

<b>Prüfbericht-Nr.:</b> Test report no.:	<b>CN21Y6V1 001</b>	<b>Auftrags-Nr.:</b> Order no.:	180212775	Seite 1 von 18 Page 1 of 18
<b>Kunden-Referenz-Nr.:</b> Client reference no.:	N/A	<b>Auftragsdatum:</b> Order date:	2021-08-10	
<b>Auftraggeber:</b> Client:	YONGKANG TENGRUN ELECTRONIC CO LTD NO. 1, 25/F, JINPIN MANSION, HEADQUARTERS CENTER, YONGKANG, JINHUA ZHEJIANG, P.R. CHINA			
<b>Prüfgegenstand:</b> Test item:	Centrifugal blower			
<b>Bezeichnung / Typ-Nr.:</b> Identification / Type no.:	9-9-9001/3			
<b>Auftrags-Inhalt:</b> Order content:	Type test			
<b>Prüfgrundlage:</b> Test specification:	327/2011/EU Annex I and Annex II/ 03.11 Implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirement for fans driven by motor with an electric input power between 125W and 500kW Amended by: (EU) No 666/2013 and (EU) 2016/2282			
<b>Wareneingangsdatum:</b> Date of sample receipt:	2021-08-05			
<b>Prüfmuster-Nr.:</b> Test sample no.:	A003105111-001			
<b>Prüfzeitraum:</b> Testing period:	2021-08-18 – 2021-08-18			
<b>Ort der Prüfung:</b> Place of testing:	See page 4			
<b>Prüflaboratorium:</b> Testing laboratory:	TÜV Rheinland / CCIC (Ningbo) Co., Ltd.			
<b>Prüfergebnis*:</b> Test result*:	Pass			
<b>geprüft von:</b> tested by:			<b>genehmigt von:</b> authorized by:	
<b>Datum:</b> Date: 2021-09-26	Signed by: Qiang Ye		<b>Ausstellungsdatum:</b> Issue date: 2021-09-26	Signed by: Jane Hu
<b>Stellung / Position:</b>	Project Engineer		<b>Stellung / Position:</b>	Technical Certifier
<b>Sonstiges / Other:</b>	This report is created to present the ERP test result of Centrifugal blower: 9-9-9001/3 .			
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
<p>* Legende: P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet          * Legend: P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested</p> <p><b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b>  <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p>				

TEST REPORT	
COMMISSION REGULATION(EU) No. 327/2011	
implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW	
Report No. ....:	CN21Y6V1 001
TRF Originator.....:	TÜV Rheinland/CCIC (Ningbo) Co., Ltd.
Master TRF.....:	See cover page
Testing Laboratory .....	<b>TÜV Rheinland / CCIC (Ningbo) Co., Ltd.</b>
Address .....	3F, Building C13, R&D Park, No.32, Lane 299 Guanghua Road, National Hi-Tech Zone, Ningbo 315048, P.R. China
Applicant's name .....	<b>YONGKANG TENGRUN ELECTRONIC CO LTD</b>
Address .....	NO. 1, 25/F, JINPIN MANSION, HEADQUARTERS CENTER, YONGKANG JINHUA, ZHEJIANG, P.R. CHINA
Test item description .....	Centrifugal blower
Trade Mark .....	N/A
Kind of supplies .....	See "General product information" in page 3
Model/Type reference.....:	See "General product information" in page 3
Rated Voltage .....	See "General product information" in page 3
Nameplate output power (Po).....:	See "General product information" in page 3
<b>Testing</b> .....	
Date of receipt of test item .....	See cover page
Date (s) of performance of tests .....	See cover page
<b>General remarks:</b> <p>The test results presented in this report relate only to the object tested.  This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.  "(see Enclosure #)" refers to additional information appended to the report.  "(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a comma (point) is used as the decimal separator.</p> <p>Ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 Kw.</p> <p>The test and judgment according to the test protocol of TÜV Rheinland / CCIC (Ningbo) Co., Ltd.  This report does not entitle the applicant to carry any safety mark on this or similar products. Further for sales or other application purposes of the tested product, any reference to TÜV Rheinland Group or a test through TÜV Rheinland Group is only permissible with prior written consent of TÜV Rheinland Group.</p>	
<b>Possible test case verdicts:</b> <ul style="list-style-type: none"> <li>- test case does not apply to the test object..... N/A</li> <li>- test object does meet the requirement ..... P(Pass)</li> <li>- test object does not meet the requirement ..... F(Fail)</li> </ul>	

