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 6. November 2015

Stellungnahme Schwedens vom 29. Februar 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 6 November 2015

Comments by Sweden as of 29 February 2016

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 la Suède du 29 février 2016

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

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* http://www.eup-network.de/de/eup-netzwerk-deutschland/offenes-forum-eu-regelungen-beleuchtung/background-information/texte

Es folgt ein unveränderte Originaltext.

EN: The following is an unmodified original text.

FR: Ce qui suit est une texte original.

Swedish Energy Agency

Date
29 Feb 2016

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Swedish comments on the draft regulations for one Ecodesign regulation and a revised Energy labelling regulation

Summary

Sweden welcomes the proposal for one ecodesign and one energy labelling regulation. However, Sweden proposes the following changes:

- Revise the one-equation approach and add at least one (or more) equation(s), in order to
    - Avoid backsliding of the current regulations for tertiary lighting, and
    - Ensure a more progressive and ambitious timetable for in particular LED-based lighting solutions.
- Clarify some of the definitions and test methods to ensure alignment with existing (test and other) standards when possible.

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General Comments

SE welcomes the Commission proposals for new regulations for eco-design and energy labelling for lighting products but have both general (this section) and detailed technical (next section) comments.

One regulation – one equation?

Sweden welcomes the merger of the current regulations into *one* regulation, since this will make it much easier for all stakeholders to find and interpret the relevant information. However, as pointed out already by other stakeholders, the current proposal with *one* basic *equation* that is supposed to encompass all technologies suffers from the risk of back-sliding as well as of not being progressive enough.

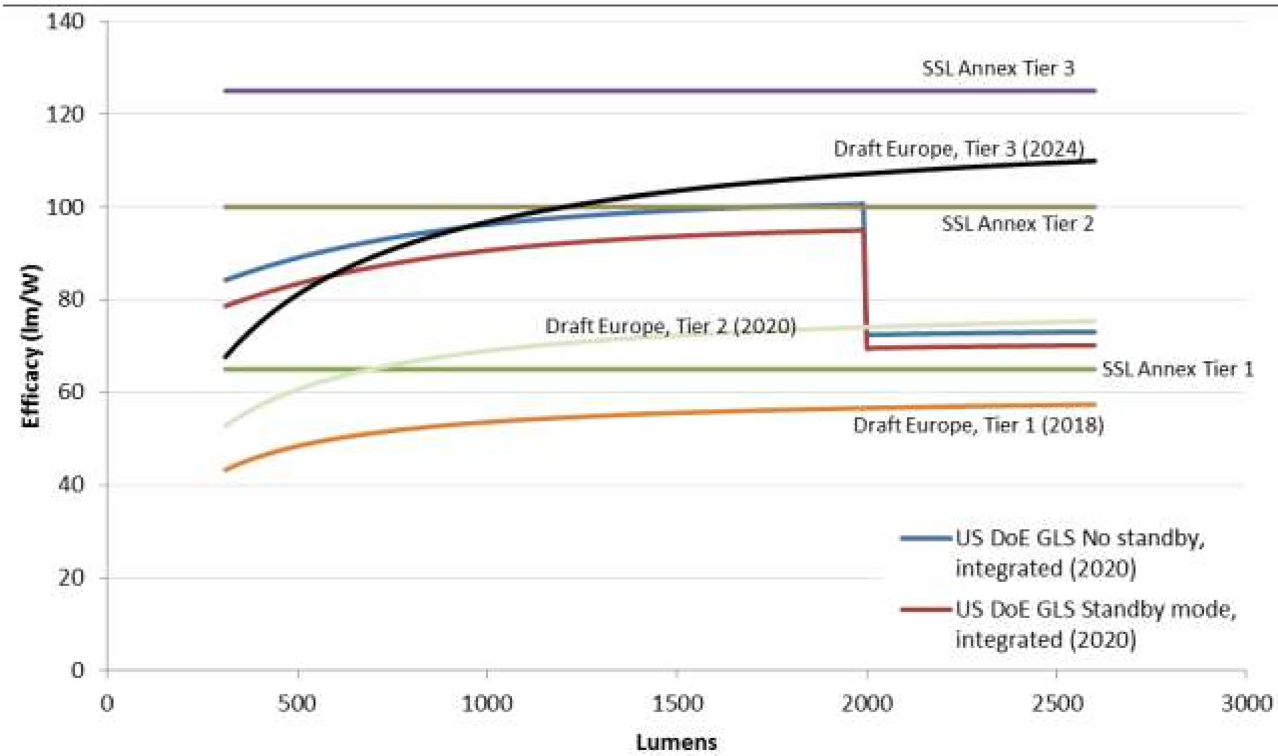
Lack of ambition

To make the last point clearer, the figure below compares three sets of requirements currently under discussion:

