



Green Label Product Fluorescent lamps

(TGL – 2- R4 – 15)

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Fluorescent lamps (TGL – 2- R4 – 15)

1. Background

The product life cycle of a fluorescent lamp indicates that the major environmental impact of 90% results from its use phase as electricity consumption. Electricity generation by petroleum and coal as source of energy contributes to global warming. The environmental impact of a fluorescent lamp is additionally attributable to raw materials for production process for instance; mercury evaporation during manufacturing process and disposal which results in contamination of household waste by hazardous waste.

In consequence, the fluorescent lamp intended to be awarded the Green Label shall provide high energy efficiency, long lifetime and low-mercury containing in order to promote electricity conservation in Thailand and reduce harmful mercury pollution.

2. Scope

These criteria shall apply to fluorescent lamp consisting of single-capped fluorescent lamp, double-capped fluorescent lamp and self-ballasted lamp for general lighting applications.

3. Definitions

- 3.1 **Fluorescent lamp** refers to a low pressure mercury-vapor gas-discharge lamp in which fluorescence is mostly radiated from one or more phosphor coating layers inside, which by means of ultraviolet radiation emitted by electrical gas-discharge excites the phosphor layer to produce visible light.
- 3.2 **Double-capped fluorescent lamp** refers to a type of fluorescent lamp in which its end caps are inserted separately at the end of each tube side, typically linear tube in shape, for example T8 and T5 type.
- 3.3 **Single-capped fluorescent lamp** refers to a type of fluorescent lamp in which its single end cap is designedly connected to external circuit, together with either internal or external ignition voltage. This includes circular fluorescent lamp.
- 3.4 **Self-ballasted lamp** refers to a type of fluorescent lamp in conjunction with built-in ballast completely assembled by manufacturer, which unable to deconstruct, nor be damaged permanently. The base is connected to light source in combination with significantly additional part for ignition and efficient operation of light source.
- 3.5 **Ballast** refers to a device inserted between the supply and one or more discharge lamps, by means of inductance, capacitance or resistance, singly or in combination, which is primarily provided to regulate electric current flow through the lamp at required value. The following additional functions may include;
 - (1) To transform voltage of the supply sufficient for ignition and filaments pre-heating
 - (2) To improve cold starting
 - (3) To reduce stroboscopic effect, provide proper power factor and/or suppress radio interference

- 3.6 **Electronic ballast** refers to a device inserted between the supply and one or more fluorescent lamps, primarily provided to regulate electric current flow through the lamp at required value. The following additional functions may include;
- (1) To maintain electric current flow and voltage from the supply to provide proper condition for filaments pre-heating and ignition
 - (2) To improve power factor, reduce harmonic distortion and electrical interferences
 - (3) To eliminate stroboscopic effect
- 3.7 **Rated wattage** refers to electric power stated on the tube, measured in Watts.
- 3.8 **Rated luminous flux** refers to luminous flux stated on the tube or as specified by manufacturer, measured in Lumen.
- 3.9 **Color rendering index** refers to a quantitative comparison between an object color appearing under a light source and under a reference light source.
- 3.10 **Color temperature** refers to the temperature of black-body object which radiates color of light comparable to color of light radiated by the lamp source. For example, color temperature of a daylight fluorescent lamp is approximately 6,500 degrees Kelvin.

4. General requirements

- 4.1 Product shall be certified to Thai Industrial Standards, TIS 236¹ for double-capped fluorescent lamp or TIS 1713² for single-capped fluorescent lamp or TIS 2233³ for self-ballasted lamp for general lighting services or shall pass the Thai Industrial Standard product quality tests as aforementioned or recognized international/national standard.

Verification method

The manufacturer shall submit certificate of TIS for that product or submit test reports indicating compliance of product quality with Thai Industrial Standard as aforementioned or declare test reports in accordance with recognized international/national standard.

- 4.2 Product shall be certified to Thai Industrial Standards on safety requirements, TIS 956⁴ for double-capped fluorescent lamp or TIS 2235⁵ for single-capped fluorescent lamp or TIS 2234⁶ for self-ballasted lamp for general lighting services or shall pass the Thai Industrial Standard product safety requirements as aforementioned or recognized international/national standard.

