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ANNEXES 1 to 5

ANNEXES

to the

COMMISSION REGULATION

laying down ecodesign requirements for electronic displays pursuant to Directive 2009/125/EC of the European Parliament and of the Council, amending Commission Regulation (EC) No 1275/2008

and repealing Commission Regulation (EC) 642/2009

ANNEX I

Definitions applicable for the Annexes

The following definitions shall apply for the purposes of the Annexes:

(1) '*on mode*' means a condition in which the product is connected to a power source, has been enabled and is providing one or more of its display functions;

(2) '*off mode*' means a condition in which the equipment is connected to the mains power source and is not providing any function;

(3) '*standby mode*' means a condition where the electronic display is connected to a power source, depends on energy input from that source to work as intended and provides only the following functions, which may persist for an indefinite time:

– reactivation function, or reactivation function and only an indication of enabled reactivation function; and/or

– information or status display.

(4) *'normal configuration*' or '*home configuration*', '*standard mode*', or, for televisions, '*home mode*', means a display screen setting which is recommended to the end-user by the manufacturer from the initial set up menu or the factory setting that the electronic display has for the intended product use. It must deliver the optimal quality for the end user in a typical domestic or office environment. The normal configuration is the condition in which the declared values for off, standby, networked standby and on mode are measured;

(5) '*External Power Supply (EPS)'* means a device as defined in *[OP, please insert the number of the Ecodesign Regulation laying down ecodesign requirements for external power supplies, repealing Regulation (EC) No 278/2009]*;

(6) '*standardised EPS'* means an external power supply designed to provide power to various devices and that is complying to a standard issued by an international standardization organization;

(7) '*USB'* means Universal Serial Bus;

(8) '*Automatic Brightness Control' ('ABC'*) means the automatic mechanism that, when enabled, controls the brightness of an electronic display as a function of the ambient light level illuminating the front of the display;

(9) '*by default*' means a specific feature or setting that is enabled or set at the factory and available when the customer uses the product for the first time or after performing a "reset to factory settings" action, if allowed by the product. A change of a setting parameter by the user shall not automatically change any other parameter set as default without notifying the user;

(10) '*AC*' means alternate current;

(11) '*DC*' means direct current;

(12) '*luminance* ' means the photometric measure of the luminous intensity per unit area of light traveling in a given direction, expressed in units of candelas per square meter (cd/m^2). The term brightness is often used to subjectively qualify the luminance of a display;

(13) *'close viewing'* means a viewing distance comparable to that obtained when viewing an electronic display kept in the hands or when sit at the desk;

(14) '*forced menu*' means a specific menu, appearing upon initial start-up of the display or upon a reset to factory settings, offering a set of alternative display settings, pre-defined by the manufacturer;

(15) *'network'* means a communication infrastructure with a topology of links and an architecture that includes the physical components, organisational principles and communication procedures and formats (protocols);

(16) '*network interface*' (or '*network port*') means a wired or wireless physical interface through which functions of the electronic display can be remotely activated and data received. Interfaces to input video and audio signals, but not associated to a network address, are not considered to be a network interface;

(17) '*network availability*' means the capability of an electronic display to activate functions after a remotely initiated trigger has been detected by a network interface;

(18) *'networked display'* means an electronic display that can connect to a network using one of its network interfaces, if enabled;

(19) '*networked standby mode*' means a condition in which the electronic display is able to resume a function by way of a remotely initiated trigger from a network interface;

(20) '*fast start'* or '*quick start' means* an enhanced reactivation function capable of completing the transition into "on mode" in a shorter time than that of the normal reactivation function;

(21) '*reactivation function'* means a function that via a remote switch, a remote control unit, an internal sensor, a timer or, for networked displays, the network, provides a switch from any standby mode to a mode, other than off-mode, providing additional functions;

(22) *'room presence sensor'* or '*gesture detection sensor*' or '*occupancy sensor*' means a sensor monitoring and reacting to the movements in the space around the product whose signal can trigger the switching to on mode. Lack of movement detection for a predetermined time can be used to switch into standby mode or networked standby mode;

(23) '*pixel (picture element)'* means the area of the smallest element of a picture that can be distinguished from its neighbouring elements, as defined in standard IEC 60050[1];

(24) '*screen area'* means the viewable area of the electronic display calculated by multiplying the maximum viewable image width by the maximum viewable image height along the surface of the panel (both flat or curved);

(25) '*touch functionality'* means the possibility of inputting commands using, as input device, a touch-sensible device, that generally is in the form of a transparent film layered on top of an electronic display panel;

(26) '*brightest on mode configuration*' or '*shop mode*' means the configuration of the electronic display, set by the manufacturer at the factory, which provides an acceptable picture with the highest measured luminance. This includes a setting

[1] International Electrotechnical Vocabulary, http://www.electropedia.org/iev/iev.nsf/display?openform&ievref=723-05-31

mode incorporated for use specifically in the context of demonstrating the electronic display, for example in high illumination (retail) conditions and not involving an auto power-off if no user action or presence is detected;

(27) '*audio-set configuration*' means an on mode test condition for the electronic display that disables or minimizes the power demand of the internal audio system during the on mode power measurement for the purposes of calculating the Energy Efficiency Index (EEI);