1) US DoE Notice of Proposed Rulemaking (NOPR) level for integrated GLS with and without standby mode[1], coming into force 2020.
2) IEA 4E SSL Annex Tier 1, Tier 2 and Tier 3 for non-directional lamps[2].
3) European Commission draft proposal Tier 1 (2018), Tier 2 (2020), Tier 3 (2024) at 80 CRI

Note: Since the US DoE NOPR levels start at 310 lumens, all curves start at that level even though the EC proposed tiers start at 60 lumens and the IEA 4E SSL Annex has no lower limit at all.

[1] http://energy.gov/eere/buildings/downloads/issuance-2016-02-12-energy-conservation-program-energy-conservation
[2] http://ssl.iea-4e.org/product-performance (The values established here are for recommendations only. This version is from 2012 but is currently under revision.)



As is shown, the EC tier 1 lies well below the 4E SSL annex tier 1; the latter was established already in 2012 after a thorough assessment of the LED light sources present at the market at the time.
Furthermore, EC tier 2 lies well below both the 4E SSL annex tier 2 and the US DoE draft proposals for GLS.

Even though this is just an example (non-directional GLS) and a deeper analysis is required to estimate the effect for all categories, it is a good illustration of that the EC tiers could be more ambitious and should be revised.

More than one equation is probably needed

Thus, it seems like it is not possible to stick to one basic equation but that two or more are needed. Although a completely technology neutral approach would be preferable, Sweden believes that a semi-neutral approach may work: e.g., split the equations in:

- One for LED-based lights sources; and
- Another one (or two) for other technologies (including halogen and discharge lamps).

A three-tier approach could be maintained, but it should be carefully explored whether a *revision* is needed before the third tier comes into force.

More details regarding the design of possible new equations

Sweden proposes the following:

- Remove the bonus-malus function for CRI in the equation(s): currently a new 2D metric for colour rendering has been proposed (TM 30) from which it´s clear that a CRI = 80 could be preferred over a higher CRI, depending on the gamut area index. Also for street lighting there is no evidence that a higher CRI necessarily leads to a higher security (or detection of moving objects). Thus, there is no simple correlation between high CRI and the quality/functionality provided by a given light source and therefore no rationale for a bonus-malus function.

- Several stakeholders have pointed out that Poff can´t be zero due to the need of a small power to maintain controllability. Explore where the lower limit could be and set Poff accordingly. As a starting point, assume Poff = 0.5 W.

Comments on the Scope and on Information requirements

Start at 30 lumen to decrease the risk of abuse of vintage lamps

- Let the lower limit of the flux start at *30 lumen* rather than at 60 lumen; or alternatively, put a *power cap* on light sources with a flux lower than 60 lumen such that Pmax <= Pmax(60 lumen). The reason is that light sources of vintage type with a very low light output and efficacy is present on the market, sometimes with an efficacy as low as 3-4 lm/W. This means that a vintage lamp with a flux close to 60 lumen could use an electrical power of close to 20 W. (It should be noted that some manufacturers have asked specific questions regarding this limit in order to produce these kinds of lamps.)
- Note that this means that the Energy labelling should start at 30 lumen also, as it is in 874/2012.

Clarify the definition of Decorative Lighting

”Decorative Lighting” On the market in Sweden it is fairly common that companies say that their lamp or luminaire containing a lamp is used for soft, indoor lighting and is therefore not intended for household room illumination because the product is not considered to enhance visibility in that space. The definition “decorative lighting” should be defined in a new Regulation.
In the document “Solid State Lighting—Definitions for Functional and Decorative Applications” from NEMA and American Lighting Association the following definition is found.

