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Everything you need to know about SLR and ELR

GET READY FOR CLIMATE-FRIENDLY LIGHT WITH LEDVANCE

THE NEW EU ECODESIGN AND ENERGY LABEL REGULATIONS 2021

OSRAM

THE NEXT STEP: CLIMATE-FRIENDLY LIGHTING

High targets have been set. In December 2019, EU member states agreed to reduce energy consumption by 55 percent by 2030 compared to 1990. The aim is for the EU to be climate-neutral by 2050.

This represents a challenge for the lighting industry. Light should – and can – make a significant contribution to achieving these targets.

The latest groundwork has now been laid. In 2019, the EU published two new regulations that redefine the ecodesign of light sources and the labeling of energy efficiency.

SLR **SINGLE LIGHTING REGULATION**
2019/2020

ELR **ENERGY LABELING REGULATION**
2019/2015

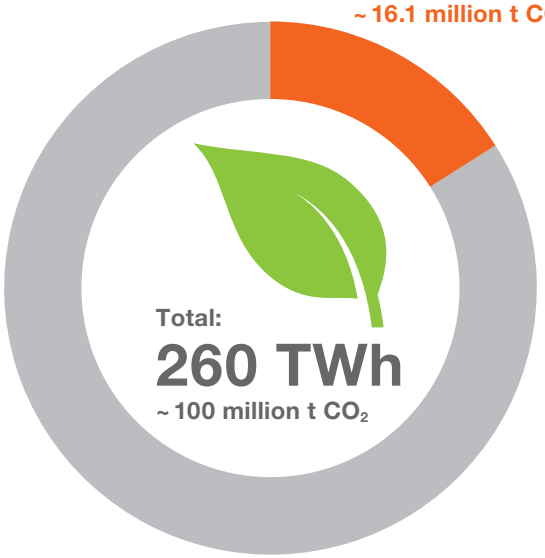
Another innovation is the **European Product Registry for Energy Labeling (EPREL)**. For the first time, all the relevant information for all the light sources on the market will be centralized here and made available to all users of this database.

AMBITIOUS CLIMATE TARGETS

The EU plans to save a total of 260 TWh of energy in 2030. Lighting would account for around 16 % of that. Energy consumption for lighting is to be reduced by 41.9 TWh. This target can only be achieved if the energy efficiency requirements for light sources are further increased.

ENERGY-SAVING TARGET FOR 2030:

Contribution from lighting:
41.9 TWh
~ 16.1 million t CO_2



THE KEY DATES AT A GLANCE

Since taking the decision in 2009 to ban incandescent lamps, the EU has been phasing out less energy-efficient light sources in several stages. The most recent to be affected included halogen lamps in classic designs in 2018.

The new regulations also provide for phasing out further conventional lamps. But these regulations are much more than yet another stage in this process.They represent a major step toward **greater clarity, greater standardization and greater transparency**.

New regulations come into force
Luminaires are no longer required to carry energy labels

EPREL product database
Product data and information must be entered in the new product database (see page 14)

The new labels can now be generated from the database

The new regulations and Phase-out I will apply from this date
Phase-out of many products, e.g. compact fluorescent lamps with integrated control gear

Start of the transition phase for the new label (see page 11)

Final date for labeling
From now on, all light sources must carry the new label.

Phase-out II
Phase-out of various linear T8 fluorescent lamps and halogen products

GREATER ENERGY EFFICIENCY, STEP BY STEP

SLR:

SINGLE LIGHTING REGULATION

Old	New
Regulation 244/2009	**Regulation 2019/2020 Single Lighting Regulation (SLR)**
Regulation 245/2009	
Regulation 1149/2012 (and amendments)	

ELR:

ENERGY LABELING REGULATION

Old	New
Regulation 874/2012 (and amendment)	**Regulation 2019/2015 Energy Labeling Regulation (ELR)**
Regulation 2017/1369	

NEW AND BASED ON BOTH NEW REGULATIONS:

European Product Registry for Energy Labeling (EPREL)

YOU AND LEDVANCE: LET'S GO FORWARD TOGETHER!

