SLOVENSKI STANDARD
oSIST prEN IEC 60034-9:2021

01-april-2021

Električni rotacijski stroji - 9. del: Omejitve hrupa

Rotating electrical machines - Part 9: Noise limits

Drehende elektrische Maschinen - Teil 9: Geräuschgrenzwerte

Machines électriques tournantes - Partie 9: Limites de bruit

Ta slovenski standard je istoveten z: **prEN IEC 60034-9:2021**

ICS:

17.140.20	Emisija hrupa naprav in opreme	Noise emitted by machines and equipment
29.160.01	Rotacijski stroji na splošno	Rotating machinery in general

oSIST prEN IEC 60034-9:2021 **en,fr,de**

2/2034/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 60034-9 ED5**	
DATE OF CIRCULATION: **2021-01-29**	CLOSING DATE FOR VOTING: **2021-04-23**
SUPERSEDES DOCUMENTS: **2/1994/CD, 2/2022A/CC**	

IEC TC 2: ROTATING MACHINERY

SECRETARIAT: United Kingdom	SECRETARY: Mr Charles Whitlock
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

☒ SUBMITTED FOR CENELEC PARALLEL VOTING

Attention IEC-CENELEC parallel voting

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

This document is still under study and subject to change. It should not be used for reference purposes.

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

TITLE:

Rotating electrical machines – Part 9: Noise limits

PROPOSED STABILITY DATE: 2024

NOTE FROM TC/SC OFFICERS:

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ROTATING ELECTRICAL MACHINES –

Part 9: Noise limits

FOREWORD

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International Standard IEC 60034-9 has been prepared by IEC technical committee 2: Rotating machinery.

Comment for CDV: The red font shows where the publication has been modified.

This fifth edition cancels and replaces the fourth edition 4.1 published in 2007 and all amendments. This edition includes the following significant technical changes:

- In Tables 2 cooling methods IC01, IC11, IC21 and IC31, IC71, IC81 are now covered.
- This edition adds Table 2b for 60 Hz machines, whereas Table 2a, which covers only 50 Hz machines, has no change in levels.
- In Table 2b, grade A is added to harmonize the highest levels seen in IEC and NEMA, whereas grade B was added to harmonize the lowest, more restrictive, levels seen in IEC and NEMA.

- The chapter “Determination of noise increments caused by converter supply” has been shifted to Annex B and renamed to “Information on typical noise increments caused by converter supply”

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

Acoustic quantities can be expressed in sound pressure terms or sound power terms. The use of a sound power level, which can be specified independently of the measurement surface and environmental conditions, avoids the complications associated with sound pressure levels, which require additional data to be specified. Sound power levels provide a measure of radiated energy and have advantages in acoustic analysis and design.

ROTATING ELECTRICAL MACHINES –

Part 9: Noise limits

1 Scope

This part of IEC 60034:

– specifies test methods for the determination of sound power level of rotating electrical machines;

– specifies maximum A-weighted sound power levels for factory acceptance testing of network-supplied, rotating electrical machines in accordance with IEC 60034-1, having methods of cooling according to IEC 60034-6 and degrees of protection according to IEC 60034-5, and having the following characteristics:

  - standard design, either a.c. or d.c., without additional special electrical, mechanical, or acoustical modifications intended to reduce the sound power level;
  - rated output from 1 kW (or kVA) up to and including 5 500 kW (or kVA);
  - rated speed not greater than 3 750 min^{-1}.

Excluded are noise limits for a.c. motors supplied by converters. For these conditions see Annex B for guidance.

The object of this standard is to determine maximum A-weighted sound power levels, L_{WA} in decibels, dB, for airborne noise emitted by rotating electrical machines of standard design, as a function of power, speed and load, and to specify the method of measurement and the test conditions appropriate for the determination of the sound power level of the machines to provide a standardized evaluation of machine noise up to the maximum specified sound power levels. This standard does not provide correction for the existence of tonal characteristics.

Sound pressure levels at a distance from the machine may be required in some applications, such as hearing protection programs. Information is provided on such a procedure in Clause 7 based on a standardized test environment.

NOTE 1 This standard recognizes the economic reason for the availability of standard noise-level machines for use in non-critical areas or for use with supplementary means of noise attenuation.