Chapter 1 art 2 p.4) Decorative lamp shouldn’t be allowed as a special purpose lamp.

*“**Decorative Luminaires***
Luminaires primarily designed for their lighted as well as their unlighted appearance and aesthetic contribution to the space. Such luminaires are typically intended for use where a decorative accent or an aesthetic appearance, not a specified amount of luminaire light output, is desired. The light output of decorative luminaires is typically not intended to independently illuminate a space or a task. “

Definition probably from ANSI/IESNA RP-16,”Nomenclature and Definitions for Illuminating Engineering”

SE proposes:

- That the definition of decorative lighting is included in ecodesign and that such lamps are excluded from ecodesign requirements.

Clarify whether battery powered and/or solar lamps are excluded from ecodesign requirements or not

SE proposes:

- Battery powered and/or solar lamps are treated as *special* lamps in ecodesign.

Revise the many information requirements

When lighting products are tested through market surveillance activities it is seldom that there is a problem with the lamps energy efficiency requirements. However, many times the lamp is considered non-compliant because the manufacturer fails to provide correct information on the package.

On one hand, product information is absolute necessary to make the market more transparent and to make it easier for consumers/purchasers to make the right choice; on the other hand it should be balanced against the burden on the manufacturers to provide all kind of information.

SE proposes:

- Revise the information requirements after an in depth examination is made on how consumers/purchasers perceive and understand the information.

Add an information requirement to clarify whether a lamp sold via the Internet is a special purpose product or not

According to regulation 244/2009 art 3, p. 2 it should be clarified if a lamp is a special purpose lamp on the packaging or in the product information. When an old incandescent light bulb is sold on the Internet, however, the Market Surveillance Authorities can´t see whether a light bulb is regarded as a special purpose product unless we buy the product packaging or ask the manufacturer. This creates extra work for the authorities and this should be changed to the next revision.

SE proposes:

- Special product information should be present also when products are sold via the Internet.

Technical comments

The Swedish Energy Agency is the Market Surveillance Authority (MSA) of eco-design and energy labelling in Sweden. For lighting, this means that we check products regarding their product information and/or energy labelling on the package, on the internet and in shops, as well as perform market surveillance tests in our in-house lighting laboratory and/or external national laboratories. The in-house facilities consist of lifetime tests, flicker measurements, two integrating spheres and a goniophotometer (for angle-resolved measurements). Furthermore, we follow (and partly participate in) the standardisation work in and outside EU as well as on-going research.

The following paragraphs is an attempt to summarise our experience from the past years of testing and enforcing lighting products, where we have encountered many difficulties due to ambiguous definitions and/or test methods. Where we can, we propose alternative definitions or test methods, based as much as possible on existing standards. We are happy to discuss the details further with the Commission as well as with other stakeholders with similar experiences.

Definitions, metrics and test standards – use established standards as much as possible

The current regulations sometimes use their own definitions, metrics and test methods, i.e. which are not established as international standards. This creates unnecessary market barriers since it increase the burden on manufacturers and retailers to adapt to regional variations. Furthermore, for market surveillance authorities (MSA:s) it is also problem since it is not always clear how to test certain parameters for compliance.

Sweden strongly recommends that the regulations use definitions, metrics and test methods that are established or best practice at the time of publication, and preferably make references to the source of these definitions, metrics and test methods.

In the following sections, concrete proposals are made in cases where Sweden has found particular problems.

Pilot test of market surveillance procedure during policy development process

Some of the requirements in the Regulations today are difficult to test from a Market Surveillance perspective.

SE proposes:

- To avoid such problems in the new Regulation, one possibility is to perform *pilot tests* to check whether the suggested new requirements are

possible to verify in a reasonable way. A suitable form would be in a kind of ring- or star test, and Sweden volunteers to be part of such an exercise.

For information: SE measurement procedure for measuring and calculating the power, flux and Pmax

There are two methods for calculating Pmax of a batch of lamps:

1. Pmax is calculated for each measured lamp. The batch Pmax is calculated as the average of all sample Pmax.
2. Pmax is calculated from the average flux of the batch.

- We believe the first method is to the producer's advantage since it allows a higher Pmax.

