

© Copyright SEK. Reproduction in any form without permission is prohibited.

## **Elektroakustik – Ljudnivåmätare – Del 2: Typprovning**

*Electroacoustics –  
Sound level meters –  
Part 2: Pattern evaluation tests*

Som svensk standard gäller europastandarden EN 61672-2:2013. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61672-2:2013.

### **Nationellt förord**

Europastandarden EN 61672-2:2013

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61672-2, Second edition, 2013 - Electroacoustics - Sound level meters - Part 2: Pattern evaluation tests**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61672-2, utgåva 1, 2003, gäller ej fr o m 2016-11-04.

### *Standarder underlättar utvecklingen och höjer elsäkerheten*

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

### *SEK är Sveriges röst i standardiseringsarbetet inom elområdet*

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

### *Stora delar av arbetet sker internationellt*

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

### *Var med och påverka!*

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

### **SEK Svensk Elstandard**

Box 1284  
164 29 Kista  
Tel 08-444 14 00  
[www.elstandard.se](http://www.elstandard.se)

English version

**Electroacoustics -  
Sound level meters -  
Part 2: Pattern evaluation tests  
(IEC 61672-2:2013)**

Electroacoustique -  
Sonomètres -  
Partie 2: Essais d'évaluation d'un modèle  
(CEI 61672-2:2013)

Elektroakustik -  
Schallpegelmesser -  
Teil 2: Baumusterprüfungen  
(IEC 61672-2:2013)

This European Standard was approved by CENELEC on 2013-11-04. CENELEC 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.

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

This European Standard 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

**CENELEC**

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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

The text of document 29/813/FDIS, future edition 2 of IEC 61672-2, prepared by IEC/TC 29 "Electroacoustics" in cooperation with the International Organization of Legal Metrology (OIML), was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61672-2:2013.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2014-08-04
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-11-04

This document supersedes EN 61672-2:2003.

EN 61672-2:2013 includes the following significant technical changes with respect to EN 61672-2:2003.

In this second edition, conformance to specifications is demonstrated when

- a) measured deviations from design goals do not exceed the applicable acceptance limits, and
- b) the uncertainty of measurement does not exceed the corresponding maximum permitted uncertainty, with both uncertainties determined for a coverage probability of 95 %.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

## Endorsement notice

The text of the International Standard IEC 61672-2:2013 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated :

|             |      |                           |
|-------------|------|---------------------------|
| IEC 61094-8 | NOTE | Harmonized as EN 61094-8. |
|-------------|------|---------------------------|

## Annex ZA

(normative)

### Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| <u>Publication</u>            | <u>Year</u>          | <u>Title</u>                                                                                                                                                         | <u>EN/HD</u>                      | <u>Year</u>          |
|-------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------------------|
| IEC 60942                     | -                    | Electroacoustics - Sound calibrators                                                                                                                                 | EN 60942                          | -                    |
| IEC 61000-4-2                 | 2008                 | Electromagnetic compatibility (EMC)<br>Part 4-2: Testing and measurement<br>techniques - Electrostatic discharge<br>immunity test                                    | EN 61000-4-2                      | 2009                 |
| IEC 61000-4-3<br>+ A1<br>+ A2 | 2006<br>2007<br>2010 | Electromagnetic compatibility (EMC)<br>Part 4-3: Testing and measurement<br>techniques - Radiated, radio-frequency,<br>electromagnetic field immunity test           | EN 61000-4-3<br>+ A1<br>+ A2      | 2006<br>2008<br>2010 |
| IEC 61000-4-6                 | 2008                 | Electromagnetic compatibility (EMC)<br>Part 4-6: Testing and measurement<br>techniques - Immunity to conducted<br>disturbances, induced by radio-frequency<br>fields | EN 61000-4-6                      | 2009                 |
| IEC 61000-6-2                 | 2005                 | Electromagnetic compatibility (EMC)<br>Part 6-2: Generic standards - Immunity for<br>industrial environments                                                         | EN 61000-6-2<br>+ corr. September | 2005<br>2005         |
| IEC 61094-1                   | -                    | Measurement microphones<br>Part 1: Specifications for laboratory<br>standard microphones                                                                             | EN 61094-1                        | -                    |
| IEC 61094-5                   | -                    | Measurement microphones<br>Part 5: Methods for pressure calibration of<br>working standard microphones by<br>comparison                                              | EN 61094-5                        | -                    |
| IEC 61183                     | -                    | Electroacoustics - Random-incidence and<br>diffuse-field calibration of sound level<br>meters                                                                        | EN 61183                          | -                    |
| IEC 61672-1                   | -                    | Electroacoustics - Sound level meters<br>Part 1: Specifications                                                                                                      | EN 61672-1                        | -                    |
| IEC 62585                     | -                    | Electroacoustics - Methods to determine<br>corrections to obtain the free-field<br>response of a sound level meter                                                   | EN 62585                          | -                    |

