DRAFT COMMUNIQUÉ (2024/1834/EU) (SGM-2025/..) ON ECODESIGN REQUIREMENTS FOR FANS DRIVEN BY MOTORS WITH AN ELECTRIC INPUT POWER BETWEEN 125 W AND 500 kW

Article 1

Purpose

1. The purpose of this Communiqué is to lay down ecodesign requirements for the placing on the market or putting into service of fans with an electric input power between 125 W and 500 kW (≥ 125 W and ≤ 500 kW) at their best efficiency point, including where they are integrated into other products for the implementation of the Regulation on Environmentally Responsible Design of Energy-Related Products put into force by the Presidential Decree No. 5187 dated 4/2/2022.

Article 2

Scope

This Communiqué covers fans driven by motors with electrical input power between 125 W and 500 kW, including those integrated with other energy-related products specified in the Regulation on Eco-Design of Energy-Related Products

2. This Communiqué shall not apply to:

(a) fan impellers mounted on the shaft of electric motors with the sole purpose of cooling the motor itself;

(b) fans integrated into laundry and washer-dryers with maximum electric input power lower than or equal to 3 kW;

(c) fans integrated into kitchen hoods with total maximum electric input power attributable to the fan(s) lower than 280 W;

(d) fans with a best energy efficiency point at 8 000revolutions per minute or more;

(e) jet fans with maximum electric input power lower than 750 W;

3. This Communiqué shall not apply to fans that are specified to operate exclusively as follows and are specifically designed and marketed as such:

(a) in potentially explosive atmospheres, as defined in the Regulation on Equipment and Protective Systems Used in Potentially Explosive Atmosphere (2014/34/EU) published in the Official Gazette dated 30/6/2016 and numbered 29758

(b) for emergency use only, with regard to fire safety requirements as set out in the Construction Materials Regulation (305/2011/EU) published in the Official Gazette dated 10/7/2013 and numbered 28703, capable of short-time duty operation of 1 hour or more at temperatures of 300 °C and above;

(c) in nuclear installations; as defined in Regulation on Safety of Nuclear Facilities and Nuclear Materials

(d) in military establishments (bunkers) and civil defence establishments (bomb shelters);

(e) where operating temperatures of the gas being moved can be higher than 100 °C, or lower than – 40 °C, or both;

(f) where operating ambient air temperatures for the motor driving the fan, if located outside the gas stream, can be higher than 60 °C, or lower than – 30 °C, or both;

(g) with a supply voltage higher than 1 000V AC or higher than 1 500V DC;

(h) for handling toxic, highly corrosive or flammable gases or vapours; as defined in Regulation on Classification, Labeling, and Packaging of Substances and Mixtures

(i) for material transport, characterised by handling substances with a solid particle concentration of more than 10 mg/ m3 and particles with an average size of at least 0,1 mm and a hardness of at least 2 on the Mohs scale, while having an average blade angle of 50° to 90°;

(j) for handling gases containing biohazardous substances;

(k) for handling gases containing carcinogens or mutagens; as defined in Regulation on Health and Safety Measures in Work with Carcinogenic or Mutagenic Substances

(l) for handling gases with a compressibility factor, rounded to the nearest second decimal, in the designated pressure and temperature range of the scope that is not equal to 1,00;

(m) in cordless or battery-powered equipment;

(n) in handheld equipment whose weight is supported by hand during operation;

(o) in hand-guided mobile equipment moved while in operation;

(p) air circulating fans.

Basis

Article 3 - (1) This Communiqué has been prepared based on Article 4 of the Product Safety and Technical Regulations Law No. 7223 dated 5/3/2020, Article 388 of the Presidential Decree No. 1 on the Organization of the Presidency and the Regulation on Environmentally Responsible Design of Energy Related Products.

Article 3

Definitions

For the purposes of this Communiqué, the following definitions shall apply:

l) ‘fan’ means a rotary-bladed machine that receives energy and utilises it by means of one or more impellers to maintain a continuous flow of air or other gas passing through it and, with a specific ratio lower than 1,1 and an output air velocity lower than 65 m/s, which can be of the following categories: axial, centrifugal, cross-flow, mixed-flow or jet, and made of at least an impeller, a motor and a stator, and includes any other significant elements that are supplied with the fan;
v) ‘significant elements’ means the elements of a fan that contribute to the continuous conversion of electric power into air volume flow rate and pressure, or that influence the efficiency of that conversion, namely:
(a) impeller(s), including all rotating elements that have an aerodynamic influence;
(b) electric motor;
(c) stator;
(d) other stationary aerodynamic elements that have an aerodynamic influence, including:
(i) inlet cone;
(ii) inlet or outlet guide vanes;
(iii) diffuser;
(e) other stationary elements that have an aerodynamic influence, including:
(i) mechanical transmission (aerodynamic influence and influence on efficiency);
(ii) electrical transmission (aerodynamic influence and influence on efficiency), such as cable conduits, frequency inverter, variable speed drive, terminal box, AC/DC converter;
(iii) structural components that hold the assembly in place and may interfere with the airflow (such as brackets supporting the motor or the bearings);
j) ‘best efficiency point’ (BEP) means the best energy efficiency point for fan operation, as declared by the manufacturer and specified by the fan speed, expressed in revolutions per minute (rpm);
z) ‘impeller’ means the rotating part of the fan that is imparting energy into the gas flow and is also known as the fan wheel;
i) ‘electric motor’ or ‘motor’ means a device that converts electrical input power into mechanical output power in the form of a rotation with a rotational speed and torque that depends on factors including the frequency of the supply voltage and the number of poles of the motor as applicable;
p) ‘inlet cone’, also known as venturi inlet, inlet bell, inlet radius, means a device that steers the air into the impeller and reduces the vena contracta and turbulence that would occur at the entrance of the impeller;
ö) ‘inlet guide vanes’ means vanes positioned before the impeller to guide the gas stream towards the impeller and which may or may not be adjustable;
f) ‘outlet guide vanes’ means vanes positioned after the impeller to guide the gas stream from the impeller and which may or may not be adjustable;
h) ‘diffuser’ means a device that influences the fan performance through static recovery;
t) ‘protective guard’ means a grid placed at fan inlet or outlet designed to prevent relatively large foreign bodies or human body elements from reaching the moving parts;
cc) ‘stator’ means the stationary part of the fan that interacts with the air stream passing through the impeller and, within the geometrical air-stream envelope between defined fan inlet and outlet sections, includes any element that may increase, and excludes any non-fan element that may decrease, the fan efficiency;
çç) ‘drive system’ means electric motor, transmission or direct drive and a variable speed drive if supplied;
ı) ‘direct drive’ means a driving arrangement for a fan where the impeller is fixed to the motor shaft, either directly or with a coaxial coupling, and where the impeller speed is identical to the motor’s rotational speed;
c) ‘transmission’ means a driving arrangement for a fan that is not direct drive, including using a belt drive, gearbox or slipping coupling;
ğ) ‘variable speed drive’ (VSD) means an electronic power converter, integrated or functioning as a separate unit, that continuously adapts the electric power supplied to a single motor, or multiple motors in order to control the motor’s mechanical power output according to the torque-speed characteristic of the load driven by the motor, by adjusting the power supply to a variable frequency and voltage supplied to the motor, including EC (electronically commutated) motors’ internal controllers, excluding variable voltage controllers where only the supply voltage for the motor is varied, including all integrated protection devices and auxiliaries;
y) ‘specific ratio’ means the stagnation pressure measured at the fan outlet divided by the stagnation pressure at the fan inlet at BEP;
m) ‘fan flow angle’ means the angle between incoming and outgoing gas flow direction of the fan impeller, expressed in degrees, as set out in Annex III;
b) ‘axial fan’ means a fan with a fan flow angle $< 20°$, as set out in point 4 of Annex III;
aa) ‘centrifugal fan’ means a fan with a flow angle $\geq 70°$, as set out in point 4 of Annex III;
ş) ‘mixed flow fan’ means a fan with a flow angle $\geq 20°$ and $< 70°$, as set out in point 4 of Annex III;

