SLOVENSKI STANDARD
oSIST prEN 17166:2024

01-oktober-2024

Ventilatorji - Postopki in metode za ugotavljanje energijske učinkovitosti za naprave z električno vhodno močjo v območju od 125 W do vključno 500 kW

Fans - Procedures and methods to determine the energy efficiency for the electrical input power range of 125 W up to 500 kW

Ventilatoren - Verfahren und Methoden zur Ermittlung der Energieeffizienz für die elektrische Eingangsleistung im Bereich von 125 W bis 500 kW

Ventilateurs - Procédures et méthodes pour déterminer l'efficacité énergétique pour la gamme de puissance d'entrée électrique de 125 W jusqu'à 500 kW

Ta slovenski standard je istoveten z: **prEN 17166**

ICS:

23.120	Zračniki. Vetrniki. Klimatske naprave	Ventilators. Fans. Air-conditioners

oSIST prEN 17166:2024 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 17166

August 2024

ICS 23.120

English Version

Fans - Procedures and methods to determine the energy efficiency for the electrical input power range of 125 W up to 500 kW

Ventilateurs - Procédures et méthodes pour déterminer et évaluer l'efficacité énergétique pour la gamme de puissance d'entrée électrique de 125 W jusqu'à 500 kW

Ventilatoren - Verfahren und Methoden zur Ermittlung der Energieeffizienz für die elektrische Eingangsleistung im Bereich von 125 W bis 500 kW

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 156.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword

This document (prEN 17166:2024) has been prepared by Technical Committee CEN/TC 156 “Ventilation for buildings”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

1 Scope

This document provides procedures and methods for measuring and/or calculating the energy efficiency and associated characteristics of fans when driven by electric motors. This document deals with the following fan types;

— axial fan;

— centrifugal forward curved fan, centrifugal radial bladed fan;

— centrifugal backward curved fan without housing, including centrifugal backward aerofoil fans;

— centrifugal backward curved fan with housing, including centrifugal backward aerofoil fans;

— mixed flow fan;

— cross flow fan;

— jet fan.

It provides procedures and methods to evaluate the compliance of the fan efficiency against minimum efficiency requirements.

This document includes stand-alone fans and fans that are integrated in other products. It gives guidance to manufacturers in providing information to surveillance authorities to describe the full extent of the fan by describing boundaries, significant elements and additional parts.

Some units previously identified as fans are now defined as Uni-Directional Ventilation Units. This document explains and shows by way of examples the difference between fans and Uni-Directional Ventilation Units.

This standard does not include:

— Uni-Directional Ventilation Units;

— fans that are designed specifically to operate in toxic, highly corrosive or flammable environments or in environments with abrasive substances, see Annex C.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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) (IEC 60034-2-1:2014)*

EN ISO 5801:2017, *Fans — Performance testing using standardized airways (ISO 5801:2017)*

EN ISO 5802:2008, *Industrial fans — Performance testing in situ (ISO 5802:2001)*

EN ISO 12759-4:2019, *Fans — Efficiency classification for fans — Part 4: Driven fans at maximum operating speed (ISO 12759-4:2019)*

EN ISO 13349-1:2022, *Fans — Vocabulary and definitions of categories — Part 1: Vocabulary (ISO 13349-1:2022)*

EN ISO 13350:2015, *Fans — Performance testing of jet fans (ISO 13350:2015)*

ISO 13348:2007, *Industrial fans — Tolerances, methods of conversion and technical data presentation*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org

3.1
fan
rotary-bladed machine that receives mechanical energy and utilizes it by means of one or more impellers fitted with blades to maintain a continuous flow of air or other gas passing through it and whose work per unit mass does not normally exceed 25 kJ/kg

[SOURCE: EN ISO 13349-1:2022, definition 3.1.1]

Note 1 to entry: A fan in this standard is a configuration of significant elements, see 5.3.1. These significant elements are required for continuous conversion of electrical power into air volume flow rate and pressure.

Note 2 to entry: A fan as defined in Regulation 327/2011 means a configuration of at least an impeller, stator and motor. These items are considered significant elements.

Note 3 to entry: A fan is a version of a Motor Driven Unit (MDU) and consists of at least a configuration of an impeller, stator and motor.

Note 4 to entry: A fan in this standard is an Extended Product that consist of Driven Equipment and Motor System, see Figure 1.

3.1.1
integrated fan
fan that is integrated into another product with the fan being a configuration of at least an impeller, stator and motor

Note 1 to entry: Based on Article 1 (1) of Regulation 327/2011.

Note 2 to entry: An additional casing around the fan is not part of the fan, but part of another energy related product. Please refer to 5.3 for further information.