Verification method

The manufacturer shall submit certificate of TIS on safety requirements for that product or submit test reports indicating compliance of product safety with Thai Industrial Standard on safety requirements as aforementioned or declare test reports in accordance with recognized international/national standard.

¹ TIS 236: Double – capped Fluorescent Lamps.

² TIS 1713: Single – capped Fluorescent Lamps.

³ TIS 2233: Self-ballasted lamps for general lighting services.

⁴ TIS 956: Double – capped fluorescent lamps: safety specifications.

⁵ TIS 2235: Single – capped fluorescent lamps: safety specifications.

⁶ TIS 2234: Self – ballasted lamps for general lighting services: safety requirements.

- 4.3 Production, transportation, and post-industrial waste disposal shall comply with the government laws and regulations or shall be certified to ISO 14001⁷

Verification method

The applicant shall submit either one of the following documents;

1. Documents or evidence to prove that the process of production, transportation, and post-industrial waste disposal are follow the government laws and regulations
2. Certificate of ISO 14001

5. Environmental requirements

- 5.1 Product shall be certified to Thai Industrial Standards on energy efficiency requirements, TIS 2309⁸ for double-capped fluorescent lamp or TIS 2334⁹ for single-capped fluorescent lamp or TIS 2310¹⁰ for self-ballasted lamp for general lighting services or shall pass the Thai Industrial Standard product energy efficiency requirements as aforementioned or recognized international/national standard.

Verification method

The manufacturer shall submit certificate of TIS on energy efficiency requirements for that product or submit test reports indicating compliance of product energy efficiency with Thai Industrial Standard on energy efficiency requirements as aforementioned or declare test reports in accordance with recognized international/national standard.

- 5.2 Power factor of a self-ballasted lamp for general lighting services shall not be less than 0.85.

Verification method

The manufacturer shall submit test report of power factor of self-ballasted lamp for general lighting services using test method in accordance with TIS 2310.

- 5.3 Mercury content in a fluorescent lamp shall not exceed 10 milligram per lamp.

Verification method

The manufacturer shall submit test report of mercury content in a fluorescent lamp using Atomic absorption spectroscopy according to Appendix of 95/533/EC¹¹ or IEC 62554¹².

- 5.4 Product shall not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyl (PBB) or polybrominated diphenyl ether (PBDE). However, the concentrations of lead, mercury, hexavalent chromium, polybrominated biphenyl (PBB) or polybrominated diphenyl ether (PBDE) below 0.1% by weight in homogeneous materials and the concentration of cadmium below 0.01% in homogeneous materials shall be assumed that the presence of those hazardous substances are non-detected.

⁷ ISO 14000: Environmental management.

⁸ TIS 2309: Double – capped fluorescent lamps: energy efficiency requirements.

⁹ TIS 2334: Single – capped fluorescent lamps: energy efficiency requirements.

¹⁰ TIS 2310: Self – ballasted lamps for general lighting services: energy efficiency requirements.

¹¹ 95/533/EC: Commission Decision of 1 December 1995 establishing the ecological criteria for the award of the EC eco-label to single-ended light bulbs

¹² IEC 62554: Sample preparation for measurement of mercury level in fluorescent lamps

Verification method

The manufacturer shall submit a document declaring homogeneous materials within the product together with test reports stating no presence of prohibited substances as defined in specific requirement No. 5.4 in product, using test method according to IEC 62321 or submit test reports of lead, mercury, cadmium, chromium (+6) using test method according to IEC 62321 together with certified document stating no presence of prohibited substances: PBB and PBDE in product. The certified document must be signed by authorized personnel of the manufacturer.

5.5 Packaging

5.5.1 Packaging of a fluorescent lamp shall be made from recycled pulp.

- shall be made from 100% recycled pulp in which using corrugating medium paper
- shall be made from at least 85% recycled pulp in which using Kraft liner board, reported on a dry weight basis or an 'as received' basis.
- shall be made from at least 70% recycled pulp in which using boxboard

Verification method

The applicant shall submit certified documents stating content of recycled pulp in packaging. The document must be signed by authorized personnel of the paper packaging manufacturer.