(28) '*circumvention device*' or '*defeat device*' means any control device, software, component or part that alters the energy consumption on a product during any test procedure, resulting in measurements that are not representative of the products true characteristics that occur during normal use under comparable conditions;

(29) '*component'* means a constituent part of a device that cannot be physically divided into smaller parts without losing its particular function;

(30) '*dismantling'* means possibly irreversible taking apart of an assembled product into constituent materials and/or components;

(31) *'dismantling step'* means an operation that finishes with a change of tool or with the removal of a component or part;

(32) '*Printed Circuit Board' ('PCB'*) *means* an assembly that mechanically supports and electrically connects electronic or electrical components using conductive tracks, pads and other features etched from one or more sheet layers of conductive metal laminated onto or between sheet layers of a non-conductive substrate;

(33) '*PMMA'* means PolyMethylMethAcrylate;

(34) *'flame retardant'* or '*fire retardant*' means a substance that markedly retards the propagation of a flame;

(35) '*halogenated flame retardant'* means a flame retardant that contains any halogen;

(36) '*homogeneous material*' means one material of uniform composition throughout or a material, consisting of a combination of materials, that cannot be disjointed or separated into different materials by mechanical actions such as unscrewing, cutting, crushing, grinding and abrasive processes;

(37) '*equivalent model'* means a model which has the same technical characteristics relevant for the technical information to be provided, but which is placed on the market or put into service by the same manufacturer or importer as another model with a different model identifier;

(38) '*disassembling'* means reversible taking apart of an assembled product into constituent materials and/or components without functional damage that would preclude reassembling, reuse or refurbishment of the product;

(39) *'professional repairer'* means an operator or undertaking which provides services of repair and maintenance, or distribution of repair equipment, tools or spare parts for household appliances or electronic devices and is registered in a Member State for such an activity;

(40) '*product family'* means a set of models of electronic displays by the same manufacturer or importer, sharing the same physical characteristics in respect to

information related to disassembling, dismantling, materials used, position of components and joining techniques used.

ANNEX II

Ecodesign requirements

A. ENERGY EFFICIENCY REQUIREMENTS

1. ENERGY EFFICIENCY INDEX LIMITS

The Energy Efficiency Index (EEI) of an electronic display shall be calculated using the following equation:

$$EEI = \frac{(P_{measured} + 1)}{\left(3 \times \left[90 \times tanh\left(0,02 + 0,004 \times (A - 11)\right) + 4\right] + 3\right) + corr_{lum}}$$

where A represents the viewing surface area in dm², $P_{measured}$ is the measured power in on mode in Watts in the normal configuration and $corr_{lum}$ is a correction factor set to zero.

The declared EEI of an electronic display shall not exceed the maximum EEI (EEI_{max}) according to the limits in Table **1**.

Table 1

	EEI_{max} for electronic displays with resolution up to HD (1980x1080 pixels)	EEI_{max} for electronic displays with resolution above HD
1 April 2021	0.90	1.10
1 April 2023	0.75	0.90
1 April 2025	0.60	0.75

Displays with a resolution above 8 294 400 pixels (UHD-4k) are exempted from the maximum *EEI* limit specified from 1 April 2021 but are subject to the maximum *EEI* limit specified from 1 April 2023.

B. ALLOWANCES AND ADJUSTMENTS FOR THE PURPOSE OF THE EEI CALCULATION AND FUNCTIONAL REQUIREMENTS

From 1 April 2021, electronic displays shall meet the following requirements:

1. Electronic display audio system

The audio-set configuration must be achievable through the electronic display remote control or through an externally accessible control or through a network interface. The technical documentation shall clearly identify the steps required to activate the *audio-set* configuration. If it is not provided, then the on mode power requirement must be measured for EEI calculation purposes with the audio set configuration meeting the on mode testing requirements of a suitable harmonised measurement standard.

2. Electronic displays with ABC enabled by default

Electronic displays shall qualify for a 15 % reduction in $P_{measured}$, in the calculation of the EEI if they meet all of the following requirements:

(a) ABC is enabled by default in the normal configuration of the electronic display and persists in any other standard dynamic range configuration, with the exception of the brightest on mode configuration;

(b) the value of $P_{measured}$, in the normal configuration, is measured, with ABC disabled or if ABC cannot be disabled, in an ambient light condition of 100 lux measured at the ABC sensor;

(c) the value of $P_{measured}$ with ABC disabled shall be equal to or greater than the on mode power measured with ABC enabled in an ambient light condition of 100 lux measured at the ABC sensor;

(d) with ABC enabled, the measured value of the on mode power must decrease by 20 % or more when the ambient light condition, measured at the ABC sensor, is reduced from 100 lux to 12 lux;

(e) the ABC control of the display screen luminance must meet all of the following characteristics when the ambient light condition measured at the ABC sensor changes:

- the measured screen luminance at 60 lux is between 65 % and 95 % of the screen luminance measured at 100 lux;
- the measured screen luminance at 35 lux is between 50 % and 80 % of the screen luminance measured at 100 lux; and
- the measured screen luminance at 12 lux is between 35 % and 70 % of the screen luminance measured at 100 lux.