| <u>Publication</u> | <u>Year</u> | <u>Title</u>                                                                                                                                                           | <u>EN/HD</u>                        | <u>Year</u>  |
|--------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------|
| CISPR 16-1-1       | -           | Specification for radio disturbance and immunity measuring apparatus and methods<br>Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus | EN 55016-1-1                        | -            |
| CISPR 16-1-2       | 2003        | Specification for radio disturbance and immunity measuring apparatus and methods                                                                                       | EN 55016-1-2                        | 2004         |
| + corr. January    | 2009        |                                                                                                                                                                        | -                                   | -            |
| + A1               | 2004        |                                                                                                                                                                        | + A1                                | 2005         |
| + A2               | 2006        | Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances                                                            | + A2                                | 2006         |
| CISPR 16-2-1       | 2008        | Specification for radio disturbance and immunity measuring apparatus and methods                                                                                       | EN 55016-2-1                        | 2009         |
| + A1               | 2010        | Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements                                                                     | + A1                                | 2011         |
| CISPR 16-2-3       | 2010        | Specification for radio disturbance and immunity measuring apparatus and methods                                                                                       | EN 55016-2-3                        | 2010         |
| -                  | -           |                                                                                                                                                                        | + AC:2013                           | 2013         |
| + A1               | 2010        | Part 2-3: Methods of measurement of disturbances and immunity - Radiated disturbance measurements                                                                      | + A1                                | 2010         |
| CISPR 22 (mod)     | 2008        | Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement                                                               | EN 55022<br>+ AC:2011 <sup>1)</sup> | 2010<br>2011 |
| ISO/IEC Guide 98-3 | -           | Uncertainty of measurement<br>Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)                                                                 | -                                   | -            |
| ISO/IEC Guide 99   | -           | International vocabulary of metrology - Basic and general concepts and associated terms (VIM)                                                                          | -                                   | -            |
| ISO 26101          | 2012        | Acoustics - Test methods for the qualification of free-field environments                                                                                              | -                                   | -            |

---

1) EN 55022 is superseded by EN 55032:2012, which is based on CISPR 32:2012 + corr. Mars 2012 + corr. August 2012 .

## CONTENTS

|        |                                                                                                                          |    |
|--------|--------------------------------------------------------------------------------------------------------------------------|----|
| 1      | Scope .....                                                                                                              | 6  |
| 2      | Normative references .....                                                                                               | 6  |
| 3      | Terms and definitions .....                                                                                              | 7  |
| 4      | Submission for testing .....                                                                                             | 7  |
| 5      | Marking of the sound level meter and information in the Instruction Manual .....                                         | 8  |
| 6      | Mandatory facilities and general requirements .....                                                                      | 8  |
| 7      | Environmental, electrostatic, and radio-frequency tests .....                                                            | 10 |
| 7.1    | General .....                                                                                                            | 10 |
| 7.2    | Uncertainties for measurements of environmental test conditions .....                                                    | 11 |
| 7.3    | Influence of static pressure .....                                                                                       | 11 |
| 7.4    | Limits on air temperature, relative humidity and static pressure .....                                                   | 12 |
| 7.5    | Acclimatization requirements for tests of the influence of air temperature and relative humidity .....                   | 12 |
| 7.6    | Abbreviated test of the combined influence of air temperature and relative humidity .....                                | 12 |
| 7.7    | Influence of air temperature .....                                                                                       | 14 |
| 7.8    | Influence of relative humidity .....                                                                                     | 15 |
| 7.9    | Influence of electrostatic discharges .....                                                                              | 16 |
| 7.10   | Influence of a.c. power-frequency and radio-frequency fields .....                                                       | 17 |
| 7.10.1 | Sound signal .....                                                                                                       | 17 |
| 7.10.2 | AC power-frequency tests .....                                                                                           | 17 |
| 7.10.3 | Radio-frequency tests .....                                                                                              | 17 |
| 8      | Radio-frequency emissions and public power supply disturbances .....                                                     | 19 |
| 9      | Electroacoustical performance tests .....                                                                                | 20 |
| 9.1    | General .....                                                                                                            | 20 |
| 9.2    | Indication at the calibration check frequency .....                                                                      | 21 |
| 9.3    | Directional response .....                                                                                               | 21 |
| 9.4    | Tests of frequency weightings with acoustical signals .....                                                              | 23 |
| 9.4.1  | General .....                                                                                                            | 23 |
| 9.4.2  | Windscreen corrections .....                                                                                             | 24 |
| 9.4.3  | Free-field tests .....                                                                                                   | 24 |
| 9.4.4  | Comparison coupler tests .....                                                                                           | 25 |
| 9.4.5  | Conformance .....                                                                                                        | 26 |
| 9.4.6  | Random incidence .....                                                                                                   | 26 |
| 9.5    | Tests of frequency weightings with electrical signals .....                                                              | 27 |
| 9.5.1  | General .....                                                                                                            | 27 |
| 9.5.2  | First alternative test procedure (variable input signal level) .....                                                     | 27 |
| 9.5.3  | Second alternative test procedure (constant input signal level) .....                                                    | 27 |
| 9.5.4  | Conformance .....                                                                                                        | 28 |
| 9.5.5  | Frequency weightings C or Z at 1 kHz .....                                                                               | 28 |
| 9.6    | Corrections for the effect of reflections from the case of a sound level meter and diffraction around a microphone ..... | 28 |
| 9.7    | Corrections to obtain free-field or random-incidence sound levels .....                                                  | 29 |
| 9.8    | Level linearity .....                                                                                                    | 30 |
| 9.8.1  | Tests at an air temperature near the reference air temperature .....                                                     | 30 |
| 9.8.2  | Tests at elevated air temperature .....                                                                                  | 31 |

