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DE MÉTROLOGIE LÉGALE

INTERNATIONAL RECOMMENDATION

Sound level meters

Sonomètres

OIML R 58

Edition 1998 (E)

CONTENTS

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FOREWORD

The International Organization of Legal Metrology (OIML) is a worldwide, intergovernmental organization whose primary aim is to harmonize the regulations and metrological controls applied by the national metrological services, or related organizations, of its Member States.

The two main categories of OIML publications are:

1) **International Recommendations (OIML R)**, which are model regulations that establish the metrological characteristics required of certain measuring instruments and which specify methods and equipment for checking their conformity; the OIML Member States shall implement these Recommendations to the greatest possible extent;

2) **International Documents (OIML D)**, which are informative in nature and intended to improve the work of the metrological services.

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SOUND LEVEL METERS

1 Scope

This Recommendation deals with sound level meters, i.e. instruments for the measurement of frequency and time weighted sound pressure levels. It contains an appropriate test scheme for pattern evaluation and verification and a test report format for pattern evaluation.

2 Construction and maximum permissible errors

2.1 Sound level meters which are submitted for control by legal metrology services shall comply with the requirements formulated in International Standard IEC 651 of the International Electrotechnical Commission (first edition 1979 with amendment No. 1-1993) for sound level meters of Classes 1 and 2, referred to as Types 1 and 2 in IEC 651.

Sound level meters shall meet the tolerances stated in IEC 651, which are considered as being the maximum permissible errors on pattern evaluation, initial and subsequent verification.

2.2 Where different values for maximum permissible errors in service and at verification are prescribed by national regulations, the values of the maximum permissible errors in service shall be equal to 1.25 times the maximum permissible errors fixed for verification, expressed in decibels and rounded to the next full tenth of a decibel.

2.3 The characteristics to be examined for pattern evaluation and verification are listed in Annex A.

2.4 A test report format for pattern evaluation is given in Annex B.

3 Stability

The materials used and the construction of sound level meters shall ensure sufficient stability to enable the instrument to comply with the tolerances and stability limits stated in IEC 651 when the device is set up in accordance with the manufacturer's instruction manual.

4 Inscription, marking and instruction manual

4.1 Sound level meters shall clearly and indelibly bear the following markings:

a) Manufacturer's name or trade mark;
b) Manufacturer's model designation and serial number;
c) Reference to IEC 651 by marking "IEC 651" (or equivalent national standard);
d) Class of the instrument;
e) Where the instrument is submitted for verification, the pattern approval sign in conformity with national regulation.

4.2 Each sound level meter shall be accompanied by an instruction manual which shall include all the information listed in subclause 11.2 of IEC 651.

4.3 Accessories which a manufacturer (for pattern evaluation) or user (for verification) indicates (in writing) are parts of the main instrument, shall be identified in a list affixed to the instrument, in an attached document or in any other appropriate manner.

5 Marks

It shall be possible to protect, by means of seals or marks, the parts and components of sound level meters that are not intended to be user-accessible.

A suitable place for the application of verification marks shall be provided.

Annex A

(Mandatory)

Extent of the procedures for pattern evaluation and verification of sound level meters

Preferably five specimens of the same pattern should be submitted for pattern evaluation. If only three or fewer specimens are tested, the acceptance for verification may be limited to two years so that further experience with this pattern may be gained.

Characteristics of sound level meters (Corresponding clauses of IEC 651-1979 and Amendment No. 1-1993 in brackets)	Pattern evaluation	Verification
a) Acoustic properties		
A.1 Indication under reference conditions (4.2, 9.1, 9.2.1)	X	X
A.2 Relative free-field frequency response in the reference direction (frequency weightings) (4.4, 6.1, 9.1, 9.2.2)	X	X (weighting at selected frequencies)
A.3 Relative free-field frequency response with accessories (10.1, 11.2.14)	X (if included)	X (if accessories are part of the configuration submitted for verification, at selected frequencies)
A.4 Directivity (5.1, 9.2.3, 11.2.23, 11.2.24)	X	
A.5 Frequency, sound pressure level and distortion of a sound calibrator (4.2, 9.2.1, see also OIML R 102)	X (if included as an integral part of the sound level meter)	X (if included as an integral part of the sound level meter)
b) Electrical properties		
A.6 RMS detector (7.2, 9.4.2)	X	X (at selected crest factors)
A.7 Time weighting (S, F, I, Peak) (4.5, 7.2-7.5, 9.4.1, 9.4.3, 9.4.4)	X	X (at selected signal levels)
A.8 Level range control (6.3, 6.4)	X	X
A.9 Indicator (7.6-7.10)	X	X
A.10 Overload indication (6.5, 9.3.1)	X (if included)	X (if included)
A.11 Outputs (6.6, 10.2, 10.4, 11.2.17, 11.2.18)	X (if included)	
A.12 Constancy of indication (4.9)	X	

