

Texte zu den geplanten neuen EU-Regelungen zur umweltgerechten Produktgestaltung und zur Energieverbrauchskennzeichnung in der Beleuchtung – Zusammenstellung \* des Umweltbundesamtes (UBA), Deutschland



Entwürfe der EU-Kommission vom 13. November 2017  
**Stellungnahme des Lichtplanerverbandes IALD \*\***  
**vom 25. Januar 2016**

*Hinweis: Bitte beachten Sie, daß der angehängte Text nur in Englisch verfaßt ist.*

**EN:** Information on the coming EU Lighting Regulations – Ecodesign and Energy Labelling – Compilation \* of the Federal Environment Agency (UBA), Germany

The EU Commission's drafts of 13 November 2017  
**Comments by the Lighting Designer Association IALD \*\***  
**as of 25 January 2018**

**FR:** Informations sur les futures réglementations de l'UE concernant l'éclairage – l'écoconception et l'étiquetage énergétique – Compilation \* de l'Agence Fédérale de l'Environnement (UBA), Allemagne

Les projets de la Commission Européenne du 6 novembre 2015  
**Commentaires de l'association des designers éclairagis IALD \*\***  
**du 25 Janvier 2018**

*Indication: Veuillez noter que le présent texte n'est disponible qu'en anglais.*

\* <http://www.eup-network.de/de/eup-netzwerk-deutschland/offenes-forum-eu-regelungen-beleuchtung/dokumente/texte/>

\*\* IALD = International Association of Lighting Designers; <http://www.iald.org/>

Es folgt ein unveränderter Originaltext.

**EN:** The following is an unmodified original text.

**FR:** Ce qui suit est un texte original.

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**Single Lighting Regulation**  
**IALD comments on 13 November 2017 Ecodesign Regulation draft**

### **Lifetime**

IALD recommends new technology of Lifetime monitoring of LED using electronics in driver or smart parts integrated in LED module.

IALD recommends load stress spikes in the range of 4-6KV have to be considered for testing.

Lamp should be regulated in combination with gear. Topics such as dimming and light quality are crucial and are strongly influenced by the gear. Regulation should take into account all the operating components between light main input and output.

### **Color Rendering**

R9 is one of the colors that is not included in the measurement of CRI yet, whenever LED light quality is discussed, R9 matters. Some percentage of R9 is actually found in all of the colors that comprise the CRI value. But the specific ability of a lighting product to accurately reproduce red is critical to accurate overall color rendering.

The R9 value is one of the 14 pigment colors scientists have established to measure color rendition. However, Color Rendition Index (CRI), which is the baseline measurement used to determine how well colors from a light source compare against those from a “natural” light source such as sunlight, does not account for the R9 value. In fact, CRI only measures the light source against the first 8 pigment color samples:

- R1-R8 (pastels)
- R9-12 (saturated solids) ← not measured in CRI
- R13-R14 (earth tones) ← not measured in CRI

For some applications you can get a reasonable color rendering without a good R9, but where red reproduction is of paramount importance you need to have a high R9 value. Energy Star defines an acceptable CRI as having a value greater than 80 and an R9 value greater than zero and this produces very good light quality and color reproduction. However many LED products fail to meet these standards. Further, when it’s really critical to produce good reds of the quality produced by halogen or incandescent lamps you need to look for a lamp with a CRI above 80 and

an R9 above 60. It's worth noting that R9 does track with increasing CRI, but because the measure is in effect an average value, it's only at very high CRI's that R9 tracks closely.

We cannot select an LED lamp based on the CRI number alone. We need to ask the manufacturer to provide their R9 values.

Although CRI still a valuable resource, its values do not give an accurate indication of some colours that are predominant in clothing, food, art, and skin tones. A good way to judge the colour quality of a light source is by taking a more saturated colour reference, such as R9 (red), into consideration. The R9 often has a lower value in LED or fluorescent technologies, yet a high R9 value means a much better colour rendering result for the majority of applications.

### **Flicker and stroboscopic effect**

Lighting Europe stated that they have two studies regarding flickering and stroboscopic effect.

Flickering has already a defined benchmark while stroboscope (SVM) has only a formula for calculation but no evaluated benchmark.

IALD strongly recommends implementing the benchmark for flicker and a request for information on stroboscope level into the labeling of LED products due to strong effects on humans, security and working environment.

### **Product availability**

A lot of retrofit products do not meet the requirements for existing projects and installations.

If lighting characteristics cannot be reproduced, and retrofits cannot be used in the existing project environments, lamp types should not be banned until an equivalent retrofit is on the market.