<b>General product information:</b>	
<b>Overall efficiency (<math>\eta</math>)</b>	45,0%
<b>Measurement category</b>	Category B
<b>Efficiency category (static or total)</b>	Total
<b>Efficiency grade at optimum energy efficiency point</b>	50.2
<b>whether the calculation of fan efficiency assumed use of a VSD and if so, whether the VSD is integrated within the fan or the VSD must be installed with the fan</b>	Calculation without VSD. A variable speed drive is integrated within the fan.
<b>Year of manufacture</b>	2021
<b>Manufacturer's name or trade mark</b>	YONGKANG TENGRUN ELECTRONIC CO LTD
<b>Product's model number</b>	9-9-9001/3
<b>Rated motor power input(s) (kW)</b>	0.665 kW
<b>Rated flow rate(s)</b>	2000 m <sup>3</sup> /h
<b>Rated pressure(s)</b>	180Pa
<b>Rotations per minute at the optimum energy efficiency point</b>	850 r/min
<b>Specific ratio</b>	0.45
<b>Rated voltage</b>	230V
<b>Rated frequency</b>	50Hz
<b>Rated current</b>	3A
<b>Manufacturer of Fan:</b> YONGKANG TENGRUN ELECTRONIC CO LTD NO. 1, 25/F, JINPIN MANSION, HEADQUARTERS CENTER, YONGKANG, JINHUA, ZHEJIANG, P.R. CHINA	

Copy of marking plate:


Model Number: **9-9-9001/3**
Description

Overall Efficiency: 45.0%

Measurement Type: B

Efficiency type: Total

Efficiency grade at optimum energy

efficiency point: N= 50.2

A variable speed drive is integrated within the fan

Measurement: without VSD

VSD: install with VSD

Electrical Supply: 230V 50Hz

Insulation Class: F

Input Power: 665W

Input Current: 3.0A

AIRFAN® P.O. Box 25, NL- 5170 AA KAAKSTHEUVEL - The Netherlands

Production date:


**Summary of testing:**

All relevant tests were performed on Centrifugal blower of type 9-9-9001/3. All tests were passed.

Evaluated Amended: (EU) No 666/2013 and (EU) 2016/2282, details see this report.

**Test performed (name of test and test clause):**
**Testing location:**

All relevant tests

**Zhejiang Testing & Inspection Institute for  
Mechanical and Electrical Products Quality  
Co., Ltd**

No.28, Chuangye street, Qingshanhu street, Linan  
city, Zhejiang P.R. China

EU 327/2011			
Clause	Requirement – Test	Result - Remark	Verdict

<b>Article 1</b>	<b>Subject matter and scope</b>		P
	1. This Regulation establishes ecodesign requirements for the placing on the market and for the putting into service of fans, including those integrated in other energy-related products as covered by Directive 2009/125/EC		P
	2. This Regulation shall not apply to:		N/A
	(i) fans with a sold electric motor of 3kW or less where the fan is fixed on the same shaft used for driving the main functionality;		N/A
	(ii) laundry and washer dryers $\leq 3$ kW maximum electrical input power;		N/A
	iii) kitchen hoods $< 280$ W total maximum electrical input power attributable to the fan(s).		N/A
	3. This Regulation shall not apply to fans which are:		N/A
	(a) designed specifically to operate in potentially explosive atmospheres as defined in Directive 94/9/EC of the European Parliament and of the Council ( 1 );		N/A
	b) designed for emergency use only, at short-time duty, with regard to fire safety requirements set out in Council Directive 89/106/EC ( 2 );		N/A
	c) designed specifically to operate:		N/A
	i) (a) where operating temperatures of the gas being moved exceed $100^{\circ}\text{C}$ ;		N/A
	(b) where operating ambient temperature for the motor, if located outside the gas stream, driving the fan exceeds $65^{\circ}\text{C}$ ;		N/A
	(ii) where the annual average temperature of the gas being moved and/or the operating ambient temperature for the motor, if located outside the gas stream, are lower than $-40^{\circ}\text{C}$ ;		N/A
	(iii) with a supply voltage $> 1\,000$ V AC or $> 1\,500$ V DC;		N/A
	(iv) in toxic, highly corrosive or flammable environments or in environments with abrasive substances;		N/A



