Draft under Finalization

DAKSHIN HARYANA BIJLI VITRAN NIGAM LIMITED

SPECIFICATION NO - S-133/DD-177 (Version-II (Draft))

TECHNICAL SPECIFICATIONS FOR COMPACT FLUORESCENT LAMPS

Issued in June, 2007
TECHNICAL SPECIFICATIONS FOR COMPACT FLUORESCENT LAMPS

SCOPE:

This specification covers the safety and performance requirements required to show compliance of CFLs intended for domestic and similar general lighting purposes having:
   a) a rated wattage up to and including 26 W
   b) a rated voltage up to and including 250 V

STANDARDS:

IS 15111(part 1&2):2002 with latest amendments

Following Indian Standards are necessary adjuncts to above mentioned standards:

IS 418:1978 with latest amendments
IS 1258:1987 with latest amendments
IS 8913:1978 with latest amendments
IS 9206:1979 with latest amendments
IS 10276 (Part 1&2):1982 with latest amendments
IS 11000(part 2):1988 with latest amendments
IS 6873 (part 5):1999 with latest amendments

OR

REFERENCE INTERNATIONAL STANDARDS:

ANSI C78 901-2001 American National Standard for Electric Lamps-Single Base Fluorescent Lamps – Dimensional and Electrical Characteristics
ANSI C78.5-1997 Specifications for Performance of Self-Ballasted Compacted Fluorescent lamps
ANSI C78.375-1997 Guide for Electrical Measurements of Fluorescent Lamps
CIE Publication No.13.3-1995 Recommended Practice for Method of measuring and specifying color rendering of light sources
IESNA LM-9-1999 Electric & Photometric Measurement of Fluorescent Lamps
IESNA LM-40-2001 Approved Method for Light Performance Testing of Fluorescent Lamps
IESNA LM-65-2001 Life testing of single ended compact Florescent Lamps
IESNA LM-66-00-2000 Electrical and Photometric Measurements of Single Ended Compact Fluorescent Lamps

DEFINITIONS:
1. Self-ballasted compact fluorescent lamp – A compact fluorescent lamp unit that incorporates permanently enclosed, all elements that are necessary for the starting and stable operation of the lamp and which does not include any replaceable or interchangeable parts.

2. Rated Voltage – The voltage marked on the lamp.

3. Rated wattage – The wattage marked on the lamp.

4. Rated supply frequency - The frequency marked on the lamp.

5. Initial performance values - The photometric and electrical characteristics at the end of the 100 hour aging period.

6. Rated luminous flux or lumen output – Initial lumen rating (100 hour) declared by the manufacturer.

7. Lumen maintenance – The luminous flux or lumen output at a given time in the life of the lamp and expressed as a percentage of the initial luminous flux. The mean lumens are the value at 40% of the rated life.

8. Average rated lamp life – The length of time declared by the manufacturer at which 50% of any large lumber of lamps reaches the end of their individual lives.

9. Lamp color – The color characteristics of a lamp as defined by the color appearance and the color rendition.

10. Color appearance – The actual color of the lamp is called the color appearance and is defined in terms of the spectral tri-stimulus values (color coordinates) according to the recommendations of the CIE Publication No. 13.3 – 1995. For color coordinates near the black body loci, the correlated color temperature (Kelvin) can be used to define color appearance.

11. Color rendition – The effect the spectral characteristic of the light emitted by the lamp has on the color appearance of the objects illuminated by it is called color rendition. The color-rendering index is defined in terms of a comparison of the spectral tri-stimulus values of the objects under test illumination and standard illumination according to the recommendations of CIE Publication No. 13.3-1005.

12. Starting time – The time needed after switching on for the lamp to start fully and remain lighted.

13. Run-up-time – The time needed after switching on the supply for the lamp to reach 80.0% of its stabilized luminous flux.

14. Starting temperature – The minimum and maximum temperature at which the lamp will reliably start.

15. Power factor – The active power divided by the apparent power (i.e. product of the rms input voltage and rms input current or a ballast).

**PERFORMANCE PARAMETERS:**

The following performance parameters are required to be fulfilled:

1. **Starting Time:** This is the time taken for the lamp to strike and produce a continuous output. The lamps shall fully light up and remain alight within 1.00 seconds.

2. **Run-up Time:** This is the time taken for the lamp to reach full brightness, or near full brightness. The time to reach 80% of the initial lumen characteristics shall not exceed 120 seconds.