As a member of ZVEI and LightingEurope, LEDVANCE has accompanied the discussions on the new regulations. And as with implementation of past regulations, we will actively support you so always comply with the regulations. Our support is based on four pillars:

- **Early provision of energy-efficient LED replacements for all affected products.**
- **Continued optimal supply of traditional light sources** within the law
- Continual development of our portfolio for even greater energy efficiency and climate-friendly design
- **Clear and comprehensive information that makes it easier for you to be technically and legally compliant**

AREA OF APPLICATION: LIGHT SOURCES INSTEAD OF LAMPS AND LUMINAIRES

A crucial element of the new regulations is that the areas of application have been redefined. The regulations now refer exclusively to light sources and separate control gears instead of to lamps, LED modules and luminaires.

In addition to lamps and LED modules, light sources now include luminaires in which the light sources are nonreplaceable. Conventional luminaires with replaceable or removable light sources and control gears, on the other hand, are considered as “containing products”. Such luminaires do not have to carry an energy label.

WHY THIS NEW CATEGORIZATION?

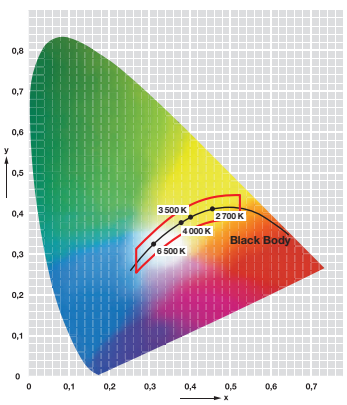
The distinction between light sources, containing products and control gears is based essentially on the following two aspects:

1. For some time now, many manufacturers have been increasingly supplying the market with fully integrated luminaires. In such cases, differentiating between lamp and luminaire no longer makes any sense from the viewpoint of existing regulation.

2. The EU is placing more and more emphasis on conservation of resources and the circular economy – and therefore on the ability to replace and remove light sources and control gears from the containing products.

WHAT IS A LIGHT SOURCE?

The EU has the precise answer: A light source as defined in the new regulations is an electrically operated product intended to emit light in the daylight to warm white spectrum. This may be a lamp, a module or a luminaire with fully integrated components. In terms of photometrics, light sources have a lumen output of < 500 lm/mm², a luminous flux of 60 to 82,000 lumens, a color rendering index CRI > 0 and defined chromaticity coordinates (see graphic).



Color triangle: defined white range of the color spectrum of light sources in accordance with the EU regulations

WHAT IS A “CONTAINING PRODUCT”?

A “containing products” is a product containing one or more light sources, or separate control gears, or both. It must be possible for the light source to be removed without permanent damage using commonly available tools. LEDVANCE luminaires are generally “containing products”.

If removal of a light source is not possible without permanent damage, the product is to be considered as a light source – and subject to the SLR/ELR regulations (see page 8 for exceptions).

Containing products have not had to carry an energy label since December 25, 2019.

WHAT DO SLR AND ELR MEAN FOR THESE NEW CATEGORIES?

SLR

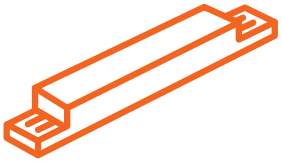
Light sources: phase-out of some conventional and LED light sources with regard to general energy efficiency and light quality (e.g. flicker or stroboscopic effect)

Containing products: new requirements for the removability of light sources and control gear.

ELR

Light sources: consideration of all products according to the same criteria – and registration of all products in the EPREL product database

Containing products: no energy label for conventional luminaires. Fully integrated luminaires are defined as light sources.



WHAT IS A CONTROL GEAR?

In the EU regulations, separate control gears are ballasts (CCG/ECG) that are not integrated into a light source. They too must meet certain minimum energy efficiency requirements (see page 9).

EVERY RULE HAS ITS EXCEPTIONS

The following are exempt from the SLR/ELR regulations:

- LED chips, dies and packages
- Emergency lighting
- Battery-powered light sources
- Original works of art
- Lighting for vehicles, transportation and military equipment
- Screens
- Medical equipment
- Marine equipment
- A few specialty or niche products
- Luminaires with replaceable light sources (see “containing products”)

SLR – ENERGY EFFICIENCY REDEFINED: THE NEW ECODESIGN REGULATION

The new EU Ecodesign Regulation 2019/2020 (Single Lighting Regulation SLR) defines the requirements for the eco-friendly design (the “ecodesign”) of light sources and separate control gears. These requirements are now based on calculations using harmonized standards.