Table 1: *Example: 10 samples, Pmax calculated in two ways.*

Two methods for calculating Pmax							
Sample	Flux on package	Measured Flux	Power on Package	Measured Power	Pmax from package values	Pmax from measured values	
1	500	449.18	6	5.95	35.34	32.53	1a) $Pmax_i$ calculated for each sample
2	500	441.27	6	6.12	35.34	32.09	
3	500	450.94	6	6.03	35.34	32.63	
4	500	450.71	6	6.03	35.34	32.61	
5	500	448.85	6	6.01	35.34	32.51	
6	500	433.40	6	6.06	35.34	31.65	
7	500	433.81	6	5.98	35.34	31.67	
8	500	394.56	6	5.59	35.34	29.45	
9	500	412.93	6	5.47	35.34	30.49	
10	500	438.85	6	6.07	35.34	31.95	
Average		**435.45**		**5.93**		**31.76**	**1b) Pmax is defined as the average of the samples $Pmax_i$**
Average		**435.45**		**5.93**		**30.63**	2) Average of samples flux is used to calculate Pmax

Note: SE adds the current 10% tolerance to the calculated Pmax, which gives the absolute PASS/FAIL limit to be 31.76W*1.1=**34.94 W** including laboratory measurement uncertainty.

What is declared on the package or product sheet is what should be delivered

Regardless of whether it is called a declared, rated or nominal value, what is declared is what is going to be checked by a MSA. E.g., if it is stated that a light source provides 700 lumen then that is what it should deliver.

Number of samples and use of tolerances

Sweden supports a reduction of the *number of samples* for light sources down to 10. However, for integrated products it can be difficult to perform measurements due to the form factor, and furthermore, the purchase price can be very high (in some cases up to 1000 Euro). Thus, Sweden proposes a 1 + 5 scheme: test one integrated product – if fail, test 5 more and take the average of those.

The use of a general +/- 10 % *tolerance level* is too crude and/or misleading and should be avoided. Sweden proposes instead a thorough review *parameter by parameter*, according to the following:

Measure 1, 5 or 10 samples:

- Procedure 1: In case of an integrated product, measure 1 unit; if fail, measure another 5 samples and take the average of those.
- Procedure 2: In case of a light source: measure 10 units, take the average.

Tolerances are given in percentage, max or min *rather than +/-*. The reason is to clarify that for most parameters the tolerance ensures that the deviation isn't too high **or** low from the declared value. There is no reason to fail too efficient products.

Example: A lamp labelled *100 lm* should pass if the flux is measured to be 95 lumen (-5%) *or higher*. The lamp is not to be failed if the flux is 105 lumen (+5%) or higher, i.e. more energy efficient than labelled.

SE proposes:

In Table 2, a list of the most common parameters are listed together with the current and proposed tolerances.

Table 2. SE proposal for parameter-specific tolerances

Parameter	Current EU policy			SE suggested policy			Procedure
	Samples	Upper	Lower	Samples	Upper	Lower	
Power [W]							
Luminaire with non-replaceable LED	20	10%	-10%	1+5	10%	No limit	1
Light source <= 5W	20	10%	-10%	10	10%	No limit	2
Light source > 5W	20	10%	-10%	10	5%	No limit	2
Power factor [0-1]							
Luminaire with non-replaceable LED	20	10%	-10%	1+5	No limit	-5%	1
Light source	20	10%	-10%	10	No limit	-5%	2
Flux [lm]							
Luminaire with non-replaceable LED	20	10%	-10%	1+5	No limit	-10%	1
Light source	20	10%	-10%	10	No limit	-5%	2
P_max [W]							
Luminaire with non-replaceable LED	20	10%	-10%	1+5	10%	No limit	1
Light source	20	10%	-10%	10	5%	No limit	2
Energy Efficiency Index							
Luminaire with non-replaceable LED	20	10%	-10%	1+5	No limit	0%	1
Light source	20	10%	-10%	10	No limit	0%	2
CRI [0-100] Ra>=80							
Luminaire with non-replaceable LED	20	+3 (Ra 83)	-3 (Ra 77)	1+5	No limit	0 (Ra 80)	1
Light source	20	+3 (Ra 83)	-3 (Ra 77)	10	No limit	0 (Ra 80)	2
Number of switching cycles							
Luminaire with non-replaceable LED	20	10%	-10%	1+5	No limit	0 cycles	1
Light source	20	10%	-10%	10	No limit	0 cycles	2
Corresponding incandescent power							
Luminaire with non-replaceable LED	20	+1W	-1W	1+5	5%	-5%	1
Light source	20	+1W	-1W	10	5%	-5%	2

