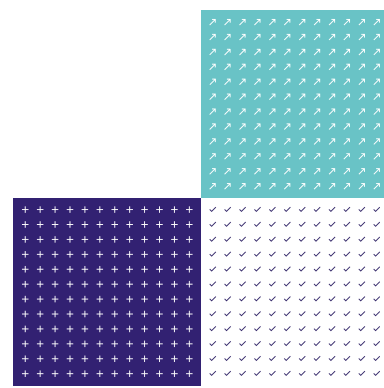


# TPS 49

Edition 3 December 2022

## **Guidance on the interpretation of IEC 61672 in the periodic testing of sound level meters**



## Contents

1.	Introduction	2
2.	General requirements	3
3.	Specific requirements	4
4.	References	7

## Changes since last edition

Updated throughout.

### 1. Introduction

This document supersedes UKAS Publication TPS 49 Edition 2 which outlined interim arrangements until IEC 61672-3: 2006<sup>[5]</sup> edition 1 was published.

- 1.1 The last edition of TPS 49 also provided interim arrangements for use in the UK to cover some aspects of periodic testing to IEC 61672-3:2006<sup>[5]</sup>, until this Part 3 of IEC 61672 was revised. However, all Parts of IEC 61672 Edition 1 have now been substantially revised and published as Edition 2. Part 3 of Edition 2 only refers to sound level meters originally manufactured according to Part 1 of Edition 2, and hence Part 3:2006 has not been revised and will not be revised in the future. This edition of TPS 49 therefore explains the periodic testing requirements for sound level meters originally manufactured according to either Edition 1 or Edition 2 of IEC 61672.
- 1.2 The purpose of this document is to advise laboratories and assessors of the periodic tests required on sound level meters originally manufactured in accordance with IEC 61672-1:2002<sup>[3]</sup> *Electroacoustics - Sound level meters - Part 1: Specifications* (dual-numbered as BS EN 61672-1:2003<sup>[3]</sup>) Edition 1, or IEC 61672-1:2013<sup>[6]</sup> (dual-numbered as BS EN 61672-1:2013<sup>[6]</sup>) Edition 2.
- 1.3 IEC has published IEC 61672-3:2006<sup>[5]</sup> *Electroacoustics - Sound level meters - Part 3: Periodic tests* Edition 1, (dual-numbered as BS EN 61672-3:2006 Edition 1<sup>[5]</sup>). This applies only to sound level meters originally manufactured in accordance with IEC 61672-1<sup>[3]</sup> Edition 1. However, in order to maintain consistency with previous periodic testing to BS EN 61672-3:2006<sup>[5]</sup> as described in the last edition of TPS 49 and to assist with practical implementation some guidance is still required for use in the UK to cover some aspects of the periodic testing of sound level meters originally manufactured to IEC 61672-1:2002<sup>[3]</sup> (BS EN 61672-1:2003<sup>[3]</sup>) Edition 1.
- 1.4 IEC has also published IEC 61672-3:2013<sup>[9]</sup> *Electroacoustics - Sound level meters - Part 3: Periodic tests* Edition 2 (dual-numbered as BS EN 61672-3:2013<sup>[9]</sup> Edition 2) to cover sound level meters manufactured according to IEC 61672-1:2013<sup>[6]</sup> Edition 2. This Part 3 shall be used for periodic testing of sound level meters originally manufactured according to IEC 61672-1:2013<sup>[6]</sup> Edition 2.

