0	700	770	95.1	95.6	96.0	96.4	96.8
28	375.0		1480	653.0	160.0	700	770	95.1	95.6	96.0	96.4	96.8

Table 3 - Values of Performance characteristics of 6 pole Energy Efficient Induction Motors (based on IS 12615:2011)

Sr No	Rated Output	Frame Size	Full Load Speed (Min.)	Full Load Current (Max.)	Breakaway Torque in terms of full load torque (Min)	Breakaway Current in terms of full load current (equal or below)		Nominal Efficiency %				
						For IE2	For IE3	Star 1	Star 2	Star 3	Star 4	Star 5
								IE2	IE2 (+)	IE3	IE3 (+)	IE3(++)
	KW		RPM	Amps	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
1	0.37	80	870	1.4	160	600	650	69.0	70.5	71.9	74.0	76.1
2	0.55	80	870	1.9	160	600	650	72.9	74.4	75.9	78.0	80.1
3	0.75	90S	890	2.3	160	600	650	75.9	77.4	78.9	81.0	83.1
4	1.1	90L	900	3.2	160	600	650	78.1	79.6	81.0	82.6	84.1
5	1.5	100L	900	4.0	160	600	650	79.8	81.2	82.5	84.4	86.2
6	2.2	112M	910	5.5	150	700	750	81.8	83.1	84.3	85.7	87.1
7	3.7	132S	920	8.8	150	700	750	84.3	85.4	86.5	87.9	89.2
8	5.5	132M	920	12.7	150	700	750	86.0	87.0	88.0	89.1	90.2
9	7.5	160M	930	16.7	150	700	750	87.2	88.2	89.1	90.3	91.5
10	11.0	160L	935	23.0	140	700	750	88.7	89.5	90.3	91.4	92.5
11	15.0	180L	940	30.5	140	700	750	89.7	90.5	91.2	92.2	93.1
12	18.5	200L	940	37.5	140	700	750	90.4	91.1	91.7	92.6	93.5
13	22.0	200L	945	44.0	140	700	750	90.9	91.6	92.2	93.1	93.9
14	30.0	225M	945	59.0	140	700	750	91.7	92.3	92.9	93.6	94.3
15	37.0	250M	950	72.0	140	700	750	92.2	92.8	93.3	94.0	94.6
16	45.0	280S	960	87.0	140	700	750	92.7	93.2	93.7	94.3	94.9
17	55.0	280M	960	107.0	140	700	750	93.1	93.6	94.1	94.7	95.2
18	75.0	315S	970	145.0	140	700	770	93.7	94.2	94.6	95.0	95.4
19	90.0	315M	970	175.0	140	700	770	94.0	94.5	94.9	95.3	95.6
20	110.0	315M	970	214.0	140	700	770	94.3	94.7	95.1	95.4	95.6
21	125.0	315M	970	245.0	140	700	770	94.4	94.8	95.2	95.5	95.7
22	132.0	315L	980	257.0	140	700	770	94.6	95.0	95.4	95.6	95.8
23	160.0	as per motor mfr catalogue.	980	315.0	140	700	770	94.8	95.2	95.6	95.8	96
24	200.0		980	370.0	140	700	770	95.0	95.4	95.8	96.0	96.1
25	250.0		980	463.0	140	700	770	95.0	95.4	95.8	96.0	96.1
26	315.0		980	583.0	140	700	770	95.0	95.4	95.8	96.0	96.1
27	355.0		980	657.0	140	700	770	95.0	95.4	95.8	96.0	96.1
28	375.0		980	694.0	140	700	770	95.0	95.4	95.8	96.0	96.1

Annexure-B

Form for Test Report of Three Phase Induction motors

Test Report No.:		Date :	
Name of the equipment		Brand	
Name of the Motor Manufacturer:		Model No. / Name (on BEE Label)	

DETAILS OF THE SAMPLE

Rated Output	kW	Rated Voltage	V	Current	A
EFF. Class		Frequency	Hz	Speed	rpm
Efficiency (%)		No. of Phases		No of Pole	
Class of insulation		Type of Duty		Type of Encl.	
Connection		Power factor		Degree of protection	IP
Type of motor	Induction motor	Frame size		Method of Cooling	IC
Ref.Std No.	IS 12615-2011	BIS Cert. Mark (Licence Number if any)		Mounting	
Motor Srl No.				Year of Manuf.	

1.0 Measurement of resistance of Windings of stator

Stator Winding Resistance per phase : Ohms at ° C
:

2.0 Insulation Resistance test

Specified Value : Meg Ohm
Before High Voltage Test : Meg Ohm
After High Voltage Test : Meg Ohm

3.0 High Voltage Test

Specified Value (1000 Volts + 2 x rated Voltage with min of 1500 Volts)
Volts applied for one minute : Pass/ Fail

4.0 Reduced voltage running up test

Speed at No load rpm in clockwise direction at Volts
Speed at No load rpm in anticlockwise direction at Volts

5.0 Momentary Overload Test

160 % of the rated Torque for 15 Secs

Outcome of the test: Pass/ Fail

6.0 Torque Test (CI 19.5 of IS 12615 : 2011)

Rated Torque			Kgm	Voltage				Volts
Parameter	Pull up torque		Breakaway Starting Torque		Breakaway Starting Current		Input Power	
Unit	Kgm	(% of FLT)	Kgm	(% of FLT)	Amps	(% of FLC)	Watts	
Specified Values								
Observed Values								

7.0 Load test values

Sl.N o.	Load	Voltage	Current	Power Input	Speed	Freq.	Power Output	Slip	Eff.	Power Factor	Torque
		Volts	Amps	Watts	rpm	Hz	Watts	%	%		kgm
1.	No Load										
2.	25 % Load										
3.	50 % Load										
4.	75 % Load										
5.	100 % Load (Rated Load)										
6.	125 % Load										

8.0 Temperature rise test

Sl. No	Requirements	Ambient temperature		° C
		Specified Limit	Actual Observed Values	
		° C	° C	
1	AC Windings of Motor by Resistance Method (max)			

10.0 <u>Degrees of protection by enclosure</u> (Clause 19.13 of IS 12615 : 2011)		
Sl. No.	Name of the Test	Remarks
1.	<u>Marking</u> :	
	Specification / Test Requirements	
2.	<u>Test for first characteristic numeral</u> :	
	Specification / Test Requirements	
3.	<u>Test for second characteristic numeral</u> :	
	Specification / Test Requirements	
	Test Results	

Tested by

Approved by

Sign

Sign

Name :

Name :

Designation :

Designation :

Date :

Date :