Colour Temperature – use ANSI-values instead of tolerances expressed in percentage

SE proposes:

- Avoid the use of tolerances in percentage, use the table below instead.
- CT values not included in the ANSI-table above should be allowed to be extrapolated or interpolated from the table values.

follow ANSI C78.377- 2011 Table 6A, for 4-step quadrangle excluding flexible CCT
2700K (2723 ± 82)
3000K (2940 ± 98)
3500K (3397 ± 125)
4000K (4036 ± 154)
5000K (4991 ± 220)
5700K (5665 ± 270)
6500K (6432 ± 340)

Test voltage

Lighting products aimed to be connected to the European low-voltage grid (230 V +- 10 %) should be tested at exactly 230 V. That includes MV HL *even if the declared* voltage is 240 V. See EN 62612 below:

– 24 – 62612 © IEC:2013

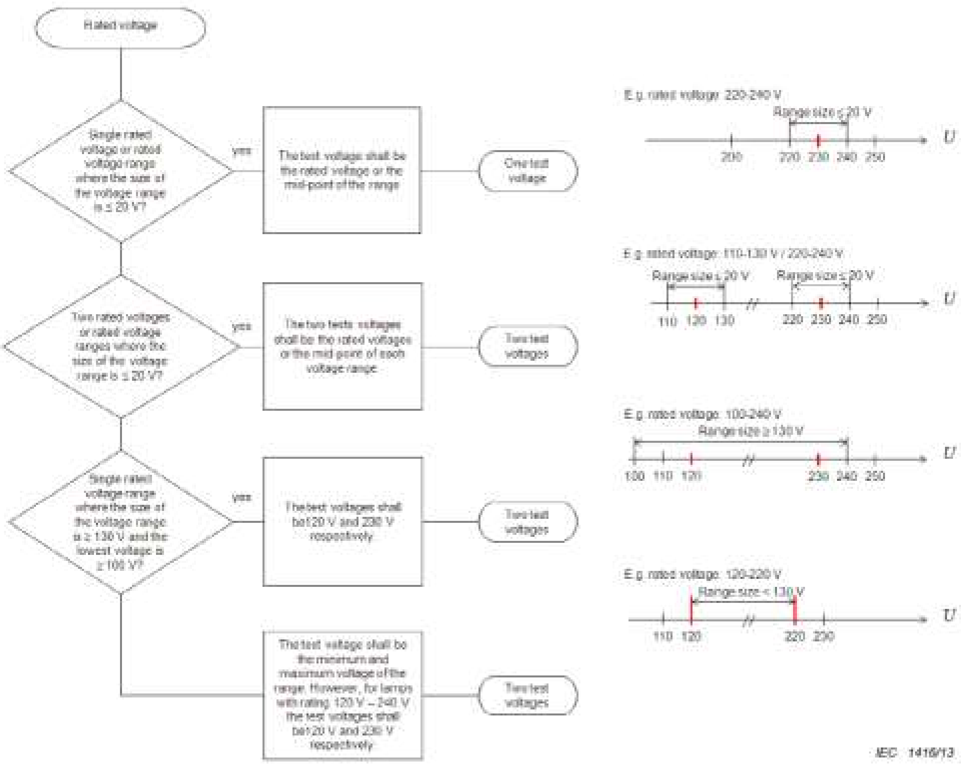


Figure A.1 – Relation of rated voltage to test voltage

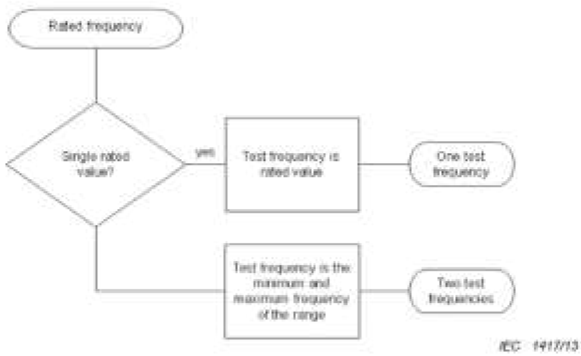


Figure A.2 – Relation of rated frequency to test frequency

Clarify the definitions on colour consistency and spatial non-uniformity of chromaticity