## 2. General requirements

- 2.1 Existing UKAS accredited calibration laboratories wishing to be accredited for calibrations under Part 3 of BS EN 61672<sup>[9]</sup>, Edition 2 should submit a request for extension to scope using the normal process of submitting an AC3 application form, which is available for download from [www.ukas.com](http://www.ukas.com).
- 2.2 The verification or periodic test method required for a sound level meter is dependent upon the standard it was manufactured to. Where sound level meters are manufactured to more than one standard, Calibration Laboratory procedures for review of requests, tenders and contracts shall ensure the appropriate method is selected and capable of meeting the customer's requirements.
- 2.3 Table 1 shows the verification method/ periodic test methods which can be used for different combinations:

Sound Level Meter	
Standard of Manufacture	Verification Method/ Periodic Test Method
BS EN 60651:1994, IEC 60651:1979 <sup>[11]</sup> Type 1 or 2 And / Or BS EN 60804:1994, IEC 60804:1985 <sup>[12]</sup> Type 1 or 2	BS 7580 - 1:1997 <sup>[2]</sup>
BS EN 60651:1994, IEC 60651:1979 <sup>[11]</sup> Type 1 or 2 And / Or BS EN 60804:1994, IEC 60804:1985 <sup>[12]</sup> Type 1 or 2 And IEC 61672-1:2002, BS EN 61672-1:2003 <sup>[3]</sup> Edition 1	BS 7580 - 1:1997 <sup>[2]</sup>  <i>Or</i>  BS EN 61672-3: 2006, IEC 61672-3:2006 <sup>[5]</sup> Edition 1 amended by TPS 49 (see 2.4)
IEC 61672-1:2002, BS EN 61672-1:2003 <sup>[3]</sup> Edition 1 And IEC 61672-1:2013, BS EN 61672-1:2013 <sup>[6]</sup> Edition 2	BS EN 61672-3:2006, IEC 61672-3:2006 <sup>[5]</sup> Edition 1 amended by TPS 49 (see 2.4)  <i>Or</i>  BS EN 61672-3:2013, IEC 61672-3:2013 <sup>[9]</sup> Edition 2

Table 1 Sound Level Meter Verification/ Periodic Test Methods

- 2.4 Where a measurement standard is used by the customer which specifically requires the use of a sound level meter manufactured to BS EN 61672-1:2002<sup>[3]</sup>, periodic testing to BS EN 61672-3:2006<sup>[5]</sup>, amended by TPS 49, shall apply.
- 2.5 Where a measurement standard is used by the customer which specifically requires the use of a sound level meter manufactured to BS EN 61672-1:2013<sup>[6]</sup>, verification to BS EN 61672-3:2013<sup>[9]</sup>, shall apply.
- 2.6 No further guidance within this document is required to interpret BS EN 61672-3:2013<sup>[9]</sup> Edition 2, which shall be applied in its entirety.

### 3. Specific requirements

3.1 Interpretations and guidance are provided below for the following specific clauses within BS EN 61672-3:2006<sup>[5]</sup> (Edition 1) together with two additional points listed below as 19u and 19v for practical application and consistency in the use of the standard for calibration laboratories seeking UKAS accreditation for these periodic tests.

**Clause 3.5** - Add the following text to the end of the existing paragraph: “However, it is possible that some of this information may not yet be available. Until further notice, exceptions are made where the data are not published in the instruction manual or made available by the manufacturer or supplier. Details of these exceptions are given in the relevant sub-clause, and no further exceptions apply”.

**Clause 3.9** - Change the last sentence to read: “Conformance shall be demonstrated for sound pressure level, frequency, and total distortion, preferably using the methods given in IEC 60942<sup>[15]</sup> for periodic testing”.

**Clause 4.4** - Add the following text to the end of the existing paragraph: “Where the manufacturer’s uncertainty data form significant elements of the uncertainty budget and contribute to the failure to meet the uncertainty requirements of this Standard, testing may be undertaken and the statement given in 19 v) shall be included on the certificate as appropriate”.

**Clause 8.2** - Change the last sentence to read “The frequency of the input signals shall be within  $\pm 0.25\%$  of the specified value.”

**Clause 10.1** – Exclude Subclause 10.1 from the periodic tests, unless specifically requested by the customer. In this case the test shall be performed according to the method given in 10.1.