An essential aspect of the new regulation is the distinction between light sources, containing products and separate control gears (see pages 4/5). With regard in particular to containing products, the EU is encouraging product designs that contribute to the circular economy and to conservation of resources.

LIGHT SOURCES: CATEGORIZATION AND REQUIREMENTS FOR ENERGY EFFICIENCY

CATEGORIES AT A GLANCE

The criteria for light sources as defined in the Regulation (page 7) exclude a large number of signaling and control luminaires as well as very powerful lighting products (e.g. for outdoor, sports, theater or industrial lighting).

The remaining light sources are categorized according to whether they are a mains light source or non-mains light source – and whether they emit directional or non-directional light. These aspects are also taken into account for calculating the energy efficiency coefficients and for classifying the light sources (see “Total mains factor” on page 10).

EXAMPLES OF THE DIFFERENT LIGHT SOURCES

	MAINS	NON-MAINS
DIRECTIONAL	 Mains voltage reflector lamps with a GU10, E27 or E14 base, etc.	 Low-voltage reflector lamps with a GU5.3 or GU4 base, etc.
NON-DIRECTIONAL	 Lamps in classic shapes with an E14 or E27 base, etc.	 (Compact) fluorescent lamps, high-pressure discharge lamps, etc.

Light sources as defined in SLR include LED/OLED lamps and modules as well as all traditional lamps.

ENERGY EFFICIENCY REQUIREMENTS

The admissibility of the light source is determined by the ratio of the **declared power P_{on}** to the **maximum allowed power P_{onmax}**.

Requirement:

$$P_{on} \leq P_{onmax}$$

P_{on}: Declared power
P_{onmax}: Maximum allowed power
$P_{onmax} = C \cdot (L + \Phi_{use}/(F \cdot \eta)) \cdot R$

Here is an overview of all the variables:

- P_{on} = Power (W) of the light source (Manufacturer's data)
- P_{onmax} = Maximum allowed power of the light source (calculated value)
- C = Correction factor (as per regulation)
- L = End loss factor (as per regulation)
- φ_{use} = Useful luminous flux (lm) of the light source (manufacturer's data)
- F = Efficacy factor: 1.00 for non-directional light sources, 0.85 for directional light sources (as per regulation)
- η = Threshold efficacy (lm/W; as per regulation)
- R = CRI factor: for CRI ≤ 25: R = 0.65,
- for CRI > 25: R = (CRI + 80)/160 (as per regulation)

FUNCTIONAL REQUIREMENTS

In addition to energy efficiency, the EU also imposes a number of functional requirements on the quality of light. These include color rendering, color consistency, luminous flux content for LED/OLED, power factor, lifetime and the behavior of mains light sources with regard to flicker and stroboscopic effect.

If a light source does not meet these requirements it will be phased out from September 1, 2021. However, certain criteria will not come into force until **September 1, 2023**. Phase-out of some light sources will therefore not begin until this date. (More on pages 15 ff)

EXAMPLES OF PERMITTED AND PHASED-OUT LIGHT SOURCES

Light source	Product name	P_{on}	P_{onmax}	Relation	
LED lamp	LED CLA 100 10 W/2 700 K E27	10 W	14.2 W	$P_{on} \leq P_{onmax}$	**Permitted**
Halogen lamp	DECOSTAR 51 35 W 12 V	35 W	8.9 W	$P_{on} \geq P_{onmax}$	**Phase-out Sept 1, 2021**
T8 fluorescents	L 36 W/840	36 W	41.9 W	$P_{on} \leq P_{onmax}$	**Allowed from Sept 1, 2021 to Aug 31, 2023**
T8 fluorescents	L 36 W/840	36 W	29.4 W	$P_{on} \geq P_{onmax}$	**Phase-out Sept 1, 2023**

BONUS FOR SPECIAL PROPERTIES

There is a bonus for certain light sources in this calculation (in other words, the efficacy factor F is corrected upwards). The properties benefitting from this bonus include high luminance, color rendering CRI > 90 (for fluorescent lamps), special glare protection and the ability to tune the light color.