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Clause	Requirement – Test	Result - Remark	Verdict
	(d) placed on the market before 1 January 2015 as replacement for identical fans integrated in products which were placed on the market before 1 January 2013; except that the packaging, the product information and the technical documentation must clearly indicate regarding (a), (b) and (c) that the fan shall only be used for the purpose for which it is designed and regarding (d) the product(s) for which it is intended.		N/A
	(e) designed to operate with an optimum energy efficiency at 8 000 rotations per minute or more.		N/A
<b>Article 2</b>	<b>Definitions</b>		P
	In addition to the definitions set out in Directive 2009/125/EC, the following definitions shall apply:		P
	1. 'Fan' means a rotary bladed machine that is used to maintain a continuous flow of gas, typically air, passing through it and whose work per unit mass does not exceed 25 kJ/kg, and which:		P
	— is designed for use with or equipped with an electrical motor with an electric input power between 125 W and 500 kW ( $\geq 125$ W and $\leq 500$ kW) to drive the impeller at its optimum energy efficiency point,		P
	— is an axial fan, centrifugal fan, cross flow fan or mixed flow fan,	Centrifugal fan	P
	— may or may not be equipped with a motor when placed on the market or put into service;	Be equipped with a motor	P
	2. 'Impeller' means the part of the fan that is imparting energy into the gas flow and is also known as the fan wheel;		P
	3. '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;		N/A
	4. 'Inlet guide vanes' are vanes positioned before the impeller to guide the gas stream towards the impeller and which may or may not be adjustable;		P
	5. 'Outlet guide vanes' are vanes positioned after the impeller to guide the gas stream from the impeller and which may or may not be adjustable;		P
	6. 'Orifice panel' means a panel with an opening in which the fan sits and which allows the fan to be fixed to other structures;		N/A

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Clause	Requirement – Test	Result - Remark	Verdict
	7. 'Orifice ring' means a ring with an opening in which the fan sits and which allows the fan to be fixed to other structures;		N/A
	8. 'Centrifugal fan' means a fan in which the gas enters the impeller(s) in an essentially axial direction and leaves it in a direction perpendicular to that axis. The impeller may have one or two inlets and may or may not have a housing;		P
	9. 'Centrifugal radial bladed fan' means a centrifugal fan where the outward direction of the blades of the impeller(s) at the periphery is radial relative to the axis of rotation;		P
	10. 'Centrifugal forward curved fan' means a centrifugal fan where the outward direction of the blades of the impeller(s) at the periphery is forward relative to the direction of rotation;		N/A
	11. 'Centrifugal backward curved fan without housing' means a centrifugal fan where the outward direction of the blades of the impeller(s) at the periphery is backward relative to the direction of rotation and which does not have a housing;		N/A
	12. 'Housing' means a casing around the impeller which guides the gas stream towards, through and from the impeller;		P
	13. 'Centrifugal backward curved fan with housing' means a centrifugal fan with an impeller where the outward direction of the blades at the periphery is backward relative to the direction of rotation and which has a housing;		N/A
	14. '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;		N/A
	15. 'Mixed flow fan' means a fan in which the gas path through the impeller is intermediate between the gas path in fans of centrifugal and axial types;		N/A
	16. 'Short-time duty' means working of a motor at a constant load, which is not long enough to reach temperature equilibrium;		N/A
	17. 'Ventilation fan' means a fan that is not used in the following energy-related products:		N/A
	— laundry and washer dryers > 3 kW maximum electrical input power,		N/A
	— indoor units of household air-conditioning products and indoor household air-conditioners, ≤ 12 kW maximum airco output power,		N/A
	— information technology products;		N/A