3. Electronic displays requiring an external AC to DC power supply (EPS)

For electronic displays supplied with a standardised DC power connection (such as those standardised for USB) and that are placed on the market without an external AC to DC power supply in the packaging, $P_{measured}$ for the purposes of the EEI calculation shall be the DC input power.

4. Forced menu and set up menus

Electronic displays may be placed on the market with a forced menu on initial activation proposing alternative settings. Where a forced menu is provided, the normal configuration shall be set as default choice. If the user selects a setting other than the normal configuration and this setting results in a higher power demand than the normal configuration, a warning message about the likely increase in energy use shall appear and confirmation of the action explicitly requested.

A change by the user in a single parameter in any setting shall not trigger any change in any other energy-relevant parameter, unless advisable or unavoidable. In such a case the user shall always be explicitly notified, via an alert window, of the change of other parameters and the confirmation of the change explicitly requested.

5. Peak luminance ratio

In the normal configuration, the peak white luminance of the electronic display in a 100 lux ambient light viewing environment shall not be less than 220 cd/m² or, if the electronic display is primarily intended for close viewing by a single user, not less than 150 cd/m².

If the display peak white luminance is factory set to less than these luminance values, it shall not be less than 65 % of the highest peak white luminance of the display, in a 100 lux ambient light viewing environment in the brightest on mode configuration.

C. OFF MODE, STANDBY AND NETWORKED STANDBY MODE REQUIREMENTS

From1 April 2021, electronic displays shall meet the following requirements listed below.

1. Power demand limits

Electronic displays shall not exceed power demand limits in the different modes and conditions listed in Table **2**, indicated in Watts:

Table 2

	Off mode	Standby mode	Networked standby mode
Maximum limits	0,30	0,50	2,00
Allowances for additional functions when present and enabled			
Status display	0,0	0,20	0,20
Deactivation using room presence detection	0,0	0,50	0,50
Touch functionality	0,0	1	1
HiNA function	0,0	0,0	4,00
Total maximum power demand with all additional functions when present and enabled	*0,30*	*2,20*	*7,70*

No allowance shall be provided for 'fast start' or for the 'indication of enabled reactivation function'. Displays with a standardized DC power connection may be measured at DC input for the purposes of off, standby and networked standby modes.

2. Availability of off, standby and networked standby modes

When an electronic display is placed on the market it shall provide off mode and/or standby mode. It may also provide other conditions which do not exceed the applicable power demand requirements for standby-mode. The configuration menu and instructions, if any, shall refer to off mode, standby mode or networked standby mode using those terms.

Automatic switch to off mode and/or standby mode and/or another condition which does not exceed the applicable power demand requirements for standby mode shall be set as default, including for networked displays where the network interface is enabled when in on mode.

Networked standby mode shall be disabled in 'normal configuration' of any networked display. The end user shall be prompted to confirm the activation of networked standby, if it is needed for a chosen remotely activated function, and must be able to disabled it.

Displays comply with the requirements for standby mode when networked standby mode is disabled.

3. Automatic power down in televisions

(a) Televisions shall provide a power management function, enabled as delivered by the manufacturer that, within 4 hours following the last user interaction, shall switch the electronic display from on mode into standby mode or networked standby mode or another condition which does not exceed the applicable power demand requirements respectively for standby or networked standby mode.

(b) If the display provides a function allowing the user to shorten, extend or disable the 4-hour period for automatic mode transitions detailed in (a), a warning message must be prompted about a potential increase in energy use and a confirmation of the new setting must be requested when an extension beyond the 4-hour period or disabling is selected.

(c) If the electronic display is equipped with a room presence sensor, the automatic transition from on mode into any mode as detailed in (a) applies if no presence is detected for no more than 1 hour.

(d) Televisions with various selectable input sources shall prioritise the power management protocols of the signal source selected and displayed over those default power management mechanisms described in the paragraph above.

4. Automatic power down in displays other than televisions

Electronic displays other than televisions with various selectable input sources shall switch, within 60 seconds, into off mode, standby mode, networked standby mode or another condition which does not exceed the applicable power demand requirements respectively for off, standby or networked standby mode when no video input signal is detected by any input source.

D. MATERIAL EFFICIENCY REQUIREMENTS

From 1 April 2021, electronic displays shall meet the requirements indicated below.

1. Design for dismantling, recycling and recovery

Manufacturers shall ensure that joining, fastening or sealing techniques do not prevent the safe and readily achievable removal of the components do not prevent the safe and readily achievable removal of the components indicated in point 1 of Annex VII of Directive 2012/19/EU on WEEE or in Article 11 of Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators, when present.

The sequence of dismantling steps, tools or technologies needed to access the targeted components shall be documented as foreseen in point E including, for each necessary operation, the type of joining, fastening or sealing techniques to be unlocked and the tools required. The sequence of steps suggested shall assure the safety of workers, if to be performed manually.

Exemptions apply to products listed in Article 2, point 2 of Directive 2006/66/EC. Exemptions shall be documented as foreseen in point E.

2. Marking of plastic components

Plastic components heavier than 50 g:

1. Shall be marked by specifying the type of polymer with the appropriate standard symbols or abbreviated terms set between the punctuation marks ">" and "<" as specified in available standards. The marking shall be legible.