FLICKER AND STROBOSCOPIC EFFECTS

To improve the quality of light produced by LED mains light sources the SLR introduces the following quality aspects:

SVM (Stroboscopic Visibility Measure)
These effects can occur when non-compliant light sources illuminate a moving object. Stroboscopic effects can result in dangerous situations as they may impair the perceptibility of rotating or moving objects (for example, rotating machine parts may be perceived as being stationary)

P_{st}LM (Perception of Short-Term Light Modulation)
This refers to visible flicker, for example on screens. The flicker can cause discomfort, visual fatigue and headaches.

- **From 09/2021: SVM ≤ 0.9[1]/P_{st}LM ≤ 1;**
- **From 09/2024: SVM ≤ 0.4[1]**

[1]Except: Light sources for outdoor, industrial and other applications that allow color rendering with CRI ≤ 80.

CONTAINING PRODUCTS: REMOVING AND REPLACING LIGHT SOURCES AND CONTROL GEARS

Manufacturers, importers and their authorized representatives are now required to ensure that light sources and separate control gears can be removed and replaced **using commonly available tools** and **without permanent damage to the light source**.

If this is not possible, the product (e.g. a fully integrated luminaire) is regarded as a light source.

THIS RESULTS IN THREE PRODUCT DESIGN CATEGORIES:

Light sources and control gears can be removed and replaced.

These products comply with the concept of the circular economy.

Containing product

Light sources and control gears can be removed for verification[1] but not replaced.

Containing product

Light sources and control gears cannot be removed or replaced.

Light source

OBLIGATION TO INFORM END USERS AND QUALIFIED PERSONS

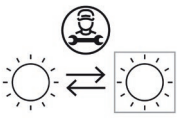
Manufacturers, importers and their authorized representatives must provide end users and qualified persons with clear information about the replaceability or non-replaceability of light sources and control gears. LEDVANCE provides this information on a variety of media:

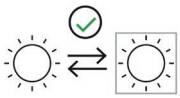
- On a free-access website
- In the operating instructions
- On the packaging in the form of pictograms

Further information can be found on page 13.

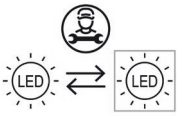
[1] By market surveillance authorities

REPLACEABILITY PICTOGRAMS

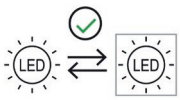

Light source replaceable by qualified person


Light source replaceable by end user

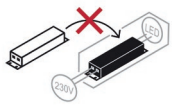
Non-replaceable light source

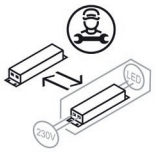


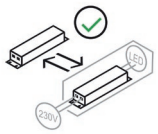
LED light source replaceable by qualified person



LED light source replaceable by end user


Non-replaceable control gear


Control gear replaceable by qualified person


Control gear replaceable by end user

CONTROL GEARS: ENERGY EFFICIENCY AT FULL LOAD AND IN STANDBY MODE

From September 1, 2021 new minimum requirements will also apply to separate control gears with regard to their energy efficiency and their power consumption in standby mode.

DECLARED POWER	MINIMUM ENERGY EFFICIENCY (AT FULL LOAD)
Control gear for HL light sources:	
All wattages	0.91
Control gear for FL light sources:	
$P_{ls} \leq 5$	0.71
$5 < P_{ls} \leq 100$	$P_{ls}/(2*\sqrt{(P_{ls}/36)+38/36*P_{ls}+1})$
$100 < P_{ls}$	0.91
Control gear for HID light sources:	
$P_{ls} \leq 30$	0.78
$30 < P_{ls} \leq 75$	0.85
$75 < P_{ls} \leq 105$	0.87
$105 < P_{ls} \leq 405$	0.90
$405 < P_{ls}$	0.92
Control gear for LED or OLED light sources	
All wattages	$P_{cg}0{,}81/(1.09*P_{cg}0{,}81+2.10)$

STANDBY MODE: MAX. 0.5 W

Power consumption in no-load mode, standby mode and networked standby mode are also included in the regulation. In all three cases, it must not exceed 0.5 W.

OBLIGATION TO INFORM END USERS AND QUALIFIED PERSONS

LEDVANCE provides information to end users and qualified persons about energy efficiency and other product characteristics on free-access websites, in technical documentation and on the packaging of separate control gears in accordance with the EU regulation. Further information on the obligation to inform can be found on page 13.

