SLOVENSKI STANDARD
SIST EN 60034-9:2006/A1:2007

01-september-2007

Električni rotacijski stroji - 9. del: Mejne vrednosti hrupa (IEC 60034-9:2003/A1:2007)

Rotating electrical machines - Part 9: Noise limits (IEC 60034-9:2003/A1:2007)

Drehende elektrische Maschinen - Teil 9: Geräuschgrenzwerte (IEC 60034-9:2003/A1:2007)

Machines électriques tournantes - Partie 9: Limites de bruit (CEI 60034-9:2003/A1:2007)

Ta slovenski standard je istoveten z: **EN 60034-9:2005/A1:2007**

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

SIST EN 60034-9:2006/A1:2007 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60034-9/A1

April 2007

ICS 29.160

English version

Rotating electrical machines - Part 9: Noise limits

(IEC 60034-9:2003/A1:2007)

Machines électriques tournantes - Partie 9: Limites de bruit (CEI 60034-9:2003/A1:2007)

Drehende elektrische Maschinen - Teil 9: Geräuschgrenzwerte (IEC 60034-9:2003/A1:2007)

This amendment A1 modifies the European Standard EN 60034-9:2005; it was approved by CENELEC on 2007-04-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 60034-9:2005/A1:2007 E

Foreword

The text of document 2/1383/CDV, future amendment 1 to IEC 60034-9:2003, prepared by IEC TC 2, Rotating machinery, was submitted to the IEC-CENELEC parallel Unique Acceptance Procedure and was approved by CENELEC as amendment A1 to EN 60034-9:2005 on 2007-04-01.

The following dates were fixed:

– latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2008-01-01
– latest date by which the national standards conflicting with the amendment have to be withdrawn	(dow)	2010-04-01

_____

Endorsement notice

The text of amendment 1:2007 to the International Standard IEC 60034-9:2003 was approved by CENELEC as an amendment to the European Standard without any modification.

_____

NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC
60034-9

2003

AMENDEMENT 1
AMENDMENT 1
2007-03

Amendement 1

Machines électriques tournantes –

Partie 9: Limites de bruit

Amendment 1

Rotating electrical machines –

Part 9: Noise limits

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE G

Pour prix, voir catalogue en vigueur
For price, see current catalogue

FOREWORD

This amendment has been prepared by IEC technical committee 2: Rotating machinery.

The text of this amendment is based on the following documents:

CDV	Report on voting
2/1383/CDV	2/1413/RVC

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this amendment and the base publication 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.

Page 11

1 Scope

Replace the first paragraph of the scope with the following:

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}.

– provides guidance for the determination of noise levels for a.c. cage induction motors supplied by converters.

Page 19

6 Sound power level limits

Add before NOTE 1 the following new text:

Converter-supplied a.c. machines are excluded from specified limits.

Add a new Clause 7 as follows:

7 Determination of noise increments caused by converter supply

Noise emissions of electromagnetic origin at the converter supply can be considered as the superposition of:

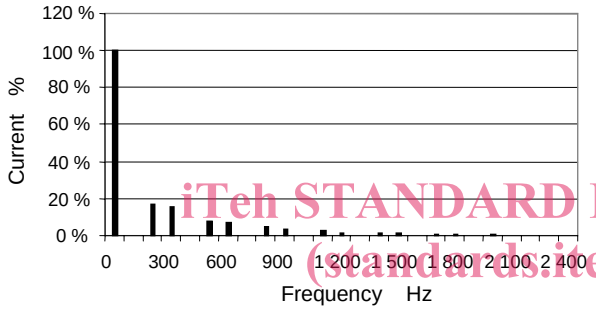
- the noise generated by the voltages and currents of fundamental frequency, which is identical with the noise at sinusoidal supply of the same values, and
- an increment caused by voltages and currents at other frequencies.

