

EN 62115

Clause	Requirement + Test	Result - Remark	Verdict
19	Radiation, toxicity and similar hazards		
19.2	Addition: Electric toys shall not present a radiation hazard. Electric toys incorporating LEDs shall comply with 19.E.2. Electric toys incorporating lasers shall comply with 19.E.3. Electric toys incorporating UV-emitting lamps shall comply with 19.E.4. All electric toys incorporating optical radiation sources shall comply with 19. E.5.		
19.E.2	Light-emitting diodes (LEDs)		
	The emission from electric toys incorporating LEDs shall not exceed the following limits:		
	0,01Wm ⁻² when assessed at 10 mm from the LED front for accessible emissions with wavelengths of <315 nm;		N/A
	0,01Wsr ⁻¹ or 0,25 Wm ⁻² when assessed at 200 mm, for accessible emissions with wavelengths of 315 nm ≤ λ < 400nm;		N/A
	0,04 Wsr ⁻¹ or the AEL specified in Tables E.2 or E.3 assessed at 200 mm for accessible emissions with wavelengths of 400nm ≤ λ < 780 nm;	4.83 x10 ⁻³ Wsr ⁻¹	P
	0,64Wsr ⁻¹ or 16Wm ⁻² when assessed at 200 mm for accessible emissions with wavelengths of 780 nm ≤ λ < 1 000 nm;		N/A
	0,32Wsr ⁻¹ or 8Wm ⁻² when assessed at 200 mm for accessible emissions with wavelengths of 1000 nm ≤ λ < 3 000 nm.		N/A
	The emission only incorporates the emissions that the eye is exposed to from one viewing position at a time. Any emissions that cannot be viewed simultaneously shall be assessed separately and independently.		P
	Compliance is checked by application of either 19.E.2.2 for evaluation of the technical data sheet of LEDs or by measurement of the output from an electric toy and application of the same limits, using the following method.		P
	In case of doubt or incomplete technical data sheets, measurement according to 19.E.2.1 shall be used for checking compliance.		N/A
	Pulsed sources are considered as if they were continuous sources for the purposes of applying these limits.		N/A
19.E.2.1	Measurement of emission from electric toys		
	Electric toys are operated as intended until steady state conditions and normal operating temperature is reached. The measurement shall be carried out under normal conditions and with the fault conditions of 9.9 applied to the circuit controlling the LED. The measurement is taken after steady state conditions have been reached for a minimum of 60s.		P
	Measurements may be made on the LED itself for facilitating simple and more accurate measurement. In this case, the driving current for the LED is that measured under normal conditions or the fault conditions of 9.9. Should the accessible emissions of the LED not exceed the requirements of 19.E.2, the electric toy is considered to meet these requirements. The output of multiple colour or flashing LEDs may be regulated to give a constant emission for the purpose of		P

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	accurate and simple measurement. Should the accessible emissions of the LED exceed the requirements of 19.E.2, the accessible emission shall be measured from the electric toy.		
	The spectral emission of the LED is measured at intervals of 3 nm using a spectrometer having a bandwidth not exceeding 3 nm		P
	The accessible emission is measured to an accuracy of 0,001 Wsr ⁻¹ or by any device with a photopic luminous efficiency not exceeding 3 % across the measured spectrum. For wavelengths equal to or greater than 315 nm, the measurements are made at a distance of 200 mm from the surface of the electric toy, independent of the position of the source inside the electric toy, in whatever direction gives the highest output. For wavelengths shorter than 315 nm, the distance of 200 mm is replaced by 10mm.	200mm	P
19.E.2.2	Use of LED data sheets		
	The output of LEDs as specified on technical data sheets shall not exceed the AEL as specified in 19.E.2.2.1, 19.E.2.2.2, 19.E.2.3, 19.E.2.4 and 19.E.2.5. As the technical data sheet is essential for compliance with this standard, it shall be developed following the measurement criteria of condition A or condition B of CIE 127. The technical data sheet shall indicate that it has been created using the CIE 127 measurement methods and as a minimum include:		P
	– the luminous intensity in candela or radiant intensity in Watts per steradian as a function of forward current,		N/A
	– the angle,		N/A
	– the peak wavelength,		N/A
	– the spectral emission bandwidth,		N/A
	– the date of issue and the revision number.		N/A
	If the data sheet specifies values of typical forward current, maximum forward current or peak forward current, the maximum forward current shall be used, since it gives the highest output.		N/A
	If the evaluation of the technical data sheet shows that the LED does not comply with the specified AEL then compliance of the electric toy can be assessed in accordance with 19. E.2.1.		N/A
	Where the data sheet parameters result in more than one AEL specified in this standard, the most stringent limit shall be used.		N/A
19.E.2.2.1	UVB and UVC AEL		N/A
	Ultraviolet radiation emissions with wavelengths <315nm shall not exceed an AEL of 0,01Wm ⁻² .		N/A
19.E.2.2.2	UVA AEL		N/A
	The output of ultraviolet radiation with a wavelength $315 \text{ nm} \leq \lambda < 400 \text{ nm}$ (UVA) from LEDs shall not exceed the AEL as calculated using one of the following equations.		N/A
	Where the output of the LED is expressed in Watts per steradian: $\frac{0,01 \times C}{A} [\text{Wsr}^{-1}]$		N/A