Replacement of lamps with wrong lighting characteristic result in lower/higher lighting levels and low quality, which has a negative impact on work and live environments and safety.

### **Application date Ecodesign requirements**

1 September 2020 application date is too early to allow for a smooth transition.

It should not be applicable to all lamp types in the same manner otherwise this would result in:

- precautionary purchases - industry needs to purchase huge amounts of old conventional lamps to guarantee the proper and safe operation of their installations. This will entirely neutralize the desired effect of energy savings and CO2 savings.
- bad lighting environments – with wrong light levels (to high - / to low) , flicker and bad renderings have negative impact on perception and wellbeing of human beings both at work and in their private lives.
- acceptance of LED products from consumers will go down with the bad light quality.

IALD recommends to allow a longer transition period for industry and manufacturers to deliver quality products with the requested technical and lighting characteristics.

## Draft EcoDesign Single Lighting Regulation

<b>Organization:</b> IALD	<b>Name:</b> KEVAN SHAW	<b>Date:</b> Jan 25 2018
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Article / Annexe #	Section #	Page #	Topic	Comment	Proposed change
ACT-EG- EL_2017-12- 07				Labelling regulation: A specific time limit needs to be set to re-label products already placed on the market when the reclassification takes place otherwise there will be significant confusion of the meaning of the label and a strongly likelihood that correctly labelled product will be overlooked by end users in favour of much lower efficiency old lable products.	
ACT-EG-ED review lighting 20171110					
2	definitions		1 light source  using incandescence, fluorescence, high- intensity discharge, light emitting diodes or their combination	Listing the methods of generating light from electricity risks creating loopholes for new technologies or even old ones such as carbon arc or capacitive electroluminescent material	delete phrase

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			s as lighting technology.		
			<p>If a containing product is itself a light source, the light source to be considered for the purpose of this Regulation is the smallest physical unit that can be readily removed from the containing product without permanent mechanical damage and that meets the definition for light source</p>	<p>This is very unclear. For example an LED tape product may be sold as a roll of 5M length, any subdivision is irreversible, however many are made to be cut to length by a given dimension. The smallest part that may be cut off is likely to be unsuitable to be powered by the power supply or driver supplied that would be to drive a stated minimum length. Clarity is needed to allow a single element to be usefully measurable. Also is a roll of LED light tape a light source or a containing product?</p> <p>There needs to be a definition of “permanent mechanical damage” One is proposed below.</p> <p>As currently written individual LEDs supplied as electronic components for incorporation in light sources and containing products would be considered as “light sources” As their luminous efficiency will be determined by application it is impractical to establish a suitable testing protocol; to cover all possible applications these need to be specifically excluded</p>	<p>If a containing product is itself a light source, the light source to be considered for the purpose of this Regulation is the smallest physical unit that can be readily removed from the containing product without permanent mechanical damage, will operate directly on the power supply intended for the containing product and that otherwise meets the definition for light source.</p> <p>Light emitting electronic components that require infrastructure such as circuit boards, heat sinks specific mechanical supports etc. and that are supplied in a format to be used in manufacture of light sources , containing products or other products are specifically excluded from this regulation.</p>
			<p>(2) control gear The term does not include</p>	<p>This makes it very unclear as to how to consider combined power supplies, “gear” as defined and control elements when all within a single product.</p>	<p>(1) ‘control gear’ means one or more devices, intended to prepare the mains electricity supply for the electric format required by one or more specific light sources within boundary conditions</p>

		<p>power supplies within the scope of Commission Regulation (EC) No 278/2009 <sup>(1)</sup>. The term does also not include lighting control parts and non-lighting parts (as defined in Annex II), although such parts may be physically integrated with a control gear or marketed together as a single product.</p>		<p>set by electric safety and electromagnetic compatibility. It may include transforming the supply and starting voltage, limiting operational and preheating current, preventing cold starting, correcting the power factor and/or reducing radio interference and/or any other controlling and monitoring other electronic characteristic required to allow the light source to function as intended.</p> <p>One or more devices performing these functions may be directly integrated with the light source or be built into a “containing product”</p> <p>The term does not include power supplies within the scope of Commission Regulation (EC) No 278/2009 <sup>(2)</sup>. The term does also not include lighting control parts and non-lighting parts (as defined in Annex II), although such parts may be physically integrated with a control gear or marketed together as a single product.</p>
		<p>3 ‘<i>separate control gear</i>’, means a control gear that is not physically integrated with a light source and is placed on the market as a</p>	<p>This is unclear as to how a control gear that is supplied with a containing product but physically a separate item is considered when it is essential and specific to the operation of the containing product and is not separately marketed</p>	<p>(2) ‘<i>separate control gear</i>’, means a control gear that is not physically integrated with a light source and is placed on the market as a separate product or placed on the market exclusively with a specific containing product or light source</p>

<sup>1</sup> OJ L93, 7.4.2009, p.3.