Two features mainly influence this increment:

a) The frequency spectrum at the converter terminals

Three typical frequency spectra can be identified:

1) Spectrum of a block-type current-source converter

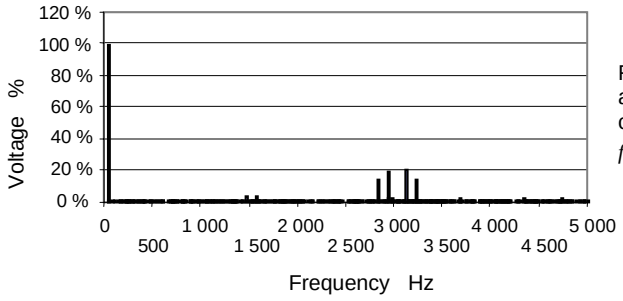


Frequency spectrum of the currents at the output terminals of a 6-pulse current-source converter

f_1 = 50 Hz

IEC 337/07

2) Spectrum of type A voltage-source converter (characterized by pronounced spikes CLOSE to the switching frequency and its multiples)

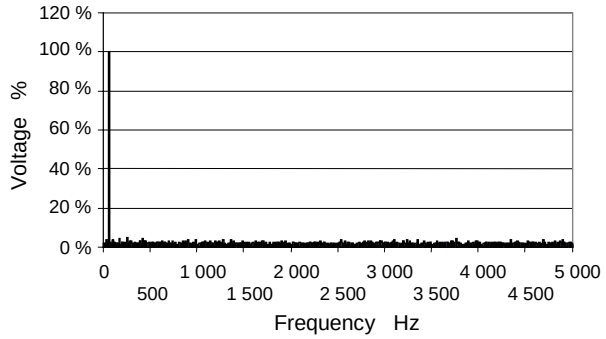


Frequency spectrum of the voltages at the terminals of a type A voltage-source converter

f_1 = 50 Hz, f_s = 3 kHz

IEC 338/07

3) Spectrum of type B voltage-source converter (characterized by a broad voltage spectrum without pronounced spikes.)



Frequency spectrum of the voltages of a type B voltage-source converter
f_1 = 50 Hz, f_s average = 4,5 kHz

IEC 339/07

Specific considerations are necessary when the spectrum deviates significantly from a typical spectrum.

b) The resonance frequencies of the motor for the modes of vibration caused by the harmonics

The relevant resonance frequencies of motors can be grouped according to the following table:

Shaft height H	Resonance frequencies of vibration mode r			
	r = 0	r = 2	r = 4	r = 6
H ≤ 200 mm	> 4 000 Hz	> 600 Hz	> 4 000 Hz	> 5 000 Hz
H ≥ 280 mm	< 3 000 Hz	< 500 Hz	< 2 500 Hz	< 4 000 Hz

A magnetically excited tone is generated by the interaction of the fundamental fields of the number of pole-pairs p of the fundamental frequency f_1 at the motor terminals and of one of the harmonic frequencies $n \cdot f_1$, as shown in the relevant frequency spectrum. The tones are of:

frequencies $$f_r = f_1 \cdot (n \pm 1) = \begin{cases} (n+1) \cdot f_1 \\ (n-1) \cdot f_1 \end{cases}$$

vibration modes $$r = p \pm p = \begin{cases} 2p \\ 0 \end{cases}$$

Usually combinations with $n \cdot f_1$, close to the switching frequency generate objectionable tones.

A reasonable increase of the audible noise is to be expected, if the frequency and the vibration mode of a tone are close to the corresponding values of the resonant structure of the motor. In some cases, objectionable tones may be avoided by changes to the parameter assignment of the converter.

The following table shows the expected increase of noise, at converter supply, when compared to the noise at sinusoidal supply, with the same fundamental values of voltage and frequency.

Increments of noise

Kind of converter	Case	Expected increment
Block-type current-source converter	6-pulse or 12-pulse	1 to 5 dB(A) The higher values relate to motors with low ventilation noise. Increment depends on load.
Type A voltage-source converter	High frequency voltages of high amplitudes excite resonances of the motor	Up to 15 dB(A) Increment does not depend on load. Initial calculation possible by adequate software.
	High frequency voltages of high amplitudes do not excite resonances of the motor	1 to 5 dB(A) Increment does not depend on load.
Type B voltage-source converter	Broad voltage spectrum without pronounced spikes	5 to 10 dB(A) Increment does not depend on load.

7 Determination of sound pressure level

Renumber this Clause as:

8 Determination of sound pressure level

Page 21

8 Declaration and verification of sound power values

Renumber this Clause as:

9 Declaration and verification of sound power values