

New EU Appliance Regulations Add Complexity, Reform Product Labeling

by Kevin Parmenter, Chair, and James Spangler, Co-chair, PSMA Safety and Compliance Committee

Globally there are a plethora of energy efficiency regulations for almost anything that consumes energy. These regulations cover both operating mode efficiency as well as standby power consumption. Some of these energy efficiency regulations are mandatory and some such as Energy Star in the U.S. are voluntary and more marketing than regulatory in nature. And while there are challenges in meeting regulatory requirements in many regions, the European regulations are possibly the strictest in the world.

In Europe there are newer, updated regulations for energy efficiency targeting consumer white goods which we could see adopted as best practices globally. The new regulations also include changes in the labeling for appliances. In many cases, the product ratings used on labels have been simplified. The main purpose of these labeling changes is to allow consumers to make better purchasing decisions. Ultimately, the goal of these changes in energy efficiency and labeling requirements is to achieve energy efficiency objectives for the region.

Specifically, there is a mandate from the European Commission (EC) for the EU to achieve an improvement of 32.5% over 2018 energy consumption by the year 2030. The regulations are to reduce energy used in refrigerator products, dishwashers, washing machines and dryers, TVs and monitors, and lighting products.

These new European standards impose energy efficiency regulations on a product's standby, idle, and off modes of operation. Also there are new levels of energy consumption in the use mode. This is a complex calculation given in the details of each regulation.

Many of the appliances have motors, which have raised concerns not only about their energy consumption but also regarding the noise they produce. As a result, the new EU regulations also contain emissions levels for audible noise. These noise limits may require the use of brushless dc motors (also known as electronically commutated motors or ECMs) to reduce the noise and increase energy efficiency in the operating mode.

These changes in EU appliance regulations are the subject of an upcoming webinar by Power Integrations (PI) on "EU Ecodesign and Energy Labeling Directives," which will be presented by PI's David Chen on Tuesday, May 19, 2020 at 9:00 AM U.S. Pacific time (1600 UTC). This article highlights some of the key regulatory changes to be discussed in this webinar. To learn more, you can register for the webinar at PI's events [page](#).

We would like to thank Power Integrations for sharing information from their webinar with How2Power Today in advance of the broadcast and for David Chen's input for this article. In addition, we'd also like to thank PI for the resources they have provided in the form of a free database and for their support of the PSMA Energy Efficiency database.

Label Reform

Under the emerging regulatory changes, the label on each of the appliance products changes and there are new requirements for each product. For example, the labeling required in the old (EC) no 642/2009 and (EU) 1062/2010, which apply to TVs and monitors, changes in the new regulation. While the existing product ratings assign A, A+, A++, and A+++, the new rating system goes from A through G (more on this in the section on Displays).

Refrigeration Appliances

In this product category, the current regulation is (EU) 1060/2010, which offers product ratings from A+++ (most efficient) to G (least efficient). These ratings take into account energy consumption, storage volume, and a freezer compartment. In contrast, the newer standard (EU) 2019/2016 has a label with ratings ranging from A (most efficient) to G (least efficient). There is also a new sound emissions requirement which governs noise produced by the compressor for cooling.



This article presents highlights of Power Integrations' upcoming webinar "[EU Ecodesign and Energy Labeling Directives](#)".

The most effective means of energy savings is to keep ice from forming around the cooling coils. The removal of this ice is called a defrost cycle. This is described in the new standard.

Dishwashers

The older regulation (EU) 1059/2010 has been replaced by (EU) 2019/2017. This new regulation takes into account standby energy, idle energy, and operating energy. The label for the product has changed with added icons to help the consumer to make an informed decision about energy use and acoustic noise emissions.

This regulation has a similar rating scale as the refrigerators, ranging from A to G. In addition there's a figure of merit for the product's efficiency. The Energy Efficiency Index (EEI) is a ratio of two numbers, the ECO Program Energy Consumption (EPEC, measured in kWh/cycle) divided by the Standard Program Energy Consumption (SPEC, also measured in kWh/cycle):

$$EEI = \left(\frac{EPEC}{SPEC} \right)$$

The new regulation goes into greater detail on the measurement and the ratings.

