

Date: 13th October, 2016

Revision 1

(*Red color represents the changes inserted.)*

Schedule - 20
LED LAMPS

1. SCOPE

1.1. This schedule specifies the energy labeling requirements for self-ballasted non-directional general service LED lamps for general lighting services that works on single phase ac supply up to and including 250V, 50Hz, being manufactured, imported or sold in India.

1.2. This schedule does not covers self-ballasted LED-lamps that intentionally produce tinted or colored light neither does it cover OLEDs

2. NORMATIVE REFERENCE

This schedule shall be read in conjunction with the latest publication of the following standards with all amendments:

Table 1: Reference Standards

| Reference Standard | Title of the Standard |
|-------------------------------|--|
| IS 16102:2012 – Part I | Self-Ballasted LED Lamps for General Lighting Services – Safety Requirements |
| IS 16102:2012 – Part II | Self-Ballasted LED Lamps for General Lighting Services – Performance Requirements |
| IS 16106:2012 | Method of Electrical and Photometric Measurements of Solid State Lighting (LED) products |
| IS 14700 (Part 3/Sec 2) :1999 | Electromagnetic compatibility Part 3 Limits Sec 2 Limits for harmonic current emissions |

3. TERMINOLOGY

For the purpose this schedule, the definitions referred & given in IS 16102 (Part I&II), shall apply in addition to the following:

- 3.1. Rated Wattage:** The wattage marked on the lamp or declared by manufacturer or responsible vendor.
- 3.2. Rated luminous flux:** The flux marked on the lamp or declared as such by manufacturer or responsible vendor. The luminous flux is denoted by lumens (L)
- 3.3. Luminous efficacy:** The ratio of luminous flux emitted by a lamp to the power consumed by the lamp and is expressed in L/W.
- 3.4. Label:** Label means any written, printed, marked, stamped or graphic matter affixed to, or appearing upon, the LED lamps.
- 3.5. Validity of Label:** The validity period of the luminous efficacy (L/W) value under energy labeling plan specified in the schedule.

4. PRE-QUALIFICATION CRITERIA:

To qualify as a BEE star labelled product, the LED lamps covered under this schedule shall meet the following requirement:

- 4.1.** The LED lamps shall confirm to the safety requirements as specified in IS 16102 (Part 1).
- 4.2.** The LED lamps shall meet the harmonics requirement as per IS 14700 (Part 3/Sec 2) and power factor requirements as per IS 16102 (Part 2).
- 4.3.** The LED lamps shall confirm the photo biological test as specified in IS 16108.

Note: In view of the lack of test facilities, manufacturer may submit the test certificate of LED chips as per IS 16108/IEC:62471:2008 (Photo biological test report) and IS16105/LM 80 (Lumen maintenance of SSL source). Also LM 79 or IS 16106 Report of LED Lamp (as complete product) needs to be submitted.

- 4.4.** The lamp shall have at least 95 percent lumen maintenance at 1000 hours of operation at the time of application submission.
- 4.5. The lamp shall comply with the following criteria defined for star rating level:**
 - 1. Star Rating level:** “The star rating level shall be declared based on the initial luminous efficacy.”
 - 2. Luminous efficacy:** “In a batch, the failure of LED lamps shall not exceed the qualifying limit for wattage and initial luminous flux (Refer clause 18.2 of IS 16102 (Part 2): 2012).”

Illustration: Technical specifications of LED lamp

Star rating band: ≥ 90 L/W & < 105 L/W

Star rating level: 3 star

Declared luminous efficacy: 92 L/W

No. of LED samples in a batch: 10

Case 1: Pass i.e. a batch is eligible for star rating

Out of 10 samples in a batch, 6 samples are having individual luminous efficacy of ≥ 90 L/W and rest 4 samples are having individual luminous efficacy < 90 L/W. Batch of LED lamp has an average luminous efficacy of ≥ 90 L/W. This batch will pass the test, firstly, because the average efficacy meets the star rating band and secondly the no. of failures are within the qualifying limit of acceptance test (Refer clause 18.2 of IS 16102 (Part 2):2012)

Case 2: Failure

Out of 10 samples in a batch, 5 samples are having individual luminous efficacy of ≥ 90 L/W and rest 5 samples are having individual luminous efficacy of < 90 L/W. Batch of LED lamps has an average luminous efficacy of ≥ 90 L/W. The batch will fail the test, though the average luminous efficacy meets the star rating band but the no. of failures exceeds the qualifying limit of acceptance test (Refer clause 18.2 of IS 16102 (Part 2): 2012)