Plastic components are exempt from marking requirements in the following circumstances:

(a) the marking is not possible because of the shape or size;

(b) the marking would impact on the performance or functionality of the plastic component;

(c) marking is technically not possible because of the molding method.

For the following plastic components no marking is required:

(a) packaging, tape, labels and stretch wraps;

(b) wiring, cables and connectors, rubber parts and where not enough appropriate surface area is available for the marking to be of a legible size;

(c) PCB assemblies, PMMA boards, optical components, electrostatic discharge components, electromagnetic interference components, speakers;

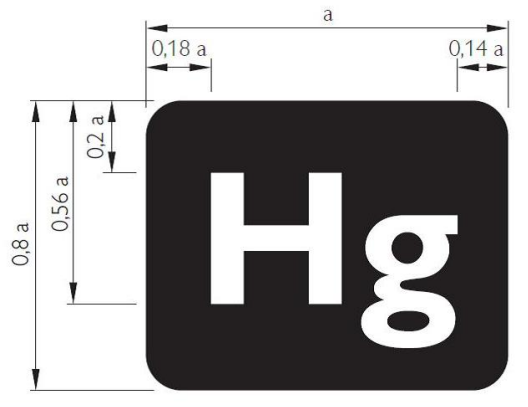
(d) transparent parts where the marking would obstruct the function of the part in question.

2. Components containing flame retardants shall additionally be marked with the abbreviated term of the polymer followed by hyphen, then the symbol "FR" followed by the code number of the flame retardant in parentheses. The marking on the enclosure and stand components shall be clearly visible and readable.

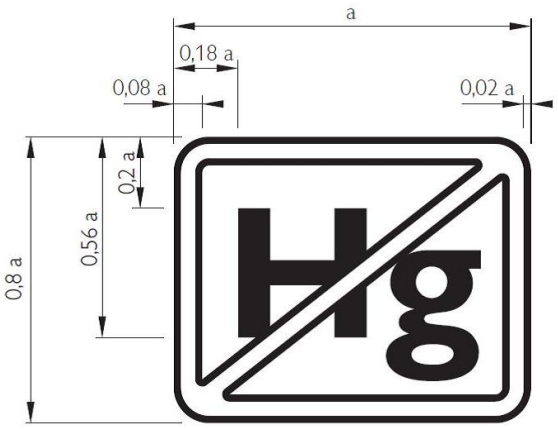
3. Mercury logo

Electronic displays which contain Cold Cathode Fluorescent Lamps (CCFL) shall be labelled with the "Mercury inside" logo. The logo shall be visible without the removal of a cover, durable, legible and indelible. The logo shall be in the form of the following graphic:

Mercury inside



Mercury free



The "Mercury inside" logo shall be firmly attached also internally on the display panel in a position clearly visible by workers once the external cover bearing the external logo is removed.

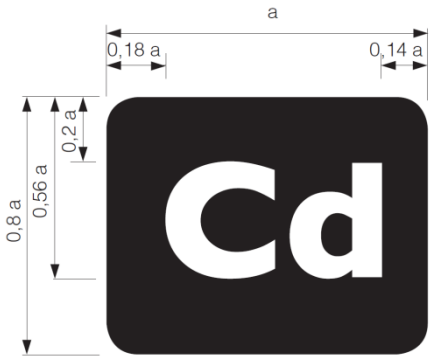
A "Mercury free" logo may be used if no Cold Cathode Fluorescent Lamps (CCFL) is present in the electronic display.

The dimension of "a" shall be greater than 9 mm and the typeface to be used is 'Gill Sans'.

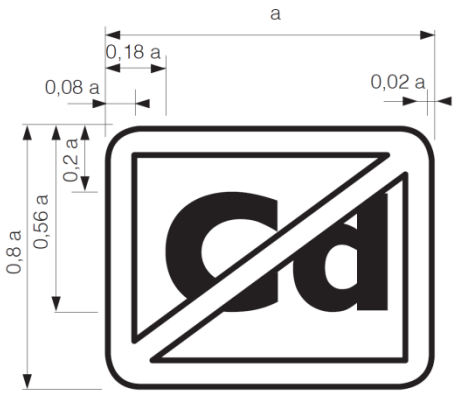
4. Cadmium logo

Electronic displays with a screen panel in which concentration values of Cadmium (Cd) by weight in homogeneous materials exceed 0,01 % as defined in Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment with a be labelled with the "Cadmium inside" logo. The logo shall be clearly visible without the removal of a cover, durable, legible and indelible. The logo shall be in the form of the following graphic:

Cadmium inside



Cadmium free



The dimension of "a" shall be greater than 9 mm and the typeface to be used is 'Gill Sans'.

The "Cadmium inside" logo shall be firmly attached also internally on the display panel in a position clearly visible by workers once the external back cover bearing the external logo is removed.

A "Cadmium free" logo may be used if no cadmium is used.

E. INFORMATION AVAILABILITY REQUIREMENTS

From 1 April 2021, the information set out below shall be available when placing on the market the first unit of a model or of an equivalent model. The same information can be provided for any equivalent model or model of the same family, if applicable.