Acoustic noise emission is one of the important consumer ratings. This requires the use of sound insulation and the use of an ECM.

Washing Machines

The current regulation (EU) 1061/2010 has been replaced with (EU) 2019/2014. Like the above appliances, the rating system goes from A (most efficient) to G (least efficient). The new rating is defined by the following equation:

$$EEI_W = (E_W / SCE_W) \times 100$$

where E_W is the weighted energy consumption (kWh/cycle) and SCE_W is the standard cycle energy consumption (kWh/cycle), and these terms are defined as:

$$E_W = A \times E_{W,full} + B \times E_{W,1/2} + C \times E_{W,1/4}$$

$$SCE_W = -0.0025 \times c^2 + 0.0846 \times c + 0.3920$$

where c is the rated capacity.

The new standard defines water consumption along with how well the water is removed from the clothes in the last spin cycle. This is important, as it affects the energy used for drying clothes.

Displays

The European Union will lump TV sets and monitors together in the new regulation.

The current regulation (EU) 1062/2010 for televisions sets forth the following conditions:

- Labels scale from A+++ (most efficient) to D (least efficient).
- Screen size is shown, but not resolution or high dynamic range (HDR).
- Annual energy use shown on the label assumes the television is turned on for four hours/day, every day of the year.
- It does not apply to computer monitors or to signage displays.

The new regulation (EU) 2019/2013 for electronic displays (TVs and monitors) imposes the following changes:

- This regulation becomes effective on March 1, 2021, repealing the current regulation.

- Labels are re-scaled from A (most efficient) to G (least efficient), with a lowering of the maximum power consumption limits (i.e. the new limits are more stringent).
- New and old classes are not comparable, as the new scaling system is improved and better takes into account the screen area.
- New labels will also show the efficiency of the product in HDR as well as information on the diagonal size of the display and the resolution.

Under the new regulation for electronic displays, there is a new energy efficiency calculation:

$$EEI_{label} = \frac{(P_{measured} + 1)}{(3 \times [90 \times \tanh(0,025 + 0,0035 \times (A - 11) + 4)] + 3) + corr_1}$$

where A represents the viewing surface area in dm^2 , $P_{measured}$ is the measured power in the on-mode in watts in the normal configuration and $corr_1$ is a correction factor set as indicated in Table 3 (in the regulation).

The new label has the following format:

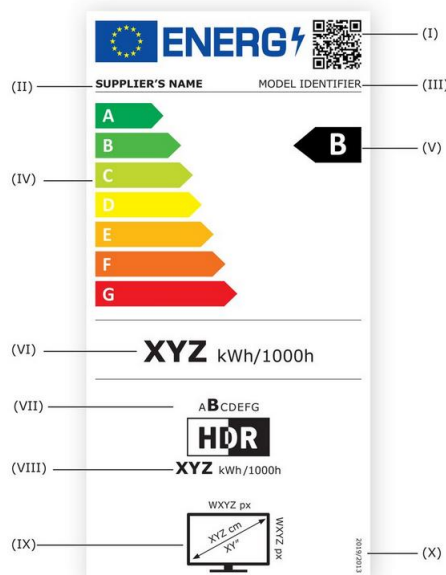


Figure. New label format for (EU) 2019/2013 for electronic displays.

Lighting Products

Lighting is a major user of energy. In many cases, LEDs have replaced incandescent, fluorescent and halogen lamps. The LED luminaire is a complete electric light fixture that distributes, filters and transforms light from one or more light sources to an open room or wall.

Many of these newer fixtures do not have replacement parts like the lamp or standard Edison A lamp. The fixture is complete with no replacement parts internal.

The current regulation (EU) 874/2012 for lighting products imposes the following conditions:

- Ratings range from A++ (most efficient) to E (least efficient).
- Luminaires have labels showing what lamps are suitable for use.