bb) ‘centrifugal blade angle’ means the blade angle β2 of a centrifugal fan, expressed in degrees, as set out in point 5 of Annex III;
ü) ‘forward curved fan’ means a centrifugal fan with a fan blade angle $\beta 2 > 90°$, as set out in point 5 of Annex III;
n) ‘backward curved fan’ means a centrifugal fan with a fan blade angle β2 where $0° < \beta 2 \leq 50°$, as set out in point 5 of Annex III;
o) ‘backward inclined fan’ means a centrifugal fan with a fan blade angle β2 where $50° < \beta 2 \leq 90°$, as set out in point 5 of Annex III;
e) ‘cross-flow fan’ means a fan in which the gas path through the impeller is in a direction essentially at right angles to its axis both entering and leaving the impeller at its periphery;
s) ‘jet fan’ means an axial, centrifugal or radial fan that produces a high velocity jet of air in a space (thrust), unconnected to any ducting, where the jet of air induces movement of the surrounding air, creating an overall air flow through the space, and that is designed for operation with open inlets and outlets rather than operating against pressure, including radial and centrifugal jet fans with an angle entrance of $\leq 90°$ to the outlet;
d) ‘declared values’ means the values provided by the manufacturer, importer or authorised representative for the stated, calculated or measured technical parameters in accordance with Article 6, for the verification of compliance by the Ministry;
k) ‘equivalent model’ means a model that 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, importer or authorised representative as another model with a different model identifier;
u) ‘model identifier’ means the code, usually alphanumeric, which distinguishes a specific product model from other models with the same trademark or the same manufacturer’s, importer’s or authorised representative’s name;
g) ‘multiple speed motor’ means a motor of which the rotating speed can be varied by energising different motor windings;
r) ‘air-circulating fan’ means a fan that is unconnected to any ducting, without a stator or with a stator that cannot be connected to ducting, used for moving air within a space, such as a room or open-air area. There is no partition between inlet and outlet and the air circulates freely from outlet to inlet, it operates against zero external pressure and is not a jet fan and is not marketed as such. Its measurement arrangement is as per measurement category E. Fans for which performance information at any pressure different than zero Pa is provided on the manufacturer’s website, catalogues, brochures, technical documentation, or other relevant means are not air circulating fans.
a) ‘EU’ means European Union;
ç) ‘Ministry’ means Ministry of Industry and Technology;

Article 5
Ecodesign requirements
The ecodesign requirements for fans are set out in Annex II and shall apply from the dates indicated therein.

Article 6
Conformity assessment
1. The conformity assessment procedure referred to in Article 10 of the Regulation on Eco-Design of Energy-Related Products shall be the internal design control system set out in Annex IV to that Directive or the management system for assessing conformity set out in Annex V to that Directive.
2. For the purposes of the conformity assessment pursuant to Article 10 of the Regulation on Eco-Design of Energy-Related Products, the technical documentation shall contain a copy of the declared values of parameters in point 2.2 of Annex II, of the declared values of the parameters of the test points in point 3 of Annex II and, where applicable, of the product information provided in accordance with points 2, 3 and 4 of Annex II to this Communiqué, and the details and results of calculations set out in Annex III.
3. Where the information included in the technical documentation for a particular model has been obtained by either of the following means, the technical documentation shall include the details of the calculation, the assessment undertaken by the manufacturer to verify the accuracy of the calculation and, where appropriate, the declaration of identity between the models of different manufacturers:
(a) from a model that has the same technical characteristics relevant for the technical information to be provided but is produced by a different manufacturer;
(b) by calculation on the basis of design or extrapolation from another model of the same or a different manufacturer, or both.
4. The technical documentation shall include a list of all equivalent models, including the model identifiers.
5. Where the manufacturer has used the compliance assessment options set out in point 2 of Annex III, non-significant elements removed, model scaling, test conditions and calculations and the place where the testing is conducted shall be duly reported in the technical documentation.
6. Where this Communiqué requires the provision of performance curves at different speeds pursuant to point 3 of Annex II, the technical documentation shall indicate the characteristics of the speed regulation device used, and the speed used (as a percentage of the inherent speed) for those curves.
7. A fan to which a VSD is added shall not be considered a new fan model requiring a new conformity assessment if:
(a) the VSD is physically located so as not to interfere with the air stream;
(b) the VSD can be removed from the fan for verification without damaging the fan and the VSD.

Article 7
Verification procedure for market surveillance purposes
Member State authorities shall apply the verification procedure laid down in Annex IV to this Communiqué when performing the market surveillance checks referred to in the second paragraph of Article 5 of the Regulation on Eco-Design of Energy-Related Products for the products covered by this Communiqué.

Article 8
Circumvention
1. Manufacturers, importers or authorised representatives shall not place on the market or put into service products designed to alter their behaviour or properties when being tested so as to achieve a more favourable result for any declared value of the parameters regulated in this Communiqué. That includes, but is not limited to, products designed to detect they are being tested by recognising the test conditions or test cycle and to automatically alter their behaviour or properties in response, and products preset to alter their behaviour or properties at the time of testing.
2. Manufacturers, importers or authorised representatives shall not prescribe specific test instructions that alter the behaviour or the properties of products to achieve a more favourable result for any of the declared values of the parameters regulated in this Communiqué. That includes, but is not limited to, prescribing a manual alteration of a product in preparation for the test that alters the product's behaviour or properties compared with when it is in normal use and operated by the end-user.
3. Manufacturers, importers or authorised representatives shall not place on the market or put into service products designed to alter their behaviour or properties within a short period of being put into service in a way that worsens any declared value for the parameters regulated in this Communiqué.

Article 9
Indicative benchmarks
The indicative benchmarks for the best-performing fans available on the market at the time of adopting this Communiqué are set out in Annex V.

Consultation Forum procedures
Article 10 - (1) The Ministry shall participate in the meetings of the Consultation Forum established by the European Commission, including the meetings where the EU legislation on which this Communiqué is based is reviewed by the European Commission in the light of technological developments.

Harmonization with EU legislation
Article 11 - (1) This Communiqué has been prepared within the framework of harmonization with European Union legislation based on Commission Regulation (EU) No 2024/1834 of July 3, 2024 on Eco-Design Requirements for Fans Driven by Motors with Electrical Input Power Between 125 W and 500 kW, Implementing Directive 2009/125/EC of the European Parliament and of the Council, Repealing Commission Regulation (EU) No 327/2011

Repealed Communiqué
Article 12 - (1) The Communiqué on Environmentally Friendly Design Requirements for Fans Driven by Motors with Electric Input Power Between 125 W and 500 kW published in the Official Gazette dated 20/12/2019 and numbered 30984 (SVGM: 2019/15) has been repealed.

Temporary measures
Temporary Article 1 - (1) Annex I, Annex II and Annex III of the Communiqué on Eco-Design Requirements for Fans Driven by Motors with Electric Input Power Between 125 W and 500 kW (SVGM: 2019/15) shall continue to be applied until 24/7/2037 in terms of fans integrated into other products and spare part fans.
(2) The units of the models placed on the market between the date of publication of this article and 24/7/2027 and complying with the provisions of this Communiqué shall be deemed to comply with the requirements of the Communiqué on Eco-Design Requirements for Fans Driven by Motors with Electric Input Power Between 125 W and 500 kW (SVGM: 2019/15).