1. Repair and re-use information and documentation

(a) The manufacturer or importer website, or an equivalent means of information, shall indicate the process for professional repairers to register for access to information. Manufacturers or importers may require the professional repairer to demonstrate that:

(i) the professional repairer complies with the applicable regulations for repairers of electrical and electronic equipment in the Member State where it operates. Reference to an official registration system as professional repairer, where such system exists in the Member State, shall be accepted as proof;

(ii) the professional repairer is covered by relevant insurance, covering liabilities resulting from its activity.

(b) A registered repairer should have access, within 24 hours in working days, to the repair and maintenance information for any product model requested and for which availability of spare parts is assured as indicated in the Product Information Sheet as from Annex V of Regulation (EU) *[OP - please insert here the number of the accompanying Energy Labelling Regulation on electronic displays]*;

(c) the repair and maintenance information shall include:

- the unequivocal appliance identification;
- a disassembly map or exploded view;
- list of necessary repair and test equipment;
- component and diagnosis information (such as minimum and maximum theoretical values for measurements);
- wiring and connection diagrams;
- diagnostic fault and error codes (including manufacturer-specific codes);
- user manual.

Links to the same information, where available, may be provided.

(d) the same information can be provided for any equivalent model or model of the same family, if relevant. The repair information shall be available when placing on the market the first unit of a model or of an equivalent model;

(e) manufacturers or importers may charge reasonable and proportionate fees for access to additional repair and maintenance information or for receiving regular updates. A fee is reasonable or proportionate if it does not discourage access by failing to take into account the extent to which the professional repairer uses it.

2. Software and firmware updates

Information on the minimum guaranteed availability of software and firmware updates, availability of spare parts and product support has to be indicated in the Product Information Sheet as from Annex V of Regulation (EU) *[OP - please insert here the number of the accompanying Energy Labelling Regulation on electronic displays]*.

3. End of life information and documentation

The product manufacturer or importer shall make available to professional operators of the waste sector, in a website and free of charge, information relevant for dismantling, recycling and recovery at end-of-life of the electronic displays, as provided in Article 15 of Directive (EU) 2012/19 on WEEE and Article 9 of Directive (EU) 2018/851 on waste. This should include at least the following:

(a) a diagram of the product showing the location of the plastic components containing flame retardants

(b) the location of components containing the toxic or ecotoxic substances or their compounds and of the critical raw materials listed in Table 3 hereafter.

Table 3: Toxic, ecotoxic substances or compounds, critical raw materials

Substance	***Indicative quantity***

	(X,X mg)
Arsenic	
Cadmium	
Lead	
Mercury	
Compounds of above substances	
Indium	

(c) for each type of joining, fastening or sealing technique to be unlocked, the instructions on the sequence of steps needed to remove these components and tools required;

(d) optionally, for substances listed in point (b), the advised recycling techniques to be applied;

(e) the reason why certain, if any, components are not removable as per exemption set out in point D(1);

(f) the reason why certain, if any, plastic parts are not marked as per the exemption set out in point D(2);

(g) if plastic components larger than 50 grams containing flame retardants are used, documentation in the format of Table **4**.

Table 4: Flame retardant in plastic components larger than 50 grams index calculation table

Brand name and Product family:			
Component reference (with flame retardant)	**Polymer ***	**Flame retardant****	**Mass (g)**
Reference *(1)*	…	…	…
Reference *(2)*	…	…	…
…	…	…	…
Reference *(j)*	…	…	…
Component reference (without flame retardant)	**Polymer ***		**Mass (g)**
Reference *(1)*	…		
Reference *(2)*	…		
…	…		
Reference *(j)*	…		
A) Total mass of plastic components*** incorporated in the electronic display containing flame retardants			
B) Total mass of plastic components***incorporated in the electronic display not containing flame retardants			
C) Total mass of the product ***(g)***			

* standard abbreviated term for the polymer(s) in the plastic component, according to EN ISO 1043 series

** standard code number of the flame retardant(s) in the plastic component, according to EN ISO 1043 series

All masses shall be expressed in grams (g).

F. TECHNICAL DOCUMENTATION

The technical documentation for the purposes of conformity assessment pursuant to Article 4 shall include the information in the order and as set out in Table 4 of Annex VI to Regulation (EU) *[OP - please insert here the number of the accompanying Energy Labelling Regulation on electronic displays]*. For market surveillance purposes, manufacturers may refer to the technical documentation uploaded to the product database, which contains the same information as per Regulation (EU) *[OP - please insert here the number of the accompanying Energy Labelling Regulation on electronic displays]*.

ANNEX III

Measurement and calculation methods

For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations shall be made using harmonised standards the reference numbers of which have been published for this purpose in the *Official Journal of the European Union*, or other reliable, accurate and reproducible methods, which takes into account the generally recognised state-of-the-art, and in line with the following provisions.

Measurements and calculations shall meet the technical definitions, conditions, equations and parameters set out in this Annex. Electronic displays which can operate in both 2D and 3D modes shall be tested when they operate in 2D mode, according to the on mode power demand test methodology established for electronic displays with 2D mode only.

An electronic display which is placed on the market split into two or more physically separate units shall, for checking the conformity with the requirements of this Annex, be treated as a single electronic display regardless of the functions and powering arrangements of each unit. Where multiple electronic displays placed on the market are combined in a single system, the system is not considered as an electronic display for the purpose of this regulation.