<sup>2</sup> OJ L93, 7.4.2009, p.3.

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			separate product or as a part of a containing product.		
			4 containing product	<p>Many luminaires are manufactured so that LED light sources are tightly mechanically integrated for the purposes of thermal transfer and protection. It must be acknowledged that light sources removed from luminaires are unlikely to perform in the same way with the same output and efficiency as they would within the luminaire due to the different thermal and optical conditions. Considering the entire luminaire as the “light source” is inappropriate without considering the intended operation, application and photometric requirements for the luminaire. The more complex the requirement the greater the reduction in efficiency.</p>	<u><i>See comment to Article IV</i></u>
			18 Flicker	<p>This definition covers only visible flicker, however flicker at higher frequencies can also cause health problems or induce visual problems. The definition also excludes the “phantom array” effect as it only considers a static observer in a static environment. It also excludes strobe risks of moving elements in an environment that appear static such as rotating machinery where the visible flicker may not be apparent</p>	<p>‘flicker’ means the temporal variation in intensity of a light source or group light sources either at a frequency between 0 Hz and 10 kHz or non periodically. The temporal variations may be induced by the light source itself, the power source, other influencing factor or combinations of some or all of these factors</p>

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			19 'permanent mechanical damage'	A definition is required for this to clarify the reasonable extent of dismantling required for market surveillance that will not compromise the performance of the measured components	19 ' <i>permanent mechanical damage</i> ' Shall mean the fracturing of any part or joint of the casing , lens or framework of the containing product, dismantling requiring de-soldering of leads and components, breaking any thermally bonded joints including, but not exclusively thermal bonds between light source and its heatsink, any part of electronic gear and its effective heatsink, removal of any thermal protection between components of a containing product, breaking of any adhesive or bonded joint or subdivision of a product below the minimum operable unit as defined by the manufacturer, e.g . LED tape products, multiple light source containing products where light sources share common operating parts such as heat sinks lenses and gear
4			Removal of Light sources and separate control gears	<p>We are extremely concerned that this Article does not consider the practicalities of well designed luminaires for solid state light sources, The first paragraph seems specifically to mandate a light fitting and lamp approach to products that really is no longer relevant to the predominantly LED lighting market. With well designed integrated products the LED element is likely to have a much longer life than other parts including gear and at any event its useful life would be close to the life of a fitting in commercial use.</p> <p>Close thermal, mechanical and optical integration leads to the highest efficiency and longest lasting lighting products, mandating separable products risks forcing poorer quality products into the commercial and domestic markets and also making it more difficult and time consuming to perform market</p>	<p>Manufacturers and importers shall ensure where practicable that light sources and separate control gears in scope of this Regulation can be readily removed without permanent mechanical damage by the end-user from any product containing them that is placed on the market.</p> <p>Where light sources and separate control gears in scope of this Regulation cannot be readily removed by the end-user, manufacturers and importers shall ensure, where it shall not compromise the containing product's performance, life and efficacy, that the containing product is designed in such a way that light sources and separate control gears can be readily removed by qualified professionals. Containing products shall be accompanied by instructions on how light sources and separate control gears can be readily removed by either the end-user or by qualified professionals where appropriate without permanent mechanical damage.</p>