3. **Efficacy:** This is the ratio of light output to electricity consumption. The efficacy level should be as below:
### Rating of Lamp

<table>
<thead>
<tr>
<th>Rating of Lamp</th>
<th>Lumen/watt at colour temperature 4400 K</th>
<th>Lumen/watt at colour temperature 6500 K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to &amp; including 7 W</td>
<td>54</td>
<td>52</td>
</tr>
<tr>
<td>8 to 10 W</td>
<td>59</td>
<td>57</td>
</tr>
<tr>
<td>11 to 15 W</td>
<td>64</td>
<td>61</td>
</tr>
<tr>
<td>16 to 23 W</td>
<td>70</td>
<td>66</td>
</tr>
<tr>
<td>24 to 26 W</td>
<td>70</td>
<td>66</td>
</tr>
</tbody>
</table>

4. **Rated Average Lifetime**: The lamp life is defined as the time at which the portion of lamp in a sample that has failed is 50%. The average life of CFL shall not be less than 6000 Hrs.

5. **Lumen Maintenance**: After 2000 Hrs. of operation including ageing period the lumen maintenance shall not be less than 90% of the initial luminous characteristics.

6. **Luminous Flux**: The initial luminous flux measured after the ageing time shall not be less than 90% of the rated luminous flux. The value shall be expressed in lumen.

7. **Harmonics**: The Harmonics of the input current when measured in accordance with IS 6973 (part 5) shall not exceed the limits specified in IS 15111(part 2):2002.

8. **Colour Appearance**: The colour coordinates of the lamp shall be within the tolerance area on the chromaticity chart as declared by the manufacturer shall in any case be within in 5 SDCM (Standard Deviation of Colour matching) from the target values.

9. **Power factor**: The power factor of the combination of the ballast and lamp must be greater than 0.5. The manufacturer with better power factor shall be preferred/given extra weightage.

10. **Mercury Content**: CFLs use small amount of mercury in gaseous form with in the tube where it conducts the electric arc that excites the phosphors. This feature assists in providing a good lumen maintenance characteristic. The amount of mercury per lamp shall not exceed 5 mg per lamp.

11. **Warranty**: The warranty of CFL shall be at least 2 years from the date of commissioning.

12. **The CFL should be at least Three Star rating of Bureau of Energy Efficiency of India.**

13. **Switching Withstand / Rapid Cycle Test**: Lamp shall survive a rapid
switching test of 5 minutes on five minutes off with the number of cycles equal to half the rated life in hours.

**INTERCHANGEABILITY:**
Interchangeability shall be ensured by use of caps in accordance with IS 9206

**PROTECTION AGAINST ELECTRIC SHOCK:**
Self ballasted lamp shall be so constructed that, without any additional enclosure in the form of luminaire, no internal metal or live metal parts of the lamp cap are accessible when the lamp is installed in a lamp holder in accordance with IS 1258 or IS 10276.

**INSULATION RESISTANCE AND ELECTRIC STRENGTH AFTER HUMIDITY TREATMENT:**
Insulation resistance and electric strength shall be adequate between current carrying metal parts of the lamp and accessible parts of the lamp and shall not be less than 4 (Four) Mega ohm. The insulation resistance between shell and contact shall not be less than 5 (Five) Mega ohm.
Type HV (220 V to 250 V) : 4000 V r.m.s.
Type BV (200 V to 120 V) : 2U (rated voltage) + 1000 V
No flashover or breakdown shall occur during the test

**MECHANICAL STRENGTH:**
The caps shall remain firmly attached to the bulbs or that part of the lamp, which is used for screwing the lamp in or out when subjected to the torque levels of 1.15 Nm & 3 Nm. Also neither lamp nor the cap shall become loose.

**CAP TEMPERATURE RISE:**
The cap temperature rise tests of the complete lamp during run-up, stabilization period and after stabilization shall not exceed 120 K as specified in IS 8913.

**RESISTANCE TO HEAT:**
Self ballasted lamp shall be sufficiently resistant to heat. External parts of insulating material providing protection against electric shock, and parts of insulating material retaining live parts in position shall be sufficiently resistant to heat.

**REISTANCE TO FLAME AND IGNITION:**
Parts of insulating material retaining live parts in position and external parts of insulating material providing protection against electric shock are subjected to glow wire test in accordance with IS 11000 (part 2/sec1). Any flame or glowing of the specimen shall
extinguish with in 30 s of withdrawing the glow wire and any flaming drop shall not ignite a piece of tissue paper, spread out horizontally 200 ± 5 mm below the specimen.