Under the new regulation (EU) 2019/2015 for light sources, the following changes take effect:

- As of 25 December 2019, labeling of luminaires is no longer required.
- This regulation goes into effect 1 September 2021, repealing the current regulation.
- Labels are re-scaled from A (most efficient) to G (least efficient).
- Labels will show energy consumption in kilowatt-hours (kWh) per 1000 hrs and include a QR-code link to more information in an online database.

Summary

The following is a list of the EU regulations for appliances.

- (EU) 2019/2013 Electronic displays including TV and monitors
- (EU) 2019/2014 Washing Machines
- (EU) 2019/2015 Lighting
- (EU) 2019/2016 Refrigerators
- (EU) 2019/2017 Dishwashers

There are many details in each of the regulations and a Google search on each one will lead you to more-detailed information. It is beyond the scope of this article to provide the complete information on these requirements. However the two best practical resources on this subject are PI's Energy Efficiency Resources page^[1] and the PSMA's Energy Efficiency database.^[2]

Many of the appliance types discussed above have standby power supplies. The new appliance regulations impose limits on the energy consumption in the standby, idle, and off modes. Therefore, it is in the best interest of engineers developing products in these markets to become aware of these regulations before the design phase to make sure the product development will meet or exceed the target requirements so that the product can be viable for sale in Europe and elsewhere. This along with EMC, safety and materials declarations requirements constitute most of what products will have to meet to be marketable.

References

Resources on energy efficiency standards:

1. <https://ac-dc.power.com/green-room/energy-efficiency-resources/>
2. <https://www.pdma.com/technical-forums/energy-management/database>

About the Authors



Kevin Parmenter is an IEEE Senior Member and has over 20 years of experience in the electronics and semiconductor industry. Kevin is currently director of Field Applications Engineering North America for Taiwan Semiconductor. Previously he was vice president of applications engineering in the U.S.A. for Excelsys, an Advanced Energy company; director of Advanced Technical Marketing for Digital Power Products at Exar; and led global product applications engineering and new product definition for Freescale Semiconductors AMPD - Analog, Mixed Signal and Power Division.

Prior to that, Kevin worked for Fairchild Semiconductor in the Americas as senior director of field applications engineering and held various technical and management positions with increasing responsibility at ON Semiconductor and in the Motorola Semiconductor Products Sector. Kevin also led an applications engineering team for the start-up Primarion.

Kevin serves on the board of directors of the [PSMA](#) (Power Sources Manufacturers Association) and was the general chair of APEC 2009 ([the IEEE Applied Power Electronics Conference](#).) Kevin has also had design engineering experience in the medical electronics and military electronics fields. He holds a BSEE and BS in Business Administration, is a member of the IEEE, and holds an Amateur Extra class FCC license (call sign KG5Q) as well as an FCC Commercial Radiotelephone License.



Jim Spangler is a Life Member of the IEEE with over 40 years of electronics design experience and is president of Spangler Prototype Inc. (SPI). His power electronics engineering consulting firm's priority is helping companies to place products into production, assisting them to pass government regulations and agency standards such as UL, FCC, ANSI, IES, and the IEC.

For many years, he worked as a field applications engineer (FAE) for Motorola Semiconductor, On Semiconductor, Cirrus Logic, and Active Semiconductor, assisting customers in using semiconductors. He published numerous application notes and conference papers at a variety of conferences: APEC, ECCE, IAS, and PCIM. Topics included power factor correction, lighting, and automotive applications. As a FAE, he traveled internationally giving switch-mode power supply seminars in Australia, Hong Kong, Taiwan, Korea, Japan, Mexico, and Canada.

Jim has a master's degree from Northern Illinois University (NIU) and was a PhD candidate at Illinois Institute of Technology (IIT). He taught senior and first-level graduate student classes: Survey of Power Electronics, Fields and Waves, and Electronic Engineering at IIT and Midwest College of Engineering. Jim is a member of the IEEE: IAS, PELS, PES; the Illuminating Engineering Society (IES), and the Power Sources Manufacturers Association (PSMA) where he is co-chair of the Safety and Compliance Committee.

For further reading on power supply-related safety and compliance issues, see How2Power's special section on [Power Supply Safety and Compliance](#).