

Sound Level Meter Type 2245

with Microphone Type 4966

From Hardware Version 1.0

Instruction Manual

Contents

Table of Contents

Chapter 1 Introduction	5
1.1 About This Manual	5
1.1.1 Conventions Used in this Manual	5
1.2 System Overview	5
1.2.1 Hardware and Software on the Sound Level Meter	5
1.2.2 Basic PC Software	5
1.2.3 Hardware Setup	6
1.2.4 Block Diagrams	8
Chapter 2 Short Guide to the Sound Level Meter	9
2.1 Introduction	9
2.2 Switch sound level meter On/Off	9
2.3 Setting up the sound level meter	9
2.3.1 Measurement settings	10
2.3.2 Display settings	13
2.3.3 System Settings	13
2.3.4 Data explorer	13
2.3.5 Calibration history	14
2.3.6 Status	14
2.4 Calibration	15
2.4.1 Calibration Procedure	15
2.4.2 Calibration Check Procedure	17
2.5 Measuring with the sound level meter	19
2.5.1 Start/Pause/Stop of Measurement	19
2.5.2 Overload and Underrange	20
2.6 Looking at the measurement	20
2.7 Looking at saved measurements	21
2.8 Placing the Microphone (Sound Level Meter)	23
2.9 Mounting the Sound Level Meter on a Tripod	23
2.10 Measuring Low-level Sounds	23
2.11 Measuring at Low Static Pressure	24
2.12 Mechanical Vibration	25
2.13 Frequency Weightings	25
2.14 Measured Quantities	27
2.14.1 Instantaneous Broadband Measurements	27
2.14.2 Timed Broadband Measurements	29
2.14.3 Spectrum Measurements	34
2.14.4 Instantaneous Spectrum Measurements	34
2.14.5 Timed Spectrum Measurements	34
2.15 Overload and Underrange	35
2.15.1 Overload	35
2.15.2 Underrange	35
Chapter 3 Conformance Testing	36
3.1 Introduction	36
3.2 Microphone, Accessories and Sound Fields	36
3.2.1 For acoustical tests	36
3.2.2 For electrical tests	36
3.3 Calibration during Pattern evaluation and Periodic tests	36
3.3.1 Acoustic calibration	36
3.3.2 Electrical Substitute for Microphones	37

3.4	Wi-Fi and Bluetooth during tests.....	37
3.5	Mounting for Acoustical Tests.....	37
3.6	Periodic Testing of Acoustical Frequency Responses	38
3.7	Mounting for Mechanical Vibrations Tests.....	38
3.8	Testing 1/1-octave-band and 1/3-octave-band Filters	38
3.9	EMC Test Procedures	38
3.9.1	Signal Sources for Immunity Test	38
3.9.2	Reference Orientation	39
3.9.3	Securing of Cables During EMC Test	39
3.9.4	Accessories Included in EMC Test.....	40
3.9.5	Normal Mode of Operation During EMC Test	40
	Chapter 4 Specifications.....	42
4.1	Specifications.....	42
4.2	Standards.....	42
4.3	Reference Environmental Conditions	42
4.4	Reference Conditions for Acoustic Calibration	43
4.5	Microphone	43
4.6	Frequency Responses.....	44
4.6.1	Electrical Frequency Responses.....	44
4.6.2	Typical Low-frequency Responses	45
4.6.3	Acoustical Frequency Responses	46
4.6.4	Free-field Frequency Responses	46
4.6.5	Diffuse-field Frequency Responses	46
4.6.6	Free-field Frequency Responses for Diffuse-field Calibrated Instruments	47
4.7	Directional Responses.....	48
4.8	Self-generated Noise	55
4.8.1	Maximum Broadband Self-generated Noise	55
4.8.2	Typical Broadband Self-generated Noise.....	55
4.8.3	Typical Self-generated Noise Spectra.....	55
4.9	Measuring Ranges.....	56
4.9.1	Maximum Sound Level	56
4.9.2	Total Range	56
4.9.3	Primary Indicator Range.....	57
4.9.4	Indicator Range	57
4.9.5	Linearity Range	57
4.9.6	Pulse Range	58
4.9.7	Linear Operating Range	58
4.9.8	Peak C Range	58
4.10	Detectors.....	59
4.10.1	Exponential Averaging.....	59
4.10.2	Linear Averaging	60
4.10.3	Peak.....	60
4.11	Spectrum Analysis	60
4.11.1	1/1- octave Band Centre Frequencies.....	60
4.11.2	1/3-octave Band Centre Frequencies.....	61
4.11.3	Linear Operating Range	63
4.11.4	Measurement Range	63
4.11.5	Octave Band Time Constants.....	63
4.12	Influence from the Operating Environment.....	64
4.12.1	Environmental Stabilisation Time	64
4.12.2	Temperature	64
4.12.3	Humidity.....	64
4.12.4	Vibration.....	64
4.12.5	Immunity to Power Magnetic Fields	64
4.12.6	Immunity to Power and Radio-frequency Fields.....	65

4.13	Wireless interface to the Sound Level Meter	65
4.13.1	Bluetooth.....	65
4.13.2	Wi-Fi	65
4.14	Electrical interface to the Sound Level Meter	65
4.14.1	Output for Headphone and test	65
4.14.2	Digital Interfaces	66
4.14.3	Charge /power Interface	66
4.15	Power Supply	66
4.15.1	External AC Main Supply Adapter	66
4.15.2	Battery	66
4.16	Warm-up Time	67
4.17	Real-time Clock.....	67
4.18	CE-mark and C-Tick mark Compliance	67
	Chapter 5 Regulatory	68
5.1	Regulatory ID's summary	68
5.2	Certified Antennas – do we need this?	68
5.3	FCC and IC/ISED Regulatory	68
5.3.1	FCC (Federal Communication Commission Interference Statement)	68
5.3.2	IC (Industry Canada Statement).....	69
5.4	EU Declarations of Conformity	69
	Appendix A Tables	70
	Electrical Frequency Responses	70
	Free-field Frequency Responses	72
	Diffuse-field Frequency Responses	76
	Free-field Frequency Responses for Diffuse-field Calibrated Instruments	80
	Directional Responses	82
	Periodic Testing of Acoustical Frequency Responses.....	100
	Appendix B Cross-references to Standards	103
	Introduction	103
	Cross-references to Standards	103
	Irrelevant Topics.....	110

Chapter 1

Introduction

1.1 About This Manual

This Instruction Manual for Sound Level Meter Type 2245 has been created to fulfil the documentation requirements of the national and international standards that the sound level meter conform to. These standards are listed in section 4.2.

For other microphone configurations, supplements to this manual will be provided.

Other documentation and sales material will also contain specifications for the sound level meter. In the event of any unintended inconsistency between these and those in this instruction manual, the instruction manual takes precedence.

Appendix B of this manual provides cross-references between specific paragraphs in the standards that require topics to be documented and the corresponding sections in this manual that conform to them.

PC Software and smart device software contains online help including user help for the sound level meter.

1.1.1 Conventions Used in this Manual

The term "sound level meter" is an abbreviation for "Sound Level Meter Type 2245" throughout this manual.

Icons, Buttons and pages on the Screen

Indicated by bold typeface (for example, **MEASUREMENT SETTINGS** page).

Parameter Values, Text and Variables

Parameter values, instructions, descriptions appearing on the screen and variables are indicated by italics (for example, *Free-field*).

Menu, Parameters and Screen Navigation

Indicated by bold typeface (for example, **Measurement settings > Input > Sound field**).

1.2 System Overview

1.2.1 Hardware and Software on the Sound Level Meter

The About screen lists the hardware and software versions currently installed. See section 2.3.3.

1.2.2 Basic PC Software

Noise Partner for PC can be used for transferring measurement data from the sound level meter to a standard PC for post-processing and reporting.

Noise Partner for smart devices can be used for controlling the sound level meter and for transferring data from the sound level meter to the smart device for display and post processing.

Noise Partner can be downloaded from Brüel & Kjær's web site. For instructions on this software, see the software's online help.

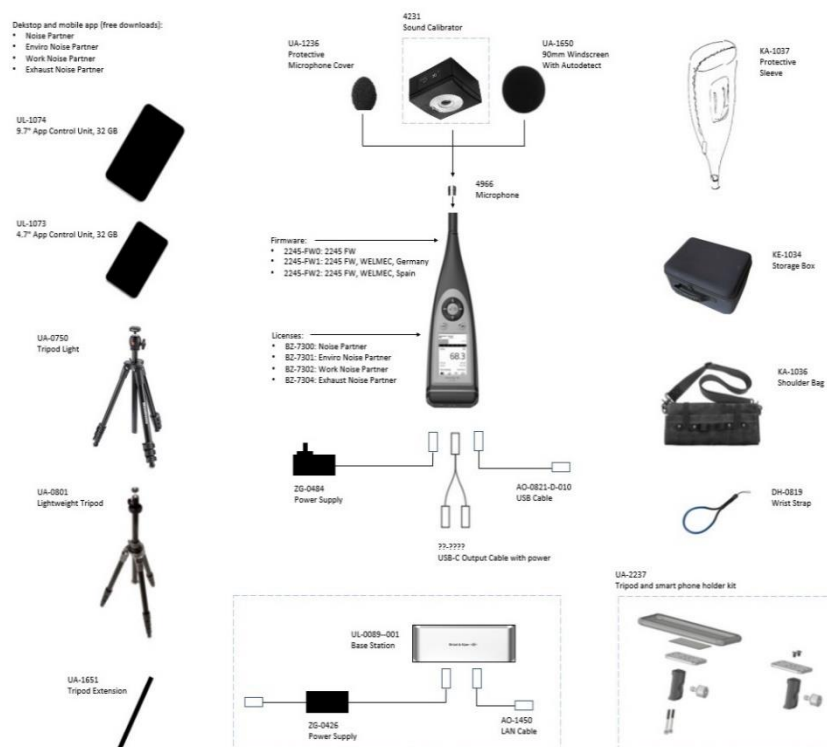
1.2.3 Hardware Setup

This section provides an overview of the hardware components used with the sound level meter.

A hardware overview is provided in Fig. 1.1, optional accessories are designated on the diagram.

The components needed for conformance testing Sound Level Meter Type 2245 are listed in Table 1.1.

Fig. 1.1 *Hardware overview*



DRAFT

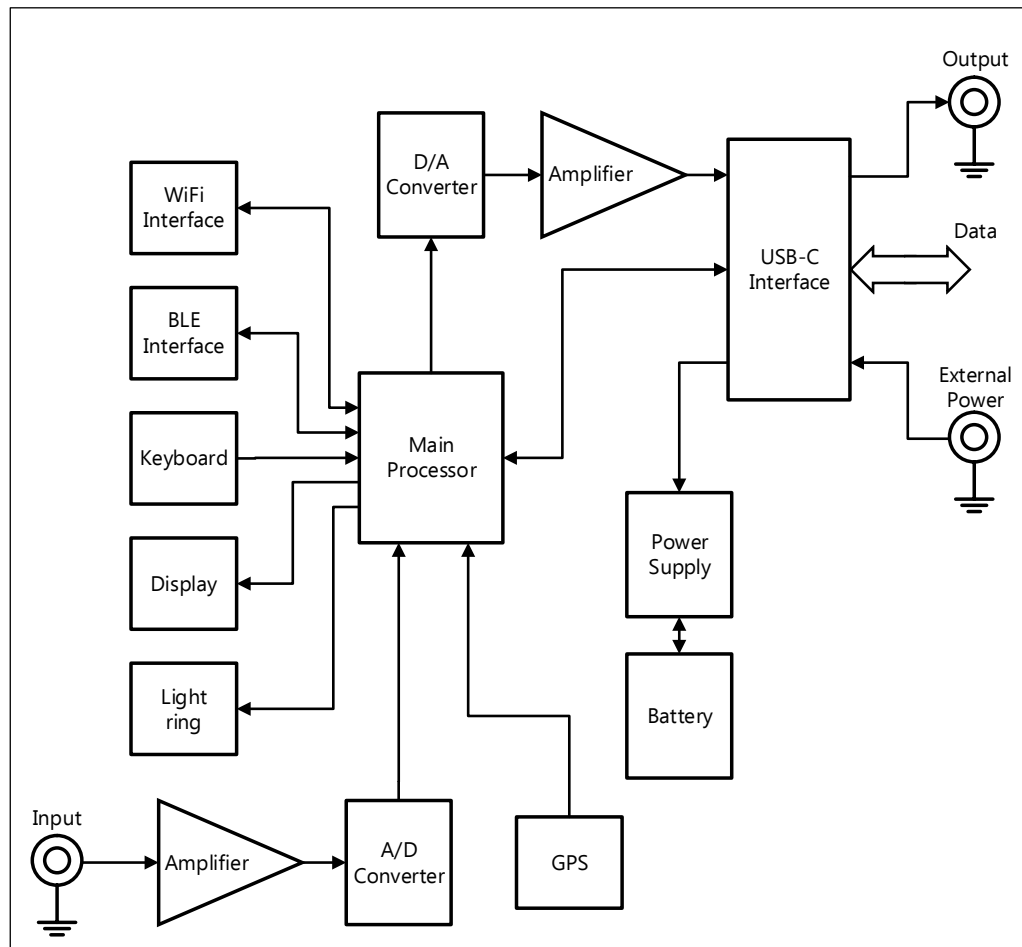
Table 1.1 *Hardware components needed for conformance testing of Sound Level Meter Type 2245*

Quantity*	Brüel & Kjær Type/Part Number	Description
1	Type 4966	Prepolarized Free-field ½" Condenser Microphone
1	WA-0302-B	Electrical Substitute for Microphone Type 4966, 15 pF
1	UA-0245	10–32 UNF to BNC Adapter
1	UA-1650	90mm Windscreen with auto detect insert, for Sound Level Meter Type 2245
1	UA-1651	Tripod Extension for Hand-held Analyzers
	ZG-0484	Power supply with integrated USB-C cable, for Sound Level Meter Type 2245
1	AO-0821-D-010	USB Shielded I/O Cable, Type A-to-C, USB 2.0, 1.0m, for Sound Level Meter Type 2245
1	AO-0846	USB-C to 3.5mm (Mini) Jack Adapter for analog Headphone, for Sound Level Meter Type 2245
1	HT-0015	Earphones, unscreened cable
1	Type 4231	Sound Calibrator
1	Type 4226	Multifunction Acoustic Calibrator

1.2.4 Block Diagrams

The Block Diagram for Sound Level Meter Type 2245 is shown in Fig. 1.2.

Fig. 1.2 Block Diagram for Type 2245



Chapter 2

Short Guide to the Sound Level Meter

2.1 Introduction

This chapter contains a brief guide to the use of the sound level meter.

The user interface of the sound level meter is classic:

- A screen for displaying settings, results and status
- A keyboard for navigating on the screen, changing settings and controlling the measurement
- A light ring to indicate which colour-coded to reflect the status of the instrument.

2.2 Switch sound level meter On/Off

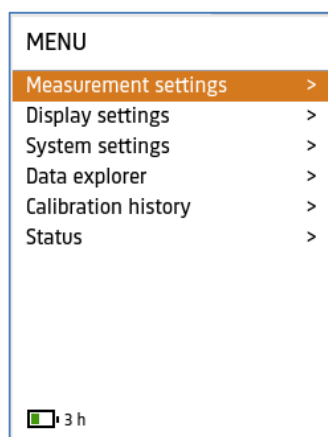
Switch on the sound level meter by pressing the **Power/Menu/Select** button  for a few seconds. The instrument will start in the last used measurement display.

Pressing and holding down the button for at least 4 s will switch off the sound level meter.

2.3 Setting up the sound level meter

Note: Not all settings might be available on your sound level meter – only settings being part of the licensed features are available.

Press the **Power/Menu/Select** button  to enter the menus.

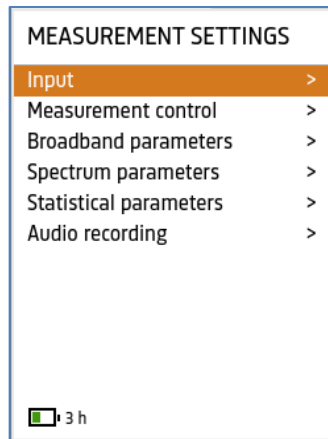


The menus are hierarchically ordered, you navigate in them using up/down buttons and between them using the left/right arrow buttons.

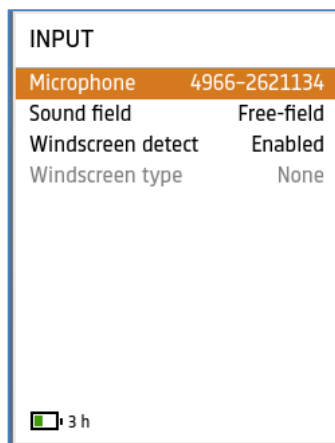
2.3.1 Measurement settings

The acoustical frequency response and calibration depends on the sound field, the microphone, the microphone accessories used and the electrical frequency response. To improve the quality of the measurement and help the user to measure correctly the sound level meter compensates for the sound field, the microphone and the microphone accessories used by automatically changing the electrical frequency response and calibration.

This means that it is very important that parameters in **Measurement settings** and its sub menus are correct.



Use **Measurement settings > Input** to select:



- **Microphone** to use (if more than one has been specified in **System settings > Advanced settings > Microphones**)

- **Sound field.** Select a correction matching the sound field of your measurements, that is, you can make correct measurements in a diffuse-field using a Type 4966 free-field microphone, by selecting *Diffuse-field* correction. Even *Free-field* correction of a free-field microphone will enhance the overall frequency response of the system. Generally, ISO requires free-field conditions and ANSI requires diffuse-field conditions. Check your local standards for the setting you require. No correction is made for an unknown microphone.

- **Windscreen detect.** *Enabled/Disabled* automatic detection of windscreen UA-1650 when mounted on the microphone preamplifier.

- **Windscreen type.** Select type of windscreen, when **Windscreen Detect** is *Disabled*.

Use **Measurement settings > Measurement control** to setup how to control your measurement:

MEASUREMENT CONTROL	
Logging mode	Disabled
Logging interval	1 s
Measurement time	Preset
Preset time	00:01:00
Back-erase mode	Enabled
Back-erase time	5 s
 3 h	

- **Logging mode:** Select *Enabled* to log measurement data at every **Logging interval**.
- **Measurement time:** Select *Preset* for the measurement to run for **Preset time** – or *Free* to run until you stop it.
- **Back-erase mode:** Select *Enabled* to back-erase all data for the last **Back-erase time**, when continuing a paused measurement. Only available for **Logging mode** is *Disabled*

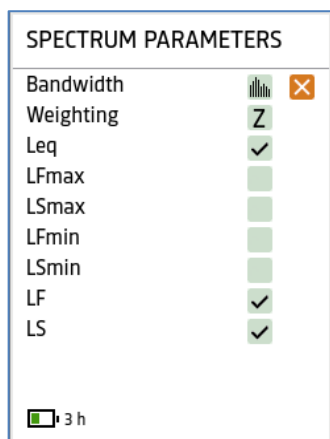
Use **Measurement settings > Broadband parameters** to select the frequency weightings to use and the broadband parameters to measure:

BROADBAND PARAMETERS			
Weighting	A	C	✕
Leq	☒	☐	
Lpeak	☐	☒	
LFmax	☒	☐	
LSmax	☒	☐	
LFmin	☒	☐	
LSmin	☒	☐	
Lleq	☐	☐	
Llmax	☐	☐	
LF	☒	☒	
LS	☒	☒	
 3 h			

The use of keyboard in this display.

See details on measured broadband parameters in sections 2.13 Frequency Weightings and 2.14 Measured Quantities.

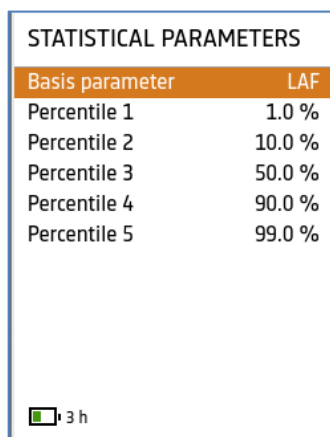
Use **Measurement settings** > **Spectrum parameters** to select **Bandwidth** (1/1-octave  or 1/3-octave ), Frequency **Weighting** to use and the spectrum parameters to measure.



The use of keyboard in this display.

See details on measured broadband parameters in sections 2.13 Frequency Weightings and 2.14 Measured Quantities.

Use **Measurement settings** > **Statistical parameters** to select the **Basis parameter** for the statistics (*LAeq*, *LAF* or *LAS*) and up to five percentiles.



See details on statistics in section 2.14.2.

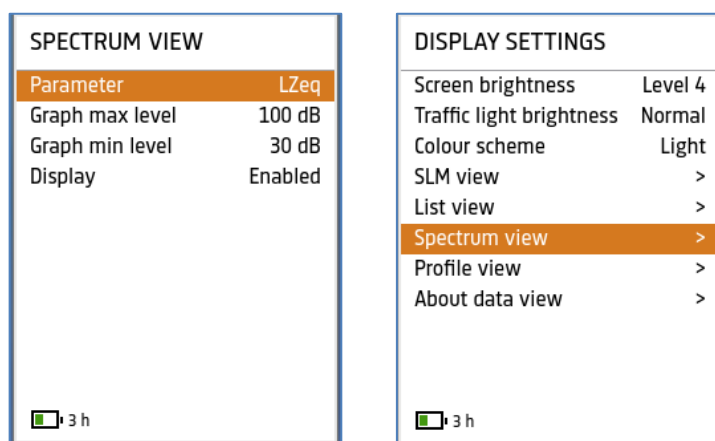
Use **Measurement settings** > **Audio recording** to select whether you want to record the audio in *Listen quality* (mp3-files) or not.

2.3.2 Display settings

Use **Display settings** > **Screen brightness** and > **Light ring brightness** to adjust the brightness of the screen and light ring on the instrument.

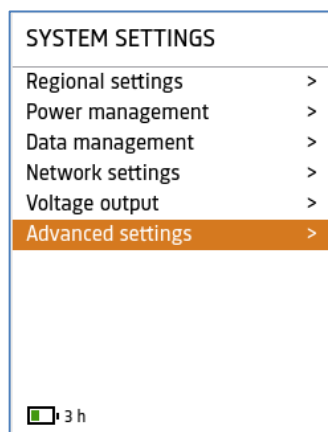
Use **Display settings** > **Colour scheme** to select either *Light* or *Dark* scheme.

Use the rest of the **Display settings** to specify how to display your measurement data. There is a view for each of the five possible displays to specify which parameters to display, the max and min levels of the graphs and whether to enable the view for display or not. Here we only show the **Spectrum view**.



2.3.3 System Settings

????:



Godkendelsesmæssigt skal der være noget om Network og Voltage output ????

Use **System settings** > **Regional settings** > **Language** to select your preferred user interface language.

Use **System settings** > **Advanced settings** > **About** to see the Serial number, hardware versions and software versions currently installed.

2.3.4 Data explorer

See section 2.7

2.3.5 Calibration history

???

2.3.6 Status

Use **Status** to see the Battery and Disk status:



The small icon in the bottom left corner of the display gives a brief overview of the battery status. This icon is on all displays.

2.4 Calibration

Calibration is an adjustment of your sound level meter to measure and display correct values. The sensitivity of the microphone as well as the response of the electronic circuitry can vary slightly over time or could be affected by environmental conditions such as temperature and humidity. While you are unlikely to ever experience a large drift or change in sensitivity with the sound level meter, it is nevertheless good practice to perform regular checks of the calibration, normally before and after each set of measurements.

It is strongly recommended that Brüel & Kjær Sound Calibrator Type 4231 is used.

2.4.1 Calibration Procedure

The sound level meter requires a stable signal of either 94 dB or 114 dB. Use Sound Calibrator Type 4231. It provides a stable sound pressure at 1 kHz and has minimal susceptibility to environmental factors. The calibration procedure is semi-automatic: you just need to select calibration mode and mount and switch on the calibrator, then the sound level meter will calculate the sensitivity.

To perform acoustic calibration:

1. Stand away from loud sound sources that may interfere with the calibrator's signal.
2. Switch on the sound level meter.
3. Press the **POWER/MENU/SELECT** button  and the arrow buttons to navigate to **System settings > Advanced settings** and set **Service mode** to *Enabled*.

ADVANCED SETTINGS	
About	>
Service mode	Enabled
Password	*****
Lock settings	Disabled
Calibration	>
Microphones	>
Reset to default	>
Reset to factory default	>
View event logs	>
Check for updates	>
BZ-7300--N-	enabled
 3 h	

4. Use right arrow button to enter **Calibration** and insert the **Calibrator serial no.** (use up/down arrow buttons to change the number)

CALIBRATION SETTINGS

Calibrator serial no. >

0012345

Calibrator serial no. 12345

Automatic check Enabled

3 h

5. Use right arrow button to enter **Calibrate**:

CALIBRATION SETTINGS

Calibrate?

Do you want to calibrate
the instrument using
calibrator with serial no.
12345 ?

Yes

No

3 h

6. Fit Sound Calibrator Type 4231 carefully onto the microphone of the sound level meter. To avoid handling vibrations that disturb the calibration, rest the assembly in a roughly horizontal position on a table or other flat surface. Ensure that the calibrator fits snugly on the microphone.
7. Switch on the calibrator. Wait a few seconds for the level to stabilize.
8. Press the  button to start the calibration
9. *Detection signal* appears on the screen as feedback. When the signal has been detected and verified for a while, then the sensitivity is calculated and displayed on the screen together with deviations from last calibration and from initial calibration:

CALIBRATION

Calibration succeeded

New sensitivity: 57,14 mV/Pa

Deviation from

- last calibration: 0,00 dB
- initial calibration: 0,00 dB

Measured level: 93,85 dB

Use new sensitivity?

Yes

No

3 h

10. Press the  button to accept the calibration and remove the calibrator. It will automatically switch off after a few seconds.

If no calibration signal is detected, you will be informed about an unstable calibration signal and asked to mount the calibrator, switch it on and press Retry to restart the calibration.

If the calibration deviates more than ± 1.5 dB (± 1.1 dB in Spain) from the initial calibration, then the calibration is stopped without changing the calibration of the sound level meter.

You can verify the calibrations made by navigating from the main menu: **Calibration history > Calibrations >**

CALIBRATION HISTORY	CALIBRATIONS	CALIBRATIONS
Checks >	Microphone 4966-2621134	Microphone 4966-2621134
Calibrations >	2018-12-03 13:36 0.62 dB >	Time 2018-12-03 13:36:49
Microphone 4966-2621134	2018-11-03 12:44 0.14 dB >	Time zone GMT+01:00
Max input level 0.00 dB	2018-07-06 09:33 0.00 dB >	Deviation from initial 0.62 dB
Sensitivity 57.13 mV/Pa		Sensitivity 57.13 mV/Pa
Calibrated 2018-12-03 13:36		Measured level 94.33 dB
Deviation from init. 0.62 dB		Calibrator serial no. 3001926
 3 h	 3 h	 3 h

2.4.2 Calibration Check Procedure

It is good practice to perform regular checks of the calibration, normally before and after each set of measurements. This can easily be done without changing the calibration. The sound level meter keeps a history of all the checks.

Use Sound Calibrator Type 4231. It provides a stable sound pressure at 1 kHz and has minimal susceptibility to environmental factors.

Kræver Automatic check enabled

To perform an acoustic check of the calibration:

1. Stand away from loud sound sources that may interfere with the calibrator's signal.
2. Switch on the sound level meter.
3. Be sure that the instrument doesn't measure or is paused but is stopped and reset (press ) – and is on a measurement screen (not in settings).
4. Fit Sound Calibrator Type 4231 carefully onto the microphone of the sound level meter. To avoid handling vibrations that disturb the calibration, rest the assembly in a roughly horizontal position on a table or other flat surface. Ensure that the calibrator fits snugly on the microphone.
5. Switch on the calibrator. Wait a few seconds for the level to stabilize.

6. The sound level meter will detect the signal and pop up the message:

CALIBRATION CHECK

Check?

Do you want to check the calibration of the instrument using calibrator with serial no. 12345 ?

Yes
No



7. Press the  button to start the calibration check
8. *Detection signal* appears on the screen as feedback. When the signal has been detected and verified for a while, then the sensitivity is calculated and displayed on the screen together with deviations from last calibration and from initial calibration:

CALIBRATION CHECK

Check passed

Sensitivity: 57,14 mV/Pa

Deviation from

- last check: 1,16 dB
- initial calibration: 0,00 dB

Measured level: 93,85 dB

Switch off the calibrator

OK



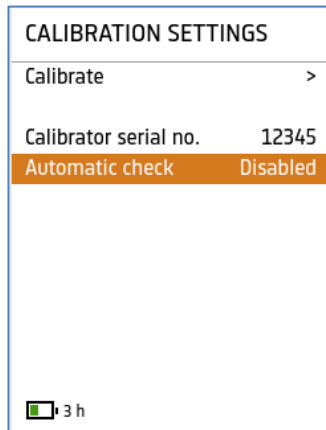
9. Press the  button to terminate the calibration check and remove the calibrator. It will automatically switch off after a few seconds.

You can verify the calibration checks made by navigating from the main menu:

Calibration history > Checks >

CALIBRATION HISTORY		CALIBRATION CHECKS		CALIBRATION CHECKS	
Checks	>	Microphone	4966-2621134	Microphone	4966-2621134
Calibrations	>	2018-12-03 13:19	0.62 dB >	Time	2018-12-03 13:19:41
Microphone	4966-2621134	2018-12-02 17:21	0.13 dB >	Time zone	GMT+01:00
Max input level	0.00 dB	2018-12-02 08:29	0.13 dB >	Check passed	
Sensitivity	54.06 mV/Pa	2018-11-22 16:15	0.51 dB >	Deviation from initial	0.63 dB
Calibrated	---	2018-11-19 11:13	0.51 dB >	Sensitivity	57.13 mV/Pa
Deviation from init.	0.15 dB			Measured level	94.33 dB
				Calibrator serial no.	3001926
 3 h		 3 h		 3 h	

Note: You can disable the automatic calibration check in **System settings > Advanced settings > Calibration:**



2.5 Measuring with the sound level meter

Before a measurement is started and after it is stopped, the sound level meter displays an instantaneous broadband measurement. Which one can be selected with the left/right arrows.

This measurement cannot be saved but it is useful to survey where to measure.

To make a measurement over a time period that can be saved follow the procedure in the next section.

For more information on instantaneous and timed measurements, see section 2.14.

2.5.1 Start/Pause/Stop of Measurement

The upper part of the measurement display shows the measurement status:

Stopped mode, shows current time and number for next measurement



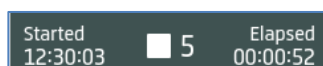
Press  to start a measurement, the measurement status turns green and the elapsed time is displayed to the right.



Press  again to pause the measurement, shown as yellow status. You can continue the measurement by pressing the button again.



Press  to stop and automatically save the measurement (as #5)



Press  again to reset the measurement and display, ready for a new measurement.

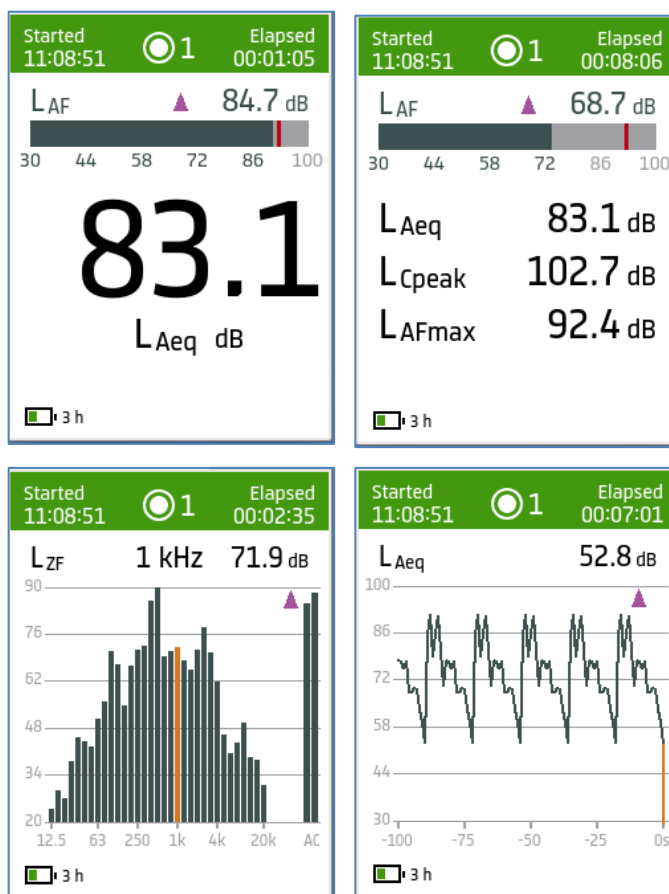
Time
12:32:52  6

2.5.2 Overload and Underrange

????

2.6 Looking at the measurement

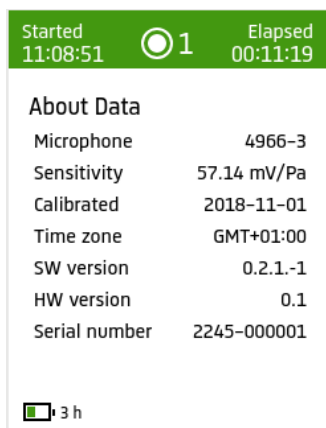
There is a number of measurement displays (SLM, List, Spectrum, Profile and About data), you navigate between them using the up/down arrow buttons   :



Note: Use right and left buttons in the measurement displays to toggle the (main) parameter in the display without going into the **Display settings**. Press and hold the buttons down to move the cursor (Spectrum and Profile only).

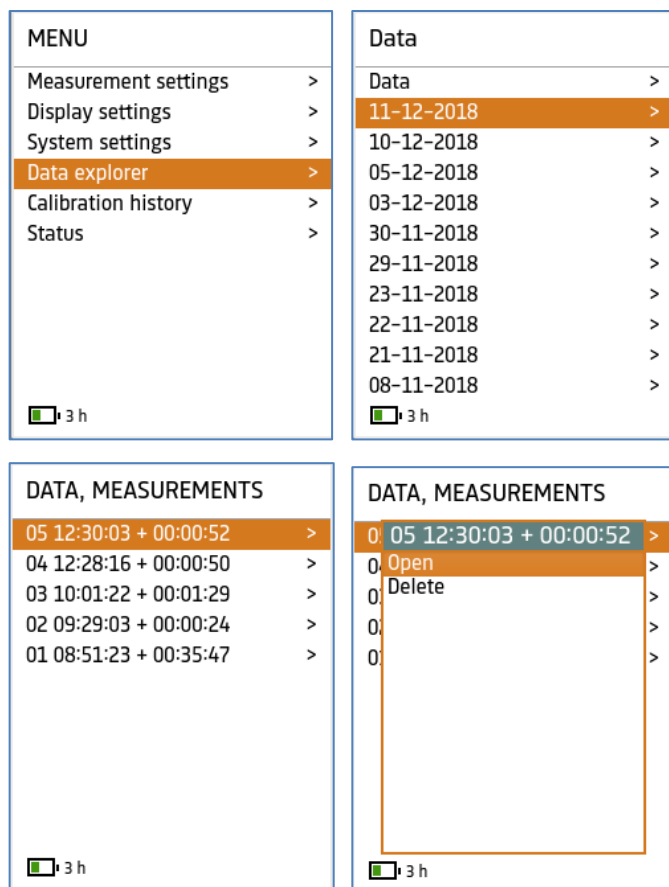
Press and hold the up button  down to zoom the y-axis on the spectrum and the profile.

The **About data** display shows the precondition for the measurement.



2.7 Looking at saved measurements

Open a saved measurement by pressing  and then selecting it in **Data explorer**:



5.1.6The Instruction Manual shall describe appropriate procedures for use of the sound level meter.

5.18.5 When results of a measurement are provided at a digital output, the Instruction Manual shall describe the method for transferring or downloading of digital data to an external data-storage or display device. The computer software as well as the hardware for the interface shall be identified.

5.20.1, 9.2.6 f) If applicable, the Instruction Manual shall describe the procedure to set the time of day.

7.4, 9.2.7 c) If internal or external bandpass filters are provided for spectral analysis of a soundpressure signal, the Instruction Manual shall describe how the sound level meter is to be used to measure filtered sound pressure levels.

9.2.3 b), 61260 7.2 h) The method to confirm that the power supply is sufficient to operate the sound level meter in conformance to the specifications of this standard.

9.2.3 c) For battery-powered sound level meters designed to be able to measure sound levels over a duration that exceeds the nominal battery life, a description of the means to operate the sound level meter from an external power supply.

2.8 Placing the Microphone (Sound Level Meter)

The sound level meter must be placed away from shielding, reflecting, or absorbing objects. In a diffuse sound field, absorbing objects will reduce the measured sound levels. In a free sound field, reflecting objects can change the measured sound levels. Typically, the sound level 0.5 m from a plain reflecting wall is 3 dB higher than if there was no wall.

The operator of the system may be personally shielding, absorbing, and reflecting, and the operator can also be an additional noise source.

The optimum position for the microphone is best found by trying different positions and observing the resulting sound levels.

For outdoor noise measurements (or indoor measurements exposed to air movement) mount Windscreen UA-1650 onto the microphone and preamplifier combination, making sure it snaps into place over the windscreen sensor.

It is good practice to measure downwind in dry conditions with a wind speed less than 5 m/s.

It is recommended to place the sound level meter on a tripod.

2.9 Mounting the Sound Level Meter on a Tripod

To minimise the influence of the operator on measurements, the sound level meter should be mounted on Tripod UA-0750, possibly using the tripod adapter UA-2237.

For all practical purposes, the sound level meter fulfils the requirements of IEC 61672-1 in this configuration, with or without Windscreen UA-1650 fitted. However, tripod mounting still presents some major difficulties in the measurement of acoustical characteristics of sound level meters and it is, therefore, normally beyond the scope of type approval for sound level meters.

2.10 Measuring Low-level Sounds

If the measured sound level is within the Linear Operating Range or, for C-weighted peak sound levels, within the Peak C Range given in the specifications (see section 4.9.7 and section 4.9.8), then the self-generated noise and level linearity problems can be ignored.

It is possible to correct the measured sound levels, except peak levels, for the typical self-generated noise, found in the specifications, see section 4.8.2. The correction for self-generated noise can be made by subtracting self-generated noise, L_{inh} , from the total sound level, L_{tot} , using the following equation:

$$L_{res} = 10 \lg(10^{L_{tot}/10} - 10^{L_{inh}/10})$$

If $L_{tot} - L_{inh}$ is less than 3 dB, the sound level is too low to be compensated.

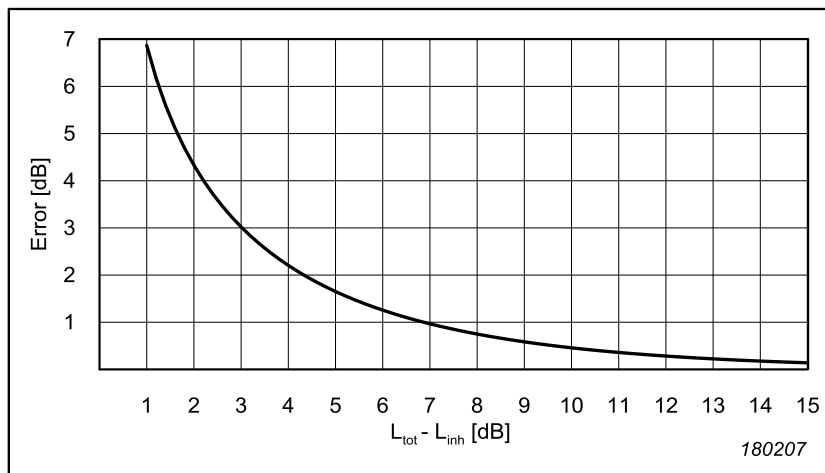
Fig. 2.1 *Error from self-generated noise*

Fig. 2.1 shows the error on the measured sound levels from the presence of self-generated noise. The curve can also be used for compensation by subtracting the error from the measured sound levels. This is equivalent to using the formula.

2.11 Measuring at Low Static Pressure

The frequency response of the microphone depends on the static pressure. Using a sound level calibrator to adjust the sensitivity of a sound level meter at the Calibration Check Frequency (1kHz) provides no information on the influence of static pressure on frequency response. Fig. 2.2 shows the changes in frequency response with changes in static pressure.

The microphone's sensitivity and frequency response are affected by variations in the ambient pressure. This is due to changes in air stiffness in the cavity behind the diaphragm, and changes in air mass in the small gap between the diaphragm and the back plate. The effects are shown in Fig. 2.2 and Fig. 2.3. The typical pressure coefficient at 250 Hz for Prepolarized Free-field 1/2" Microphone Type 4966 is – 0.012 dB/kPa, well within the ± 0.025 dB/kPa limits required for Class 1 sound level meters by IEC 61672.

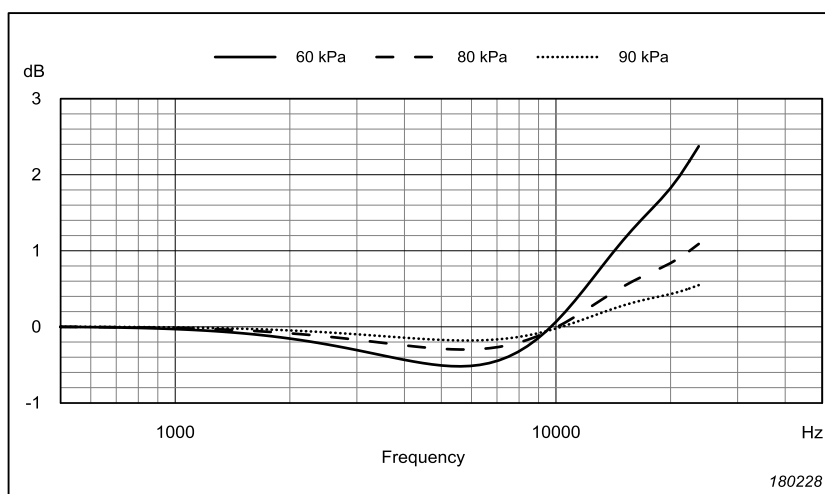
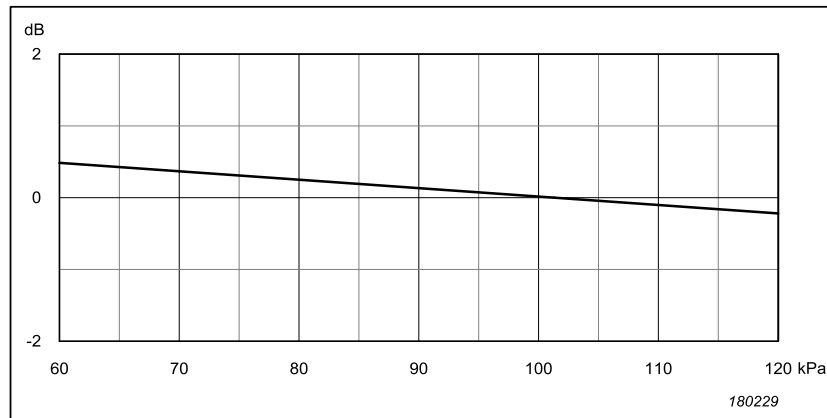
Fig. 2.2 *Typical variation in frequency response (normalized at 250 Hz) from that at 101.3 kPa as a function of change in ambient pressure*

Fig. 2.3 Typical variation in sensitivity at 250 Hz from that at 101.3 kPa as a function of ambient pressure



At the Calibration Check Frequency (1 kHz), the recommended Brüel & Kjær Sound Calibrator Type 4231 is rather insensitive to variations in the static pressure – the static pressure coefficient is below 0.001 dB/kPa.

2.12 Mechanical Vibration

Mechanical vibration can affect indicated levels at low levels. Section 4.12.4 gives an indication of the level of these errors.

The primary source to the vibration sensitivity is the microphone. It is most sensitive to vibrations coming from a direction perpendicular to the diaphragm.

To reduce this problem the sound level meter should be mounted isolated from the vibrations if measurements are taken at places where there are strong vibrations.

2.13 Frequency Weightings

Both broadband and spectrum measurements can be frequency weighted with A-, B-, C- or Z-weighting.

The A- and C-weightings conform to the requirements in IEC 61672–1 and IEC 60651. The B-weighting is not defined in IEC 61672–1, but conforms to the requirements in IEC 60651. Although B-weighting is not specified in IEC 61672–1, this realization complies to the same acceptance limits as A- and C-weighting.

The Z-weighting (Zero frequency weighting) is a linear, unweighted frequency weighting. It conforms to the Z-weighting defined in IEC 61672–1 and the Lin response defined in IEC 60651.