MEETING REQUIREMENTS – AND EXCEEDING THEM

A very large proportion of LEDVANCE products already meet the requirements of the new ecodesign regulation. And from September 1, 2021 or September 1, 2023 we will of course ensure that we supply you exclusively with products that conform to the regulation. We are also committed to not only meeting the requirements but exceeding them, even under the new framework conditions.

ELR – CLEAR AND TRANSPARENT: THE NEW ENERGY LABEL REGULATION

According to the new Energy Label Regulation (ELR), each light source is required to be listed in the EPREL database from September 1, 2021. That's where it will be classified following ecological and sustainable criteria, among others. Depending on their energy efficiency class, new products will then be given a label in line with current guidelines. Existing products will receive a new, updated label. LEDVANCE guarantees registration of its products in EPREL. All the existing LEDVANCE products have already been entered.

$$\text{Total } \textbf{mains efficacy} = \frac{\text{(Useful) } \textbf{luminous flux}}{\text{declared on mode } \textbf{power consumption}} \times \textbf{Total mains factor}$$

(see table 2 below)

IMPORTANT:

The products are not downgraded by the new classification, but are reclassified on a different calculation basis. The new classification from A to G was chosen to ensure sufficient headroom for future developments.

WHAT'S WHAT HERE?

Physical variable	Symbol	Unit
Total mains efficacy	η_{TM}	Lumens/watt (lm/W)
Useful) luminous flux	φ_{use}	Lumens (lm)
Declared on-mode power consumption	P_{on}	Watts (W)
Total mains factor	F_{TM}	(No unit)

TOTAL MAINS FACTOR/EFFICACY FACTOR

This factor takes into account both the beam characteristic (directional or non-directional) and the distinction between mains light sources and non-mains light sources (see p. 8).

Light source type	Factor F_{TM}
Non-directional (NDLS), operating on mains (MLS)	1.000
Non-directional (NDLS), not operating on mains (NMLS)	0.926
Directional (DLS), operating on mains (MLS)	1.176
Directional (DLS), not operating on mains (NMLS)	1.089

RESCALING OF THE ENERGY EFFICIENCY CLASSES WITH REGARD TO TOTAL MAINS EFFICACY

Total mains efficacy η_{TM} (lm/W)	Energy efficiency class
$210 \leq \eta_{TM}$	A
$185 \leq \eta_{TM} < 210$	B
$160 \leq \eta_{TM} < 185$	C
$135 \leq \eta_{TM} < 160$	D
$110 \leq \eta_{TM} < 135$	E
$85 \leq \eta_{TM} < 110$	F
$\eta_{TM} < 85$	G

EXAMPLES OF RECLASSIFIED LIGHT SOURCES

Conventional R7s halogen lamp
η_{TM} = 26.0 lm/W

LED PARATHOM DIM PAR16 50 2700 K GU10
η_{TM} = 74.84 lm/W

LED PARATHOM CLASSIC A 60 2700 K E27 FIL
η_{TM} = 115.14 lm/W

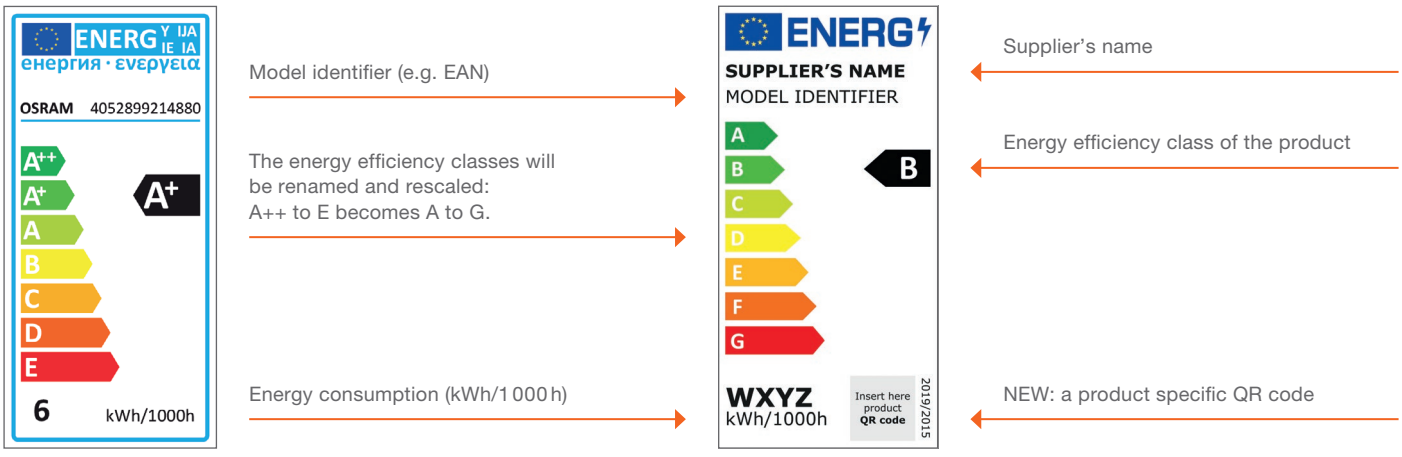
LED SUBSTITUBE® T8 PRO ULTRA OUTPUT EM 21.1 W/4000 K 1500 mm
η_{TM} = 175.36 lm lm/W