1. General conditions

Measurements shall be made at an ambient temperature of 23 °C +/– 5 °C.

2. Measurements of on mode power demand

Measurements of the power demand referred to in Annex II, point 1 shall fulfil all of the following conditions:

(a) measurements of power demand ($P_{measured}$) shall be made in the normal configuration;

(b) measurements shall be made using a dynamic broadcast-content video signal representing typical broadcast content for electronic displays in standard dynamic range (SDR). The measurement shall be the average power consumed over 10 consecutive minutes;

(c) measurements shall be made after the electronic display has been in the off mode for a minimum of 1 hour immediately followed by a minimum of 1 hour in the on mode and shall be completed before a maximum of 3 hours in on-mode. The relevant video signal shall be displayed during the entire on mode duration. For electronic displays that are known to stabilise within 1 hour, these durations may be reduced if the resulting measurement can be shown to be within 2 % of the results that would otherwise be achieved using the durations described here.

(d) where the ABC function exists, measurements shall be made with it switched off. If the ABC function cannot be switched off, then the measurements shall be performed in an ambient light condition of 100 lux measured at the ABC sensor.

3. Measurements of standby/off mode, enhanced reactivation functions and networked standby power demand

Measurements of the standby/off mode, additional power demand of enhanced reactivation functions and networked standby mode power demand shall be made using a reliable, accurate and reproducible measurement procedure, which takes into account the generally recognised state of the art measurement methods. If the electronic display offers a “fast start”

function, measurement of the standby mode shall be made with this function enabled and disabled.

4. Measurements of peak luminance

Measurements of the peak luminance referred to in point B(5) of Annex II shall be made:

(a) with a luminance meter, detecting that portion of the screen exhibiting a full (100 %) white image, which is part of a 'full screen test' pattern that does not exceed the average picture level (APL) point where any power limiting or other irregularity occurs in the electronic display luminance drive system affecting electronic display luminance;

(b) without disturbing the luminance meter's detection point on the electronic display whilst switching between any of the conditions referred to in point B(5) of Annex II.

5. Verification of marking of plastic components

Verification of correct marking of plastic referred to in point D(2) of Annex II shall be made using a reliable, accurate and reproducible verification procedure, which takes into account the generally recognised state of the art verification methods.

6. Mercury and Cadmium logos

The Mercury and Cadmium logos shall be affixed on the displays that contain cold cathode fluorescent lamp or Cadmium-based Quantum Dots respectively.

Measurements of the presence of mercury or cadmium in components of electronic displays referred to in point D of Annex II, shall be made using available standards, as those already used to check the compliance of product with the Directive 2011/65/EU on the restriction of the use of certain hazardous substances.

ANNEX IV

Verification procedure for market surveillance purposes

The verification tolerances defined in this Annex relate only to the verification of the measured parameters by Member State authorities and shall not be used by the manufacturer or importer as an allowed tolerance to establish the values in the technical documentation or in interpreting these values with a view to achieving compliance or to communicate better performance by any means.

When verifying the compliance of a product model with the requirements laid down in this Regulation pursuant to Article 3(2) of Directive 2009/125/EC, for the requirements referred to in this Annex, the authorities of the Member States shall apply the procedure indicated below. They shall apply the steps set out in points 2(a), 2(b) and 3 below also during the verification procedure set out in points 2 to 9 of this Annex.

1. Verification procedure for requirements established in Annex II

(1) The Member States authorities shall verify one single unit of the model.

(2) The model shall be considered to comply with the applicable requirements if:

(a) the values given in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC (declared values), and, where applicable, the values used to calculate these values, are not more favourable for the manufacturer or importer than the results of the corresponding measurements carried out pursuant to paragraph (g) thereof;

(b) the declared values meet any requirements laid down in this Regulation, and any required product information published by the manufacturer or importer does not contain values that are more favourable for the manufacturer or importer than the declared values;

(c) when the Member State authorities test the unit of the model, the determined values (the values of the relevant parameters as measured in testing and the values calculated from these measurements) comply with the respective verification tolerances as given in Table 6 and

(d) when the Member State authorities check the unit of the model, it complies with the functional requirements and the requirements on repair and end-of-life aspects.

If the results referred to in points 2 (a), (b) and (d) are not achieved, the model and all equivalent models shall be considered not to comply with this Regulation.

(3) If the result referred to in point 2(c) is not achieved, the Member State authorities shall select three additional units of the same model for testing. As an alternative, the three additional units selected may be of one or more different models that have been listed as equivalent models in the supplier's technical documentation.

(4) The model shall be considered to comply with the applicable requirements if, for these three units, the arithmetical mean of the determined values complies with the respective verification tolerances given in Table 6.

(5) If the result referred to in point 5 is not achieved, the model and all equivalent models shall be considered not to comply with this Regulation.

(6) The Member State authorities shall provide all relevant information to the authorities of the other Member States and to the Commission within one month of the decision being taken on the non-compliance of the model according to points 3 and 6.

The Member State authorities shall use the measurement and calculation methods set out in Annex III.