Entry into force
Article 13 - (1) This Communiqué;
a) Article 8 and the second paragraph of Provisional Article 1 enters into foce on the date of publication,

b) Other provisions enter into force on 24/7/2027,

Execution

ARTICLE 14 - (1) The provisions of this Communiqué shall be executed by the Minister of Industry and Technology.

ANNEX I

DEFINITIONS APPLICABLE FOR THE PURPOSES OF THE ANNEXES

(1) 'measurement category' means a test, measurement or usage arrangement that defines the inlet and outlet conditions of the fan being tested;

(2) 'measurement category A' means an arrangement where the fan is measured with free inlet and outlet conditions, and a partition between inlet and outlet zone;

(3) 'measurement category B' means an arrangement where the fan is measured with free inlet and with a duct fitted to its outlet, and a partition between inlet and outlet zone;

(4) 'measurement category C' means an arrangement where the fan is measured with a duct fitted to its inlet and free outlet conditions, and a partition between inlet and outlet zone;

(5) 'measurement category D' means an arrangement where the fan is measured with a duct fitted to its inlet and outlet, and a partition between inlet and outlet zone;

(6) 'measurement category E' means an arrangement where the fan is measured with free inlet and outlet conditions, and without a partition between inlet and outlet zone;

(7) 'efficiency category' means the fan gas output energy form used to determine the fan energy efficiency, with a distinction for all fans except jet fans between 'static' or 'total' efficiency depending on whether the fan gas power has been determined with respectively the fan static pressure or fan pressure;

(8) 'fan efficiency' (η) means the ratio of the fan gas power output Pu and the electric input power Pe, both expressed in W and determined at BEP, multiplied with correction factors for power conversion Cp, part load compensation Cc and guard compensation Cguard, with a distinction between 'static' or 'total' efficiency depending on whether the fan gas power Pu has been determined with respectively the fan static pressure or fan pressure, in accordance with point 6.1 of Annex III;

(9) 'fan gas power' (Pu), in W, means the product of the volume flow rate qv, in m3/s, and the applicable pressure difference between fan inlet and outlet Δp (fan pressure or fan static pressure), in Pa, both determined at BEP, with a distinction between 'static' or 'total' fan gas power depending on whether the fan gas power has been determined with, respectively, the fan static pressure or fan pressure;

(10) 'electric input power' (Pe), in W, means the electric input power at BEP or Tm, measured at main terminals of motor or, when present, of variable speed drive;

(11) 'power conversion correction' (Cp), means a correction factor for power conversion losses, as determined according to point 6 of Annex III;

(12) 'part load compensation' (Cc) means a correction factor for part load, as determined according to point 6 of Annex III;

(13) 'guard compensation' (Cguard) means a correction factor, as determined according to point 6 of Annex III, that may be applied when calculating fan efficiency where the fan is equipped with permanently fitted protective guards that cannot be removed without making the fan inoperable;

(14) 'volume flow rate' (qv), in m3/s, means the gas volume displaced per unit of time by the fan and is derived from the mass flow rate, typically with standard air with a density ρ at default 1 200kg/m3;

(15) 'total pressure' (ptot), in Pa, means the pressure calculated from the absolute pressure and the dynamic pressure;

(16) 'absolute pressure' (p), in Pa, means the pressure measured with respect to absolute zero pressure;

(17) 'dynamic pressure' (pd), in Pa, means the pressure calculated from the velocity and the density;

(18) 'fan static pressure' (pfs), in Pa, means the difference between the static pressure at the fan outlet and the stagnation pressure at the fan inlet or, when the compressibility phenomenon is not a factor, the difference between the static pressure at the fan outlet and the total pressure at the fan inlet. It is the omnidirectional force per unit surface area exerted at the fan outlet and is typically assessed by measuring the stagnation pressure in a (cylindrical) hole of appropriate geometry and dimensions, in duct wall or appropriate measurement instrument perpendicular to the direction of the gas flow;

(19) 'fan pressure' (pf), in Pa, means the difference between the stagnation pressures at the fan outlet and the fan inlet or, when compressibility phenomenon is not a factor, the difference between the total pressures at the fan outlet and the fan inlet. It is the directional force per unit surface area exerted at the fan outlet and is typically assessed by measuring the stagnation pressure in a (cylindrical) hole of appropriate geometry and dimensions facing the direction of the gas flow;

(20) 'stagnation pressure' (psg), in Pa, means the pressure measured at a point in a flowing gas if it were brought to rest via a process where there is no transfer of heat or matter;

(21) 'efficiency grade' means a parameter in the calculation of the minimum energy efficiency of a fan of specific electric input power at its BEP or at Tm (expressed as parameter 'N' in the calculation of the fan energy efficiency);

(22) 'minimum fan efficiency' (ηmin) means the fan efficiency to be achieved in order to meet the requirements, calculated as the outcome of the appropriate equation in Annex II, using the applicable integer N of the efficiency grade and the electric input power Pe of the fan expressed in kW at its BEP;

(23) 'minimum jet fan efficiency (ηr,min)' means fan efficiency to be achieved in order to meet the requirements, calculated as the outcome of the appropriate equation in Annex II, using the applicable integer N of the efficiency grade and the electric input power Pe of the fan expressed in kW at its measured thrust;

(24) 'measured thrust (Tm)' is the jet fan thrust measured, in N, assessed according to measurement category E and converted to the density of 1,2;

(25) ‘jet-fan efficiency’ ηr(T) means the fan gas power output derived from the measured thrust of a jet fan divided by the electric input power Pe, multiplied with correction factors for power conversion Cp, part load compensation Cc and guard compensation Cguard, in accordance with point 6.2 of Annex III;
(26) ‘specific speed’ (σBEP) means the ratio between volume flow rate and fan pressure as dimensionless characteristic number determined at BEP, in accordance with point 8 of Annex III;
(27) ‘low noise fan’ means an axial fan with an electric input power of 10 kW or more with a maximum characteristic noise emission value $L \leq 32$ dB(A) at BEP;
(28) ‘dual use fan’ means a fan designed for both ventilation under normal conditions and emergency use as set out in Article 2(3), point (b);
(29) ‘reversible fan’ means a fan capable of reaching at least 80 % of the nominal forward volume flow rate in the reverse direction;
(30) ‘custom fan’ means a fan having a custom design for a specific customer and/or contract with respect to one or more of the significant elements, and an operating point or range specified by the customer/contract. These fans are only supplied to that customer/contract. Details are not presented in catalogues, online media or general selection tools. The performance details are specific to the application and the customer/contract;
(31) ‘safety critical fan’ means a fan that has been designed, verified, certified and manufactured under the scope of either the Regulation (EU) No 305/2011 or Directive 2014/34/EU relating to equipment and protective systems intended for use in potentially explosive atmospheres;
(32) ‘professional repairer’ means an operator or undertaking which provides services of repair and professional maintenance of fans;
(33) ‘manufacturer-authorised professional repairer’ means a professional repairer authorised by the manufacturer, importer or authorised representative to repair safety critical fans they place on the market;
(34) ‘wearing parts (sacrificial elements)’ means parts that are intentionally designed to wear, for the fan to meet the requirements of its intended use. For example, where a fan is used in an abrasive environment the fan can quickly become damaged by the abrasion. Some parts are designed as sacrificial elements to protect other critical areas and are designed to be replaced more frequently;
(35) ‘proprietary tool’ means a tool that is not commonly available and is specifically designed for a function that cannot be safely and/or reliably achieved by a commonly available tool;
(36) ‘inherent speed’ means the rotation speed of the fan, when the fan is operated at nominal or rated supply conditions of the motor;
(37) ‘guarantee’ means any undertaking by the manufacturer, importer or authorised representative to the consumer, to: (a) reimburse the price paid; or (b) replace, repair or handle fans in any way if they do not meet the specifications set out in the guarantee statement or in the relevant advertising;
(38) ‘spare part’ means a separate part that can replace a part with the same or similar function in a fan;
(39) ‘spare part fan’ means a fan intended to replace a corresponding existing fan that is integrated into a product.