THE NEW ENERGY LABELS

Since 1994, energy labels in the EU have been used as quick and simple guidelines for consumers. The labels are now entering round three. Apart from a slightly modified design, the new labels for light sources differ essentially in two respects:

- The new energy efficiency scale from A to G.
- A QR code with a link to the product data stored in the EPREL database.

The new scale was created because the previous classification had reached its limits (A, A+, A++) and was no longer clear. At the same time, the EU wants to give manufacturers more headroom for developing future products (current light sources with A++ now reach E or D at best). The QR code with a link to the product data in EPREL also gives consumers the option of obtaining transparent information at the PoS.



PLACEMENT ON THE PACKAGING

The front of the packaging shows the shortened form of the label including the product's energy efficiency class. The complete label is shown on one of the packaging sides.

Shortened version of the new EU label for the front packaging

TIMELINE: NEW ENERGY LABEL

DEC 25 2019

The new regulations come into force

Old EU label for lamps and luminaires

MAY 1 2021

EPREL product database
The new labels can be generated from the EPREL database.

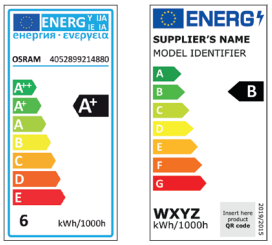
But: products with a new label must not yet be placed in stores.

Old EU label

SEPT 1 2021

The new regulations will apply from this date
Products already placed on the market can be relabeled.

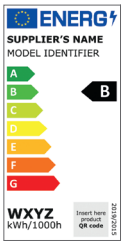
New products placed on the market will carry the new label.



Transition phase:
old EU label for products already on the market and new EU label for light sources

MAR 1 2023

Final date for labeling
All products must carry the new label; old products must be relabeled.



New EU label for light sources

SPECIAL CASE: LUMINAIRES

Luminaires from which light sources can be removed using commonly available tools without permanent damage (**"containing products"**), have no longer needed **a label since December 25, 2019**.

These luminaires will also **not need to be registered** in EPREL.

Fully integrated luminaires are classed as light sources from September 1, 2021. Here the new regulations apply analogously to the lamps and LED modules.

RELABELING: WHAT YOU NEED TO KEEP IN MIND

During the transition phase from September 1, 2021 to March 1, 2023 retailers can relabel product packaging that carries the old label. Please note the following:

- The label is available in two formats: standard = 72 × 36 mm; small = 54 × 20 mm.
- The new labels must completely cover the old ones.
- Single-colored labels may be used if the entire packaging is printed in one color.

NEW LABEL FORMAT

The new labels are a bit smaller than the old labels. So the new labels must include additional white space to completely cover the old labels as required.

OBLIGATION TO INFORM FOR MANUFACTURERS AND RETAILERS

THE MANUFACTURER'S OBLIGATION TO INFORM

This obligation to inform includes, among other things, showing energy labels on the packaging, entering product information into the EPREL database (see page 15), showing the new labels on visual displays and mentioning the energy efficiency class in technical advertising materials.

LEDVANCE reliably fulfills all obligations in good time – so you are always within the law with regard to labels, product information, packaging and advertising materials. LEDVANCE provides its trading partners with electronic labels and product data sheets for each model.

You can find more details on the obligation to inform for containing products and control gears on pages 8/9.