The Member State authorities shall only apply the verification tolerances that are set out in Table 1 and shall only use the procedure described in points 1 to 7 for the requirements referred to in this Annex. No other tolerances, such as those set out in harmonised standards or in any other measurement method, shall be applied.

2. Verification procedure for requirements established in point B(3) of Annex II

Member State authorities shall test one single unit.

The model shall be considered to comply with the requirements if:

(a) the ABC of the product is enabled by default and persists in all SDR modes, except in the brightest condition configuration;

(b) the measured on mode power of the product decreases by 20 % or more when the ambient light condition measured at the ABC sensor is reduced from 100 lux o 12 lux;

(c) the ABC control of display luminance meets the requirements of point B(3)e of Annex II.

If these tests results are not achieved, three additional units of the same model shall be tested.

After three additional units of the same model have been tested, the model shall be considered to comply with the requirements, if:

(a) the results for the additional three units achieves the requirement of (a) above and

(b) the average of the results for the additional three units meets the requirement of (b) above;

otherwise, the model and all equivalent models shall be considered not to comply with the requirements.

3. Verification procedure for requirements established in point B(4) of Annex II

Member State authorities shall test one single unit.

The model with forced menu on initial activation shall be considered to comply with the applicable requirement, if:

(a) the home mode/standard mode is provided as the default choice on initial activation of the electronic display; and

(b) a second selection process is prompted to confirm the choice, if the user selects a mode other than home mode/standard mode.

If these test results are not achieved the model and all equivalent models shall be considered not to comply with the applicable requirements.

4. Verification procedure for requirements established in point C(1) of Annex II

Member States authorities shall test one single unit.

The model shall be considered to comply with the applicable requirement, if:

(a) the off mode and/or standby mode, and/or another condition which does not exceed the applicable power demand requirements for off mode and/or standby mode, is set as default;

(b) the unit provides networked standby mode with HiNA functionality, the unit does not exceed the applicable power demand requirements for HiNA functionality when the electronic display is connected to the power source; and

(c) the unit provides networked standby mode without HiNA functionality, the unit does not exceed the applicable power demand requirements without HiNA functionality when the electronic display is connected to the power source.

If any of these test results are not achieved, three additional units of the same electronic display shall be tested.

After three additional units have been tested, the model shall be considered to comply with the requirements if all three of the additional units meet all the conditions with the applicable power demand limits averaged for the three units. Otherwise, the model and all equivalent models shall be considered not to comply with the requirements.

5. Verification procedure for requirements established in point C(2) of Annex II

Member State authorities shall test one single unit.

The model shall be considered to comply with the applicable requirement, if:

(a) the unit provides off mode and/or standby mode, and/or another condition which does not exceed the applicable power demand requirements for off mode and/or standby mode, when the electronic display is connected to the power source; and

(b) the activation of the network availability requires the end-user's intervention;

(c) the network availability can be disabled by the end-user and

(d) it complies with the requirements for standby mode when networked standby mode is not enabled.

If any of these test results are not achieved the model and all equivalent electronic displays shall be considered not to comply with the applicable requirements.

6. Verification procedure for requirements established in point C(3) of Annex II for electronic displays

Member State authorities shall test one single unit.

The model shall be considered to comply with the applicable requirement, if:

(a) within 4 hours in on mode following the last user interaction or within 1 hour if a room presence sensor is enabled, the electronic display automatically switches from on mode, to standby mode, or off mode, or, networked standby mode if enabled, or another condition which does not exceed the applicable power demand requirements for off mode and/or standby mode. Member State authorities shall use the applicable procedure to measure the power demand after the automatic power down functionality switches the electronic display into the applicable power mode; and

(b) the function is set as default;

(c) in on mode the unit displays an alert message before automatically switching from on mode to the applicable mode/condition and

(d) if the unit provides a function allowing the user to shorten, extend or disable the 4-hour period for automatic mode transitions detailed in (a), a warning message must be prompted about a potential increase in energy use and a confirmation of the new setting must be requested when an extension beyond the 4-hour period or disabling is selected.

If the test results under subpoint (a) is not achieved, three additional units of the same model shall be tested.

After three additional units have been tested, the model shall be considered to comply with the requirements if all three of the additional units meet the test result specified under subpoint (a). Otherwise, the model and all equivalent electronic displays shall be considered not to comply with the requirement.

If any of the test results under subpoints (b) to (d) are not achieved, the model and all equivalent models shall be considered not to comply with the applicable requirements.

7. Verification procedure for requirements established in point C(3) of Annex II for networked displays

Member State authorities shall test one single unit.

The networked display with the network availability enabled shall be considered to comply with the applicable requirement, if after no more than 4 hours in on mode following the last user interaction, or after 1 hour with no movement detected for displays with room presence sensor enabled:

(a) the electronic display automatically switches from on mode to a condition of networked standby mode or any other condition which does not exceed the applicable power demand requirements for conditions providing networked standby. Member State authorities shall use the applicable procedure to measure the power demand after the automatic power down functionality switches the electronic display into the applicable power mode;

(b) if the unit provides a function allowing the user to shorten or extend the time period or disable the auto power down function, extending the time period shall trigger a warning message about the increase in energy use requiring a confirmation; and

(c) as stated in the technical documentation, the power management function and/or the user can switch the electronic display being in a condition providing networked standby into standby mode, or off mode or another condition which does not exceed the applicable power demand requirements for off mode and/or standby mode.