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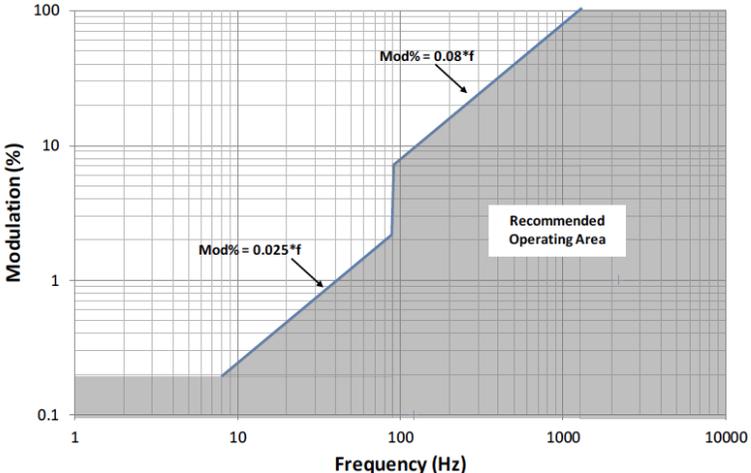
				surveillance testing with less representative accurate results.	
5			<p>“Circumvention” Where applicable, the power consumption of the product shall not increase after a software or firmware update when measured with the same test standard originally used for the declaration of conformity, except with explicit consent of the end-user.”</p>	<p>Software updates that enhance the features of a product may very likely increase the energy use or even more likely reduce the light output particularly for colour tuneable systems. This seems a difficult requirement to meet without restricting future flexibility for software driven products. The proposed wording provides specific measures to require end user involvement in the process</p>	<p>“Where applicable, the power consumption of the product shall not increase after a software or firmware update when measured with the same test standard originally used for the declaration of conformity, without the end-user being explicitly informed of the likely impacts of the firmware or software update, and being given the option of accepting or rejecting such updates.”</p>
Annexe 1				<p>There are significant omissions from the exemptions that will defeat the intent of the regulation stated in point 13 of the main regulation’s text. These exemptions exist within the current regulations. These exemptions must be added back into the annexe. Exemptions must respect the applications where lighting has specific requirements or can have significant health effects on a proportion of the population.</p>	<ul style="list-style-type: none"> <li>(i) the spectral distribution of the light is adjusted to the specific needs of particular technical equipment, in addition to making the scene or object visible for humans (such as studio lighting, show effect lighting, theatre lighting); or</li> <li>(ii) the scene or object lit requires special protection from the negative effects of the light source (such as lighting for photosensitive patients or photosensitive museum exhibits);</li> </ul>
				<p>An Alternative proposal for meeting the requirements of exemption (i): Annexe 1 section 3 add the following wording</p>	

				<p>An Alternative proposal for meeting the health and wellbeing aspect of exemption (ii) : Annexe 1 section 2 add the following wording- In the wording of the regulation Article 2 Definitions</p>	<p>(h) Light sources provided specifically for use by photosensitive patients (e.g. frosted , pearl or opal incandescent lamps)</p> <p>(18) ‘<i>Photosensitive patients</i>’ People with a specific disease causing photosensitive symptoms and people who experience adverse reactions to natural and/or certain forms of artificial lighting technology.</p>
				<p>Add the reference of the Directive 2001/84/EC of the European Parliament (work of art), to exclude from the scope items manufactured as unique items or in limited quantities to form matched sets or groupings.</p> <p>Add to list:-</p>	<p>(j) “work of art “products as set out in Council Directive 2001/84/EC”</p>
			<p>Any light source or separate control gear in scope of this Regulation shall be exempt from the requirements of Annex III, with the exception of the information requirements set out in Annex III point 3.5, if it has a specific</p>	<p>We would support a proposal to generalise exempted lamps required for non general lighting purposes.</p> <p>It may be possible to create a list of lamp types, classes or bases that would be exempt however this list could not possibly be exhaustive. It will have to be very clear to Market Surveillance authorities that such a list is not absolute or exhaustive and exclusion from the list does not mean any specific lamp is in scope of the regulation.</p>	<p>3. Any light source, control gear or containing product in scope of this regulation shall be exempt from the requirements of Annex III, if it has a specific technical design for its intended use and it is not designed for general lighting.</p> <p>For these light sources, control gear or containing products, the following information shall be clearly and prominently indicated on their packaging and in all forms of product information accompanying the lamp when it is placed on the market including advertisement:</p> <ul style="list-style-type: none"> <li>(a) their intended purpose; and</li> <li>(b) that they are not designed for general lighting; and</li> <li>(c) the technical parameters that make the lamp design specific for the stated intended purpose</li> </ul> <p>The technical documentation file drawn up for the purposes of conformity assessment pursuant to Article 8 of Directive 2009/125/EC 2005/32/EC shall list the technical parameter(s) that make the lamp design specific for the special purpose as indicated</p>