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Clause	Requirement – Test	Result - Remark	Verdict
	18. The 'specific ratio' means the stagnation pressure measured at the fan outlet divided by the stagnation pressure at the fan inlet at the optimal energy efficiency point of the fan.		P
<b>Article 3</b>	<b>Ecodesign requirements</b>		P
	1. The ecodesign requirements for fans are set out in Annex I.		P
	2. Each fan energy efficiency requirement of Annex I Section 2 shall apply in accordance with the following timetable:		P
	a) first tier: from 1 January 2013, ventilation fans shall not have a lower target energy efficiency than as defined in Annex I, Section 2, Table 1;		N/A
	(b) second tier: from 1 January 2015, all fans shall not have a lower target energy efficiency than as defined in Annex I, Section 2, Table 2.	Comply with Table 2	P
	3. The product information requirements on fans and how they must be displayed are as set out in Annex I, Section 3. These requirements shall apply from 1 January 2013.		P
	4. The fan energy efficiency requirements of Annex I Section 2 shall not apply to fans which are designed to operate:		N/A
	(b) in applications in which the 'specific ratio' is over 1,11;		N/A
	(c) as conveying fans used for the transport of non-gaseous substances in industrial process applications.		N/A
	5. For dual use fans designed for both ventilation under normal conditions and emergency use, at short-time duty, with regard to fire safety requirements as set out in Directive 89/106/EC, the values of the applicable efficiency grades set out in Annex I Section 2 will be reduced by 10 % for Table 1 and by 5 % for Table 2.		N/A
	6. Compliance with ecodesign requirements shall be measured and calculated in accordance with requirements set out in Annex II.		P
<b>Article 4</b>	<b>Conformity assessment</b>		P
	The conformity assessment procedure referred to in Article 8 of Directive 2009/125/EC 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.		P



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Clause	Requirement – Test	Result - Remark	Verdict

<b>Article 5</b>	<b>Verification procedure for market surveillance purposes</b>		N/A
	When performing the market surveillance checks referred to in Article 3(2) of Directive 2009/125/EC, the authorities of the Member States shall apply the verification procedure set out in Annex III to this Regulation.		N/A
<b>Article 6</b>	<b>Indicative benchmarks</b>		N/A
	The indicative benchmarks for the best-performing fans available on the market at the time of entry into force of this Regulation are set out in Annex IV.		N/A
<b>Article 7</b>	<b>Revision</b>		N/A
	The Commission shall review this Regulation no later than 4 years after its entry into force and present the result of this review to the Ecodesign Consultation Forum. The review shall in particular assess the feasibility of reducing the number of fan types in order to reinforce competition on grounds of energy efficiency for fans which can fulfil a comparable function. The review shall also assess whether the scope of exemptions can be reduced, including allowances for dual use fans.		N/A
<b>Article 8</b>	<b>Entry into force</b>		P
	This Regulation shall enter into force on the 20th day following its publication in the Official Journal of the European Union.  This Regulation shall be binding in its entirety and directly applicable in all Member States.		P

<b>Annex I</b>	<b>ECODESIGN REQUIREMENTS FOR FANS</b>		P
<b>2</b>	<b>Fan energy efficiency requirements</b>		P
	The minimum energy efficiency requirements for fans are set out in Tables 1 and 2.		P
	Table 1 — First tier minimum energy efficiency requirements for fans from 1 January 2013		N/A
	Table 2 — Second tier minimum energy efficiency requirements for fans from 1 January 2015		P
<b>3</b>	<b>Product information requirements on fans</b>		P