**FAULT CONDITIONS:**
The lamp shall not impair safety when operated under fault conditions as mentioned below, which may occur during the intended use:

a) In a switch start circuit the starter is short-circuited.
b) Short-circuit across capacitors.
c) The lamp does not start, because one of the cathodes is broken.
d) The lamp does not start, although, the cathodes circuits are intact (deactivated lamp)
e) The lamp operated, but one of the cathodes is deactivated or broken (Rectifying effect)
f) Opening or bridging other points in the circuit where the diagram indicates that such fault condition may impair safety.

**TYPE TESTS:**
The following shall constitute the type tests to be carried out on the samples of self ballasted lamps as per IS 15111 (part1&2):2002:

a) Dimensions
b) Starting and run-up time
c) Lamp wattage
d) Luminous Flux
e) Colour
f) Lumen maintenance
g) Life
h) Harmonics
i) Lamp Efficacy
j) Power Factor
k) Marking
l) Interchangeability
m) Protection against Electric shock
n) Insulation resistance and electric strength after humidity treatment
o) Mechanical strength
p) Cap temperature rise
q) Resistance to Heat
r) Residence to flame and ignition
s) Fault conditions

The type test shall not be more than 3 (Three) years old and shall be from NABL Govt. approved laboratory.

ACCEPTANCE TESTS:
The following acceptance test shall be carried out during inspection as per IS 15111 (part1&2):2002:

a) Dimensions
b) Starting and run-up time
c) Lamp wattage
d) Luminous Flux
e) Colour
f) Power factor
g) Marking
h) Interchangeability
i) Protection against Electric shock
j) Insulation resistance and electric strength after humidity treatment
k) Mechanical strength
l) Cap temperature rise

SAMPLES OF LAMPS FOR TESTS:
The samples should be selected for testing as per IS 15111(part1&2):2002.

MARKING:
The lamps shall be clearly and durably marked with the following mandatory markings:

a) Mark of Origin
b) Rated Voltage (in Volts)
c) Rated wattage (in Watts)
d) Rated Frequency
e) Rated Luminous Flux  
f) Rated Colour Temperature

In addition to above following information shall be given by the manufacturer either on the lamp or packing or in installation instructions:

a) Lamp current  
b) Burning position if restricted  
c) For the lamps with weight significantly higher than that of the lamps for which they are a replacement  
d) Special condition or restrictions which shall be observed for lamp operation

The lamps should also be marked with BIS certification marking as per the provisions of Bureau of Indian standards.

<table>
<thead>
<tr>
<th>CGM/P&amp;D</th>
<th>CGM/MM</th>
<th>CGM/Commercial</th>
<th>GM/P&amp;D</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHBVN, Hisar</td>
<td>DHBVN, Hisar</td>
<td>DHBVN, Hisar</td>
<td>DHBVN, Hisar</td>
</tr>
</tbody>
</table>
## Guaranteed Technical Particulars

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make of CFL</td>
<td></td>
</tr>
<tr>
<td>Lamp Type</td>
<td></td>
</tr>
<tr>
<td>Power (watts)</td>
<td></td>
</tr>
<tr>
<td>Color temperature</td>
<td></td>
</tr>
<tr>
<td>Rated Lumens</td>
<td></td>
</tr>
<tr>
<td>Life of CFL (Min.)</td>
<td></td>
</tr>
<tr>
<td>Power Factor (Min.)</td>
<td></td>
</tr>
<tr>
<td>Harmonics</td>
<td></td>
</tr>
<tr>
<td>Rated Input supply voltage</td>
<td></td>
</tr>
<tr>
<td>Performance Guarantee</td>
<td></td>
</tr>
<tr>
<td>Lumen maintenance</td>
<td></td>
</tr>
<tr>
<td>Starting time</td>
<td></td>
</tr>
<tr>
<td>Run-up time</td>
<td></td>
</tr>
<tr>
<td>Mercury content</td>
<td></td>
</tr>
<tr>
<td>Color appearance</td>
<td></td>
</tr>
<tr>
<td>Standards applicable</td>
<td></td>
</tr>
<tr>
<td>Any other information</td>
<td></td>
</tr>
</tbody>
</table>