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			technical design for its intended use in at least one of the following applications :		on the packaging. This exemption shall not be applicable to products placed on the market if the mentioned technical parameters for the specific special purpose application are also present in lamps with equivalent technical parameters while having higher energy efficiency classes according to Regulation (EU) No...
Annexe 2, Definitions		1		This definition is unclear and can be misread to include “non-mains light sources” as defined below. Replace second paragraph with -	Light sources that operate directly on the mains, and can also operate indirectly on the mains using a separate control gear, shall be considered to be mains light sources.
		8		<p>“colour tuneable light source should not specify the technology used. This is redundant and potentially creates a loophole for a hybrid technology products.</p> <p>The proposed wording potentially excludes tuneable white light sources that operate completely with the range defined in article 2(1) and dim to warm light sources intended to replicate the dimmed behaviour of incandescent light sources. These should be clarified</p>	<p>(1) ‘<i>colour-tuneable light source</i>’ (CTLS) means a light source (CLS), that can be set to emit light with a large variation of colours outside the range defined in article 2 (1)(a), but can also be set to emit white light inside the range defined in article 2 (1)(a) for which the light source is in scope of this Regulation.</p> <p>The term does include tuneable-white light source that allows a continuous tuneable white with more than 2000 K variation in CCT.</p> <p>The term does not include dim-to-warm light sources, that shift their white light output to lower colour temperature when dimmed, simulating the behaviour of incandescent light sources</p>
		10		“non lighting parts” should include devices to facilitate Visual Light Communication (VLC) for way-finding, information provision and advertising etc. add-	devices to facilitate Visual Light Communication (VLC) for way-finding, information provision and advertising

		21	<p>(2) <i>'on-mode power'</i> (Pon), expressed in Watt, is the electric power consumption of a light source in full-load with all lighting control parts and non-lighting parts disconnected. If these parts cannot be disconnected they shall be switched off or their power consumption shall be minimised following manufacturer's instructions.</p>	<p>"On power Mode" It is unreasonable to expect separate power control of fully integrated control or communications electronics within a light source. Propose alternative method of determining effective Pon</p>	<p>(3) <i>'on-mode power'</i> (Pon), expressed in Watt, is the electric power consumption of a light source in full-load with all lighting control parts and non-lighting parts disconnected. If these parts cannot be disconnected, the manufacturer's declared power consumption for these parts shall be subtracted from the measured Pon value</p>
		43		<p>The Pst LM method of determining flicker is based on IEC 61000-4-15 which was seeking to measure flicker in incandescent lamps as a result of power line voltage fluctuations typically in the range of 0.5 to 35Hz. This range is a very small proportion of the flicker range experienced from LED products. This method also does not consider stroboscopic effects and "Phantom Array" effects that occur with LED light sources.</p>	<p>To limit the biological effects and detection of flicker in general illumination, then the Flicker Modulation (%) should be kept within the shaded region in diagram below.</p>

				<p>A more appropriate point of reference is IEE 1789-2015 (a simplified “explainer“ article is available at <a href="https://www.dial.de/en/blog/article/ieee-1789-a-new-standard-for-evaluating-flickering-leds/">https://www.dial.de/en/blog/article/ieee-1789-a-new-standard-for-evaluating-flickering-leds/</a> )</p> <p>Given the potential and known health, safety and wellbeing risks from flicker we propose that the recommendations in IEE1789-2015 are adopted for this regulation until such time as CIE produce a recommendation on this subject</p>	 <p style="text-align: center;">diagram from IEE1789-2015</p> <p>Modulation (%) = <math>Mod\% = 100 \cdot \frac{L_{max} - L_{min}}{L_{max} + L_{min}}</math>          where <math>L_{max}</math> and <math>L_{min}</math> correspond to the maximum and minimum luminance, respectively. Flicker Modulation (%) shall be limited to the following regions for limited biological effects:</p> <ul style="list-style-type: none"> <li>  Below 90 Hz, Modulation (%) is less than 0.025 X frequency.</li> <li>  Between 90 Hz and 1250 Hz, Modulation (%) is below 0.08 X frequency.</li> <li>  Above 1250 Hz, there is no restriction on Modulation (%).</li> </ul>
	52			<p>“Lifetime” proposals are inappropriate to a predominantly LED market place M70 F50 is below an acceptable performance to meet lighting requirements. Part of the value proposition for LED installations is that the entire installation should be able to function for the full manufacturer’s stated life. The expectation of a far higher rate of survivability of LED as opposed to conventional lighting was the argument that was made for reducing the end of life flux to 70% rather than the 80%</p>	<p>‘lifetime’ for LED and OLED light sources means the time in hours between the start of their use and the moment when 10% of a population of light sources have either abruptly failed (no light output anymore) or their light output has gradually degraded to a value below 80% of the initial luminous flux. This is also referred to as the M<sub>80</sub>F<sub>10</sub> lifetime.</p>