WHAT RETAILERS NEED TO KEEP IN MIND

- The energy label must be visible on the packaging of light sources.
- When it comes to distance or internet selling, the label and the product data sheet must be provided.
- Visual advertising must show the product's energy efficiency class and the scale for the energy efficiency classes.
- Technical promotional material must contain the energy efficiency class.
- Existing labels on the packaging of light sources must be relabeled from March 1, 2023 (see timeline on page 12).

New label format
The new labels are a bit smaller than the old labels. So the new labels must include additional white space to completely cover the old labels as required.

OTHER INFORMATION REQUIRED ON THE PRODUCT AND PACKAGING

Product
Useful luminous flux, CCT, safety information, beam angle (DLS only)

Packaging
On the side facing the consumer on the shelf:
Useful luminous flux, CCT, beam angle (mandatory for DLS), power supply information (e.g. "E27")

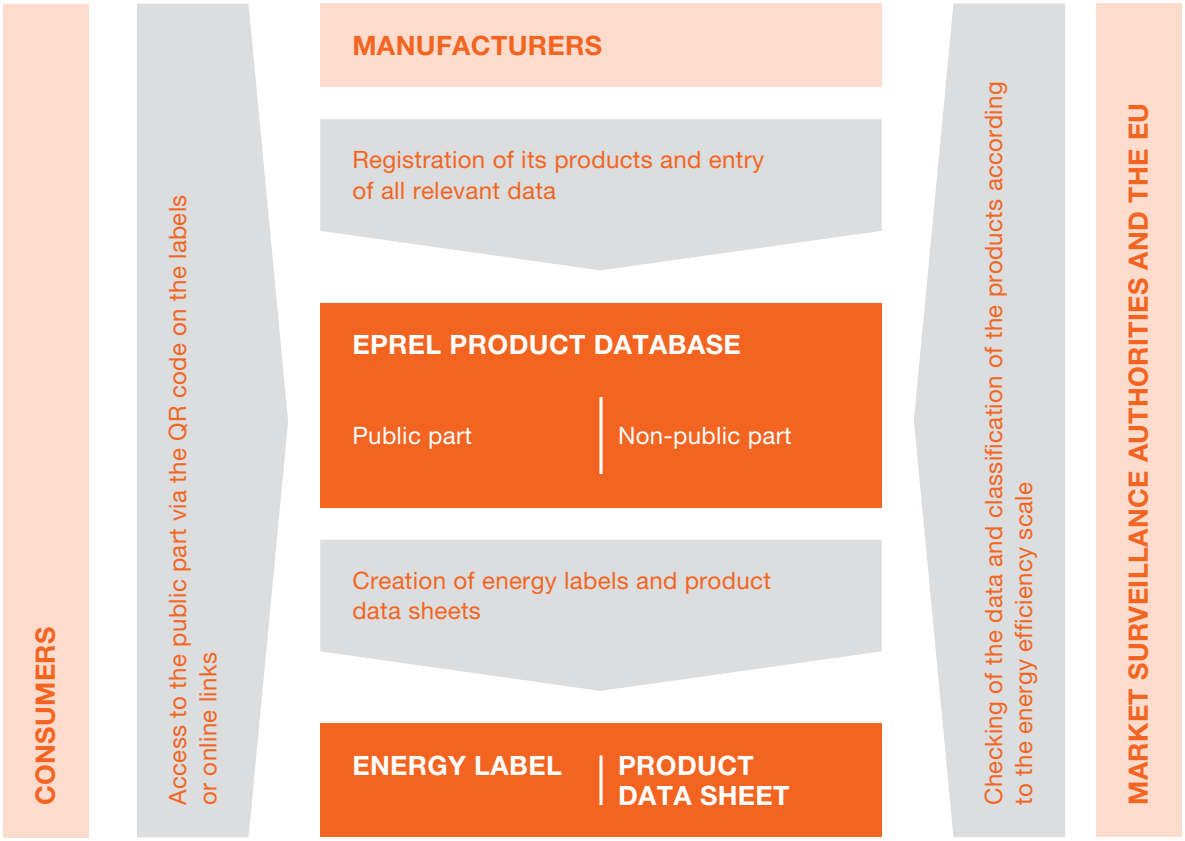
Additional information:
L70B50, Power consumption (on and standby mode), CRI, for dimmable lamps: details if compatible with special dimmers only