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Clause	Requirement – Test	Result - Remark	Verdict
	1. The information on fans set out in points 2(1) to 2(14) shall be visibly displayed on:		P
	(a) the technical documentation of fans;		P
	(b) free access websites of manufacturers of fans.		P
	2. The following information shall be displayed:		P
	(1) overall efficiency ( $\eta$ ), rounded to 1 decimal place;	45,0%	P
	(2) measurement category used to determine the energy efficiency (A-D);	Measurement category B	P
	(3) efficiency category (static or total);	Total	P
	(4) efficiency grade at optimum energy efficiency point;	50,2	P
	(5) whether the calculation of fan efficiency assumed use of a VSD and if so, whether the VSD is integrated within the fan or the VSD must be installed with the fan;	Calculation without a VSD. A variable speed drive is integrated within the fan.	P
	(6) year of manufacture;	See "General Product Information" in page 3	P
	(7) manufacturer's name or trade mark, commercial registration number and place of manufacturer;	See "General Product Information" in page 3	P
	(8) product's model number;	See marking plate	P
	(9) the rated motor power input(s) (kW), flow rate(s) and pressure(s) at optimum energy efficiency;	See "General Product Information" in page 3	P
	(10) rotations per minute at the optimum energy efficiency point;	See "General Product Information" in page 3	P
	(11) the 'specific ratio';	See "General Product Information" in page 3	P
	(12) information relevant for facilitating disassembly, recycling or disposal at end-of-life;		N/A
	(13) information relevant to minimise impact on the environment and ensure optimal life expectancy as regards installation, use and maintenance of the fan;		N/A
	(14) description of additional items used when determining the fan energy efficiency, such as ducts, that are not described in the measurement category and not supplied with the fan.		N/A

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Clause	Requirement – Test	Result - Remark	Verdict
	3. The information in the technical documentation shall be provided in the order as presented in points 2(1) to 2(14). The exact wording used in the list does not need to be repeated. It may be displayed using graphs, figures or symbols rather than text.		P
	4. The information referred to in points 2(1), 2(2), 2(3), 2(4) and 2(5) shall be durably marked on or near the rating plate of the fan, where for point 2(5) one of the following forms of words must be used to indicate what is applicable:		P
	— ‘A variable speed drive must be installed with this fan’.		P
	— ‘A variable speed drive is integrated within the fan’.		N/A
	5. Manufacturers shall provide information in the manual of instruction on specific precautions to be taken when fans are assembled, installed or maintained. If provision 2(5) of the product information requirements indicates that a VSD must be installed with the fan, manufacturers shall provide details on the characteristics of the VSD to ensure optimal use after assembly.		P

ANNEX II	MEASUREMENTS AND CALCULATIONS		P
2	Measurement method		P
	For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations must be made using a reliable, accurate and reproducible method, which takes into account the generally recognised state-of-the-art measurement methods, and whose results are deemed to be of low uncertainty, including methods set out in documents the reference numbers of which have been published for that purpose in the Official Journal of the European Union		P
3	Calculation method		P
	The methodology for calculating the energy efficiency of a specific fan is based on the ratio of gas power to electrical input power to the motor, where fan gas power is the product of gas volume flow rate and pressure difference across the fan. The pressure is either the static pressure or the total pressure, which is the sum of static and dynamic pressure depending upon the measurement and efficiency category.		P

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Clause	Requirement – Test	Result - Remark	Verdict
3.1	Where the fan is supplied as a 'final assembly', measure the gas power and the electric input power of the fan at its optimum energy efficiency point:		P
	a) where the fan does not include a variable speed drive, calculate the overall efficiency using the following equation: $\eta_e = P_{u(s)} / P_e$		P
	b) where the fan includes a variable speed drive, calculate the overall efficiency using the following equation: $\eta_e = (P_{u(s)} / P_e) * C_C$		N/A
3.2	Where the fan is supplied as 'not final assembly', the fan overall efficiency is calculated at the impeller's optimum energy efficiency point, using the following equation: $\eta_e = \eta_r \cdot \eta_m \cdot \eta_T \cdot C_m \cdot C_C$		N/A
3.3	The fan gas power, $P_u(s)$ (kW), is calculated according to the measurement category test method chosen by the fan supplier:	Category B	P
	(a) where the fan has been measured according to measurement category A, fan static gas power $P_{us}$ is used from the equation $P_{us} = q \cdot p_{sf} \cdot k_{ps}$ ;		N/A
	(b) where the fan has been measured according to measurement category B, fan gas power $P_u$ is used from the equation $P_u = q \cdot p_r \cdot k_p$ ;		P
	(c) where the fan has been measured according to measurement category C, fan static gas power $P_{us}$ is used from the equation $P_{us} = q \cdot p_{sf} \cdot k_{ps}$ ;		N/A
	(d) where the fan has been measured according to measurement category D, fan gas power $P_u$ is used from the equation $P_u = q \cdot p_r \cdot k_p$ .		N/A
4	<b>Methodology for calculating the target energy efficiency</b>		P
	The target energy efficiency is the energy efficiency a fan from a given fan type must achieve in order to comply with the requirements set out in this Regulation (expressed in full percentage points). The target energy efficiency is calculated by efficiency formulas that include the electrical input power $P_{e(d)}$ and the minimum efficiency grade as defined in Annex I. The complete power range is covered by two formulas: one for fans with an electric input power from 0,125 kW up to and including 10 kW and the other for fans above 10 kW up to and including 500 kW.	Electric input power from 0,125kW up to and including 10kW.	P