Table 2.1 states the design goal frequency responses for the frequency weightings. They are stated for the complete instrument including the microphone. The corresponding acceptance limits can be found in the standards.

Table 2.1 *Frequency weighting design goals*

Nominal Frequency (Hz)	Exact Frequency (6 digits) (Hz)	Frequency Weightings (1 decimal) (dB)			
		A	B	C	Z
10	10.0000	-70.4	-38.2	-14.3	0.0
13	12.5893	-63.4	-33.2	-11.2	0.0
16	15.8489	-56.7	-28.5	-8.5	0.0
20	19.9526	-50.5	-24.2	-6.2	0.0
25	25.1189	-44.7	-20.4	-4.4	0.0
32	31.6228	-39.4	-17.1	-3.0	0.0
40	39.8107	-34.6	-14.2	-2.0	0.0
50	50.1187	-30.2	-11.6	-1.3	0.0
63	63.0957	-26.2	-9.3	-0.8	0.0
80	79.4328	-22.5	-7.4	-0.5	0.0
100	100.000	-19.1	-5.6	-0.3	0.0
125	125.893	-16.1	-4.2	-0.2	0.0
160	158.489	-13.4	-3.0	-0.1	0.0
200	199.526	-10.9	-2.0	0.0	0.0
250	251.189	-8.6	-1.3	0.0	0.0
315	316.228	-6.6	-0.8	0.0	0.0
400	398.107	-4.8	-0.5	0.0	0.0
500	501.187	-3.2	-0.3	0.0	0.0
630	630.957	-1.9	-0.1	0.0	0.0
800	794.328	-0.8	0.0	0.0	0.0
1000	1000.00	0.0	0.0	0.0	0.0
1250	1258.93	0.6	0.0	0.0	0.0
1600	1584.89	1.0	0.0	-0.1	0.0
2000	1995.26	1.2	-0.1	-0.2	0.0
2500	2511.89	1.3	-0.2	-0.3	0.0
3150	3162.28	1.2	-0.4	-0.5	0.0
4000	3981.07	1.0	-0.7	-0.8	0.0
5000	5011.87	0.5	-1.2	-1.3	0.0
6300	6309.57	-0.1	-1.9	-2.0	0.0
8000	7943.28	-1.1	-2.9	-3.0	0.0
10000	10000.0	-2.5	-4.3	-4.4	0.0
12500	12589.3	-4.3	-6.1	-6.2	0.0
16000	15848.9	-6.6	-8.4	-8.5	0.0
20000	19952.6	-9.3	-11.1	-11.2	0.0

2.14 Measured Quantities

This section gives a precise mathematical definition of the measured quantities and defines the abbreviations used on the display.

2.14.1 Instantaneous Broadband Measurements

These measurements are done continuously, independent of measurement **Start**, **Pause** and **Stop**. They cannot be saved and are only displayed.

Overload

For Instantaneous Measurements, the *Overload* indication is displayed as long as the overload condition exists, or for 1 s, whichever is the greater.

Overload is indicated as a flashing  (colour: red) on the screen and by a flashing red "traffic light" indicator. Overload is common to all results of Instantaneous Measurements.

Underrange

The *Underrange* indication  is displayed as long as the underrange condition exists, or for 1 s, whichever is the greater.

The Underrange condition is present if any measurement of time-weighted sound level, time average sound level, or sound exposure level is less than the specified lower limit of a linear operating range.

Time-weighted Sound Level, F and S Time-weighted

The time-weighted sound level, $L_{xy}(t)$, is defined as twenty times the logarithm to the base ten of the ratio of a given root-mean-square sound pressure to the reference sound pressure, root-mean-square sound pressure being obtained with a frequency weighting, x , and standard time weighting, y , where:

- x is A for A-weighted, B for B-weighted, C for C-weighted or Z for Z-weighted
- y is F for Fast-weighted or S for Slow-weighted

The time-weighted sound level is a continuous function of time and is expressed in decibels (dB). $L_{xy}(t)$ is not displayed, but is the base for $L_{xy}(T_n)$, $L_{xy}(SPL)(T_n)$, $L_{xy}max(T)$ and $L_{xy}min(T)$.

In symbols, frequency-weighted and time-weighted sound level, $L_{xy}(t)$, at any instant of time, t , is represented by:

$$L_{xy}(t) = 20 \lg \left[\sqrt{(1/\tau) \int_{-\infty}^t p_x^2(\xi) e^{-(t-\xi)/\tau} d\xi} / p_0 \right] \quad [\text{dB}]$$

where:

- τ is the exponential time constant in seconds for time-weighting F or S
- ξ is a dummy variable of time integration from some time in the past, as indicated by $-\infty$ for the lower limit of the integral, to the time of observation t
- $p_x(\xi)$ is the x frequency-weighted instantaneous sound pressure
- p_0 is the reference sound pressure, equal to 20 μPa

The exponential time constants are stated in Table 2.2.

Table 2.2 Exponential time constants and corresponding averaging times

Time Weighting	Time Constant (seconds)	Averaging Time (seconds)
Fast	0.125	0.25
Slow	1	2

Time-weighted Sound Level, I Time-weighted

The I (Impulse) time-weighted sound level, $L_{xi}(t)$, is defined as ten times the logarithm to base ten of the ratio of a given mean-square sound pressure to the square of the reference sound pressure, p_0 , followed by a peak detector with a decay time constant of 1500 ms. The mean-square sound pressure being obtained with a frequency weighting, x , and time weighting with a 35 ms time constant, where:

- x is A for A-weighted, B for B-weighted, C for C-weighted or Z for Z-weighted
- p_0 is the reference sound pressure, equal to 20 μPa

The I time-weighted sound level is a continuous function of time and is expressed in decibels (dB). $L_{xi}(t)$ is not displayed but is the base for $L_{xi}(T_n)$, $L_{xi}(SPL)(T_n)$, $L_{xi\max}(T)$, $L_{xi\min}(T)$ and $L_{xi\text{Im}}(T)$.

Instantaneous Time-weighted Sound Level

The instantaneous time-weighted sound level, $L_{xy}(T_n)$, is defined as the time-weighted sound level, $L_{xy}(t)$, sampled at $t = T_n$ where:

- x is A for A-weighted, B for B-weighted, C for C-weighted or Z for Z-weighted
- y is F for Fast-weighted, S for Slow-weighted or I for Impulse-weighted
- $T_n = t_0 + n \cdot \Delta t$
- t_0 is some starting time
- n is an incrementing integer
- Δt is the display update interval

The instantaneous time-weighted sound level is, in other words, updated every Δt second and is expressed in decibels (dB).

The symbols used by the sound level meter for instantaneous time-weighted sound levels are (for A, B, C and Z frequency weighting and F, S and I time weighting):

L_{AF} L_{AS} L_{AI} L_{BF} L_{BS} L_{BI} L_{CF} L_{CS} L_{CI} L_{ZF} L_{ZS} L_{ZI}

Sound Pressure Level (SPL)

The sound pressure level, $L_{xy}(SPL)(T_n)$, is defined as the greatest time-weighted sound level, $L_{xy}(t)$, within a time interval starting at $t = T_n$ and ending at $t = T_n + \Delta t$ where:

- x is A for A-weighted, B for B-weighted, C for C-weighted or Z for Z-weighted
- y is F for Fast-weighted, S for Slow-weighted or I for Impulse-weighted
- $T_n = t_0 + n \cdot \Delta t$
- t_0 is some starting time
- n is an incrementing integer
- Δt is the display update interval, equal to 1 second

The sound pressure level is, in other words, updated every 1 second and is expressed in decibels (dB).

The symbols used by the sound level meter for sound pressure levels are (for A, B, C and Z frequency weighting and F, S and I time weighting):

$L_{AF}(SPL)$, $L_{AS}(SPL)$, $L_{AI}(SPL)$, $L_{BF}(SPL)$, $L_{BS}(SPL)$, $L_{BI}(SPL)$, $L_{CF}(SPL)$, $L_{CS}(SPL)$, $L_{CI}(SPL)$, $L_{ZF}(SPL)$, $L_{ZS}(SPL)$, $L_{ZI}(SPL)$

Taktmaximalpegel

The Taktmaximalpegel, $L_{AF}T(T_n)$, is defined as the greatest time-weighted sound level, $L_{AF}(t)$, within a time interval starting at $t = T_n$ and ending at $t = T_n + \Delta t$ where:

- $T_n = t_0 + n \cdot \Delta t$
- t_0 is some starting time
- n is an incrementing integer
- Δt is the update interval (Taktzeit), equal to 5 seconds

The Taktmaximalpegel is, in other words, updated every 5 seconds and is expressed in decibels (dB).

The Taktmaximalpegel is not displayed by the sound level meter. It is only used for the calculation of Taktmaximal- Mittelungspegel.

2.14.2 Timed Broadband Measurements

These measurements are only executed when **Start**  is activated and are paused when  is activated again or when **Stop**  has been activated or when *Preset time* has expired, whichever occurs first. The time interval between start and pause/stop is the Elapsed time indicated as *Elapsed*. During the measurement time interval, intermediate results are displayed as if the measurements were paused at the time of display. When the measurements are paused/stopped, the set of results, including *Latched overload*  (colour: magenta) are automatically stored and this is held on the display until either **Stop** is activated again, or a new measurement is started.

Press **Stop**  to a stopped measurement to reset the latched overload and to reset all time-weighted sound levels to zero ($-\infty$ dB). From this, they increase to their current values. The timed measurements derived from time-weighted sound levels (e.g., Minimum Time-weighted Sound Level, Maximum Time-weighted Sound Level, Equivalent Continuous I- weighted Sound Level, Taktmaximal-Mittelungspegel, and Statistics) are first valid after this has settled. The settling time is less than 1 s for Fast weighting and less than 2 s for Slow weighting. Therefore, it is recommended to wait a couple of seconds after a reset before starting the measurement. Measurement of Equivalent Continuous Sound Level, Sound Exposure Level, and Peak Sound Level are not influenced by this start-up settling after a reset.

Note: Changing microphone, windscreen or weightings will also make a reset.

Latched Overload

For the timed measurements, a latched overload indication is displayed and included in the set of results if the overload condition exists at any time during the measurement time interval. The latched overload is indicated by a magenta triangle  on the screen. The latched overload is common to all the results of the timed measurements.

Minimum Time-weighted Sound Level

The minimum time-weighted sound level, $L_{xymin}(T)$, is defined as the smallest time-weighted sound level, $L_{xy}(t)$, within a time interval starting at $t = T$ and ending at $t = T + \Delta t$ where:

- x is A for A-weighted, B for B-weighted, C for C-weighted or Z for Z-weighted
- y is F for Fast-weighted, S for Slow-weighted or I for Impulse-weighted
- T is the start time of the measurement, indicated as *Start Time*
- Δt is the measuring period, indicated as *Elapsed Time*

The minimum time-weighted sound level is expressed in decibels (dB).

The symbols used by the sound level meter for maximum time-weighted sound levels are (for A, B, C and Z frequency weighting and F, S and I time weighting):

L_{AFmin} L_{ASmin} L_{AImin} L_{BFmin} L_{BSmin} L_{BImin} L_{CFmin} L_{CSmin} L_{CImin} L_{ZFmin} L_{ZSmin} L_{ZImin}

Maximum Time-weighted Sound Level

The maximum time-weighted sound level, $L_{xymax}(T)$, is defined as the greatest time-weighted sound level, $L_{xy}(t)$, within a time interval starting at $t = T$ and ending at $t = T + \Delta t$ where:

- x is A for A-weighted, B for B-weighted, C for C-weighted or Z for Z-weighted
- y is F for Fast-weighted, S for Slow-weighted or I for Impulse-weighted
- T is the start time of the measurement, indicated as *Start Time*
- Δt is the measuring period, indicated as *Elapsed Time*

The maximum time-weighted sound level is expressed in decibels (dB).

The symbols used by the sound level meter for maximum time-weighted sound levels are (for A, B, C and Z frequency weighting and F, S and I time weighting):

L_{AFmax} L_{ASmax} L_{AImax} L_{BFmax} L_{BSmax} L_{BImax} L_{CFmax} L_{CSmax} L_{CImax} L_{ZFmax} L_{ZSmax} L_{ZImax}

Equivalent Continuous Sound Level

The equivalent continuous sound level (also called time-average sound level), $L_{x\text{eq}}(T)$, is defined as twenty times the logarithm to base ten of the ratio of a root-mean-square sound pressure during a time interval to the reference sound pressure, sound pressure being obtained with a frequency weighting, x. The time interval is starting at $t = T$ and ending at $t = T + \Delta t$ where:

- x is A for A-weighted, B for B-weighted, C for C-weighted or Z for Z-weighted
- T is the start time of the measurement, indicated as *Start Time*
- Δt is the averaging time interval, indicated as *Elapsed Time*

The equivalent continuous sound level is expressed in decibels (dB). In symbols, equivalent continuous sound level, $L_{x\text{eq}}(T)$, is given by:

$$L_{x\text{eq}}(T) = 20 \lg \left[\sqrt{(1/\Delta t) \int_T^{T+\Delta t} p_x^2(\xi) d\xi} / p_0 \right] \quad [\text{dB}]$$

where:

- ξ is a dummy variable of time integration over the averaging time interval
- $p_x(\xi)$ is the x frequency-weighted instantaneous sound pressure
- p_0 is the reference sound pressure, equal to 20 μPa

The symbols used by the sound level meter for equivalent continuous sound levels are (for A, B, C and Z frequency weighting):

$L_{A\text{eq}}, L_{B\text{eq}}, L_{C\text{eq}}, L_{Z\text{eq}}$

Equivalent Continuous I-weighted Sound Level

The equivalent continuous I-weighted sound level (also called average I-weighted sound level), $L_{x\text{Ieq}}(T)$, is defined as ten times the logarithm to base ten of the mean of ten to the power of the I time-weighted sound level, $L_{x\text{I}}(t)$, divided by ten during a time interval. The time interval is starting at $t = T$ and ending at $t = T + \Delta t$ where:

- x is A for A-weighted, B for B-weighted, C for C-weighted or Z for Z-weighted
- T is the start time of the measurement, indicated as *Start Time*
- Δt is the averaging time interval, indicated as *Elapsed Time*

The equivalent continuous I-weighted sound level is expressed in decibels (dB). In symbols, equivalent continuous I-weighted sound level, $L_{x\text{Ieq}}(T)$, is given by:

$$L_{x\text{Ieq}}(T) = 10 \lg \left[(1/\Delta t) \int_T^{T+\Delta t} 10^{L_{x\text{I}}(\xi)/10} d\xi \right] \quad [\text{dB}]$$

where ξ is a dummy variable of time integration over the averaging time interval

The symbols used by the sound level meter for equivalent continuous I-weighted sound levels are (for A, B, C and Z frequency weighting):

$L_{A\text{Ieq}}, L_{B\text{Ieq}}, L_{C\text{Ieq}}, L_{Z\text{Ieq}}$

Taktmaximal-Mittelungspegel

The Taktmaximal-Mittelungspegel, $L_{AFTeq}(T)$, is defined as ten times the logarithm to base ten of the mean of ten to the power of the Taktmaximalpegel, $L_{AFT}(T_n)$, divided by ten during a time interval. The time interval is starting at $t = T$ and ending at $t = T + N \cdot \Delta t$ where:

- T is the start time of the measurement, indicated as *Start Time*
- Δt is the Taktzeit, equal to 5 seconds
- $N \cdot \Delta t$ is the averaging time interval, indicated as *Elapsed Time*

The Taktmaximal-Mittelungspegel is expressed in decibels (dB). In symbols, Taktmaximal-Mittelungspegel, $L_{AFTeq}(T)$, is given by:

$$L_{AFTeq}(T) = 10 \lg \left[(1/N) \sum_{n=1}^N 10^{L_{AFT}(T_n)/10} \right]$$

The symbol used by the sound level meter for Taktmaximal-Mittelungspegel is:

L_{AFTeq}

Sound Exposure Level

The sound exposure level, $L_{xE}(T)$, is defined as ten times the logarithm to base ten of the ratio of integral of the squared sound pressure during a time interval to the reference sound exposure, sound pressure being obtained with a frequency weighting, x . The time interval is starting at $t = T$ and ending at $t = T + \Delta t$ where:

- x is A for A-weighted, B for B-weighted, C for C-weighted or Z for Z-weighted
- T is the start time of the measurement, indicated as *Start Time*
- Δt is the averaging time interval, indicated as *Elapsed Time*

The equivalent continuous sound level is expressed in decibels (dB). In symbols, equivalent continuous sound level, $L_{xE}(T)$, is given by:

$$L_{xE}(T) = 10 \lg \left[\int_T^{T+\Delta t} p_x^2(\xi) d\xi / E_0 \right] \quad [\text{dB}]$$

where:

- ξ is a dummy variable of time integration over the averaging time interval
- $p_x(\xi)$ is the x frequency-weighted instantaneous sound pressure
- E_0 is the reference sound exposure, equal to $(20 \mu\text{Pa})^2 \times (1 \text{ s}) = 400 \times 10^{-12} \text{ Pa}^2\text{s}$

The sound exposure level $L_{xE}(T)$ can also be expressed in terms of the equivalent continuous sound level $L_{xeq}(T)$ and *Elapsed Time* as:

$$L_{xE}(T) = L_{xeq}(T) + 10 \lg(\Delta t) \quad [\text{dB}]$$

where Δt is the averaging time interval, indicated as *Elapsed Time*, expressed in seconds.

The symbols used by the sound level meter for sound exposure levels are (for A, B, C and Z frequency weighting):

$L_{AE} \quad L_{BE} \quad L_{CE} \quad L_{ZE}$

Peak Sound Level

The peak sound level, $L_{xpeak}(T)$, is defined as twenty times the logarithm to base ten of the ratio of the greatest absolute instantaneous sound pressure, $p_x(t)$, within a time interval starting at $t = T$ and ending at $t = T + \Delta t$, to the reference sound pressure, p_0 , instantaneous sound pressure being obtained with a frequency weighting, x , where:

- x is A for A-weighted, B for B-weighted, C for C-weighted or Z for Z-weighted
- $p_x(t)$ is the x frequency-weighted instantaneous sound pressure
- p_0 is the reference sound pressure, equal to 20 μPa
- T is the start time of the measurement, indicated as *Start Time*
- Δt is the measuring period, indicated as *Elapsed Time*

The maximum peak sound level is expressed in decibels (dB).

The symbols used by the sound level meter for peak sound levels are (for A, B, C and Z frequency weighting):

L_{Apeak} L_{Bpeak} L_{Cpeak} L_{Zpeak}

Average Sound Level

Average Sound Level with Time Weighting S and Exchange Rate $Q = 4$ or 5. Exchange rate is the increase in noise level that corresponds to a doubling of the noise level. This is a widely used occupational health noise parameter in the USA, corresponding to the LAeq used otherwise.

The symbols used by the sound level meter for average sound levels are (for exchange rates 4 and 5):

L_{avS4} L_{avS5}

Statistics

Statistics can be based on sampling the continuous output of the A-weighted exponential detectors F every 16 ms or S every 125 ms or the 1 s linearly averaged results L_{Aeq} . The samples are divided into 0.2 dB classes in which the frequency of appearance is counted. Based on the counted frequency distribution the percentile sound levels (also called the exceedance levels) $L_{Ay/N}$ are calculated.

- x is A for A-weighted or B for B-weighted
- y is F for Fast-weighted or S for Slow-weighted and nothing for Leq
- N is a percentage between 0.1 and 99.9. It notes the percentage of time that the indicated noise level was exceeded during the measurement period.

2.14.3 Spectrum Measurements

The definition of the measured quantities is the same as for the broadband measurements.

At low frequency bands the exponential time constants for Fast and Slow weighting are modified to get a reasonable B*T product, see section 4.11.5.

2.14.4 Instantaneous Spectrum Measurements

The Instantaneous Spectrum Measurements can measure instantaneous time-weighted sound level L_{xy} where:

- x is A for A-weighted, B for B-weighted, C for C-weighted or Z for Z-weighted
- y is F for Fast-weighted or S for Slow-weighted

The symbols used by the sound level meter for instantaneous time-weighted sound level spectrums are (for A, B, C and Z frequency weighting and F and S time weighting):

$L_{AF}, L_{AS}, L_{BF}, L_{BS}, L_{CF}, L_{CS}, L_{ZF}, L_{ZS}$

Overload is common to the broadband measurements.

2.14.5 Timed Spectrum Measurements

The Timed Spectrum Measurements can measure minimum time-weighted sound level, L_{xymin} maximum time-weighted sound level, L_{xymax} and equivalent continuous sound level, L_{xeq} where:

- x is A for A-weighted, B for B-weighted, C for C-weighted or Z for Z-weighted
- y is F for Fast-weighted or S for Slow-weighted

The symbols used by the sound level meter for minimum time-weighted sound level spectrum, maximum time-weighted sound level spectrum and equivalent continuous sound level spectrum are (for A, B, C and Z frequency weighting and F and S time weighting):

$L_{AFmin}, L_{ASmin}, L_{BFmin}, L_{BSmin}, L_{CFmin}, L_{CSmin}, L_{ZFmin}, L_{ZSmin}$

$L_{AFmax}, L_{ASmax}, L_{BFmax}, L_{BSmax}, L_{CFmax}, L_{CSmax}, L_{ZFmax}, L_{ZSmax}$

$L_{Aeq}, L_{Beq}, L_{Ceq}, L_{Zeq}$

Latched Overload is common to the broadband measurements.

Timed Spectrum Measurements can be reset in the same way as Timed Broadband Measurements (section 2.14.2). As stated above, the exponential time constant is modified at low frequencies. This leads to longer settling times at low frequencies.

2.15 Overload and Underrange

2.15.1 Overload

Overload indicates that the input signal level exceeded the capability of the sound level meter with the current settings.

During measurement, overload is indicated with the flashing red triangle  and by a flashing red “traffic light” indicator. The indication is displayed as long as the overload condition exists or for 1 second, whichever is the greater.

The final result of the measurement contains an indication with a magenta triangle  if there have been any overloads during the measurement.

If an overload condition exists, some of the input signal is clipped away and therefore missing in the broadband results, which becomes too small. In the spectrum measurements, due to the distortion of the signal, some of the missing signal is placed in other bands.

2.15.2 Underrange

Underrange indicates that one or more of the measured quantities time-weighted sound level, time average sound level, or sound exposure level is momentary below the specified lower limit of the Linear Operating Range. The decision of whether there is an underrange condition is taken and displayed every 1 second and is based on the results for the last 1 second.

Underrange is indicated with a yellow triangle .

Underrange is only indicated on the screen during measurement. No underrange information is saved with the final result of the measurement.

The underrange indication does not account for the influence of self-generated noise from the microphone because the specifications for the lower limit of the Linear Operating Range apply for measurements of electrical signals inserted into the preamplifier through the applicable input device. This makes the underrange indication a dubious indicator of the quality of the measurement.

Chapter 3

Conformance Testing

3.1 Introduction

This chapter contains the information needed to conduct conformance testing according to the specified standards.

3.2 Microphone, Accessories and Sound Fields

The acoustical frequency response and calibration depends on the sound field, the microphone, the microphone accessories used and the electrical frequency response. To improve the quality of the measurement and help the user to measure correctly the sound level meter compensates for the sound field, the microphone and the microphone accessories used by automatically changing the electrical frequency response and calibration.

This means that a calibration of a microphone is valid for both free-field and diffuse-field and for all the recommended accessories.

This also means that it is very important that parameters on menus reflect the desired configuration. The important menus are:

- **Measurement settings > Input**
- **Measurement settings > Broadband parameters** and
- **Measurement settings > Spectrum parameters**

3.2.1 For acoustical tests

A Microphone Type 4966 shall be used and selected in **Measurement settings > Input > Microphone**.

3.2.2 For electrical tests

The Electrical Substitute for Microphones shall be used.

In **Measurement settings > Input** the following shall be selected:

- An Unknown microphone in **Microphone**,
- *Free-field* in **Sound field**,
- *Disabled* in **Windscreen detect** and
- *None* in **Windscreen type**.

In this way, an uncompensated electrical frequency response is ensured.

3.3 Calibration during Pattern evaluation and Periodic tests

For Pattern evaluation tests (type approval) and Periodic tests, the sound level meter shall be calibrated.

For Periodic tests performed by a test laboratory, it may be inappropriate to add more temporary calibrations to the customer's **Calibration history**. If this is the case the laboratory should create new microphones (one 4966 and one unknown) in **System settings > Advanced settings > Microphones** before the tests. After the tests, these microphones can be deleted. This removes there **Calibration history**.

3.3.1 Acoustic calibration

The calibration procedure can be found in section 2.4.1.

For acoustic calibration the Brüel & Kjær Sound Level Calibrator Type 4231 shall be used and selected in **System settings >Advanced settings > Calibration > Calibrator**.

The adjustment data according to IEC 61672-1 paragraph 5.2.4 for Microphone Type 4966 with Sound Calibrator Type 4231 is 93.85 dB for the 94 dB setting of the calibrator. This value is build into the software when *Microphone Type 4966* and *Calibrator Type 4231* is selected in the user interface.

3.3.2 Electrical Substitute for Microphones

For electrical tests, the Electrical Substitute for Microphones shall be used and the instrument shall be calibrated by keying in the *Sensitivity* using the following procedure:

- 1) To obtain a BNC Type electrical input, replace the microphone with a WA-0302-B, 15 pF, fitted with a 10–32 UNF to BNC Adapter, UA-0245.
- 2) In **System settings >Advanced settings > Service mode** select *Enabled*.
- 3) In **System settings >Advanced settings > Microphones** select the microphone used for the tests and select **Edit > Sensitivity > Yes**.
- 4) Adjust *Sensitivity* to 43.35 mV/Pa. This corresponds to the Microphone Type 4966's nominal Open Circuit Sensitivity (50.00 mV/Pa), attenuated by the build in microphone preamplifier's nominal attenuation (1.24 dB).
- 5) Connect an electrical sinusoidal signal with a frequency of 1 kHz to the Electrical Substitute for Microphones and adjust the amplitude of this signal until L_{ZF} (or L_{CF}) displays 94.00 dB in the normal measurement screen. This electrical amplitude is the 94.00 dB reference signal for the electrical tests. The amplitude will typically be 51.9 mV. This is due to the attenuation of the Electrical Substitute for Microphones together with the preamplifier (nominally 1.54 dB).

This procedure calibrates the sound level meter to a calibration that corresponds to the calibration you would get if the sound level meter were fitted with a microphone with the nominal Open Circuit Sensitivity.

The electrical input obtained in this way has a maximum input level of $\pm 16.9 V_{Peak}$ and no damage will occur for signals up to $\pm 20 V_{Peak}$.

All electrical inputs can be short-circuited when needed for test.

3.4 Wi-Fi and Bluetooth during tests

Bluetooth is only used for paring devises (transferring IP address) for Wi-Fi. Therefore, it is not relevant during tests.

Wi-Fi should be turned on as a **Hotspot during tests using the following procedure:**

Set System settings >Network settings > Wi-Fi settings to Hotspot

3.5 Mounting for Acoustical Tests

For acoustical tests, it is important that the test rig for mounting the sound level meter to be tested is designed to minimise the influence of reflections to a level that is comparatively smaller than the test parameter's maximum Expanded Uncertainties of Measurement. This has to be demonstrated with a good, known laboratory microphone.

The sound level meter can be mounted using Tripod Extension for Hand-held Analyzers UA-1651. The tripod extension stem is screwed into the Tripod Mounting Thread situated on the rear end of the sound level meter. The thread on the other end of the stem is used to mount the assembly to the test rig.

3.6 Periodic Testing of Acoustical Frequency Responses

Acoustical signal test of frequency response can be made with plane progressive waves in an anechoic facility. However, this is normally very time-consuming and difficult to do with sufficient accuracy. For the purpose of periodic testing, it is recommended that you use one of the following Brüel & Kjær products for acoustic frequency response tests:

- Multifunction Acoustic Calibrator Type 4226
- Electroacoustic Calibrator UA-0033

If the Multifunction Acoustic Calibrator is used, the calibrator must be set to its Calibration and Pressure sound field modes. The calibrator must be calibrated. Further details can be found in the Instruction Manual for the Multifunction Acoustic Calibrator.

Acoustical signal test with Electrostatic Actuator UA-0033 should be made only by personnel that are educated in and familiar with the use of the actuator. The actuator should be operated with a DC voltage of approximately 800 V and an RMS AC voltage of approximately 100 V.

Correction data, which must be applied to the sound levels displayed in response to the sound pressure produced by Multifunction Acoustic Calibrator Type 4226, or in response to simulation of sound pressure by Electrostatic Actuator UA-0033, in order to obtain the equivalent sound levels that would be displayed in response to plane progressive sinusoidal sound waves incident from the reference direction, are given in Table A. 24 and Table A. 25.

3.7 Mounting for Mechanical Vibrations Tests

The sound level meter is mounted on the shaker using the tripod mounting thread on the rear end of the sound level meter.

3.8 Testing 1/1-octave-band and 1/3-octave-band Filters

All tests according to IEC 61260 must be conducted with the following settings:

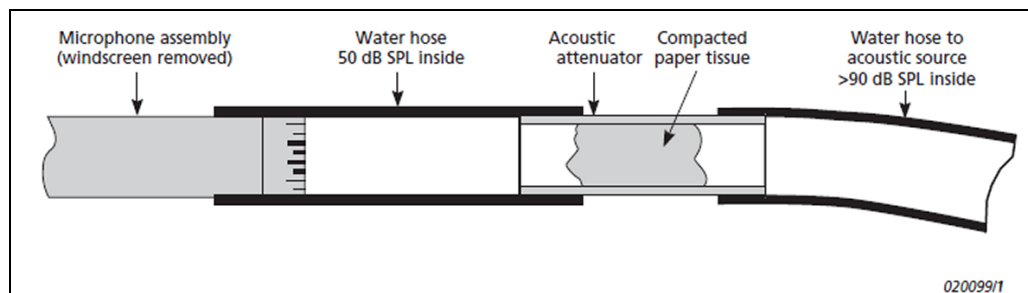
- Use the Electrical Substitute for Microphones calibrated according to section 3.3.2.
- Use the settings for electrical tests according to section 3.2.2.
- Set **Measurement settings** > **Spectrum parameters** > **Weighting** to *Z*

3.9 EMC Test Procedures

3.9.1 Signal Sources for Immunity Test

Acoustical Source for Testing According to IEC 61672

The acoustic signal, which is used during the immunity test according to IEC 61672, is applied to the microphone through a ½" plastic hose (a normal water hose) – from a source outside the test area, see Fig. 3.1. In this way, the acoustic source is not affected by the RF or magnetic field. The source may be a normal entertainment earphone.

Fig. 3.1 *Setting up the signal source for an immunity test*

To prevent the acoustic source from being affected by acoustic noise in the surroundings, the following method can be used.

Insert an acoustic attenuator in the hose close to the microphone, so that the sound pressure within the greater part of the hose is held far above the surrounding sound level. The acoustic attenuator can easily be made from a short piece of metal tubing with an outer diameter of $\frac{1}{2}$ ". Squeeze a piece of paper tissue into the tube, and compress it until the desired attenuation is obtained. Up to 40 to 60 dB of acoustic attenuation can be obtained.

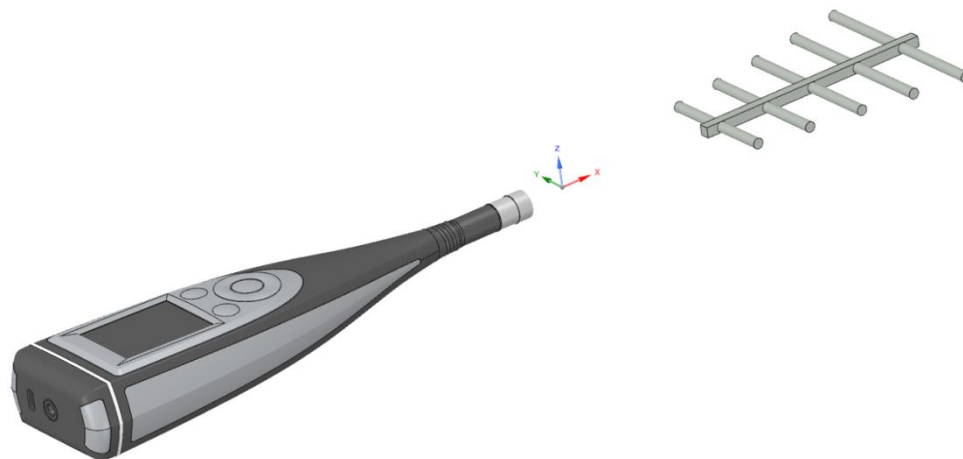
Electrical Source for Testing According to IEC 61260

The short-circuit of the input signal may be achieved by short-circuiting the electrical substitute for microphones mounted on the sound level meter.

3.9.2 Reference Orientation

Fig. 3.2 shows the reference orientation of the sound level meter, relative to the RF-emitter/receiver. This is common to both emission and immunity tests.

Fig. 3.2 *Reference orientation of the sound level meter relative to the RF-emitter/receiver*



3.9.3 Securing of Cables During EMC Test

During test, any excessive cable is folded back on itself in an even number of figure eights.

The cable arrangement is common for both the Emission and Immunity tests.

3.9.4 Accessories Included in EMC Test

The following accessories are connected to the instrument during the EMC tests:

- Mains Power Supply ZG-xxxx is connected to the 'USB' socket on the rear panel of 2245 using a USB cable AO-xxxx.

Detailed descriptions of the parts are given in Table 1.1.

3.9.5 Normal Mode of Operation During EMC Test

Testing Emission

The greatest level of radio frequency emission is radiated from the sound level meter when set up as follows:

- 1) Make the connections described in section 3.9.4.
- 2) Arrange orientation as shown in Fig. 4.19.
- 3) Start a measurement and let it run during test.

Testing Immunity as a Sound Level Meter According to IEC 61672

The highest Susceptibility (Susceptibility = 1/Immunity) is achieved when the sound level meter is set up as follows:

- 1) Make the connections described in section 3.9.4.
- 2) In **Measurement settings > Input** the following shall be selected:
 - A 4966 microphone in **Microphone**,
 - *Free-field* in **Sound field**,
 - *Disabled* in **Windscreen detect** and
 - *None* in **Windscreen type**.
- 3) Calibrate the microphone according to section 3.3.1.
- 4) Arrange orientation as shown in Fig. 4.19.
- 5) Excite the microphone with an acoustical signal as described in section 3.9.1.
- 6) Start a measurement and let it run during test.
- 7) For radio-frequency tests, observe L_{AF} during test.
- 8) For power-frequency magnetic field tests, observe L_{AF} , L_{BF} , L_{CF} and L_{ZF} during test (only two frequency weightings can be observed simultaneously).

Testing Immunity as a Frequency Analyzer According to IEC 61260

The highest Susceptibility (Susceptibility = 1/Immunity) for the filter sets is achieved when the sound level meter is set up as follows:

- 1) Make the connections described in section 3.9.4.
- 2) Mount and calibrate the electrical substitute for microphones described in section 3.3.2 on the microphone preamplifier and short-circuit it.
- 3) In **Measurement settings > Input** the following shall be selected:
 - A 4966 microphone in **Microphone**,
 - *Free-field* in **Sound field**,
 - *Disabled* in **Windscreen detect** and
 - *None* in **Windscreen type**.
- 4) In **Measurement settings > Spectrum parameters > Weighting** Z shall be selected.
- 5) Arrange orientation as shown in Fig. 4.19.
- 6) Start the measurement and let it run during test.
- 7) For radio-frequency tests, observe the L_{ZF} spectrum at 1 kHz during test.
- 8) For power-frequency magnetic field tests, observe the L_{ZF} spectrum during test.

Only 1/3-octave-band filters need to be tested. This is because the filters are digital, and no disturbance at the filter input will show up to be greater at 1/1-octave bandwidth than at 1/3-octave bandwidth.

Chapter 4

Specifications

4.1 Specifications

Specifications are given for the configuration detailed in Chapter 1.

Unless specifically noted, specifications are given as typical data under Reference Environmental Conditions, and with the sound level meter calibrated to the nominal microphone open circuit sensitivity.

4.2 Standards

The sound level meter part of the Sound Level Meter Type 2245 conforms to the following national and international standards and classes/types/groups with the accessories and configurations specified in section 1.2.3:

- **IEC 61672– 1:2002– 05**, Class 1, Group X/Z
- **IEC 61672– 1:2013**, Class 1, Group X/Z
- **DIN 45657:1997– 07**
- **DIN 45657:2014– 07**
- **IEC 60651:1979** (plus Amendment 1 (1993–02) and Amendment 2 (2000–10)), Type 1, Group X/Z
- **IEC 60804:2000–10**, Type 1, Group X/Z
- **ANSI S1.4–1983** (plus ANSI S1.4A-1985 Amendment), Type 1
- **ANSI/ASA S1.4 PART 1-2014**, Class 1, Group X/Z
- **ANSI S1.43–1997**, Type 1

The frequency analysis part of the Sound Level Meter Type 2245 conforms to the following additional national and international standards and classes/types/groups:

- **IEC 61260:1995–07** (plus Amendment 1 (2001–09)), 1/1-octave Bands and 1/3-octave Bands, Class 0, Group X/Z, all filters
- **IEC 61260– 1:2014**, 1/1-octave Bands and 1/3-octave Bands, Class 1, Group X/Z, all filters
- **ANSI S1.11–2004**, 1/1-octave Bands and 1/3-octave Bands, Class 0, Group X/Z, all filters
- **ANSI/ASA S1.11–2014/Part 1**, 1/1-octave Bands and 1/3-octave Bands, Class 1, Group X/Z, all filters

In the text elsewhere in this manual, references to these standards are shortened to the standards name but are to be understood as the full text above.

The international IEC standards are adopted as European standards by CENELEC. When this happens, the letters IEC are replaced with EN and the number is retained. Type 2245 also conforms to these EN standards.

4.3 Reference Environmental Conditions

Air Temperature: 23 °C

Static Pressure: 101.325 kPa

Relative Humidity: 50%

4.4 Reference Conditions for Acoustic Calibration

Reference Level Range: Only one level range exists and this is the reference level range.

Reference Sound Pressure Level: 94.00 dB re. 20 μ Pa

Calibration Check Frequency: 1 kHz

4.5 Microphone

Microphone Type 4966:

Type: Prepolarized Free-field $\frac{1}{2}$ " Condenser Microphone

Nominal Open Circuit Sensitivity: 50 mV/Pa, (corresponding to -26 dB re 1 V/Pa) ± 1.5 dB

Capacitance: 14 pF (at 250 Hz)

Nominal Preamplifier Attenuation: 1.24 dB $\pm$ 0.1 dB

Microphone Reference Point: The centre of the front surface of the microphone protection grid.

Reference Direction of Sound Incidence: See the small drawings in the lower right corner of the directional response graphs in section 4.7.

4.6 Frequency Responses

The frequency responses are given in tabular form in Appendix A and in graphical form in this section.

The specifications for the Lin response defined in IEC 60651 are equivalent to those given here for the Z-weighting.

The acoustical frequency response depends on the sound field, the microphone, the used microphone accessories and the electrical frequency response. To improve the quality of the measurement, the sound level meter compensates for the sound field, the microphone and the used microphone accessories by changing the electrical frequency response.

This means that it is very important that parameters on menus reflect the desired configuration. The important menus are:

- **Measurement settings > Input**
- **Measurement settings > Broadband parameters** and
- **Measurement settings > Spectrum parameters**

Limit curves are drawn on some of the frequency response graphs in the following sections. These curves represent the IEC 61672–1:2013 acceptance limits.

The Expanded Uncertainties of Measurement in the tables are the two-sigma limits maintained in the Brüel & Kjær production for the specific product. This means that the correct value lies in the range of the measured value plus/minus the Expanded Uncertainties of Measurement with a probability of 95%.

Please note: This range is not related to the production spread. The range is for a specific typical unit. The factory acceptance tests at Brüel & Kjær ensure that the ranges for all units are within the IEC 61672–1 limits.

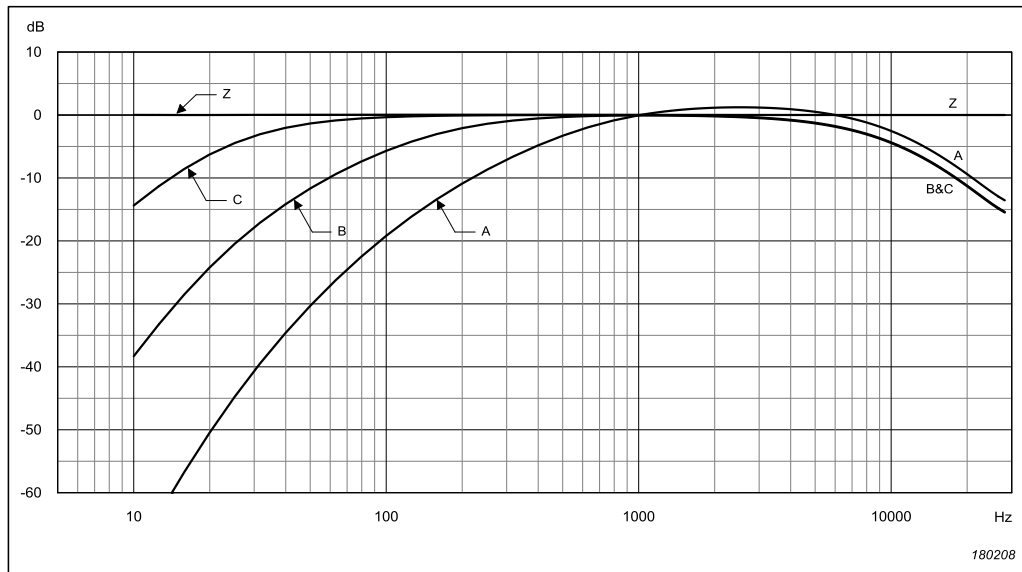
4.6.1 Electrical Frequency Responses

The uncompensated electrical frequency response for the different frequency weightings are given in Fig. 4.1 and Table A.1.

The compensated Z-weighted electrical frequency response is given in the “Electrical Response” column of the appropriate tables of Table A. 2 to Table A. 6 in Appendix A.

The electrical frequency responses in Fig. 4.1 and Table A.1 are valid for introduction of the electrical signal through the recommended means to substitute the microphone with an electrical input facility (see section 3.3.2).

Fig. 4.1 *Uncompensated electrical frequency response, corresponds to Table A.1*



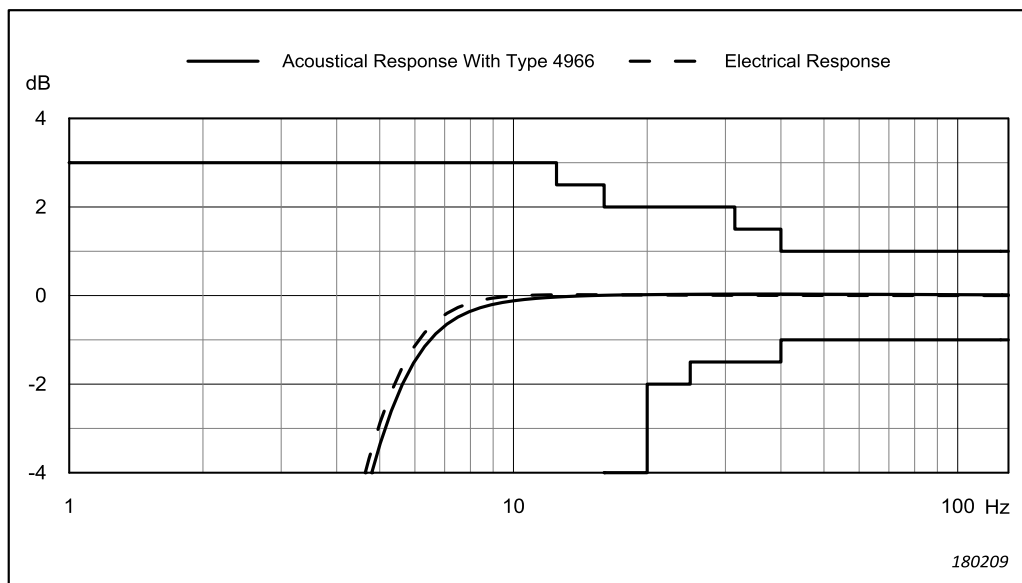
4.6.2 Typical Low-frequency Responses

The typical Low-frequency Responses for Z frequency weighting are given in Fig. 4.2.

The electrical responses in Fig. 4.2. is the Low-frequency Responses for introduction of the electrical signal through the recommended means to substitute the microphone with an electrical input facility (see section 3.3.2)

The Low-frequency Responses are not influenced by the microphone accessories described in section 1.2.3.

Fig. 4.2 *Typical low-frequency responses*



4.6.3 Acoustical Frequency Responses

All the acoustical frequency responses are given for Z frequency weighting.

The A-, B- and C-weighted acoustical frequency responses can be found by adding the appropriate response from the “Add to Acoustical Responses” columns of Table A.1 to the Z-weighted responses.

4.6.4 Free-field Frequency Responses

The free-field frequency responses for plane progressive sinusoidal sound waves incident from the reference direction with Z frequency weighting are provided in Fig. 4.3 to Fig. 4.4 and Table A. 2 to Table A. 3. The tables also provides the ‘Expanded Uncertainties of Measurement’ required by IEC 61672–1, see the start of section 4.6.

Fig. 4.3 Free-field 0° frequency response for the sound level meter. Corresponds to the “Acoustical Response” column in Table A. 2

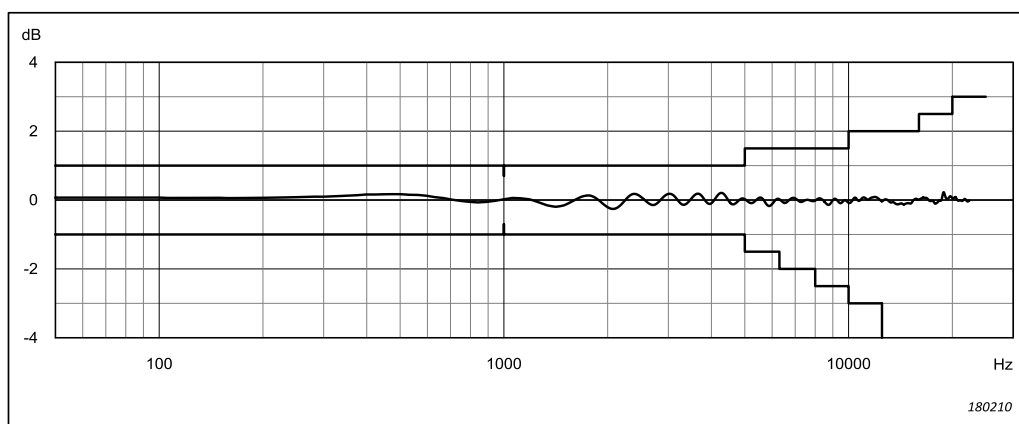
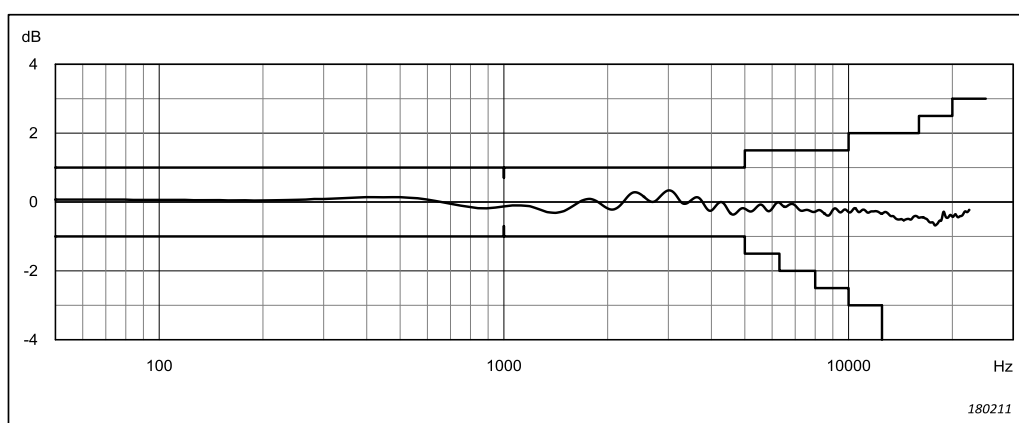


Fig. 4.4 Free-field 0° frequency response for the sound level meter with Windscreen UA-1650. Corresponds to the “Acoustical Response” column in Table A. 3.



4.6.5 Diffuse-field Frequency Responses

The diffuse-field frequency responses (also called random-incidence frequency responses) with Z frequency weighting are provided in Fig. 4.5 to Fig. 4.6 and Table A. 4 to Table A. 5.

Fig. 4.5 Diffuse-field frequency response for the sound level meter. Corresponds to the “Acoustical Response” column in Table A. 4.

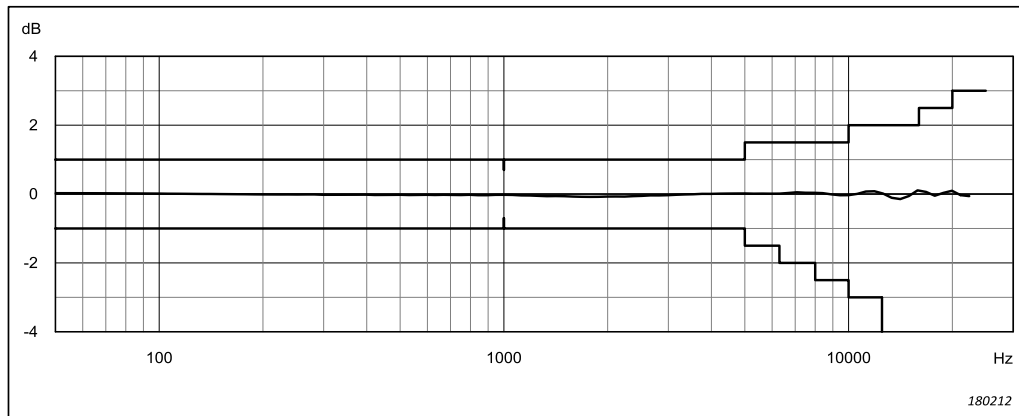
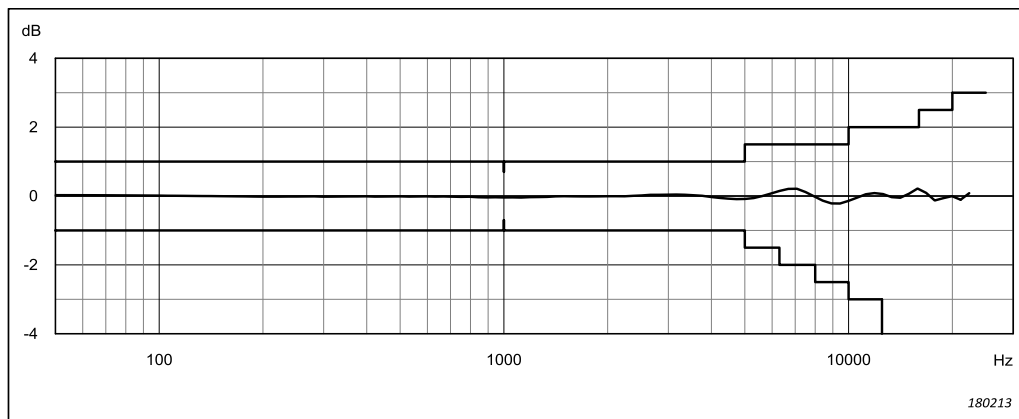


Fig. 4.6 Diffuse-field frequency response for the sound level meter with Windscreen UA-1650. Corresponds to the “Acoustical Response” column in Table A. 5.



4.6.6 Free-field Frequency Responses for Diffuse-field Calibrated Instruments

According to IEC 60651 and IEC 60804, the free-field frequency responses in the reference direction for diffuse-field calibrated instruments must be specified. These responses are given in Table A. 6.

4.7 Directional Responses

This section gives directional responses for plane progressive sinusoidal sound waves normalised to the response in the reference direction. Influence of the windscreen UA-1650 is also given as tables in Appendix A. Only the resulting directional responses are given here as graphs.

The sensitivity variation graphs show the absolute maximum difference between the sensitivities at any two sound incidence angles within the specified interval of angles. For example, at each frequency the value for $\pm 30^\circ$ is the difference between the highest and the lowest sensitivity found in a circular cone with an opening angle of 60° , the top at the position of the microphone and with the reference direction of incidence as the axis. Because the angle interval defines a three-dimensional geometric shape there is only one set of graphs with sensitivity variations, also where the directional response is shown for two planes. The graphs show the maximum variation for the two measurement planes combined. The sensitivity variations are also given as tables in Appendix A.

Limit curves are drawn on the sensitivity variation graphs in the following sections. These curves represent the IEC 61672-1:2013 standard's acceptance limits.

IEC 61672-1:2013 defines relative directional response in clause 3.17.

The relative directional response for a reference angle can be derived from the specified directional response by normalization with the values (in decibels) in the reference direction; that is, for each frequency the value at the reference direction is subtracted from the values at all angles so that the resulting value in the reference direction is 0 dB.

IEC 61672-1:2013 requires information on the directivity index.

The directivity index definition in the standard is not very precise; therefore, we have chosen to use the definition in IEC 61183:1994 chapter 4 so that the directivity index in decibels equals the difference between the free-field response in the reference direction and the diffuse-field response without the sound level meter electrical responses.

The directivity index for a specific microphone configuration can therefore be found by subtracting the Acoustical Response column minus the Electrical Response column in the relevant diffuse-field table (Table A. 4 to Table A. 5), from the Acoustical Response column minus the Electrical Response column in the relevant free-field table (Table A. 2 to Table A. 3).

Fig. 4.7 Directional response for the sound level meter, measured in a plane parallel to the display and along the microphone axis. Corresponds to Table A.7 to Table A.9

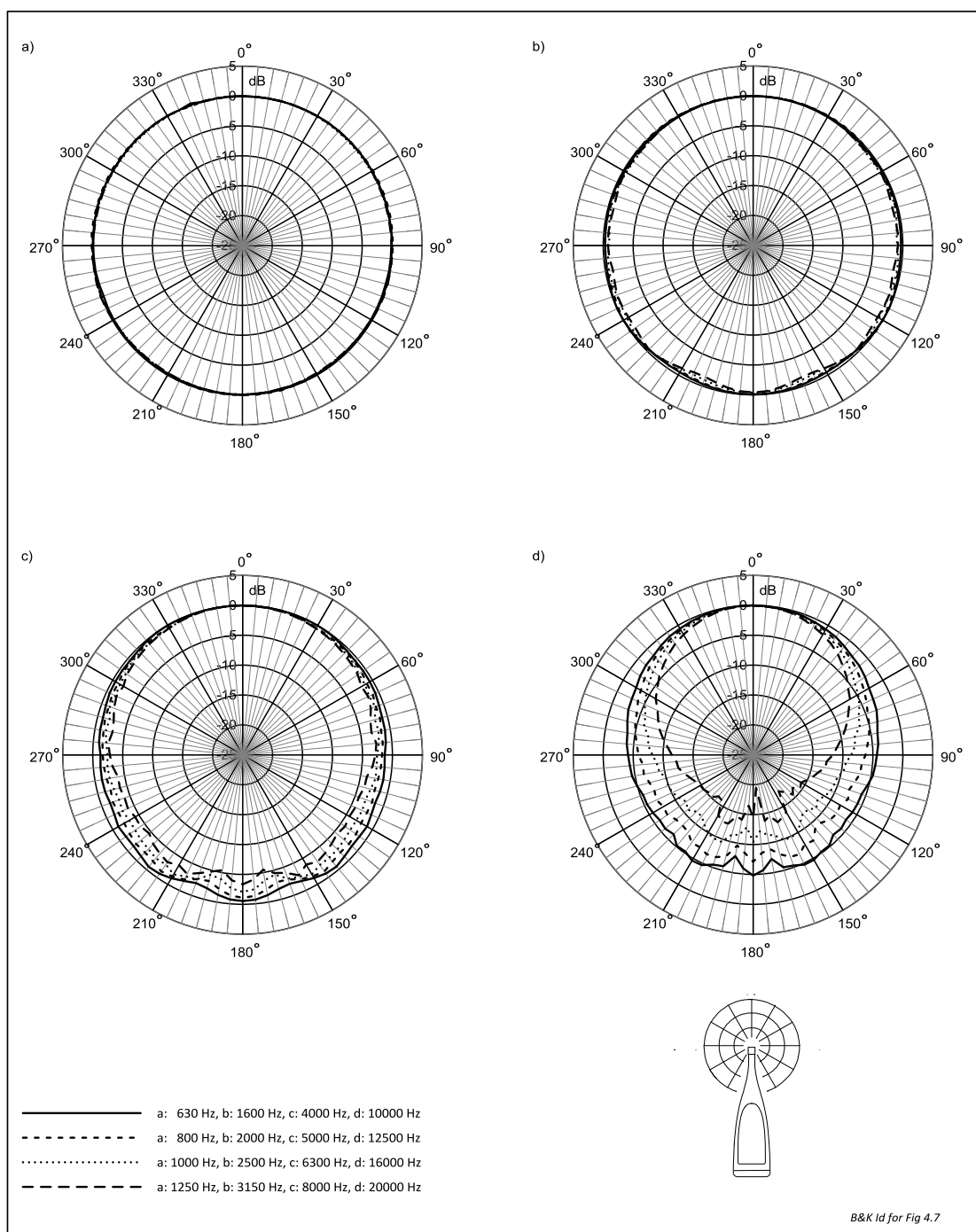


Fig. 4.8 Directional response for the sound level meter, measured in a plane perpendicular to the display and along the microphone axis. Corresponds to Table A.10 to Table A.12

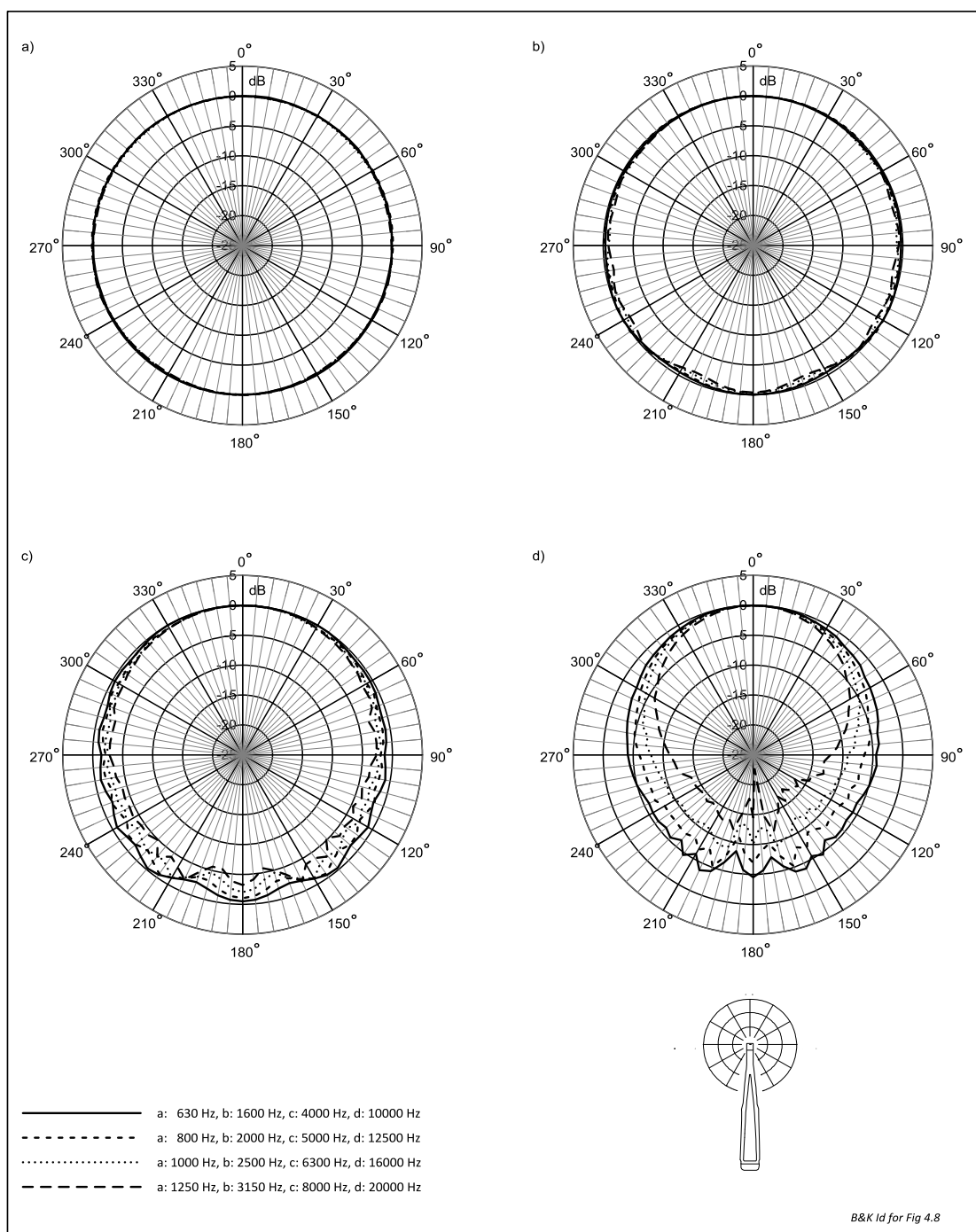


Fig. 4.9 Sensitivity variations of the sound level meter, at sound incidence angles within $\pm\theta^\circ$ from the reference direction. Corresponds to Table A.13

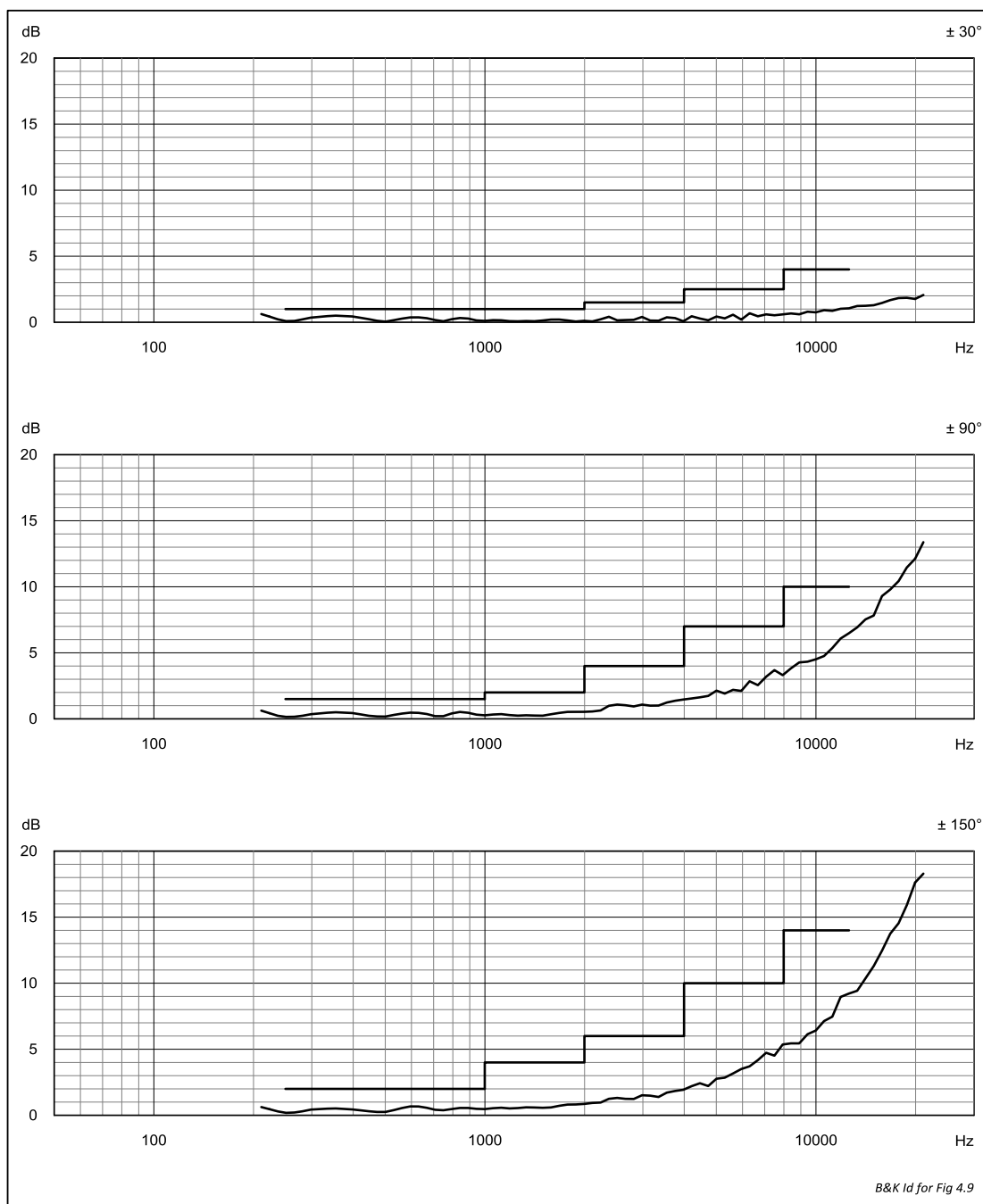


Fig. 4.10 Directional response for the sound level meter with Windscreen UA-1650, measured in a plane parallel to the display and along the microphone axis. Corresponds to Table A.17 to Table A.19

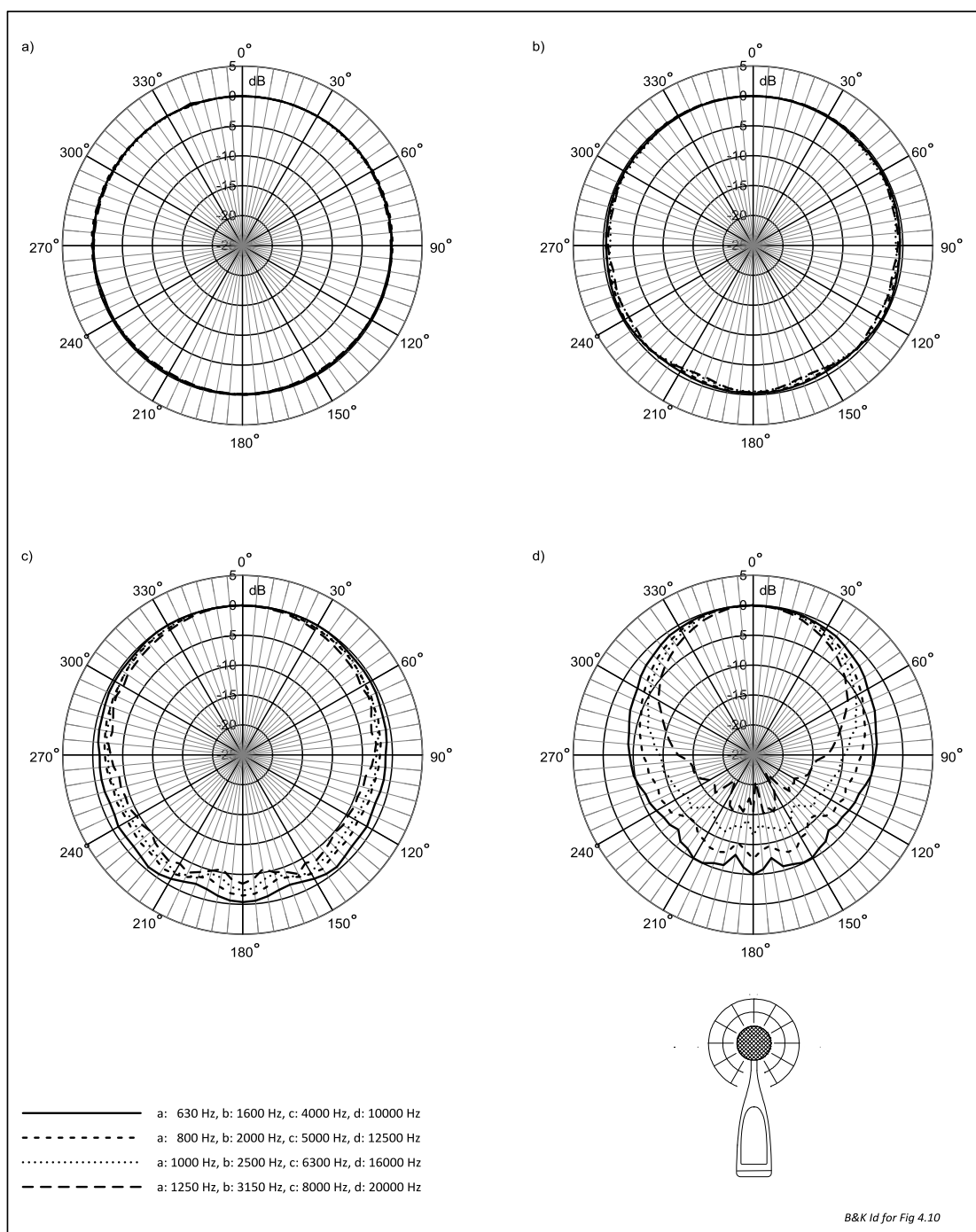


Fig. 4.11 Directional response for the sound level meter with Windscreen UA-1650, measured in a plane perpendicular to the display and along the microphone axis. Corresponds to Table A.20 to Table A.22

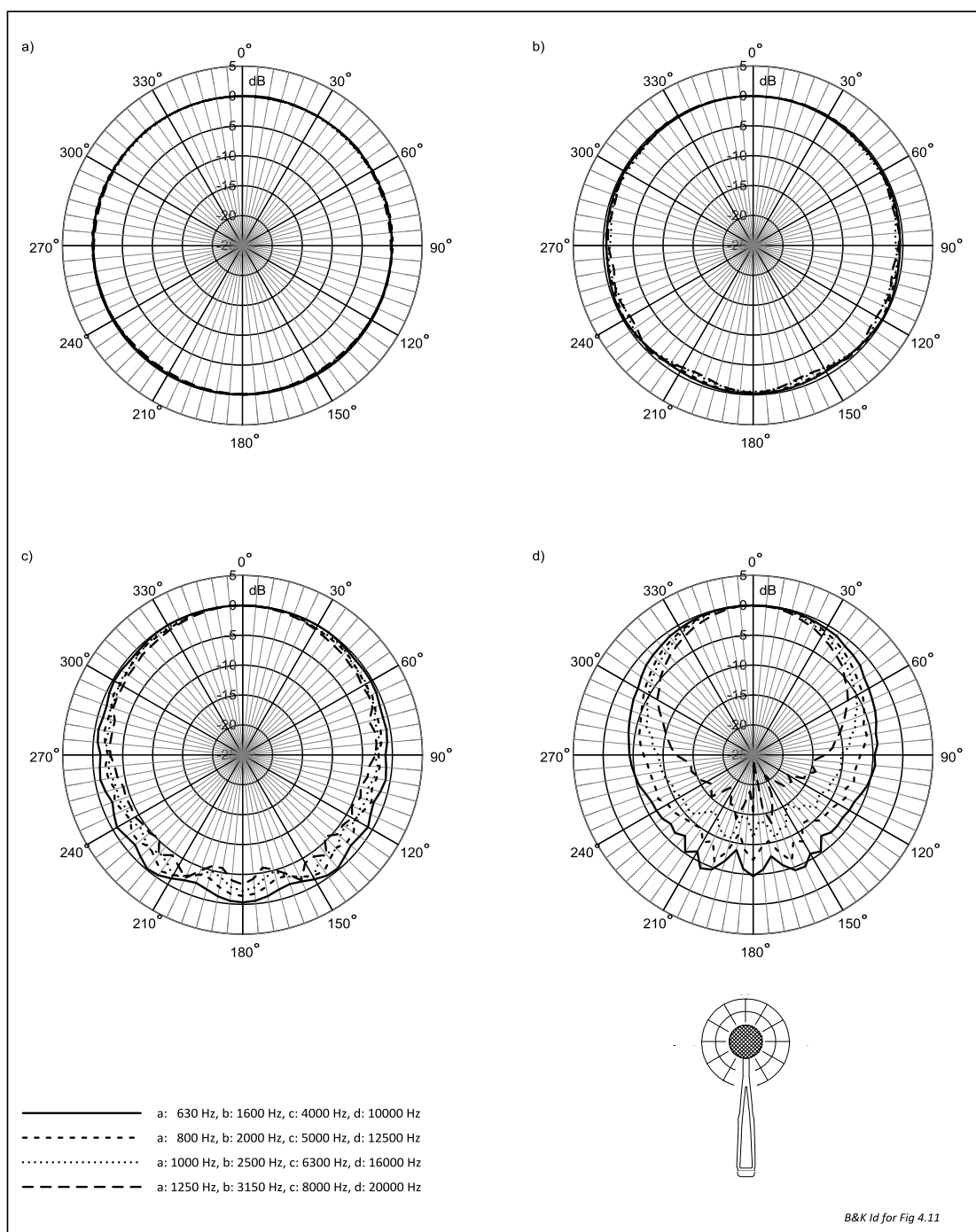
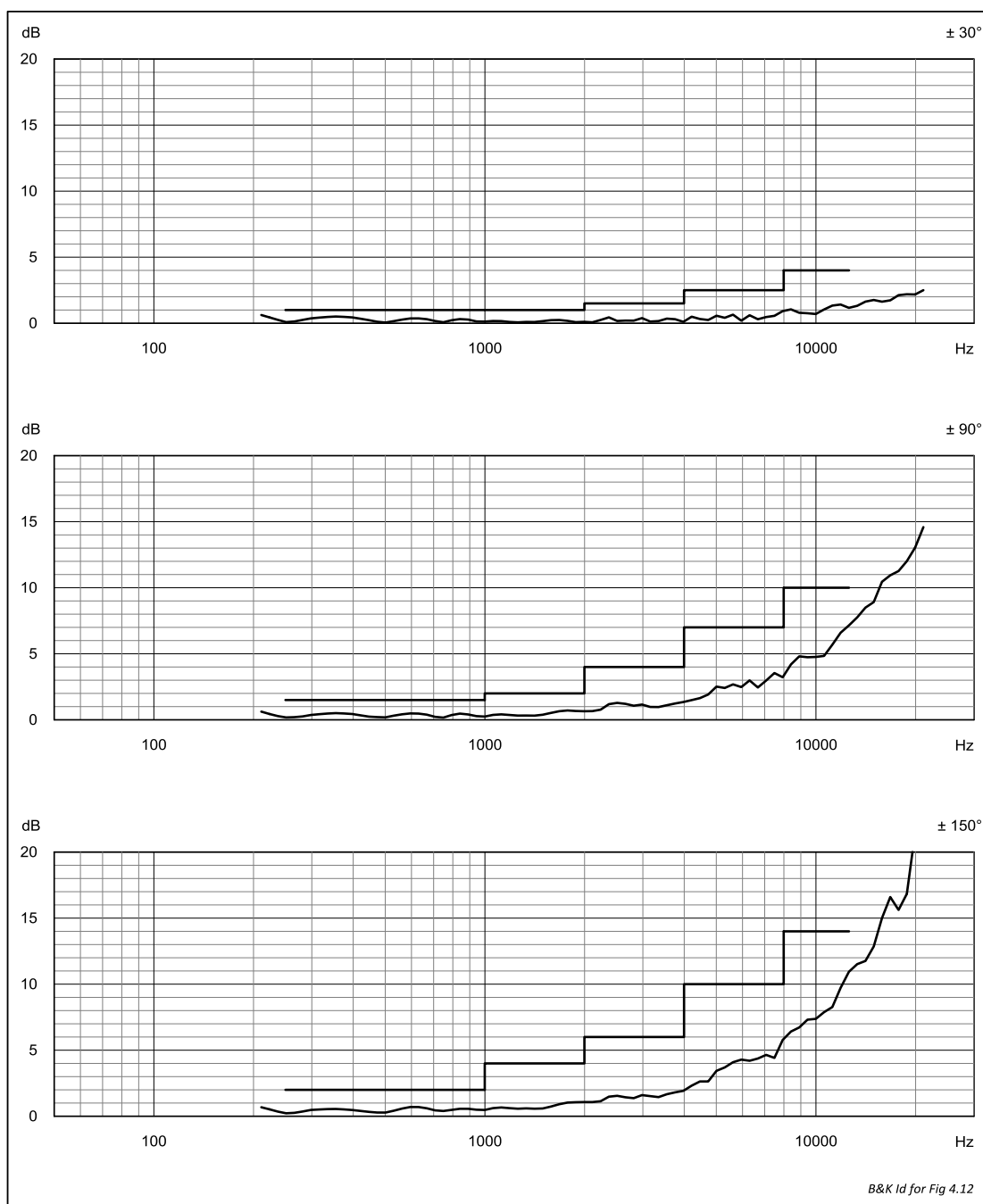


Fig. 4.12 Sensitivity variations of the sound level meter with Windscreen UA-1650, at sound incidence angles within $\pm\theta$ ° from the reference direction. Corresponds to Table A.23



4.8 Self-generated Noise

Self-generated noise is given for nominal microphone Open Circuit Sensitivity, with **Measurement settings > Input > Sound Field** set to *Free-field* and no microphone accessories selected.

4.8.1 Maximum Broadband Self-generated Noise

Table 4.1 Maximum broadband self-generated noise

Maximum Noise	Frequency Weighting			
	A-weighting (dB)	B-weighting (dB)	C-weighting (dB)	Z-weighting (dB)
Microphone	16.0	14.8	14.8	16.8
Electrical	11.5	11.2	13.7	20.4
Total	17.3	16.4	17.3	21.9

4.8.2 Typical Broadband Self-generated Noise

Table 4.2 Typical broadband self-generated noise

Typical Noise	Frequency Weighting			
	A-weighting (dB)	B-weighting (dB)	C-weighting (dB)	Z-weighting (dB)
Microphone	14.9	13.7	13.8	15.5
Electrical	9.8	9.5	12.2	18.8
Total	16.1	15.1	16.1	20.5

4.8.3 Typical Self-generated Noise Spectra

Typical spectra for self-generated noise are shown in Fig. 4.13 to Fig. 4.14.

Fig. 4.13 Typical self-generated noise, 1/1-octave band

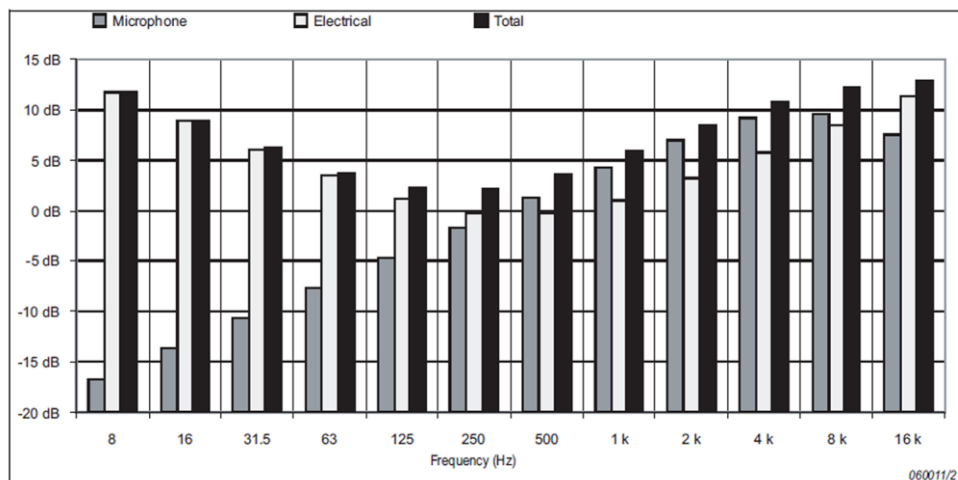
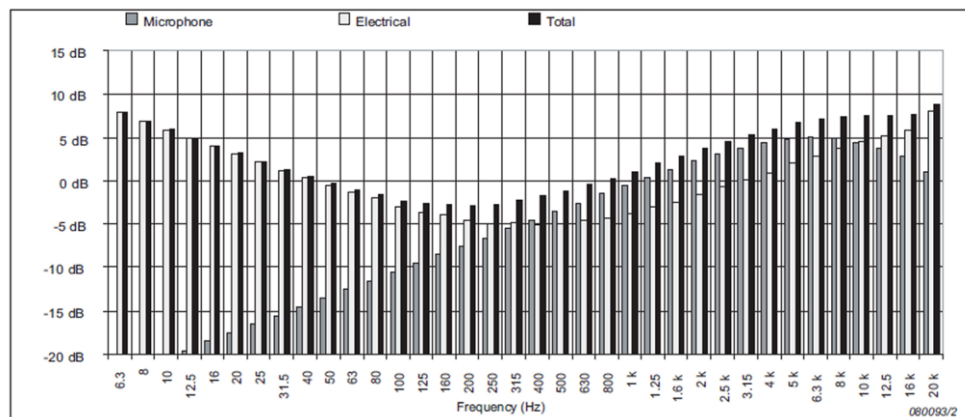


Fig. 4.14 Typical self-generated noise, 1/3 octave band

4.9 Measuring Ranges

The Upper Limit in the following sections is based on the guaranteed worst-case limit for the sound level meter and the nominal Open Circuit Sensitivity of the microphone. The Overload Limit can, due to tolerances in the sound level meter, be up to **1.5 dB higher** than the worst-case limit, but tolerances specified in the international standards are maintained as long as no Overload is indicated.

The Lower Limit in the following sections is based on the guaranteed worst-case limit for the sound level meter, the nominal open circuit sensitivity of the microphone, under Reference Environmental Conditions, **Measurement settings > Input > Sound Field** set to *Free-field* and no microphone accessories selected.

4.9.1 Maximum Sound Level

The maximum Sound Level that the sound level meter can accommodate without causing damage to the sound level meter: 158 dB Peak.

4.9.2 Total Range

Total Range is defined as the difference between the Upper Limit on the least sensitive level range, and the lowest sound pressure level measurable on the most sensitive level range, which can be measured at 1 kHz within the most conservative tolerance limits, specified in the international standards IEC 61672–1, IEC 60651 and IEC 60804:

Table 4.3 Total Range

Frequency Weighting			
A-weighting (dB)	B-weighting (dB)	C-weighting (dB)	Z-weighting (dB)
140.9 - 22.7	140.9 - 22.4	140.9 - 24.9	140.9 - 31.6

Please note: For Sound Exposure Levels, the stated ranges are valid if $10 \cdot \lg(\Delta t)$ is added to the limits. Δt being the averaging time interval, indicated as *Elapsed Time*, expressed in seconds.

4.9.3 Primary Indicator Range

Primary Indicator Range according to the International Standard IEC 60651:

Table 4.4 *Primary Indicator Range*

Upper Limit (dB)	Lower Limit			
	A-weighting (dB)	B-weighting (dB)	C-weighting (dB)	Z-weighting (dB)
123.6	21.4	21.1	23.6	30.3

4.9.4 Indicator Range

Indicator Range according to the international standard IEC 60804:

Table 4.5 *Indicator Range*

Upper Limit (dB)	Lower Limit			
	A-weighting (dB)	B-weighting (dB)	C-weighting (dB)	Z-weighting (dB)
140.6	21.4	21.1	23.6	30.3

Please note: For Sound Exposure Levels, the stated ranges are valid if $10 \cdot \lg(\Delta t)$ is added to the limits. Δt being the averaging time interval, indicated as *Elapsed Time*, expressed in seconds.

4.9.5 Linearity Range

Linearity Range according to the international standard IEC 60804 is the difference between the Upper and Lower Limit in the following table:

Table 4.6 *Linearity Range*

Upper Limit (dB)	Lower Limit			
	A-weighting (dB)	B-weighting (dB)	C-weighting (dB)	Z-weighting (dB)
142.1	19.3	19.0	21.5	28.2

Please note: For Sound Exposure Levels, the stated ranges are valid if $10 \cdot \lg(\Delta t)$ is added to the limits. Δt being the averaging time interval, indicated as *Elapsed Time*, expressed in seconds.

4.9.6 Pulse Range

Pulse Range according to the international standard IEC 60804 is the difference between the Upper and Lower Limit in the following table:

Table 4.7 *Pulse Range*

Upper Limit (dB)	Lower Limit			
	A-weighting (dB)	B-weighting (dB)	C-weighting (dB)	Z-weighting (dB)
145.1	19.3	19.0	21.5	28.2

Please note: For Sound Exposure Levels, the stated ranges are valid if $10 \cdot \lg(\Delta t)$ is added to the limits. Δt being the averaging time interval, indicated as *Elapsed Time*, expressed in seconds.

4.9.7 Linear Operating Range

The starting point for all the Linear Operating Range tests is 94.0 dB.

Linear Operating Range according to the International Standard IEC 61672–1:

Table 4.8 *Linear Operating Range*

Frequency Weighting	Upper Limit					Lower Limit
	31.5 Hz (dB)	1 kHz (dB)	4 kHz (dB)	8 kHz (dB)	12.5 kHz (dB)	All (dB)
A-weighting	101.8	140.9	142.1	140.0	136.0	22.7
B-weighting	124.2	140.9	140.4	138.2	134.2	22.4
C-weighting	138.3	140.9	140.3	138.1	134.1	24.9
Z-weighting	141.3	140.9	141.1	141.1	140.4	31.6

Please note: For Sound Exposure Levels, the stated ranges are valid if $10 \cdot \lg(\Delta t)$ is added to the limits. Δt being the averaging time interval, indicated as *Elapsed Time*, expressed in seconds.

4.9.8 Peak C Range

Peak C Range according to the international standard IEC 61672– 1 is:

Table 4.9 *Peak C Range*

Upper Limit					Lower Limit
31.5 Hz (dB)	1 kHz (dB)	4 kHz (dB)	8 kHz (dB)	12.5 kHz (dB)	All (dB)
141.3	143.9	143.3	141.1	137.1	41.7

4.10 Detectors

Display-update Rates: L_{xy} , broadband bars and spectra every 0.2 s; all other spectra and numbers every 1 s.

4.10.1 Exponential Averaging

Exponential Averaging Times: Fast (250 ms), Slow (2000 ms), Impulse (70 ms + 1500 ms hold time, constant)

Response to tone bursts for exponential averaging detectors according to IEC 60651 and DIN 45657:

Table 4.10 Response to tone bursts for exponential averaging detectors

Time Weighting	Duration of test tone burst (ms)	Maximum response to test tone burst referred to response to continuous signal (dB)	Standards tolerances on maximum response (dB)	Analyzer tolerances on maximum response (dB)
	Continuous	0.00		
Fast	200	-0.98	±1	±0.1
	100	-2.59	±2	±0.1
	50	-4.82	±2	±0.1
	20	-8.30	±2	±0.1
	10	-11.14	±2	±0.1
	5	-14.07	±2	±0.1
	2	-17.99	±2	±0.1
	1	-20.99	±2	±0.1
	0.50	-23.99	±2	±0.1
	0.25	-26.99	±2	±0.1
Slow	2000	-0.63	-	±0.1
	500	-4.05	±1	±0.1
	200	-7.42	-	±0.1
	50	-13.12	-	±0.1
Impulse	20	-3.61	±1.5	±0.2
	5	-8.76	±2	±0.2
	2	-12.55	±2	±0.2

Please note: The maximum response to test tone burst referred to response to continuous signal is calculated from the formula in IEC 60651, appendix C.

4.10.2 Linear Averaging

Linear Averaging Times: 1 second to 24 hours, in steps of 1 second

Settling Time According to IEC 60804: <2 seconds

Nominal Delay Time between operation of the reset facility and re-initiation of a measurement according to IEC 61672-1: <3 seconds

Time Interval after completion of a measurement before a reading is displayed according to IEC 61672-1: <1 second

Minimum Hold Time according to IEC 60804: Results of a Timed Measurement are held until a new measurement is initiated or the result is reset.

4.10.3 Peak

Peak Onset Time according to IEC 60651: <100 μ s

4.11 Spectrum Analysis

Analytical Filter Design: Optimised Z-transformation of analogue Butterworth filters

Base: 10

Sampling Rate: Octave-based down-sampling from 65.536 kHz

Reference Attenuation: 0 dB, relative to the broadband equivalent continuous Z-weighted sound level L_{Zeq} for a 1 kHz sinusoidal input

4.11.1 1/1- octave Band Centre Frequencies

Nominal: 16 Hz, 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, 16 kHz

Exact (5 digits): 15.849 Hz, 31.623 Hz, 63.096 Hz, 125.89 Hz, 251.19 Hz, 501.19 Hz, 1 kHz, 1.9953 kHz, 3.9811 kHz, 7.9433 kHz, 15.849 kHz

Real-time Frequency Range (Time-invariant Range): 16 Hz to 16 kHz centre frequencies.