Please also note: the product is not suitable for any other purpose than that shown on the packaging

ALL THE INFORMATION IN ONE PLACE: THE EPREL PRODUCT DATABASE

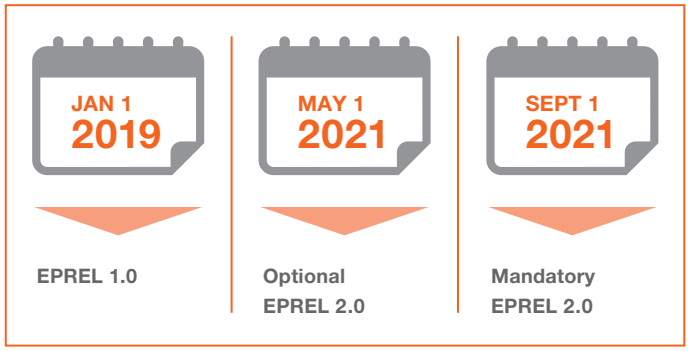
At the heart of the new EU energy efficiency regulations is the EPREL (European Product Registry for Energy Labeling) product database. That's where manufacturers have had to register their light sources since January 1, 2021. This applies to lamps and fully integrated luminaires which have been placed on the market after August 1, 2017. Light sources inside containing products must be registered in EPREL no later than March 1, 2023 – however, this does not apply to the containing product itself (see page 8). LEDVANCE registered all relevant products early on.

Both the energy labels and the product data sheets are generated directly from EPREL. The option of accessing the public part of the database provides maximum transparency for consumers. They can do so through the QR code on the energy efficiency labels, for example.



STEP-BY-STEP DEVELOPMENT

From January 1, 2019 participants have used version EPREL 1.0. As of May 1, 2021, the products can also be registered in EPREL 2.0. The registration of light sources in EPREL 2.0 will become mandatory from September 1, 2021.



ALWAYS LOOKING AHEAD: LEDVANCE BY YOUR SIDE

The new EU regulations are not aimed simply at removing certain lighting products from the market. They specifically promote energy-efficient and sustainable lighting design, strengthening of the circular economy and transparent information for consumers.

LEDVANCE expressly welcomes this path. That's why we are actively supporting our partners with the development of new, even more energy-efficient light sources, with measures and information that will guide you through the various phases of the regulations coming into force – and of course with high-quality LED replacement for the phased-out products made available early on.

Alternatives will be ready early on.

PHASE-OUT AND LEDVANCE REPLACEMENT PRODUCTS

PRODUCTS AFFECTED		BANNED[1]	LED REPLACEMENT PRODUCTS
COMPACT FLUORESCENT LAMPS CFLi – E27, E14 etc. with integrated control gear		SEPT 1, 2021	
HIGH-VOLTAGE HALOGEN LAMPS[2] R7s > 2 700 lm corresponds to approx. 140 W		SEPT 1, 2021	
LOW-VOLTAGE HALOGEN LAMPS GU4, GU5.3, G53 with reflector >10° beam angle		SEPT 1, 2021	
LINEAR FLUORESCENT LAMPS T12 and T2		SEPT 1, 2021	
LINEAR FLUORESCENT LAMPS T8 600 mm, 1 200 mm, 1 500 mm		SEPT 1, 2023	
HALOGEN PINS G4, GY6.35, G9		SEPT 1, 2023	

[1] Products that are already on the market may still be sold after this date, but may not be placed on the market again.
[2] Suitable for the light point, differing lighting performance. Limitations: maximum luminous flux, general thermal requirements, dimensions of the replacement lamp.

You can find all product lists/overviews including replacement products at: **ledvance.com/services**

Further information on SLR and ELR:

ec.europa.eu
www.licht.de
www.zvei.de
www.lightingeurope.org
www.netzwerke.bam.de

ABOUT LEDVANCE

With offices in more than 50 countries and business activities in more than 140 countries, LEDVANCE is one of the world's leading general lighting providers for professional users and end consumers. Having emerged from OSRAM's general lighting business, LEDVANCE offers a wide-ranging portfolio of LED luminaires for a broad spectrum of applications. The company also offers lighting products for Smart Home and Smart Building solutions, one of the most comprehensive ranges of advanced LED lamps, traditional light sources, an LED Strip System and light management systems.

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