There is a problem that the Ecodesign requirement on colour *consistency* refers to a test standard on colour *variation*:

- **Color consistency** refers to the average amount of variation in chromaticity among a batch of supposedly identical lamp samples. To limit this variation, the lighting industry uses a colour consistency system based on MacAdam ellipses (Wyszecki and Stiles 1982). http://www.lrc.rpi.edu/programs/nlpip/lightinganswers/lightsources/whatisColorConsistency.asp

- IES LM 79-08. **Spatial non-uniformity of chromaticity.** SSL products may have a variation of colour with angle of emission. Spatial non-uniformity of chromaticity shall be evaluated using the measurement conditions describe in section 12.2 [Figure 4 below]

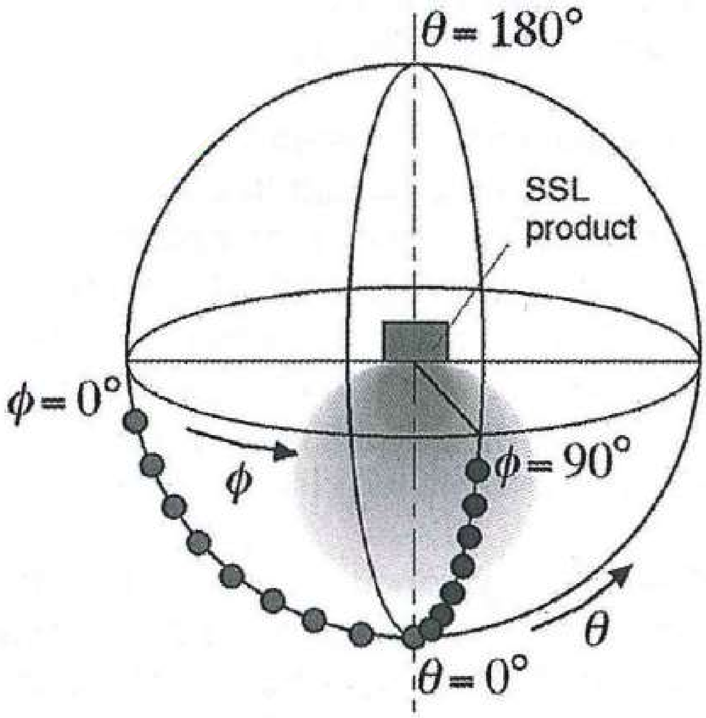


Figure 4. Geometry for the chromaticity measurement using a goniometer (the figure shows the case for a SSL product emitting light in downward directions only).

The spatially averaged chromaticity coordinate is calculated from these points.

1194/2012, Annex III, p.2.2 Functionality requirements for non-directional and directional LED lamps, Table 5:

1. Table 5 cover both directional and non-directional lamps. Colour consistency is by EOJ C22 24 referred to standard IEC 62612 however only for directional lamps (EOJ C22 24, 4e, Colour consistency – EN 62612, 10.1) and not for non-directional lamps (closest reference EOJ C22 24, 3d, Chromaticity coordinates).

IEC 62612, 10.1 Colour variation categories
Reference is made to Annex D of IEC 60081. The rated colour of a lamp should preferably be one of the following seven values:

F2700, P2700, F3000, F3500, F4000, F5000 or F6500

For reference purposes, the standardised chromaticity co-ordinates and CCT (see CIE S017/E:2011) values corresponding to these colours are given in Table 3 (Source: IEC 60081,Clause D.2, modified):

The initial chromaticity co-ordinates are measured. A second measurement of maintained chromaticity co-ordinates is made at an operational time as stated in 7.1.

[7.1 General test conditions
Testing duration is 25 % of rated life time up to a maximum of 6 000 h.]