ANNEX II

ECODESIGN RREQUIREMENTS FOR FANS

Fans shall comply with the ecodesign requirements set out in points 1 to 5 of this Annex, except for fans that meet all the following criteria:
(a) are integrated or placed on the market exclusively to be integrated into other products;
(b) are placed on the market within the first year after the date of application of this Communiqué;
(c) meet the requirements of Annex I to Communiqué on Environmentally Friendly Design Requirements for Fans Driven by Motors with Electric Input Power Between 125 W and 500 kW (SVGM: 2019/15), using the calculation methods in Annex II to that Regulation, and verifiable by market surveillance authorities in accordance with Annex III to that Regulation, in line with the fan’s declaration of conformity;
(d) the first unit of the concerned model is placed on the market before 24 July 2027.
However, until 24 July 2037, spare part fans replacing fans placed on the market before 24 July 2027, or until the date of the last placing on the market of the last unit of the model for fans that meet the criteria (a) to (d) above, and integrated into a product, are exempt from the requirements set out in points 1 to 5, provided that:
(a) in the range of products offered by the manufacturer/importer/authorised representative, there is no replacement fan that is fit to be integrated into the product in question which is compliant with this Communiqué;
(b) they comply with the information requirements set out in point 6;
(c) they meet the requirements set out in point 2 of Annex I of the Communiqué on Environmentally Sensitive Design Requirements for Fans Driven by Motors with Electric Input Power Between 125 W and 500 kW (SVGM: 2019/15) that were applicable at the date of placing on the market of the fan it is intended to replace, using the calculation methods in Annex II to that Regulation, and verifiable by market surveillance authorities in accordance with Annex III to that Regulation.

1. Minimum fan efficiency requirements

With effect from 24 July 2027, the following rules shall apply:
1. Fans, except jet fans, cross flow fans and fans referred to in point 7, shall have a fan efficiency (η) equal to or larger than the minimum fan efficiency (ηmin), which is a function of the electric input power Pe (in kW) and minimum efficiency grade N following the equations:

— for fans with Pe < 10 kW: ηmin = 4,56 ln(Pe) – 10,5 + N [%];
— for fans with Pe ≥ 10 kW: ηmin = 1,1 ln(Pe) – 2,6 + N [%].
2. Jet fans shall have a fan efficiency (ηr) equal to or larger than the minimum jet fan efficiency (ηr,min), which is a function of the electric input power Pe (in kW) and minimum efficiency grade N following the equations:
— for jet fans with Pe ≥ 750 W and < 10 kW: ηr,min = 7,32 ln(Pe) – 21,25 + N [%];
— for jet fans with Pe ≥ 10 kW: ηr,min = 1,73 ln(Pe) – 8,35 + N [%].
3. Cross flow fans shall have a minimum total fan efficiency (B,D) of at least 0,21 (21 %) over the entire power range.
4. The fan efficiency shall be established in accordance with the measurement and calculations methods set in Annex III.
Except for cross flow fans, the values of the minimum efficiency grade N are set out in Table 1 per fan type, efficiency category (static or total) and measurement category (A to E) as appropriate.
Table 1
Minimum efficiency grades

Fan type	Measurement category	Efficiency category (pressure)	Minimum efficiency grades (N)
Axial fans	A, C	static	50
	B, D	total	64
Forward curved < 5 kW and backward inclined centrifugal fans	A, C	static	52
	B, D	total	57
Other centrifugal fans	A, C	static	64
	B, D	total	67
Mixed flow fans	A, C	static	57 + 7 • (α – 45) / 25
	B, D	total	67
Jet fans ≥ 750 W	E		50

5. The calculation of the minimum efficiency grade N for mixed flow fans involves the fan flow angle α, in degrees rounded to the nearest integer, established in accordance with point 4 of Annex III.
6. For fans having the following characteristics, the values of the minimum efficiency grades N set out in Table 1 shall be multiplied by the corresponding factor(s), as applicable:

Fans characteristics	Factor value
Dual use fans designed for both ventilation under normal conditions and emergency use as set out in Article 2(3) point b	0,9
Reversible fans	0,85
Low noise fans	0,9

7. For centrifugal fans with specific speed σBEP < 0,12, electric input power Pe < 10 kW, measurement category B or D and efficiency category ‘total’, the minimum fan efficiency (ηmin) is a function of σBEP as follows: ηmin = 2,95 * σBEP + 0,2.
2. Product information requirements on fans
1. With effect from 24 July 2027, the information on fans set out in points 2(a) to (o) shall be visibly displayed in:

(a) the technical data sheet or user manual supplied with the fan, unless an internet link or a QR code linking to the free access website referred to in point (c) is supplied with the fan. A pictogram as in ISO 7000:2019 reference n°1641 is displayed next to the link or QR code;
(b) the technical documentation for the purposes of conformity assessment pursuant to Article 6, in the order as listed in points 2(a) to (q), the exact wording does not need to be repeated, information may be displayed using graphs, figures or symbols rather than text;
(c) free access websites of the manufacturer of the fan, its authorised representative or the importer for a period of at least 20 years after the placing on the market of the last unit of the model concerned.
2. The following information shall be displayed:
(a) fan type: select one of the following types: axial fan, forward curved centrifugal fan, backward curved centrifugal fan, backward inclined centrifugal fan, cross flow fan, mixed flow fan, jet fan;
(b) fan efficiency (η or ηr), either as a number rounded to the nearest third decimal, or as a percentage (with symbol '%') rounded to the nearest decimal;
(c) whether the calculation of fan efficiency assumed use of a VSD and if so, whether the VSD is integrated in the fan or the VSD must be installed with the fan;
(d) measurement category used to determine the fan efficiency (A-E);
(e) efficiency category (static or total), except for jet fans;
(f) efficiency grade N at BEP or Tm, except for cross flow fans;
(g) the electric input power Pe (in kW, rounded to the nearest third decimal), volume flow rate qv (in m3/h rounded to the nearest integer, or alternatively, when flow rate is $\geq$ 0,50 m3/s in m3/s rounded to the nearest second decimal), and applicable pressure difference Δp (in Pa, rounded to the nearest integer) at BEP or Tm;
(h) special characteristics: select one or more of the following: dual use fan, reversible fan, low noise fan;
(i) DC voltage lower than 100 V, with answer 'yes' or 'no';
(j) list of all significant elements supplied with the fan;
(k) specific speed σBEP , only for centrifugal fans with specific speed σBEP < 0,12, electric input power Pe < 10 kW, measurement category B or D and efficiency category 'total';
(l) fan speed in revolutions per minute (in rpm, rounded to the nearest integer) at BEP or Tm;
(m) the specific ratio, rounded to the nearest second decimal;
(n) manufacturer's name, registered trade name or registered trademark, and the address at which the manufacturer can be contacted;
(o) the model identifier and, where appropriate, other codes and marks sufficient for the product to be unequivocally and easily identified;
(p) information relevant for facilitating disassembly, recycling or disposal at end-of-life;
(q) information relevant to minimise impact on the environment and ensure optimal life expectancy as regards installation, use and maintenance of the fan.
For custom fans, the information listed in points (a) to (q) shall be provided with the commercial offers provided to the customers instead of on the free access websites.
The information referred to in points 2(a), 2(b), 2(c), 2(d), 2(e) and 2(f) and year of manufacture shall be durably marked on or near the rating plate of the fan, and for point 2(c) one of the following forms of words must be used if applicable:
— 'A variable speed drive must be installed with this fan',
— 'A variable speed drive is integrated within the fan'.
Manufacturers shall provide information in the user manual on specific precautions to be taken when fans are assembled, installed or maintained, including cleaning.
3. Information requirements on partial load or at specified duty
With effect from 24 July 2028, the following requirements shall apply:
1. For all fans, except custom fans, jet fans and fans with multiple speed motors:
The partial-load operational performance of the fan shall be provided for fans, except custom fans, jet fans and fans with multiple speed motors. This shall be described by a minimum of three performance curves at different speeds: one at the stated inherent speed, one at a lower speed of between 40 % and 50 % of the inherent speed, plus an additional one in the middle (± 10 percentage points) of the other two. More than three curves can be provided, including at any speeds including ones lower than 40 %.
Performance curves shall comprise a sufficient number of test points to permit the characteristic curve to be plotted over the normal operating range.
The information on the curves can be in digital form such as selection software or online catalogue. The values of volume flow, pressure, electric power, fan rotation speed and efficiency shall be provided for the individual test points.
This information shall be available in:
(a) the technical data sheet or user manual supplied with the fan, unless an internet link or a QR code to that information is supplied with the fan. A pictogram as in ISO 7000:2019 reference n° 1641 is displayed next to the link or QR code;

