

**Elektrikompressoritega õhu konditsioneerid,  
vedelikjahutusseadmed, soojuspumbad ja õhukuivatid  
ruumide kütteks ja jahutuseks. Õhumüra mõõtmine.  
Helivõimsuse taseme määramine**

**Air conditioners, liquid chilling packages, heat pumps  
and dehumidifiers with electrically driven compressors  
for space heating and cooling - Measurement of  
airborne noise - Determination of the sound power level**

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN 12102:2013 sisaldab Euroopa standardi EN 12102:2013 ingliskeelset teksti.	This Estonian standard EVS-EN 12102:2013 consists of the English text of the European standard EN 12102:2013.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 31.07.2013.	Date of Availability of the European standard is 31.07.2013.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

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English Version

**Air conditioners, liquid chilling packages, heat pumps and  
dehumidifiers with electrically driven compressors for space  
heating and cooling - Measurement of airborne noise -  
Determination of the sound power level**

Climatiseurs, groupes refroidisseurs de liquide, pompes à  
chaleur et déshumidificateurs avec compresseur entraîné  
par moteur électrique pour le chauffage et la réfrigération -  
Mesure de bruit aérien émis - Détermination du niveau de  
puissance acoustique

Klimageräte, Flüssigkeitskühlsätze, Wärmepumpen und  
Entfeuchter mit elektrisch angetriebenen Verdichtern zur  
Raumbeheizung und -kühlung - Messung der  
Luftschallemissionen - Bestimmung des  
Schallleistungspegels

This European Standard was approved by CEN on 30 May 2013.

CEN 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 CEN 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 CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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# Contents

Page

Foreword.....	4
1 Scope .....	5
2 Normative references .....	6
3 Terms, definitions and symbols.....	7
3.1 General.....	7
3.2 Symbols .....	7
3.2.1 Non ducted units.....	7
3.2.2 Ducted units .....	7
3.3 Standard operating conditions.....	8
4 Measuring instruments .....	8
5 Operation of the unit .....	9
6 Installation .....	11
6.1 General points.....	11
6.2 Ducted units .....	11
6.2.1 Installation .....	11
6.2.2 Duct end correction .....	11
6.2.3 Bend correction .....	12
6.2.4 Pressure and airflow measurements .....	13
6.2.5 Casing radiated test .....	14
6.3 Wall mounted .....	14
6.4 Ceiling mounted.....	14
6.5 Window-type.....	14
6.6 Multisplits .....	14
6.7 Single ducts.....	14
6.7.1 Noise radiated by the casing .....	14
6.7.2 Ducted outlet.....	15
7 Acoustic measurement methods .....	15
7.1 Frequency range .....	15
7.2 To choose a method .....	15
7.2.1 General.....	15
7.2.2 Available test facilities .....	15
7.2.3 Target of measurement .....	16
7.3 Reverberation room methods.....	16
7.3.1 General.....	16
7.3.2 Non ducted units.....	16
7.3.3 Ducted units .....	17
7.4 Installation of the free field over a reflecting plane method .....	18
7.4.1 General.....	18
7.4.2 Reference surface .....	18
7.4.3 Measuring surface .....	18
8 Uncertainty of measurement results .....	20
9 Test report .....	20
9.1 General.....	20
9.2 Unit specification .....	20
9.3 Operating conditions, installation and environmental conditions .....	21
9.4 Measurement instruments .....	21
9.5 Measured values and results.....	21

<b>Annex A (normative) Specific measurement for variable speed units</b>	<b>23</b>
<b>A.1 General requirements</b>	<b>23</b>
<b>A.2 Test mode</b>	<b>23</b>
<b>A.3 Measurements process</b>	<b>23</b>
<b>Annex ZA (informative) Relationship between this European Standard and the requirements of Commission Regulation (EC) No 206/2012</b>	<b>24</b>
<b>Bibliography</b>	<b>25</b>

## Foreword

This document (EN 12102:2013) has been prepared by Technical Committee CEN/TC 113 "Heat pumps and air conditioning units", the secretariat of which is held by AENOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2014 and conflicting national standards shall be withdrawn at the latest by January 2014.

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

This document supersedes EN 12102:2008.

The main changes with respect to the previous edition are listed below:

- a) the addition of a table containing the sound power levels to be recorded in the test report;
- b) the addition of an Annex ZA relating to the Commission Regulation (EC) n°206/2012.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

# 1 Scope

This European Standard establishes requirements for determining, in accordance with a standardized procedure, the sound power level emitted into the surrounding air by air conditioners, heat pumps, liquid chilling packages with electrically driven compressors when used for space heating and/or cooling, including water cooled multisplit systems, as described in EN 14511 and dehumidifiers as described in EN 810.

This European Standard also covers the measurement of the sound power level of evaporatively-cooled condenser air conditioners, as defined in EN 15218. However, the measurement should be done without external water feeding and these units will thus be considered as the other air conditioners covered by EN 14511.

It is emphasised that this measurement standard only refers to airborne noise.

This European Standard offers ways to determine the sound power level of units. Some of them are specifically adapted to provide results with low uncertainties, by using laboratory class acoustic methods and highly controlled working conditions. Those measurements are suitable for certification, labelling and marking purposes.