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Clause	Requirement – Test	Result - Remark	Verdict

	There are three series of fan types for which energy efficiency formulas are developed to reflect the different characteristics of various fan types:		P
4.1	The target energy efficiency for axial fans, centrifugal forward curved fans and centrifugal radial bladed fans (axial fan within) is calculated using the following equations:		P
	Power range P from 0,125 kW to 10 kW $\eta_{target} = 2,74 \cdot \ln(P) - 6,33 + N$		P
	Power range P from 10 kW to 500 kW $\eta_{target} = 0,78 \cdot \ln(P) - 1,88 + N$		N/A
	where the input power P is the electrical input power $P_{e(d)}$ and N is the integer of the energy efficiency grade required.		P
4.2	The target energy efficiency for centrifugal backward curved fans without housing, centrifugal backward curved fans with housing and mixed flow fans is calculated using the following equations:		N/A
	Power range P from 0,125 kW to 10 kW $\eta_{target} = 4,56 \cdot \ln(P) - 10,5 + N$		N/A
	Power range P from 10 kW to 500 kW $\eta_{target} = 1,1 \cdot \ln(P) - 2,6 + N$		N/A
	where the input power P is the electrical input power $P_{e(d)}$ and N is the integer of the energy efficiency grade required.		N/A
4.3	The target energy efficiency for cross flow fans is calculated using the following equations:		N/A
	Power range P from 0,125 kW to 10 kW $\eta_{target} = 1,14 \cdot \ln(P) - 2,6 + N$		N/A
	Power range P from 10 kW to 500 kW $\eta_{target} = N$		N/A
	where the input power P is the electrical input power $P_{e(d)}$ and N is the integer of the energy efficiency grade required.		N/A



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Clause	Requirement – Test	Result - Remark	Verdict

<b>5</b>	<b>Applying the target energy efficiency</b>		P
	The fan overall efficiency $\eta_e$ calculated according to the appropriate method in Section 3 of Annex II must be equal to or greater than the target value $\eta_{\text{target}}$ set by the efficiency grade to meet the minimum energy efficiency requirements.		P
<b>ANNEX III</b>	<b>Product compliance verification by market surveillance authorities</b>		N/A
	The verification tolerances defined in this Annex relate only to the verification of the measured parameters by Member State authorities and shall not be used by the manufacturer or importer as an allowed tolerance to establish the values in the technical documentation or in interpreting these values with a view to achieving compliance or to communicate better performance by any means.		N/A
	When verifying the compliance of a product model with the requirements laid down in this Regulation pursuant to Article 3(2) of Directive 2009/125/EC, for the requirements referred to in this Annex, the authorities of the Member States shall apply the following procedure:		N/A
	(1) The Member State authorities shall verify one single unit of the model.		N/A
	(2) The model shall be considered to comply with the applicable requirements if:		N/A
	(a) the values given in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC (declared values), and, where applicable, the values used to calculate these values, are not more favourable for the manufacturer or importer than the results of the corresponding measurements carried out pursuant to paragraph (g) thereof; and		N/A
	(b) the declared values meet any requirements laid down in this Regulation, and any required product information published by the manufacturer or importer does not contain values that are more favourable for the manufacturer or importer than the declared values; and		N/A
	(c) when the Member State authorities test the unit of the model, the determined values (the values of the relevant parameters as measured in testing and the values calculated from these measurements) comply with the respective verification tolerances as given in Table 3.		N/A

