

EL146. Digital Projectors

[EL146-2006/2/2009-72]



1. Scope

The criteria shall apply to LCD and DLP type projectors that displays by magnifying images transmitted in connection with machines transmitting digital image information such as PC, VTR, and DVD player.

2. Definition

2.1

"Projector" refers to a device which magnifies photographs or images by using light source and lens on a screen.

2.2

"LCD(liquid crystal display) method" refers to a method of expressing images by letting light pass through or reflecting light which changes the arrangement direction of molecules by applying voltage through transparent electrodes after filling in liquid crystal solution in the narrow gap between two sheets of thin glass plate.

2.3

"DLP(digital light processing) method" refers to a method of expressing images by using semi-conductors formed with minute reflecting mirror elements called digital micro mirror device(DMD).

2.4

"Standby electricity" refers to electricity consumed by the product in standby state.

2.5

"Standby state" refers to a state where the machine is standing by so that it can immediately switchover to the operating state by receiving the signal of the remote control device such as remote control in the normal usage state.

2.6

"Brightness of light source" refers to the average brightness of the entire screen when projecting white balance from the projector to the screen, and is indicated by 'ANSI lumen.'

2.7

"ANSI lumen" refers to a brightness unit of a light source stipulated by ANSI(American National Standards Institute).

2.8

"White balance" refers to the combination of 3 colors so that the white color can be projected from the light source to the screen in a relative strength to red, green, and blue.

2.9

"Illumination intensity ratio" refers to the ratio of brightness between the center and the edge of the entire screen projected on a screen.

3. Certification Criteria

3.1 Environmental Criteria

3.1.1

With respect to the consumption of energy during the use stage, the product shall satisfy the following requirements.

3.1.1.1

The standby electricity of the product shall be not more than 5.0 W.

3.1.1.2

The electric consumption of the product shall satisfy the following requirements in accordance to the brightness of the light source.

Brightness of Light Source	Electric Consumption [W]
below 1000	' $0.025 \times$ brightness of light source + 195' and below
1000 ~ 3000	' $0.05 \times$ brightness of light source + 170' and below
3000 ~ 5000	' $0.075 \times$ brightness of light source + 95' and below
over 5000	' $0.1 \times$ brightness of light source + 70' and below

3.1.2

With respect to the occurrence of noise during the stage of use, the noise of the projector (sound pressure level or the sound power level) shall satisfy the following requirements in standard operating conditions. In case results of measurement of sound pressure level and sound power level all exist, measurement results of sound power level shall be first applied.

Classification	Brightness of Light Source		
	≤1000	1000 ~ 3000	> 3000
Sound Pressure Level [dB(A)]	≤30	≤35	≤40
Sound Power Level [dB(A)]	≤36	≤42	≤48

3.1.3

With respect to the recyclability of its parts in the usage of chemical substances during the manufacturing process or the stage of its disposal, the product shall satisfy the following requirements. However, cases relevant to <attachment> and soldering of the printed circuit board shall not be applied with requirements of relevant items.

3.1.3.1

Lead, cadmium, mercury, compounds of these chemicals and hexavalent chromium compounds shall not be used in the product.

3.1.3.2

With respect to lead(Pb), cadmium(Cd), mercury(Hg) and hexavalent chromium(Cr6+) included in the parts constituting the product, the product shall satisfy any one of the following.

3.1.3.2.1

In order to make sure the harmful elements contained in the parts constituting the product satisfy the following requirement, an appropriate management system shall be established and operated.

Item	Lead(Pb)	Cadmium(Cd)	Mercury(Hg)	Hexavalent Chromium (Cr+6)
Standard [mg/kg]	≤ 1000	≤ 100	≤ 1000	≤ 1000

3.1.3.2.2

In case no appropriate management system is established and operated for relevant

harmful elements, the harmful elements contained in the parts constituting the product shall satisfy the following requirements.

Item	Lead(Pb)	Cadmium(Cd)	Mercury(Hg)	Hexavalent Chromium (Cr+6)note)
standard [mg/kg]	≤ 1000	≤ 100	≤ 1000	≤ 1000

Note) Even when the total chromium(Cr) content is below 1000 mg/kg, it is considered as suitable for the requirements.