(b) the technical documentation for the purposes of conformity assessment pursuant to Article 6;
(c) the free access websites of the manufacturer of the fan, its authorised representative or the importer.
2. For custom fans, except jet fans:
The performance or performance curve of custom fans at the specified operating point(s) or operating range(s) shall be provided. A performance curve shall comprise a sufficient number of test points to permit the characteristic curve to be plotted over the normal operating range. The values of volume flow, pressure, electric power and efficiency shall be provided for the individual test points.
This information shall be available in:
(a) the commercial offers provided to the customers or the technical data sheet or user manual supplied with the fan, unless an internet link or a QR code to that information is supplied with the product. A pictogram as in ISO 7000:2019 reference n° 1641 is displayed next to the link or QR code;
(b) the technical documentation for the purposes of conformity assessment, pursuant to Article 6.
3. For jet fans:
The partial-load operational performance of the fan shall be provided for jet fans:
(a) for jet fans with a single speed motor there is no partial load operation, and no partial load information is required;
(b) for jet fans without variable speed drives or not intended to be used with variable speed drives, but fitted with a multiple fixed speed motor, the additional operating point is at the lower speed settings;
(c) for jet fans with a variable speed drive or intended to be used with a variable speed drive the additional data points shall be at 30 % and 50 % of the inherent speed.
For each operating point, the published data shall include thrust, electric input power, rotational speed and efficiency, as a minimum.
This information shall be available in:
(a) the technical data sheet or user manual supplied with the fan, unless an internet link or a QR code to that information is supplied with the fan. A pictogram as in ISO 7000:2019 reference n° 1641 is displayed next to the link or QR code;
(b) the technical documentation for the purposes of conformity assessment pursuant to Article 6;
(c) the free access websites of the manufacturer of the fan, its authorised representative or the importer.
For custom jet fans, the information shall be provided with the commercial offers provided to the customers instead of on the free access websites.
4. For fans with multiple speed motors except jet fans, the curves shall be provided for the motor's inherent and minimum speed available to the customer in the same conditions as set out in points 1 and 2 depending on whether or not the fan is a custom fan.
4. Resource efficiency requirements
For fans that are specifically designed and marketed exclusively to be integrated in specific energy-related products covered by ecodesign requirements with respect to spare part availability, the specific provisions of the implementing regulation applicable to the product in question shall apply, for the duration specified therein, in place of the requirements set out in this point.
For custom fans for which spare part availability is addressed in the contract, and which are not covered by the previous paragraph, no specific requirements shall apply.
For other fans, the following requirements shall apply from 24 July 2027:
1. Availability of spare parts and software updates:
(a) For all models, units of which are placed on the market as from 24 July 2027, manufacturers, importers or authorised representatives of fans, other than safety critical fans, shall make available to professional repairers at least the following spare parts, if part of the fan, as individual elements or in an assembly when integrated as originally supplied:
(1) motors of which the rated power is lower than 10 kW;
(2) motor brushes;
(3) impellers;
(4) stator elements;
(5) mechanical drive components;
(6) variable speed drives;
(7) sensors;
(8) wearing parts (sacrificial elements);
(9) joints and fixtures required to install these spare parts;
(10) fan bearings;
(11) motor bearings when the fan is integrated with the motor above 1 kW.

(b) For all models, units of which are placed on the market as from 24 July 2027, manufacturers, importers or authorised representatives of safety critical fans shall make available to manufacturer-authorised professional repairers at least the following spare parts, if part of the fan, as individual elements or in an assembly when integrated as originally supplied:
(1) motors, of which the rated power is lower than 10 kW;
(2) motor brushes;
(3) impellers,
(4) stator elements;
(5) mechanical drive components;
(6) variable speed drives;
(7) sensors;
(8) wearing parts (sacrificial elements);
(9) joints and fixtures required to install these spare parts;
(10) fan bearings;
(11) motor bearings when the fan is integrated with the motor above 1 kW.
(c) Availability of spare parts referred to in points (a) and (b) shall be ensured for a minimum period starting at the latest 24 July 2029 or two years after the placing on the market of the first unit of the model, whichever is the later date, and ending at least 10 years after placing on the market the last unit of the model concerned. For that purpose, the list of spare parts, the procedure for ordering them shall be publicly available on the free access website of the manufacturer, importer or authorised representative, at least during the same period and starting at the date referred to in this point. For safety critical fans, the website providing the list of spare parts and the procedure for ordering them and the repair information may be restricted by username and password to manufacturer-authorised professional repairers.
(d) Maximum delivery time of spare parts:
During the period mentioned in point (c), the manufacturer, importer or authorised representative shall ensure the delivery of the spare parts with the following timeframe:
(1) as specified in a contract, where a contract exists between the manufacturer and the end user of the fan;
(2) if not, as specified in the product information of the fan and made available on free access websites;
(3) if not, then no later than 6 weeks after having received the order.
(e) Manufacturers, importers or authorised representatives shall ensure that the spare parts mentioned in points (a) and (b) can be replaced without permanent damage to the product.
(f) When manufacturers, importers or authorised representatives of fans make available software and firmware updates, these shall remain available for a minimum of 10 years after the placing of the last unit of a model on the market, and these software and firmware updates shall be provided free of charge.
2. Access to repair information:
(a) During the period referred to in point 1(c) the manufacturer, importer or authorised representative shall provide access to the fan repair information to professional repairers.
The manufacturer's, importer's or authorised representative's website shall indicate the process for professional repairers to request access to information. In order to accept such a request, the manufacturers, importers or authorised representatives may only require the professional repairer to demonstrate that:
(1) the professional repairer has the technical competence to repair fans and complies with the applicable regulations for repairers of electrical equipment in the Member States where it operates. Reference to an official registration system as professional repairer, where such system is in place in the Member States concerned, shall be accepted as proof of compliance with this point;
(2) the professional repairer is covered by insurance covering liabilities resulting from its activity regardless of whether this is required by the Member State.
(b) manufacturers, importers or authorised representatives shall accept or refuse the request referred to in point (a) within 5 working days;
(c) manufacturers, importers or authorised representatives may charge reasonable and proportionate fees for access to the repair information or for receiving regular updates. A fee is reasonable if it does not discourage access by failing to take into account the extent to which the professional repairer uses the information;
(d) once the request is accepted, a professional repairer shall have access to the requested repair information within one working day. The information may be provided for an equivalent model or model of the same family, where relevant;
(e) The repair information shall include:
(1) the unequivocal appliance identification;
(2) a disassembly map or exploded view allowing to visualise at least the spare parts made available;
(3) a technical manual with instructions for repair;
(4) a list of necessary repair and test equipment including details of any proprietary tool required for repair;
(5) component and diagnosis information (such as minimum and maximum theoretical values for measurements);