The measured actual chromaticity co-ordinate values (both initial and maintained) shall fit within 1 of 4 categories (see Table 4), which correspond to a particular MacAdam ellipse around the rated chromaticity co-ordinate value, whereby the size of the ellipse (expressed in n steps) is a measure for the tolerance or deviation of an individual LED lamp.

Compliance:
For compliance of family members, refer to 7.2.3.
For all of the tested units in a sample, the measured chromaticity co-ordinate values of an LED lamp (the initial value and maintained value) shall not move beyond the chromaticity coordinate tolerance category as indicated by the manufacturer or responsible vendor (see Table 1). The measured values shall be of the same category as the rated values or better. The sample units for the chromaticity coordinate measurement shall be selected from four different batches4.

CCT and chromaticity co-ordinates are measured according to Annex A.

SE proposes:

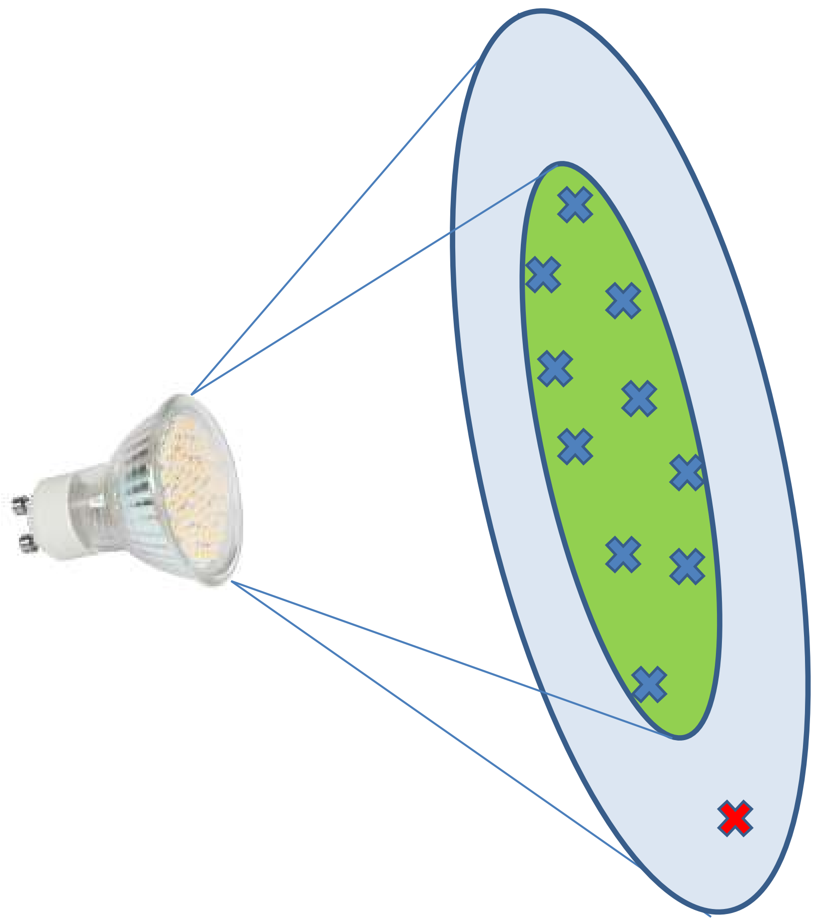
- Change the word “Colour consistency” to “Colour variation” in order to be compatible with the wording in EN 62612 10.1.
- Clarify that “Colour variation” is a time dependent test.
- Add a requirement for angular chromaticity variation for both non-directional and directional light sources. Refer to for example standard CIE S025 7.1.4.
- Reduce the ellipse size limit from 6 to 5 in order to be compatible with the referenced IEC 62612, p.7.4, Table 4.