If the test results under subpoints (a) to (c) are not achieved, three additional units of the same model shall be tested.

After three additional units have been tested, the model shall be considered to comply with the applicable requirements if all three of the additional units meet the test results under subpoints (a) to (c). Otherwise, the model and all equivalent models shall be considered not to comply with the applicable requirements.

8. Verification procedure for requirements established in point C(4) of Annex II

Member State authorities shall test one single unit.

The model shall be tested for each end user selectable signal input interface type which has specified that it can carry power management control signals or data. Where there are two or more identical signal interfaces not labelled for a specific host product type (e.g. HDMI-1,

HDMI-2, etc.) it is sufficient to test one of these signal interfaces selected at random. Where there are labelled or menu designated signal interfaces (e.g. computer, set top box or analogous) the appropriate host signal source device should be connected to the designated signal interface for the test.

The model shall be considered to comply with the applicable requirement when no signal by any input source is detected and the model switches into standby mode, off mode or networked standby mode.

If any of the test results show that the host signal source power management protocols are not recognised and prioritised, the model and all equivalent models shall be considered not to comply with the applicable requirement.

9. Verification procedure for requirements established in point D and E of Annex II

Member State authorities shall test one single unit of the model.

The model shall be considered to comply with the requirements, if:

(a) the documentation provided as per point E(2) of Annex II provides sufficient information on the sequence of dismantling steps leading to the extraction of the targeted components, as set out in point D(1) of Annex II and no joining, fastening or sealing technique necessarily determines breakage of the listed components;

(b) all plastic components of the electronic display heavier than 50 g, other than those exempted as defined in point D(2) of Annex II, are marked with the proper symbols set out in point D(2)1 of Annex II. Joined parts consisting of two or more polymers or polymer blends shall each contain the relevant marking. Models with plastic components heavier than 50 g (other than PMMA board and display optical plastics) containing flame retardants shall be considered to comply with the requirements if marked with the proper symbols for flame retardant, as set out in point D(2)2 of Annex II. For exempted plastic components, the market surveillance authority shall check that a justification is provided in the end-of-life documentation, as set out in point E(2)e of Annex II;

(c) the mercury logo and/or cadmium logo, as detailed in point D(3) and (4) of Annex II, are present for products containing respectively cold cathode fluorescent lamps or Cadmium-based Quantum Dot screen panels; and

(d) the end-of-life documentation for the product family containing all information set out in point E(2) of Annex II, as applicable, is made available on website and free of charge.

If the test results and requirements under subpoints (a) to (d) are not achieved, the model and all equivalent models shall be considered not to comply with the applicable requirements.

10. Verification tolerances

The verification tolerances defined in this Annex relate only to the verification of the measured parameters by the Member State authorities and shall not be used by the manufacturer as an allowed tolerance on the values in the technical documentation to achieve compliance with the requirements. Declared values shall not be more favourable for the manufacturer than the values reported in the technical documentation.

Table 6 – Verification tolerances	
Parameter	*Verification tolerances*
On mode power demand excluding allowances and adjustments for the purposes of EEI calculation ($P_{measured}$) set out in Annex II.A and, for the purposes of allowances and adjustments, in point B of Annex II.	The determined value shall not exceed the declared value by more than 7 %
Off mode, standby mode and networked standby mode, as applicable, limit values set out in point C(1) of Annex II.	The determined value shall not exceed the declared value by more than 0,10 Watt
Peak luminance ratio set out in point B of Annex II	The determined value shall not be lower than 60 % of the peak luminance of the brightest on mode configuration provided by the electronic display
Peak luminance (cdl/m²) requirements as set out in points B((5) of Annex II	The determined value shall not deviate from the required value by more than 8 %
Timed functions as set out in points C(3) and C(4) of Annex II	The switch shall be completed within 5 seconds of the determined values
Weight of plastic components as qualified in point E(2) of Annex II	The determined value shall not be different from the declared value by more than 5 grams

11. Circumvention devices

Where the operation of a circumvention device is suspected during testing, Market Surveillance authorities should perform complementary tests or other appropriate actions in an attempt to detect the presence and operation of any such devices. Details of any such action and their effect, in any of the verification points from 1 to 9, shall be included in the test report.

Where the presence of a circumvention device is confirmed, the model and all equivalent models shall be considered not compliant.

ANNEX V

Benchmarks

The best available technology on the market, at the time of entry into force of this Regulation, for the environmental aspects that were considered significant and are quantifiable is indicated below.

The following indicative benchmarks are identified for the purpose of part 3, point 2 of Annex I to Directive 2009/125/EC. They refer to the best available technology at the time of drafting this Regulation (December 2017) for electronic displays on the market.

Diagonal of viewing area		HD	UHD
(cm)	(inches)	Watt	Watt
55.9	22	15	
81.3	32	25	
108.0	42.5	36	51
123.2	48.5	43	57
152.4	60	62	67
165.1	65	69	73
Other functioning modes:			
Off mode (hard switch):			0.0 W
Off mode (no hard switch):			0.1 W
Standby			0.2 W
Networked standby (non-Hina):			0.9 W