Characteristics of sound level meters (Corresponding clauses of IEC 651-1979 and Amendment No. 1-1993 in brackets)	Pattern evaluation	Verification
A.13 Battery voltage (4.8)	X	
c) Sensitivity to various environments		
A.14 Static pressure (8.1)	X	
A.15 Temperature (8.5)	X	
A.16 Humidity (8.6)	X	
A.17 High sound pressure levels (8.2)	X	
A.18 Mechanical vibrations (8.3)	X	
A.19 Alternating magnetic fields (8.4)	X	
d) Inscription, marking and instruction manual		
A.20 Inscription and marking	X	X
A.21 Instruction manual (11.2)	X	

Annex B - Test report format

(Mandatory for application within the *OIML Certificate System*)

Note: This Annex is informative with regard to the implementation of Recommendation R 58 in national regulations.

This *Test report format* presents a standardized format for the results of the various tests and examinations to which a pattern of a sound level meter shall be submitted with a view to its approval. The tests are listed in Annex A of this International Recommendation.

It is recommended that all metrology services or laboratories evaluating patterns of sound level meters according to OIML R 58 or to national or regional regulations based on OIML R 58 use this *Test report format*, directly or after translation into a language other than English or French.

It is also recommended that this *Test report format* in English or in French (or in both languages) be transmitted by the country performing the tests to the relevant authorities of another country, under bi- or multi-lateral cooperation agreements. In the framework of the *OIML Certificate System for measuring instruments*, use of the *Test report format* is mandatory.

Explanatory notes

This *Test report format* is intended as a general document for all sound level meters which claim to meet Type 1 or Type 2 requirements as described in any appropriate clauses of IEC 651. This may mean that some items in the general *Test report format* are not relevant or cannot be completed, purely due to the design of a particular meter. Where this is the case “n/a” (i.e. not applicable) should be entered at the appropriate point in the report. Where possible, such items have been specifically identified in the following text.

Meaning of symbols and expressions used in the Tables:

+	=	Approved
–	=	Not approved
n/a	=	Not applicable
mpe	=	Maximum permissible errors as specified in clause 2 of OIML R 58; ± if not indicated otherwise

The *Summary of the tests* and the Tables on *Inscriptions and markings* and the *Instruction manual* shall be completed according to the following example:

+	–	
X		Approved
	X	Not approved
n/a	n/a	Not applicable

"Date" in the test reports refers to the date on which the test was performed.

Note concerning page numbering in this publication

In addition to the sequential numbering "R 58 Annex B page .." at the bottom of each page, a space has been left at the top of each page (starting on page 7) for numbering the pages of reports established following this model. In particular, some tests shall be repeated several times, each test being reported individually on a separate page following the relevant format. For a given report, it is advisable to complete the sequential numbering of each page by indicating the total number of pages in the report.

GENERAL INFORMATION CONCERNING THE PATTERN

Application No: .....

Date: .....

Manufacturer: .....

Applicant: .....

Sound level meter: ..... Model: ..... Serial no: .....

Microphone: Manufacturer: ..... Model: ..... Serial no: .....

Preamplifier: Manufacturer: ..... Model: ..... Serial no: .....

Extension cable: Manufacturer: ..... Model: ..... Serial no: .....

Accessories: .....

Class of instrument (claimed by manufacturer):

Calibrator: Manufacturer: ..... Model: ..... Serial no: .....

Specifications of the sound level meter

Reference range: ..... Reference sound pressure level: ..... dB

Reference frequency: ..... Hz Outputs provided: .....