(6) wiring and connection diagrams;
(7) diagnotic fault and error codes (including manufacturer-specific codes, where applicable);
(8) instructions for installation of relevant software and firmware including reset software;
(9) information on how to access data records of reported failure incidents stored on the product (where applicable).
3. Requirements for dismantling for material recovery and recycling while avoiding pollution:
(a) manufacturers, importers or authorised representatives shall ensure that fans are designed in such a way that the materials and components referred to in Annex-3 of the Regulation on the Management of Waste Electrical and Electronic Equipment published in the Official Gazette dated 26/12/2022 and numbered 32055 can be removed with the use of commonly available tools;
(b) manufacturers, importers and authorised representatives shall fulfil the obligations laid down in Article 16 of the Regulation on the Management of Waste Electrical and Electronic Equipment.
5. Material efficiency product information requirements
For a minimum period starting at the latest 24 July 2029or two years after the placing on the market of the first unit of the model, whichever is the later date, and ending at least 10 years after placing on the market of the last unit of the model concerned, user and installer instructions shall be provided in the form of a user manual on free access websites of manufacturers, importers and authorised representatives, and shall include the following information:
(a) how to access professional repair services (internet webpages, addresses, contact details);
(b) relevant information for ordering the spare parts made available to end-users, directly from the manufacturer or through other channels;
(c) the minimum period during which these spare parts are available;
(d) the minimum duration of the guarantee of the fan in years;
(e) details of any proprietary tool required for repair;
(f) instructions of correct installation;
(g) instructions for maintenance;
(h) identification of errors, the meaning of the errors and the action required, including identification of errors requiring professional assistance;
(i) information on any implications of self-repair or non-professional repair for the safety of the user and for the guarantee.
6. Product information requirements for spare part fans
From 24 July 2027, the packaging (or the product itself in the absence of packaging), the technical data sheet or user manual supplied with the fan, and product information available online and in catalogues shall indicate in a clear and visible manner:
'This fan does not meet the performance requirements of Regulation (EU) 2024/1834 with regard to ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW, and can only be used to replace a corresponding existing fan placed on the market before 24 July 2027 and integrated into a product, because no compliant fan is fit to be used as a replacement'.
The technical data sheet or user manual supplied with the spare part fan shall provide:
(a) manufacturer's name, registered trade name or registered trademark, and the address at which the manufacturer can be contacted;
(b) the model identifier and, where appropriate, other codes and marks sufficient for the product to be unequivocally and easily identified;
(c) information relevant for facilitating disassembly, recycling or disposal at end-of-life;
(d) information relevant to minimise impact on the environment and ensure optimal life expectancy as regards installation, use and maintenance of the fan;
(e) information about the product or products in which the spare part fan is to be integrated.

ANNEX III

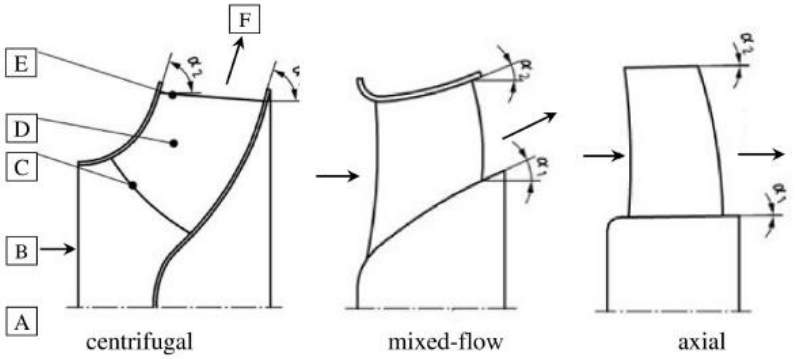
MEASUREMENTS AND CALCULATIONS

1. For the purposes of compliance and verification of compliance with the requirements of this Communiqué, 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 using other reliable, accurate and reproducible methods that take into account the generally recognised state-of-the-art methods, in line with provisions set out in points 2 to 8.
In the absence of existing relevant standards and until the publication of the references of the relevant harmonised standards in the Official Journal, the transitional testing methods set out in Table 2, or other reliable, accurate and reproducible methods, which take into account the generally recognised state-of-the-art methods, shall be used, in line with provisions sent out in points 2 to 8.
Manufacturers, importers or authorised representatives shall use the declared values of the parameters referred to in Article 6(2) for the calculations in this Annex.

2. For the purpose of assessing compliance with the requirements of this Communiqué and provided that reliable, accurate and reproducible test- and calculation methods are used, the manufacturer:
(a) may remove the elements that are not significant elements as defined in Article 4, point (1), subparagraph (v);
(b) may conduct the tests with the geometrical equivalent of the stator inner surface;
(c) may conduct the tests with a scale model of the fan and calculate the results for the real-size fan if the fan has an impeller diameter above 1 m for jet fans or 0,5 m for other fans;
(d) may conduct the tests at customer's or manufacturer's site if the fan has an impeller diameter above 1 m for jet fans or 0,5 m for other fans.
3. The compliance of fans with multiple speed motors shall be determined at the power and speed corresponding to the highest speed made available to the customer.
The compliance of fans of which the blade pitch angle can be adjusted to fulfil the customer's duty point shall be determined using the least favourable pitch configuration made available to the customer.
4. Fan flow angle
The fan flow angle α is calculated as the average value of angles α1 and α2 following the formula:

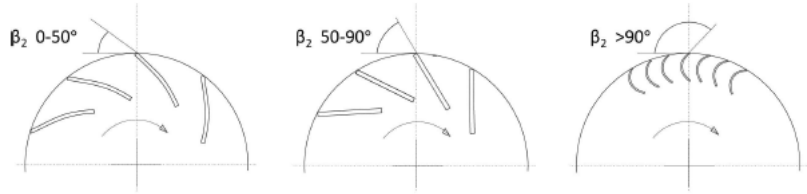
$$\alpha = \frac{\alpha_1 + \alpha_2}{2}$$

where:
α1 is the angle to the direction of the rotational axis of the tangent at the hub at the intersection of the blade trailing edge with the hub;
α2 is the angle to the direction of the rotational axis of the tangent at the shroud or at the outer diameter of the blade at the intersection of the blade trailing edge with the shroud or with the outer diameter of the blade, given that, if the hub and/or shroud are not axisymmetric, angles α1 and α2 are the average values in circumferential direction.
An impeller defined as 'axial' if $\alpha < 20°$, 'mixed-flow' if $20° \leq \alpha < 70°$ and 'centrifugal' if $\alpha \geq 70°$.