5. STAR RATING PLAN:

5.1. The star rating plan for self- ballasted non directional general service LED lamps shall be as given in Table 2.

Table 2

**(a) Star Rating Plan – Voluntary Phase
(Validity: 6/7/2015 to 31/12/2017)**

| Star Rating | Rated Luminous Efficacy (Lumen/Watt) | Remarks |
|-------------|--------------------------------------|---------|
| 1 | ≥ 68 & < 79 | Freezed |
| 2 | ≥ 79 & < 90 | |
| 3 | ≥ 90 & < 105 | |
| 4 | ≥ 105 & < 120 | |
| 5 | ≥ 120 | |

**(b) Star Rating Plan – Mandatory Phase
(Validity: 1/1/2018 to 31/12/2019)**

| Star Rating | Rated Luminous Efficacy (Lumen/Watt) | Remarks |
|-------------|--------------------------------------|---------|
| 1 | ≥ 68 & < 79 | Freezed |
| 2 | ≥ 79 & < 90 | Freezed |
| 3 | ≥ 90 & < 105 | |
| 4 | ≥ 105 & < 120 | |
| 5 | ≥ 120 | |

5.2. To qualify for BEE Star label during voluntary period, all the tested LED lamps shall meet the minimum luminous efficacy of 79 L/W. During mandatory period, all the tested LED lamps shall meet the minimum luminous efficacy of 90 L/W.

5.3. The value reported shall be rounded off up to one significant figure and rounding off shall be done in accordance with IS 2:1960.

6. TESTING GUIDELINE:

6.1. Test Parameter: For the purpose of star rating criteria, the following type tests and corresponding testing protocol as mentioned in respective standard shall be conducted:

Table 3: Test Parameters

| S.No. | Test parameters | Test Standards |
|-------|---|---|
| 1 | Wattage | IS 16102 Part 2 |
| 2 | Initial Luminous Flux | IS 16102 Part 2 |
| 5 | Colour chromaticity and colour rendering index (CRI) | IS 16102 Part 2 |
| 6 | Life | IS 16102 Part 2 |
| 7 | Harmonics | IS 14700 (Part 3/Sec 2) |
| 8 | Limits and methods of measurement of radio disturbance characteristics : Part 5 Electrical lighting and similar equipment | IS 6873 (Part 5): 1999 |
| 9 | Lamp efficacy | The lamp efficacy shall be derived from the measured value of lumen output and the wattage at the rated voltage and frequency |

6.2. Testing Conditions: The testing conditions while conducting the tests for electrical and photometric characteristics shall be as per Annexure A of IEC 62612.

6.3. Test methods: The test methods for conducting electrical and Photometric requirements shall be in accordance with IS 16102 (Part 2) and IS 16106.

6.4. Test Report:

6.4.1. The results of tests reported shall be submitted in the prescribed format as given in Annex 1 of this schedule.

6.4.2. At the time of application submission, the following test reports shall be submitted along with the above mentioned format:

- a. Photo-biological safety
- b. Lumen maintenance test report after 1000 h
- c. Harmonic content and power factor
- d. Performance requirement specified in Table 3 of this schedule

e. Safety requirement

6.4.3. The test report for photo biological safety shall not be more than two years old at the time of submission/approval of model.

6.4.4. Within 12 months from the date of approval of label, the permittee shall submit the test report for lumen maintenance after 25% of declared life or 6000 hours of operation as per IS 16102 Part 2.

Note:

- a. The label will be withdrawn, if the permittee fails to submit the test report of lumen maintenance after 25% of declared life or 6000 hours, within 12 months from the date of approval of label;
- b. Penalty shall be applicable, for those models failed in rated lumen maintenance as per the test report submitted within 12 months from the date of approval of label.
- c. In case of failure, the permittee shall withdraw the product from the market.