In some cases, the target and/or the environment of the measurements do not allow such precision-class methods. This European Standard also offers ways to assess sound power levels with acceptable accuracy even though acoustic methods and/or working conditions are not laboratory-type, e.g. *in situ* or quality control measurements.

This European Standard gives two classes of measurements and results, according to the test environment:

- Class A measurements correspond to controlled working conditions (standard or application rating conditions). It is defined by the respect to the tolerances of Table 2 and should be used for the conformity to requirements of the Commission Regulation (EC) No 206/2012 of 6 March 2012 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for air conditioners
- Class B measurements correspond to the case where the range defined by the tolerances of Table 2 cannot be fulfilled.

In both classes, precision or engineering class acoustic methods should be applied. The choice of the acoustic measurement method is done in accordance with EN ISO 3740 and EN ISO 9614 depending on the type of surrounding acoustic fields (diffuse or free field, enclosed or open space), and the available instrumentation. Whatever the current working conditions, the reference of acoustic standard should be reported, with explicit mention of its accuracy class.

The use of EN ISO 3746 and EN ISO 3747 as survey grade methods are not recommended due to the high level of uncertainties. Their use is only allowed for non controlled environments.

Three methods for determining the sound power levels are specified in order to avoid unduly restricting existing facilities and experience:

- the first methodology is based on reverberation room measurement (see EN ISO 3741, EN ISO 3743 and EN ISO 3747 in some favourable cases when the engineering grade can be fulfilled);
- the second method is based on measurements in an essentially free field over a reflecting plane (see EN ISO 3744 and EN ISO 3745);
- the third method is based on sound intensity measurement (see EN ISO 9614) in preferably free field environment.

The references in this European Standard to EN ISO 3743 should be understood as EN ISO 3743-1 or EN ISO 3743-2 as well.

The necessity to regulate the test conditions obviously leads to recommend test methods implemented in acoustically designed (enclosed) spaces, such as EN ISO 3741, EN ISO 3743, EN ISO 3745 and also EN ISO 9614 when implemented in an enclosed space.

The open spaces should be covered only in specific cases, e.g. when the size or the power of the unit under test cannot be managed by standard test rooms. Suitable test methods are EN ISO 3744 and EN ISO 9614.

**NOTE** Intensity measurement methods are quite robust and are well suited for tests to be done in environments without or with a light acoustic treatment (the better the acoustic treatment, the easier the implementation).

## 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.

EN 15218:2013, *Air conditioners and liquid chilling packages with evaporatively cooled condenser and with electrically driven compressors for space cooling - Terms, definitions, test conditions, test methods and requirements*

EN 810:1997, *Dehumidifiers with electrically driven compressors — Rating tests, marking, operational requirements and technical data sheet*

EN 14511-1:2013, *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling — Part 1: Terms, definitions and classification*

EN 14511-2:2013, *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling — Part 2: Test conditions*

EN 14511-3:2013, *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling — Part 3: Test methods*

EN 14511-4:2013, *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling — Part 4: Operating requirements, marking and instructions*

EN ISO 3740, *Acoustics — Determination of sound power levels of noise sources — Guidelines for the use of basic standards (ISO 3740)*

EN ISO 3741, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Precision methods for reverberation test rooms (ISO 3741)*

EN ISO 3743-1, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for small, movable sources in reverberant fields — Part 1: Comparison method for hard-walled test rooms (ISO 3743-1)*

EN 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: Methods for special reverberation test rooms (ISO 3743-2)*

EN ISO 3744, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744)*

EN ISO 3747, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering/survey methods for use in situ in a reverberant environment (ISO 3747)*



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

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

EN ISO 9614-3, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 3: Precision method for measurement by scanning (ISO 9614-3)*

### 3 Terms, definitions and symbols

#### 3.1 General

Terms, definitions and symbols of EN 14511:2013, EN 15218:2013 and EN 810:1997 apply.

The terms, definitions and symbols of the acoustic standards referred in Clause 2 apply.

The required value, sound power level, expressed in dB, is denoted by  $L_W$ , defined by:

$$L_W = 10 \cdot \log_{10} \left( \frac{W}{W_0} \right) \quad (1)$$

where  $W$  is the sound power and  $W_0$  is the reference sound power = 1 pW ( $10^{-12}$  W)

#### 3.2 Symbols

##### 3.2.1 Non ducted units

The suffix "i" denotes the indoor side of units and "o" the outdoor ones.

$L_{Wi}$  : sound power level radiated by the indoor side.

$L_{Wo}$  : sound power level radiated by the outdoor side.

##### 3.2.2 Ducted units

For ducted unit, the attended value is the sound power level travelling into the duct. It is assessed from the sound power level radiated by the air outlet opening of the duct, corrected by the "duct end correction" factor  $E$  (voir 6.2.2). The suffix "d" denotes the "in duct" sound power level.

$L_{Wd}$  = sound power level travelling into the (discharge or suction) duct.

For the case of a ducted indoor side of a split unit:

$L_{Wdi}$  = sound power level travelling into the (discharge or suction) duct of indoor unit.

For the case of a ducted unit on the outdoor side:

$L_{Wdo}$  = sound power travelling into the (discharge or suction) duct of outdoor unit.

The sound radiated by the casing does not require any specific suffix. Use the same symbols as in 3.2.1 to specify which unit is concerned, indoor or outdoor side.