**Clause 10.2** - Change the end of the main text to read:

“.....10.1.3 shall be recorded for the most-sensitive level range on which a valid indication is available and for all frequency weightings available in the sound level meter”.

**Clause 11.4** - Add the following text to the end of the existing paragraph: “If data on the influence of effects due to the case of the sound level meter are not separately available, the corrections shall be assumed to be numerically zero, and the statement given below in 19u) added. Where a windscreen is in use, and data on the influence of the windscreen which excludes any effects due to the case of the sound level meter are not available, the windscreen corrections shall be assumed to be numerically zero, and a statement added to the certificate to that effect. Where an extension cable is in use, and data on the influence of effects due to the case of the sound level meter are not separately available, the corrections shall be assumed to be numerically zero, and a statement added to the certificate to that effect”.

**Clause 11.7** - Change the last sentence of the first paragraph to read: “Where the associated uncertainties of measurement are supplied, they shall be from the same source as the adjustment data”.

On the second line of the second paragraph, add the word “numerically” before “zero”.

**Clause 12.6** – Replace the paragraph with the following text: “For each frequency weighting and at each test frequency, corrections shall be applied to the level differences determined in 12.5 to account for the deviation of the microphone response from a uniform frequency response, and for the typical effects of reflections from the case of the sound level meter and diffraction of sound

around the microphone, and, if applicable, the influence of a windscreen. The microphone response shall preferably be the measured response of the actual microphone, but if the actual microphone response is not available, then a typical microphone response shall be used. The use of a typical microphone response shall be reported on the Certificate. If data on the influence of effects due to the case of the sound level meter are not separately available, the corrections shall be assumed to be numerically zero, and the statement given in 19u) added. Where a windscreen is in use, and data on the influence of the windscreen which excludes any effects due to the case of the sound level meter are not available, the windscreen corrections shall be assumed to be numerically zero, and a statement added to the certificate as given in 19u). Where an extension cable is in use, and data on the influence of effects due to the case of the sound level meter are not separately available, the corrections shall be assumed to be numerically zero, and the statement given in 19u) added".

**Clause 15.4** - Add the following text to the end of the existing paragraph: "On all ranges, the level of the input signal shall be adjusted to display an indication 2 dB above the lower limit of the range specified in the instruction manual, except where the lower limit of the range is less than 16 dB above the level of the self-generated noise as measured for frequency weighting A in 10.2, or less than 16 dB above the minimum indication of the sound level meter. In this case, measurements shall be performed for indications 16 dB above the level of the self-generated noise or above the minimum indication of the sound level meter, whichever is the higher. When the self-generated noise is measured on several ranges, where available the value measured for the range under test shall be used to determine the test point. For other ranges where the self-generated noise is not measured in 10.2, the highest measured level of A-weighted self-generated noise shall be used to determine the test point".

This additional test has been included as experience has shown that linearity at the bottom of ranges is a common cause of failure to meet the specifications.

**Clause 18.3** - Add the following NOTE:-

"For practical reasons laboratories may use any suitable method to determine the overload point to a resolution of 0.1 dB, not necessarily the method given in this subclause".

**Clause 19** - Add 2 more sections:-

"19 u) If no data on the influence of effects due to the case of the sound level meter are not separately available, the corrections shall be assumed to be numerically zero, and the statement given below is added. If either an extension lead or a windscreen or both are in use and no data is available either in the instruction manual or from the manufacturer or supplier of the sound level meter to adjust the indications, as required in 11.4 and/or 12.6, a statement as follows should be included in the certificate:

"No adjustment data have been published in the instruction manual or made available by the manufacturer or supplier of the sound level meter to account for the average effects of reflections from the case of the sound level meter and diffraction of sound around the microphone and, if applicable, the influence of a windscreen (delete as appropriate), as required by sub-clause 11.4 and/or 12.6 (delete as appropriate) of IEC 61672-3:2006<sup>[5]</sup> Edition 1. The average effects of reflections from the case of the sound level meter and diffraction of sound around the microphone and, if applicable, for the influence of a windscreen (delete as appropriate) have therefore been assumed to be numerically zero for the purposes of this periodic test. If these adjustment data are

not actually zero, there is a possibility that the frequency response of the sound level meter may not meet the requirements of IEC 61672-1:2002<sup>[3]</sup> (BS EN 61672-1:2003<sup>[3]</sup>) Edition 1”.