Table 3: *Proposal for improved test methods for colour variations*

	Current Policy	Proposal: Average chromaticity change (Sphere measurement)		Proposal: Angular chromaticity variation or angular colour uniformity requirement is added to ecodesign (Goniometer measurement)	
		Initial (100h)	25% of life or at 6000h	Initial (100h)	25% of life or at 6000h
Non directional lamps	1194/2012 > EUOJ C22 24 > not pointing to any standard for non - directional lamps	<= 5 MacAdams EN 62612, 10.1	<= 5 MacAdams EN 62612, 10.1	<= 5 MacAdams CIE S025, 7.1.4	<= 5 MacAdams CIE S025, 7.1.4
Directional lamps	1194/2012 > EUOJ C22 24 > EN 62612, 10.1	<= 5 MacAdams EN 62612, 10.1	<= 5 MacAdams EN 62612, 10.1	<= 5 MacAdams CIE S025, 7.1.4	<= 5 MacAdams CIE S025, 7.1.4

SE proposes:

- Angular chromaticity variation is measured within the green area (intensity is 50 % of maximum value or higher), i.e. within the beam angle.



Blue ellipse: any light from directional source

Green ellipse: intensity is 50% of max or higher.

Blue markers: chromaticity measurement directions with goniometer (SE: 30-50 measurements). Used for MacAdam ellips calculation

Red marker: chromaticity difficult to measure with goniometer due to low intensity

Change the definition of the flux from directional sources

Current definition of useful flux:

1.1

Φ use is defined as follows:

— directional lamps with a beam angle ≥ 90° other than filament lamps and carrying a warning on their packaging in accordance with point 3.1.2(j) of this Annex: rated luminous flux in a 120° cone (Φ 120°)

— other directional lamps: rated luminous flux in a 90° cone (Φ 90°).

3.1.2

(j) If the lamp's beam angle is ≥ 90° and its useful luminous flux as defined in point 1.1 of this Annex is to be measured in a 120° cone, a warning that the lamp is not suitable for accent lighting;

SE comments:

The test procedure means that it is necessary to first define a measurement cone of either if 90 or 120 degree and then to measure the flux within that cone. However, it is difficult to guarantee that the light cone is perfectly aligned with a 90 or 120 degree measurement cone. Instead, it would be much easier to avoid that first step and directly measure the flux from within a 180 degree cone using a goniometer and defining the measured flux as all light within the 180 degree cone.

SE proposes:

- The flux from directional light sources are measured within a 180 degree cone using a goniometer, or if back lighting is also emitted, in a 360 degree cone (or closest possible) using a goniometer.
- The beam angle is calculated from 50 % of max intensity angles.

Simplify the test procedure for *corresponding power* for directional lights (1194/2012, Annex III, 3.1.2.m)

Considering that the general view is to use lumen instead of electrical power for describing the performance of a product, the parameter “corresponding power” takes unreasonable efforts to quantify.

The current quite complicated test procedure of the *corresponding power* is as follows

1. Measurement in 90 degree cone (instead of general 180 degree cone)
2. Calculation of beam angle from test result (where is intensity 50% of maximum?)
3. Selection of beam-angle multiplication factor from Table 8.
4. Measure LLMF (lumen maintenance factor at the end of the nominal life) for the product.
5. Selection of technology and lumen maintenance multiplication factor from Table 7 using LLMF for LED
6. Selection of appropriate table for corresponding power according to lamp socket
7. Interpolation of corresponding power to nearest 1W.

SE proposes:

- Measure the flux in a180 degree cone – see the previous section for the rationale of replacing 90 or 20 degrees with 180 degrees.
- Replace Table 6 with a table covering powers from 20W, 21W, … 150W and corresponding lumens for all product types.
- This will reduce the efforts to one standardised measurement and one look-up in a table without any calculations.

Use of decimals when calculating the energy consumption of lamps

SE proposes:

- Introduce a breakpoint, e. g. at 5 kWh/1000 h:
    - Below the breakpoint: use two decimals
    - Above the breakpoint: use one decimal

Aging time should be 100 h for all technologies

SE proposes:

- Use the same aging time for all lighting technologies.

Clarify if aging included in premature failure time or not

According to CEI IEC 60969, Annex A, A.3 Electrical and photometrical characteristics, A.3.2 Ageing:

"Lamps shall have been aged for a period of 100 h of normal operation."

Is premature failure including the aging time or not?

I.e. in 244/2009, Annex II, Table 4, is the lamp to be aged 100 h + 400 h or only 400 h before evaluating if <= 2% of the population has failed or not?

SE proposes:

- *Include* aging time in the premature failure time