Note 3 to entry: Integrated also means a fan embedded within another energy related product.

Note 4 to entry: Annex A provides further information.

3.1.2
stand-alone fan
fan that is installed as a unique entity and not integrated into any other product

Note 1 to entry: It may or may not have ducting connected to its inlet and outlet.

3.2
fan driven by motor
fan driven by an electrical motor (included all transmissions and drives)

Note 1 to entry: One or more impellers fitted to or connected to a motor, with or without a drive mechanism, or a housing or a means of variable speed drive.

Note 2 to entry: See Figure 12.

3.3
extended product
EP
driven equipment together with its connected motor system

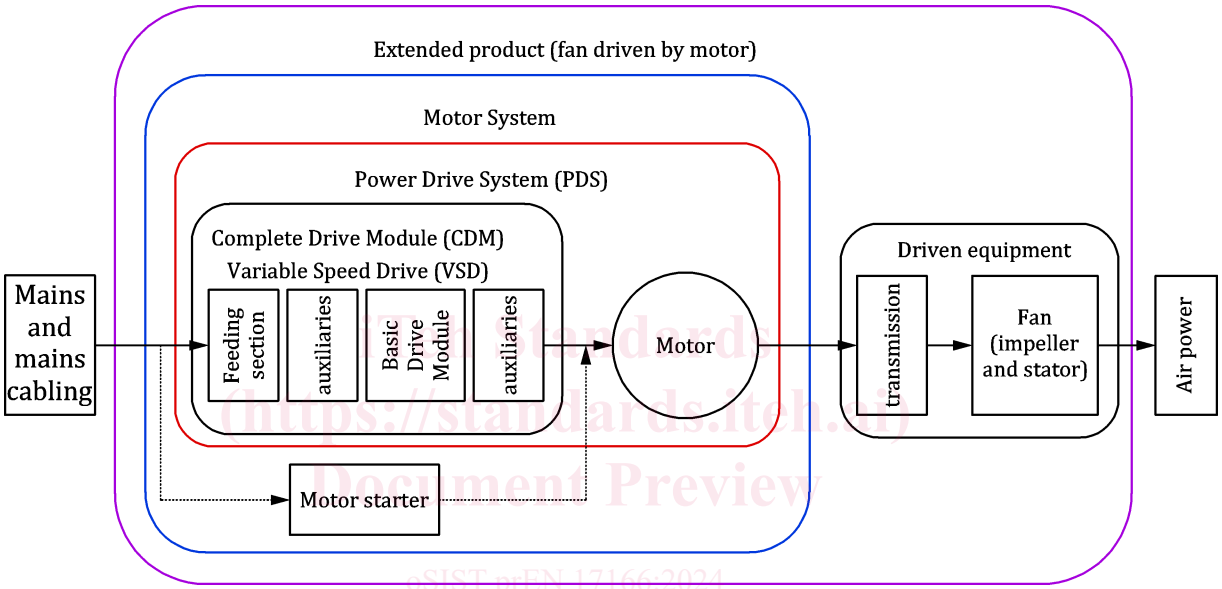


Figure 1 — Illustration of extended product – fan driven by motor

Note 1 to entry: The extended product in this standard is ‘fan driven by motor’ reference 3.2.

Note 2 to entry: A Complete Drive Module (CDM) is also known as an VSD (see 3.17).

[SOURCE: adapted from EN 61800-9-1:2017, 3.1.3 with additional details for a fan as the driven equipment]

3.4
impeller
rotating part of the fan that is imparting energy into the gas flow and is also known as the fan wheel

3.5
fan type
fan of specific and typical design primarily distinguished by the geometry of its impeller and the resulting gas path through the fan

3.5.1
axial, mixed flow and centrifugal fan
fan types which are identified by the angle α, average value of the angles α_1 and α_2 (see figures)

$$\alpha = (\alpha_1 + \alpha_2)/2 \quad (1)$$

where

α1 is the angle of the tangent at the hub at the intersection of the blade trailing edge with the hub;