|      |                                                                                                                     |    |
|------|---------------------------------------------------------------------------------------------------------------------|----|
| 9.9  | Under-range indication .....                                                                                        | 31 |
| 9.10 | Self-generated noise level .....                                                                                    | 31 |
| 9.11 | Decay time constants for time weightings F and S .....                                                              | 32 |
| 9.12 | Toneburst response for sound level meters that measure time-weighted<br>sound level .....                           | 32 |
| 9.13 | Toneburst response for sound level meters that measure sound exposure<br>level or time-averaged sound level .....   | 33 |
| 9.14 | Response to sequences of repeated tonebursts for sound level meters that<br>measure time-averaged sound level ..... | 34 |
| 9.15 | Overload indication .....                                                                                           | 34 |
| 9.16 | C-weighted peak sound level .....                                                                                   | 35 |
| 9.17 | Reset .....                                                                                                         | 36 |
| 9.18 | Electrical output .....                                                                                             | 36 |
| 9.19 | Timing facilities .....                                                                                             | 36 |
| 9.20 | Crosstalk in multi-channel sound level meter systems .....                                                          | 36 |
| 9.21 | Power supply .....                                                                                                  | 36 |
| 10   | Pattern evaluation report .....                                                                                     | 37 |
|      | Bibliography .....                                                                                                  | 38 |

# **ELECTROACOUSTICS – SOUND LEVEL METERS –**

## **Part 2: Pattern-evaluation tests**

### **1 Scope**

This part of IEC 61672 provides details of the tests necessary to verify conformance to all mandatory specifications given in IEC 61672-1 for time-weighting sound level meters, integrating-averaging sound level meters, and integrating sound level meters. Pattern-evaluation tests apply for each channel of a multi-channel sound level meter, as necessary. Tests and test methods are applicable to class 1 and class 2 sound level meters. The aim is to ensure that all laboratories use consistent methods to perform pattern-evaluation tests.

NOTE 1 In this document, references to IEC 61672-1, IEC 61672-2, and IEC 61672-3 refer to the second editions unless stated otherwise.

NOTE 2 Procedures for the pattern-evaluation testing of sound level meters designed to conform to the specifications of IEC 61672-1:2002 were given in IEC 61672-2:2003.

### **2 Normative references**

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60942, *Electroacoustics – Sound calibrators*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2010, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic-field immunity test*

IEC 61000-4-6:2008, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-6-2:2005, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments*

IEC 61094-1, *Measurement microphones – Part 1: Specifications for laboratory standard microphones*

IEC 61094-5, *Measurement microphones – Part 5: Methods for pressure calibration of working standard microphones by comparison*

IEC 61183, *Electroacoustics – Random-incidence and diffuse-field calibration of sound level meters*

IEC 61672-1, *Electroacoustics – Sound level meters – Part 1: Specifications*

IEC 62585, *Electroacoustics – Methods to determine corrections to obtain the free-field response of a sound level meter*

CISPR 16-1-1, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus*<sup>1</sup>

CISPR 16-1-2:2006, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Conducted disturbances*

CISPR 16-2-1:2010 (Ed. 2.1), *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements*

CISPR 16-2-3:2010 (Ed. 3.1), *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements*

CISPR 22:2008, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*

ISO/IEC Guide 98-3, *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM: 1995)*

ISO/IEC Guide 99, *International vocabulary of metrology – Basic and general concepts and associated terms (VIM)*

ISO 26101:2012, *Acoustics – Test methods for the qualification of free-field environments*

---

<sup>1</sup> In English, CISPR stands for International Special Committee on Radio Interference.