3.1.3.2.3

PBBs(polybrominated biphenyls), PBDEs(polybrominated diphenylethers), and short-chained chlorinated paraffins(C=10~13) with chlorine concentration of over 50% shall not be used in the product.

3.1.3.2.4

Over 25g of plastic parts constituting the housing of the product shall not use halogenated synthetic resin such as vinyl chloride resin(PVC), and halogen compound shall not be included in the synthetic resin. However, organofluorine additive(e.g. anti-dripping agent) with 0.5 weight percentage and below is allowed.

3.1.4

With respect to the recyclability of the product in the recycling or disposal stage during the manufacturing process, the product shall satisfy the following requirements.

3.1.4.1

The synthetic resin used in the product(with size 200mm² or over of its flat surface and weight 25g or over) shall be marked with material classification of each separated part to be separated and collected easily before disposal.

3.1.4.2

The package cushioning material of the product shall use paper or pulp material such as pulp mold. However, in the following cases, it is regarded as the same material.

3.1.4.2.1

Package cushioning material which has attained Eco-label certification with 'packaging material(EL606)' among certification criteria by products with environmental mark.

3.1.4.2.2

Package cushioning material manufactured using not less than 50 weight % of waste synthetic resin.

3.1.4.2.3

Foaming synthetic resin(EPS, EPE, EPP) package cushioning material manufactured by using substance with ODP of 0 as foaming agent.

3.1.4.3

The applicant shall establish collection & recycling system of disposed product and be enforcing and operating this. However, in the case of designating and managing specialized actual results, it is regarded as suitable for this.

3.1.5

In order to reduce the environmental load in the entire process of the product, the product shall be designed and manufactured by considering the conservation of resource and energy, reduction of emission of pollutants and usage of harmful substances, usage of recyclable material, enhancement of recyclability, and extension of usage life.

3.2 Quality Criteria

3.2.1

The brightness of the light source of the relevant product shall be not less than 90% of the value provided by the manufacturer.

3.2.2

The illumination intensity ratio of the relevant product shall be not less than 80%.

3.2.3

The relevant product shall satisfy the relevant information of the electrical appliance safety standard in accordance to 「Electric Appliance Safety Management Act」.

3.2.4

If Korean Industrial Standards are available as a national standard of the product in question, it should satisfy the quality or performance criteria of the standard in question.

However, items related to “3.1 Environmental Criteria” are excluded.

3.2.5

If no Korean Industrial Standards are available as a national standard of the product in question, it should satisfy the quality and performance criteria according to the following sequence. However, the items related to “3.1 Environmental Criteria” are excluded. Also, if the E-Mark Certification Criteria Setting Committee determines that the applying criteria are not reasonable considering the characteristic of the product, it should satisfy the standards that were modified by the committee (test item, test method, standards, etc.).

3.2.5.1

National standards other than Korean Industrial Standards.

3.2.5.2

Overseas national standards or international standards regarding the product quality in question.

3.2.5.3

Standards of the organizations at home and abroad that are referred by the current E-mark target product and certification standard.

3.2.5.4

A private standard that is recognized as higher than the national standard in the industry of the product in question.

3.2.6

The parts supply and after service systems should be established, so that the product can be repaired and maintained without difficulty.

3.3 Information for Consumers

3.3.1

A user manual shall be provided with the product so that information regarding the product or service can be conveyed to the user.

3.3.2

For power saving and safe usage, the following information shall be provided to the user.

3.3.2.1

Electric consumption in standby state

3.3.2.2

Except for products with attached power switches that can completely shut off power, phrase with the meaning "power must be disconnected in order to make electric consumption '0'.