Where:
A = rotation axis; B = inflow; C = leading edge; D = blade; E = trailing edge; F = outflow

5. Centrifugal blade angle
'Centrifugal blade angle β2 means the angle between the tangent to the outer circumference of the outer circle, as defined by the trailing edge of the blades, and a line bisecting the trailing edge of the blade. To consider blade designs that have a rapid change of angle at the trailing edge, the angle is the arithmetic mean along 50 % of the trailing length of the blade. The trailing edge of the blade is the edge at the tip of the blade at the outlet of the impeller. A centrifugal impeller is defined as 'backward curved' if $0° < \beta2 \leq 50°$, 'backward inclined' if $50° < \beta2 \leq 90°$ and 'forward-curved' if $\beta2 > 90°$.



Backward curved Backward inclined Forward curved

6. Fan efficiency

6.1. Fans, other than jet fans

The fan efficiency is calculated as follows:

$$\eta = C_p \bullet C_c \bullet C_{guard} \bullet P_u / P_e$$

where:

Cp is a correction factor for power conversion losses with a value of 0,9 for fans equipped with a DC motor with a rated voltage lower than 100 V when the converter transforming AC into DC is not part of the fan, and 1,0 otherwise;

Cc is a correction factor for part load compensation with one of the following values:

— Cc = 1 for a fan without a variable speed drive;

— Cc = 1,04 for a fan with a variable speed drive and Pe ≥ 5 kW and where this variable speed drive is included in the fan conformity assessment;

— Cc = 1 + 0,0812 (Pe)–0,5 for a fan with a variable speed drive and Pe < 5 kW and where this variable speed drive is included in the fan conformity assessment;

Cguard is a correction factor for guard compensation that may be applied when calculating fan efficiency in case the fan is equipped by permanently fitted protective guards that cannot be removed without making the fan inoperable. The value of Cguard is:

— 1 for a fan without a protective guard, with removable protective guard, or a protective guard with opening e > 30 mm;

— 1 + (30-e) • 0,004 for a fan equipped with a protective guard with opening 20 < e ≤ 30 mm;

— 1,04 + (20-e) • 0,0035 for a fan equipped with a protective guard with opening 10 < e ≤ 20 mm;

— 1,075 + (10-e) • 0,0375 for a fan equipped with a protective guard with opening 8 < e ≤ 10 mm;

— 1,15 for a fan equipped with a protective guard with opening e ≤ 8 mm,

where ‘e’ is the dimension of the opening, corresponding to the side of a square opening, the diameter of a round opening and the narrowest dimension of a slot opening, as defined in section 4.2.4.1 of standard EN ISO 13857:2019;

Pu, in W, is the product of the volume flow rate qv, in m3/s, and the applicable pressure difference between fan in- and outlet Δp, in Pa, both determined at BEP, following the expression:

$$P_u = q_v \bullet \Delta p,$$

were qv, in m3/s, is the gas volume displaced per unit of time by the fan and is derived from the mass flow rate, typically with standard air with a density ρ at default 1 200kg/m3.

6.2. Jet-fans

The jet-fan efficiency ηr(T) is calculated as:

$$\eta_r(T) = Cp \bullet Cc \bullet Cguard \bullet q_v(T) \bullet \frac{\Delta p(T)}{P_e} = Cp \bullet Cc \bullet Cguard \bullet 0,5 \sqrt{\frac{T_m}{\rho \bullet A_2}} \bullet \frac{T_m}{P_e}$$

where:

qv(T) is volume flow rate at thrust T, in m3/s;

Δp(T) is pressure difference at thrust T, in Pa;

Pe electric input power supplied to the fan, in W;
ρ is the standard air density (1,2 kg/m3);
A2 is the gross fan outlet area in m2;
Tm is the jet fan thrust as defined in Annex I (24);
Cp, Cc and Cguard are correction factors as outlined in section 6.1 above.
7. Characteristic noise emission value L
The characteristic noise emission value, in dB(A) is defined as

$$L = PWL_{impeller} - 30 \log u_{tip} - 10 \log (0{,}001 \cdot q_v \cdot p_{fs}) + 5 \log D_{impeller}$$

where:
PWL impeller is impeller sound power level at BEP, in dB(A);
u tip is impeller tip speed at BEP, in m/s;
qv is volume flow rate at BEP, in m3/s;
pfs is fan static pressure at BEP, in Pa;
Dimpeller is impeller diameter, in m.
8.
Specific speed σBEP
The specific speed σBEP of centrifugal fans with electric input power Pe < 10 kW, measurement category B or D and efficiency category 'total' is defined as:

$$\sigma_{BEP} = n \cdot \frac{2 \cdot \sqrt{\pi \cdot q_{v,BEP}}}{\left(2 \cdot \frac{p_{f,BEP}}{\rho}\right)^{0,75}}$$

where:
σBEP is specific speed;
n is fan speed in revolutions per second (rps);
ρ is air density 1,2 kg/m3;
qv,BEP is volume flow rate at BEP, in m3/s;
pf,BEP is fan pressure at BEP, in Pa;
π is the number pi (3,14…).
Table 2
References and qualifying notes for fans
(The source of all references is CEN unless otherwise indicated)

Parameter	Reference/Title	Notes and short description
	FprEN 17166:2020 Fans – Procedures and methods to determine the energy efficiency for the electric input power range of 125 W up to 500 kW	
Measurement category	4.3 Identification of an appropriate measurement category.	The measurement category means a test, measurement or usage arrangement that defines the inlet and outlet conditions of the fan under test, used to determine the energy efficiency. Categories included are numbered A through E, according to EN ISO 13349:2010 and EN ISO 5801:2017 subclauses 6.2, 6.3, 6.4, 6.5 (categories A though D) and EN ISO 13350:2015 (category E – jet fans).
Efficiency category	3.15.1 and 3.15.3 Definitions of fan pressure and fan static pressure.	The fan gas output energy form used to determine the fan energy efficiency, defined by fan pressure or fan static pressure.
Efficiency grade	6.1 and 6.2 Method of comparison between efficiency grades.	Parameter in the calculation of the minimum fan energy efficiency is denoted in this Regulation as 'N'. In FprEN 17166:2020 the minimum required efficiency grade is denoted N_g.
Fan efficiency	5.5.2.5 Testing of jet fans.	Jet fan overall efficiency is calculated following EN ISO 13350:2015.
Volume flow rate q_v	3.18 Volume flow rate.	Volume flow rate q_{v1} is the mass flow rate divided by the density at fan inlet: $q_{v1} = q_m/\rho_1$. EN ISO 5801:2017 subclause 11.2 and Annex A for mass flow rate measurement and calculation, whereby the volume flow rate can be calculated according to subclause 15.1.8.
Specific speed σ_{BEP}	3.15.1	The ratio between flow rate and fan pressure as dimensionless characteristic number determined at BEP, which can be calculated according to Annex III, 8. The needed fan pressure can be calculated according to FprEN 17166:2020 subclause 3.15.1.
	EN ISO 5801:2017 Fans – Performance testing using standardised airways	
Pressure difference Δp (in Pa) at BEP	12.8.9 Method of measurement.	Describes how to measure pressure difference between fan inlet and outlet, which following the Regulation has to be measured at BEP.
Fan speed (rpm)	7.2 and 12.3 Rotational speed.	
Specific ratio	15.1.6 Fan pressure.	The stagnation pressure measured at the fan outlet divided by the stagnation pressure at the fan inlet at nominal flow rate. The specific ratio can be calculated from EN ISO 5801:2017 subclause 3.35 where it is defined as fan pressure ratio (r), where $r = p_{sg2}/p_{sg1}$.
	IEC/EN 60034-2-1:2014 Rotating electrical machines – Part 2-1: Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)	
Electric input power P_e (in kW)	6.1.2 Direct measurement of input (P_1) and output (P_2).	The electric input power at BEP, measured at main terminals of motor or, when present, variable speed drive. EN IEC/60034-2-1:2014 for the electric input power of electric motors fed directly from the grid, EN IEC 61800-9-2:2017 for the electric input power of electric motors combined with and fed by a CDM).