Fig. 4.15 The shapes of the 1/1-octave band filters (from 0 to -80 dB). The innermost and outermost curves show IEC 61260 limits

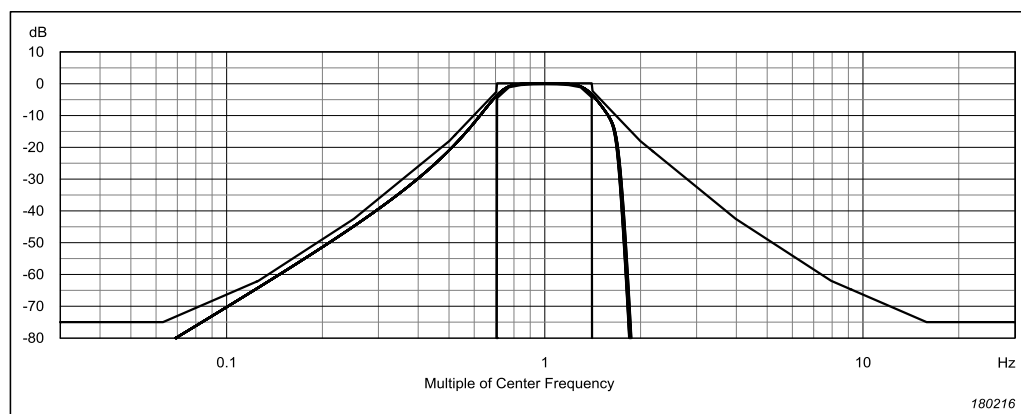
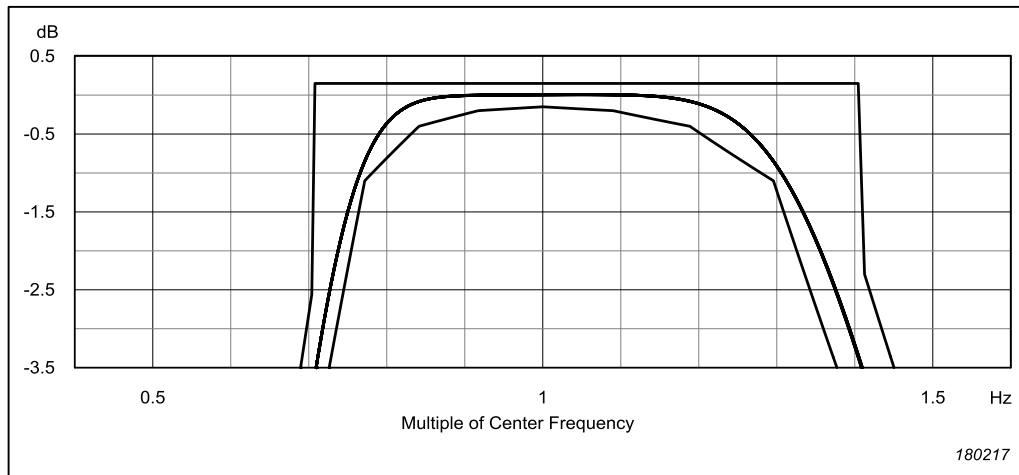


Fig. 4.16 The shapes of the 1/1-octave band filters (from 0 to –3.5 dB). The innermost and outermost curves show IEC 61260 limits



4.11.2 1/3-octave Band Centre Frequencies

Nominal: 12.5 Hz, 16 Hz, 20 Hz, 25 Hz, 31.5 Hz, 40 Hz, 50 Hz, 63 Hz, 80 Hz, 100 Hz, 125 Hz, 160 Hz, 200 Hz, 250 Hz, 315 Hz, 400 Hz, 500 Hz, 630 Hz, 800 Hz, 1 kHz, 1.25 kHz, 1.6 kHz, 2 kHz, 2.5 kHz, 3.15 kHz, 4 kHz, 5 kHz, 6.3 kHz, 8 kHz, 10 kHz, 12.5 kHz, 16 kHz, 20 kHz

Exact (5 digits): 6.3096 Hz, 7.9433 Hz, 10 Hz, 12.589 Hz, 15.849 Hz, 19.953 Hz, 25.119 Hz, 31.623 Hz, 39.811 Hz, 50.119 Hz, 63.096 Hz, 79.433 Hz, 100 Hz, 125.89 Hz, 158.49 Hz, 199.53 Hz, 251.19 Hz, 316.23 Hz, 398.11 Hz, 501.19 Hz, 630.96 Hz, 794.33 Hz, 1 kHz, 1.2589 kHz, 1.5849 kHz, 1.9953 kHz, 2.5119 kHz, 3.1623 kHz, 3.9811 kHz, 5.0119 kHz, 6.3096 kHz, 7.9433 kHz, 10 kHz, 12.589 kHz, 15.849 kHz, 19.953 kHz

Real-time Frequency Range (Time-invariant Range): 12.5 Hz to 20 kHz, centre frequencies.

Fig. 4.17 The shapes of the 1/3- octave band filters (from 0 to –80 dB). The innermost and outermost curves show IEC 61260 limits

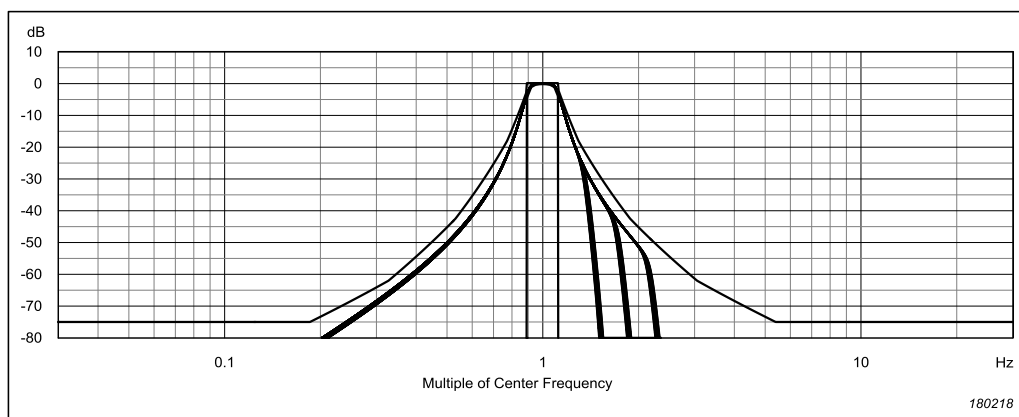
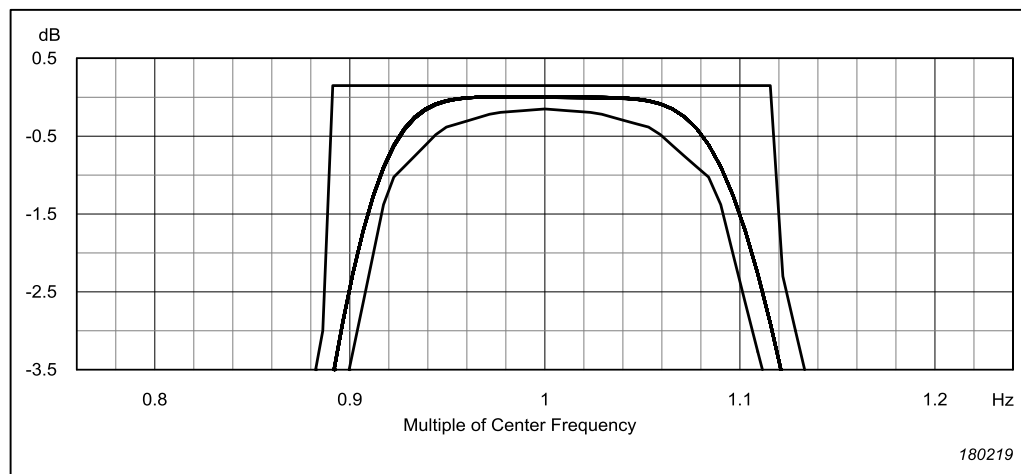


Fig. 4.18 The shapes of the 1/3- octave band filters (from 0 to -3.5 dB). The innermost and outermost curves show IEC 61260 limits



4.11.3 Linear Operating Range

Linear Operating Range according to the international standard IEC 61260, for electrical input, for all filters in the filter banks:

Table 4.11 *Linear Operating Range*

Upper Limit (dB)	Lower Limit 1/1-octave (dB)	Lower Limit 1/3-octave (dB)
141.2	21.2	22.1

Below the Lower Limit, the Level Linearity Error is less than or equal to the error found in Fig. 2.1 with L_{inh} set to the Lower Limit – 11.5 dB.

4.11.4 Measurement Range

Measurement Range according to the international standard IEC 61260 is the difference between the Upper Limit of the Linear Operating Range on the least sensitive level range and the Lower Limit of the Linear Operating Range on the most sensitive level range.

Table 4.12 *Measurement Range*

1/1-octave (dB)	1/3-octave (dB)
141.2 - 21.2	141.2 - 22.1

4.11.5 Octave Band Time Constants

At low centre frequencies, the B*T product for time weightings becomes too small to give statistically reliable measurements. To overcome this, the Fast time constant (125 ms) and the Slow time constant (1000 ms) are replaced by progressively longer time constants with decreasing centre frequencies (and corresponding bandwidths). See Table 4.13 and Table 4.14.

Table 4.13 *Octave band Fast Time Constants*

1/1-octave Centre Frequency (Hz)	1/3-octave Centre Frequency (Hz)	Time Constant (ms)	Averaging Time (ms)
≥63	≥100	125 (Fast)	250 (Fast)
31.5	80, 63, 50	250	500
16	40, 31.5, 25	500	1000
-	20, 16, 12.5	1000	2000

Table 4.14 *Octave band Slow Time Constants*

1/1-octave Centre Frequency (Hz)	1/3-octave Centre Frequency (Hz)	Time Constant (ms)	Averaging Time (ms)
≥16	≥12.5	1000 (Slow)	2000 (Slow)

For a white Gaussian signal and for 1/1-octave centre frequencies from 16 Hz to 63 Hz, these time constants give a maximum relative standard deviation of approximately 1.5 dB. For 1/3-octave centre frequencies from 12.5 Hz to 160 Hz, these time constants give a maximum relative standard deviation of approximately 2 dB.

4.12 Influence from the Operating Environment

The temperature and humidity specifications are given provided that no condensation inside the sound level meter results from the combination.

Excessive condensation may cause permanent damage to the instrumentation.

4.12.1 Environmental Stabilisation Time

Typical stabilisation time after change in environmental conditions is 10 minutes.

When the sound level meter is moved from a warm environment with high humidity, to a colder environment, care should be taken not to produce condensation inside the sound level meter. If condensation is produced, much longer stabilisation periods may be necessary.

4.12.2 Temperature

Operating Temperature Range: -10 to +50 °C (+14 to +122 °F)

Storage temperature range: -25 to +70 °C (-13 to +158 °F)

4.12.3 Humidity

Operating Humidity Range: 0% < RH < 90%, provided that there is no condensation

4.12.4 Vibration

Vibration Sensitivity (20 – 1000 Hz) for 1 ms⁻²: A-weighted max. 73 dB, Z-weighted max. 83 dB

4.12.5 Immunity to Power Magnetic Fields

Maximum sensitivity to power line (50/60 Hz) magnetic field strength of 80 A/m: is specified as the rise in the self-generated noise coming from the magnetic field. The self-generated noise is stated in section 4.8.

Table 4.15 *Rise in the self-generated noise coming from the magnetic field*

Most Sensitive Direction	Rise in Self-generated Noise				1/3-octave 50 Hz Band (dB)
	A-weighted (dB)	B-weighted (dB)	C-weighted (dB)	Z-weighted (dB)	
Magnetic field perpendicular to the display surface	Not detectable	<4	<11	<7	<25

4.12.6 Immunity to Power and Radio-frequency Fields

Fig. 4.19 *The most sensitive direction*



4.13 Wireless interface to the Sound Level Meter

It is not possible to change or corrupt the measured values in any way through these interfaces.

4.13.1 Bluetooth

Bluetooth is only used for pairing devices (transferring IP address) for Wi-Fi.

Standard: ????

Frequencies: ????

Power: ????

4.13.2 Wi-Fi

Wi-Fi can be used for monitoring a measurement, setting up a measurement, controlling a measurement, and transferring data from the sound level meter to another device.

Standard: ????

Frequencies: ????

Power: ????

4.14 Electrical interface to the Sound Level Meter

Instrument is equipped with a USB-C interface. With available accessory listed in Fig. 1.1 this can be used as a digital interface for transferring data to and from the sound level meter, as a DC input for charging and powering the instrument, as well as an analog output for earphones or other equipment.

4.14.1 Output for Headphone and test

3.5 mm Minijack cable AO-0846 from USB-C:

In System settings > Voltage output set Source to the required signal (Input A-, B-, C- or Z-weighted). The possible weightings will be the two weightings selected in

Information on the signal source, frequency weighting and gain**Maximum Peak Output Voltage:** $\pm 4.46 \text{ V}$ **Maximum Sinusoidal Output Voltage:** $3.16 \text{ V}_{\text{RMS}}$ **Output Impedance:** 50Ω **Load Impedance:** $>15 \text{ k}\Omega \div < 1 \text{ nF}$ for $<0.2 \text{ dB}$ attenuation from DC to 20 kHz, short-circuit proof without affecting the measurement results**Max DC Offset:** $\pm 15 \text{ mV}$ **4.14.2 Digital Interfaces**

The digital interfaces can be used for monitoring a measurement, setting up a measurement, controlling a measurement, data storage, and transferring data from the sound level meter to another device. However, it is not possible to change or corrupt the measured values in any way through these interfaces.

USB: ????**Ethernet:** ????**4.14.3 Charge /power Interface**

The instrument may be charged with USB-charger fitted with or combined with USB-C cable. Instrument support Fast Charging with up to 3 A charge current.

Instrument will start up in operation mode when powered from charger. If turned off, charge current will be limited to max 0.5 A. independent of charger.

4.15 Power Supply**4.15.1 External AC Main Supply Adapter****Part No.:** Mains Power Supply ZG-0484**Supply Voltage:** 100 – 120/200 – 240 V AC; 47 – 63 Hz**Max output current/voltage:** 1.5 A / 5 V**Connector:** USB-C**4.15.2 Battery**

Build in rechargeable Li-Ion battery

Voltage: 3.7 V**Capacity:** 5200 mAh nominal**Typical Operating Time:** >18 hours. However, if the instrument is used in low temperatures or there is extensive use of the display backlight, this may reduce the time**Battery Cycle Life:** >500 complete charge/discharge cycles**Battery Indicator:** Remaining battery capacity and expected working time may be read out in % and in time**Battery Fuel Gauge:** The battery is equipped with a built-in fuel gauge, which continuously measures and stores the actual battery capacity in the battery unit

Charge Time: In instrument, typically 10 hours from empty at ambient temperatures below 30 °C. To protect the battery, charging will be terminated completely at ambient temperatures above 40 °C. At 30 to 40 °C charging time will be prolonged. With external charger ZG-0444 (optional accessory), typically 5 hours.

Please note: It is not recommended to charge the battery at temperatures below 0 °C (32 °F) or over 50 °C (122 °F). Doing this will reduce battery lifetime.

4.16 Warm-up Time

Warm-up Time: < 30 s after reaching equilibrium with the ambient environment and switching on power.

4.17 Real-time Clock

Back-up Powered Clock Drift: <0.45 seconds over a 24-hour period

4.18 CE-mark and C-Tick mark Compliance

The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EU directives RCM mark indicates compliance with applicable ACMA technical standards – that is, for telecommunications, radio communications, EMC and EME

China RoHS mark indicates compliance with administrative measures on the control of pollution caused by electronic information products according to the Ministry of Information Industries of the People's Republic of China

WEEE mark indicates compliance with the EU WEEE Directive

Safety

EN/IEC 61010– 1, ANSI/UL 61010–1 and CSA C22.2 No.1010.1: Safety requirements for electrical equipment for measurement, control and laboratory use

EMC Emission

EN/IEC 61000–6–3: Generic emission standard for residential, commercial and light industrial environments EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits

IEC 61672–1, IEC 61260, IEC 60651 and IEC 60804: Instrumentation standards

Note: The above is only guaranteed using accessories listed in this document

EMC Immunity

EN/IEC 61000–6–2: Generic standard – Immunity for industrial environments

EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements IEC 61672–1, IEC 61260, IEC 60651 and IEC 60804: Instrumentation standards

Note: The above is only guaranteed using accessories listed in this document

Temperature

IEC 60068–2–1 & IEC 60068–2–2: Environmental Testing. Cold and Dry Heat.

Operating Temperature: –10 to +50 °C (14 to 122 °F)

Storage Temperature: –25 to +70 °C (–13 to 158 °F)

Humidity

IEC 60068–2–78: Damp Heat: 93% RH (non-condensing at +40 °C (104 °F)). Recovery time 2 ??4 hours

Mechanical**Non-operating:**

IEC 60068–2–6: Vibration: 0.3 mm, 20 m/s², 10 – 500 Hz

IEC 60068–2–27: Bump: 1000 bumps at 400 m/s²

IEC 60068–2–27: Shock: 1000 m/s², 6 directions

Enclosure

IEC 60529 (1989): Protection provided by enclosures: IP44*

* With preamplifier, extension cable or protection plug connected to the top socket and the hinged cover protecting the bottom connectors

Chapter 5

Regulatory

5.1 Regulatory ID's summary

Model	US/FCC	Canada/IC
-2245---	2ASFB-2245-1	24805-2245-1

5.2 Certified Antennas – *do we need this?*

Model	Type	Connector	Peak gain (2.4-2.5 GHz)
Laird/NanoBlade-??	??	??	2dBi

5.3 FCC and IC/ISED Regulatory

5.3.1 FCC (Federal Communication Commission Interference Statement)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference

to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Prohibition of Co-location This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

IMPORTANT NOTE: *Do we need to add the two FCC inquiries?*

5.3.2 IC (Industry Canada Statement)

This device contains license-exempt transmitter/receiver that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

--oversættes til fransk

5.4 EU Declarations of Conformity

This equipment has been tested and found to comply with the requirements of the Radio Equipment directive **2014/53/EU**.

Appendix A

Tables

Electrical Frequency Responses

Uncompensated electrical frequency responses for the different frequency weightings. Please see the instructions in section 3.2.2 on how to ensure an uncompensated electrical frequency response.

Table A.1 *Uncompensated electrical frequency responses*

Nominal Frequency (Hz)	Exact Frequency (6 digits) (Hz)	Electrical Response (dB)				Add to Acoustical Responses (dB)		
		A- weighting	B- weighting	C- weighting	Z- weighting	A- weighting	B- weighting	C- weighting
63	63.0957	-26.24	-9.39	-0.86	0.04	-26.21	-9.36	-0.83
80	79.4328	-22.55	-7.41	-0.55	0.04	-22.51	-7.37	-0.51
100	100.000	-19.19	-5.69	-0.34	0.04	-19.15	-5.65	-0.30
125	125.893	-16.15	-4.23	-0.21	0.04	-16.10	-4.19	-0.17
160	158.489	-13.40	-3.03	-0.13	0.04	-13.35	-2.99	-0.09
200	199.526	-10.92	-2.09	-0.08	0.04	-10.87	-2.05	-0.03
250	251.189	-8.68	-1.39	-0.04	0.04	-8.63	-1.35	0.00
315	316.228	-6.66	-0.89	-0.03	0.04	-6.62	-0.85	0.02
400	398.107	-4.85	-0.55	-0.02	0.04	-4.81	-0.51	0.02
500	501.187	-3.28	-0.32	-0.01	0.04	-3.24	-0.28	0.03
630	630.957	-1.95	-0.17	-0.02	0.03	-1.91	-0.14	0.02
800	794.328	-0.87	-0.09	-0.03	0.03	-0.84	-0.06	0.01
1000	1000.00	-0.04	-0.04	-0.04	0.03	-0.02	-0.02	-0.02
1060	1059.25	0.12	-0.04	-0.05	0.02	0.15	-0.01	-0.03
1120	1122.02	0.28	-0.04	-0.06	0.02	0.30	-0.01	-0.04
1180	1188.50	0.42	-0.04	-0.07	0.02	0.44	-0.01	-0.05
1250	1258.93	0.55	-0.04	-0.08	0.02	0.57	-0.02	-0.06
1320	1333.52	0.66	-0.04	-0.09	0.02	0.68	-0.02	-0.07
1400	1412.54	0.76	-0.05	-0.10	0.02	0.78	-0.03	-0.08
1500	1496.24	0.86	-0.05	-0.11	0.02	0.87	-0.04	-0.10
1600	1584.89	0.94	-0.07	-0.13	0.02	0.95	-0.05	-0.11
1700	1678.80	1.01	-0.08	-0.15	0.01	1.02	-0.06	-0.13
1800	1778.28	1.07	-0.09	-0.17	0.01	1.08	-0.08	-0.15
1900	1883.65	1.11	-0.11	-0.19	0.01	1.13	-0.10	-0.18
2000	1995.26	1.15	-0.13	-0.21	0.01	1.17	-0.12	-0.20
2120	2113.49	1.19	-0.16	-0.24	0.01	1.20	-0.15	-0.23
2240	2238.72	1.21	-0.19	-0.27	0.01	1.22	-0.18	-0.26
2360	2371.37	1.22	-0.22	-0.31	0.01	1.23	-0.21	-0.30
2500	2511.89	1.23	-0.25	-0.34	0.01	1.23	-0.25	-0.34
2650	2660.73	1.22	-0.30	-0.39	0.01	1.23	-0.29	-0.38
2800	2818.38	1.21	-0.34	-0.44	0.01	1.21	-0.33	-0.43

Nominal Frequency (Hz)	Exact Frequency (6 digits) (Hz)	Electrical				Add to Acoustical		
		A- weighting	B- weighting	C- weighting	Z- weighting	A- weighting	B- weighting	C- weighting
3000	2985.38	1.19	-0.39	-0.49	0.01	1.19	-0.39	-0.48
3150	3162.28	1.15	-0.45	-0.55	0.01	1.16	-0.45	-0.54
3350	3349.65	1.11	-0.52	-0.62	0.01	1.12	-0.51	-0.61
3550	3548.13	1.06	-0.59	-0.69	0.00	1.06	-0.59	-0.69
3750	3758.37	1.00	-0.67	-0.77	0.00	1.00	-0.67	-0.77
4000	3981.07	0.92	-0.76	-0.86	0.00	0.93	-0.76	-0.86
4250	4216.97	0.84	-0.86	-0.97	0.00	0.84	-0.86	-0.96
4500	4466.84	0.74	-0.98	-1.08	0.00	0.74	-0.97	-1.07
4750	4731.51	0.63	-1.10	-1.20	0.00	0.63	-1.10	-1.20
5000	5011.87	0.50	-1.24	-1.34	0.00	0.51	-1.23	-1.34
5300	5308.84	0.36	-1.39	-1.49	0.00	0.36	-1.39	-1.49
5600	5623.41	0.20	-1.55	-1.66	0.00	0.21	-1.55	-1.66
6000	5956.62	0.03	-1.74	-1.84	0.00	0.03	-1.74	-1.84
6300	6309.57	-0.17	-1.94	-2.04	0.00	-0.17	-1.94	-2.04
6700	6683.44	-0.38	-2.16	-2.27	0.00	-0.38	-2.16	-2.26
7100	7079.46	-0.62	-2.40	-2.51	0.00	-0.62	-2.40	-2.51
7500	7498.94	-0.88	-2.66	-2.77	0.00	-0.87	-2.66	-2.77
8000	7943.28	-1.16	-2.95	-3.06	0.00	-1.16	-2.95	-3.05
8500	8413.95	-1.46	-3.26	-3.37	0.00	-1.46	-3.26	-3.37
9000	8912.51	-1.79	-3.59	-3.70	0.00	-1.79	-3.59	-3.70
9500	9440.61	-2.15	-3.96	-4.06	0.00	-2.15	-3.95	-4.06
10000	10000.0	-2.54	-4.34	-4.45	0.00	-2.54	-4.34	-4.45
10600	10592.5	-2.95	-4.76	-4.87	0.00	-2.95	-4.76	-4.87
11200	11220.2	-3.39	-5.20	-5.31	0.00	-3.39	-5.20	-5.31
11800	11885.0	-3.86	-5.68	-5.78	0.00	-3.86	-5.68	-5.78
12500	12589.3	-4.36	-6.18	-6.29	0.00	-4.36	-6.18	-6.29
13200	13335.2	-4.89	-6.71	-6.82	0.00	-4.89	-6.71	-6.82
14000	14125.4	-5.45	-7.27	-7.38	0.00	-5.45	-7.27	-7.38
15000	14962.4	-6.04	-7.86	-7.97	0.00	-6.04	-7.86	-7.97
16000	15848.9	-6.65	-8.47	-8.58	0.00	-6.65	-8.47	-8.58
17000	16788.0	-7.30	-9.12	-9.23	0.00	-7.30	-9.12	-9.22
18000	17782.8	-7.96	-9.79	-9.89	0.00	-7.96	-9.79	-9.89
19000	18836.5	-8.65	-10.48	-10.59	0.00	-8.65	-10.48	-10.58
20000	19952.6	-9.37	-11.19	-11.30	0.00	-9.37	-11.19	-11.30
21200	21134.9	-10.09	-11.92	-12.03	0.00	-10.09	-11.92	-12.03
22400	22387.2	-10.83	-12.66	-12.76	0.00	-10.83	-12.66	-12.76

Free-field Frequency Responses

Frequency responses with Z frequency weighting. Measured with plane progressive sinusoidal sound waves incident from the reference direction and the sound level meter's **Sound field** set to *Free-field*, see section 4.6.

Table A. 2 *Free-field 0° frequency response for the sound level meter*

Nominal Frequency	Exact Frequency (6 digits)	Microphone Free-field Response	Expanded Uncertainty	Body Influence	Expanded Uncertainty	Electrical Response	Acoustical Response	Expanded Uncertainty
Hz	Hz	dB	dB	dB	dB	dB	dB	dB
63	63.0957	0.03	0.05	0.00	0.10	0.04	0.07	0.11
80	79.4328	0.03	0.05	0.00	0.10	0.04	0.07	0.11
100	100.000	0.02	0.05	0.00	0.10	0.04	0.06	0.11
125	125.893	0.02	0.05	0.00	0.10	0.04	0.06	0.11
160	158.489	0.01	0.05	0.01	0.10	0.04	0.06	0.11
200	199.526	0.00	0.05	0.02	0.10	0.04	0.06	0.11
250	251.189	0.00	0.05	0.03	0.10	0.04	0.07	0.11
315	316.228	0.00	0.05	0.07	0.10	0.04	0.11	0.11
400	398.107	0.00	0.06	0.11	0.10	0.04	0.15	0.11
500	501.187	0.00	0.06	0.13	0.10	0.04	0.17	0.12
630	630.957	-0.01	0.07	0.05	0.10	0.04	0.08	0.12
800	794.328	-0.01	0.08	-0.08	0.10	0.04	-0.05	0.13
1000	1000.00	-0.02	0.08	0.00	0.10	0.04	0.02	0.13
1060	1059.25	-0.02	0.08	0.00	0.10	0.04	0.02	0.13
1120	1122.02	-0.04	0.09	0.00	0.10	0.04	0.00	0.13
1180	1188.50	-0.04	0.09	0.00	0.10	0.04	0.00	0.13
1250	1258.93	-0.05	0.09	0.00	0.10	0.04	-0.01	0.13
1320	1333.52	-0.06	0.09	0.02	0.10	0.04	0.00	0.13
1400	1412.54	-0.06	0.09	0.03	0.10	0.05	0.02	0.13
1500	1496.24	-0.06	0.09	0.02	0.10	0.05	0.01	0.13
1600	1584.89	-0.07	0.10	0.00	0.10	0.05	-0.02	0.14
1700	1678.80	-0.08	0.10	0.02	0.10	0.05	-0.01	0.14
1800	1778.28	-0.09	0.10	0.03	0.10	0.06	0.00	0.14
1900	1883.65	-0.09	0.10	0.00	0.10	0.06	-0.03	0.14
2000	1995.26	-0.08	0.10	0.03	0.10	0.06	0.01	0.14
2120	2113.49	-0.09	0.11	-0.22	0.10	0.07	-0.24	0.15
2240	2238.72	-0.10	0.11	-0.01	0.15	0.07	-0.04	0.18
2360	2371.37	-0.09	0.11	0.19	0.15	0.08	0.18	0.18
2500	2511.89	-0.09	0.11	0.08	0.15	0.09	0.08	0.19
2650	2660.73	-0.09	0.11	-0.13	0.15	0.09	-0.13	0.19
2800	2818.38	-0.10	0.11	-0.05	0.15	0.10	-0.05	0.19
3000	2985.38	-0.10	0.12	0.16	0.15	0.11	0.17	0.19
3150	3162.28	-0.10	0.12	0.04	0.15	0.11	0.05	0.19
3350	3349.65	-0.10	0.12	-0.15	0.15	0.12	-0.13	0.19
3550	3548.13	-0.11	0.12	0.09	0.15	0.13	0.11	0.19

Nominal Frequency	Exact Frequency (6 digits)	Microphone Free-field Response	Expanded Uncertainty	Body Influence	Expanded Uncertainty	Electrical Response	Acoustical Response	Expanded Uncertainty
Hz	Hz	dB	dB	dB	dB	dB	dB	dB
3750	3758.37	-0.11	0.12	0.08	0.15	0.14	0.11	0.19
4000	3981.07	-0.12	0.13	-0.13	0.15	0.14	-0.11	0.20
4250	4216.97	-0.13	0.13	0.16	0.15	0.15	0.18	0.20
4500	4466.84	-0.13	0.13	-0.01	0.15	0.15	0.01	0.20
4750	4731.51	-0.14	0.14	-0.08	0.15	0.15	-0.07	0.20
5000	5011.87	-0.14	0.14	0.01	0.15	0.15	0.02	0.21
5300	5308.84	-0.15	0.15	-0.06	0.15	0.15	-0.06	0.21
5600	5623.41	-0.14	0.15	0.04	0.15	0.14	0.04	0.21
6000	5956.62	-0.14	0.16	-0.14	0.15	0.13	-0.15	0.22
6300	6309.57	-0.12	0.16	0.03	0.15	0.10	0.01	0.22
6700	6683.44	-0.07	0.16	-0.02	0.15	0.07	-0.02	0.22
7100	7079.46	-0.01	0.16	0.00	0.15	0.04	0.03	0.22
7500	7498.94	0.03	0.16	-0.01	0.20	-0.01	0.01	0.26
8000	7943.28	0.09	0.16	-0.04	0.20	-0.07	-0.02	0.26
8500	8413.95	0.15	0.17	-0.01	0.20	-0.15	-0.01	0.26
9000	8912.51	0.21	0.17	-0.04	0.20	-0.23	-0.06	0.26
9500	9440.61	0.28	0.21	-0.04	0.20	-0.33	-0.09	0.29
10000	10000.0	0.40	0.30	-0.04	0.20	-0.44	-0.08	0.36
10600	10592.5	0.55	0.31	0.01	0.20	-0.55	0.01	0.37
11200	11220.2	0.74	0.32	-0.03	0.20	-0.66	0.05	0.38
11800	11885.0	0.86	0.34	-0.01	0.20	-0.76	0.09	0.39
12500	12589.3	0.87	0.35	-0.05	0.20	-0.84	-0.02	0.40
13200	13335.2	0.79	0.37	0.01	0.20	-0.87	-0.07	0.42
14000	14125.4	0.73	0.39	0.01	0.20	-0.85	-0.11	0.43
15000	14962.4	0.72	0.40	-0.05	0.20	-0.76	-0.09	0.45
16000	15848.9	0.69	0.42	-0.09	0.20	-0.58	0.02	0.47
17000	16788.0	0.36	0.44	0.01	0.20	-0.30	0.07	0.48
18000	17782.8	-0.13	0.46	-0.03	0.20	0.06	-0.10	0.50
19000	18836.5	-0.50	0.48	0.22	0.20	0.50	0.22	0.52
20000	19952.6	-0.92	0.50	-0.01	0.20	0.99	0.06	0.53
21200	21134.9	-1.54	0.52	0.03	0.20	1.51	0.00	0.55
22400	22387.2	-2.04	0.54	-0.01	0.20	2.03	-0.02	0.57

Table A. 3 Free-field 0° frequency response for the sound level meter with Windscreen UA-1650

Nominal Frequency	Exact Frequency (6 digits)	Microphone Free-field Response	Expanded Uncertainty	Body Influence	Expanded Uncertainty	Influence of Windscre	Expanded Uncertainty	Electrical Response	Acoustical Response	Expanded Uncertainty
Hz	Hz	dB	dB	dB	dB	dB	dB	dB	dB	dB
63	63.0957	0.03	0.05	0.00	0.10	0.00	0.15	0.04	0.07	0.19
80	79.4328	0.03	0.05	0.00	0.10	0.00	0.15	0.04	0.07	0.19
100	100.000	0.02	0.05	0.00	0.10	0.00	0.15	0.04	0.06	0.19
125	125.893	0.02	0.05	0.00	0.10	0.00	0.15	0.04	0.06	0.19
160	158.489	0.01	0.05	0.01	0.10	0.00	0.15	0.03	0.05	0.19
200	199.526	0.00	0.05	0.02	0.10	0.00	0.15	0.03	0.05	0.19
250	251.189	0.00	0.05	0.03	0.10	0.01	0.15	0.02	0.06	0.19
315	316.228	0.00	0.05	0.07	0.10	0.03	0.15	0.00	0.10	0.19
400	398.107	0.00	0.06	0.11	0.10	0.05	0.15	-0.02	0.14	0.19
500	501.187	0.00	0.06	0.13	0.10	0.07	0.15	-0.06	0.14	0.19
630	630.957	-0.01	0.07	0.05	0.10	0.10	0.15	-0.11	0.03	0.19
800	794.328	-0.01	0.08	-0.08	0.10	0.14	0.15	-0.19	-0.14	0.20
1000	1000.00	-0.02	0.08	0.00	0.10	0.18	0.15	-0.30	-0.14	0.20
1060	1059.25	-0.02	0.08	0.00	0.10	0.21	0.15	-0.33	-0.14	0.20
1120	1122.02	-0.04	0.09	0.00	0.10	0.25	0.15	-0.36	-0.15	0.20
1180	1188.50	-0.04	0.09	0.00	0.10	0.28	0.15	-0.39	-0.15	0.20
1250	1258.93	-0.05	0.09	0.00	0.10	0.32	0.15	-0.42	-0.15	0.20
1320	1333.52	-0.06	0.09	0.02	0.10	0.37	0.15	-0.45	-0.12	0.20
1400	1412.54	-0.06	0.09	0.03	0.10	0.41	0.15	-0.48	-0.10	0.20
1500	1496.24	-0.06	0.09	0.02	0.10	0.45	0.15	-0.51	-0.10	0.20
1600	1584.89	-0.07	0.10	0.00	0.10	0.50	0.15	-0.54	-0.11	0.21
1700	1678.80	-0.08	0.10	0.02	0.10	0.55	0.15	-0.56	-0.07	0.21
1800	1778.28	-0.09	0.10	0.03	0.10	0.59	0.15	-0.58	-0.05	0.21
1900	1883.65	-0.09	0.10	0.00	0.10	0.63	0.15	-0.58	-0.04	0.21
2000	1995.26	-0.08	0.10	0.03	0.10	0.67	0.20	-0.59	0.03	0.24
2120	2113.49	-0.09	0.11	-0.22	0.10	0.70	0.20	-0.58	-0.19	0.25
2240	2238.72	-0.10	0.11	-0.01	0.15	0.71	0.20	-0.56	0.04	0.27
2360	2371.37	-0.09	0.11	0.19	0.15	0.72	0.20	-0.54	0.28	0.27
2500	2511.89	-0.09	0.11	0.08	0.15	0.72	0.20	-0.51	0.20	0.27
2650	2660.73	-0.09	0.11	-0.13	0.15	0.70	0.20	-0.46	0.02	0.27
2800	2818.38	-0.10	0.11	-0.05	0.15	0.68	0.20	-0.42	0.11	0.27
3000	2985.38	-0.10	0.12	0.16	0.15	0.63	0.20	-0.36	0.33	0.27
3150	3162.28	-0.10	0.12	0.04	0.15	0.55	0.20	-0.30	0.19	0.27
3350	3349.65	-0.10	0.12	-0.15	0.15	0.44	0.20	-0.24	-0.05	0.27
3550	3548.13	-0.11	0.12	0.09	0.15	0.30	0.20	-0.18	0.10	0.27

Nominal Frequency	Exact Frequency (6 digits)	Microphone Free-field Response	Expanded Uncertainty	Body Influence	Expanded Uncertainty	Influence of Windscre	Expanded Uncertainty	Electrical Response	Acoustical Response	Expanded Uncertainty
Hz	Hz	dB	dB	dB	dB	dB	dB	dB	dB	dB
3750	3758.37	-0.11	0.12	0.08	0.15	0.16	0.20	-0.12	0.01	0.27
4000	3981.07	-0.12	0.13	-0.13	0.15	0.05	0.20	-0.06	-0.26	0.28
4250	4216.97	-0.13	0.13	0.16	0.15	-0.05	0.20	0.00	-0.02	0.28
4500	4466.84	-0.13	0.13	-0.01	0.15	-0.13	0.20	0.04	-0.23	0.28
4750	4731.51	-0.14	0.14	-0.08	0.15	-0.18	0.20	0.09	-0.31	0.28
5000	5011.87	-0.14	0.14	0.01	0.15	-0.19	0.20	0.12	-0.20	0.28
5300	5308.84	-0.15	0.15	-0.06	0.15	-0.17	0.25	0.15	-0.23	0.33
5600	5623.41	-0.14	0.15	0.04	0.15	-0.16	0.25	0.17	-0.09	0.33
6000	5956.62	-0.14	0.16	-0.14	0.15	-0.13	0.25	0.17	-0.24	0.33
6300	6309.57	-0.12	0.16	0.03	0.15	-0.11	0.25	0.17	-0.03	0.33
6700	6683.44	-0.07	0.16	-0.02	0.15	-0.16	0.25	0.16	-0.09	0.34
7100	7079.46	-0.01	0.16	0.00	0.15	-0.28	0.25	0.14	-0.15	0.34
7500	7498.94	0.03	0.16	-0.01	0.20	-0.36	0.25	0.11	-0.23	0.36
8000	7943.28	0.09	0.16	-0.04	0.20	-0.41	0.25	0.08	-0.28	0.36
8500	8413.95	0.15	0.17	-0.01	0.20	-0.47	0.25	0.03	-0.30	0.36
9000	8912.51	0.21	0.17	-0.04	0.20	-0.45	0.25	-0.02	-0.30	0.36
9500	9440.61	0.28	0.21	-0.04	0.20	-0.47	0.25	-0.08	-0.31	0.39
10000	10000.0	0.40	0.30	-0.04	0.20	-0.52	0.25	-0.13	-0.29	0.44
10600	10592.5	0.55	0.31	0.01	0.20	-0.63	0.25	-0.19	-0.26	0.45
11200	11220.2	0.74	0.32	-0.03	0.20	-0.74	0.25	-0.23	-0.26	0.46
11800	11885.0	0.86	0.34	-0.01	0.20	-0.86	0.25	-0.26	-0.27	0.47
12500	12589.3	0.87	0.35	-0.05	0.20	-0.88	0.25	-0.26	-0.32	0.47
13200	13335.2	0.79	0.37	0.01	0.20	-0.99	0.25	-0.22	-0.41	0.48
14000	14125.4	0.73	0.39	0.01	0.20	-1.13	0.25	-0.12	-0.51	0.50
15000	14962.4	0.72	0.40	-0.05	0.20	-1.20	0.30	0.05	-0.48	0.54
16000	15848.9	0.69	0.42	-0.09	0.20	-1.33	0.30	0.30	-0.43	0.56
17000	16788.0	0.36	0.44	0.01	0.20	-1.50	0.30	0.64	-0.49	0.57
18000	17782.8	-0.13	0.46	-0.03	0.20	-1.61	0.30	1.09	-0.68	0.59
19000	18836.5	-0.50	0.48	0.22	0.20	-1.64	0.30	1.62	-0.30	0.59
20000	19952.6	-0.92	0.50	-0.01	0.20	-1.73	0.30	2.24	-0.42	0.61
21200	21134.9	-1.54	0.52	0.03	0.20	-1.81	0.30	2.91	-0.41	0.63
22400	22387.2	-2.04	0.54	-0.01	0.20	-1.79	0.30	3.61	-0.23	0.64

Diffuse-field Frequency Responses

Diffuse-field frequency responses with Z frequency weighting. Measured with sounds at random incidence and the sound level meter's **Sound field** set to *Diffuse-field*, see section 4.6.