3.3.2.3

Information regarding lamp life and electric consumption and management method for ensuring lamp life

3.3.2.4

Information about replaceable lamp when replacing lamp

4. Test Methods

Certification Criteria		Test and Verification Methods	
Environmental Criteria	3.1.1	3.1.1.1	Test report by the relevant accredited testing laboratory in accordance to KS C IEC 62301(Household electrical appliances - Measurement of standby power)
		3.1.1.2	Test report by the accredited testing laboratory in accordance to 'test method of 4.1 & 4.2'
	3.1.2		<ul style="list-style-type: none">▪ Sound pressure level : Test report by the accredited testing laboratory in accordance to 'test method of 4.1 & 4.3'▪ Sound power level : Test report by the accredited testing laboratory in accordance to KS A ISO 7779(Acoustics- Measurement of airborne noise emitted by information technology and telecommunication equipment)
	3.1.3	3.1.3.1	Verification of submitted documents.
3.1.3.2		Test report by the accredited testing laboratory in accordance to 'test method of 4.1 & 4.4'	

	3.1.3.3- 3.1.3.4	Verification of submitted documents.
	3.1.4-3.1.5	Verification of submitted documents.
Quality Criteria	3.2.1-3.2.2	Test report by the accredited testing laboratory in accordance to 'test method of 4.1 & 4.5'
	3.2.3-3.2.4	Test report by the relevant accredited testing laboratory or certificate of standards equivalent or higher.
	3.2.5	Verification of submitted documents.
Consumer Information		Verification of submitted documents.

4.1 General Matters

4.1.1

One test samples shall be required for each applied product.

4.1.2

Test samples shall be collected at random by a certification institute from products in market or those in storage at the production site.

4.1.3

Test result shall be numerically set according to KS Q 5002 (Statistical interpretation method of the data – Part 1: Statistical description of the data).

4.2 Test Methods of Electric Consumption in the Stage of Usage

4.2.1

Connect power measurement instrument to the power for testing.

Note) Power for testing shall be sine wave with content rate harmonics not more than 3%, and error scope of measuring equipment shall be within ± 0.5 %.

4.2.2

Installation and other testing method of test sample follow '4. test method – 4.5 measurement method of brightness of light source and illumination intensity ratio' of this criteria.

4.2.3

Measurement of electric consumption measures the stable condition after projecting white light on the screen with the operating conditions provided by the manufacturer. However, the voice signal shall not be inputted.

4.3 Noise (sound pressure level) measurement method

4.3.1

Test for noise emission shall be conducted with the following condition in accordance with KS I ISO 1996-1 (Acoustics - Description, measurement and assessment of acoustics - Description, measurement and assessment of environment noise - Part 1: Basic quantities and assessment procedures). A sound level meter specified in KS C 1502 (Sound level meters) shall be used, and the noise emission shall be determined in accordance with the weighting network A.

4.3.2

Noise is expressed with the noise with the biggest direction among average values of value measured 3 times respectively with sound level meter from the point 1m apart from the central part of the side, front and rear of the product. However, when it is difficult to get a single value due to the big range of change of the noise, it can be measured as the equivalent noise.

4.3.3

In case it is not a complete anechoic room, the distance between the wall and the specimen shall be wide enough to ignore the reflective sound, and the background noise shall be over 10 db(A) smaller than the measured noise.

4.4 Suitability verification and test method regarding usage limit criteria of harmful elements

4.4.1

Verification method of establishment & operation of suitable management system regarding harmful elements

Note) This method is for verifying the suitability regarding the criteria limiting the use of lead, cadmium, mercury, its compounds, and hexavalent chromium compounds on parts constituting the product. This method can be used as the method for proving that the applicant is appropriately managing PBBs, PBDEs, and short-chain chlorinated paraffin(C=10~13) other

than harmful elements.

4.4.1.1

Verify the suitability by checking any of the following 4.4.1.1.1~4.4.1.1.4 or documents and over or test results.

4.4.1.1.1

Manual and related documents regarding the management system that the producer is preparing for appropriately managing relevant harmful elements when being supplied with part from suppliers

4.4.1.1.2

Test results performed in-house for the appropriate management of relevant harmful elements when product producer receives supply of parts from parts supplier(In this case, it shall clearly state specific test methods including conditioning method applied to the in-house test.)

4.4.1.1.3

Certificate from 3rd party accredited testing laboratory that can prove the parts constituting the product is appropriate for the certification criteria.