Frequency weightings: ..... Exp. time weightings: .....

Measuring ranges for different time and frequency weightings

upper limit (L_{AF}, L_{AS} / L_{AI}): ..... / ..... dB

upper limit (L_{LinF}, L_{LinS} / L_{LinI}): ..... / ..... dB

lower limit (L_{AF}, L_{AS} / L_{AI}): ..... / ..... dB

lower limit (L_{LinF}, L_{LinS} / L_{LinI}): ..... / ..... dB

Primary indicator range upper limit: lower limit:	..... dB ..... dB	
Max. A-weighted sound pressure level	$L_{AF, max}$ ..... dB $L_{AS, max}$ ..... dB	$L_{AI, max}$ ..... dB

Batteries: Type: ..... Nom. voltage: ..... V Required number: .....

Note: The specifications are as given by the manufacturer. If missing or deviating values are defined by the testing laboratory as a result of the tests performed, these values are to be marked in an appropriate manner

SUMMARY OF THE TESTS

Application No: .....

Date: .....

No.	Test	+	–	Remarks	Page of test report
	a) Acoustic properties				
B.1	Indication under reference conditions				10
B.2	Relative free-field frequency response in the reference direction				11
B.3	Relative free-field frequency response with accessories				12
B.4	Directivity				13
B.5	Sound calibrator according to OIML R 102				14
	b) Electrical properties				
B.6	RMS detector				15
B.7a	Time weighting (S, F)				16
B.7b	Time weighting I				17
B.7c	Peak mode				18
B.8	Level range control				18
B.9a	Indicator, general				19
B.9b	Level linearity				19
B.10	Overload indication				20
B.11a	AC output				20
B.11b	DC output				20
B.12	Constancy of indication				21
B.13	Battery voltage				21
	c) Sensitivity to various environments				
B.14	Static pressure				22
B.15	Temperature				22
B.16	Humidity				22
B.17	High sound pressure levels				23
B.18	Mechanical vibrations				23
B.19	Alternating magnetic fields				23
	d) Inscription, marking and instruction manual				
B.20	Inscription and marking				24
B.21	Instruction manual				24

Note 1: In the “Remarks” column, insertion of an “X” means that reference is made to a remark at the end of the corresponding paragraph on one of the following pages

Note 2: No internationally agreed test procedures exist for testing digital outputs and electromagnetic susceptibility. It is recommended, however, to include tests during pattern evaluation. Test results are based on the procedures specified by the test laboratory or furnished by the manufacturer and are provided in the test report for information only (see pages 21 and 23)

a) Acoustic properties

B.1 Indication under reference conditions (IEC 651: 4.2, 9.1, 9.2.1)

The absolute sensitivity of the instrument under test is determined for a progressive sound wave in a free field by comparison with a reference microphone (substitution method) at the reference sound pressure level.

Reference sound pressure level: ..... dB Reference direction: .....

Reference frequency: ..... Hz Loudspeaker distance(s): ..... m

Environmental conditions:

Temperature: + ... °C Rel. humidity: ..... % Ambient pressure: ..... kPa

Frequency weighting: ..... Time weighting: .....

Remarks: .....

Data to be used for initial adjustment of the instrument according to manufacturer's specifications:

- ❑ Polarization voltage: V
- ❑ Microphone sensitivity: ..... mV/Pa
- ❑ Sensitivity level referring to 1 V/Pa / K factor ..... dB
- ❑ Attenuation of preamplifier ..... dB
- ❑ With sound calibrator
  (model: ..... / serial no: ..... / ..... dB)
  Displayed level: ..... dB
- ❑ Free-field correction ..... dB
- ❑ Level adjusted with sound calibrator to ..... dB
  (model: ..... / serial no: ..... / ..... dB/ ..... Hz)

Note: Depending on the design of the particular instrument under test, all the data required above may not be relevant or available. Where this is the case, the item should be marked "n/a".

	mpe Class 1/2
Indicated sound pressure level minus reference sound pressure level: ..... dB	0.7 / 1.0 dB

B.2 Relative free-field frequency response in the reference direction (IEC 651: 4.4, 6.1, 9.1, 9.2.2)