- 5.5.2 Paints or pigments used for printing on packaging or for labeling on packaging are permitted to have the sum of concentrations of mercury, lead, cadmium and hexavalent chromium due to impurities and contamination not exceeding 0.01% (≤ 100 mg/kg) by weight.

Verification method

The applicant shall submit test reports of mercury, lead, cadmium and hexavalent chromium using the following test methods;

1. Mercury (Hg) content by ISO 3856-7¹³ or ASTM D 3624¹⁴ or IEC 62321 or equivalent test method
2. Lead (Pb) content by ISO 3856-1¹⁵ or ASTM D 3335¹⁶ or IEC 62321 or equivalent test method
3. Cadmium (Cd) content by ISO 3856-4¹⁷ or ASTM D 3335 or IEC 62321 or equivalent test method
4. Hexavalent Chromium (Cr⁶⁺) content by ISO 3856-5¹⁸ or IEC 62321 or equivalent test method

¹³ ISO 3856-7: Paints and varnishes - Determination of soluble metal content - Part 7: Determination of mercury content of the pigment portion of the paint and of the liquid portion of water-dilatable paints.

¹⁴ ASTM D 3624: Standard Test Method for Low Concentrations of Mercury in Paint.

¹⁵ ISO 3856-1: Paints and varnishes - Determination of soluble metal content -Part 1: Determination of lead content.

¹⁶ ASTM D 3335: Standard Test Method for Low Concentrations of Lead, Cadmium, and Cobalt in Paint.

¹⁷ ISO 3856-4: Paints and varnishes - Determination of soluble metal content - Part 4: Determination of cadmium content.

¹⁸ ISO 3856-5: Paints and varnishes - Determination of soluble metal content - Part 5: Determination of chromium hexavalent content of the pigment portion of the liquid paint or the paint in powder.

- 5.5.3 Blowing agent, laminates or plastic composite raw material shall not be used in packaging.

Verification method

The manufacturer shall submit certified document/manufacturer report, stating no presence of blowing agent, laminates or plastic composite raw material in packaging, to TGL Scheme official. The document must be signed by authorized personnel of the blowing agent manufacturer.

- 5.6 The following instruction shall be stated in user manual accompany with the product packaging;
- 5.6.1 Warning and/or proper instruction to use in combination with additional accessory, such as Dimmer switches
- 5.6.2 Appropriate procedures or conditions for storage of end-used product and packaging by means of simplified message or figure
- 5.6.3 The name and address of the user authorized to use Thai Green Label mark shall be clearly stated on product or packaging or on packaging. In case of the authorized user is not a manufacturer, the name and address of the manufacturer shall be stated instead as well.
- 5.6.4 The locations for the return of end-used product shall be stated.

Verification method

The manufacturer shall submit user manual/instruction as defined in specific requirement No. 5.6 to TGL Scheme official. The document must be signed by authorized personnel of the manufacturer.

- 5.7 Appropriate take-back policy regarding end-used product shall be provided in reasonably practical way. Assessment and report shall be clearly stated as well.

Verification method

The manufacturer shall submit evidences of plan and record of the take-back system. The document must be signed by authorized personnel of the manufacturer.

6. Testing and certification

6.1 Testing

6.1.1 The laboratory shall be operated by the government or under governmental control as defined by clause 5 of the Industrial Standard Act B.E. 2511 (and its addenda) or certified by TIS 17025¹⁹ or ISO 17025²⁰.

6.1.2 Test results

6.1.2.1 Test results shall comply with testing methods defined in this document.

6.1.2.2 If “comparable test methods” are submitted, the following documents shall be submitted with the test results:

(1) Declaration letter from the laboratory verifying that the test methods are comparable to the methods defined in this document.

(2) Method validation documents which enable unequivocal scientific verification that the testing methods and requirements defined in this document have been met.

6.1.2.3 Test results shall have been issued no more than 1 year following the application date.

6.2 Declaration letter to verify compliance with Green Label requirements

6.2.1 Shall have been issued no more than 1 year following the application date.

6.2.2 Shall be signed by the authorized directors and have the company seal affixed (if relevant).

¹⁹ TIS 17025 General Requirements for the Competence of Testing and Calibration Laboratories.
²⁰ ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories.