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ANNEXES 1 to 4

ANNEXES

to

COMMISSION REGULATION (EU) .../...

of XXX

laying down ecodesign requirements for external power supplies, wireless chargers, wireless charging pads, battery chargers for portable batteries of general use and USB Type-C cables, pursuant to Directive 2009/125/EC of the European Parliament and of the Council and repealing Commission Regulation (EC) No 2019/1782

ANNEX I

Ecodesign requirements referred to in Article 3

1. Energy efficiency requirements

The following energy efficiency requirements shall apply:

- (a) The no-load condition power consumption of EPS shall not exceed the values set out in Table 1.

Table 1 – No-load power consumption limit values for EPS

| Nameplate output power | Single-voltage | Single-voltage | Single-voltage | Single-voltage | Multiple-voltage EPS |
|---|----------------|----------------|----------------|----------------|----------------------|
| | AC-DC EPS | AC-DC EPS | AC-AC EPS | AC-AC EPS | |
| | Basic-Voltage | Low-Voltage | Basic-Voltage | Low-Voltage | |
| $P_{out} \leq 49 \text{ W}$ | 0.075 W | 0.075 W | 0.075 W | 0.072 W | 0.075 W |
| $49 \text{ W} < P_{out} \leq 250 \text{ W}$ | 0.15 W | 0.15 W | 0.075 W | 0.185 W | 0.125 W |
| $P_{out} > 250 \text{ W}$ | 0.15 W | 0.15 W | 0.200 W | 0.500 W | 0.125 W |

- (b) The low load efficiency shall not be less than the values set out in Table 2 for EPS with a nameplate output power exceeding 10 W, except for the conditions set out in point (c).

Table 2 – Low load efficiency limit values for EPS

| Nameplate output power | Single-voltage | Single-voltage | Single-voltage | Multiple-voltage EPS |
|--|---|---|--|--|
| | AC-DC EPS | AC-AC EPS | EPS | |
| | Basic-Voltage | Basic-Voltage | Low-Voltage | |
| $10 \text{ W} < P_{out} \leq 49 \text{ W}$ | $0.071 \times \ln(P_{out}/1 \text{ W}) - 0.00115 \times P_{out}/1 \text{ W} + 0.61$ | $0.0582 \times \ln(P_{out}/1 \text{ W}) - 0.00104 \times P_{out}/1 \text{ W} + 0.667$ | $0.0834 \times \ln(P_{out}/1 \text{ W}) - 0.0011 \times P_{out}/1 \text{ W} + 0.549$ | $0.0782 \times \ln(P_{out}/1 \text{ W}) + 0.0013 \times P_{out}/1 \text{ W} + 0.583$ |
| $49 \text{ W} < P_{out}$ | 0.83 | 0.842 | 0.82 | 0.825 |

- (c) The low load efficiency at the highest nameplate output voltage shall not be less than the values set out in Table 3 for the following EPS:

- (1) adaptive EPS with a nameplate output power exceeding 100 W;
- (2) multiple-voltage adaptive EPS with a nameplate output power exceeding 10 W.

Table 3 – Low load efficiency limit value exemptions for adaptive EPS

| Nameplate output power | Single-voltage adaptive EPS | Multiple-voltage adaptive EPS |
|--|-----------------------------|--|
| $10 \text{ W} \leq P_{\text{out}} \leq 49 \text{ W}$ | No exemption | $0.0782 \times \ln(P_{\text{out}}/1 \text{ W}) + 0.0013 \times P_{\text{out}}/1 \text{ W} + 0.543$ |
| $49 \text{ W} < P_{\text{out}} \leq 100 \text{ W}$ | No exemption | 0.785 |
| $P_{\text{out}} > 100 \text{ W}$ | 0.79 | 0.785 |

- (d) The average active efficiency of EPS shall not be less than the values set out in Table 4:

Table 4 – Average active efficiency limit values for EPS

| Nameplate output power | Single-voltage AC-DC EPS Basic-Voltage | Single-voltage AC-AC EPS Basic-Voltage | Single-voltage EPS Low-Voltage | Multiple-voltage EPS |
|--|---|---|--|--|
| $P_{\text{out}} \leq 1 \text{ W}$ | $0.5 \times P_{\text{out}}/1 \text{ W} + 0.169$ | $0.5 \times P_{\text{out}}/1 \text{ W} + 0.169$ | $0.517 \times P_{\text{out}}/1 \text{ W} + 0.091$ | $0.497 \times P_{\text{out}}/1 \text{ W} + 0.067$ |
| $1 \text{ W} < P_{\text{out}} \leq 49 \text{ W}$ | $0.071 \times \ln(P_{\text{out}}/1 \text{ W}) - 0.00115 \times P_{\text{out}}/1 \text{ W} + 0.67$ | $0.0582 \times \ln(P_{\text{out}}/1 \text{ W}) - 0.00104 \times P_{\text{out}}/1 \text{ W} + 0.727$ | $0.0834 \times \ln(P_{\text{out}}/1 \text{ W}) - 0.0011 \times P_{\text{out}}/1 \text{ W} + 0.609$ | $0.0782 \times \ln(P_{\text{out}}/1 \text{ W}) - 0.0013 \times P_{\text{out}}/1 \text{ W} + 0.643$ |
| $49 \text{ W} < P_{\text{out}}$ | 0.89 | 0.902 | 0.88 | 0.885 |

- (e) The relevant load conditions are set out in Table 5.

Table 5 – Load conditions for EPS

| Percentage of reference output current * | |
|--|-----------|
| Load condition 1 | 100% ± 2% |
| Load condition 2 | 75% ± 2% |
| Load condition 3 | 50% ± 2% |
| Load condition 4 | 25% ± 2% |

| | |
|------------------|-------------------------------|
| Load condition 5 | 10% ± 1% (low load condition) |
| Load condition 6 | 0% (no-load condition) |

* For EPS with the exception of USB-PD ports at the lowest output voltage, the reference output current shall be the nameplate output current. For USB-PD ports, the reference output current at the lowest output voltage shall be 2 A, with the exception of load condition 5 for which the reference output current shall be 3 A.

Where applicable, the reference output current shall be derated according to the proportional allocation method, with the exception of the reference output current for load condition 5.

- (f) For EPS with multiple power outputs, the nameplate output power (P_{out}) shall be the sum of the nameplate output power of each power output when providing power at the specified load conditions.
- (g) For dynamic EPS, the nameplate output power (P_{out}) shall be the maximum power, if it can be tested completely at conditions based on the maximum power. Otherwise it shall be the guaranteed power.
- (h) Adaptive EPS, including multiple-voltage adaptive EPS, shall meet the energy efficiency requirements laid down in point (a) to (f) at both the lowest and highest nameplate output voltage.
- (i) A multiple-voltage adaptive EPS shall meet the energy efficiency requirements for multiple-voltage EPS, even if any of its power outputs fulfills at the lowest output voltage the criteria for a low-voltage EPS.
- (j) If a single-voltage adaptive EPS fulfills at the lowest output voltage the criteria for a low-voltage EPS, it shall meet at that condition the energy efficiency requirements for low-voltage EPS.
- (k) A user-selectable EPS shall meet the energy efficiency requirements at the lowest and highest selectable output voltage. If at the lowest output voltage it fulfills the criteria for a low-voltage EPS, it shall meet at that condition the energy efficiency requirements for low-voltage EPS.
- (l) The standby mode power consumption of wireless charging pads shall not be higher than 0.48 W.
- (m) The standby mode power consumption of wireless chargers with the power supply integrated into the same unit shall not be higher than 0.8 W.

2. Power output performance requirements

- (a) The declared output voltage of EPS as required in Table 8 shall not be less by more than 10% than the corresponding declared nameplate output voltage for power outputs other than those of USB Type-C ports at any of the applicable load conditions.

For dynamic EPS, the requirement applies to the load conditions based on the guaranteed output current.

- (b) The declared output voltage as required in Table 8 shall not be less by more than 5% than the corresponding declared nameplate output voltage for the power outputs of USB Type-C ports at any of the applicable load conditions.

For dynamic EPS, the requirement applies to the load conditions based on the guaranteed output current.

3. Interoperability requirements

- (a) An AC-DC EPS shall be an interoperable EPS that meets all the requirements set out in point (b) unless it fulfils the requirements set out in point (c).
- (b) An interoperable EPS shall satisfy all the following requirements:
 - (1) it shall be fitted with at least one USB Type-C port;
 - (2) the operation of the USB Type-C ports shall be independent from any power output unless they are shared capacity USB Type-C ports;
 - (3) the maximum nameplate output power of a single power output shall be supplied at a USB Type-C power output using the USB Type-C or USB-PD standard;
 - (4) where it engages over-current or over-temperature protection, it shall attempt to resume default operation after determining that the cause of the fault is no longer present;
 - (5) it shall have no hard-wired output cable;
 - (6) it shall fulfil the information requirements laid down in point 5(b) and (d).
- (c) An AC-DC EPS is not required to be an interoperable EPS if it satisfies at least one of the following conditions:
 - (1) it has a nameplate output power greater than 100 W;
 - (2) it has a maximum nameplate output voltage less than or equal to 4.5 V;
 - (3) it is a user-selectable EPS;
 - (4) it has a nameplate output voltage higher than 20 V combined with a nameplate output power less than 15 W;
 - (5) it is intended to be used only in a wet environment that requires a liquid ingress protection level of IPX3 or higher;
 - (6) it must withstand electrostatic discharge at a level higher than level 4 as specified in point 5, 'Table 1 - Test levels' of standard EN 61000-4-2:2009 'Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test', as a result of applicable safety, performance or reliability requirements or standards.
 - (7) it is intended to be used only with products within the scope of Directive 2009/48/EC of the European Parliament and of the Council ⁽¹⁾, including their charging cradles, or with electric model trains and their accessories;
 - (8) it is intended to be used with one of the following types of power tools or their charging cradles:
 - (a) power tools with removable batteries;

¹ Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2009 on the safety of toys, (OJ L 170, 30.6.2009, p. 1–37, ELI: <http://data.europa.eu/eli/dir/2009/48/oj>).

- (b) power tools with integrated batteries with a nominal voltage higher than 7.2 V;
- (c) power tools specifically designed for outdoor use;
- (9) it is intended to be used only with non-battery powered equipment used primarily for recording, processing or reproducing sound;
- (10) it is intended to be used only with products with a peak-power demand of more than 130% of its nameplate output power for more than 15 ms, provided that the nameplate output power and the peak power could be supplied by a USB-PD EPS only at different fixed output voltages;
- (11) it is intended to be used only with base stations for cordless phones with an analogue line connection.
- (d) USB Type-C receptacles of EPS shall be associated with USB Type-C ports as defined by this Regulation.
- (e) Each USB Type-C port of an EPS that supports USB power delivery must have at the lowest output voltage a nameplate output current greater than or equal to 3 A.
- (f) The following equipment shall be powered by interoperable EPS, unless the prongs for insertion into the mains socket form an integral part of the main body of that equipment:
 - (1) battery chargers for portable batteries of general use, with an input power not exceeding 100 W;
 - (2) wireless chargers and wireless charging pads that are not intended to be used with the equipment falling under the scope of point 3(c).
- (g) Cables placed on the market with USB Type-C plugs at both ends shall be USB Type-C cables as defined by this Regulation.

4. Durability requirements

- (a) Class I interoperable EPS shall meet the resistibility requirements for the 2.5 kV basic test levels of the tests numbered 5.1.1a and 5.1.1.b in 'Table 5 - Test conditions for mains power ports' from the standard 'Recommendation ITU-T K.21 (08/2022)'.
 - (b) Class II interoperable EPS shall meet the resistibility requirements for the 2.5 kV basic test levels of the test numbered 5.1.1a in 'Table 5 - Test conditions for mains power ports' from the standard 'Recommendation ITU-T K.21 (08/2022)'.

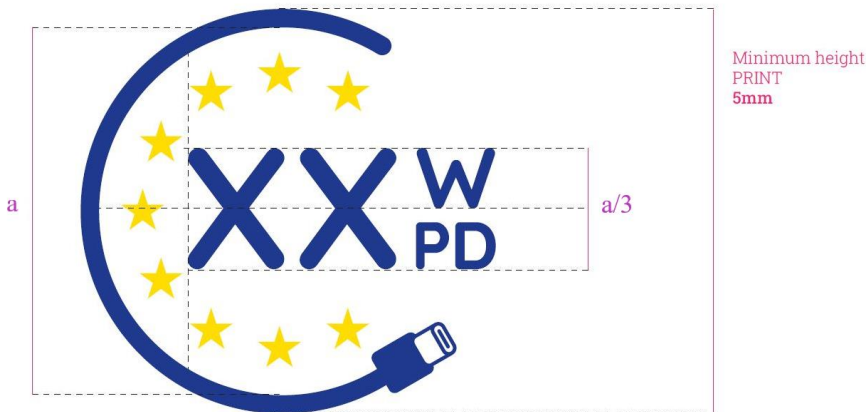
5. Information requirements

- (a) The nameplate of EPS shall include the information set out in Table 6.

Table 6 – Nameplate information requirements for EPS

| Nameplate information | Value and precision | Unit | Notes |
|-----------------------|---------------------|------|---|
| Output power | XXX.X | W | The nameplate output voltage shall indicate whether it is AC or DC. |
| Output voltage | XX.X | V | <p>The nameplate output power shall be calculated as the product between the nameplate output voltage and current.</p> <p>Where applicable, the combination of output power, voltage and current shall also be provided for each single power output at each fixed output voltage.</p> <p>The total maximum output power shall also be provided.</p> <p>For shared capacity ports, the maximum combined output power shall also be provided together with corresponding output voltage and current for each port.</p> <p>Dynamic EPS shall provide the guaranteed output power and corresponding current.</p> |
| Output current | XX.X | A | |

- (b) Interoperable EPS shall be affixed with the following ‘Common Charger’ logo on their nameplate or enclosure, packaging and instruction manual:



- (1) The logo shall be clearly visible, indelible and shall have a height of at least 5 mm when affixed to the nameplate, or 7 mm when affixed to the enclosure, packaging or the instruction manual. If the logo is enlarged, the proportions set out in the drawings shall be maintained.
- (2) The reference colours for the logo shall be cyan (100% cyan + 90% magenta + 10% black) and yellow (10% magenta + 100% yellow + 10% black) when a four-colour process is used. When RGB colours are used, the reference colours shall be blue (30 red + 57 green + 141 blue) and yellow (255 red + 221 green).
- (3) The font used in the logo shall be Quicksand Bold.

- (4) 'XX' shall be replaced by the value of the maximum nameplate output power provided by a single USB Type-C port. For dynamic EPS this value shall be the guaranteed output power.
- (5) 'PD' shall be displayed only if the external power supply supports USB power delivery.
- (6) If the logo is used on a dark background, it may be used in the following negative format using the same background colour:



- (7) The logo may be used in the following black and white format or other analogous monochrome formats, if the product nameplate, enclosure, packaging, or instruction manual only use those colours:



- (c) The 'Common Charger' logo specified in point (b) shall not be affixed on or used in relation to the marketing of other products than interoperable EPS, unless required by Union law.
- (d) Interoperable EPS shall be marked at each USB Type-C port with that port's maximum output power and shall indicate by using the letters 'PD' if it is also compliant with USB power delivery at that port. Shared capacity USB-PD ports shall also graphically indicate the maximum combined output power that they share. All markings shall be durable and indelible, and the font size shall not be less than 2.56 mm in height.
- (e) USB Type-C cables shall be marked on the overmoulds of the two plugs with the text '60W' or '240W' in accordance with the maximum supported power. The marking shall be visible and indelible, and the font size shall not be of less than 1.2 mm in height for the text '60' or '240' and not of less than 0.6 mm in height for the letter 'W'.

- (f) The information displayed pursuant to point (a), (b), (d) and (e) shall be clearly legible in accordance with the test method laid down in Annex B to the standard EN ISO 20417:2021 ‘Medical devices — Information to be supplied by the manufacturer’, where the intended position shall be at viewing distance of 25 cm.
- (g) The information set out in Table 7 shall be displayed for EPS by means set out in point (h).

Table 7 – Product information sheet for EPS

| Information published | Value and precision | Unit | Notes |
|--|----------------------------|-------------|---|
| Manufacturer’s name or trademark, commercial registration number and address | - | - | - |
| Model identifier | - | - | - |
| Input voltage * | XXX | V | Value or range. |
| Input AC frequency * | XX | Hz | Value or range. |
| Nameplate output voltage | XX.X | V | The notes laid down in Table 6 shall apply. |
| Nameplate output current | XX.X | A | |
| Nameplate output power | XXX.X | W | |
| Power delivery standard (if applicable) | - | - | Name and version of all supported standards. |
| Average active efficiency | XX.X | % | Declared by the manufacturer ** based on the value calculated as the arithmetical mean of efficiency at load conditions 1 to 4. |
| Low load efficiency (10%) | XX.X | % | Declared by the manufacturer ** based on the value calculated at load condition 5. EPS with a nameplate output power of 10 W or less shall be exempted from the requirement in this row. |

| | | | |
|--|------|---|---|
| No-load power consumption | X.XX | W | Declared by the manufacturer ** based on the value measured for load condition 6. |
| True power factor | X.XX | - | Declared by the manufacturer ** based on measurements at load conditions 1 to 6. |
| Total harmonic distortion of the input current | XXX | % | Declared by the manufacturer ** based on measurements at load conditions 1 to 6. |

* The corresponding values declared in response to the requirements of Directive 2014/35/EU of the European Parliament and of the Council ⁽²⁾ shall be used. They shall not be subject to verification requirements under this Regulation.

** For adaptive EPS and user selectable EPS it shall be declared for the lowest and highest output voltage.

*** For adaptive EPS it shall be declared for the lowest output voltage. For user selectable EPS it shall be declared for the lowest and highest output voltage.

- (h) The information for EPS set out in point (g) shall be visibly displayed in:
- (1) the technical data sheet or user manual supplied with the EPS, unless an internet link or a QR code linking to the free access website referred to in point (ii) is supplied with the EPS. The pictogram with the reference number 5.4.3 of standard EN ISO 15223-1:2021 'Medical devices - Symbols to be used with information to be supplied by the manufacturer - Part 1: General requirements' shall be displayed next to the link or QR code;
 - (2) a free access website of the EPS manufacturer, its authorised representative or the importer for a period of at least 10 years after the placing on the market of the last unit of the model concerned.

6. Technical documentation

The technical documentation for the purposes of conformity assessment pursuant to Article 4 shall contain the following elements:

- (a) for EPS:

Table 8 – Technical documentation for EPS

| Declared Parameter | Notes |
|-----------------------|--|
| Output current (mA) * | Declared by the manufacturer based on the measurements at load conditions 1 to 5 for EPS with a nameplate output power exceeding 10 W, otherwise at load conditions 1 to 4, and where applicable also at the additional conditions required in Table |
| Output voltage (V) * | |

² Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits, (OJ L 96, 29.3.2014, p. 357–374, ELI: <http://data.europa.eu/eli/dir/2014/35/oj>).

| | |
|--|---|
| | 5. |
| Active output power (W) | <p>Declared by the manufacturer based on the measurements of the active output power at load conditions 1 to 5 for EPS with a nameplate output power exceeding 10 W, otherwise at load conditions 1 to 4, and where applicable also at the additional conditions required in Table 5.</p> <p>For USB Type-C ports, the following cable correction factor shall be subtracted from each measurement result:</p> <p>$R_{cable} \times I_{out}^2$, where</p> <p>$I_{out}$ is the output current, and</p> <p>$R_{cable} = 0.150 \Omega$ if the maximum nameplate output current of that port is not higher than 3 A, otherwise $R_{cable} = 0.125 \Omega$.</p> <p>Where applicable, the active output power (W) shall be the the sum of the active output power at each power output.</p> |
| Root mean square input power (W) | <p>Declared by the manufacturer based on the measurements at load conditions 1 to 6, for EPS with a nameplate output power exceeding 10 W, otherwise at load conditions 1 to 4 and 6.</p> <p>The root mean square input voltage (V) shall be recorded.</p> |
| Total harmonic distortion of the input current (%) | |
| True power factor | |
| Active mode efficiency | <p>Calculated by dividing the ‘Active output power’ by the ‘Root mean square input power’ at load conditions 1 to 5 for EPS with a nameplate output power exceeding 10 W, otherwise at load conditions 1 to 4.</p> |
| Average active efficiency | <p>Calculated as arithmetical mean of the ‘Active mode efficiency’ at load conditions 1 to 4.</p> |

* for AC output voltage, these shall be root mean square values.

The relevant load conditions are set out in in Table 5.

- (b) for adaptive EPS - specifications of the supported power delivery protocols relevant to the requirements of this Regulation.
- (c) for interoperable EPS - documentation demonstrating compliance with the requirements set out in point 3(b).
- (d) for EPS exempt from the interoperability requirements pursuant to points 3(c)(v) to (xi):
 - (1) reference to the relevant point of point 3(c);
 - (2) supporting documentation, also concerning the intended powered product, demonstrating that the conditions for the exemption are met;
- (e) for EPS serving other major functions in addition to converting mains electricity into lower voltage DC or AC current - instructions on how to disconnect the components of the product that fulfil other functions, provided that this does not affect the ability of the product to convert mains electricity into lower voltage DC or AC current.
- (f) for wireless chargers with the power supply integrated into the same unit:
 - (1) the manufacturer's name or trademark, commercial registration number and address;
 - (2) the model identifier;
 - (3) input voltage (V);
 - (4) input current (AC) frequency;
 - (5) power consumption in standby mode (W);
- (g) for wireless charging pads:
 - (1) the manufacturer's name or trademark, commercial registration number and address;
 - (2) the model identifier;
 - (3) input voltage (V);
 - (4) power consumption in standby mode (W);
 - (5) documentation demonstrating compatibility with interoperable EPS.
- (h) for battery chargers for portable batteries of general use subject to the requirements laid down in point 3(f)(i):
 - (1) the manufacturer's name or trademark, commercial registration number and address;
 - (2) the model identifier;
 - (3) input voltage (V);
 - (4) documentation demonstrating compatibility with interoperable EPS.
- (i) for USB Type-C cables - documentation demonstrating compliance with the specifications laid down in standard EN IEC 62680-1-3:2022 'Universal serial bus interfaces for data and power – Part 1-3: Common components – USB Type-C® Cable and Connector Specification'.

ANNEX II

Measurements and calculations

1. For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations shall be made either using harmonised standards whose reference numbers have been published for this purpose in the Official Journal of the European Union or using other reliable, accurate and reproducible methods that take into account the generally recognised state-of-the-art method.
2. Where a parameter is declared pursuant to Article 4 its declared value shall be used by the manufacturer, importer or authorised representative for the calculations in this Annex.
3. In the absence of existing relevant standards for any requirement of this Regulation, and until the publication of the references of the relevant harmonised standards in the Official Journal, use shall be made of the transitional testing methods set out in point 4, or of other reliable, accurate and reproducible methods, which take into account the generally recognised state-of-the-art methods.
4. The transitional testing methods are the following:
 - (a) For adaptive EPS, EPS with multiple power outputs and user-selectable EPS, the test procedure of the Department of Energy of the United States of America, laid down in Appendix Z to Subpart B of Part 430 of Title 10, Chapter II, Subchapter D of the Code of Federal Regulations, 87 FR 51221, in its version applicable on 19 August 2022, may be used, except for the requirements laid down in letter (b) to (e) of this point.
 - (b) For the USB-PD ports of EPS, the output current at the low load condition shall be 0.3 A and shall not be derated.
 - (c) Output measurements of USB Type-C ports of EPS shall be made at their output receptacles, regardless of whether or not the EPS is supplied with a cable. A correction factor accounting for a cable resistance of 0.150 Ω shall be applied if the maximum nameplate output current of that port is not higher than 3 A, otherwise a correction factor accounting for a cable resistance of 0.125 Ω shall be applied.
 - (d) Output measurements of EPS at other than USB Type-C ports shall be made at the product-load side of the longest output cable provided by the manufacturer, its authorised representative or the importer. If the EPS is not supplied with a cable, it must be tested with a 1 m long output wire or cable with a conductor cross-sectional area sufficient to carry the maximum required current, which shall be the minimum cross-sectional area for that current laid down in Table 11 of Section 25.8 of standard EN 60335-1:2002/A2:2006 'Household and similar electrical appliances - Safety - Part 1: General requirements'.
 - (e) If a dynamic EPS cannot be tested completely at load conditions based on the maximum power, it shall be tested at load conditions based only on the guaranteed power.

ANNEX III

Verification procedure for market surveillance purposes referred to in Article 5

1. The verification tolerances defined in this Annex relate only to the verification by Member State authorities of the declared values and shall not be used by the manufacturer, importer or authorised representative as an allowed tolerance to establish the values in the technical documentation or in interpreting those values with a view to achieving compliance or to communicate better performance by any means.
2. Where a model does not comply with the requirements laid down in Article 3, the model and all equivalent models shall be considered non-compliant.
3. As part of 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, the authorities of the Member States shall apply the following procedure:
 - (a) the Member State authorities shall verify one single unit of the model;
 - (b) the model and all equivalent models shall be considered to comply with the requirements set out in this Regulation if all the following conditions are fulfilled:
 - (1) the declared values given in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC and, where applicable, the values used to calculate those values are not more favourable for the manufacturer, importer or authorised representative than the results of the corresponding measurements carried out pursuant to point 2(g) of that Annex;
 - (2) the declared values meet any requirements laid down in this Regulation and any required product information published by the manufacturer, importer or authorised representative does not contain values that are more favourable for the manufacturer, importer or authorised representative than the declared values;
 - (3) when the Member State authorities check the unit of the model, it complies with the information requirements in point 4 of Annex I, as applicable;
 - (4) 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 those measurements) comply with the respective verification tolerances set out in Table 9.
4. Where the conditions set out in points 3(b)(i), (ii) and (iii) are not met, the model and all equivalent models shall be considered not to comply with this Regulation.
5. If the condition set out in point 3(b)(iv) is not met, 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 equivalent models.
6. The model shall be considered to comply with the applicable requirements if, for the three units referred to in point 5, the arithmetical mean of the determined values complies with the respective verification tolerances given in Table 9.

7. Where the condition set out in point 6 is not met, the model and all equivalent models shall be considered to be not in compliance with this Regulation.
8. The Member State authorities shall without delay provide all relevant information to the authorities of the other Member States and to the Commission through the information and communication referred to in Article 34 of Regulation (EU) 2019/1020 of the European Parliament and of the Council³) after a decision has been taken on the model's non-compliance pursuant to points 2, 4, 5, or 7 of this Annex.
9. The Member State authorities shall use the measurement and calculation methods set out in Annex II.
10. The Member State authorities shall only apply the verification tolerances that are set out in Table 9. They shall use only the procedure described in this Annex for the requirements referred to in this Annex. For the parameters in Table 9, no other tolerances, such as those set out in harmonised standards or in any other measurement method, shall be applied.

Table 9 – Verification tolerances

³ Regulation (EU) 2019/1020 of the European Parliament and of the Council of 20 June 2019 on market surveillance and compliance of products and amending Directive 2004/42/EC and Regulations (EC) No 765/2008 and (EU) No 305/2011 (OJ L 169, 25.6.2019, p. 1, ELI: <http://data.europa.eu/eli/reg/2019/1020/oj>).

| Parameter | Verification tolerance |
|--|---|
| Output current (mA) * | The values shall be set in accordance with the tolerances laid down in Table 5. |
| Output voltage (V) * | The determined value ** shall not be lower than the declared value by more than 1%, at all applicable load conditions. |
| Active output power (W) | The determined value ** shall not be lower than the declared value by more than 2% for declared values greater than 0.5 W. It shall not be lower than the declared value by more than 0.025 W for declared values lower than or equal to 0.5 W. |
| Root mean square input power (W) | The determined value ** shall not exceed the declared value by more than 2% for declared values greater than 0.5 W. It shall not exceed the declared value by more than 0.01 W for declared values lower than or equal to 0.5 W. The root mean square input voltage (V) shall be recorded. |
| Total harmonic distortion of the input current | The determined value ** shall not exceed the declared value by more than 2 percentage points. |
| True power factor | The determined value ** shall not exceed the declared value by more than 2%. |
| Power consumed (W) at no-load condition | The determined value ** shall not exceed the declared value by more than 0.01 W. |
| Power consumed (W) in standby mode | The determined value ** shall not exceed the declared value by more than 0.01 W. |