Level: .....dB Loudspeaker distance(s): ..... m

Range of environmental conditions: .....°C .....% rel. humidity .....kPa

Nominal frequency Hz	Level deviation in dB				mpe dB Class 1/2
	A-weighting	B-weighting	C-weighting	Lin	
10					+3; – / +5; –
12.5					+3; – / +5; –
16					+3; – / +5; –
20					3 / 3
25					2 / 3
31.5					1.5 / 3
40					1.5 / 2
50					1.5 / 2
63					1.5 / 2
80					1.5 / 2
100					1 / 1.5
125					1 / 1.5
160					1 / 1.5
200					1 / 1.5
250					1 / 1.5
315					1 / 1.5
400					1 / 1.5
500					1 / 1.5
630					1 / 1.5
800					1 / 1.5
1 000					1 / 1.5
1 250					1 / 1.5
1 600					1 / 2
2 000					1 / 2
2 500					1 / 2.5
3 150					1 / 2.5
4 000					1 / 3
5 000					1.5 / 3.5
6 300					+1.5;–2 / 4.5
8 000					+1.5;–3 / 5
10 000					+2; –4 / +5; –
12 500					+3; –6 / +5; –
16 000					+3; – / +5; –
20 000					+3; – / +5; –

Note 1: Level deviations in decibels are from design goal values given in IEC 651, Table IV for different frequency weightings

Note 2: The tests may be carried out partly as acoustic and partly as electrical tests if no loss in accuracy results

Remarks: .....

B.3 Relative free-field frequency response with accessories (IEC 651: 10.1, 11.2.14)

Level: .....dB Loudspeaker distance(s): ..... m

Range of environmental conditions: .....°C .....% rel. humidity .....kPa

Frequency weighting: .....

Nominal frequency Hz	Level deviation in dB Wind-screen	Extension cable			mpe dB Class 1/2
10					+3; – / +5; –
12.5					+3; – / +5; –
16					+3; – / +5; –
20					3 / 3
25					2 / 3
31.5					1.5 / 3
40					1.5 / 2
50					1.5 / 2
63					1.5 / 2
80					1.5 / 2
100					1 / 1.5
125					1 / 1.5
160					1 / 1.5
200					1 / 1.5
250					1 / 1.5
315					1 / 1.5
400					1 / 1.5
500					1 / 1.5
630					1 / 1.5
800					1 / 1.5
1 000					1 / 1.5
1 250					1 / 1.5
1 600					1 / 2
2 000					1 / 2
2 500					1 / 2.5
3 150					1 / 2.5
4 000					1 / 3
5 000					1.5 / 3.5
6 300					+1.5;–2 / 4.5
8 000					+1.5;–3 / 5
10 000					+2; –4 / +5; –
12 500					+3; –6 / +5; –
16 000					+3; – / +5; –
20 000					+3; – / +5; –

Note 1: Level deviations in decibels are from design goal values given in IEC 651, Table IV for different frequency weightings

Note 2: Where the nature of the accessory permits, the tests may be carried out partly as acoustic and partly as electrical tests if no loss in accuracy results

Remarks: .....

B.4 Directivity (IEC 651: 5.1, 9.2.3, 11.2.23, 11.2.24)

Reference direction: ..... Loudspeaker distance(s): ..... m

Mounting: .....

Level: ..... Frequency weighting: .....

Maximum change in sensitivity level within various angles from the reference direction, in decibels:

within an angle of ± 30°

Frequency Hz	Max. change dB	mpe dB Class 1/2
31.5 – 1 000		1/2
1 000 – 2 000		1/2
2 000 – 4 000		1.5/4
4 000 – 8 000		2.5/9
8 000 – 12 500		4/--

within an angle of ± 90°

31.5 – 1 000		1.5/3
1 000 – 2 000		2/5
2 000 – 4 000		4/8
4 000 – 8 000		8/14
8 000 – 12 500		16/--

Note: The frequencies at which the directivity measurements were performed should be stated

Remarks: .....

B.5 Sound calibrator (IEC 651: 4.2, 9.2.1, according to OIML R 102)

These tests are to evaluate the performance of the calibrator, if provided. It is recommended to perform them before checking the indication of the sound level meter under reference conditions (B.1).

Manufacturer: .....

Model designation:
Model: ..... Serial No: .....