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				<p>previously used for conventional light sources. The market and knowledge of LED has moved forward considerably and many products are now marketed as L90 F10, these do tend to be premium products. In order to prevent over specification required to meet an end of design life calculation as demanded in lighting standards including EN14264:1, it is necessary to require a higher standard.</p> <p>M80 F10 is more reasonable . There is a real requirement to consider LED separately from legacy light sources where M80 F50 is a better definition of effective life.</p>	
Annexe 3	3.3.2			<p>QR codes need to be on the body of the product to allow future maintenance access to relevant information</p>	<p>If a separate control gear is placed on the market, the following information shall be displayed on at least one free-access website, including a website optimized for mobile devices linked to a QR-code on the exterior of the product:</p>
	Table 4		Functional Requirements	<p>Colour Rendering: We strongly believe that Ra is not satisfactory to determine LED colour quality. We acknowledge the comment that this will be reviewed however it will be possible to incorporate R9. Please see separate IALD proposal to incorporate R9 with Ra.</p>	
				<p>Colour Consistency: We think that 6 step Mcadam ellipse variation is unambitious. The majority of current products achieve 3 or 4 step Mcadam ellipse consistency apart from the cheapest and lowest quality. We propose colour</p>	<p>Variation of chromaticity coordinates within a four-step MacAdam ellipse or less.</p>

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				consistency should be within 4 Mcadam ellipses	
				Flicker . This should not be limited to LED and OLED devices. The Pst LM measure is inappropriate to cover the range of temporal lighting artefacts that can cause issues. Please see note above	<ul style="list-style-type: none"> <li>  Below 90 Hz, Modulation (%) is less than 0.025 X frequency.</li> <li>  Between 90 Hz and 1250 Hz, Modulation (%) is below 0.08 X frequency.</li> <li>  Above 1250 Hz, there is no restriction on Modulation (%).</li> </ul>
				Moving the data to another page on the website would break the QR code link that might be vital to determine operating parameters to conduct maintenance. This information needs to remain accessible for at least 10 years	Information on separate control gears that are no longer in production or that are not or no longer intended for sale in the European Union should be clearly marked as such on the relevant web page s and such pages shall remain accessible from the product QR code link and through searches for no less than 10 years after the product is discontinued in the market.
Annexe 4			In case light sources and/or control gears are placed on the market as parts inside a containing product or supplied with the product, the manufacturer or importer of this containing	<p>This is not practicable for many lighting products. We have introduced a definition for “Permanent Mechanical Damage” to clarify what is expected and what actions would compromise the operating efficiency of an integrated light source. The result will be the requirement to test many “containing products” as light sources and the necessity to rely on manufacturers providing accurate operating data for the components within the products.</p> <p>Proposed additional wording-</p> <p>IALD have separately proposed a market surveillance method that deals with the</p>	Where it is impractical to dismount light sources and control gear from containing products without permanent mechanical damage, the manufacturer / importer shall provide full technical details of light source/s and gear/s and provide evidence that these have been tested to prove that they meet the declared specification, and if considered necessary following review of the test data, provide a disassembled containing product to allow confirmation testing of the relevant components

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		<p>product shall facilitate market surveillance authorities verifying compliance of the light sources and/or control gears with this Regulation by providing, on request, the identification of the contained source(s) and control gear(s), and detailed instructions to the market surveillance authorities on how to dismount light source(s) and/or control gear(s) for inspection without</p>	<p>majority of domestic LED replacement lamp products</p>	
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			permanent mechanical damage.		
Annexe 5				<p>We question the validity of the proposed accelerated endurance testing proposed herein. Our concern is that manufacturers are likely to ensure that products will be optimised to meet the requirements of the short term test rather than ensuring the product meets the expected life performance. The proposal for market surveillance doesn't have any provisions to ensure the light sources do meet the life performance criteria in the long term.</p> <p>We are also concerned about the proposal to test light sources outside of the containing product. The operating conditions of the light source and gear outside the containing product will be different to those encountered in normal operation, therefore testing under proposed accelerated conditions is likely to be unrepresentative of the performance of the products in use.</p>	
	1(1)		Temperature cycling test	This is the most difficult of the proposed tests for Surveillance Authorities to undertake and requires the most resources. We are not convinced that it materially adds to the information and outcomes achieved in test 3	<b><u>Delete this proposed test</u></b>

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	1 (3)		Any thermal protecting devices that would switch off the model or reduce its performance shall be bypassed.	This is impractical for most products containing thermal protection.	<b><u>Delete sentence</u></b>