4.4.1.1.4

Other data that can prove that the relevant harmful elements is appropriately managed when the product producer receives supply of parts from parts supplier

4.4.1.2

In case it is difficult to determine whether or not the management system regarding harmful elements is appropriately established and operated in accordance with 4.4.1.1.1 or when the Eco-label certification review committee demand test results of specific parts, the product shall be verified in accordance to the following '4.4.2 Test method of harmful element content' regarding parts collected at random by a certification institute.

4.4.2

Test method for harmful element content

Note) This method is an example of a test method that verifies content of lead(Pb),

cadmium(Cd), mercury(Hg) and hexavalent chromium(Cr+ 6) included in the parts constituting the product. Other than this method, content can be verified with objective test method that can be used internationally. In this case, specific test method containing conditioning method shall be clearly stated, and the suitability of clearly stated test method shall be determined after going through the evaluation of the Eco-label certification evaluation committee.

4.4.2.1

Parts to be tested for harmful element content shall be parts collected at random by the certification institute.

4.4.2.2

It shall be a general rule to prepare homogenous substance which has gone through fabrication such as grinding by basic unit of parts as the sample to be analyzed for its content.

4.4.2.3

Method of analyzing lead(Pb), cadmium(Cd), mercury(Hg), hexavalent chromium(Cr+6), total chromium(Cr)

4.4.2.3.1

Lead(Pb), Cadmium(Cd) : KS M 0016(General Rules for Atomic Absorption Spectrochemical Analysis), KS M 0032(General Rules for ICP Emission Spectrochemical Analysis), Inductively Coupled Plasma Mass Spectrometry(ICP-MS).

4.4.2.3.2

Mercury(Hg): atomic absorption spectrochemical analysis by combustion gold amalgamation method, KS M 0016(General Rules for Atomic Absorption Spectrochemical Analysis)

4.4.2.3.3

Hexavalent Chromium (Cr+6) : Ultraviolet spectrometry by diphenylcarbazide method, ultraviolet spectrometry by lead acetate trihydrate method.

4.4.2.3.4

Total chromium(Cr) : KS M 0016(General Rules for Atomic Absorption Spectrochemical Analysis), KS M 0032(General Rules for ICP Emission Spectrochemical Analysis), and

Inductively Coupled Plasma Mass Spectrometry(ICP-MS).

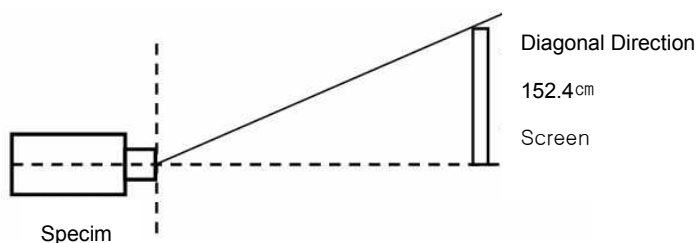
4.5 Method of measuring brightness of light source and illumination intensity ratio

Note) This measuring method is modified and organized in order to apply "ANSI/PIMA IT7.231-1998" and "ISO 11315-1:1997" to this certification criteria. Information not described here follows the relevant standard, and in the case where the relevant standard is revised, it follows the revised criteria applied at the point of applying for certification.

4.5.1

Installation of specimen

As for the specimen, it is a general rule for the size of the projected white light on the screen to be 152.4 cm in the diagonal direction in a darkened room as shown below. However, in the case the specimen cannot satisfy the abovementioned size, it will be the maximum size projectable by the specimen.



<Figure> Example of Test Method

Note) The distance between the specimen and the screen shall be appropriately adjusted according to the specimen.

4.5.2

Brightness of light source & illumination intensity ratio

4.5.2.1

Divide the entire surface of the screen into 9 parts as shown below.

4.5.2.2

Measure illumination intensity of each center point(A~I) and edge of the screen(a~d).

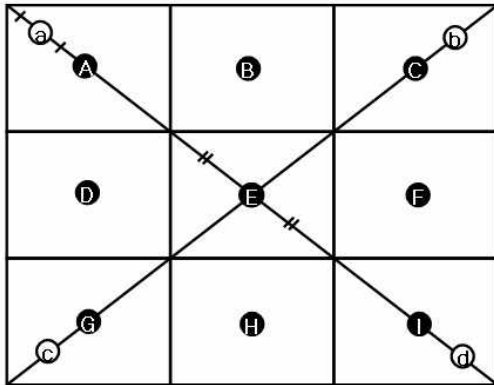
4.5.2.3

The brightness of the light source is the value dividing the average of the illumination

intensity of each measured center point(A~I) by the entire size of the screen[m²].