ANNEX IV

VERIFICATION PROCEDURE FOR MARKET SURVEILLANCE PURPOSES

1. The verification tolerances defined in this Annex relate only to the verification by Ministry 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 these values with a view to achieving compliance or to communicate better performance by any means.

2. Where a model is not in conformity with the requirements laid down in Article 8, 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 Communiqué pursuant to the second paragraph of Article 5 of the Regulation on Eco-Design of Energy-Related Products, the authorities of the Ministry shall apply the following procedure:

(a) the Ministry 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 Communiqué if all the following conditions are fulfilled:

(i) the declared values given in the technical documentation pursuant to Articles 2 and 3 in Annex 4 of the Regulation on Eco-Design of Energy-Related Products and, where applicable, the values used to calculate these values, are not more favourable for the manufacturer, importer or authorised representative than the results of the corresponding measurements carried out pursuant to point 3(f) of that Annex;

(ii) the declared values meet any requirements laid down in this Communiqué 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;

(iii) when the Ministry authorities check the unit of the model, it complies with the product information requirements in points 2, 3, 5 and 6 and resource efficiency requirements in point 4 of Annex II, as applicable;

(iv) when the Ministry 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 set out in Table 3;

(v) the fan type determined following the application of points 8(a) (b) or (c) is the same as the declared fan type.

4. Where the results referred to in points 3(b), (i), (ii) and (iii) are not achieved, the model and all equivalent models shall be considered not to comply with this Communiqué.

5. Where the result referred to in point 3(b)(iv) or (v) is not achieved:

(a) for models that are produced in quantities of less than 25 per calendar year including equivalent models, the model and all equivalent models shall be considered not to comply with this Communiqué;

(b) for models that are produced in quantities of 25 or more per calendar year including equivalent models, 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 one or more of equivalent models.

6. The model shall be considered to comply with the applicable requirements if, for the three units referred to in point 5(b), the arithmetical mean of the determined values, complies with the respective verification tolerances set out in Table 3, and if the fan type determined following the application of points 8(a) (b) or (c) is the same as the declared fan type, where the determined value of α and/or $\beta 2$ means the arithmetical mean of the values determined for those three additional units.

7. Where the result referred to in point 6 is not achieved, the model and all equivalent models shall be considered not in compliance with this Communiqué.

8. When the Ministry authorities verify the correspondence between fan type, centrifugal blade angle $\beta 2$ and/or fan flow angle α and the minimum efficiency grade (N) specified in Table 1, they shall, for the purpose of this Annex:

(a) for centrifugal fans declared as backward inclined fans, or as forward curved fans and driven by a motor with an electric input power < 5 kW: use the fan type and N value corresponding to 'other centrifugal fan' if the determined value of $\beta 2$ is less than 47°;

(b) for centrifugal fans declared as backward inclined fans and driven by a motor with an electric input power Pe >= 5 kW: use the fan type and N value corresponding to 'other centrifugal fan' if the determined value of $\beta 2$ is more than 93°;

(c) for fans declared as axial fans, efficiency category 'total': use the fan type and N value corresponding to 'mixed flow fans' if the determined value of α is more than 23°;

(d) for fans declared as axial fans or mixed flow fans, efficiency category 'static': use the N value directly resulting from the determined value of α.

9. The Ministry 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 relevant market surveillance legislation after a decision is taken on the non- compliance of the model according to points 2, 4, 5(a), 7 or 11.

10. The Ministry authorities shall use the measurement and calculation methods set out in Annex III.

11. When the Ministry authorities verify the performance curves referred to in point 3 of Annex II, a minimum of two declared test points for each of the characteristic curves shall be tested, in line with points 3 to 10 above, taking into account points 12 to 14 below. If one of the declared test points is found non-compliant, the model and all equivalent models shall be considered non-compliant with this Communiqué.

12. Ministry authorities may decide to undertake the verification procedure of fans with an impeller diameter above 1 m for jet fans or 0,5 m for other fans at the premises of manufacturers, authorised representatives or importers before the products are put into service. The Ministry authority can do this verification using its own testing equipment.
13. If factory acceptance tests are planned for such fans, which will test parameters laid down in Annex II of this Communiqué, the Ministry authorities may decide to use witnessed testing during these factory acceptance tests to gather test results which can be used to verify compliance of the fan under investigation. The authorities may request a manufacturer, authorised representative or importer to disclose information on any planned factory acceptance tests relevant for witnessed testing.
14. In the cases mentioned in points 12 and 13, the Ministry authorities only need to verify one single unit of the model. If the results referred to in point 3(b)(iv) and 3(b)(v) are not achieved, the model and all equivalent models shall be considered not to comply with this Communiqué.
15. When testing fans at partial load, the Ministry authorities shall use a variable speed drive without filters, with a view to minimising VSD energy losses.
16. The Ministry authorities shall only apply the verification tolerances set out in Table 3 and shall only use the procedure described in this Annex for the requirements referred to in this Annex. For the parameters in Table 3, no other tolerances such as those set out in harmonised standards or in any other measurement method shall be applied.
Table 3
Verification tolerances

Parameters	Verification tolerances
Fan efficiency (η)	The determined value* shall not be lower than the value representing 93 % of the corresponding declared value at BEP or T_m, and not be lower than the value representing 85 % of the corresponding declared value at partial load.
Electric input power (P_e)	The determined value* shall not be higher than the value representing 107 % of the corresponding declared value at BEP or T_m, and not be higher than the value representing 110 % of the corresponding declared value at partial load.
Volume flow rate (q_v)	The determined value* shall not differ by more than 5 % from the corresponding declared value at BEP or T_m, and not more than 10 % than the corresponding declared value at partial load.
Pressure difference (Δp), 'fan static pressure' (p_{fs}) or 'fan pressure' (p_f)	The determined value* shall not differ by more than 5 % from the corresponding declared value at BEP, and not more than 10 % than the corresponding declared value at partial load.
Fan speed (rpm)	The determined value* shall not differ by more than 2 % from the corresponding declared value.
Characteristic noise emission value (L)	For fan declared as low noise fans: the determined value* shall not exceed the declared value of 32 dB by more than 3 dB with respect to 1 pW.

* Where three additional units are tested in accordance with point 5(b), the determined value means the arithmetical mean of the values determined for those three additional units.

ANNEX V
INDICATIVE ENCHMARKS
The maximum values relate to the achievable efficiency grade N (minimum efficiency formulas are set out in Annex II) with clean air and no space and/or noise restrictions. The minimum values apply to contaminated air (some dust load) and space, noise and/or other operational restrictions at the limit of what is still in scope according to the exemptions in Article 2.
Table 4
Indicative benchmarks for fans

Fan type	Measurement category	Pressure	N minimum	N maximum
Axial fans	A, C	static	50	75
	B, D	total	64	85
Forward curved < 5 kW and backward inclined fans	A, C	static	52	65
	B, D	total	57	70
Forward curved ≥ 5 kW, backward curved fans	A, C	static	64	80
	B, D	total	67	85
Mixed flow fans	A, C	static	57 + 7 • (α – 45) / 25	77
	B, D	total	67	85
Jet fans	E		50	60

Cross flow fans: 21 % efficiency.