Table A. 4 *Diffuse-field frequency response for the sound level meter*

Nominal Frequency	Exact Frequency (6 digits)	Microphone Diffuse-field Response	Electrical Response	Acoustical Response	Expanded Uncertainty
Hz	Hz	dB	dB	dB	dB
63	63.0957	0.03	0.04	0.07	0.07
80	79.4328	0.02	0.04	0.06	0.07
100	100.000	0.02	0.04	0.06	0.07
125	125.893	0.01	0.04	0.05	0.07
160	158.489	0.00	0.04	0.04	0.07
200	199.526	-0.01	0.05	0.04	0.07
250	251.189	-0.02	0.05	0.03	0.07
315	316.228	-0.03	0.05	0.02	0.07
400	398.107	-0.03	0.05	0.02	0.07
500	501.187	-0.04	0.06	0.02	0.08
630	630.957	-0.06	0.07	0.01	0.09
800	794.328	-0.07	0.09	0.02	0.10
1000	1000.00	-0.10	0.11	0.01	0.10
1060	1059.25	-0.12	0.12	0.00	0.11
1120	1122.02	-0.14	0.13	-0.01	0.11
1180	1188.50	-0.16	0.14	-0.02	0.11
1250	1258.93	-0.18	0.16	-0.02	0.11
1320	1333.52	-0.21	0.17	-0.04	0.11
1400	1412.54	-0.22	0.19	-0.03	0.11
1500	1496.24	-0.25	0.21	-0.04	0.11
1600	1584.89	-0.28	0.23	-0.05	0.12
1700	1678.80	-0.31	0.25	-0.06	0.12
1800	1778.28	-0.34	0.28	-0.06	0.12
1900	1883.65	-0.37	0.31	-0.06	0.12
2000	1995.26	-0.40	0.34	-0.06	0.12
2120	2113.49	-0.43	0.37	-0.06	0.12
2240	2238.72	-0.48	0.41	-0.07	0.13
2360	2371.37	-0.51	0.46	-0.05	0.13
2500	2511.89	-0.55	0.51	-0.04	0.13
2650	2660.73	-0.59	0.56	-0.03	0.13
2800	2818.38	-0.65	0.62	-0.03	0.13
3000	2985.38	-0.71	0.68	-0.03	0.13
3150	3162.28	-0.77	0.75	-0.02	0.13
3350	3349.65	-0.83	0.83	0.00	0.14
3550	3548.13	-0.91	0.91	0.00	0.14

Nominal Frequency	Exact Frequency (6 digits)	Microphone Diffuse-field Response	Electrical Response	Acoustical Response	Expanded Uncertainty
Hz	Hz	dB	dB	dB	dB
3750	3758.37	-0.99	1.00	0.01	0.14
4000	3981.07	-1.08	1.09	0.01	0.14
4250	4216.97	-1.18	1.19	0.01	0.15
4500	4466.84	-1.28	1.30	0.02	0.15
4750	4731.51	-1.39	1.41	0.02	0.15
5000	5011.87	-1.51	1.53	0.02	0.16
5300	5308.84	-1.64	1.65	0.01	0.17
5600	5623.41	-1.76	1.78	0.02	0.17
6000	5956.62	-1.90	1.91	0.01	0.17
6300	6309.57	-2.03	2.04	0.01	0.17
6700	6683.44	-2.15	2.18	0.03	0.18
7100	7079.46	-2.27	2.32	0.05	0.18
7500	7498.94	-2.41	2.45	0.04	0.18
8000	7943.28	-2.55	2.59	0.04	0.18
8500	8413.95	-2.69	2.72	0.03	0.19
9000	8912.51	-2.86	2.85	-0.01	0.19
9500	9440.61	-3.02	2.98	-0.04	0.23
10000	10000.0	-3.15	3.11	-0.04	0.32
10600	10592.5	-3.25	3.25	0.00	0.33
11200	11220.2	-3.33	3.40	0.07	0.35
11800	11885.0	-3.49	3.57	0.08	0.36
12500	12589.3	-3.76	3.78	0.02	0.38
13200	13335.2	-4.15	4.04	-0.11	0.40
14000	14125.4	-4.52	4.37	-0.15	0.42
15000	14962.4	-4.86	4.80	-0.06	0.44
16000	15848.9	-5.23	5.34	0.11	0.46
17000	16788.0	-5.93	5.99	0.06	0.49
18000	17782.8	-6.79	6.74	-0.05	0.51
19000	18836.5	-7.55	7.59	0.04	0.53
20000	19952.6	-8.39	8.49	0.10	0.56
21200	21134.9	-9.45	9.41	-0.04	0.59
22400	22387.2	-10.39	10.33	-0.06	0.61

Table A. 5 *Diffuse-field frequency response for the sound level meter with Windscreen UA-1650*

Nominal Frequency	Exact Frequency (6 digits)	Microphone Diffuse-field Response	Expanded Uncertainty	Influence of Windscr	Expanded Uncertainty	Electrical Response	Acoustical Response	Expanded Uncertainty
Hz	Hz	dB	dB	dB	dB	dB	dB	dB
63	63.0957	0.03	0.07	0.00	0.16	0.04	0.07	0.17
80	79.4328	0.02	0.07	0.00	0.16	0.04	0.06	0.17
100	100.000	0.02	0.07	0.00	0.16	0.04	0.06	0.17
125	125.893	0.01	0.07	0.00	0.16	0.04	0.05	0.17
160	158.489	0.00	0.07	0.00	0.16	0.04	0.04	0.17
200	199.526	-0.01	0.07	0.00	0.16	0.04	0.03	0.17
250	251.189	-0.02	0.07	0.01	0.16	0.04	0.03	0.17
315	316.228	-0.03	0.07	0.02	0.16	0.03	0.02	0.17
400	398.107	-0.03	0.07	0.04	0.16	0.02	0.03	0.17
500	501.187	-0.04	0.08	0.06	0.16	0.01	0.03	0.18
630	630.957	-0.06	0.09	0.08	0.16	0.00	0.02	0.18
800	794.328	-0.07	0.10	0.11	0.16	-0.02	0.02	0.19
1000	1000.00	-0.10	0.10	0.15	0.16	-0.05	0.00	0.19
1060	1059.25	-0.12	0.11	0.17	0.17	-0.06	-0.01	0.20
1120	1122.02	-0.14	0.11	0.20	0.17	-0.06	0.00	0.20
1180	1188.50	-0.16	0.11	0.24	0.17	-0.07	0.01	0.20
1250	1258.93	-0.18	0.11	0.28	0.17	-0.08	0.02	0.20
1320	1333.52	-0.21	0.11	0.32	0.18	-0.08	0.03	0.21
1400	1412.54	-0.22	0.11	0.36	0.18	-0.09	0.05	0.21
1500	1496.24	-0.25	0.11	0.40	0.18	-0.09	0.06	0.21
1600	1584.89	-0.28	0.12	0.44	0.19	-0.09	0.07	0.22
1700	1678.80	-0.31	0.12	0.48	0.21	-0.09	0.08	0.24
1800	1778.28	-0.34	0.12	0.52	0.21	-0.09	0.09	0.24
1900	1883.65	-0.37	0.12	0.55	0.21	-0.08	0.10	0.24
2000	1995.26	-0.40	0.12	0.58	0.25	-0.06	0.12	0.28
2120	2113.49	-0.43	0.12	0.62	0.25	-0.04	0.15	0.28
2240	2238.72	-0.48	0.13	0.64	0.25	-0.01	0.15	0.28
2360	2371.37	-0.51	0.13	0.67	0.25	0.02	0.18	0.28
2500	2511.89	-0.55	0.13	0.68	0.25	0.07	0.20	0.28
2650	2660.73	-0.59	0.13	0.68	0.25	0.13	0.22	0.28
2800	2818.38	-0.65	0.13	0.66	0.25	0.20	0.21	0.28
3000	2985.38	-0.71	0.13	0.62	0.25	0.29	0.20	0.28
3150	3162.28	-0.77	0.13	0.55	0.25	0.39	0.17	0.28
3350	3349.65	-0.83	0.14	0.45	0.25	0.51	0.13	0.28
3550	3548.13	-0.91	0.14	0.33	0.25	0.63	0.05	0.28

Nominal Frequency	Exact Frequency (6 digits)	Microphone Diffuse-field Response	Expanded Uncertainty	Influence of Windscr	Expanded Uncertainty	Electrical Response	Acoustical Response	Expanded Uncertainty
Hz	Hz	dB	dB	dB	dB	dB	dB	dB
3750	3758.37	-0.99	0.14	0.18	0.25	0.78	-0.03	0.28
4000	3981.07	-1.08	0.14	0.03	0.25	0.93	-0.12	0.29
4250	4216.97	-1.18	0.15	-0.13	0.25	1.10	-0.21	0.29
4500	4466.84	-1.28	0.15	-0.27	0.25	1.27	-0.28	0.29
4750	4731.51	-1.39	0.15	-0.39	0.32	1.45	-0.33	0.35
5000	5011.87	-1.51	0.16	-0.46	0.40	1.64	-0.33	0.43
5300	5308.84	-1.64	0.17	-0.50	0.51	1.83	-0.31	0.54
5600	5623.41	-1.76	0.17	-0.48	0.56	2.02	-0.22	0.58
6000	5956.62	-1.90	0.17	-0.44	0.56	2.20	-0.14	0.59
6300	6309.57	-2.03	0.17	-0.38	0.56	2.39	-0.02	0.59
6700	6683.44	-2.15	0.18	-0.34	0.56	2.57	0.08	0.59
7100	7079.46	-2.27	0.18	-0.36	0.56	2.74	0.11	0.59
7500	7498.94	-2.41	0.18	-0.45	0.56	2.91	0.06	0.59
8000	7943.28	-2.55	0.18	-0.58	0.56	3.08	-0.05	0.59
8500	8413.95	-2.69	0.19	-0.71	0.56	3.25	-0.15	0.59
9000	8912.51	-2.86	0.19	-0.79	0.56	3.43	-0.22	0.59
9500	9440.61	-3.02	0.23	-0.82	0.56	3.61	-0.23	0.60
10000	10000.0	-3.15	0.32	-0.82	0.56	3.80	-0.17	0.64
10600	10592.5	-3.25	0.33	-0.86	0.84	4.02	-0.09	0.90
11200	11220.2	-3.33	0.35	-0.96	0.84	4.28	-0.01	0.91
11800	11885.0	-3.49	0.36	-1.07	0.84	4.57	0.01	0.91
12500	12589.3	-3.76	0.38	-1.19	0.84	4.92	-0.03	0.92
13200	13335.2	-4.15	0.40	-1.31	0.84	5.34	-0.12	0.93
14000	14125.4	-4.52	0.42	-1.43	0.84	5.84	-0.11	0.94
15000	14962.4	-4.86	0.44	-1.53	0.85	6.42	0.03	0.96
16000	15848.9	-5.23	0.46	-1.63	0.85	7.09	0.23	0.97
17000	16788.0	-5.93	0.49	-1.77	0.85	7.85	0.15	0.98
18000	17782.8	-6.79	0.51	-1.92	0.85	8.68	-0.03	0.99
19000	18836.5	-7.55	0.53	-1.98	0.85	9.58	0.05	1.00
20000	19952.6	-8.39	0.56	-2.07	0.85	10.53	0.07	1.02
21200	21134.9	-9.45	0.59	-2.18	0.85	11.51	-0.12	1.03
22400	22387.2	-10.39	0.61	-2.19	0.85	12.49	-0.09	1.05

Free-field Frequency Responses for Diffuse-field Calibrated Instruments

Free-field frequency response in the reference direction for diffuse-field calibrated instruments according to IEC 60651 and IEC 60804. Measured with plane progressive sinusoidal sound waves incident from the reference direction and the sound level meter's **Sound field** set to *Diffuse-field*, see section 4.6.

Table A. 6 *Free-field 0° frequency response with the **Sound field** set to *Diffuse-field* for the configurations for which there are specified normal Free-field responses*

Nominal Frequency	Exact Frequency (6 digits)	Configuration as in Table A.2	Configuration as in Table A.3
Hz	Hz	dB	dB
63	63.0957	0.07	0.07
80	79.4328	0.07	0.07
100	100.000	0.06	0.06
125	125.893	0.06	0.06
160	158.489	0.06	0.06
200	199.526	0.07	0.06
250	251.189	0.08	0.07
315	316.228	0.12	0.10
400	398.107	0.16	0.13
500	501.187	0.19	0.14
630	630.957	0.11	0.04
800	794.328	0.00	-0.11
1000	1000.00	0.09	-0.07
1060	1059.25	0.10	-0.08
1120	1122.02	0.09	-0.10
1180	1188.50	0.10	-0.11
1250	1258.93	0.11	-0.13
1320	1333.52	0.13	-0.12
1400	1412.54	0.16	-0.12
1500	1496.24	0.17	-0.13
1600	1584.89	0.16	-0.16
1700	1678.80	0.19	-0.15
1800	1778.28	0.22	-0.15
1900	1883.65	0.22	-0.17
2000	1995.26	0.29	-0.11
2120	2113.49	0.06	-0.35
2240	2238.72	0.30	-0.12
2360	2371.37	0.56	0.12
2500	2511.89	0.50	0.06
2650	2660.73	0.34	-0.09
2800	2818.38	0.47	0.05
3000	2985.38	0.74	0.35
3150	3162.28	0.69	0.33
3350	3349.65	0.58	0.26
3550	3548.13	0.89	0.61

Nominal Frequency	Exact Frequency (6 digits)	Configuration as in Table A.2	Configuration as in Table A.3
Hz	Hz	dB	dB
3750	3758.37	0.97	0.75
4000	3981.07	0.84	0.68
4250	4216.97	1.22	1.13
4500	4466.84	1.16	1.13
4750	4731.51	1.19	1.23
5000	5011.87	1.40	1.51
5300	5308.84	1.44	1.62
5600	5623.41	1.68	1.92
6000	5956.62	1.63	1.92
6300	6309.57	1.95	2.30
6700	6683.44	2.09	2.48
7100	7079.46	2.31	2.73
7500	7498.94	2.47	2.93
8000	7943.28	2.64	3.13
8500	8413.95	2.86	3.39
9000	8912.51	3.02	3.60
9500	9440.61	3.22	3.85
10000	10000.0	3.47	4.16
10600	10592.5	3.81	4.58
11200	11220.2	4.11	4.99
11800	11885.0	4.42	5.42
12500	12589.3	4.60	5.74
13200	13335.2	4.84	6.14
14000	14125.4	5.11	6.58
15000	14962.4	5.47	7.09
16000	15848.9	5.94	7.69
17000	16788.0	6.36	8.22
18000	17782.8	6.58	8.52
19000	18836.5	7.31	9.30
20000	19952.6	7.56	9.60
21200	21134.9	7.90	10.00
22400	22387.2	8.28	10.44

Directional Responses

Directional responses for plane progressive sinusoidal sound waves normalised to the response in the reference direction, including sensitivity variations.

Table A.7 Directional response for the sound level meter, measured in a plane parallel to the display and along the microphone's axis, 250 Hz - 2.8 KHz

Angle	Nominal Frequency												
	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 KHz	1.25 KHz	1.6 KHz	2 KHz	2.24 KHz	2.5 KHz	2.8 KHz
0°	0.01	0.03	0.04	-0.01	-0.03	0.02	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01
5°	-0.01	-0.02	0.00	0.01	-0.01	0.00	0.00	0.00	-0.01	0.00	-0.01	0.00	-0.02
10°	-0.01	0.00	0.00	-0.01	-0.02	0.01	-0.01	0.00	-0.03	0.00	-0.04	0.01	-0.05
15°	-0.01	0.01	0.00	-0.01	0.01	-0.01	-0.02	0.00	-0.05	0.01	-0.09	0.01	-0.09
20°	-0.02	-0.02	-0.02	-0.01	0.01	-0.01	-0.04	0.00	-0.08	0.02	-0.14	0.01	-0.14
25°	-0.06	-0.03	0.00	-0.01	-0.01	0.00	-0.06	0.01	-0.12	0.04	-0.18	-0.01	-0.16
30°	-0.03	-0.06	-0.06	-0.02	0.02	-0.01	-0.08	0.02	-0.17	0.06	-0.21	-0.07	-0.17
35°	-0.03	-0.06	-0.07	-0.03	0.04	0.00	-0.11	0.02	-0.20	0.08	-0.21	-0.17	-0.14
40°	-0.05	-0.05	-0.06	-0.04	0.03	0.01	-0.14	0.02	-0.23	0.07	-0.17	-0.32	-0.11
45°	-0.04	-0.09	-0.10	-0.05	0.02	0.03	-0.17	0.01	-0.26	0.02	-0.11	-0.51	-0.11
50°	-0.05	-0.14	-0.10	-0.05	-0.04	0.09	-0.19	-0.01	-0.26	-0.05	-0.05	-0.63	-0.16
55°	-0.06	-0.08	-0.10	-0.06	0.03	0.07	-0.18	-0.06	-0.21	-0.15	-0.02	-0.65	-0.33
60°	-0.07	-0.05	-0.04	-0.07	-0.05	0.13	-0.17	-0.10	-0.17	-0.27	-0.05	-0.58	-0.51
65°	-0.08	-0.04	-0.03	-0.08	-0.05	0.14	-0.16	-0.14	-0.14	-0.38	-0.19	-0.49	-0.60
70°	-0.08	-0.16	-0.15	-0.09	-0.02	0.13	-0.13	-0.17	-0.16	-0.41	-0.38	-0.42	-0.56
75°	-0.10	-0.11	-0.10	-0.10	-0.07	0.17	-0.10	-0.18	-0.20	-0.35	-0.55	-0.48	-0.48
80°	-0.09	-0.11	-0.11	-0.12	-0.08	0.17	-0.06	-0.17	-0.26	-0.25	-0.56	-0.70	-0.48
85°	-0.09	-0.18	-0.21	-0.14	-0.04	0.11	0.01	-0.16	-0.29	-0.22	-0.39	-0.98	-0.55
90°	-0.12	-0.10	-0.10	-0.15	-0.14	0.12	0.04	-0.10	-0.32	-0.27	-0.26	-0.98	-0.80
95°	-0.12	-0.12	-0.13	-0.16	-0.17	0.06	0.05	-0.03	-0.33	-0.33	-0.29	-0.72	-0.95
100°	-0.13	-0.15	-0.16	-0.17	-0.17	-0.01	0.04	0.04	-0.28	-0.38	-0.39	-0.60	-0.74
105°	-0.14	-0.09	-0.09	-0.19	-0.24	-0.03	-0.02	0.09	-0.18	-0.41	-0.46	-0.72	-0.56
110°	-0.15	-0.14	-0.15	-0.20	-0.22	-0.10	-0.10	0.07	-0.07	-0.37	-0.50	-0.82	-0.66
115°	-0.15	-0.14	-0.15	-0.20	-0.24	-0.13	-0.17	0.01	0.00	-0.21	-0.42	-0.81	-0.76
120°	-0.15	-0.21	-0.22	-0.22	-0.24	-0.17	-0.25	-0.10	-0.05	-0.05	-0.23	-0.75	-0.75
125°	-0.16	-0.15	-0.13	-0.22	-0.31	-0.15	-0.31	-0.20	-0.17	0.00	-0.04	-0.52	-0.60
130°	-0.15	-0.15	-0.18	-0.22	-0.24	-0.19	-0.34	-0.29	-0.29	-0.10	-0.04	-0.31	-0.33
135°	-0.13	-0.13	-0.15	-0.23	-0.28	-0.17	-0.38	-0.35	-0.43	-0.30	-0.23	-0.40	-0.24
140°	-0.13	-0.17	-0.17	-0.22	-0.28	-0.15	-0.38	-0.38	-0.52	-0.49	-0.46	-0.68	-0.47
145°	-0.14	-0.20	-0.22	-0.20	-0.20	-0.16	-0.35	-0.39	-0.54	-0.64	-0.66	-0.97	-0.80
150°	-0.14	-0.17	-0.18	-0.20	-0.21	-0.11	-0.32	-0.36	-0.52	-0.70	-0.79	-1.19	-1.10
155°	-0.14	-0.18	-0.17	-0.19	-0.21	-0.06	-0.28	-0.30	-0.46	-0.66	-0.79	-1.25	-1.26
160°	-0.14	-0.18	-0.20	-0.17	-0.14	-0.06	-0.22	-0.23	-0.35	-0.52	-0.65	-1.10	-1.15
165°	-0.15	-0.06	-0.03	-0.17	-0.25	0.04	-0.19	-0.16	-0.25	-0.36	-0.46	-0.84	-0.85
170°	-0.14	-0.15	-0.16	-0.16	-0.13	0.00	-0.15	-0.12	-0.17	-0.22	-0.28	-0.60	-0.54
175°	-0.13	-0.19	-0.17	-0.15	-0.15	0.04	-0.12	-0.07	-0.12	-0.13	-0.16	-0.44	-0.32
180°	-0.12	-0.27	-0.26	-0.14	-0.08	0.01	-0.11	-0.06	-0.10	-0.10	-0.13	-0.39	-0.25
185°	-0.12	-0.15	-0.17	-0.15	-0.09	0.01	-0.11	-0.08	-0.10	-0.13	-0.17	-0.43	-0.32
190°	-0.12	-0.15	-0.15	-0.16	-0.13	0.01	-0.14	-0.11	-0.16	-0.22	-0.30	-0.59	-0.53
195°	-0.11	-0.15	-0.14	-0.16	-0.18	0.02	-0.18	-0.16	-0.26	-0.37	-0.49	-0.84	-0.86
200°	-0.12	-0.17	-0.17	-0.17	-0.16	-0.03	-0.22	-0.22	-0.35	-0.53	-0.68	-1.09	-1.17
205°	-0.12	-0.09	-0.10	-0.18	-0.20	-0.05	-0.27	-0.29	-0.44	-0.66	-0.81	-1.21	-1.27
210°	-0.11	-0.06	-0.06	-0.19	-0.25	-0.05	-0.32	-0.34	-0.51	-0.71	-0.81	-1.15	-1.10
215°	-0.11	-0.21	-0.24	-0.18	-0.14	-0.16	-0.33	-0.38	-0.52	-0.65	-0.66	-0.94	-0.80
220°	-0.11	-0.16	-0.19	-0.19	-0.20	-0.15	-0.36	-0.37	-0.48	-0.49	-0.44	-0.64	-0.45
225°	-0.12	0.00	-0.05	-0.19	-0.22	-0.14	-0.35	-0.33	-0.37	-0.28	-0.19	-0.37	-0.21
230°	-0.08	-0.31	-0.34	-0.19	-0.14	-0.21	-0.32	-0.26	-0.27	-0.10	0.00	-0.29	-0.26
235°	-0.11	-0.10	-0.14	-0.19	-0.22	-0.14	-0.28	-0.16	-0.11	0.03	0.00	-0.47	-0.57
240°	-0.09	-0.17	-0.18	-0.18	-0.21	-0.11	-0.21	-0.04	0.00	-0.01	-0.18	-0.70	-0.72
245°	-0.09	-0.08	-0.09	-0.17	-0.25	-0.05	-0.14	0.06	0.03	-0.18	-0.39	-0.77	-0.71
250°	-0.10	0.00	0.03	-0.18	-0.35	0.07	-0.07	0.14	-0.05	-0.32	-0.44	-0.74	-0.62
255°	-0.07	-0.05	-0.06	-0.16	-0.22	0.04	0.01	0.14	-0.17	-0.36	-0.40	-0.66	-0.55
260°	-0.08	-0.08	-0.11	-0.14	-0.12	0.05	0.08	0.10	-0.25	-0.31	-0.32	-0.56	-0.71
265°	-0.05	-0.11	-0.13	-0.13	-0.12	0.13	0.09	0.02	-0.31	-0.26	-0.25	-0.68	-0.92
270°	-0.05	0.00	-0.05	-0.12	-0.08	0.16	0.08	-0.07	-0.28	-0.20	-0.25	-0.94	-0.76
275°	-0.04	-0.01	-0.03	-0.11	-0.10	0.24	0.03	-0.11	-0.25	-0.17	-0.37	-0.93	-0.50
280°	-0.03	-0.06	-0.08	-0.09	-0.03	0.23	-0.02	-0.13	-0.20	-0.21	-0.52	-0.64	-0.41
285°	-0.02	-0.11	-0.16	-0.07	0.10	0.17	-0.06	-0.14	-0.13	-0.30	-0.49	-0.42	-0.43
290°	-0.01	-0.03	-0.06	-0.06	0.03	0.20	-0.10	-0.12	-0.10	-0.36	-0.31	-0.37	-0.51
295°	0.00	-0.04	-0.06	-0.05	0.03	0.18	-0.12	-0.09	-0.10	-0.31	-0.12	-0.43	-0.55
300°	0.00	0.01	0.02	-0.04	-0.05	0.21	-0.16	-0.05	-0.15	-0.21	-0.02	-0.53	-0.48
305°	-0.01	0.01	0.01	-0.04	-0.02	0.18	-0.17	0.00	-0.19	-0.08	0.01	-0.58	-0.28
310°	0.01	-0.01	-0.02	-0.02	0.02	0.14	-0.15	0.04	-0.21	0.02	-0.01	-0.56	-0.10
315°	0.01	0.00	-0.02	-0.02	0.05	0.10	-0.14	0.05	-0.22	0.07	-0.09	-0.44	-0.05
320°	-0.01	-0.01	-0.01	-0.01	0.04	0.08	-0.11	0.06	-0.20	0.10	-0.15	-0.26	-0.06
325°	0.01	-0.07	-0.07	0.00	0.06	0.04	-0.08	0.06	-0.17	0.10	-0.18	-0.11	-0.09
330°	0.01	-0.03	-0.05	0.00	0.08	0.01	-0.05	0.05	-0.12	0.09	-0.17	-0.01	-0.12
335°	0.01	0.04	0.05	0.00	-0.01	0.05	-0.04	0.04	-0.09	0.06	-0.15	0.03	-0.13
340°	0.01	-0.25	-0.33	0.03	0.31	-0.17	0.01	0.00	-0.03	0.04	-0.09	0.04	-0.10
345°	0.01	-0.02	0.03	0.01	-0.06	0.06	-0.01	0.03	-0.04	0.03	-0.05	0.04	-0.05
350°	0.01	-0.14	-0.11	0.00	0.01	0.01	-0.01	0.01	-0.03	0.01	-0.02	0.01	-0.03
355°	0.01	-0.05	-0.06	0.01	0.04	-0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.00

Table A.8 Directional response for the sound level meter, measured in a plane parallel to the display and along the microphone's axis, 3.15 KHz - 10 KHz

Angle	Nominal Frequency												
	3.15 KHz	3.55 KHz	4 KHz	4.5 KHz	5 KHz	5.6 KHz	6.3 KHz	7.1 KHz	8 KHz	8.5 KHz	9 KHz	9.5 KHz	10 KHz
0°	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02
5°	0.00	-0.02	-0.01	-0.01	-0.02	-0.01	-0.02	-0.01	-0.02	-0.03	-0.05	-0.03	-0.03
10°	0.01	-0.06	-0.02	0.01	-0.03	-0.03	-0.05	-0.04	-0.09	-0.09	-0.15	-0.09	-0.09
15°	0.01	-0.14	-0.02	0.01	-0.08	-0.08	-0.13	-0.09	-0.15	-0.16	-0.25	-0.14	-0.16
20°	0.02	-0.22	-0.01	-0.01	-0.16	-0.18	-0.25	-0.18	-0.25	-0.29	-0.35	-0.24	-0.31
25°	-0.01	-0.30	0.00	-0.07	-0.27	-0.30	-0.40	-0.29	-0.39	-0.44	-0.43	-0.45	-0.54
30°	-0.08	-0.36	-0.01	-0.21	-0.41	-0.48	-0.57	-0.47	-0.58	-0.62	-0.58	-0.78	-0.73
35°	-0.19	-0.35	-0.06	-0.36	-0.48	-0.62	-0.67	-0.64	-0.69	-0.83	-0.77	-1.00	-0.93
40°	-0.34	-0.32	-0.21	-0.51	-0.52	-0.76	-0.75	-0.89	-0.87	-1.12	-1.00	-1.17	-1.31
45°	-0.47	-0.31	-0.41	-0.59	-0.57	-0.84	-0.85	-1.08	-1.11	-1.28	-1.31	-1.44	-1.67
50°	-0.51	-0.40	-0.51	-0.61	-0.70	-0.95	-0.98	-1.23	-1.34	-1.53	-1.67	-1.69	-1.85
55°	-0.47	-0.56	-0.48	-0.70	-0.82	-1.04	-1.40	-1.45	-1.58	-1.72	-1.80	-2.10	-2.22
60°	-0.42	-0.75	-0.51	-0.94	-1.10	-1.16	-1.44	-1.64	-2.11	-2.17	-2.23	-2.46	-2.67
65°	-0.57	-0.83	-0.58	-0.93	-1.07	-1.37	-1.72	-1.57	-1.91	-2.43	-2.43	-2.65	-2.91
70°	-0.81	-0.74	-0.80	-1.07	-1.37	-1.49	-1.48	-2.64	-2.25	-2.34	-2.64	-2.84	-3.09
75°	-0.95	-0.84	-0.91	-1.10	-1.29	-1.68	-2.18	-1.95	-2.94	-2.98	-2.88	-3.29	-3.55
80°	-0.87	-1.09	-0.90	-1.31	-1.56	-1.97	-1.99	-2.09	-3.19	-3.53	-3.45	-3.53	-3.94
85°	-0.78	-1.20	-1.03	-1.37	-1.55	-1.78	-2.20	-2.95	-2.61	-3.81	-3.92	-3.91	-4.05
90°	-0.83	-1.08	-1.30	-1.48	-1.74	-2.18	-2.59	-3.15	-2.87	-3.53	-4.25	-4.26	-4.36
95°	-1.02	-1.09	-1.24	-1.72	-1.84	-2.14	-2.58	-2.67	-3.25	-3.67	-4.42	-4.38	-4.55
100°	-1.26	-1.21	-1.18	-1.77	-2.04	-2.31	-2.48	-2.78	-3.97	-3.78	-4.65	-4.57	-4.75
105°	-1.10	-1.46	-1.29	-1.65	-2.22	-2.62	-2.91	-3.36	-3.99	-3.80	-4.92	-4.71	-5.28
110°	-0.85	-1.34	-1.49	-1.77	-2.01	-2.59	-3.19	-3.62	-4.38	-4.13	-4.70	-4.84	-5.76
115°	-0.91	-1.02	-1.34	-1.89	-2.14	-2.54	-3.00	-3.71	-4.26	-4.23	-4.99	-5.05	-5.76
120°	-1.02	-1.14	-1.05	-1.68	-2.21	-2.68	-3.11	-3.49	-4.46	-4.98	-5.09	-5.16	-5.86
125°	-0.99	-1.21	-1.23	-1.50	-1.92	-2.60	-3.11	-3.96	-4.17	-4.75	-5.14	-5.87	-6.10
130°	-0.74	-1.12	-1.26	-1.63	-1.86	-2.27	-2.91	-3.47	-4.45	-5.11	-5.24	-5.62	-5.84
135°	-0.48	-0.77	-1.00	-1.63	-1.96	-2.19	-2.65	-3.00	-4.02	-4.25	-4.81	-5.84	-6.11
140°	-0.59	-0.65	-0.64	-1.14	-1.71	-2.39	-2.57	-3.07	-3.59	-4.00	-4.55	-5.05	-5.23
145°	-0.93	-0.97	-0.80	-1.04	-1.23	-1.72	-2.55	-3.16	-3.21	-3.87	-4.29	-4.74	-5.23
150°	-1.29	-1.37	-1.23	-1.48	-1.59	-1.88	-1.94	-2.30	-3.83	-4.05	-4.13	-4.31	-4.74
155°	-1.56	-1.76	-1.74	-1.94	-2.08	-2.30	-2.58	-2.91	-2.80	-3.41	-3.73	-4.38	-4.76
160°	-1.54	-1.87	-2.08	-2.52	-2.84	-2.90	-2.97	-3.31	-4.02	-4.16	-4.43	-4.71	-5.33
165°	-1.20	-1.54	-1.79	-2.46	-3.00	-3.57	-4.28	-4.71	-4.56	-4.98	-5.12	-5.47	-5.56
170°	-0.81	-1.06	-1.18	-1.76	-2.14	-2.83	-3.73	-4.59	-5.52	-5.91	-6.29	-7.02	-7.34
175°	-0.53	-0.70	-0.71	-1.15	-1.34	-1.88	-2.46	-2.98	-4.09	-4.39	-4.72	-5.27	-5.67
180°	-0.44	-0.59	-0.57	-0.98	-1.11	-1.60	-2.10	-2.49	-3.36	-3.69	-3.98	-4.43	-4.83
185°	-0.53	-0.72	-0.74	-1.20	-1.41	-1.97	-2.62	-3.06	-3.97	-4.39	-4.75	-5.36	-5.96
190°	-0.82	-1.09	-1.24	-1.84	-2.26	-3.01	-3.92	-4.50	-5.44	-6.00	-6.42	-7.36	-7.84
195°	-1.25	-1.62	-1.93	-2.58	-3.18	-3.75	-4.27	-4.58	-4.81	-5.22	-5.45	-5.70	-5.73
200°	-1.61	-1.96	-2.21	-2.59	-2.90	-2.94	-2.88	-3.19	-3.98	-4.26	-4.50	-4.91	-5.48
205°	-1.61	-1.80	-1.76	-1.91	-2.01	-2.24	-2.57	-2.96	-3.05	-3.54	-3.86	-4.33	-4.69
210°	-1.30	-1.35	-1.19	-1.40	-1.55	-1.79	-1.94	-2.41	-3.73	-4.00	-3.97	-4.26	-4.60
215°	-0.94	-0.93	-0.76	-1.00	-1.25	-1.78	-2.63	-3.08	-3.10	-3.75	-4.35	-4.81	-5.27
220°	-0.55	-0.59	-0.58	-1.18	-1.76	-2.39	-2.44	-3.03	-3.48	-4.02	-4.49	-4.78	-5.17
225°	-0.40	-0.74	-1.02	-1.63	-1.94	-2.16	-2.75	-3.02	-3.90	-4.13	-4.73	-5.94	-6.24
230°	-0.70	-1.13	-1.25	-1.58	-1.81	-2.26	-2.84	-3.32	-4.61	-4.99	-5.01	-5.49	-5.83
235°	-1.00	-1.21	-1.21	-1.52	-1.99	-2.68	-3.09	-3.89	-4.19	-4.52	-4.97	-5.93	-5.98
240°	-0.97	-1.12	-1.03	-1.71	-2.16	-2.61	-3.12	-3.48	-4.27	-4.85	-4.78	-5.07	-5.67
245°	-0.89	-1.00	-1.38	-1.86	-2.12	-2.52	-2.88	-3.55	-3.85	-4.15	-4.73	-4.85	-5.46
250°	-0.81	-1.33	-1.46	-1.69	-1.94	-2.53	-3.04	-3.18	-4.02	-4.04	-4.43	-4.74	-5.45
255°	-1.09	-1.43	-1.23	-1.61	-2.18	-2.51	-2.77	-3.23	-3.78	-3.78	-4.67	-4.58	-4.95
260°	-1.24	-1.11	-1.15	-1.74	-1.94	-2.20	-2.45	-2.72	-3.87	-3.64	-4.37	-4.39	-4.48
265°	-0.92	-1.04	-1.18	-1.60	-1.75	-2.02	-2.35	-2.56	-3.19	-3.48	-4.12	-4.21	-4.34
270°	-0.76	-1.04	-1.26	-1.40	-1.63	-2.07	-2.43	-2.78	-2.82	-3.28	-4.02	-4.12	-4.12
275°	-0.76	-1.15	-0.93	-1.32	-1.51	-1.71	-2.17	-2.79	-2.47	-3.57	-3.70	-3.72	-3.82
280°	-0.83	-1.03	-0.84	-1.19	-1.42	-1.81	-1.79	-2.02	-2.94	-3.27	-3.24	-3.30	-3.69
285°	-0.91	-0.75	-0.86	-1.03	-1.23	-1.61	-2.01	-1.80	-2.71	-2.80	-2.69	-3.09	-3.26
290°	-0.75	-0.69	-0.71	-0.97	-1.24	-1.34	-1.40	-2.40	-2.14	-2.20	-2.48	-2.65	-2.83
295°	-0.48	-0.77	-0.50	-0.87	-0.99	-1.28	-1.57	-1.44	-1.75	-2.27	-2.25	-2.44	-2.68
300°	-0.36	-0.70	-0.45	-0.86	-1.02	-1.06	-1.36	-1.50	-2.01	-2.05	-2.11	-2.35	-2.46
305°	-0.41	-0.48	-0.43	-0.60	-0.71	-0.95	-1.23	-1.30	-1.43	-1.58	-1.65	-1.91	-1.98
310°	-0.45	-0.32	-0.45	-0.53	-0.61	-0.85	-0.83	-1.09	-1.24	-1.40	-1.55	-1.56	-1.66
315°	-0.42	-0.25	-0.33	-0.55	-0.49	-0.76	-0.74	-0.95	-1.01	-1.20	-1.19	-1.29	-1.49
320°	-0.29	-0.26	-0.12	-0.45	-0.45	-0.68	-0.66	-0.77	-0.78	-1.02	-0.89	-1.04	-1.10
325°	-0.14	-0.30	0.01	-0.29	-0.41	-0.52	-0.57	-0.50	-0.61	-0.72	-0.64	-0.88	-0.75
330°	-0.02	-0.30	0.05	-0.12	-0.33	-0.37	-0.47	-0.38	-0.50	-0.54	-0.46	-0.64	-0.59
335°	0.03	-0.25	0.03	-0.01	-0.21	-0.21	-0.31	-0.24	-0.32	-0.38	-0.36	-0.34	-0.40
340°	0.05	-0.17	0.01	0.05	-0.11	-0.09	-0.16	-0.11	-0.17	-0.21	-0.29	-0.15	-0.20
345°	0.05	-0.09	0.00	0.05	-0.03	-0.01	-0.04	-0.02	-0.07	-0.08	-0.18	-0.06	-0.08
350°	0.02	-0.04	-0.01	0.02	-0.02	0.00	-0.01	0.00	-0.03	-0.02	-0.08	-0.02	-0.03
355°	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.00	0.00	-0.01	0.00	0.00

Table A.9 Directional response for the sound level meter, measured in a plane parallel to the display and along the microphone's axis, 10.6 KHz - 20 KHz

Angle	Nominal Frequency											
	10.6 KHz	11.2 KHz	11.8 KHz	12.5 KHz	13.2 KHz	14 KHz	15 KHz	16 KHz	17 KHz	18 KHz	19 KHz	20 KHz
0°	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03	-0.04	-0.04	-0.04	-0.03	-0.01
5°	-0.03	-0.04	-0.05	-0.06	-0.06	-0.06	-0.07	-0.07	-0.09	-0.08	-0.09	-0.06
10°	-0.11	-0.12	-0.17	-0.18	-0.18	-0.17	-0.16	-0.16	-0.19	-0.21	-0.19	-0.16
15°	-0.20	-0.22	-0.29	-0.30	-0.32	-0.36	-0.35	-0.38	-0.45	-0.53	-0.49	-0.42
20°	-0.40	-0.41	-0.50	-0.46	-0.53	-0.59	-0.57	-0.67	-0.81	-0.87	-0.86	-0.80
25°	-0.66	-0.62	-0.74	-0.68	-0.82	-0.88	-0.87	-1.01	-1.22	-1.31	-1.29	-1.29
30°	-0.89	-0.84	-0.99	-1.00	-1.21	-1.23	-1.26	-1.43	-1.64	-1.80	-1.82	-1.75
35°	-1.13	-1.15	-1.27	-1.35	-1.53	-1.63	-1.68	-1.81	-2.10	-2.37	-2.42	-2.33
40°	-1.45	-1.50	-1.59	-1.71	-1.89	-2.13	-2.17	-2.30	-2.63	-2.99	-3.07	-3.00
45°	-1.73	-1.87	-2.07	-2.08	-2.38	-2.60	-2.72	-2.92	-3.23	-3.61	-3.85	-3.87
50°	-2.17	-2.28	-2.39	-2.54	-2.80	-3.10	-3.37	-3.54	-3.86	-4.30	-4.71	-4.66
55°	-2.65	-2.73	-2.84	-3.10	-3.21	-3.66	-3.91	-4.24	-4.59	-5.00	-5.39	-5.65
60°	-2.84	-3.01	-3.31	-3.61	-3.74	-4.17	-4.51	-4.78	-5.31	-5.88	-6.23	-6.33
65°	-3.25	-3.32	-3.79	-4.12	-4.18	-4.92	-4.92	-5.44	-6.09	-6.66	-7.08	-7.43
70°	-3.62	-3.86	-4.14	-4.68	-4.76	-5.33	-5.60	-6.26	-6.75	-7.45	-8.17	-8.25
75°	-3.92	-4.38	-4.60	-4.98	-5.62	-5.65	-6.55	-6.60	-7.41	-8.30	-8.80	-9.16
80°	-4.44	-4.63	-5.18	-5.35	-5.96	-6.68	-6.72	-7.81	-8.07	-8.86	-9.80	-10.10
85°	-4.62	-5.16	-5.48	-5.85	-6.31	-6.82	-7.74	-7.94	-9.12	-9.58	-10.34	-10.98
90°	-4.71	-5.34	-6.05	-6.26	-6.90	-7.51	-7.79	-8.64	-9.76	-10.36	-11.43	-11.69
95°	-5.42	-5.84	-6.54	-6.83	-7.50	-7.90	-8.62	-9.50	-9.95	-11.03	-11.94	-12.68
100°	-5.85	-6.39	-6.95	-6.91	-7.60	-8.48	-9.05	-9.66	-10.51	-11.77	-13.26	-12.80
105°	-6.12	-6.13	-6.36	-7.45	-8.16	-8.91	-9.49	-10.46	-11.23	-12.13	-12.95	-13.76
110°	-6.20	-6.39	-7.35	-7.99	-8.03	-9.00	-9.75	-10.61	-11.58	-12.81	-14.58	-14.37
115°	-5.91	-7.01	-7.73	-7.53	-8.46	-9.62	-9.62	-10.76	-11.75	-12.94	-14.34	-15.07
120°	-6.19	-6.96	-6.97	-8.23	-8.64	-9.51	-10.58	-11.21	-11.64	-13.06	-13.54	-15.78
125°	-6.76	-6.73	-7.88	-7.94	-8.82	-9.74	-9.86	-11.90	-12.46	-13.36	-14.87	-15.38
130°	-6.99	-7.25	-8.55	-8.20	-9.37	-9.49	-10.46	-11.22	-12.61	-13.15	-14.20	-16.43
135°	-6.94	-7.31	-8.00	-8.97	-9.34	-10.34	-11.11	-12.04	-12.48	-13.65	-14.70	-15.62
140°	-5.92	-6.87	-7.91	-8.89	-9.24	-10.11	-11.26	-12.16	-12.71	-14.44	-15.88	-16.85
145°	-5.84	-6.28	-6.79	-7.50	-8.09	-9.24	-10.33	-11.25	-12.43	-13.82	-14.48	-17.61
150°	-5.14	-5.44	-6.76	-7.77	-8.08	-8.55	-9.20	-10.11	-11.20	-12.28	-13.81	-13.96
155°	-5.34	-5.90	-6.56	-6.67	-7.11	-7.76	-8.61	-9.85	-11.25	-12.10	-13.14	-13.45
160°	-5.90	-6.48	-6.79	-6.87	-7.51	-8.26	-8.98	-9.86	-10.92	-11.82	-11.89	-13.03
165°	-5.85	-6.05	-6.75	-7.81	-8.60	-9.26	-10.07	-11.07	-12.11	-13.20	-14.37	-14.48
170°	-8.22	-8.74	-8.90	-9.04	-9.74	-10.54	-11.01	-11.45	-12.19	-13.14	-13.76	-13.81
175°	-6.30	-7.21	-7.91	-8.53	-9.42	-10.27	-11.12	-12.18	-13.32	-14.20	-15.80	-19.48
180°	-5.35	-5.94	-6.44	-7.14	-8.09	-8.77	-9.51	-10.46	-11.58	-12.54	-13.11	-14.49
185°	-6.66	-7.33	-7.87	-8.57	-9.88	-10.85	-11.75	-12.86	-14.19	-15.75	-15.96	-16.49
190°	-8.39	-8.54	-8.83	-9.61	-10.26	-10.75	-11.04	-11.42	-12.16	-12.81	-12.92	-14.00
195°	-5.83	-6.18	-6.66	-7.46	-8.52	-9.27	-10.10	-11.20	-12.27	-13.30	-13.76	-14.41
200°	-6.04	-6.34	-6.48	-6.82	-7.45	-8.03	-8.63	-9.53	-10.52	-11.35	-12.32	-12.79
205°	-5.01	-5.63	-6.35	-6.67	-7.09	-7.61	-8.29	-9.57	-11.01	-11.90	-12.73	-12.72
210°	-5.14	-5.44	-6.23	-7.19	-7.92	-8.37	-8.83	-9.90	-10.87	-11.98	-13.04	-13.38
215°	-5.67	-5.67	-6.26	-7.11	-7.96	-8.99	-10.04	-10.79	-11.86	-14.00	-14.34	-15.81
220°	-6.03	-6.63	-7.28	-8.13	-9.14	-9.87	-10.85	-11.63	-12.54	-14.16	-15.06	-15.98
225°	-6.58	-6.71	-7.34	-8.34	-9.17	-10.00	-10.91	-11.60	-12.06	-12.79	-13.79	-14.99
230°	-6.81	-6.83	-7.48	-8.20	-9.02	-9.24	-9.85	-10.70	-11.79	-12.40	-14.14	-15.27
235°	-6.45	-6.53	-7.15	-7.53	-8.82	-9.16	-9.49	-11.39	-11.76	-12.77	-13.93	-14.91
240°	-5.85	-6.44	-6.45	-7.70	-8.27	-9.35	-10.16	-10.69	-11.09	-12.60	-13.33	-14.80
245°	-5.62	-6.28	-6.93	-7.20	-8.40	-9.18	-9.17	-10.15	-11.24	-12.26	-13.68	-14.42
250°	-5.81	-5.73	-6.68	-7.46	-7.69	-8.59	-9.15	-9.92	-11.07	-12.20	-12.94	-13.81
255°	-5.63	-5.69	-5.80	-7.08	-7.92	-8.53	-9.11	-9.99	-10.66	-11.51	-12.81	-13.11
260°	-5.34	-5.88	-6.08	-6.47	-7.25	-8.07	-8.43	-9.09	-10.05	-11.07	-12.18	-12.33
265°	-4.97	-5.24	-5.82	-6.52	-7.25	-7.54	-8.19	-8.85	-9.41	-10.37	-11.13	-12.15
270°	-4.38	-4.86	-5.43	-5.85	-6.62	-7.14	-7.34	-8.21	-9.11	-9.61	-10.74	-11.43
275°	-4.29	-4.66	-4.83	-5.51	-6.11	-6.50	-7.25	-7.42	-8.48	-8.95	-9.70	-10.70
280°	-4.01	-4.14	-4.55	-5.05	-5.66	-6.26	-6.24	-7.22	-7.55	-8.32	-8.98	-9.77
285°	-3.56	-3.91	-4.07	-4.63	-5.33	-5.30	-6.14	-6.16	-7.02	-7.69	-8.16	-8.86
290°	-3.30	-3.44	-3.66	-4.34	-4.49	-5.05	-5.20	-5.86	-6.29	-6.88	-7.46	-8.13
295°	-2.90	-2.96	-3.29	-3.78	-3.94	-4.66	-4.58	-5.04	-5.64	-6.06	-6.51	-7.39
300°	-2.54	-2.64	-2.86	-3.36	-3.57	-3.98	-4.22	-4.41	-4.88	-5.38	-5.63	-6.22
305°	-2.34	-2.33	-2.42	-2.84	-3.01	-3.41	-3.54	-3.83	-4.19	-4.51	-4.78	-5.48
310°	-1.90	-1.95	-2.01	-2.34	-2.64	-2.86	-3.06	-3.21	-3.54	-3.89	-4.16	-4.56
315°	-1.47	-1.60	-1.71	-1.88	-2.20	-2.35	-2.42	-2.65	-2.95	-3.19	-3.38	-3.79
320°	-1.21	-1.24	-1.30	-1.52	-1.72	-1.93	-1.94	-2.05	-2.35	-2.59	-2.67	-3.03
325°	-0.93	-0.94	-1.02	-1.18	-1.36	-1.42	-1.46	-1.56	-1.80	-1.97	-1.98	-2.31
330°	-0.73	-0.66	-0.78	-0.83	-1.05	-1.06	-1.07	-1.19	-1.34	-1.44	-1.46	-1.75
335°	-0.50	-0.46	-0.54	-0.54	-0.71	-0.76	-0.72	-0.80	-1.00	-1.05	-1.01	-1.25
340°	-0.27	-0.27	-0.34	-0.34	-0.41	-0.49	-0.44	-0.48	-0.59	-0.64	-0.59	-0.75
345°	-0.10	-0.12	-0.16	-0.19	-0.22	-0.28	-0.24	-0.23	-0.29	-0.35	-0.30	-0.43
350°	-0.03	-0.03	-0.05	-0.09	-0.11	-0.13	-0.10	-0.08	-0.12	-0.12	-0.12	-0.16
355°	0.00	0.01	0.01	-0.01	-0.02	-0.02	-0.01	0.00	-0.01	0.00	0.00	-0.05