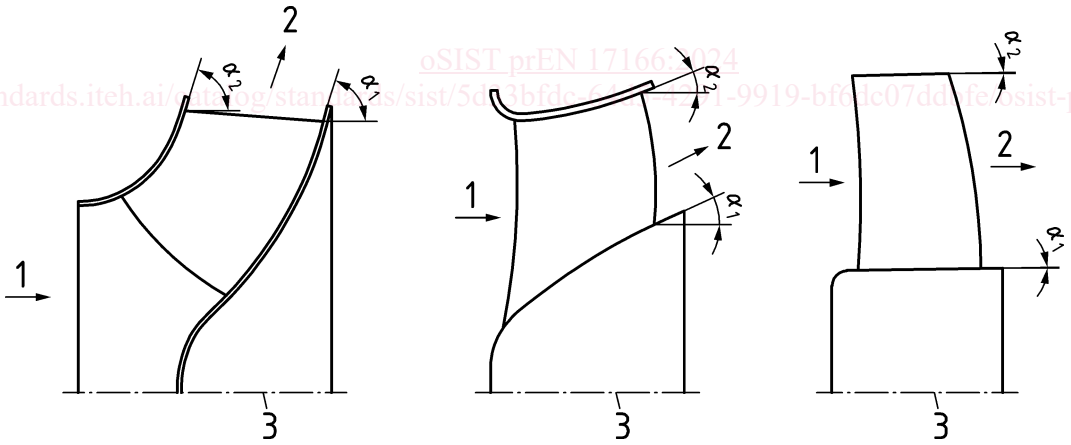
α2 is the angle of the tangent at the shroud or at the outer diameter of the blade at the intersection of the blade trailing edge with the shroud or with the outer diameter of the blade, given that, if the hub and/or shroud are not axisymmetric, angles α1 and α2 are the average values in circumferential direction.

Note 1 to entry: The fan types are defined as in Table 1.

Table 1 — Fan type defined by the relationship of the blade and the shroud/hub

Fan type	Angle α
Centrifugal fan	α ≥ °70
Mixed flow fan	20° ≤ α < 70°
Axial fan	α < 20°

Note 2 to entry: Centrifugal fans contain the types „centrifugal radial bladed fan“ (including radial tip), „centrifugal forward curved fan“ and „centrifugal backward curved fan“ (including also backward inclined and backward curved aerofoil bladed fans).



Key

1	inflow
2	outflow
3	axis of rotation
Left hand image:	centrifugal fan
Middle image:	mixed flow fan
Right hand image:	axial fan

Figure 2 — Differentiation by angles

3.5.2
axial fan
axial-flow fan in which the air enters and leaves the impeller along essentially cylindrical surfaces coaxial with the fan

Note 1 to entry: Within the scope of this document, a fan is an axial fan when its angle α is within the limits provided in Table 1.

[SOURCE: EN ISO 13349-1:2022, definition 3.5.2]

Note 2 to entry: The definition in EU 327/2011 differs from that above and is stated as: Axial fan' means a fan that propels gas in the direction axial to the rotational axis of one or more impeller(s) with a swirling tangential motion created by the rotating impeller(s). The axial fan may or may not be equipped with a cylindrical housing, inlet or outlet guide vanes or an orifice panel or orifice ring.

3.5.3
mixed-flow fan
fan in which the fluid path through the impeller is intermediate between the centrifugal and axial-flow types

[SOURCE: EN ISO 13349-1:2022, definition 3.5.9, modified – deleted "See Figures 5 and 11"]

Note 1 to entry: Within the scope of this document, a fan is a mixed-flow fan when its angle α is within the limits provided in Table 1.

Note 2 to entry: See to 3.5.1.

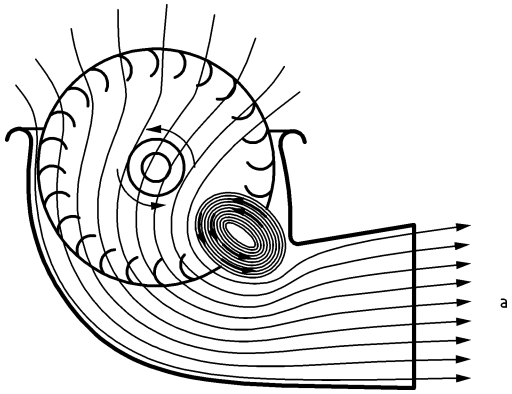
3.5.4
centrifugal fan
fan in which the fluid enters the impeller with an essentially axial direction and leaves it in a direction perpendicular, or near perpendicular to this axis (see Table 1 and Figure 2)

Note 1 to entry: Within the scope of this document, a fan is a centrifugal fan when its angle α is within the limits provided in Table 1.

Note 2 to entry: For further details see 3.5.1.