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	Where the LED output is expressed in watts and the solid angle is given in steradians: $\frac{0,01 \times \Omega}{A} \times C [W]$		N/A
	Where the output is expressed in watts and the half-width half maximum angle (HWHM) is given: $\frac{0,01 \times \pi \times \alpha^2}{4 \times A} \times C [W]$		N/A
19.E.2.3	Visible light AEL		N/A
	The output of visible optical radiation with a wavelength $400 \text{ nm} < \lambda < 780 \text{ nm}$ from LEDs shall not exceed the AEL as given below.		
	For an LED with a spectral emission bandwidth with emission $< 400 \text{ nm}$, the lowest AEL of this clause or 19.E.2.2.1 or 19.E.2.2.2 shall apply.		N/A
	For white LEDs comprising a blue emitter and a phosphor coating, a peak wavelength of 500 nm shall be used as an approximation of the actual spectrum. Where the output is given in Watts per steradian, the most restrictive limit is used (in Table E.3, the AEL is $0,13 \text{ Wsr}^{-1}$ for 100 nm bandwidth).		N/A
	For combination colour LEDs (such as a rose colour LED consisting of a blue emitter and a deep red emitter), each peak wavelength used shall be assessed separately. Each colour shall be assigned a proportion of its AEL and the sum of those proportions shall not exceed 100 % of the individual AELs (See the example in Clause G.8 for details).		N/A
	For each colour, determine the ratio of the measured output to that colour's AEL and add the ratios. The sum of the ratios shall not exceed 1,0.		N/A
	If the internal emitters work simultaneously, they shall be assessed as a group of LEDs.		N/A
	– Where output of the LED is expressed in cd, it shall not exceed the AEL values given in Table E.2.		N/A
	– Where the output of the LED is expressed in W sr^{-1} , it shall not exceed the AEL values given in Table E.3.		N/A
	The correction factor C for wavelengths $400 < \lambda < 440 \text{ nm}$ is 0,1 for electric toys intended for children under 3 years of age and, 1 for electric toys intended for children of 3 years of age and above.		N/A
19.E.2.4	Infrared AEL		N/A
	The output of infrared (IR) radiation with a wavelengths $780 \text{ nm} \leq \lambda < 3000 \text{ nm}$ from LEDs shall not exceed the AEL as calculated using the following equation.		N/A
	$0,32S \text{ Wsr}^{-1}$		N/A
	where the infrared relaxation factor, S, is 2,0 for LEDs emitting in the spectral range $780 \text{ nm} \leq \lambda < 1000 \text{ nm}$ and 1,0 for LEDs emitting in the spectral range $1000 \text{ nm} \leq \lambda < 3000 \text{ nm}$.		N/A
	The values are given below. For a peak emission wavelength $780 \text{ nm} \leq \lambda < 1000 \text{ nm}$, an AEL of $0,64 \text{ Wsr}^{-1}$.	Refer to 19. E.2 for details	N/A