Table A.10 Directional response for the sound level meter, measured in a plane perpendicular to the display and along the microphone's axis, 250 Hz - 2.8 KHz

Angle	Nominal Frequency												
	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 KHz	1.25 KHz	1.6 KHz	2 KHz	2.24 KHz	2.5 KHz	2.8 KHz
0°	0.00	0.03	0.04	0.01	-0.01	0.03	-0.01	-0.01	-0.02	-0.02	0.01	0.00	-0.01
5°	0.02	-0.11	-0.12	0.01	0.09	-0.03	-0.01	-0.02	-0.03	-0.02	0.01	-0.01	-0.01
10°	-0.01	-0.14	-0.17	0.01	0.15	-0.07	-0.01	-0.02	-0.02	0.00	-0.01	0.01	-0.03
15°	0.00	-0.06	-0.08	0.01	0.09	-0.03	-0.03	-0.01	-0.05	0.01	-0.06	0.02	-0.06
20°	-0.03	0.09	0.04	0.01	0.08	-0.03	-0.04	-0.02	-0.06	0.03	-0.11	0.01	-0.11
25°	0.00	-0.02	-0.02	-0.01	0.03	0.01	-0.07	0.00	-0.13	0.05	-0.15	-0.02	-0.14
30°	0.00	-0.10	-0.12	-0.01	0.09	-0.02	-0.09	0.00	-0.18	0.06	-0.19	-0.09	-0.16
35°	-0.01	-0.03	-0.03	-0.01	0.03	0.04	-0.11	0.02	-0.21	0.09	-0.17	-0.18	-0.12
40°	-0.02	-0.05	-0.07	-0.02	0.09	0.02	-0.14	0.01	-0.25	0.08	-0.14	-0.34	-0.11
45°	-0.03	-0.12	-0.14	-0.02	0.13	0.03	-0.16	0.01	-0.26	0.06	-0.05	-0.49	-0.10
50°	-0.02	-0.17	-0.22	-0.02	0.18	0.02	-0.17	-0.01	-0.25	-0.01	0.02	-0.60	-0.17
55°	-0.04	-0.04	-0.05	-0.04	0.03	0.13	-0.19	-0.04	-0.23	-0.11	0.05	-0.59	-0.35
60°	-0.06	-0.04	-0.04	-0.04	0.03	0.13	-0.18	-0.09	-0.18	-0.25	0.02	-0.50	-0.53
65°	-0.05	-0.09	-0.09	-0.05	0.04	0.15	-0.16	-0.14	-0.15	-0.38	-0.12	-0.38	-0.58
70°	-0.05	-0.11	-0.13	-0.06	0.07	0.14	-0.12	-0.17	-0.14	-0.43	-0.33	-0.32	-0.47
75°	-0.07	-0.13	-0.17	-0.08	0.08	0.16	-0.09	-0.18	-0.18	-0.38	-0.53	-0.42	-0.33
80°	-0.07	-0.12	-0.14	-0.10	0.00	0.19	-0.05	-0.17	-0.25	-0.28	-0.58	-0.70	-0.34
85°	-0.08	-0.17	-0.20	-0.11	0.00	0.15	0.01	-0.16	-0.29	-0.24	-0.42	-1.02	-0.53
90°	-0.07	-0.09	-0.13	-0.13	-0.07	0.14	0.05	-0.10	-0.32	-0.27	-0.28	-1.00	-0.87
95°	-0.08	-0.15	-0.20	-0.14	-0.03	0.06	0.08	-0.02	-0.31	-0.34	-0.31	-0.68	-1.04
100°	-0.10	-0.14	-0.16	-0.15	-0.12	0.04	0.06	0.06	-0.27	-0.39	-0.43	-0.54	-0.73
105°	-0.10	-0.24	-0.23	-0.16	-0.15	-0.01	0.00	0.11	-0.17	-0.42	-0.52	-0.73	-0.47
110°	-0.10	-0.18	-0.22	-0.17	-0.12	-0.09	-0.06	0.10	-0.02	-0.35	-0.53	-0.92	-0.64
115°	-0.12	-0.13	-0.16	-0.19	-0.18	-0.11	-0.15	0.03	0.05	-0.17	-0.44	-0.94	-0.90
120°	-0.12	-0.08	-0.11	-0.19	-0.21	-0.12	-0.22	-0.06	0.02	0.05	-0.17	-0.76	-0.89
125°	-0.11	-0.20	-0.20	-0.20	-0.22	-0.15	-0.29	-0.17	-0.12	0.11	0.07	-0.42	-0.61
130°	-0.12	-0.14	-0.19	-0.20	-0.18	-0.19	-0.33	-0.27	-0.27	0.00	0.08	-0.17	-0.18
135°	-0.12	-0.11	-0.14	-0.20	-0.21	-0.17	-0.37	-0.34	-0.41	-0.22	-0.12	-0.28	-0.05
140°	-0.11	-0.23	-0.30	-0.19	-0.08	-0.23	-0.36	-0.39	-0.50	-0.44	-0.39	-0.63	-0.31
145°	-0.12	-0.22	-0.26	-0.19	-0.12	-0.17	-0.35	-0.39	-0.55	-0.61	-0.61	-0.98	-0.74
150°	-0.12	-0.05	-0.05	-0.19	-0.28	-0.05	-0.33	-0.34	-0.53	-0.69	-0.76	-1.22	-1.11
155°	-0.12	-0.19	-0.22	-0.17	-0.13	-0.11	-0.26	-0.30	-0.45	-0.66	-0.78	-1.29	-1.31
160°	-0.12	-0.13	-0.15	-0.18	-0.18	-0.06	-0.21	-0.23	-0.35	-0.53	-0.68	-1.13	-1.20
165°	-0.10	-0.10	-0.11	-0.17	-0.19	-0.02	-0.16	-0.15	-0.23	-0.36	-0.50	-0.85	-0.88
170°	-0.12	-0.11	-0.13	-0.16	-0.14	-0.02	-0.11	-0.10	-0.14	-0.21	-0.31	-0.59	-0.54
175°	-0.10	-0.21	-0.24	-0.16	-0.08	-0.03	-0.09	-0.07	-0.09	-0.12	-0.19	-0.42	-0.32
180°	-0.11	-0.16	-0.18	-0.15	-0.10	0.01	-0.09	-0.05	-0.07	-0.07	-0.13	-0.35	-0.23
185°	-0.12	-0.18	-0.20	-0.14	-0.06	-0.02	-0.10	-0.07	-0.09	-0.11	-0.18	-0.41	-0.30
190°	-0.14	0.01	-0.07	-0.15	-0.05	-0.03	-0.12	-0.12	-0.12	-0.19	-0.29	-0.56	-0.51
195°	-0.12	-0.09	-0.13	-0.16	-0.11	-0.02	-0.16	-0.16	-0.22	-0.33	-0.46	-0.80	-0.82
200°	-0.12	-0.13	-0.16	-0.16	-0.13	-0.05	-0.21	-0.22	-0.33	-0.51	-0.69	-1.09	-1.19
205°	-0.12	-0.16	-0.20	-0.17	-0.10	-0.10	-0.25	-0.30	-0.44	-0.67	-0.86	-1.28	-1.37
210°	-0.10	-0.19	-0.22	-0.18	-0.14	-0.12	-0.30	-0.36	-0.52	-0.75	-0.89	-1.26	-1.22
215°	-0.11	-0.17	-0.21	-0.19	-0.16	-0.15	-0.34	-0.40	-0.54	-0.71	-0.77	-1.04	-0.88
220°	-0.10	-0.11	-0.15	-0.20	-0.19	-0.16	-0.36	-0.40	-0.50	-0.57	-0.53	-0.70	-0.44
225°	-0.11	-0.19	-0.23	-0.20	-0.18	-0.19	-0.36	-0.37	-0.42	-0.35	-0.22	-0.35	-0.08
230°	-0.10	-0.20	-0.25	-0.20	-0.16	-0.20	-0.34	-0.30	-0.29	-0.11	0.03	-0.18	-0.10
235°	-0.12	-0.12	-0.15	-0.19	-0.22	-0.15	-0.30	-0.19	-0.13	0.05	0.07	-0.37	-0.51
240°	-0.09	-0.19	-0.21	-0.20	-0.20	-0.14	-0.24	-0.07	-0.01	0.03	-0.13	-0.71	-0.87
245°	-0.10	-0.16	-0.23	-0.18	-0.11	-0.15	-0.16	0.03	0.04	-0.14	-0.41	-0.90	-0.91
250°	-0.10	-0.09	-0.12	-0.18	-0.19	-0.06	-0.08	0.11	-0.03	-0.34	-0.54	-0.87	-0.67
255°	-0.10	-0.12	-0.15	-0.16	-0.15	-0.03	0.00	0.13	-0.16	-0.42	-0.51	-0.69	-0.44
260°	-0.08	-0.11	-0.15	-0.15	-0.11	0.02	0.07	0.09	-0.27	-0.39	-0.39	-0.49	-0.60
265°	-0.08	-0.14	-0.17	-0.14	-0.08	0.06	0.09	0.00	-0.33	-0.32	-0.25	-0.58	-0.97
270°	-0.06	-0.09	-0.13	-0.13	-0.07	0.12	0.07	-0.08	-0.33	-0.22	-0.19	-0.90	-0.93
275°	-0.05	-0.11	-0.15	-0.11	-0.03	0.15	0.04	-0.14	-0.28	-0.16	-0.30	-1.02	-0.63
280°	-0.03	-0.11	-0.18	-0.10	0.06	0.13	-0.02	-0.18	-0.22	-0.18	-0.49	-0.80	-0.47
285°	-0.04	-0.10	-0.13	-0.09	0.01	0.17	-0.07	-0.17	-0.17	-0.28	-0.53	-0.55	-0.43
290°	-0.05	-0.04	-0.08	-0.07	0.04	0.15	-0.10	-0.16	-0.10	-0.35	-0.38	-0.45	-0.50
295°	-0.03	-0.03	-0.05	-0.06	-0.01	0.17	-0.13	-0.12	-0.11	-0.33	-0.20	-0.48	-0.56
300°	0.00	-0.04	-0.08	-0.05	0.04	0.13	-0.15	-0.07	-0.13	-0.23	-0.08	-0.54	-0.47
305°	0.01	0.01	-0.03	-0.05	0.01	0.13	-0.17	-0.01	-0.17	-0.11	-0.05	-0.59	-0.28
310°	-0.01	0.03	0.01	-0.03	0.00	0.10	-0.16	0.02	-0.21	-0.01	-0.08	-0.57	-0.11
315°	0.00	-0.03	-0.06	-0.03	0.05	0.06	-0.14	0.04	-0.22	0.05	-0.13	-0.44	-0.05
320°	0.00	-0.12	-0.15	-0.02	0.12	0.01	-0.11	0.05	-0.21	0.08	-0.19	-0.26	-0.07
325°	-0.01	-0.03	-0.04	-0.01	0.05	0.02	-0.09	0.05	-0.17	0.09	-0.22	-0.11	-0.12
330°	0.03	-0.11	-0.11	-0.01	0.04	0.00	-0.06	0.05	-0.15	0.07	-0.21	-0.01	-0.16
335°	-0.01	0.01	0.00	-0.01	0.03	0.00	-0.04	0.03	-0.10	0.05	-0.18	0.04	-0.17
340°	0.01	-0.01	-0.03	-0.01	0.02	-0.01	-0.02	0.03	-0.06	0.04	-0.12	0.06	-0.12
345°	0.01	0.01	-0.01	0.00	0.02	-0.02	0.00	0.02	-0.02	0.02	-0.09	0.04	-0.09
350°	-0.01	0.16	0.11	-0.01	0.02	-0.02	0.01	0.01	0.02	0.02	-0.05	0.03	-0.05
355°	0.01	-0.03	-0.03	0.00	0.01	-0.02	0.01	0.02	0.01	0.02	-0.01	0.02	0.00

Table A.11 Directional response for the sound level meter, measured in a plane perpendicular to the display and along the microphone's axis, 3.15 KHz - 10 KHz

Angel	Nominal Frequency												
	3.15 KHz	3.55 KHz	4 KHz	4.5 KHz	5 KHz	5.6 KHz	6.3 KHz	7.1 KHz	8 KHz	8.5 KHz	9 KHz	9.5 KHz	10 KHz
0°	0.01	0.00	0.00	-0.01	-0.01	-0.01	0.00	-0.01	0.00	-0.01	-0.01	-0.01	-0.01
5°	0.01	-0.01	0.00	0.00	0.00	0.02	0.01	0.00	-0.01	0.02	-0.04	0.00	0.00
10°	0.02	-0.04	-0.01	0.01	-0.02	0.01	-0.02	0.00	-0.06	-0.02	-0.15	-0.03	-0.04
15°	0.03	-0.10	-0.02	0.03	-0.05	-0.03	-0.10	-0.04	-0.10	-0.09	-0.25	-0.05	-0.09
20°	0.03	-0.18	-0.02	0.01	-0.13	-0.15	-0.26	-0.14	-0.16	-0.27	-0.32	-0.16	-0.26
25°	0.01	-0.26	0.01	-0.03	-0.25	-0.33	-0.48	-0.31	-0.24	-0.47	-0.31	-0.40	-0.47
30°	-0.06	-0.33	0.01	-0.17	-0.41	-0.56	-0.67	-0.58	-0.47	-0.65	-0.47	-0.77	-0.66
35°	-0.15	-0.33	-0.02	-0.34	-0.47	-0.61	-0.58	-0.65	-0.70	-0.74	-0.81	-0.84	-0.83
40°	-0.29	-0.32	-0.17	-0.51	-0.47	-0.60	-0.51	-0.67	-0.84	-0.95	-1.06	-0.93	-1.30
45°	-0.37	-0.30	-0.35	-0.51	-0.43	-0.65	-0.80	-0.96	-0.98	-1.22	-1.23	-1.50	-1.46
50°	-0.40	-0.39	-0.46	-0.47	-0.67	-0.98	-1.28	-1.34	-1.35	-1.41	-1.56	-1.67	-1.67
55°	-0.37	-0.53	-0.40	-0.56	-0.92	-1.10	-1.30	-1.21	-1.49	-1.62	-1.69	-1.94	-2.29
60°	-0.37	-0.71	-0.42	-0.97	-1.09	-0.96	-1.14	-1.48	-1.92	-2.18	-2.15	-2.35	-2.48
65°	-0.56	-0.75	-0.53	-0.98	-0.85	-1.40	-1.77	-1.99	-1.82	-2.18	-2.32	-2.50	-2.78
70°	-0.84	-0.65	-0.83	-0.92	-1.28	-1.58	-1.37	-2.24	-2.06	-2.31	-2.52	-2.72	-3.02
75°	-0.93	-0.79	-0.93	-0.95	-1.36	-1.44	-2.13	-1.86	-3.29	-2.82	-2.87	-3.23	-3.41
80°	-0.73	-1.10	-0.80	-1.40	-1.30	-1.86	-2.10	-1.99	-2.63	-3.77	-3.44	-3.45	-3.97
85°	-0.57	-1.16	-0.95	-1.42	-1.46	-1.82	-1.86	-3.17	-2.58	-3.28	-4.13	-4.05	-3.94
90°	-0.70	-0.87	-1.32	-1.29	-2.00	-1.88	-2.83	-2.93	-2.65	-3.50	-3.99	-4.31	-4.49
95°	-1.06	-0.87	-1.09	-1.65	-1.68	-2.35	-2.22	-2.40	-3.63	-3.29	-4.42	-4.42	-4.32
100°	-1.38	-1.23	-0.85	-1.73	-1.92	-2.33	-2.57	-2.90	-3.64	-3.73	-4.61	-4.58	-4.68
105°	-1.09	-1.66	-1.27	-1.28	-2.25	-2.37	-3.18	-3.30	-4.38	-3.71	-4.59	-4.92	-4.96
110°	-0.70	-1.37	-1.80	-1.71	-1.55	-2.64	-2.73	-4.08	-3.88	-3.91	-4.94	-4.67	-5.43
115°	-0.88	-0.90	-1.45	-2.35	-2.20	-2.07	-3.15	-3.02	-4.68	-4.67	-4.64	-4.90	-5.91
120°	-1.14	-1.12	-0.85	-1.70	-2.75	-2.81	-2.44	-3.73	-3.67	-4.44	-5.42	-5.60	-5.81
125°	-1.09	-1.39	-1.24	-1.23	-1.73	-3.15	-3.69	-3.16	-4.22	-4.82	-4.68	-5.08	-6.00
130°	-0.65	-1.19	-1.49	-1.79	-1.64	-1.95	-3.28	-4.71	-3.92	-4.20	-4.86	-5.71	-5.66
135°	-0.26	-0.60	-1.00	-1.90	-2.39	-2.33	-2.21	-2.72	-5.34	-5.35	-5.30	-5.40	-5.59
140°	-0.37	-0.37	-0.34	-0.93	-1.77	-2.77	-3.09	-3.09	-2.85	-3.71	-4.90	-6.12	-6.40
145°	-0.83	-0.78	-0.50	-0.61	-0.76	-1.32	-2.59	-4.00	-3.95	-4.17	-4.07	-4.05	-4.67
150°	-1.29	-1.34	-1.12	-1.22	-1.18	-1.24	-1.17	-1.52	-3.89	-4.47	-4.94	-5.30	-5.46
155°	-1.63	-1.82	-1.80	-1.98	-2.08	-2.19	-2.22	-1.98	-1.64	-2.24	-2.67	-3.43	-4.04
160°	-1.61	-1.94	-2.19	-2.68	-3.06	-3.12	-3.17	-3.47	-3.68	-3.60	-3.66	-3.69	-4.25
165°	-1.26	-1.58	-1.87	-2.59	-3.20	-3.79	-4.61	-5.19	-5.02	-5.36	-5.46	-5.63	-5.75
170°	-0.83	-1.05	-1.19	-1.78	-2.19	-2.90	-3.87	-4.82	-5.77	-6.21	-6.60	-7.42	-7.63
175°	-0.53	-0.69	-0.70	-1.15	-1.35	-1.89	-2.51	-3.05	-4.13	-4.45	-4.77	-5.32	-5.64
180°	-0.42	-0.55	-0.52	-0.92	-1.05	-1.53	-2.05	-2.44	-3.25	-3.56	-3.82	-4.22	-4.54
185°	-0.50	-0.67	-0.69	-1.13	-1.32	-1.89	-2.56	-3.01	-3.83	-4.25	-4.59	-5.19	-5.70
190°	-0.77	-1.02	-1.17	-1.75	-2.17	-2.93	-3.94	-4.64	-5.61	-6.30	-6.86	-8.06	-8.67
195°	-1.18	-1.56	-1.88	-2.57	-3.23	-3.92	-4.68	-5.26	-5.67	-6.14	-6.40	-6.53	-6.43
200°	-1.61	-2.04	-2.37	-2.87	-3.31	-3.42	-3.36	-3.67	-4.24	-4.23	-4.07	-4.05	-4.33
205°	-1.72	-1.99	-2.01	-2.20	-2.25	-2.33	-2.40	-2.43	-2.04	-2.29	-2.56	-3.05	-3.75
210°	-1.44	-1.49	-1.27	-1.36	-1.30	-1.31	-1.28	-1.59	-3.28	-4.15	-4.85	-5.65	-5.90
215°	-0.97	-0.87	-0.55	-0.64	-0.72	-1.33	-2.65	-4.02	-4.21	-4.45	-4.46	-4.23	-4.58
220°	-0.43	-0.35	-0.24	-0.88	-1.69	-2.88	-3.14	-3.17	-2.82	-3.38	-4.36	-5.68	-6.39
225°	-0.19	-0.52	-0.94	-1.92	-2.55	-2.42	-2.34	-2.59	-4.91	-5.42	-5.34	-5.40	-5.46
230°	-0.58	-1.22	-1.60	-1.87	-1.73	-1.85	-3.02	-4.45	-4.28	-4.13	-4.56	-5.88	-6.05
235°	-1.14	-1.48	-1.31	-1.22	-1.66	-3.14	-3.60	-3.21	-4.38	-5.11	-4.90	-5.11	-5.67
240°	-1.22	-1.16	-0.77	-1.59	-2.70	-2.79	-2.57	-3.93	-3.97	-4.17	-4.92	-5.54	-5.68
245°	-0.95	-0.79	-1.28	-2.37	-2.28	-2.11	-3.31	-3.18	-4.20	-4.65	-4.76	-5.01	-5.84
250°	-0.64	-1.23	-1.88	-1.79	-1.66	-2.89	-2.73	-3.54	-4.05	-4.01	-4.94	-4.65	-5.49
255°	-0.96	-1.71	-1.36	-1.37	-2.40	-2.28	-2.99	-3.34	-4.19	-3.90	-4.55	-4.67	-4.98
260°	-1.40	-1.31	-0.95	-1.86	-1.82	-2.22	-2.73	-2.90	-3.56	-3.76	-4.59	-4.38	-4.68
265°	-1.17	-0.98	-1.17	-1.68	-1.59	-2.53	-2.32	-2.64	-3.40	-3.58	-4.35	-4.12	-4.37
270°	-0.81	-0.97	-1.41	-1.16	-2.12	-1.92	-2.78	-2.93	-2.77	-3.66	-3.99	-4.11	-4.09
275°	-0.68	-1.23	-0.85	-1.42	-1.61	-1.88	-1.88	-3.04	-2.77	-3.50	-3.84	-3.72	-3.93
280°	-0.79	-1.12	-0.71	-1.58	-1.26	-1.93	-2.16	-1.94	-2.93	-3.49	-3.28	-3.38	-3.61
285°	-0.95	-0.70	-1.02	-1.08	-1.42	-1.40	-2.17	-2.08	-3.00	-2.79	-2.78	-3.02	-3.28
290°	-0.82	-0.61	-1.00	-0.88	-1.38	-1.66	-1.38	-2.24	-2.12	-2.31	-2.47	-2.77	-3.01
295°	-0.50	-0.80	-0.58	-0.96	-0.86	-1.45	-1.78	-1.70	-1.96	-2.26	-2.52	-2.64	-2.66
300°	-0.32	-0.84	-0.35	-1.02	-1.08	-0.99	-1.16	-1.67	-1.92	-2.23	-2.19	-2.25	-2.54
305°	-0.40	-0.63	-0.37	-0.59	-0.98	-1.08	-1.25	-1.30	-1.55	-1.67	-1.67	-1.96	-2.11
310°	-0.51	-0.40	-0.52	-0.44	-0.72	-1.05	-1.22	-1.21	-1.43	-1.50	-1.49	-1.69	-1.65
315°	-0.49	-0.26	-0.43	-0.48	-0.40	-0.65	-0.93	-0.88	-1.00	-1.17	-1.29	-1.38	-1.43
320°	-0.37	-0.26	-0.20	-0.52	-0.39	-0.48	-0.60	-0.74	-0.86	-0.96	-1.06	-1.02	-1.21
325°	-0.21	-0.32	-0.02	-0.42	-0.46	-0.48	-0.52	-0.68	-0.69	-0.79	-0.81	-0.81	-0.88
330°	-0.07	-0.33	0.05	-0.23	-0.42	-0.48	-0.48	-0.53	-0.49	-0.59	-0.56	-0.67	-0.65
335°	0.00	-0.29	0.03	-0.08	-0.30	-0.39	-0.37	-0.33	-0.36	-0.41	-0.38	-0.47	-0.41
340°	0.04	-0.19	0.02	0.02	-0.14	-0.22	-0.20	-0.13	-0.22	-0.22	-0.22	-0.25	-0.16
345°	0.03	-0.12	-0.01	0.03	-0.06	-0.11	-0.10	-0.04	-0.14	-0.14	-0.14	-0.14	-0.09
350°	0.01	-0.05	0.00	0.02	-0.02	-0.04	-0.04	-0.01	-0.06	-0.06	-0.06	-0.05	-0.04
355°	0.00	0.00	0.01	0.02	0.00	-0.01	-0.01	0.01	0.00	-0.01	0.01	0.01	0.01

Table A.12 Directional response for the sound level meter, measured in a plane perpendicular to the display and along the microphone's axis, 10.6 KHz - 20 KHz

Angle	Nominal Frequency											
	10.6 KHz	11.2 KHz	11.8 KHz	12.5 KHz	13.2 KHz	14 KHz	15 KHz	16 KHz	17 KHz	18 KHz	19 KHz	20 KHz
0°	-0.01	-0.01	0.00	0.00	-0.02	-0.01	-0.02	-0.01	-0.02	-0.03	-0.01	0.01
5°	0.00	-0.02	-0.04	-0.03	-0.03	-0.03	-0.03	-0.02	-0.04	-0.04	-0.06	-0.02
10°	-0.03	-0.06	-0.11	-0.10	-0.10	-0.12	-0.13	-0.11	-0.19	-0.17	-0.20	-0.11
15°	-0.14	-0.21	-0.28	-0.24	-0.27	-0.34	-0.31	-0.32	-0.47	-0.55	-0.48	-0.39
20°	-0.38	-0.43	-0.47	-0.38	-0.46	-0.56	-0.58	-0.67	-0.82	-0.91	-0.90	-0.85
25°	-0.58	-0.56	-0.62	-0.61	-0.75	-0.77	-0.80	-0.96	-1.13	-1.17	-1.24	-1.14
30°	-0.78	-0.77	-0.95	-1.04	-1.16	-1.19	-1.23	-1.32	-1.54	-1.79	-1.79	-1.74
35°	-1.02	-1.14	-1.26	-1.27	-1.36	-1.56	-1.62	-1.78	-2.12	-2.31	-2.35	-2.30
40°	-1.37	-1.40	-1.54	-1.60	-1.89	-2.07	-2.10	-2.29	-2.59	-2.92	-3.22	-3.01
45°	-1.64	-1.75	-2.06	-2.06	-2.26	-2.44	-2.67	-2.89	-3.25	-3.67	-3.78	-3.67
50°	-2.23	-2.23	-2.33	-2.52	-2.78	-3.13	-3.30	-3.56	-3.92	-4.37	-4.73	-4.76
55°	-2.27	-2.64	-2.80	-3.02	-3.12	-3.49	-3.92	-4.17	-4.56	-4.97	-5.33	-5.50
60°	-2.97	-2.71	-3.34	-3.40	-3.68	-4.05	-4.36	-4.76	-5.25	-5.75	-6.10	-6.31
65°	-2.97	-3.48	-3.80	-4.00	-4.04	-4.85	-5.00	-5.28	-6.05	-6.68	-7.15	-7.44
70°	-3.59	-3.52	-4.36	-4.58	-4.58	-5.38	-5.49	-6.35	-6.76	-7.41	-7.98	-8.11
75°	-3.94	-4.38	-4.27	-5.20	-5.31	-5.61	-6.58	-6.78	-7.43	-8.12	-8.89	-9.05
80°	-4.21	-4.79	-5.14	-5.03	-6.24	-6.26	-6.74	-7.82	-8.25	-8.77	-9.42	-10.19
85°	-4.65	-4.85	-5.80	-5.66	-6.03	-7.11	-7.57	-7.88	-9.34	-9.45	-10.30	-10.95
90°	-4.71	-5.12	-5.91	-6.46	-6.61	-7.46	-7.62	-9.26	-9.33	-10.39	-10.99	-12.11
95°	-5.06	-6.08	-6.01	-6.88	-7.14	-8.05	-8.69	-9.25	-9.91	-11.12	-11.89	-13.09
100°	-5.54	-6.23	-7.27	-7.10	-7.42	-8.28	-9.15	-9.61	-10.74	-11.59	-13.25	-13.12
105°	-6.27	-6.28	-6.59	-6.84	-8.46	-8.81	-9.60	-10.19	-11.44	-12.30	-14.13	-12.84
110°	-6.24	-5.98	-7.36	-7.96	-8.29	-8.30	-10.19	-10.50	-11.65	-12.67	-13.37	-14.60
115°	-5.82	-6.94	-7.97	-7.49	-8.58	-9.66	-10.40	-10.21	-12.21	-13.28	-15.00	-14.72
120°	-6.02	-7.44	-6.87	-8.19	-8.63	-8.88	-10.95	-11.30	-12.58	-12.82	-13.12	-17.03
125°	-7.11	-7.03	-7.74	-8.55	-8.52	-9.99	-10.10	-11.30	-13.03	-13.22	-15.07	-15.90
130°	-6.28	-6.42	-8.93	-8.34	-9.41	-9.82	-11.27	-10.82	-13.25	-13.62	-13.62	-16.67
135°	-6.70	-7.12	-7.71	-7.87	-8.64	-10.28	-10.79	-12.21	-13.24	-14.50	-13.70	-16.71
140°	-7.09	-7.24	-7.93	-8.82	-9.36	-10.02	-10.47	-11.20	-12.74	-14.07	-15.24	-17.52
145°	-5.44	-6.38	-8.15	-9.20	-9.32	-10.08	-11.02	-12.42	-13.71	-14.01	-14.23	-15.61
150°	-5.84	-5.83	-6.57	-7.01	-7.47	-8.59	-10.23	-11.87	-12.61	-13.33	-14.61	-17.02
155°	-4.91	-6.18	-7.74	-7.97	-8.19	-8.67	-9.15	-9.97	-11.03	-11.76	-12.90	-14.93
160°	-4.59	-4.59	-4.82	-5.24	-5.98	-7.03	-8.31	-10.09	-11.88	-13.12	-14.41	-13.77
165°	-5.96	-6.36	-7.02	-7.47	-7.95	-8.38	-8.81	-9.34	-10.12	-10.97	-11.49	-11.73
170°	-8.71	-9.33	-9.61	-9.92	-10.41	-11.13	-11.70	-12.31	-13.09	-14.06	-15.13	-14.66
175°	-6.43	-7.35	-8.22	-8.93	-9.70	-10.67	-11.63	-12.80	-14.07	-15.03	-17.02	-22.65
180°	-5.17	-5.74	-6.34	-6.95	-7.74	-8.47	-9.18	-10.08	-11.14	-12.05	-12.82	-14.53
185°	-6.61	-7.26	-7.87	-8.49	-9.70	-10.79	-11.87	-13.09	-14.52	-16.52	-17.77	-17.66
190°	-9.55	-9.83	-10.09	-11.21	-12.17	-12.66	-12.96	-13.33	-13.93	-13.98	-13.40	-15.28
195°	-6.19	-6.59	-7.09	-7.58	-8.18	-8.57	-8.83	-9.13	-9.62	-10.06	-10.79	-12.17
200°	-4.72	-4.87	-4.98	-5.14	-5.71	-6.50	-7.43	-8.87	-10.48	-12.07	-12.90	-13.52
205°	-4.60	-5.62	-6.87	-7.86	-8.70	-8.89	-8.87	-9.46	-10.31	-11.12	-12.71	-13.01
210°	-6.00	-5.90	-6.33	-6.72	-7.27	-7.99	-8.98	-10.61	-11.31	-11.83	-13.36	-13.50
215°	-5.37	-5.88	-6.92	-8.19	-8.89	-9.13	-9.81	-10.88	-12.02	-13.14	-12.51	-14.26
220°	-6.89	-6.76	-6.99	-7.73	-9.00	-9.57	-9.84	-10.47	-12.00	-13.14	-12.59	-14.54
225°	-6.27	-6.95	-7.24	-7.81	-8.66	-9.85	-10.20	-10.11	-11.78	-12.68	-13.92	-14.07
230°	-6.39	-6.40	-7.40	-7.99	-8.39	-9.49	-10.33	-10.27	-11.56	-12.43	-13.92	-14.56
235°	-6.64	-6.30	-7.21	-7.92	-8.78	-8.84	-9.80	-10.47	-10.86	-12.18	-13.39	-14.41
240°	-6.12	-6.92	-6.32	-7.96	-8.20	-8.52	-10.23	-10.05	-10.77	-11.90	-12.67	-14.17
245°	-5.57	-6.71	-6.66	-6.95	-9.01	-8.72	-9.00	-9.47	-10.76	-11.75	-13.65	-14.00
250°	-5.66	-5.62	-7.11	-7.08	-7.68	-8.18	-9.13	-9.77	-10.86	-11.37	-12.26	-14.01
255°	-5.92	-5.51	-5.99	-6.93	-8.02	-8.60	-9.02	-9.31	-10.17	-11.09	-12.32	-12.75
260°	-5.44	-5.97	-5.80	-6.69	-7.18	-7.83	-8.29	-8.90	-9.66	-10.39	-11.98	-12.10
265°	-4.95	-5.68	-5.86	-6.53	-6.95	-7.66	-8.08	-8.40	-9.11	-9.90	-11.10	-11.76
270°	-4.74	-4.86	-5.36	-6.01	-6.58	-7.09	-7.21	-7.95	-8.77	-9.06	-10.39	-11.08
275°	-4.25	-4.51	-5.11	-5.41	-5.95	-6.55	-7.23	-7.10	-8.20	-8.52	-9.56	-10.38
280°	-3.97	-4.46	-4.51	-4.91	-5.77	-6.32	-6.06	-7.11	-7.10	-8.13	-8.62	-9.58
285°	-3.76	-3.88	-4.04	-4.71	-5.42	-5.30	-6.06	-5.86	-6.91	-7.30	-7.99	-8.75
290°	-3.24	-3.45	-3.71	-4.32	-4.67	-4.88	-5.12	-5.72	-5.96	-6.68	-7.22	-8.06
295°	-2.99	-3.16	-3.29	-3.93	-3.92	-4.58	-4.49	-4.90	-5.52	-5.84	-6.23	-7.08
300°	-2.73	-2.65	-2.85	-3.34	-3.45	-4.02	-4.03	-4.34	-4.74	-5.14	-5.45	-6.01
305°	-2.28	-2.42	-2.45	-2.88	-3.11	-3.38	-3.60	-3.70	-4.05	-4.31	-4.71	-5.46
310°	-1.95	-2.11	-1.98	-2.37	-2.53	-2.85	-2.90	-3.10	-3.31	-3.65	-4.03	-4.47
315°	-1.56	-1.54	-1.72	-1.88	-2.22	-2.38	-2.43	-2.50	-2.81	-3.05	-3.30	-3.71
320°	-1.33	-1.29	-1.42	-1.49	-1.83	-1.92	-1.93	-1.98	-2.26	-2.50	-2.58	-2.93
325°	-0.91	-1.01	-1.04	-1.23	-1.38	-1.50	-1.41	-1.51	-1.75	-1.91	-1.98	-2.29
330°	-0.69	-0.71	-0.74	-0.91	-1.04	-1.09	-1.05	-1.11	-1.31	-1.35	-1.40	-1.70
335°	-0.53	-0.48	-0.56	-0.62	-0.75	-0.69	-0.69	-0.73	-0.86	-0.88	-0.86	-1.18
340°	-0.29	-0.22	-0.31	-0.32	-0.44	-0.42	-0.42	-0.49	-0.56	-0.54	-0.61	-0.81
345°	-0.15	-0.09	-0.14	-0.15	-0.24	-0.25	-0.22	-0.26	-0.29	-0.29	-0.31	-0.46
350°	-0.06	-0.03	-0.04	-0.06	-0.09	-0.12	-0.08	-0.09	-0.12	-0.11	-0.12	-0.19
355°	0.01	0.03	0.03	0.02	0.01	0.00	0.02	0.02	0.00	0.02	0.03	-0.02

Table A.13 *Sensitivity variations of the sound level meter, at sound incidence angles within $\pm\theta^\circ$ from the reference direction*

Nominal Frequency	Exact Frequency (6 digits)	Max Variation $\pm 30^\circ$	Max Variation $\pm 90^\circ$	Max Variation $\pm 150^\circ$
Hz	Hz	dB	dB	dB
250	251.189	0.09	0.15	0.18
315	316.228	0.41	0.41	0.47
400	398.107	0.44	0.44	0.44
500	501.187	0.05	0.17	0.25
630	630.957	0.37	0.45	0.67
800	794.328	0.23	0.41	0.47
1000	1000.00	0.11	0.27	0.47
1250	1258.93	0.07	0.24	0.55
1600	1584.89	0.20	0.35	0.59
2000	1995.26	0.11	0.53	0.86
2240	2238.72	0.22	0.63	0.96
2500	2511.89	0.15	1.08	1.32
2800	2818.38	0.18	0.94	1.24
3150	3162.28	0.13	1.00	1.48
3550	3548.13	0.37	1.24	1.72
4000	3981.07	0.08	1.47	1.93
4500	4466.84	0.28	1.63	2.43
5000	5011.87	0.44	2.14	2.77
5600	5623.41	0.57	2.20	3.17
6300	6309.57	0.68	2.85	3.71
7100	7079.46	0.60	3.19	4.73
8000	7943.28	0.60	3.31	5.36
8500	8413.95	0.67	3.83	5.44
9000	8912.51	0.60	4.27	5.44
9500	9440.61	0.80	4.33	6.14
10000	10000.0	0.75	4.51	6.42
10600	10592.5	0.91	4.76	7.13
11200	11220.2	0.87	5.36	7.47
11800	11885.0	1.02	6.08	8.96
12500	12589.3	1.06	6.48	9.21
13200	13335.2	1.23	6.93	9.43
14000	14125.4	1.25	7.53	10.36
15000	14962.4	1.29	7.82	11.30
16000	15848.9	1.46	9.30	12.46
17000	16788.0	1.68	9.79	13.75
18000	17782.8	1.83	10.42	14.53
19000	18836.5	1.85	11.46	15.91
20000	19952.6	1.77	12.12	17.62

Table A.14 Influence of Windscreen UA-1650 on directional response, 250 Hz - 2.8 KHz

Angel	Nominal Frequency												
	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 KHz	1.25 KHz	1.6 KHz	2 KHz	2.24 KHz	2.5 KHz	2.8 KHz
0°	-0.02	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01
5°	-0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01
10°	0.03	0.01	0.00	-0.01	0.00	0.00	-0.01	-0.01	0.00	-0.01	0.00	0.00	0.00
15°	0.01	0.01	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	-0.01
20°	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.00
25°	0.02	0.01	0.00	-0.01	-0.01	0.00	-0.01	-0.01	-0.02	-0.01	-0.02	0.00	0.00
30°	0.02	0.01	0.00	-0.01	-0.01	0.00	-0.01	-0.02	-0.02	-0.02	-0.02	-0.01	0.00
35°	0.02	0.01	0.00	-0.01	-0.02	-0.01	-0.01	-0.03	-0.03	-0.03	-0.03	-0.02	0.01
40°	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.02	-0.04	-0.04	-0.05	-0.03	-0.03	0.02
45°	0.01	0.01	0.00	-0.01	-0.02	-0.02	-0.02	-0.05	-0.05	-0.07	-0.04	-0.04	0.02
50°	-0.01	-0.01	0.00	0.00	-0.01	-0.02	-0.02	-0.06	-0.06	-0.08	-0.06	-0.05	0.01
55°	-0.01	-0.01	0.00	-0.01	-0.01	-0.02	-0.03	-0.07	-0.08	-0.10	-0.08	-0.06	-0.01
60°	-0.01	-0.01	-0.01	-0.01	-0.01	-0.03	-0.04	-0.07	-0.10	-0.11	-0.11	-0.07	-0.01
65°	-0.02	-0.01	-0.01	-0.01	-0.01	-0.03	-0.05	-0.08	-0.12	-0.12	-0.13	-0.10	-0.02
70°	-0.01	-0.01	-0.01	-0.01	-0.01	-0.03	-0.05	-0.09	-0.13	-0.14	-0.14	-0.13	-0.04
75°	-0.01	-0.01	-0.01	-0.02	-0.02	-0.04	-0.06	-0.09	-0.15	-0.16	-0.15	-0.15	-0.06
80°	0.00	-0.01	-0.01	-0.02	-0.02	-0.04	-0.06	-0.10	-0.16	-0.19	-0.17	-0.16	-0.09
85°	0.02	0.00	-0.02	-0.03	-0.03	-0.04	-0.07	-0.11	-0.17	-0.22	-0.19	-0.18	-0.10
90°	-0.01	-0.01	-0.02	-0.02	-0.02	-0.05	-0.07	-0.12	-0.18	-0.23	-0.22	-0.20	-0.11
95°	-0.01	-0.01	-0.02	-0.02	-0.03	-0.05	-0.07	-0.13	-0.18	-0.24	-0.24	-0.23	-0.14
100°	-0.01	-0.01	-0.02	-0.02	-0.03	-0.05	-0.07	-0.12	-0.19	-0.25	-0.25	-0.24	-0.17
105°	-0.03	-0.02	-0.02	-0.02	-0.02	-0.06	-0.07	-0.12	-0.19	-0.26	-0.26	-0.25	-0.19
110°	-0.01	-0.02	-0.02	-0.03	-0.03	-0.05	-0.08	-0.12	-0.19	-0.26	-0.27	-0.25	-0.19
115°	-0.01	-0.01	-0.02	-0.03	-0.04	-0.05	-0.07	-0.12	-0.19	-0.26	-0.27	-0.26	-0.18
120°	0.01	-0.01	-0.02	-0.04	-0.04	-0.05	-0.07	-0.12	-0.19	-0.26	-0.26	-0.26	-0.18
125°	-0.02	-0.02	-0.02	-0.03	-0.03	-0.05	-0.07	-0.12	-0.18	-0.25	-0.25	-0.26	-0.18
130°	-0.03	-0.02	-0.02	-0.03	-0.04	-0.05	-0.07	-0.13	-0.18	-0.25	-0.24	-0.24	-0.17
135°	-0.02	-0.02	-0.02	-0.03	-0.04	-0.05	-0.07	-0.12	-0.17	-0.24	-0.23	-0.23	-0.15
140°	-0.02	-0.02	-0.02	-0.03	-0.04	-0.05	-0.07	-0.12	-0.16	-0.24	-0.22	-0.22	-0.13
145°	-0.03	-0.03	-0.03	-0.03	-0.04	-0.06	-0.08	-0.13	-0.15	-0.24	-0.22	-0.21	-0.12
150°	-0.03	-0.03	-0.03	-0.03	-0.04	-0.06	-0.08	-0.12	-0.15	-0.24	-0.22	-0.20	-0.12
155°	-0.02	-0.02	-0.03	-0.03	-0.04	-0.06	-0.07	-0.13	-0.15	-0.23	-0.22	-0.20	-0.11
160°	-0.03	-0.03	-0.03	-0.03	-0.04	-0.06	-0.07	-0.13	-0.15	-0.23	-0.21	-0.19	-0.11
165°	-0.03	-0.03	-0.03	-0.03	-0.04	-0.06	-0.07	-0.13	-0.15	-0.23	-0.21	-0.19	-0.10
170°	-0.03	-0.03	-0.03	-0.03	-0.04	-0.06	-0.07	-0.13	-0.15	-0.22	-0.21	-0.19	-0.10
175°	-0.02	-0.02	-0.03	-0.04	-0.04	-0.06	-0.07	-0.13	-0.16	-0.22	-0.21	-0.19	-0.10
180°	0.01	-0.01	-0.03	-0.05	-0.05	-0.05	-0.07	-0.13	-0.16	-0.22	-0.21	-0.19	-0.10
185°	-0.04	-0.03	-0.03	-0.03	-0.03	-0.06	-0.07	-0.12	-0.16	-0.23	-0.21	-0.19	-0.10
190°	-0.02	-0.02	-0.03	-0.04	-0.05	-0.06	-0.07	-0.13	-0.16	-0.23	-0.22	-0.20	-0.11
195°	-0.03	-0.03	-0.03	-0.03	-0.04	-0.06	-0.07	-0.13	-0.16	-0.23	-0.22	-0.20	-0.11
200°	-0.03	-0.03	-0.03	-0.03	-0.04	-0.06	-0.07	-0.13	-0.16	-0.24	-0.22	-0.21	-0.12
205°	-0.04	-0.03	-0.03	-0.03	-0.04	-0.06	-0.07	-0.13	-0.16	-0.24	-0.23	-0.21	-0.12
210°	-0.03	-0.03	-0.03	-0.03	-0.04	-0.06	-0.07	-0.13	-0.16	-0.24	-0.23	-0.22	-0.12
215°	-0.04	-0.03	-0.03	-0.03	-0.04	-0.06	-0.08	-0.13	-0.16	-0.25	-0.23	-0.22	-0.13
220°	-0.01	-0.02	-0.03	-0.04	-0.05	-0.06	-0.08	-0.13	-0.17	-0.25	-0.23	-0.22	-0.14
225°	-0.02	-0.03	-0.03	-0.04	-0.04	-0.06	-0.08	-0.13	-0.18	-0.25	-0.24	-0.23	-0.15
230°	-0.03	-0.03	-0.03	-0.03	-0.04	-0.06	-0.08	-0.13	-0.18	-0.25	-0.25	-0.24	-0.17
235°	-0.03	-0.03	-0.03	-0.03	-0.04	-0.06	-0.08	-0.13	-0.19	-0.26	-0.26	-0.26	-0.19
240°	-0.02	-0.02	-0.03	-0.03	-0.04	-0.06	-0.08	-0.12	-0.20	-0.26	-0.27	-0.26	-0.19
245°	-0.02	-0.02	-0.03	-0.03	-0.04	-0.06	-0.08	-0.13	-0.20	-0.27	-0.27	-0.26	-0.18
250°	-0.02	-0.02	-0.02	-0.03	-0.04	-0.05	-0.08	-0.13	-0.20	-0.26	-0.27	-0.26	-0.19
255°	-0.03	-0.02	-0.02	-0.03	-0.04	-0.06	-0.08	-0.13	-0.20	-0.26	-0.26	-0.25	-0.19
260°	-0.04	-0.03	-0.02	-0.02	-0.03	-0.05	-0.07	-0.13	-0.19	-0.25	-0.25	-0.25	-0.18
265°	-0.02	-0.02	-0.02	-0.03	-0.04	-0.05	-0.07	-0.13	-0.18	-0.24	-0.24	-0.23	-0.14
270°	-0.02	-0.02	-0.02	-0.02	-0.03	-0.05	-0.07	-0.12	-0.17	-0.23	-0.22	-0.21	-0.11
275°	0.01	-0.01	-0.02	-0.04	-0.04	-0.04	-0.07	-0.12	-0.16	-0.21	-0.20	-0.18	-0.10
280°	-0.01	-0.02	-0.02	-0.02	-0.02	-0.04	-0.07	-0.10	-0.15	-0.19	-0.17	-0.16	-0.08
285°	-0.01	-0.01	-0.01	-0.02	-0.03	-0.04	-0.06	-0.10	-0.14	-0.16	-0.15	-0.14	-0.05
290°	-0.01	-0.01	-0.01	-0.02	-0.02	-0.04	-0.05	-0.09	-0.13	-0.14	-0.13	-0.12	-0.03
295°	-0.03	-0.02	-0.01	-0.01	-0.01	-0.03	-0.05	-0.08	-0.11	-0.12	-0.12	-0.09	-0.01
300°	0.00	-0.01	-0.01	-0.02	-0.03	-0.03	-0.04	-0.07	-0.09	-0.11	-0.10	-0.06	0.00
305°	-0.02	-0.01	-0.01	-0.01	-0.02	-0.03	-0.03	-0.06	-0.08	-0.09	-0.07	-0.05	0.01
310°	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.03	-0.05	-0.06	-0.08	-0.05	-0.04	0.02
315°	0.04	0.01	-0.01	-0.02	-0.03	-0.02	-0.02	-0.04	-0.05	-0.06	-0.03	-0.03	0.03
320°	-0.02	-0.01	0.00	0.00	-0.01	-0.01	-0.02	-0.03	-0.03	-0.04	-0.02	-0.02	0.02
325°	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02	0.00	0.02
330°	0.00	0.00	0.00	-0.01	-0.01	0.00	-0.01	-0.01	-0.02	-0.01	-0.01	0.01	0.02
335°	0.02	0.01	0.00	0.00	-0.01	0.00	0.00	-0.01	-0.01	0.00	-0.01	0.01	0.02
340°	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
345°	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02
350°	0.03	0.01	0.00	-0.01	-0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.02
355°	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01

