SLOVENSKI STANDARD
SIST EN 50216-12:2011

01-junij-2011

Armature močnostnih transformatorjev in dušilk - 12. del: Ventilatorji

Power transformer and reactor fittings - Part 12: Fans

Zubehör für Transformatoren und Drosselspulen - Teil 12: Ventilatoren

Accessoires pour transformateurs de puissance et bobines d'inductance - Partie 12: Ventilateurs

Ta slovenski standard je istoveten z: **EN 50216-12:2011**

ICS:

29.180 Transformatorji. Dušilke Transformers. Reactors

SIST EN 50216-12:2011 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50216-12

April 2011

ICS 29.180

English version

Power transformer and reactor fittings - Part 12: Fans

Accessoires pour transformateurs de puissance et bobines d'inductance - Partie 12: Ventilateurs

Zubehör für Transformatoren und Drosselspulen - Teil 12: Ventilatoren

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Ref. No. EN 50216-12:2011 E

Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 14, Power transformers.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50216-12 on 2011-03-21.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2012-03-21
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2014-03-21

EN 50216-12 is to be read in conjunction with EN 50216-1, *Power transformer and reactor fittings – Part 1: General*.

Contents

Figures

1 Scope

EN 50216-12 deals with fans for oil-to-air coolers used for transformers as well as fans used for blowing out radiators. Only fans operating axially are dealt with in this standard specification.

This standard specification defines the dimensions and requirements for ensuring fan interchangeability and uniform fan assembly.

2 Normative references

The following referenced documents are indispensable for the application 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 22768-1	General tolerances – Part 1: Tolerances for linear and angular dimensions without individual tolerance indications (ISO 2768-1)
EN 22768-2	General tolerances – Part 2: Geometrical tolerances for features without individual tolerance indications (ISO 2768-2)
EN 50216-1:2002	Power transformer and reactor fittings – Part 1: General
EN 50262	Cable glands for electrical installations
EN 60034-1	Rotating electrical machines – Part 1: Rating and performance (IEC 60034-1)
EN 60529	Degrees of protection provided by enclosures (IP Code) (IEC 60529)
EN 60721-3-4	Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 4: Stationary use at non–weather protected locations (IEC 60721-3-4)
EN ISO 3506-1	Mechanical properties of corrosion-resistant stainless steel fasteners – Part 1: Bolts, screws and studs (ISO 3506-1)
EN ISO 5801	Industrial fans – Performance testing using standardized airways (ISO 5801)
EN ISO 13857	Safety of machinery – Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857)
ISO 10816-1	Mechanical vibration – Evaluation of machine vibration by measurements on non-rotating parts – Part 1: General guidelines
ISO 13347-1	Industrial fans – Determination of fan sound power levels under standardized laboratory conditions – Part 1: General overview
ISO 13347-3	Industrial fans – Determination of fan sound power levels under standardized laboratory conditions – Part 3: Enveloping surface methods
ISO 14694	Industrial fans – Specifications for balance quality and vibration levels

3 Terms and definitions

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

3.1
drive
depending on the specification the motor used to drive the fan wheel can be either a three-phase a.c. motor, an a.c. motor or a d.c. motor. The motor is mounted rigidly in the housing

3.2
connection box
the electrical connection between the external power supply (and control system if this exists) and the internal connection is made in the terminal box. The terminal board is located in the connection box

3.3
housing
the housing is used for attaching the fan to the radiator or cooler; the housing also supports the motor. In addition the protective grating and / or basket guard is / are attached to it

3.4
fan wheel
the fan wheel is mounted rigidly on the motor axle / rotor

3.5
protective grating / basket guard
the protective grating or basket guard is used to prevent accidental contact with the rotating parts. Furthermore, the protective grating or basket guard also prevents large foreign bodies from coming into contact with the parts

4 Requirements

4.1 Rated values

The following designations are used:

- f [Hz] = frequency;
- U_r [V] = rated voltage;
- I [A] = operating current during free blowing;
- I_r [A] = rated current of the motor;
- P_1 [W] = active-power input during free blowing;
- η [%] = overall efficiency of the fan;
- N [1/min] = rotational speed;
- q_V [m^3/s] = volume flow of the fan during free blowing;
- p_{sF} [Pa] = maximum static pressure which the fan can produce, in producing static pressure volume flow is reduced;
- L_{WA} [dB(A)] = A-weighted sound power level of a fan during free blowing;
- D [mm] = diameter of the fan wheel.

NOTE The characteristic curve should be delivered by the supplier ($p_{sF} = f(q_V)$). The noise is dependent on the working point and the installation conditions.