Class stated by the manufacturer: .....

Accessory: .....

Model: ..... Serial No: .....

Temperature: ..... °C Rel. humidity: ..... % Ambient pressure: ..... kPa

The following measurements are performed at the nominal sound pressure level and frequency specified by the sound level meter manufacturer for initial adjustment of the sound level meter:

For microphone model ..... with adapter model ..... , if applicable

Nominal sound pressure level: ..... dB

Measured sound pressure level: ..... dB Class 1/2

Difference: ..... dB mpe: 0.3/0.5 dB

Nominal frequency: ..... Hz

Measured frequency: ..... Hz

Difference: ..... Hz ..... % mpe: 2 % / 4 %

Maximum total harmonic distortion: ..... % max. permitted value: 3 % / 3 %

Note: This is not a complete test according to IEC 942 - 1988

Remarks: .....

b) Electrical properties

For the electrical tests:
the microphone was replaced by the equivalent electrical impedance of ..... Ω / by a capacitance of ..... pF.

The sensitivity of the electrical input was adjusted to ..... mV / Pa.

B.6 RMS detector (IEC 651: 7.2, 9.4.2)

Test signal: Sequence of positive and negative rectangular pulses, duration 200 µs, rise and fall times between 3 µs and 10 µs (for Lin and C-weighting only);
Tone bursts 2 000 Hz, repetition rate 40 Hz; crest factors 3, 5 and 10;
Levels 2, 22, 42 and 62 dB below upper limit of primary indicator range, as applicable.

Time weighting: S (F if S is not provided)
Frequency weighting: .....
Primary indicator range: .....

	Differences in dB re continuous signal				mpe dB Class 1/2
	at: –2 dB	–22 dB	–42 dB	–62 dB	
Rect. pulses positive $1 < CF \leq 3$					0.5 / 1.0
Rect. pulses negative $1 < CF \leq 3$					0.5 / 1.0
Rect. pulses positive $3 < CF \leq 5$					1.0 / 1.0
Rect. pulses negative $3 < CF \leq 5$					1.0 / 1.0
Rect. pulses positive $5 < CF \leq 10$					1.5 / --
Rect. pulses negative $5 < CF \leq 10$					1.5 / --
Tone bursts $1 < CF \leq 3$					0.5 / 1.0
Tone bursts $3 < CF \leq 5$					1.0 / 1.0
Tone bursts $5 < CF \leq 10$					1.5 / --

Note: Tolerances are only specified for crest factors > 3 for sound level meters which include time weighting I

Remarks: .....

B.7a Time weighting (S, F) (IEC 651: 4.5, 7.2, 7.4, 9.4.1) (if applicable)

Test signal: Tone bursts 2 000 Hz, 20 dB step
Level: 4, 24 and 44 dB (and 64 and 84 dB if applicable) below upper limit of primary indicator range.

Frequency weighting: .....

Primary indicator range: .....

Weighting/ burst duration	Reference tone burst response	Differences in dB re continuous signal at: −4 dB	−24 dB	−44 dB	.....	mpe dB Class 1/2
S 500 ms	−4.1 dB					1.0 / 2.0
F 200 ms	−1.0 dB					1.0 / +1.0; −2.0

Indication in the S, F and I modes *do not differ / differ* by more than 0.1 dB for steady state sinusoidal signals.

❑ Overshoot F: ..... dB (≤ 1.1 dB for a signal suddenly applied)
❑ Overshoot S: ..... dB (≤ 1.6 dB for a signal suddenly applied)

❑ Decay time F: ..... dB (signal suddenly turned off: ≤ 0.5 s for 10 dB decay)
❑ Decay time S: ..... dB (signal suddenly turned off: ≤ 3.0 s for 10 dB decay)

Remarks: .....

B.7b Time weighting I (IEC 651: 4.5, 7.3–7.4, 9.4.3) (if applicable)

Test signal: Single bursts, sequence of tone bursts, 2 000 Hz
Level: 0, 20 and 40 dB (and 60 dB if applicable) below upper limit of primary indicator range.

Frequency weighting: ..... Primary indicator range: .....