Table A.15 Influence of Windscreen UA-1650 on directional response, 3.15 KHz
- 10 KHz

Angel	Nominal Frequency												
	3.15 KHz	3.55 KHz	4 KHz	4.5 KHz	5 KHz	5.6 KHz	6.3 KHz	7.1 KHz	8 KHz	8.5 KHz	9 KHz	9.5 KHz	10 KHz
0°	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.01	-0.01
5°	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.01	0.00	0.00
10°	0.00	0.00	-0.01	-0.01	-0.02	-0.01	0.01	0.00	-0.06	-0.04	-0.02	0.02	0.00
15°	0.01	0.00	-0.01	-0.02	-0.03	-0.01	0.03	0.02	-0.11	-0.10	-0.03	0.06	0.01
20°	0.02	0.01	0.00	-0.03	-0.06	-0.02	0.06	0.05	-0.20	-0.18	-0.05	0.08	0.03
25°	0.03	0.03	0.00	-0.04	-0.09	-0.03	0.09	0.10	-0.27	-0.26	-0.08	0.10	0.05
30°	0.04	0.04	0.01	-0.05	-0.13	-0.06	0.10	0.14	-0.31	-0.36	-0.17	0.06	0.07
35°	0.05	0.06	0.02	-0.06	-0.16	-0.08	0.12	0.19	-0.34	-0.50	-0.28	0.03	0.12
40°	0.06	0.07	0.03	-0.07	-0.19	-0.11	0.15	0.28	-0.37	-0.56	-0.38	-0.04	0.08
45°	0.06	0.09	0.04	-0.07	-0.24	-0.18	0.14	0.34	-0.32	-0.62	-0.54	-0.17	0.06
50°	0.07	0.11	0.06	-0.08	-0.28	-0.24	0.11	0.35	-0.25	-0.65	-0.59	-0.30	-0.03
55°	0.07	0.12	0.09	-0.07	-0.30	-0.27	0.10	0.43	-0.14	-0.58	-0.67	-0.40	-0.11
60°	0.07	0.14	0.11	-0.06	-0.31	-0.34	0.02	0.42	-0.04	-0.51	-0.64	-0.47	-0.25
65°	0.07	0.15	0.12	-0.05	-0.33	-0.40	0.00	0.41	0.05	-0.40	-0.61	-0.48	-0.30
70°	0.06	0.15	0.14	-0.03	-0.33	-0.40	-0.04	0.35	0.11	-0.34	-0.51	-0.47	-0.32
75°	0.06	0.15	0.15	-0.01	-0.32	-0.43	-0.10	0.29	0.10	-0.28	-0.48	-0.40	-0.32
80°	0.04	0.14	0.15	-0.01	-0.32	-0.44	-0.10	0.24	0.01	-0.28	-0.46	-0.39	-0.25
85°	0.01	0.14	0.14	-0.01	-0.33	-0.45	-0.12	0.23	-0.02	-0.35	-0.46	-0.40	-0.24
90°	-0.01	0.12	0.14	-0.02	-0.35	-0.47	-0.12	0.22	-0.17	-0.36	-0.51	-0.39	-0.24
95°	-0.02	0.09	0.12	-0.04	-0.38	-0.50	-0.15	0.26	-0.15	-0.42	-0.53	-0.42	-0.25
100°	-0.04	0.08	0.07	-0.08	-0.42	-0.55	-0.16	0.28	-0.22	-0.46	-0.54	-0.45	-0.27
105°	-0.08	0.06	0.05	-0.13	-0.47	-0.60	-0.20	0.32	-0.21	-0.46	-0.60	-0.49	-0.31
110°	-0.09	0.02	0.03	-0.17	-0.55	-0.68	-0.23	0.33	-0.22	-0.52	-0.63	-0.57	-0.42
115°	-0.08	0.00	-0.01	-0.20	-0.62	-0.77	-0.33	0.32	-0.22	-0.57	-0.76	-0.69	-0.49
120°	-0.07	0.03	-0.01	-0.25	-0.65	-0.84	-0.42	0.25	-0.26	-0.66	-0.86	-0.83	-0.67
125°	-0.07	0.04	0.02	-0.23	-0.68	-0.89	-0.47	0.16	-0.37	-0.82	-1.06	-1.03	-0.76
130°	-0.06	0.04	0.03	-0.20	-0.64	-0.88	-0.52	0.10	-0.43	-0.95	-1.27	-1.25	-0.96
135°	-0.04	0.06	0.05	-0.18	-0.60	-0.79	-0.45	0.09	-0.40	-0.94	-1.31	-1.31	-1.08
140°	-0.03	0.08	0.08	-0.15	-0.57	-0.77	-0.40	0.12	-0.35	-0.85	-1.12	-1.13	-0.93
145°	-0.01	0.11	0.10	-0.11	-0.52	-0.71	-0.36	0.13	-0.32	-0.79	-0.99	-0.86	-0.64
150°	0.00	0.12	0.13	-0.07	-0.46	-0.65	-0.30	0.17	-0.28	-0.73	-0.92	-0.75	-0.47
155°	0.01	0.13	0.15	-0.05	-0.43	-0.60	-0.25	0.20	-0.23	-0.63	-0.76	-0.59	-0.38
160°	0.02	0.13	0.16	-0.03	-0.41	-0.57	-0.21	0.22	-0.19	-0.53	-0.63	-0.45	-0.24
165°	0.02	0.14	0.16	-0.02	-0.39	-0.55	-0.20	0.25	-0.14	-0.48	-0.55	-0.35	-0.17
170°	0.03	0.15	0.17	0.00	-0.38	-0.53	-0.21	0.27	-0.11	-0.44	-0.48	-0.29	-0.17
175°	0.03	0.15	0.18	0.01	-0.36	-0.52	-0.21	0.27	-0.10	-0.41	-0.45	-0.27	-0.15
180°	0.03	0.15	0.18	0.01	-0.37	-0.53	-0.22	0.27	-0.11	-0.41	-0.45	-0.29	-0.16
185°	0.03	0.15	0.17	0.00	-0.37	-0.54	-0.23	0.26	-0.13	-0.44	-0.48	-0.32	-0.19
190°	0.02	0.14	0.16	-0.01	-0.39	-0.56	-0.24	0.25	-0.15	-0.48	-0.52	-0.34	-0.21
195°	0.02	0.13	0.15	-0.03	-0.41	-0.58	-0.23	0.25	-0.15	-0.50	-0.57	-0.37	-0.20
200°	0.01	0.13	0.14	-0.04	-0.43	-0.59	-0.23	0.24	-0.18	-0.55	-0.66	-0.48	-0.27
205°	0.00	0.12	0.13	-0.05	-0.45	-0.61	-0.27	0.20	-0.24	-0.64	-0.77	-0.60	-0.37
210°	0.00	0.11	0.12	-0.08	-0.48	-0.66	-0.32	0.19	-0.29	-0.73	-0.92	-0.75	-0.47
215°	-0.01	0.10	0.10	-0.12	-0.53	-0.73	-0.37	0.16	-0.32	-0.79	-1.01	-0.88	-0.63
220°	-0.03	0.08	0.07	-0.15	-0.58	-0.79	-0.40	0.13	-0.35	-0.85	-1.14	-1.15	-0.93
225°	-0.05	0.05	0.04	-0.18	-0.61	-0.81	-0.46	0.10	-0.39	-0.95	-1.34	-1.34	-1.10
230°	-0.07	0.04	0.03	-0.20	-0.65	-0.89	-0.52	0.10	-0.43	-0.96	-1.30	-1.30	-1.01
235°	-0.07	0.04	0.03	-0.24	-0.70	-0.91	-0.48	0.14	-0.36	-0.85	-1.13	-1.09	-0.81
240°	-0.07	0.03	-0.01	-0.26	-0.67	-0.87	-0.44	0.24	-0.28	-0.68	-0.91	-0.89	-0.70
245°	-0.08	0.00	-0.02	-0.20	-0.63	-0.81	-0.35	0.30	-0.21	-0.57	-0.78	-0.72	-0.50
250°	-0.09	0.01	0.03	-0.18	-0.57	-0.71	-0.27	0.30	-0.20	-0.51	-0.66	-0.61	-0.45
255°	-0.08	0.06	0.06	-0.15	-0.49	-0.62	-0.22	0.30	-0.19	-0.47	-0.62	-0.52	-0.33
260°	-0.04	0.08	0.07	-0.08	-0.43	-0.57	-0.18	0.27	-0.20	-0.46	-0.56	-0.49	-0.29
265°	-0.01	0.09	0.11	-0.05	-0.39	-0.52	-0.16	0.27	-0.15	-0.43	-0.55	-0.45	-0.26
270°	0.00	0.11	0.14	-0.03	-0.36	-0.48	-0.13	0.23	-0.14	-0.36	-0.54	-0.42	-0.26
275°	0.01	0.15	0.14	-0.01	-0.34	-0.46	-0.12	0.25	-0.01	-0.35	-0.48	-0.42	-0.26
280°	0.04	0.15	0.15	-0.01	-0.32	-0.44	-0.10	0.26	0.04	-0.29	-0.48	-0.42	-0.27
285°	0.06	0.15	0.16	-0.01	-0.32	-0.43	-0.09	0.32	0.11	-0.29	-0.50	-0.43	-0.33
290°	0.07	0.16	0.15	-0.02	-0.33	-0.40	-0.03	0.36	0.12	-0.35	-0.53	-0.49	-0.33
295°	0.07	0.16	0.14	-0.03	-0.33	-0.39	0.02	0.43	0.05	-0.40	-0.63	-0.50	-0.30
300°	0.08	0.15	0.12	-0.05	-0.31	-0.33	0.05	0.43	-0.01	-0.52	-0.66	-0.49	-0.25
305°	0.08	0.14	0.10	-0.06	-0.29	-0.26	0.12	0.45	-0.14	-0.59	-0.69	-0.41	-0.11
310°	0.08	0.12	0.08	-0.07	-0.26	-0.23	0.13	0.39	-0.24	-0.65	-0.61	-0.30	-0.03
315°	0.07	0.11	0.06	-0.06	-0.22	-0.17	0.16	0.37	-0.31	-0.63	-0.54	-0.17	0.06
320°	0.07	0.08	0.05	-0.05	-0.17	-0.10	0.17	0.29	-0.37	-0.56	-0.38	-0.04	0.08
325°	0.07	0.07	0.03	-0.04	-0.14	-0.06	0.14	0.20	-0.34	-0.49	-0.27	0.04	0.13
330°	0.06	0.06	0.02	-0.03	-0.11	-0.03	0.12	0.16	-0.30	-0.35	-0.16	0.07	0.08
335°	0.05	0.05	0.02	-0.02	-0.07	-0.01	0.11	0.12	-0.26	-0.24	-0.07	0.11	0.06
340°	0.03	0.04	0.02	0.00	-0.04	0.01	0.09	0.07	-0.18	-0.16	-0.03	0.11	0.05
345°	0.03	0.03	0.01	0.01	-0.01	0.01	0.06	0.04	-0.09	-0.08	-0.01	0.08	0.03
350°	0.02	0.02	0.01	0.01	0.01	0.02	0.04	0.02	-0.03	-0.03	0.01	0.05	0.02
355°	0.02	0.02	0.01	0.01	0.01	0.02	0.03	0.02	0.00	0.00	0.02	0.03	0.02

Table A.16 Influence of Windscreen UA-1650 on directional response, 10.6 KHz
- 20 KHz

Angel	Nominal Frequency											
	10.6 KHz	11.2 KHz	11.8 KHz	12.5 KHz	13.2 KHz	14 KHz	15 KHz	16 KHz	17 KHz	18 KHz	19 KHz	20 KHz
0°	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02
5°	-0.02	-0.03	-0.02	0.00	-0.01	-0.03	-0.01	0.00	-0.01	-0.02	-0.01	-0.03
10°	-0.05	-0.08	-0.05	0.00	-0.03	-0.09	-0.02	0.01	-0.02	-0.04	-0.02	-0.08
15°	-0.08	-0.16	-0.11	0.01	-0.05	-0.17	-0.09	0.04	-0.03	-0.11	-0.05	-0.15
20°	-0.10	-0.25	-0.18	0.00	-0.09	-0.26	-0.20	0.04	-0.06	-0.20	-0.12	-0.22
25°	-0.11	-0.35	-0.25	-0.01	-0.08	-0.36	-0.30	-0.07	-0.02	-0.27	-0.25	-0.31
30°	-0.11	-0.46	-0.39	-0.09	-0.07	-0.38	-0.46	-0.16	-0.04	-0.28	-0.33	-0.37
35°	-0.07	-0.49	-0.50	-0.18	-0.09	-0.40	-0.51	-0.33	-0.06	-0.21	-0.36	-0.40
40°	-0.05	-0.52	-0.63	-0.30	-0.11	-0.33	-0.54	-0.40	-0.17	-0.08	-0.25	-0.37
45°	0.03	-0.46	-0.65	-0.41	-0.18	-0.31	-0.49	-0.40	-0.29	-0.02	-0.09	-0.30
50°	0.00	-0.43	-0.68	-0.53	-0.29	-0.29	-0.40	-0.38	-0.40	-0.16	-0.04	-0.29
55°	-0.01	-0.36	-0.64	-0.57	-0.39	-0.32	-0.41	-0.39	-0.47	-0.39	-0.19	-0.36
60°	-0.08	-0.38	-0.61	-0.58	-0.52	-0.43	-0.47	-0.46	-0.52	-0.58	-0.41	-0.44
65°	-0.20	-0.45	-0.66	-0.63	-0.62	-0.55	-0.56	-0.53	-0.54	-0.65	-0.50	-0.53
70°	-0.23	-0.51	-0.71	-0.70	-0.73	-0.66	-0.60	-0.56	-0.58	-0.63	-0.54	-0.81
75°	-0.22	-0.51	-0.74	-0.73	-0.79	-0.80	-0.65	-0.59	-0.66	-0.71	-0.66	-0.90
80°	-0.19	-0.45	-0.69	-0.73	-0.78	-0.90	-0.82	-0.74	-0.82	-0.80	-0.79	-0.85
85°	-0.13	-0.37	-0.58	-0.70	-0.78	-0.94	-1.02	-1.01	-1.04	-0.80	-0.66	-0.77
90°	-0.08	-0.32	-0.51	-0.64	-0.81	-0.95	-1.08	-1.14	-1.13	-0.83	-0.54	-0.91
95°	-0.08	-0.29	-0.54	-0.68	-0.90	-0.91	-1.00	-0.93	-0.94	-0.81	-0.84	-1.70
100°	-0.11	-0.33	-0.57	-0.75	-1.07	-0.94	-0.81	-0.65	-0.66	-0.86	-1.27	-1.98
105°	-0.18	-0.36	-0.57	-0.74	-1.03	-1.05	-0.87	-0.57	-0.61	-0.88	-1.35	-1.35
110°	-0.23	-0.39	-0.54	-0.61	-0.89	-1.09	-0.91	-0.80	-0.99	-0.99	-1.05	-0.90
115°	-0.31	-0.42	-0.49	-0.51	-0.74	-1.10	-0.94	-0.86	-1.05	-1.12	-1.27	-1.01
120°	-0.33	-0.40	-0.44	-0.50	-0.79	-1.10	-0.84	-0.82	-0.88	-1.32	-1.22	-1.30
125°	-0.42	-0.48	-0.55	-0.64	-0.90	-1.04	-0.71	-0.58	-0.76	-1.30	-1.14	-1.29
130°	-0.62	-0.70	-0.76	-0.96	-1.32	-1.09	-0.55	-0.48	-0.79	-0.94	-0.87	-0.95
135°	-0.76	-0.92	-1.18	-1.61	-1.97	-1.32	-0.81	-0.82	-1.58	-0.59	-0.52	-0.82
140°	-0.75	-0.99	-1.42	-1.93	-2.12	-1.62	-1.54	-1.96	-2.68	-1.05	-0.71	-1.78
145°	-0.52	-0.86	-1.33	-1.70	-1.71	-1.58	-1.79	-2.53	-2.83	-1.56	-1.77	-3.84
150°	-0.38	-0.80	-1.21	-1.29	-1.12	-1.14	-1.61	-2.29	-2.00	-1.49	-2.18	-4.05
155°	-0.31	-0.74	-1.17	-1.15	-0.84	-0.84	-1.54	-1.89	-1.21	-0.94	-2.22	-2.77
160°	-0.26	-0.71	-1.02	-0.88	-0.57	-0.77	-1.49	-1.73	-0.86	-0.77	-2.32	-1.91
165°	-0.20	-0.67	-0.89	-0.66	-0.40	-0.68	-1.44	-1.37	-0.53	-0.64	-2.22	-1.47
170°	-0.17	-0.58	-0.79	-0.47	-0.23	-0.59	-1.32	-1.16	-0.33	-0.57	-2.09	-1.28
175°	-0.19	-0.57	-0.74	-0.47	-0.21	-0.58	-1.19	-1.07	-0.25	-0.43	-1.93	-1.08
180°	-0.21	-0.60	-0.75	-0.48	-0.25	-0.60	-1.21	-1.08	-0.30	-0.43	-1.95	-1.03
185°	-0.23	-0.62	-0.80	-0.54	-0.29	-0.64	-1.28	-1.22	-0.39	-0.49	-2.08	-1.24
190°	-0.21	-0.61	-0.83	-0.51	-0.24	-0.60	-1.36	-1.25	-0.37	-0.56	-2.18	-1.38
195°	-0.21	-0.67	-0.92	-0.70	-0.43	-0.70	-1.50	-1.54	-0.64	-0.62	-2.39	-1.76
200°	-0.28	-0.73	-1.05	-0.95	-0.59	-0.74	-1.52	-1.88	-0.90	-0.69	-2.49	-2.34
205°	-0.30	-0.73	-1.21	-1.24	-0.88	-0.83	-1.57	-2.09	-1.29	-0.79	-2.26	-3.02
210°	-0.37	-0.80	-1.26	-1.40	-1.15	-1.08	-1.56	-2.44	-2.15	-1.37	-2.11	-4.31
215°	-0.49	-0.82	-1.36	-1.80	-1.80	-1.54	-1.74	-2.59	-3.04	-1.46	-1.56	-4.08
220°	-0.72	-0.96	-1.42	-2.02	-2.24	-1.68	-1.46	-1.99	-3.04	-1.21	-0.72	-2.45
225°	-0.74	-0.89	-1.22	-1.73	-2.11	-1.49	-0.77	-0.94	-1.76	-0.53	-0.53	-1.05
230°	-0.64	-0.68	-0.84	-1.08	-1.40	-1.11	-0.54	-0.56	-0.85	-0.82	-0.94	-1.40
235°	-0.43	-0.47	-0.57	-0.71	-0.96	-1.03	-0.71	-0.71	-0.85	-1.14	-0.98	-2.13
240°	-0.33	-0.39	-0.46	-0.56	-0.87	-1.08	-0.81	-0.99	-1.11	-1.14	-0.86	-1.81
245°	-0.30	-0.41	-0.52	-0.59	-0.81	-1.06	-0.85	-1.00	-1.36	-1.03	-0.95	-1.15
250°	-0.23	-0.37	-0.57	-0.70	-0.97	-1.05	-0.80	-0.82	-1.30	-1.04	-0.75	-0.95
255°	-0.18	-0.33	-0.59	-0.82	-1.15	-1.07	-0.76	-0.55	-0.81	-0.97	-1.25	-1.60
260°	-0.10	-0.29	-0.57	-0.83	-1.19	-0.98	-0.73	-0.65	-0.77	-0.88	-1.16	-2.36
265°	-0.06	-0.26	-0.53	-0.76	-1.02	-0.95	-0.95	-0.95	-1.06	-0.83	-0.71	-1.96
270°	-0.07	-0.29	-0.51	-0.71	-0.90	-0.97	-1.02	-1.19	-1.32	-0.86	-0.41	-1.04
275°	-0.12	-0.35	-0.59	-0.75	-0.86	-0.94	-0.95	-1.07	-1.21	-0.89	-0.59	-0.90
280°	-0.19	-0.43	-0.70	-0.78	-0.86	-0.90	-0.77	-0.77	-0.93	-0.86	-0.76	-1.00
285°	-0.21	-0.50	-0.74	-0.80	-0.87	-0.80	-0.63	-0.61	-0.73	-0.71	-0.60	-1.07
290°	-0.21	-0.50	-0.72	-0.77	-0.80	-0.66	-0.59	-0.60	-0.65	-0.61	-0.54	-0.92
295°	-0.19	-0.44	-0.67	-0.70	-0.66	-0.53	-0.55	-0.57	-0.60	-0.65	-0.53	-0.66
300°	-0.07	-0.37	-0.63	-0.62	-0.52	-0.39	-0.46	-0.50	-0.56	-0.60	-0.46	-0.49
305°	0.00	-0.37	-0.66	-0.59	-0.38	-0.29	-0.41	-0.43	-0.51	-0.42	-0.22	-0.40
310°	0.00	-0.44	-0.70	-0.54	-0.28	-0.27	-0.42	-0.42	-0.44	-0.17	-0.06	-0.32
315°	0.03	-0.48	-0.66	-0.41	-0.17	-0.32	-0.52	-0.45	-0.34	-0.03	-0.12	-0.36
320°	-0.05	-0.52	-0.63	-0.29	-0.10	-0.35	-0.57	-0.45	-0.20	-0.08	-0.29	-0.42
325°	-0.07	-0.48	-0.49	-0.17	-0.09	-0.40	-0.53	-0.37	-0.08	-0.22	-0.40	-0.44
330°	-0.10	-0.45	-0.37	-0.07	-0.07	-0.39	-0.48	-0.19	-0.05	-0.29	-0.36	-0.40
335°	-0.09	-0.34	-0.23	0.01	-0.07	-0.35	-0.32	-0.08	-0.01	-0.28	-0.27	-0.33
340°	-0.08	-0.23	-0.15	0.02	-0.07	-0.25	-0.21	0.04	-0.03	-0.20	-0.13	-0.23
345°	-0.06	-0.14	-0.08	0.03	-0.03	-0.17	-0.10	0.05	-0.02	-0.11	-0.05	-0.14
350°	-0.03	-0.06	-0.03	0.03	-0.01	-0.09	-0.02	0.02	-0.01	-0.03	-0.02	-0.06
355°	0.00	-0.01	0.00	0.02	0.01	-0.01	0.01	0.02	0.01	0.00	0.00	0.00

Table A.17 Directional response for the sound level meter with Windscreen UA-1650, measured in a plane parallel to the display and along the microphone's axis, 250 Hz - 2.8 KHz

Angle	Nominal Frequency												
	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 KHz	1.25 KHz	1.6 KHz	2 KHz	2.24 KHz	2.5 KHz	2.8 KHz
0°	-0.01	0.02	0.03	0.00	-0.03	0.02	-0.01	0.00	-0.01	-0.01	-0.01	-0.02	-0.02
5°	-0.03	-0.02	0.00	0.01	0.00	0.00	0.00	0.00	-0.02	-0.01	-0.02	-0.01	-0.02
10°	0.02	0.01	0.00	-0.02	-0.02	0.01	-0.01	0.00	-0.03	0.00	-0.05	0.00	-0.05
15°	0.00	0.02	0.00	-0.01	0.01	-0.01	-0.03	-0.01	-0.06	0.00	-0.10	0.01	-0.10
20°	-0.02	-0.02	-0.02	-0.01	0.01	-0.01	-0.05	0.00	-0.10	0.01	-0.15	0.01	-0.14
25°	-0.04	-0.02	0.00	-0.02	-0.02	0.00	-0.06	0.00	-0.14	0.03	-0.20	-0.01	-0.16
30°	-0.01	-0.05	-0.06	-0.03	0.01	-0.01	-0.09	0.00	-0.19	0.04	-0.23	-0.08	-0.17
35°	0.00	-0.05	-0.08	-0.04	0.02	-0.01	-0.12	0.00	-0.23	0.04	-0.23	-0.18	-0.13
40°	-0.05	-0.06	-0.06	-0.04	0.03	0.00	-0.15	-0.02	-0.27	0.02	-0.20	-0.35	-0.10
45°	-0.02	-0.09	-0.10	-0.06	0.00	0.02	-0.19	-0.04	-0.31	-0.05	-0.16	-0.55	-0.09
50°	-0.06	-0.15	-0.11	-0.06	-0.05	0.07	-0.21	-0.06	-0.33	-0.13	-0.11	-0.68	-0.16
55°	-0.06	-0.08	-0.10	-0.07	0.02	0.05	-0.22	-0.12	-0.29	-0.25	-0.11	-0.71	-0.34
60°	-0.08	-0.06	-0.04	-0.07	-0.06	0.10	-0.22	-0.17	-0.27	-0.38	-0.16	-0.65	-0.53
65°	-0.10	-0.05	-0.04	-0.08	-0.07	0.11	-0.20	-0.22	-0.26	-0.50	-0.31	-0.58	-0.63
70°	-0.09	-0.17	-0.16	-0.10	-0.03	0.09	-0.18	-0.26	-0.29	-0.55	-0.52	-0.55	-0.60
75°	-0.11	-0.13	-0.11	-0.12	-0.09	0.13	-0.16	-0.27	-0.35	-0.51	-0.70	-0.63	-0.54
80°	-0.09	-0.12	-0.13	-0.14	-0.10	0.13	-0.12	-0.28	-0.42	-0.44	-0.73	-0.86	-0.56
85°	-0.08	-0.19	-0.23	-0.16	-0.07	0.06	-0.06	-0.27	-0.46	-0.43	-0.58	-1.16	-0.66
90°	-0.13	-0.11	-0.12	-0.17	-0.16	0.07	-0.02	-0.22	-0.50	-0.50	-0.48	-1.19	-0.91
95°	-0.13	-0.13	-0.15	-0.19	-0.20	0.01	-0.01	-0.15	-0.51	-0.57	-0.53	-0.96	-1.09
100°	-0.14	-0.17	-0.18	-0.20	-0.20	-0.06	-0.04	-0.08	-0.47	-0.63	-0.64	-0.85	-0.92
105°	-0.17	-0.11	-0.11	-0.21	-0.27	-0.08	-0.09	-0.03	-0.38	-0.66	-0.72	-0.97	-0.75
110°	-0.15	-0.15	-0.17	-0.23	-0.25	-0.15	-0.17	-0.05	-0.26	-0.63	-0.76	-1.07	-0.85
115°	-0.16	-0.15	-0.17	-0.23	-0.28	-0.18	-0.24	-0.12	-0.19	-0.47	-0.69	-1.07	-0.94
120°	-0.14	-0.21	-0.24	-0.25	-0.28	-0.23	-0.32	-0.22	-0.24	-0.31	-0.49	-1.02	-0.93
125°	-0.18	-0.17	-0.16	-0.24	-0.35	-0.20	-0.38	-0.32	-0.35	-0.25	-0.29	-0.77	-0.78
130°	-0.18	-0.18	-0.20	-0.24	-0.28	-0.24	-0.41	-0.41	-0.47	-0.35	-0.28	-0.56	-0.49
135°	-0.15	-0.15	-0.17	-0.26	-0.31	-0.22	-0.45	-0.48	-0.59	-0.55	-0.46	-0.63	-0.39
140°	-0.15	-0.19	-0.19	-0.25	-0.32	-0.20	-0.45	-0.50	-0.68	-0.73	-0.69	-0.90	-0.60
145°	-0.17	-0.23	-0.25	-0.23	-0.24	-0.22	-0.43	-0.51	-0.70	-0.88	-0.89	-1.18	-0.92
150°	-0.17	-0.20	-0.21	-0.23	-0.24	-0.17	-0.40	-0.48	-0.68	-0.94	-1.01	-1.39	-1.21
155°	-0.16	-0.20	-0.19	-0.22	-0.25	-0.12	-0.35	-0.42	-0.61	-0.89	-1.01	-1.45	-1.37
160°	-0.16	-0.21	-0.22	-0.20	-0.18	-0.12	-0.29	-0.36	-0.50	-0.75	-0.86	-1.30	-1.26
165°	-0.17	-0.09	-0.06	-0.20	-0.30	-0.01	-0.26	-0.29	-0.41	-0.59	-0.67	-1.03	-0.96
170°	-0.17	-0.17	-0.18	-0.19	-0.18	-0.06	-0.21	-0.25	-0.32	-0.44	-0.49	-0.79	-0.64
175°	-0.15	-0.21	-0.20	-0.19	-0.20	-0.02	-0.19	-0.20	-0.28	-0.35	-0.37	-0.63	-0.42
180°	-0.11	-0.28	-0.29	-0.19	-0.13	-0.05	-0.17	-0.19	-0.26	-0.32	-0.34	-0.58	-0.35
185°	-0.16	-0.18	-0.20	-0.18	-0.12	-0.05	-0.19	-0.20	-0.26	-0.35	-0.39	-0.63	-0.42
190°	-0.14	-0.17	-0.18	-0.19	-0.17	-0.04	-0.21	-0.24	-0.32	-0.45	-0.51	-0.79	-0.64
195°	-0.14	-0.17	-0.17	-0.19	-0.22	-0.04	-0.25	-0.29	-0.41	-0.60	-0.71	-1.04	-0.97
200°	-0.15	-0.19	-0.20	-0.20	-0.20	-0.08	-0.29	-0.35	-0.51	-0.77	-0.90	-1.29	-1.28
205°	-0.16	-0.12	-0.13	-0.21	-0.24	-0.11	-0.34	-0.42	-0.60	-0.90	-1.04	-1.43	-1.39
210°	-0.14	-0.09	-0.10	-0.22	-0.29	-0.11	-0.39	-0.47	-0.68	-0.95	-1.04	-1.37	-1.22
215°	-0.15	-0.24	-0.27	-0.21	-0.18	-0.22	-0.41	-0.51	-0.69	-0.89	-0.90	-1.16	-0.92
220°	-0.12	-0.19	-0.22	-0.23	-0.24	-0.21	-0.44	-0.50	-0.65	-0.73	-0.67	-0.86	-0.59
225°	-0.14	-0.02	-0.08	-0.23	-0.27	-0.20	-0.43	-0.46	-0.54	-0.53	-0.43	-0.59	-0.36
230°	-0.11	-0.34	-0.37	-0.22	-0.18	-0.27	-0.40	-0.39	-0.46	-0.35	-0.25	-0.53	-0.43
235°	-0.14	-0.13	-0.16	-0.22	-0.25	-0.20	-0.36	-0.29	-0.30	-0.23	-0.25	-0.73	-0.75
240°	-0.11	-0.19	-0.20	-0.21	-0.25	-0.17	-0.29	-0.17	-0.20	-0.27	-0.44	-0.96	-0.91
245°	-0.11	-0.10	-0.11	-0.20	-0.29	-0.11	-0.21	-0.06	-0.17	-0.44	-0.66	-1.03	-0.89
250°	-0.11	-0.02	0.01	-0.21	-0.39	0.01	-0.15	0.02	-0.25	-0.59	-0.70	-1.00	-0.81
255°	-0.09	-0.07	-0.08	-0.19	-0.26	-0.01	-0.07	0.01	-0.36	-0.62	-0.66	-0.91	-0.74
260°	-0.12	-0.11	-0.13	-0.16	-0.15	0.00	0.00	-0.03	-0.44	-0.55	-0.57	-0.81	-0.89
265°	-0.06	-0.13	-0.15	-0.16	-0.16	0.08	0.02	-0.11	-0.49	-0.50	-0.48	-0.91	-1.06
270°	-0.07	-0.01	-0.06	-0.14	-0.11	0.12	0.01	-0.19	-0.45	-0.43	-0.47	-1.14	-0.88
275°	-0.03	-0.02	-0.05	-0.14	-0.14	0.20	-0.04	-0.22	-0.42	-0.38	-0.56	-1.11	-0.59
280°	-0.04	-0.07	-0.09	-0.11	-0.05	0.19	-0.09	-0.24	-0.36	-0.40	-0.69	-0.80	-0.49
285°	-0.03	-0.12	-0.18	-0.09	0.06	0.13	-0.11	-0.24	-0.28	-0.46	-0.64	-0.56	-0.49
290°	-0.03	-0.05	-0.07	-0.07	0.01	0.17	-0.14	-0.21	-0.23	-0.49	-0.45	-0.49	-0.54
295°	-0.02	-0.06	-0.08	-0.06	0.02	0.15	-0.17	-0.17	-0.21	-0.43	-0.24	-0.52	-0.56
300°	0.00	0.01	0.01	-0.06	-0.07	0.18	-0.20	-0.12	-0.24	-0.32	-0.12	-0.60	-0.48
305°	-0.03	0.00	0.01	-0.04	-0.04	0.15	-0.20	-0.06	-0.26	-0.17	-0.06	-0.63	-0.27
310°	-0.01	-0.02	-0.02	-0.03	0.01	0.12	-0.18	-0.01	-0.27	-0.06	-0.07	-0.60	-0.08
315°	0.05	0.01	-0.03	-0.04	0.02	0.08	-0.16	0.01	-0.26	0.01	-0.13	-0.47	-0.03
320°	-0.03	-0.02	-0.01	-0.01	0.03	0.07	-0.13	0.03	-0.24	0.06	-0.17	-0.27	-0.03
325°	0.01	-0.07	-0.07	-0.01	0.05	0.03	-0.10	0.03	-0.20	0.08	-0.19	-0.12	-0.07
330°	0.01	-0.03	-0.05	0.00	0.07	0.02	-0.06	0.04	-0.14	0.08	-0.18	0.00	-0.10
335°	0.02	0.05	0.05	0.00	-0.02	0.05	-0.04	0.03	-0.10	0.06	-0.15	0.04	-0.11
340°	0.00	-0.25	-0.33	0.02	0.31	-0.17	0.01	0.00	-0.03	0.05	-0.09	0.06	-0.08
345°	0.01	-0.01	0.03	0.01	-0.06	0.06	-0.02	0.03	-0.04	0.04	-0.04	0.06	-0.03
350°	0.05	-0.13	-0.11	0.00	0.00	0.02	-0.01	0.02	-0.03	0.02	-0.01	0.02	-0.01
355°	0.01	-0.05	-0.05	0.01	0.04	-0.02	0.01	0.01	0.00	0.02	0.01	0.02	0.01

Table A.18 Directional response for the sound level meter with Windscreen UA-1650, measured in a plane parallel to the display and along the microphone's axis, 3.15 Hz - 10 KHz

Angel	Nominal Frequency												
	3.15 KHz	3.55 KHz	4 KHz	4.5 KHz	5 KHz	5.6 KHz	6.3 KHz	7.1 KHz	8 KHz	8.5 KHz	9 KHz	9.5 KHz	10 KHz
0°	-0.02	-0.02	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.04	-0.04	-0.03	-0.03
5°	-0.01	-0.03	-0.02	-0.02	-0.03	-0.02	-0.02	-0.02	-0.05	-0.04	-0.06	-0.03	-0.03
10°	0.01	-0.07	-0.02	-0.01	-0.05	-0.04	-0.04	-0.04	-0.15	-0.13	-0.17	-0.07	-0.09
15°	0.02	-0.13	-0.03	-0.01	-0.11	-0.09	-0.10	-0.07	-0.26	-0.26	-0.28	-0.08	-0.15
20°	0.03	-0.20	-0.02	-0.04	-0.22	-0.20	-0.20	-0.13	-0.45	-0.47	-0.40	-0.15	-0.29
25°	0.02	-0.28	0.00	-0.11	-0.36	-0.34	-0.31	-0.19	-0.66	-0.69	-0.51	-0.36	-0.49
30°	-0.04	-0.32	0.00	-0.26	-0.54	-0.54	-0.47	-0.33	-0.88	-0.98	-0.75	-0.72	-0.66
35°	-0.14	-0.30	-0.05	-0.42	-0.64	-0.69	-0.55	-0.45	-1.03	-1.33	-1.05	-0.96	-0.81
40°	-0.28	-0.24	-0.18	-0.57	-0.71	-0.87	-0.60	-0.61	-1.25	-1.69	-1.38	-1.22	-1.23
45°	-0.41	-0.22	-0.37	-0.66	-0.81	-1.02	-0.71	-0.73	-1.42	-1.90	-1.85	-1.61	-1.62
50°	-0.44	-0.29	-0.45	-0.69	-0.98	-1.19	-0.86	-0.87	-1.59	-2.17	-2.26	-1.99	-1.88
55°	-0.39	-0.44	-0.39	-0.77	-1.12	-1.31	-1.29	-1.03	-1.73	-2.30	-2.47	-2.50	-2.33
60°	-0.34	-0.62	-0.40	-1.00	-1.41	-1.50	-1.41	-1.22	-2.15	-2.68	-2.86	-2.93	-2.93
65°	-0.50	-0.67	-0.45	-0.98	-1.40	-1.77	-1.72	-1.16	-1.86	-2.83	-3.04	-3.13	-3.21
70°	-0.75	-0.58	-0.66	-1.09	-1.69	-1.89	-1.52	-2.30	-2.14	-2.68	-3.14	-3.30	-3.41
75°	-0.89	-0.69	-0.76	-1.11	-1.61	-2.11	-2.27	-1.65	-2.84	-3.26	-3.37	-3.69	-3.87
80°	-0.83	-0.95	-0.74	-1.32	-1.88	-2.41	-2.09	-1.85	-3.19	-3.82	-3.91	-3.92	-4.19
85°	-0.77	-1.05	-0.89	-1.38	-1.88	-2.23	-2.32	-2.72	-2.64	-4.16	-4.38	-4.31	-4.29
90°	-0.84	-0.96	-1.16	-1.50	-2.10	-2.65	-2.71	-2.93	-3.03	-3.90	-4.76	-4.65	-4.59
95°	-1.03	-1.00	-1.13	-1.76	-2.22	-2.64	-2.73	-2.41	-3.41	-4.10	-4.96	-4.81	-4.81
100°	-1.31	-1.13	-1.11	-1.84	-2.46	-2.86	-2.64	-2.50	-4.19	-4.23	-5.19	-5.02	-5.03
105°	-1.18	-1.40	-1.24	-1.78	-2.68	-3.22	-3.11	-3.05	-4.20	-4.26	-5.52	-5.20	-5.59
110°	-0.94	-1.32	-1.46	-1.94	-2.56	-3.27	-3.43	-3.29	-4.60	-4.65	-5.33	-5.41	-6.17
115°	-0.99	-1.02	-1.35	-2.10	-2.76	-3.31	-3.33	-3.39	-4.48	-4.80	-5.75	-5.73	-6.25
120°	-1.09	-1.11	-1.07	-1.93	-2.86	-3.51	-3.54	-3.24	-4.71	-5.64	-5.96	-5.99	-6.53
125°	-1.06	-1.17	-1.22	-1.74	-2.61	-3.49	-3.58	-3.80	-4.54	-5.57	-6.21	-6.90	-6.87
130°	-0.80	-1.08	-1.23	-1.83	-2.51	-3.15	-3.42	-3.37	-4.88	-6.06	-6.51	-6.87	-6.80
135°	-0.52	-0.71	-0.96	-1.82	-2.56	-2.99	-3.10	-2.91	-4.42	-5.19	-6.12	-7.15	-7.19
140°	-0.62	-0.57	-0.57	-1.29	-2.28	-3.16	-2.97	-2.95	-3.94	-4.85	-5.67	-6.18	-6.16
145°	-0.94	-0.86	-0.70	-1.15	-1.74	-2.42	-2.91	-3.03	-3.53	-4.67	-5.28	-5.60	-5.87
150°	-1.29	-1.25	-1.11	-1.55	-2.05	-2.53	-2.24	-2.12	-4.11	-4.79	-5.06	-5.06	-5.21
155°	-1.55	-1.63	-1.60	-1.99	-2.51	-2.90	-2.83	-2.71	-3.03	-4.04	-4.49	-4.97	-5.14
160°	-1.52	-1.73	-1.92	-2.56	-3.25	-3.46	-3.18	-3.08	-4.21	-4.70	-5.06	-5.16	-5.57
165°	-1.18	-1.40	-1.63	-2.48	-3.39	-4.12	-4.49	-4.46	-4.70	-5.46	-5.66	-5.81	-5.73
170°	-0.79	-0.91	-1.01	-1.76	-2.52	-3.36	-3.94	-4.31	-5.63	-6.35	-6.77	-7.31	-7.51
175°	-0.50	-0.55	-0.53	-1.14	-1.71	-2.40	-2.67	-2.71	-4.19	-4.80	-5.17	-5.54	-5.81
180°	-0.41	-0.44	-0.39	-0.97	-1.48	-2.13	-2.32	-2.23	-3.47	-4.10	-4.43	-4.71	-4.99
185°	-0.51	-0.57	-0.57	-1.20	-1.78	-2.51	-2.85	-2.80	-4.10	-4.83	-5.23	-5.68	-6.15
190°	-0.80	-0.95	-1.08	-1.85	-2.65	-3.57	-4.16	-4.25	-5.59	-6.48	-6.94	-7.70	-8.05
195°	-1.24	-1.48	-1.78	-2.61	-3.59	-4.33	-4.50	-4.32	-4.96	-5.71	-6.01	-6.08	-5.93
200°	-1.60	-1.84	-2.07	-2.63	-3.33	-3.53	-3.11	-2.96	-4.16	-4.81	-5.15	-5.38	-5.76
205°	-1.60	-1.67	-1.63	-1.97	-2.46	-2.85	-2.83	-2.76	-3.29	-4.18	-4.63	-4.93	-5.06
210°	-1.31	-1.24	-1.07	-1.48	-2.03	-2.45	-2.26	-2.21	-4.02	-4.73	-4.89	-5.01	-5.07
215°	-0.95	-0.83	-0.66	-1.11	-1.79	-2.51	-3.00	-2.92	-3.43	-4.54	-5.37	-5.69	-5.90
220°	-0.58	-0.51	-0.51	-1.33	-2.34	-3.18	-2.84	-2.90	-3.83	-4.87	-5.63	-5.92	-6.10
225°	-0.45	-0.69	-0.98	-1.81	-2.54	-2.97	-3.20	-2.93	-4.29	-5.08	-6.07	-7.28	-7.34
230°	-0.77	-1.09	-1.22	-1.78	-2.46	-3.15	-3.36	-3.21	-5.04	-5.95	-6.30	-6.79	-6.84
235°	-1.07	-1.16	-1.18	-1.75	-2.69	-3.59	-3.57	-3.75	-4.55	-5.38	-6.10	-7.02	-6.79
240°	-1.05	-1.09	-1.03	-1.97	-2.83	-3.48	-3.56	-3.24	-4.55	-5.53	-5.69	-5.95	-6.37
245°	-0.97	-1.00	-1.39	-2.07	-2.75	-3.32	-3.23	-3.25	-4.06	-4.72	-5.52	-5.57	-5.96
250°	-0.91	-1.32	-1.43	-1.87	-2.51	-3.24	-3.31	-2.88	-4.23	-4.55	-5.09	-5.34	-5.90
255°	-1.17	-1.37	-1.17	-1.76	-2.68	-3.13	-2.99	-2.93	-3.97	-4.25	-5.29	-5.10	-5.28
260°	-1.28	-1.03	-1.08	-1.82	-2.38	-2.77	-2.63	-2.45	-4.07	-4.10	-4.93	-4.88	-4.77
265°	-0.94	-0.95	-1.07	-1.65	-2.14	-2.54	-2.51	-2.29	-3.34	-3.92	-4.67	-4.65	-4.60
270°	-0.77	-0.93	-1.12	-1.43	-1.99	-2.55	-2.56	-2.55	-2.97	-3.64	-4.56	-4.54	-4.38
275°	-0.74	-1.01	-0.79	-1.33	-1.85	-2.18	-2.29	-2.55	-2.48	-3.92	-4.17	-4.15	-4.08
280°	-0.79	-0.88	-0.68	-1.20	-1.75	-2.25	-1.89	-1.75	-2.90	-3.57	-3.72	-3.73	-3.96
285°	-0.85	-0.60	-0.70	-1.04	-1.55	-2.05	-2.10	-1.48	-2.60	-3.09	-3.20	-3.52	-3.59
290°	-0.68	-0.52	-0.55	-0.99	-1.56	-1.73	-1.43	-2.04	-2.02	-2.55	-3.01	-3.15	-3.16
295°	-0.40	-0.61	-0.36	-0.90	-1.32	-1.66	-1.55	-1.01	-1.70	-2.67	-2.87	-2.94	-2.98
300°	-0.27	-0.54	-0.33	-0.91	-1.33	-1.40	-1.30	-1.07	-2.02	-2.58	-2.77	-2.83	-2.71
305°	-0.32	-0.34	-0.33	-0.66	-1.00	-1.21	-1.11	-0.85	-1.57	-2.17	-2.34	-2.32	-2.09
310°	-0.37	-0.19	-0.36	-0.60	-0.87	-1.08	-0.70	-0.70	-1.49	-2.05	-2.15	-1.86	-1.68
315°	-0.35	-0.15	-0.27	-0.61	-0.71	-0.93	-0.58	-0.59	-1.32	-1.83	-1.73	-1.46	-1.43
320°	-0.22	-0.18	-0.07	-0.50	-0.62	-0.78	-0.50	-0.48	-1.15	-1.58	-1.28	-1.08	-1.01
325°	-0.08	-0.23	0.05	-0.33	-0.55	-0.58	-0.44	-0.30	-0.95	-1.21	-0.91	-0.84	-0.62
330°	0.03	-0.24	0.07	-0.15	-0.44	-0.40	-0.35	-0.21	-0.80	-0.89	-0.63	-0.58	-0.51
335°	0.08	-0.20	0.05	-0.02	-0.28	-0.22	-0.20	-0.12	-0.58	-0.62	-0.43	-0.23	-0.34
340°	0.08	-0.13	0.03	0.04	-0.15	-0.08	-0.07	-0.04	-0.35	-0.37	-0.32	-0.04	-0.16
345°	0.07	-0.06	0.02	0.06	-0.04	0.00	0.02	0.02	-0.17	-0.17	-0.18	0.02	-0.04
350°	0.04	-0.01	0.01	0.03	-0.01	0.02	0.03	0.02	-0.06	-0.05	-0.07	0.03	0.00
355°	0.02	0.01	0.01	0.02	0.02	0.03	0.04	0.03	0.00	0.00	0.01	0.03	0.02