4.2 Rated power and noise

The values for air power and noise apply when protective gratings are fitted. The volume flow refers to an air density = 1,20 kg/m³ at a temperature of t = 20 °C and an air pressure of 101,325 kPa (this corresponds to a site altitude below 1 000 m). They are to be measured at rated voltage with the associated frequency provided that no other operating data has been specified in the order.

4.3 Design of the drive

The motor shall comply with EN 60034-1 and suitable for unprotected outdoor installation. The provided degree of protection is to be at least IP54 or above as per the order specification in accordance with EN 60529.

Thermal class 155 as per EN 60034-1 applies to all motors.

Condensation water and any other intrusive water shall be able to run off without any damaging effect. This applies to both horizontal and vertical mounting of the fan (blowing upwards). The bearings of the motor shall be made in such a way that they are able to guarantee a trouble- and maintenance-free running time (continuous operation) of at least 4 years (at least 3 years for four-pole operation) or rather as agreed upon.

The connecting lead between the winding space of the motor and the cable compartment of the terminal box can be run on both the inside and the outside.

4.4 Design of the connection box

The connection box (if present) shall be mounted in such a way that it is easily accessible. The connection box is to provide protection to at least IP54 as per EN 60529. Condensation water in the connection box shall not affect operation or lead to any damage.

Each of the terminals shall be suitable for holding down two 2,5 mm² leads at I < 1,5 A. At I > 1,5 A each terminal shall be suitable for holding down two 4 mm² leads.

The earthing screw in the connection box shall be easily accessible.

Captive screws shall be used for the cover of the connection box.

Screwed cable glands (at least 2) as per EN 50262 made from nickel-plated brass are to be used for the connecting lead inlet.

The cover seal shall be secured using suitable measures so that overpressing or slipping is prevented at all times.

4.5 Design of the housing

As a rule the housing is cylindrical. The motor with fan wheel (chosen by the manufacturer) is mounted on to the housing. The fixing points of the fan are likewise located on the housing. If a connection box is mounted on the outside of the housing then the connection cables are to be suitably fixed.

The direction of air flow (in connection with the rotational direction) is to be indicated on the housing using a durable marking (can also be combined with the rating plate).

4.6 Design of the fan wheel

The fan wheel shall be designed in such a way that no water is able to gather. This applies to both horizontal and vertical mounting of the fan (blowing upwards).

4.7 Design of the protective grating / basket guard

Fans for radiator cooling systems are to be fitted with 2 protective gratings (inlet and discharge sides), fans for oil-to-air coolers are to be fitted with 1 protective grating (either inlet or discharge side). The opening widths of the protective gratings on both the inlet and discharge sides are to provide protection as per EN ISO 13857.

The protective grating or the basket guard is to be rigidly mounted on the housing.

4.8 Materials

Fan housing:	Chosen by manufacturer
Fan wheel:	Aluminium with high quality coating or plastic, e.g. PP10.20 VT.- black with approximately 25 % solid body content (glass)
Connection box:	Cast iron, steel or aluminium with high quality coating
Protective grating / basket guard:	Inlet side: steel or stainless steel; Discharge side: steel with coating or galvanized
Terminal board or terminal block:	Insulating material ceramic or equivalent material or plastic material
Motor housing:	Chosen by manufacturer
Threaded bolts, washers, nuts for electrical connections:	Made from material which is not dangerous on contact and which is non-corrosive
Screws, washers, nuts, except for electrical connections:	Stainless steel, e.g. A2-70 in accordance with EN ISO 3506-1
Strain washers:	Non-rusting spring steel

Other materials are to be agreed upon.

4.9 Mechanical design

— To prevent rusting underneath the surface all external components shall be welded completely without breaks.

— The vibration severity determined at the outer perimeter of the fan housing in accordance with ISO 14694 (BV - 3) or ISO 10816-1 (class 1 zone B).

— Tolerances as per EN 22768-1 and EN 22768-2.

4.10 Surface protective coating

The buyer and manufacturer are to agree upon the corrosion protection treatment and coating.

At the same time the necessary environmental conditions are to be observed.

The environmental conditions shall correspond to EN 60721-3-4.

5 Identification

5.1 Specifications for the fan rating plate

— The fans shall have a clearly visible all-weather rating plate displaying the ratings for 50 Hz and/or 60 Hz operation.

— Type designation and serial number of the manufacturer and year of manufacture

- volume flow in m^3/s during free blowing,
- rotational speed in min^{-1} during free blowing,