Burst duration (single bursts)	Reference tone burst response	Differences in dB re continuous signal at: 0 dB	–20 dB	–40 dB	–60 dB	mpe dB Class 1/2
20 ms	–3.6 dB					1.5 / 2.0
5 ms	–8.8 dB					2.0 / 3.0
2 ms	–12.6 dB					2.0 / --

Repetition frequency (sequence of bursts)		at: 0 dB	–20 dB	–40 dB	–60 dB	
100 Hz	–2.7 dB					1.0 / 1.0
20 Hz	–7.6 dB					2.0 / 2.0
2 Hz	–8.8 dB					2.0 / 3.0

Decay rate		at: 0 dB	–20 dB	–40 dB	–60 dB	
Sinusoidal signal (2 000 Hz) off	–2.9 dB/s					0.5 / 1 dB/s

Remarks: .....

B.7c Peak mode (IEC 651: 4.5, 7.5, 9.4.4) (if applicable)

Test signal: Positive and negative rectangular pulses 100 µs and 10 ms (rise and fall times between 3 µs and 10 µs);
10 ms signal: 1 dB below upper limit of primary indicator range.

Frequency weighting (Lin or C, if available): .....

Single positive and negative pulses with the same peak amplitude and with a duration of 100 µs give an indication of ..... dB/..... dB, respectively, below the indication of the 10 ms pulse; the indication for the 100 µs pulse shall not be more than 2 dB below the indication for the 10 ms pulse.

Note: The tolerance limit given is mandatory only for Type 0 sound level meters.

Remarks: .....

B.8 Level range control (IEC 651: 6.3, 6.4)

Test signal: Sinusoidal, 31.5 Hz to 8 000 Hz / 20 Hz to 12 500 Hz
Level: 2 dB below upper limit of primary indicator range (corresponding levels for each setting)

	Deviation in dB 31.5 Hz to 8 000 Hz	Deviation in dB 20 Hz to 12 500 Hz	mpe dB 31.5 Hz to 8 000 Hz Class 1/2	mpe dB 20 Hz to 12 500 Hz Class 1/2
Max. error range control			0.5 / 0.7	1.0 / --

❑ Overlapping of adjacent level ranges: ..... dB ($\geq$ 5 / $\geq$ 10 dB)

Note: The frequencies and range control settings corresponding to the greatest errors introduced by the level range control should be reported

Remarks: .....

B.9a Indicator, general (IEC 651: 7.6, 7.7, 7.8)

❑ Indicator range ≥ 15 dB

❑ Primary indicator range ≥ 10 dB

❑ Analogue scale: graduated steps ≤ 1 dB

❑ Width of division ≥ 1 mm (for analogue meters only)

❑ Digital display: resolution ≤ 0.1 dB

❑ Digital display: latched maximum levels

Remarks: .....

B.9b Level linearity (IEC 651: 7.9, 7.10)

Test signal: Sinusoidal 31.5 Hz - 1 000 Hz - 8 000 Hz

Reference level: ..... dB

Indicator range (including any automatic or manual range controls): .....

Primary indicator range: ..... (see note on page 8)
(specified value ≥ measured value from linearity test)

	Inside primary indicator range			Outside primary indicator range within measuring range			mpe (inside) dB Class 1/2	mpe (outside) dB Class 1/2
	31.5 Hz	1 kHz	8 kHz	31.5 Hz	1 kHz	8 kHz		
Max. error linearity							0.7 / 1.0	1.0 / 1.5
Max. error differential linearity 1 dB							0.2 / 0.3	0.3 / 0.4
Max. error differential linearity 10 dB							0.4 / 0.6	1.0 / 1.5

The use of the time weighting S is recommended for level linearity tests at 31.5 Hz.

Remarks: .....

B.10 Overload indication (IEC 651: 6.5, 9.3.1)

Time weighting: S (F if S is not provided)

Frequency weighting: .....

❑ Overload indicator is not present.

❑ The overload indication occurs when the level of the positive and negative rectangular pulses from the RMS-test B.6 at a level 2 dB less than the upper limit of the primary indicator range and with a crest factor of ..... is increased by ..... dB; in this case the deviation from the expected value of the indication (e.g. as indicated by a reference meter, see Appendix A of IEC 651) is ..... dB.

(mpe Class 1/2: 0.5 / 1.0 dB for CF 3 and 1.5 / -- dB for CF 10).