NOTE 2 Where sound power levels lower than those specified in Tables 1 or 2 are required, these should be agreed between the manufacturer and the purchaser, as special electrical, mechanical, or acoustical design may involve additional measures.

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.

IEC 60034-1, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-5, *Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification*

IEC 60034-6, *Rotating electrical machines – Part 6: Methods of cooling (IC Code)*

ISO 3741, *Acoustics – Determination of sound power levels of noise sources using sound pressure – Precision methods for reverberation rooms*

ISO 3743-1, *Acoustics – Determination of sound power levels of noise sources – Engineering methods for small, movable sources in reverberant fields – Part 1: Comparison method for hard-walled test rooms*

ISO 3743-2, *Acoustics – Determination of sound power levels of noise sources using sound pressure – Engineering methods for small, movable sources in reverberant fields – Part 2: Method for special reverberation test rooms*

ISO 3744, *Acoustics – Determination of sound power levels of noise sources using sound pressure – Engineering method in an essentially free field over a reflecting plane*

ISO 3745, *Acoustics – Determination of sound power levels of noise sources – Precision methods for anechoic and semi-anechoic rooms*

ISO 3746, *Acoustics – Determination of sound power levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane*

ISO 3747, *Acoustics – Determination of sound power levels of noise sources using sound pressure – Comparison method in situ*

ISO 4871, *Acoustics – Declaration and verification of noise emission values of machinery and equipment*

ISO 9614-1, *Acoustics – Determination of sound power levels of noise sources using sound intensity – Part 1: Measurement at discrete points*

ISO 9614-2, *Acoustics – Determination of sound power levels of noise sources using sound intensity – Part 2: Measurement by scanning*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in the standards listed in the normative references together with the following apply.

3.1
sound power level
L_W
ten times the logarithm to the base 10 of the ratio of the sound power radiated by the source under test to the reference sound power [W_o = 1 pW (10^{-12} W)] expressed in decibels

3.2
sound pressure level
L_p
ten times the logarithm to the base 10 of the ratio of the square of the sound pressure to the square of the reference sound pressure [P_o = 20 µPa (2×10^{-5} Pa)] expressed in decibels

3.3
measurement surface index
L_S
ten times the logarithm to the base 10 of the ratio of the measurement surface S to the reference surface S_0 [m^2] expressed in decibels

93
94 **3.4**
95 **maximum value**
96 is the value that defines the upper limit without further tolerance
97
98

4 Methods of measurement

4.1 Sound pressure level measurements and calculation of sound power level produced by the machine shall be made in accordance with ISO 3744, unless one of the alternative methods specified in 4.3 or 4.4 below applies.

NOTE It is general practice to use the parallelepiped method for all shaft heights.

4.2 The maximum sound power levels specified in Tables 1 and 2 or adjusted by Table 3, relate to measurements made in accordance with 4.1.

4.3 When appropriate, one of the methods of precision or engineering grade accuracy, such as the methods of ISO 3741, ISO 3743-1, ISO 3743-2, ISO 3745, ISO 9614-1 or ISO 9614-2, may be used to determine sound power levels.

4.4 The simpler but less accurate method specified in ISO 3746 or ISO 3747 may be used, especially when the environmental conditions required by ISO 3744 cannot be satisfied (for example, for large machines).

However, to prove compliance with this standard, unless a correction due to inaccuracy of the measurement has already been applied to the values determined by this method in accordance with ISO 3746 or ISO 3747, the levels of Tables 1 and 2 shall be decreased by 2 dB.

4.5 If testing under rated load conditions, the methods of ISO 9614 are preferred. However, other methods are allowed when the load machine and auxiliary equipment are acoustically isolated or located outside the test environment.

5 Test conditions

5.1 Machine mounting

5.1.1 Precautions

Care should be taken to minimize the transmission and the radiation of structure-borne noise from all mounting elements including the foundation. This can be achieved by the resilient mounting for smaller machines, however, larger machines can usually only be tested under rigid mounting conditions.

Machines tested under load conditions shall be rigidly mounted.

5.1.2 Resilient mounting

The natural frequency of the support system and the machine under test shall be lower than a third of the frequency corresponding to the lowest rotational speed of the machine.

The effective mass of the resilient support shall be not greater than one-tenth of that of the machine under test.