* For AC voltage outputs, these shall be root mean square values.

** In the case of the three additional units tested as prescribed in point (4), the determined value means the arithmetical mean of the values determined for those three additional units.

ANNEX IV

Benchmarks referred to in Article 6

At the time of entry into force of this Regulation, the best available technologies (BAT) on the market for EPS in terms of their no-load power consumption, low load efficiency and average active efficiency have been identified as follows:

(a) No-load condition:

The lowest identified no-load power consumption of an EPS declared by a manufacturer is 0.02 W for $P_{\text{Out}} \leq 250$ W;

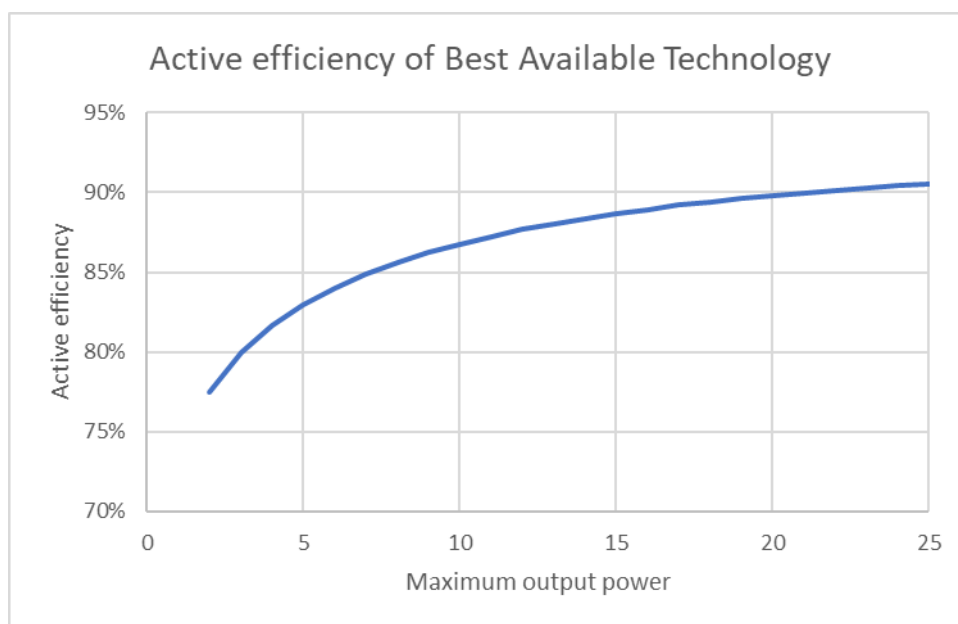
(b) Low load efficiency (10%):

A new approach to the front-end design of an EPS is reported as offering the potential to achieve a much flatter energy efficiency performance over the range from 10% to 100% of maximum power. Information provided on a 75 W reference design shows that the design is claimed to achieve 91.1% active efficiency and 89.5% low load efficiency.

(c) Average active efficiency of single voltage AC-DC EPS:

Observed BAT in the market of the United States of America for single voltage AC-DC EPS below 25 W maximum output power are described by the following formula and illustrated in the graph:

BAT average active efficiency = $0.0654 \times \ln(P_{\text{out}}) - 0.00149 \times P_{\text{out}} + 0.732$.



Observed manufacturer data on EPS in the Union market is:

- (1) for P_{out} between 25 W and 40 W, the BAT average active efficiency increases progressively to 92.6 %.
- (2) for P_{out} above 40 W, the BAT average active efficiency is over 92.6% with observed performance reaching 93.2%.