❑ The overload indication is equally responsive to single positive and negative pulses of a duration in the range of 200 µs to 10 ms (mpe 2.0 dB).

❑ With A-weighting characteristic the overload indication

occurs / does not occur

when a sinusoidal signal with a frequency of 1 000 Hz and with a level of 5 dB below the maximum A-weighted level which the instrument is designed to measure (..... dB)

is decreased in frequency to ..... Hz
and increased in level to ..... dB (as compensation for the A-weighting).

The mpe of ..... dB (tolerance of A-weighting design goal at the lowest frequency under test) is

not exceeded / exceeded.

Remarks: .....

B.11a AC output (IEC 651: 6.6, 10.2, 11.2.17, 11.2.18)

❑ Indicator not affected (load $\geq$ ..... Ω)

❑ Manufacturer specified max. output voltage, if available: V

Remarks: .....

B.11b DC output (IEC 651: 10.2, 10.4, 11.2.17, 11.2.18)

❑ Indicator not affected (load $\geq$ ..... Ω)

❑ Manufacturer specified max. output voltage, if available: V

Remarks: .....

Digital output (Results of the tests described in this subclause are for information only)

1 There is no requirement for a specified test for digital outputs in IEC 651.

2 It is recommended to test these outputs (preferably having internationally standardized interface bus compatibility - for instance RS-232 or IEC-625/IEEE 488 as recommended in IEC 804) by using an external computer or printer at the appropriate output. Custom made digital outputs should only be included in a pattern evaluation when the appropriate external device (printer, data storage or display device, computer) is available during the test and when the correct working conditions can be checked.

3 The testing laboratory should describe the method employed and state the results. The following items should especially be considered:

- ❑ Does the instruction manual uniquely identify the relevant computer software as well as the hardware for the interfaces?
- ❑ Do the data displayed by a computer or printed by a printer, whether in numerical, diagrammatic or tabular form, contain all necessary information relating to the measured values such as frequency and time weightings, overload as well as information on the measuring time and duration, if provided by the sound level meter?
- ❑ Are all settings of the instrument (level ranges, time and frequency weightings) when controlled by an external computer clearly visible on the display of the instrument?

4 The test laboratory may consider accepting test data and other information furnished by the manufacturer regarding the digital output of the instrument and may consider recording and attaching such data and information in the test report.

B.12 Constancy of indication (IEC 651: 4.9)

After a warm-up period of ..... minutes (specified by the manufacturer; max. 10 minutes) the reading *changes / does not change* within 1 hour of continuous operation by more than 0.3 / 0.5 dB (Class 1/2).

Remarks: .....

B.13 Battery voltage (IEC 651: 4.8)

❑ The instrument complies with the requirements of the standard with a battery voltage as low as V

❑ Battery voltage check is available / automatic warning

Remarks: .....

c) Sensitivity to various environments

B.14 Static pressure (IEC 651: 8.1)

For a variation of ±10 % in static pressure relative to the standard atmospheric pressure the sensitivity level of the complete instrument changes by ..... dB when tested at frequencies between 200 Hz and 1 000 Hz; mpe is 0.3 dB / 0.5 dB for Class 1 / Class 2.

Remarks: .....

B.15 Temperature (IEC 651: 8.5)

Indication at various temperatures (relative humidity 65 %)

Sound pressure level at +20 °C: ..... dB; Frequency weighting: .....

Frequency: ..... Sound source: .....

	−10 °C	0 °C	+10 °C	+20 °C	+30 °C	+40 °C	+50 °C	mpe dB Class 1/2
Reading				- -				
Δ*L*				0.0				0.5

Note: Δ*L* equals the sound pressure level at the indicated air temperature minus the sound pressure level at an air temperature of +20 °C

Remarks: .....

B.16 Humidity (IEC 651: 8.6)

Indication at various relative humidities (temperature +40 °C)

Sound pressure level at 65 %: ..... dB; Frequency weighting: .....

Frequency: ..... Sound source: .....

	30 %	50 %	65 %	80 %	90 %	mpe dB Class 1/2
Reading			- -			
Δ*L*			0.0			0.5

Note: Δ*L* equals the sound pressure level at the indicated relative humidity minus the sound pressure level at a relative humidity of 65 %.