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Clause	Requirement – Test	Result - Remark	Verdict				
	(3) If the results referred to in point 2(a) or (b) are not achieved, the model shall be considered not to comply with this Regulation.		N/A				
	(4) If the result referred to in point 2(c) is not achieved:		N/A				
	(a) for models that are produced in quantities of less than five per year, the model shall be considered not to comply with this Regulation;		N/A				
	(b) for models that are produced in quantities of five or more per year, the Member State authorities shall select three additional units of the same model for testing. The models shall be considered to comply with the applicable requirements if, for these three units, the arithmetical mean of the determined values complies with the respective verification tolerances given in Table 3.		N/A				
	(5) If the result referred to in point 4(b) is not achieved, the model shall be considered not to comply with this Regulation.		N/A				
	(6) The Member State authorities shall provide all relevant information to the authorities of the other Member States and to the Commission without delay after a decision being taken on the non-compliance of the model according to points 3, 4(a) and 5.		N/A				
	The Member State authorities shall use the measurement and calculation methods set out in Annex II.		N/A				
	The Member State authorities shall only apply the verification tolerances that are set out in Table 3 and shall only use the procedure described in points 1 to 6 for the requirements referred to in this Annex. No other tolerances, such as those set out in harmonised standards or in any other measurement method, shall be applied.		N/A				
	Table 3 — Verification tolerances		—				
	<table><tr><th>Parameter</th><th>Verification tolerance</th></tr><tr><td>Overall efficiency (<math>\eta_o</math>)</td><td>The determined value shall not be lower than the value representing 90 % of the corresponding declared value.</td></tr></table>	Parameter	Verification tolerance	Overall efficiency ( $\eta_o$ )	The determined value shall not be lower than the value representing 90 % of the corresponding declared value.		N/A
Parameter	Verification tolerance						
Overall efficiency ( $\eta_o$ )	The determined value shall not be lower than the value representing 90 % of the corresponding declared value.						
ANNEX IV	INDICATIVE BENCHMARKS REFERRED TO IN ARTICLE 6		N/A				