3.5.5
cross flow fan
tangential fan
fan in which the fluid path through the impeller is in a direction essentially at right angles to its axis both entering and leaving the impeller at its periphery (see Figure 3)

[SOURCE: EN ISO 13349-1:2022, definition 3.5.11]



Key

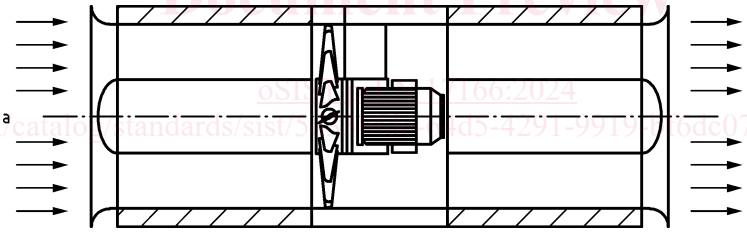
a flow of air

Figure 3 — Cross flow fan

3.5.6
jet fan
impulse fan
fan used for producing a jet of air in a space and unconnected to any ducting (see Figures 4 and 5)

Note 1 to entry: Jet fans performance and efficiency are determined by the thrust measurements only (see EN ISO 13350:2015).

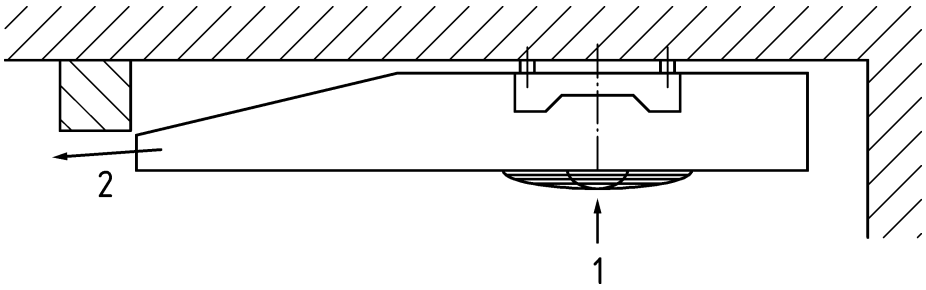
Note 2 to entry: The air jet can be used, for example, for adding momentum to the air within a tunnel or other space (e.g. enclosed car park), or for intensifying the heat transfer in a determined zone.



Key

a flow of air

Figure 4 — Axial jet fan



Key

1 inlet
2 discharge

Figure 5 — Centrifugal jet fan

3.6 Detailed specification of centrifugal fan types

3.6.1
centrifugal forward curved fan
centrifugal fan with curved blades, where the outward direction of the blades at the periphery is inclined forward relative to the direction of rotation (see Figure 6)

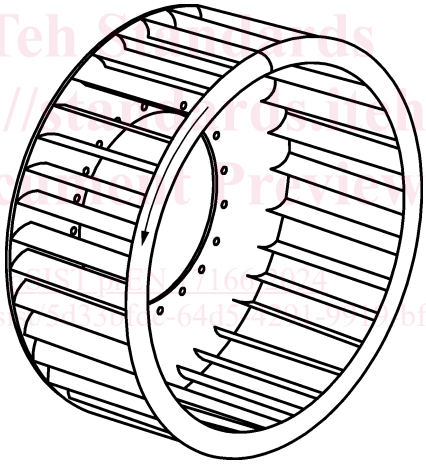


Figure 6 — Impeller of a centrifugal forward curved fan

[SOURCE: EN ISO 13349-1:2022, Figure 13]

3.6.2
centrifugal backward curved fan
centrifugal fan with curved blades, where the outward direction of the blades at the periphery is inclined backwards relative to the direction of rotation (see Figure 7)

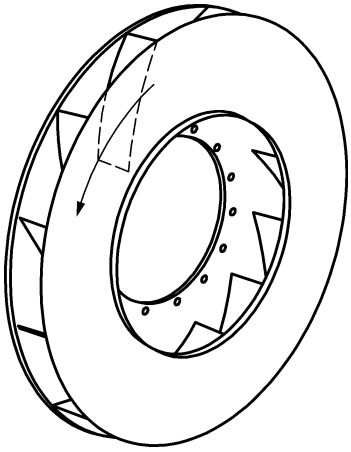


Figure 7 — Impeller of a centrifugal backward curved fan

[SOURCE: EN ISO 13349-1:2022, Figure 13]

3.6.3
centrifugal backward inclined fan
centrifugal fan with flat blades, where the outward direction of the blades at the periphery is inclined backwards relative to the direction of rotation (see Figure 8)

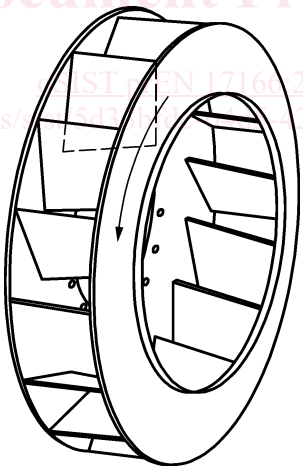


Figure 8 — Impeller of a centrifugal backward inclined fan

[SOURCE: EN ISO 13349-1:2022, Figure 13]