Remarks: .....

B.17 High sound pressure levels (IEC 651: 8.2)

When the microphone is replaced by an equivalent electrical impedance and the sound level meter is placed in a steady sinusoidal field arriving in the reference direction at a sound pressure level of 100 dB, or at the upper limit of the sound pressure level which the instrument is designed to measure, whichever is lower, the indicated sound pressure level is ..... dB for frequencies in the range from 31.5 Hz to 8 kHz. At each frequency, the indicated sound pressure level shall be at least 20 dB less than the free-field sound pressure level. The frequency sweep rate, where used, shall not exceed 0.1 octave/s.

Remarks: .....

B.18 Mechanical vibrations (IEC 651: 8.3)

When the sound level meter is vibrated sinusoidally at a rms acceleration of 1 m/s in the frequency range between 20 Hz and 1 000 Hz, the sound level displayed on the instrument is:

L_A = ... dB; L_{Lin} = ... dB

The level displayed with a reference sound level meter not being vibrated but under the same acoustic conditions is:

L_A = ... dB; L_{Lin} = ... dB

Remarks: .....

B.19 Alternating magnetic fields (IEC 651: 8.4)

A sound level meter immersed in an alternating magnetic field with a rms strength H = 80 A/m (at a frequency of 50/60 Hz, as appropriate) gives the following maximum indication (from different orientations in the field) for available frequency weightings:

L_A = ... dB; L_B = ... dB; L_C = ... dB; L_{Lin} = ... dB

Remarks: .....

Electromagnetic susceptibility (results of the tests described in this subclause are for information only)

1 There is no standardized test procedure for sound level meters. International standardization is in progress in IEC/TC 29;

2 In some countries the following test procedure and performance criteria are applied:

The sound level meter is exposed to random noise filtered to have an approximately flat spectrum between 800 Hz and 5 kHz with a sound pressure level of 80 dB to 90 dB. In the presence of an electromagnetic field of strength 6 V/m in the frequency range 25 MHz to 1 000 MHz (amplitude modulated to a depth of 80 % by a 1 kHz sinusoidal signal) the indicated sound pressure level should not vary by more than 1 dB / 2 dB (Class 1 / Class 2) compared to the reading in the absence of the field. The frequency of the electromagnetic field is varied in steps of 4 %;

3 The testing laboratory should describe the methods employed and state the results;

4 The testing laboratory may consider accepting test data and other information furnished by the manufacturer regarding the electromagnetic susceptibility of the instrument and may consider referencing such data and information in the test report.

Remarks: .....

d) Inscription, marking and instruction manual

B.20 Inscription and marking

Requirement as specified in OIML R 58	Inscription and marking	+	–	Remarks
4.1	Name or trademark			
4.1	Model designation and serial number			
4.1	Marking “IEC 651" or equivalent			
4.1	Class			
4.3	List of accessories where appropriate			
5	Protection seals or marks			
5	Place for verification mark			

B.21 Instruction manual (IEC 651: 11.2)

Requirements according to IEC 651	Information	+	–	Remarks
11.2.1	Type of microphone, method of mounting			
11.2.2	Reference direction			
11.2.3	Range of sound pressure levels			
11.2.4	Reference sound pressure level			
11.2.5	Nominal frequency weightings			
11.2.6	Description of detector, indicator characteristics			
11.2.7	Effect of vibrations			
11.2.8	Effect of magnetic fields			
11.2.9	Effect of temperature			
11.2.10	Effect of the operator			
11.2.11	Effect of humidity			
11.2.12	Limits of temperature and humidity			
11.2.13	Extension cable correction			
11.2.14	Effect of accessories			
11.2.15	Calibration procedure			
11.2.16	Position of instrument case and observer			
11.2.17	Use of filters, etc.			
11.2.18	Electrical output connector impedance			
11.2.19	Reference frequency			
11.2.20	Reference range			
11.2.21	Warm-up time			
11.2.23	Diffuse field correction			
11.2.24	Directional response			
11.2.25	Electrical impedance to substitute for microphone			
11.2.26	Primary indicator range			
11.2.27	Range control settling time			
11.2.28	Mounting conditions for testing			