EU 327/2011			
Clause	Requirement – Test	Result - Remark	Verdict

	At the time of adoption of this Regulation, the best available technology on the market for fans is as indicated in Table 1. These benchmarks may not always be achievable in all applications or for the full power range covered by the Regulation.		N/A																																								
	Table 1 — Indicative benchmarks for fans		N/A																																								
	<table> <tr> <th>Fan types</th><th>Measurement category (A-D)</th><th>Efficiency category (static or total)</th><th>Efficiency grade</th></tr> <tr> <td rowspan="2">Axial fan</td><td>A, C</td><td>static</td><td>65</td></tr> <tr> <td>B, D</td><td>total</td><td>75</td></tr> <tr> <td rowspan="2">Centrifugal forward curved fan and centrifugal radial bladed fan</td><td>A, C</td><td>static</td><td>62</td></tr> <tr> <td>B, D</td><td>total</td><td>65</td></tr> <tr> <td>Centrifugal backward curved fan without housing</td><td>A, C</td><td>static</td><td>70</td></tr> <tr> <td rowspan="2">Centrifugal backward curved fan with housing</td><td>A, C</td><td>static</td><td>72</td></tr> <tr> <td>B, D</td><td>total</td><td>75</td></tr> <tr> <td rowspan="2">Mixed flow fan</td><td>A, C</td><td>static</td><td>61</td></tr> <tr> <td>B, D</td><td>total</td><td>65</td></tr> <tr> <td>Cross flow fan</td><td>B, D</td><td>total</td><td>32</td></tr> </table>	Fan types	Measurement category (A-D)	Efficiency category (static or total)	Efficiency grade	Axial fan	A, C	static	65	B, D	total	75	Centrifugal forward curved fan and centrifugal radial bladed fan	A, C	static	62	B, D	total	65	Centrifugal backward curved fan without housing	A, C	static	70	Centrifugal backward curved fan with housing	A, C	static	72	B, D	total	75	Mixed flow fan	A, C	static	61	B, D	total	65	Cross flow fan	B, D	total	32		N/A
Fan types	Measurement category (A-D)	Efficiency category (static or total)	Efficiency grade																																								
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Measurement and calculation				Model type			9-9-9001/3		
Position no.	Unit	1	2	3	4	5	6	7	8
<b>Testing condition</b>									
Pressure of air	Pa	100509	100508	100508	100501	100494	100486	100483	100478
Temperature of air	°C	31,6	31,58	31,51	31,46	31,38	31,32	31,26	31,2
Humidity of air	%	54,1	54,3	55	55,4	55,2	55,9	56	56,4
The difference of flow	Pa	8,1283	12,906	24,614	40,019	60,142	83,428	100,98	119,92
Static pressure of entry	Pa	201,54	190,89	169,14	149,08	121,68	84,11	52,66	18,87
Rotary speed of fan	r/min	972	967	960	951	939	924	912	897
Input power	kW	0,17	0,17	0,18	0,2	0,21	0,23	0,25	0,26
Motor efficiency	%	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
<b>Testing status</b>									
Flow rate (q)	m³/h	651,47	818,76	1126,1	1431,2	1749,1	2054,7	2256,8	2455,5
Fan total pressure (Pf)	Pa	211,68	206,78	198,91	196,83	192,61	181,57	169,98	157,49
Static pressure (Psf)	Pa	208,7	202,07	190	182,44	171,11	151,9	134,17	115,08
Dynamic pressure	Pa	2,9801	4,7074	8,9076	14,39	21,499	29,676	35,812	42,409
Power input	kW	0,17	0,17	0,18	0,2	0,21	0,23	0,25	0,26
Rotational speed	r/min	972	967	960	951	939	924	912	897
<b>Designated status</b>									
Flow rate (q)	m³/h	569,7	719,69	997,09	1279,2	1583,3	1890,2	2103,3	2326,8
Fan total pressure (Pf)	Pa	170,76	168,54	164,47	165,84	166,41	162,01	155,65	149,06
Static pressure(Psf)	Pa	168,36	164,7	157,11	153,71	147,84	135,53	122,86	108,92
Dynamic pressure	Pa	2,4041	3,8368	7,3654	12,124	18,575	26,479	32,794	40,14
Internal power	kW	0,1199	0,1218	0,1318	0,1506	0,1642	0,1888	0,2133	0,2332
Total efficiency	%	22,521	27,65	34,55	39,105	44,538	45,035	42,6	41,294
<b>Dimensionless coefficient</b>									
Flow rate coefficient	$\varphi$	0,2897	0,366	0,5071	0,6506	0,8052	0,9613	1,0697	1,1834
Total pressure coefficient	$\psi_t$	1,1495	1,1345	1,1071	1,1163	1,1202	1,0905	1,0477	1,0034
Dynamic pressure coefficient	$\psi_d$	0,0066	0,0162	0,0258	0,0496	0,0816	0,125	0,1782	0,2207
Power coefficient	$\lambda_{in}$	1,3699	1,4779	1,5009	1,624	1,8561	2,024	2,3264	2,6294

Target Energy Efficiency:			
Annex II (for fans from 1 January 2015)			
Model type	9-9-9001/3		
Fan type	Centrifugal fan	Measurement category	B
Rated power	$P=0,665\text{kW}$ ( $0,125 \leq P \leq 10$ )	Calculation formula	$\eta_{\text{target}} = 2,74 \cdot \ln(P) - 6,33 + N$
Efficiency grade (N)	49	Target energy efficiency (%)	35,24%
Testing energy efficiency:			
Clause	Overall efficiency formula	Remark	Result
Cl. 3.3(b) Cl. 3.1	$P_u(s)=q \cdot P_f \cdot K_{ps}$ $\eta_e=P_u(s)/P_e$	Total efficiency: $45,0\% > 35,24\%$	Pass