“19 v) Where the uncertainty in manufacturer supplied data is sufficiently large that a laboratory cannot add its own measurement uncertainty without exceeding the permitted uncertainties given in IEC 61672-1<sup>[3]</sup> Annex A, but where the permitted uncertainty is not exceeded if the contribution from manufacturer’s data is excluded, the test may be carried out, and the following statement shall be added to the certificate:-

“The instrument failed to meet the requirements for the test of (insert test or tests as required) as the uncertainty of measurement exceed the maximum permitted value due to a significant contribution from data supplied by the manufacturer. If the manufacturer’s uncertainty data were not included, the sound level meter would meet the requirements of the Standard”.

## 4. References

- [1] ISO/IEC 17025:2017, *General requirements for the competence of testing and calibration laboratories*
- [2] BS 7580-1:1997, *Specification for the verification of sound level meters. Part 1. Comprehensive procedure*
- [3] BS EN 61672-1:2003, IEC 61672-1:2002, Edition 1, *Electroacoustics. Sound level meters. Specifications*
- [4] BS EN 61672-2:2003, IEC 61672-2:2003, Edition 1, *Electroacoustics. Sound level meters. Pattern evaluation tests*
- [5] BS EN 61672-3:2006, IEC 61672-3:2006, Edition 1, *Electroacoustics. Sound level meters. Periodic tests*
- [6] BS EN 61672-1:2013, IEC 61672-1:2013, Edition 2, *Electroacoustics. Sound level meters. Specifications*
- [7] BS EN 61672-2:2013, IEC 61672-2:2013, Edition 2, *Electroacoustics. Sound level meters. Pattern evaluation tests*
- [8] BS EN 61672-2:2013+A1:2017, Edition 2, IEC 61672-2:2013/AMD1:2017, *Electroacoustics. Sound level meters. Pattern evaluation tests*
- [9] BS EN 61672-3:2013, IEC 61672-3:2013, Edition 2, *Electroacoustics. Sound level meters. Periodic tests*
- [10] BS 7189:1989, IEC 60942:1988, *Specification for sound calibrators*
- [11] BS EN 60651:1994, IEC 60651:1979, *Specification for sound level meters*
- [12] BS EN 60804:1994, IEC 60804:1985, *Specification for integrating-averaging sound level meters*
- [13] BS EN 60804:2001, IEC 60804:2001, *Integrating-averaging sound level meters*
- [14] BS EN 60942:1998, IEC 60942:1997, *Electroacoustics – Sound calibrators*
- [15] BS EN 60942:2003, IEC 60942:2003, *Electroacoustics – Sound calibrators*
- [16] BS EN IEC 60942:2018, *Electroacoustics – Sound calibrators*
- [17] BIPM, IEC, IFCC, ILAC, ISO, IUPAC, IUPAP, OIML, *Evaluation of measurement data – Guide to the expression of uncertainty in measurement*. Joint committee for guides in metrology, JCGM 100:2008 (Often referred to as ‘GUM’, or ‘The Guide’)
- [18] BIPM, IEC, IFCC, ILAC, ISO, IUPAC, IUPAP, OIML, *International vocabulary of metrology – Basic and general concepts and associated terms*. Joint committee for guides in metrology, JCGM 200:2012 (Often referred to as ‘VIM’)
- [19] United Kingdom Accreditation Service, M3003, *The Expression of Uncertainty and Confidence in Measurement*. Edition 4, October 2019