7. TOLERANCE LIMIT:

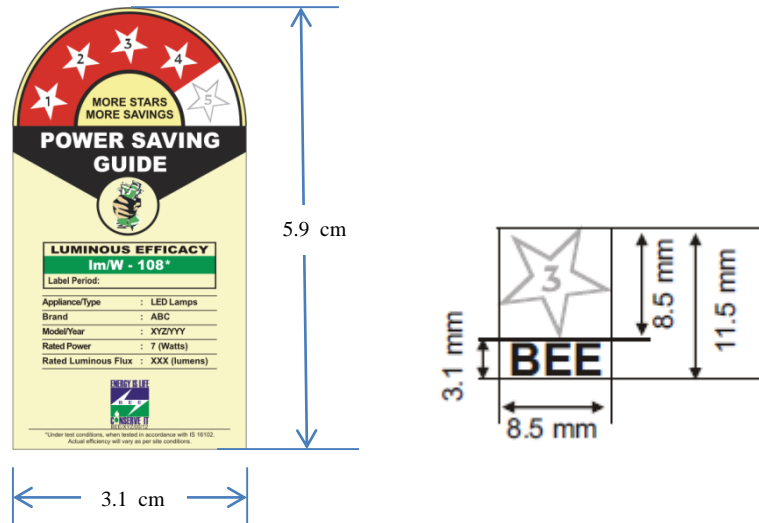
7.1. Tolerances for those testing parameters mentioned in Table 2 shall be applicable as given in respective IEC/Indian Standards.

7.2. However, there is no negative tolerance for star rating; all tested products must be at par or better than the star rating band threshold. The scope for manufacturing tolerance and other variations shall be accounted by the manufacturer or permittee while determining the Star Rating of a particular model.

8. SAMPLING: The testing sampling size shall be as per IS 16102 Part 2.

9. LABEL DESIGN & MANNER OF DISPLAY:

9.1. Label design, dimension & content of the label: The content along with the design and dimension of label is given below:



(a) Label on wrapper

(b) Label on lamp

9.2. Colour Scheme: The colour scheme of the label is as follows:



Note: The CDR file is available on BEE website (www.beestarlabel.com)

9.3. Material, Shape & Placement:

9.3.1. On wrapper {Refer figure 9.1 (a)}:

- a. The label shall be printed on the package; or
- b. A durable paper, self-adhesive on the package

9.3.2. On Lamp {Refer figure 9.1(b)}: Respective star mark shall be printed on the lamp.

10. FEES:

- 10.1. Application Fee:** Fee payable on application for authority to affix labels is INR 2000/- (Rupees two thousand only).
- 10.2. Renewal Fee:** Fee payable on renewal application for authority to affix labels is INR 1000/- (Rupees One thousand only).
- 10.3. Labeling fee** for affixation of label on each piece of LED lamp is INR 0.50/- (Fifty Paise Only)

11. USER INFORMATION REQUIREMENT:

In order to educate and motivate the general consumer, the manufacturers shall provide the information in a tabular form about the LED lamp wattage equivalent to incandescent lamp wattage on the packing.

ANNEXURE

This annexure provides the test report format to be used by the manufacturers and the same shall be submitted to BEE at the time of their application registration. This must include the following minimum requirement:

Test Report No:

Date:

A. Product Details.

- (i) Manufacturer Name & Address
- (ii) Brand:
- (iii) Type:
- (iv) Model name/number:
- (v) Rated voltage or voltage range:
- (vi) Rated Wattage:
- (vii) Rated Luminous Flux:
- (viii) Rated Luminous Efficacy:

B. Test summary

- (i) Laboratory Name & Address:
- (ii) Date of Receipt of Sample:
- (iii) Date of test:
- (iv) Name of Testing Personnel:
- (v) Nature of Test and Details of Test conducted as per the relevant standards
- (vi) General test condition as per IS 16106,;
- (vii) List of standards followed for testing

C. Test Results

| S.No. | Test parameters & relevant units | Measured Values | Rated/Declared Values (after applying tolerances as per standards) |
|-------|----------------------------------|-----------------|--|
| 1 | Power consumption (Watt) | | |
| 2 | Initial luminous flux (Lumen) | | |

| | | | |
|---|--|--|--|
| 3 | Luminous Flux at 1000 hours (Lumen) | | |
| 4 | Colour chromaticity and colour rendering index (CRI) Compliance with safety requirement (Yes/No) [If yes, attach relevant part of test report] | | |
| 5 | Life (hours) | | |
| 6 | Lamp efficacy (Lumen/Watt) | | |
| 7 | Harmonics Compliance with safety requirement (Yes/No) [If yes, attach relevant part of test report] | | |
| 8 | Power Factor | | |
| 9 | Emission of radio frequency disturbances Compliance with safety requirement (Yes/No) [If yes, attach relevant part of test report] | | |