4.5.2.4

Illumination intensity ratio is the value dividing the average of the illumination intensity of the edge of the screen(a~d) by the illumination intensity of center point(E).



5. Reasons for Certification

"Power saving, low noise, reduction of harmful substance, environmentally friendly design"

<Attachment> Subject Excluded from Applying Usage Limit of Harmful Substances [‘3.1. Environmental Criteria’ 3.1.3 related]

Note) The <Attachment> is modified and organized in order to apply the annex of EU guideline 2002/95/EC to this certification criteria. In case EU guideline 2002/95/EC is revised, it follows the revised EU guideline applied at the point of applying for certification.

Classification		Subject
Harmful Elements	Lead(Pb)	<ul style="list-style-type: none"> ▪ Lead contained in glass used in CRT, electronic parts, and fluorescent tube.
	Mercury(Hg)	<ul style="list-style-type: none"> ▪ Lead of weight percentage below 0.25 contained in iron or ▪ 5 mg or less of mercury contained in compact fluorescent lamp ▪ Mercury contained in straight fluorescent lamp for general use. - Halophosphate fluorescent lamp: ≤10 mg - Average life triphosphate fluorescent lamp: ≤ 5 mg - Long life triphosphate fluorescent lam: ≤ 8 mg ▪ Mercury contained in straight fluorescent lamp for special use ▪ Mercury contained in other lamps not specifically designated in the excluded items.
	Cadmium(Cd)	<ul style="list-style-type: none"> ▪ Cadmium alloy except items relevant to EU guideline 91/338/EEC
	Chromium 6 (Cr ⁺⁶)	<ul style="list-style-type: none"> ▪ Hexavalent chromium as an anti-corrosive of carbon steel cooling system in absorption refrigerators
	PBBs & PBDEs	<ul style="list-style-type: none"> ▪ Use of deca BDE as PBDEs.

Common Criteria, Notice No. 2012-36, the Ministry of Environment

1. Eco-label products must follow the following provisions with regard to the proper treatment of environmental pollution substances, such as air and water wastes and noxious chemical substances emitted in the process of manufacturing or service operation.

A. When first applying for certification, the product manufacturer should observe the environment related laws and agreements pertaining to the region where the production factory or the place of service operation is located for a period of one year prior to the date of application. Any case of violation of the penalty clause will be verified by confirming documents involved during a period of one year to the date of application. Regarding any violation not related to the penalty clause, confirmation will be made on the completion of appropriate measures.

B. A person who has received a certification of eco-labeling shall observe the environment related laws and agreements pertaining to the region where the production factory or the place of service operation is located during the period of certification. However, regarding any violation besides a penalty, confirmation will be made on the completion of appropriate measures.

2. As a general rule, information for consumers shall be indicated on the surface of the product in such a way not to be easily erased. However, in case that indication on the surface of the product is impossible or undesirable, it can be indicated on the appropriate part such as product packaging, product guidebook and user's manual that consumers can recognize. However, the service information should be indicated inside and outside of the place of service operation. In case that indication inside and outside of the place of service operation is impossible or undesirable, it can be indicated on the appropriate part such as an agreement, letter of delivery, letter of guarantee, and PR materials that consumers can recognize.

3. In order to establish fair trade and to protect consumer, the applicant for eco-label and the holder of eco-label license shall observe the Act on the Fairness of

Indication and Advertisement with respect to the environmental aspects of the product.

4. For Various standards referred in the certification criteria by target product, the latest revised edition applies at the date of application, if not specified otherwise.

5. In applying the quality related criteria for each target product, if no standard is available that can be applied as the quality criteria, the president of Korea Environmental Industry & Technology Institute (KEITI) (hereafter referred to as "president of KEITI") may establish and operate the quality criteria for the product involved after review by a competent committee.