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	For a peak emission wavelength $1000\text{nm} \leq \lambda < 3000\text{ nm}$, an AEL of $0,32\text{ Wsr}^{-1}$.		N/A												
	Compliance is checked by comparing values from the component data sheets with the appropriate AEL.		N/A												
19.E.2.5	Groups of LEDs		N/A												
	The total emission of a group of LEDs shall be considered of the sum of emissions when spaced a distance:		N/A												
	– less than or equal to 280 mm, when measured centre to centre, for LEDs having emission with wavelengths $< 400\text{ nm}$;		N/A												
	– less than or equal to 40 mm, when measured centre to centre, for LEDs having emission with wavelengths $\geq 400\text{ nm}$.		N/A												
	When summed, the total emission shall not exceed the AEL specified in 19.E.2.2, 19.E.2.3 and 19. E.2.4.		N/A												
19.E.3	Lasers		N/A												
	Lasers in electric toys shall not exceed the AEL for class 1 laser products when measured in accordance with Clause 4 and 5 of IEC 60825-1 :2014 using measurement conditions in IEC TR 60825-13 where appropriate.		N/A												
19.E.4	UV-emitting lamps		N/A												
	Emission from electric toys incorporating UV-emitting lamps shall not exceed the limits for wavelength λ and assessment distance δ as follows.		N/A												
	<table><tr><td>$\lambda < 315\text{ nm}$</td><td>$\delta = 10\text{ mm}$</td><td>Children 3 years or younger $0,001\text{ Wm}^{-2}$</td></tr><tr><td>$\lambda < 315\text{ nm}$</td><td>$\delta = 10\text{ mm}$</td><td>Children older than 3 years $0,01\text{ Wm}^{-2}$</td></tr><tr><td>$315\text{ nm} \leq \lambda \leq 400\text{ nm}$</td><td>$\delta = 200\text{ mm}$</td><td>Children 3 years or younger $0,02\text{ Wm}^{-2}$</td></tr><tr><td>$315\text{ nm} \leq \lambda \leq 400\text{ nm}$</td><td>$\delta = 200\text{ mm}$</td><td>Children older than 3 years $0,2\text{ Wm}^{-2}$</td></tr></table>	$\lambda < 315\text{ nm}$	$\delta = 10\text{ mm}$	Children 3 years or younger $0,001\text{ Wm}^{-2}$	$\lambda < 315\text{ nm}$	$\delta = 10\text{ mm}$	Children older than 3 years $0,01\text{ Wm}^{-2}$	$315\text{ nm} \leq \lambda \leq 400\text{ nm}$	$\delta = 200\text{ mm}$	Children 3 years or younger $0,02\text{ Wm}^{-2}$	$315\text{ nm} \leq \lambda \leq 400\text{ nm}$	$\delta = 200\text{ mm}$	Children older than 3 years $0,2\text{ Wm}^{-2}$		N/A
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$315\text{ nm} \leq \lambda \leq 400\text{ nm}$	$\delta = 200\text{ mm}$	Children older than 3 years $0,2\text{ Wm}^{-2}$													
	If the electric toy contains more than one UV-emitting lamp or UV emitting LED, the total emission from the electric toy shall be measured taking account the cumulative effect of all UV-emitting lamps or UV-emitting LEDs.		N/A												
19.E.4.1	If the electric toy contains more than one UV-emitting lamp or UV emitting LED, the total emission from the electric toy shall be measured taking account the cumulative effect of all UV-emitting lamps or UV-emitting LEDs.		N/A												
	Electric toys are operated as intended until steady state conditions and normal operating temperature is reached. The measurement shall be carried out under normal conditions and with the fault conditions of 9.9 applied to the circuit controlling the UV-emitting lamp. The measurement is taken after steady state conditions have been reached for a minimum of 60 s.		N/A												
	Measurements may be made on the UV-emitting lamp itself for facilitating simple and more accurate measurement. In this case the driving current for the UV-emitting lamp is that measured under normal conditions or the fault conditions of 9.9. Should the accessible emissions of the UV-emitting lamp not exceed the requirements of 19.E.4 the electric toy is considered to meet these requirements. The output of		N/A												

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	multiple colour or flashing UV-emitting lamps may be regulated to give a constant emission for the purpose of accurate and simple measurement. Should the accessible emissions of the UV-emitting lamp exceed the requirements of 19.E.4, the emission shall be measured from the electric toy.		
	The accessible emission is measured to an accuracy of $\pm 0,001 \text{ Wm}^{-2}$ or by any device with a photopic luminous efficiency not exceeding 3% across the measured spectrum. For wavelengths equal to or greater than 315 nm, the measurements are made at a distance of 200 mm from the surface of the electric toy, independent of the position of the source inside the electric toy, in whatever direction gives the highest output. For wavelengths shorter than 315 nm, the distance of 200 mm is replaced by 10 mm.		N/A
19.E.5	Modulated accessible emission		N/A
	The packaging or instructions for electric toys with modulated output from visible optical radiation sources with a frequency of modulation between 4 Hz and 60 Hz shall include the following warning that shall be visible at the point of purchase:		N/A
	WARNING: This toy produces flashes that may trigger epilepsy in sensitised individuals.		N/A

Test data graph

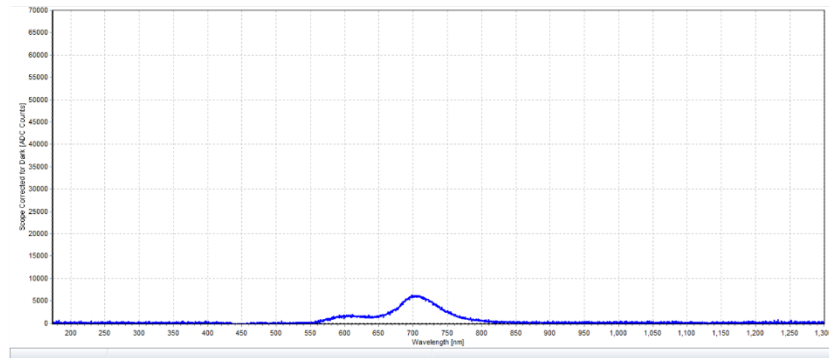


Figure 1: Spectrogram

Figure 2: $400\text{nm} \leq \lambda < 780\text{ nm}$ test result

Photo Document



Figure 1: Sample photos