Table A.19 Directional response for the sound level meter with Windscreen UA-1650, measured in a plane parallel to the display and along the microphone's axis, 10.6 KHz - 20 KHz

Angle	Nominal Frequency											
	10.6 KHz	11.2 KHz	11.8 KHz	12.5 KHz	13.2 KHz	14 KHz	15 KHz	16 KHz	17 KHz	18 KHz	19 KHz	20 KHz
0°	-0.03	-0.03	-0.03	-0.03	-0.04	-0.03	-0.04	-0.05	-0.05	-0.05	-0.04	-0.02
5°	-0.05	-0.06	-0.08	-0.07	-0.07	-0.09	-0.07	-0.07	-0.10	-0.10	-0.10	-0.09
10°	-0.16	-0.21	-0.22	-0.18	-0.21	-0.27	-0.19	-0.15	-0.21	-0.25	-0.21	-0.24
15°	-0.28	-0.37	-0.40	-0.29	-0.38	-0.53	-0.44	-0.34	-0.48	-0.64	-0.54	-0.58
20°	-0.50	-0.66	-0.68	-0.46	-0.61	-0.85	-0.77	-0.62	-0.86	-1.06	-0.99	-1.02
25°	-0.76	-0.97	-0.99	-0.69	-0.90	-1.23	-1.17	-1.08	-1.24	-1.58	-1.54	-1.60
30°	-1.00	-1.30	-1.38	-1.09	-1.28	-1.60	-1.72	-1.58	-1.68	-2.08	-2.15	-2.12
35°	-1.21	-1.64	-1.76	-1.54	-1.63	-2.03	-2.19	-2.13	-2.16	-2.58	-2.78	-2.73
40°	-1.50	-2.02	-2.22	-2.00	-2.00	-2.47	-2.71	-2.70	-2.80	-3.07	-3.32	-3.37
45°	-1.70	-2.34	-2.72	-2.49	-2.56	-2.90	-3.21	-3.31	-3.52	-3.63	-3.94	-4.17
50°	-2.18	-2.70	-3.07	-3.07	-3.09	-3.38	-3.77	-3.92	-4.26	-4.46	-4.75	-4.95
55°	-2.66	-3.10	-3.47	-3.66	-3.60	-3.98	-4.31	-4.64	-5.06	-5.40	-5.57	-6.01
60°	-2.92	-3.39	-3.91	-4.19	-4.26	-4.60	-4.98	-5.24	-5.82	-6.46	-6.64	-6.76
65°	-3.45	-3.77	-4.44	-4.76	-4.81	-5.48	-5.48	-5.97	-6.63	-7.31	-7.59	-7.96
70°	-3.85	-4.38	-4.84	-5.38	-5.49	-5.99	-6.20	-6.83	-7.34	-8.08	-8.71	-9.05
75°	-4.13	-4.90	-5.33	-5.70	-6.41	-6.45	-7.19	-7.19	-8.07	-9.01	-9.46	-10.06
80°	-4.63	-5.08	-5.86	-6.08	-6.74	-7.57	-7.55	-8.55	-8.89	-9.66	-10.58	-10.95
85°	-4.75	-5.53	-6.05	-6.55	-7.09	-7.76	-8.76	-8.95	-10.16	-10.39	-11.00	-11.75
90°	-4.79	-5.65	-6.56	-6.91	-7.72	-8.46	-8.87	-9.78	-10.89	-11.19	-11.96	-12.60
95°	-5.50	-6.13	-7.08	-7.51	-8.40	-8.81	-9.62	-10.42	-10.89	-11.85	-12.78	-14.38
100°	-5.96	-6.72	-7.51	-7.66	-8.66	-9.42	-9.85	-10.31	-11.17	-12.63	-14.53	-14.77
105°	-6.30	-6.49	-6.92	-8.19	-9.19	-9.96	-10.36	-11.03	-11.84	-13.02	-14.30	-15.11
110°	-6.43	-6.78	-7.89	-8.60	-8.92	-10.09	-10.66	-11.41	-12.57	-13.80	-15.63	-15.27
115°	-6.22	-7.43	-8.22	-8.04	-9.20	-10.72	-10.56	-11.63	-12.80	-14.06	-15.62	-16.08
120°	-6.53	-7.35	-7.42	-8.73	-9.43	-10.60	-11.42	-12.03	-12.53	-14.37	-14.76	-17.08
125°	-7.18	-7.22	-8.43	-8.58	-9.72	-10.78	-10.57	-12.48	-13.21	-14.66	-16.01	-16.67
130°	-7.61	-7.95	-9.31	-9.16	-10.68	-10.58	-11.01	-11.71	-13.40	-14.08	-15.07	-17.38
135°	-7.70	-8.22	-9.18	-10.58	-11.30	-11.66	-11.92	-12.87	-14.06	-14.24	-15.22	-16.44
140°	-6.67	-7.86	-9.32	-10.82	-11.36	-11.73	-12.80	-14.12	-15.39	-15.48	-16.58	-18.64
145°	-6.36	-7.13	-8.13	-9.20	-9.80	-10.81	-12.12	-13.79	-15.26	-15.38	-16.26	-21.45
150°	-5.52	-6.24	-7.98	-9.06	-9.19	-9.69	-10.81	-12.40	-13.20	-13.78	-15.99	-18.00
155°	-5.66	-6.64	-7.73	-7.83	-7.95	-8.60	-10.15	-11.74	-12.46	-13.05	-15.36	-16.22
160°	-6.16	-7.19	-7.81	-7.75	-8.09	-9.03	-10.47	-11.59	-11.78	-12.58	-14.21	-14.94
165°	-6.05	-6.71	-7.65	-8.47	-9.00	-9.94	-11.52	-12.44	-12.64	-13.84	-16.59	-15.95
170°	-8.39	-9.32	-9.69	-9.51	-9.97	-11.12	-12.33	-12.61	-12.51	-13.71	-15.85	-15.09
175°	-6.48	-7.79	-8.65	-9.00	-9.63	-10.85	-12.31	-13.25	-13.57	-14.63	-17.73	-20.56
180°	-5.57	-6.54	-7.19	-7.62	-8.33	-9.37	-10.72	-11.54	-11.88	-12.97	-15.06	-15.53
185°	-6.89	-7.96	-8.67	-9.11	-10.17	-11.49	-13.04	-14.08	-14.59	-16.24	-18.03	-17.73
190°	-8.60	-9.15	-9.66	-10.13	-10.51	-11.35	-12.40	-12.67	-12.53	-13.37	-15.10	-15.38
195°	-6.05	-6.86	-7.58	-8.16	-8.95	-9.97	-11.60	-12.74	-12.92	-13.92	-16.14	-16.17
200°	-6.32	-7.06	-7.53	-7.76	-8.04	-8.77	-10.15	-11.41	-11.43	-12.04	-14.81	-15.13
205°	-5.31	-6.35	-7.56	-7.91	-7.97	-8.45	-9.86	-11.66	-12.30	-12.69	-15.00	-15.73
210°	-5.50	-6.24	-7.49	-8.59	-9.06	-9.45	-10.40	-12.34	-13.02	-13.34	-15.16	-17.69
215°	-6.16	-6.49	-7.62	-8.91	-9.76	-10.53	-11.78	-13.38	-14.90	-15.46	-15.90	-19.89
220°	-6.75	-7.59	-8.69	-10.15	-11.37	-11.55	-12.31	-13.62	-15.58	-15.37	-15.79	-18.43
225°	-7.32	-7.60	-8.56	-10.07	-11.28	-11.49	-11.68	-12.54	-13.82	-13.32	-14.32	-16.03
230°	-7.45	-7.51	-8.32	-9.29	-10.42	-10.35	-10.39	-11.26	-12.64	-13.21	-15.08	-16.67
235°	-6.89	-7.00	-7.72	-8.24	-9.78	-10.20	-10.21	-12.10	-12.61	-13.91	-14.92	-17.04
240°	-6.18	-6.84	-6.91	-8.25	-9.14	-10.42	-10.97	-11.68	-12.21	-13.74	-14.19	-16.61
245°	-5.92	-6.68	-7.45	-7.79	-9.21	-10.24	-10.02	-11.15	-12.60	-13.29	-14.63	-15.57
250°	-6.04	-6.10	-7.25	-8.16	-8.66	-9.64	-9.95	-10.74	-12.38	-13.24	-13.69	-14.76
255°	-5.80	-6.01	-6.39	-7.90	-9.07	-9.59	-9.88	-10.53	-11.47	-12.48	-14.06	-14.71
260°	-5.44	-6.17	-6.65	-7.30	-8.44	-9.05	-9.16	-9.73	-10.82	-11.94	-13.35	-14.70
265°	-5.03	-5.50	-6.35	-7.28	-8.27	-8.49	-9.14	-9.80	-10.46	-11.20	-11.84	-14.11
270°	-4.45	-5.16	-5.94	-6.56	-7.52	-8.11	-8.36	-9.40	-10.42	-10.47	-11.15	-12.47
275°	-4.41	-5.00	-5.41	-6.25	-6.97	-7.44	-8.20	-8.49	-9.69	-9.84	-10.29	-11.60
280°	-4.20	-4.57	-5.25	-5.83	-6.53	-7.16	-7.01	-7.99	-8.47	-9.18	-9.73	-10.77
285°	-3.77	-4.40	-4.81	-5.43	-6.20	-6.09	-6.77	-6.77	-7.75	-8.40	-8.75	-9.93
290°	-3.52	-3.94	-4.38	-5.11	-5.29	-5.71	-5.79	-6.46	-6.93	-7.50	-8.00	-9.05
295°	-3.09	-3.39	-3.96	-4.48	-4.60	-5.18	-5.12	-5.60	-6.23	-6.71	-7.03	-8.05
300°	-2.61	-3.02	-3.49	-3.98	-4.09	-4.37	-4.68	-4.91	-5.44	-5.98	-6.08	-6.71
305°	-2.34	-2.70	-3.08	-3.44	-3.39	-3.70	-3.94	-4.26	-4.70	-4.92	-5.00	-5.88
310°	-1.90	-2.38	-2.71	-2.88	-2.91	-3.13	-3.48	-3.62	-3.98	-4.05	-4.21	-4.88
315°	-1.45	-2.08	-2.38	-2.29	-2.37	-2.68	-2.94	-3.10	-3.28	-3.22	-3.50	-4.16
320°	-1.26	-1.76	-1.93	-1.81	-1.82	-2.28	-2.51	-2.50	-2.55	-2.68	-2.96	-3.46
325°	-1.00	-1.42	-1.50	-1.34	-1.45	-1.82	-2.00	-1.93	-1.88	-2.19	-2.39	-2.75
330°	-0.83	-1.11	-1.15	-0.90	-1.11	-1.45	-1.56	-1.38	-1.39	-1.74	-1.82	-2.15
335°	-0.59	-0.79	-0.77	-0.53	-0.77	-1.12	-1.04	-0.89	-1.01	-1.32	-1.27	-1.58
340°	-0.35	-0.50	-0.48	-0.32	-0.48	-0.75	-0.65	-0.44	-0.63	-0.85	-0.72	-0.98
345°	-0.16	-0.25	-0.24	-0.15	-0.25	-0.45	-0.34	-0.17	-0.31	-0.46	-0.36	-0.57
350°	-0.06	-0.09	-0.08	-0.06	-0.12	-0.22	-0.12	-0.05	-0.13	-0.15	-0.13	-0.22
355°	0.01	0.00	0.01	0.01	-0.01	-0.04	0.00	0.02	0.00	0.00	0.00	-0.04

Table A.20 Directional response for the sound level meter with Windscreen UA-1650, measured in a plane perpendicular to the display and along the microphone's axis, 250 Hz - 2.8 KHz

Angle	Nominal Frequency												
	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 KHz	1.25 KHz	1.6 KHz	2 KHz	2.24 KHz	2.5 KHz	2.8 KHz
0°	-0.02	0.02	0.04	0.01	0.00	0.03	-0.02	-0.01	-0.02	-0.02	0.00	-0.01	-0.02
5°	0.01	-0.11	-0.11	0.01	0.10	-0.02	-0.01	-0.01	-0.03	-0.02	0.00	-0.01	-0.02
10°	0.02	-0.13	-0.17	0.00	0.15	-0.07	-0.02	-0.03	-0.03	0.00	-0.01	0.01	-0.03
15°	0.01	-0.06	-0.08	0.01	0.09	-0.03	-0.04	-0.02	-0.06	0.00	-0.07	0.01	-0.07
20°	-0.03	0.09	0.04	0.00	0.08	-0.03	-0.05	-0.02	-0.08	0.02	-0.12	0.00	-0.11
25°	0.02	-0.01	-0.02	-0.02	0.02	0.01	-0.08	-0.01	-0.16	0.03	-0.17	-0.02	-0.14
30°	0.02	-0.10	-0.12	-0.01	0.08	-0.02	-0.10	-0.02	-0.21	0.04	-0.20	-0.10	-0.15
35°	0.01	-0.02	-0.03	-0.02	0.01	0.03	-0.13	0.00	-0.24	0.06	-0.20	-0.19	-0.11
40°	-0.02	-0.05	-0.07	-0.02	0.08	0.01	-0.16	-0.03	-0.28	0.03	-0.17	-0.36	-0.10
45°	-0.02	-0.11	-0.14	-0.03	0.11	0.01	-0.18	-0.04	-0.31	-0.01	-0.09	-0.53	-0.08
50°	-0.03	-0.18	-0.22	-0.03	0.17	0.00	-0.19	-0.07	-0.31	-0.09	-0.04	-0.65	-0.16
55°	-0.05	-0.05	-0.05	-0.05	0.02	0.10	-0.23	-0.11	-0.31	-0.21	-0.03	-0.65	-0.35
60°	-0.07	-0.05	-0.05	-0.05	0.02	0.11	-0.22	-0.17	-0.28	-0.36	-0.09	-0.57	-0.55
65°	-0.07	-0.10	-0.10	-0.06	0.02	0.12	-0.21	-0.22	-0.27	-0.50	-0.24	-0.48	-0.60
70°	-0.07	-0.12	-0.14	-0.07	0.06	0.11	-0.18	-0.26	-0.27	-0.57	-0.46	-0.45	-0.51
75°	-0.08	-0.15	-0.18	-0.10	0.06	0.12	-0.15	-0.27	-0.33	-0.55	-0.68	-0.57	-0.39
80°	-0.07	-0.12	-0.15	-0.12	-0.02	0.15	-0.12	-0.28	-0.41	-0.47	-0.75	-0.86	-0.43
85°	-0.06	-0.18	-0.22	-0.14	-0.03	0.11	-0.06	-0.27	-0.46	-0.45	-0.61	-1.20	-0.63
90°	-0.09	-0.11	-0.14	-0.15	-0.09	0.10	-0.02	-0.22	-0.49	-0.51	-0.50	-1.21	-0.98
95°	-0.08	-0.16	-0.22	-0.17	-0.06	0.01	0.01	-0.15	-0.49	-0.58	-0.55	-0.91	-1.17
100°	-0.10	-0.15	-0.18	-0.17	-0.14	-0.01	-0.02	-0.06	-0.46	-0.64	-0.68	-0.78	-0.90
105°	-0.14	-0.26	-0.25	-0.18	-0.17	-0.07	-0.07	-0.01	-0.37	-0.68	-0.78	-0.98	-0.67
110°	-0.11	-0.19	-0.24	-0.20	-0.16	-0.14	-0.14	-0.03	-0.22	-0.61	-0.80	-1.17	-0.82
115°	-0.13	-0.15	-0.18	-0.21	-0.22	-0.16	-0.22	-0.09	-0.15	-0.43	-0.70	-1.19	-1.08
120°	-0.11	-0.08	-0.13	-0.23	-0.26	-0.17	-0.30	-0.18	-0.17	-0.21	-0.43	-1.02	-1.07
125°	-0.13	-0.22	-0.23	-0.22	-0.26	-0.20	-0.36	-0.30	-0.31	-0.14	-0.18	-0.67	-0.79
130°	-0.15	-0.17	-0.21	-0.23	-0.22	-0.24	-0.41	-0.40	-0.45	-0.25	-0.16	-0.41	-0.35
135°	-0.14	-0.13	-0.17	-0.23	-0.25	-0.22	-0.44	-0.47	-0.58	-0.46	-0.35	-0.50	-0.19
140°	-0.13	-0.25	-0.32	-0.22	-0.12	-0.28	-0.43	-0.51	-0.66	-0.68	-0.61	-0.84	-0.45
145°	-0.15	-0.24	-0.28	-0.22	-0.16	-0.23	-0.43	-0.51	-0.70	-0.85	-0.83	-1.19	-0.86
150°	-0.15	-0.08	-0.08	-0.22	-0.31	-0.11	-0.41	-0.47	-0.69	-0.93	-0.98	-1.42	-1.23
155°	-0.13	-0.21	-0.25	-0.20	-0.17	-0.17	-0.33	-0.42	-0.60	-0.89	-1.00	-1.48	-1.42
160°	-0.14	-0.15	-0.17	-0.21	-0.22	-0.11	-0.28	-0.35	-0.50	-0.76	-0.89	-1.32	-1.31
165°	-0.13	-0.12	-0.14	-0.20	-0.23	-0.08	-0.22	-0.28	-0.39	-0.59	-0.71	-1.04	-0.98
170°	-0.15	-0.13	-0.16	-0.19	-0.18	-0.08	-0.18	-0.23	-0.29	-0.43	-0.52	-0.77	-0.64
175°	-0.12	-0.23	-0.27	-0.19	-0.12	-0.08	-0.16	-0.19	-0.25	-0.34	-0.40	-0.61	-0.42
180°	-0.10	-0.17	-0.21	-0.20	-0.16	-0.05	-0.16	-0.18	-0.23	-0.29	-0.34	-0.54	-0.33
185°	-0.16	-0.21	-0.23	-0.17	-0.09	-0.08	-0.17	-0.20	-0.25	-0.34	-0.39	-0.61	-0.40
190°	-0.16	-0.01	-0.10	-0.19	-0.09	-0.09	-0.19	-0.25	-0.28	-0.42	-0.51	-0.76	-0.62
195°	-0.15	-0.12	-0.16	-0.19	-0.15	-0.08	-0.23	-0.29	-0.38	-0.56	-0.68	-1.00	-0.93
200°	-0.15	-0.16	-0.19	-0.19	-0.17	-0.11	-0.28	-0.36	-0.49	-0.75	-0.91	-1.30	-1.30
205°	-0.16	-0.19	-0.23	-0.20	-0.14	-0.16	-0.33	-0.43	-0.59	-0.92	-1.09	-1.50	-1.49
210°	-0.13	-0.21	-0.25	-0.21	-0.18	-0.18	-0.38	-0.49	-0.68	-0.99	-1.12	-1.47	-1.35
215°	-0.14	-0.20	-0.24	-0.22	-0.20	-0.21	-0.42	-0.53	-0.71	-0.96	-1.00	-1.26	-1.01
220°	-0.11	-0.13	-0.19	-0.24	-0.24	-0.22	-0.44	-0.53	-0.67	-0.82	-0.76	-0.92	-0.58
225°	-0.13	-0.22	-0.26	-0.24	-0.22	-0.24	-0.44	-0.50	-0.60	-0.60	-0.46	-0.57	-0.23
230°	-0.13	-0.23	-0.28	-0.23	-0.21	-0.26	-0.41	-0.43	-0.47	-0.36	-0.21	-0.42	-0.27
235°	-0.15	-0.15	-0.18	-0.22	-0.25	-0.21	-0.38	-0.32	-0.32	-0.21	-0.19	-0.63	-0.70
240°	-0.12	-0.21	-0.24	-0.23	-0.24	-0.19	-0.32	-0.20	-0.21	-0.23	-0.40	-0.98	-1.06
245°	-0.11	-0.18	-0.25	-0.22	-0.15	-0.21	-0.23	-0.10	-0.15	-0.41	-0.68	-1.16	-1.09
250°	-0.12	-0.11	-0.14	-0.21	-0.23	-0.11	-0.16	-0.01	-0.23	-0.60	-0.81	-1.13	-0.86
255°	-0.12	-0.14	-0.17	-0.19	-0.18	-0.09	-0.07	0.00	-0.35	-0.68	-0.77	-0.94	-0.63
260°	-0.12	-0.14	-0.17	-0.16	-0.14	-0.03	-0.01	-0.04	-0.46	-0.64	-0.64	-0.74	-0.77
265°	-0.09	-0.16	-0.19	-0.17	-0.12	0.01	0.02	-0.13	-0.52	-0.56	-0.49	-0.81	-1.11
270°	-0.07	-0.11	-0.15	-0.15	-0.10	0.07	0.01	-0.20	-0.50	-0.45	-0.41	-1.11	-1.04
275°	-0.04	-0.12	-0.17	-0.15	-0.07	0.11	-0.03	-0.25	-0.45	-0.37	-0.50	-1.20	-0.73
280°	-0.05	-0.13	-0.20	-0.12	0.03	0.09	-0.09	-0.28	-0.38	-0.37	-0.66	-0.96	-0.55
285°	-0.05	-0.11	-0.14	-0.11	-0.02	0.13	-0.13	-0.27	-0.31	-0.44	-0.68	-0.69	-0.48
290°	-0.07	-0.06	-0.09	-0.08	0.02	0.11	-0.15	-0.25	-0.23	-0.49	-0.52	-0.57	-0.53
295°	-0.06	-0.05	-0.06	-0.07	-0.03	0.14	-0.18	-0.19	-0.22	-0.45	-0.32	-0.57	-0.57
300°	-0.01	-0.05	-0.09	-0.07	0.01	0.10	-0.19	-0.14	-0.22	-0.34	-0.18	-0.60	-0.47
305°	-0.01	0.00	-0.03	-0.06	-0.01	0.11	-0.20	-0.08	-0.25	-0.20	-0.12	-0.64	-0.28
310°	-0.02	0.02	0.00	-0.04	-0.01	0.08	-0.19	-0.04	-0.27	-0.09	-0.13	-0.61	-0.09
315°	0.04	-0.02	-0.07	-0.05	0.03	0.04	-0.17	0.00	-0.27	-0.01	-0.17	-0.47	-0.02
320°	-0.01	-0.13	-0.15	-0.02	0.11	-0.01	-0.13	0.02	-0.24	0.04	-0.21	-0.27	-0.05
325°	-0.01	-0.03	-0.05	-0.02	0.04	0.01	-0.10	0.03	-0.20	0.06	-0.24	-0.11	-0.10
330°	0.02	-0.11	-0.12	-0.02	0.03	0.00	-0.07	0.04	-0.16	0.06	-0.22	0.00	-0.14
335°	0.01	0.02	0.00	-0.02	0.01	0.00	-0.04	0.03	-0.11	0.05	-0.19	0.05	-0.15
340°	0.01	-0.01	-0.03	-0.01	0.02	-0.01	-0.03	0.03	-0.06	0.05	-0.12	0.07	-0.10
345°	0.02	0.01	-0.01	0.00	0.02	-0.02	-0.01	0.02	-0.03	0.03	-0.08	0.06	-0.07
350°	0.03	0.17	0.10	-0.02	0.01	-0.01	0.00	0.02	0.03	0.03	-0.04	0.04	-0.03
355°	0.01	-0.03	-0.03	0.00	0.01	-0.02	0.02	0.03	0.02	0.03	0.00	0.03	0.01

Table A.21 Directional response for the sound level meter with Windscreen UA-1650, measured in a plane perpendicular to the display and along the microphone's axis, 3.15 KHz - 10 KHz

Angle	Nominal Frequency												
	3.15 KHz	3.55 KHz	4 KHz	4.5 KHz	5 KHz	5.6 KHz	6.3 KHz	7.1 KHz	8 KHz	8.5 KHz	9 KHz	9.5 KHz	10 KHz
0°	0.00	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03	-0.02	-0.02
5°	0.00	-0.02	-0.01	-0.01	-0.02	0.00	0.00	0.00	-0.03	0.00	-0.05	0.00	0.00
10°	0.02	-0.05	-0.02	0.00	-0.04	-0.01	-0.01	0.00	-0.12	-0.07	-0.17	-0.01	-0.04
15°	0.04	-0.09	-0.02	0.01	-0.08	-0.05	-0.07	-0.02	-0.21	-0.19	-0.28	0.01	-0.08
20°	0.04	-0.16	-0.02	-0.01	-0.19	-0.17	-0.20	-0.10	-0.36	-0.45	-0.37	-0.07	-0.24
25°	0.03	-0.23	0.01	-0.07	-0.34	-0.37	-0.39	-0.21	-0.51	-0.72	-0.38	-0.30	-0.43
30°	-0.02	-0.29	0.01	-0.22	-0.54	-0.62	-0.57	-0.44	-0.77	-1.01	-0.64	-0.71	-0.59
35°	-0.10	-0.27	0.00	-0.40	-0.63	-0.68	-0.46	-0.46	-1.04	-1.24	-1.09	-0.81	-0.71
40°	-0.23	-0.25	-0.14	-0.58	-0.66	-0.71	-0.36	-0.40	-1.22	-1.52	-1.44	-0.97	-1.22
45°	-0.31	-0.21	-0.30	-0.58	-0.67	-0.83	-0.66	-0.62	-1.30	-1.84	-1.76	-1.67	-1.41
50°	-0.34	-0.28	-0.40	-0.54	-0.96	-1.22	-1.17	-0.99	-1.60	-2.06	-2.15	-1.97	-1.70
55°	-0.30	-0.41	-0.32	-0.63	-1.22	-1.36	-1.20	-0.79	-1.63	-2.21	-2.36	-2.34	-2.41
60°	-0.29	-0.58	-0.30	-1.03	-1.41	-1.30	-1.11	-1.06	-1.96	-2.69	-2.79	-2.82	-2.73
65°	-0.50	-0.60	-0.41	-1.03	-1.19	-1.79	-1.77	-1.58	-1.77	-2.57	-2.93	-2.97	-3.08
70°	-0.78	-0.50	-0.70	-0.94	-1.61	-1.98	-1.41	-1.89	-1.95	-2.64	-3.03	-3.19	-3.34
75°	-0.88	-0.64	-0.78	-0.96	-1.69	-1.88	-2.22	-1.56	-3.19	-3.11	-3.35	-3.63	-3.73
80°	-0.69	-0.96	-0.64	-1.41	-1.62	-2.29	-2.20	-1.75	-2.63	-4.06	-3.90	-3.84	-4.22
85°	-0.56	-1.02	-0.81	-1.43	-1.79	-2.27	-1.98	-2.94	-2.60	-3.63	-4.58	-4.44	-4.17
90°	-0.71	-0.76	-1.18	-1.31	-2.35	-2.34	-2.95	-2.70	-2.82	-3.86	-4.50	-4.70	-4.73
95°	-1.07	-0.79	-0.97	-1.69	-2.06	-2.85	-2.37	-2.14	-3.78	-3.72	-4.95	-4.85	-4.57
100°	-1.42	-1.16	-0.78	-1.81	-2.34	-2.88	-2.73	-2.62	-3.86	-4.18	-5.15	-5.03	-4.95
105°	-1.17	-1.60	-1.22	-1.42	-2.71	-2.97	-3.38	-2.99	-4.59	-4.18	-5.18	-5.41	-5.27
110°	-0.79	-1.36	-1.77	-1.88	-2.10	-3.32	-2.96	-3.75	-4.09	-4.43	-5.58	-5.24	-5.85
115°	-0.96	-0.90	-1.46	-2.55	-2.82	-2.85	-3.48	-2.71	-4.89	-5.25	-5.39	-5.58	-6.40
120°	-1.21	-1.09	-0.86	-1.94	-3.41	-3.65	-2.86	-3.48	-3.93	-5.10	-6.28	-6.43	-6.48
125°	-1.16	-1.35	-1.22	-1.46	-2.41	-4.04	-4.17	-3.00	-4.59	-5.64	-5.74	-6.11	-6.76
130°	-0.72	-1.15	-1.46	-1.99	-2.28	-2.83	-3.80	-4.62	-4.35	-5.15	-6.13	-6.95	-6.62
135°	-0.30	-0.55	-0.95	-2.08	-2.99	-3.13	-2.66	-2.63	-5.74	-6.29	-6.61	-6.71	-6.67
140°	-0.40	-0.29	-0.27	-1.09	-2.34	-3.54	-3.49	-2.97	-3.19	-4.55	-6.02	-7.25	-7.33
145°	-0.84	-0.67	-0.40	-0.72	-1.27	-2.03	-2.95	-3.87	-4.28	-4.96	-5.06	-4.91	-5.31
150°	-1.29	-1.22	-0.99	-1.29	-1.64	-1.89	-1.47	-1.35	-4.16	-5.20	-5.87	-6.05	-5.93
155°	-1.62	-1.69	-1.66	-2.03	-2.50	-2.78	-2.46	-1.78	-1.87	-2.88	-3.43	-4.01	-4.42
160°	-1.60	-1.80	-2.03	-2.72	-3.47	-3.69	-3.38	-3.25	-3.87	-4.13	-4.29	-4.14	-4.49
165°	-1.24	-1.44	-1.70	-2.60	-3.59	-4.34	-4.81	-4.95	-5.16	-5.83	-6.00	-5.97	-5.92
170°	-0.80	-0.90	-1.02	-1.79	-2.56	-3.42	-4.08	-4.55	-5.88	-6.65	-7.08	-7.71	-7.80
175°	-0.50	-0.54	-0.52	-1.14	-1.71	-2.41	-2.73	-2.78	-4.23	-4.86	-5.22	-5.60	-5.79
180°	-0.39	-0.40	-0.34	-0.91	-1.41	-2.06	-2.27	-2.17	-3.36	-3.97	-4.27	-4.50	-4.70
185°	-0.48	-0.52	-0.52	-1.13	-1.69	-2.43	-2.79	-2.76	-3.96	-4.69	-5.07	-5.51	-5.90
190°	-0.75	-0.88	-1.01	-1.76	-2.55	-3.49	-4.18	-4.39	-5.76	-6.78	-7.39	-8.40	-8.88
195°	-1.16	-1.42	-1.73	-2.59	-3.64	-4.51	-4.91	-5.01	-5.82	-6.64	-6.97	-6.91	-6.63
200°	-1.60	-1.91	-2.24	-2.91	-3.73	-4.01	-3.59	-3.43	-4.42	-4.77	-4.73	-4.53	-4.60
205°	-1.72	-1.87	-1.89	-2.26	-2.70	-2.94	-2.66	-2.22	-2.28	-2.92	-3.32	-3.65	-4.12
210°	-1.44	-1.38	-1.16	-1.44	-1.78	-1.97	-1.60	-1.40	-3.57	-4.87	-5.77	-6.40	-6.37
215°	-0.98	-0.77	-0.45	-0.75	-1.26	-2.06	-3.01	-3.86	-4.54	-5.24	-5.48	-5.11	-5.21
220°	-0.46	-0.28	-0.18	-1.04	-2.27	-3.67	-3.54	-3.03	-3.17	-4.22	-5.51	-6.83	-7.32
225°	-0.24	-0.47	-0.91	-2.10	-3.16	-3.24	-2.80	-2.49	-5.30	-6.37	-6.68	-6.74	-6.56
230°	-0.65	-1.18	-1.56	-2.07	-2.38	-2.74	-3.54	-4.35	-4.71	-5.09	-5.85	-7.18	-7.06
235°	-1.21	-1.44	-1.28	-1.46	-2.36	-4.06	-4.08	-3.07	-4.74	-5.96	-6.03	-6.20	-6.48
240°	-1.29	-1.13	-0.78	-1.84	-3.37	-3.66	-3.02	-3.69	-4.25	-4.85	-5.83	-6.43	-6.37
245°	-1.03	-0.78	-1.30	-2.57	-2.91	-2.92	-3.66	-2.88	-4.41	-5.23	-5.54	-5.73	-6.34
250°	-0.73	-1.22	-1.85	-1.97	-2.23	-3.60	-3.00	-3.23	-4.25	-4.53	-5.59	-5.26	-5.94
255°	-1.04	-1.64	-1.31	-1.52	-2.89	-2.90	-3.21	-3.03	-4.38	-4.37	-5.17	-5.19	-5.31
260°	-1.44	-1.23	-0.88	-1.94	-2.26	-2.78	-2.91	-2.63	-3.76	-4.22	-5.15	-4.86	-4.97
265°	-1.18	-0.89	-1.06	-1.73	-1.98	-3.05	-2.48	-2.38	-3.55	-4.02	-4.90	-4.57	-4.63
270°	-0.82	-0.85	-1.27	-1.19	-2.48	-2.40	-2.92	-2.69	-2.91	-4.02	-4.53	-4.53	-4.35
275°	-0.67	-1.08	-0.71	-1.43	-1.95	-2.34	-2.00	-2.79	-2.78	-3.86	-4.31	-4.14	-4.19
280°	-0.74	-0.97	-0.56	-1.58	-1.58	-2.36	-2.26	-1.68	-2.89	-3.78	-3.76	-3.81	-3.88
285°	-0.89	-0.55	-0.85	-1.09	-1.74	-1.83	-2.27	-1.76	-2.89	-3.08	-3.28	-3.46	-3.61
290°	-0.75	-0.45	-0.85	-0.89	-1.71	-2.06	-1.41	-1.88	-2.01	-2.65	-3.00	-3.27	-3.34
295°	-0.42	-0.64	-0.44	-1.00	-1.18	-1.84	-1.77	-1.27	-1.91	-2.66	-3.14	-3.14	-2.96
300°	-0.24	-0.68	-0.23	-1.06	-1.39	-1.33	-1.11	-1.23	-1.94	-2.75	-2.85	-2.74	-2.79
305°	-0.32	-0.48	-0.27	-0.66	-1.27	-1.34	-1.14	-0.85	-1.70	-2.26	-2.36	-2.37	-2.22
310°	-0.43	-0.28	-0.44	-0.51	-0.98	-1.28	-1.09	-0.83	-1.68	-2.15	-2.09	-2.00	-1.68
315°	-0.41	-0.15	-0.37	-0.54	-0.62	-0.82	-0.77	-0.52	-1.31	-1.79	-1.83	-1.54	-1.36
320°	-0.30	-0.17	-0.15	-0.57	-0.56	-0.58	-0.43	-0.46	-1.23	-1.52	-1.45	-1.06	-1.12
325°	-0.14	-0.25	0.01	-0.46	-0.60	-0.54	-0.39	-0.48	-1.04	-1.28	-1.08	-0.77	-0.75
330°	-0.02	-0.27	0.07	-0.26	-0.53	-0.51	-0.35	-0.36	-0.79	-0.94	-0.72	-0.60	-0.57
335°	0.04	-0.24	0.05	-0.10	-0.38	-0.40	-0.26	-0.21	-0.62	-0.64	-0.45	-0.36	-0.35
340°	0.08	-0.15	0.04	0.02	-0.18	-0.21	-0.11	-0.06	-0.40	-0.38	-0.25	-0.14	-0.12
345°	0.06	-0.09	0.01	0.04	-0.07	-0.10	-0.03	0.00	-0.23	-0.22	-0.15	-0.06	-0.06
350°	0.03	-0.03	0.01	0.03	-0.01	-0.03	0.00	0.01	-0.09	-0.09	-0.05	0.00	-0.01
355°	0.02	0.01	0.02	0.03	0.02	0.01	0.02	0.03	0.00	-0.01	0.03	0.03	0.03

Table A.22 Directional response for the sound level meter with Windscreen UA-1650, measured in a plane perpendicular to the display and along the microphone's axis, 10.6 KHz - 20 KHz

Angle	Nominal Frequency											
	10.6 KHz	11.2 KHz	11.8 KHz	12.5 KHz	13.2 KHz	14 KHz	15 KHz	16 KHz	17 KHz	18 KHz	19 KHz	20 KHz
0°	-0.02	-0.03	-0.02	-0.01	-0.03	-0.02	-0.03	-0.03	-0.03	-0.04	-0.02	0.00
5°	-0.02	-0.04	-0.06	-0.04	-0.05	-0.05	-0.03	-0.02	-0.05	-0.05	-0.07	-0.05
10°	-0.08	-0.14	-0.16	-0.10	-0.13	-0.22	-0.15	-0.09	-0.21	-0.21	-0.23	-0.19
15°	-0.22	-0.37	-0.39	-0.23	-0.32	-0.51	-0.40	-0.27	-0.50	-0.66	-0.53	-0.54
20°	-0.48	-0.68	-0.65	-0.38	-0.55	-0.82	-0.78	-0.63	-0.87	-1.10	-1.02	-1.08
25°	-0.69	-0.91	-0.87	-0.61	-0.83	-1.13	-1.09	-1.02	-1.14	-1.44	-1.49	-1.45
30°	-0.89	-1.24	-1.34	-1.13	-1.23	-1.56	-1.69	-1.48	-1.58	-2.07	-2.12	-2.11
35°	-1.10	-1.62	-1.76	-1.45	-1.45	-1.95	-2.12	-2.11	-2.18	-2.52	-2.70	-2.70
40°	-1.42	-1.91	-2.17	-1.90	-1.99	-2.40	-2.64	-2.69	-2.76	-3.00	-3.47	-3.38
45°	-1.61	-2.21	-2.71	-2.46	-2.44	-2.75	-3.16	-3.29	-3.55	-3.68	-3.87	-3.97
50°	-2.23	-2.66	-3.00	-3.04	-3.07	-3.41	-3.70	-3.93	-4.32	-4.53	-4.78	-5.05
55°	-2.28	-3.01	-3.43	-3.59	-3.51	-3.81	-4.32	-4.56	-5.03	-5.36	-5.52	-5.86
60°	-3.06	-3.09	-3.94	-3.98	-4.20	-4.48	-4.83	-5.22	-5.76	-6.32	-6.50	-6.74
65°	-3.18	-3.93	-4.45	-4.63	-4.66	-5.40	-5.56	-5.81	-6.60	-7.33	-7.66	-7.98
70°	-3.82	-4.03	-5.06	-5.27	-5.31	-6.04	-6.10	-6.92	-7.35	-8.04	-8.52	-8.92
75°	-4.16	-4.89	-5.01	-5.93	-6.09	-6.41	-7.22	-7.38	-8.08	-8.83	-9.55	-9.95
80°	-4.40	-5.24	-5.83	-5.76	-7.02	-7.16	-7.57	-8.56	-9.07	-9.57	-10.20	-11.04
85°	-4.78	-5.22	-6.37	-6.36	-6.81	-8.05	-8.59	-8.89	-10.38	-10.25	-10.96	-11.72
90°	-4.79	-5.43	-6.41	-7.11	-7.42	-8.41	-8.70	-10.40	-10.46	-11.22	-11.52	-13.01
95°	-5.14	-6.37	-6.54	-7.57	-8.04	-8.96	-9.69	-10.17	-10.85	-11.93	-12.73	-14.79
100°	-5.65	-6.56	-7.84	-7.86	-8.49	-9.23	-9.96	-10.26	-11.41	-12.45	-14.51	-15.10
105°	-6.45	-6.64	-7.16	-7.58	-9.49	-9.86	-10.47	-10.76	-12.04	-13.19	-15.47	-14.20
110°	-6.47	-6.37	-7.90	-8.57	-9.18	-9.38	-11.10	-11.30	-12.64	-13.67	-14.42	-15.50
115°	-6.13	-7.36	-8.46	-8.00	-9.32	-10.76	-11.34	-11.07	-13.26	-14.40	-16.27	-15.73
120°	-6.35	-7.84	-7.31	-8.69	-9.42	-9.98	-11.79	-12.12	-13.47	-14.13	-14.33	-18.33
125°	-7.53	-7.51	-8.28	-9.19	-9.41	-11.03	-10.81	-11.88	-13.79	-14.52	-16.21	-17.19
130°	-6.90	-7.12	-9.69	-9.29	-10.72	-10.91	-11.82	-11.30	-14.04	-14.56	-14.49	-17.62
135°	-7.46	-8.03	-8.89	-9.48	-10.61	-11.60	-11.60	-13.04	-14.82	-15.09	-14.22	-17.53
140°	-7.84	-8.23	-9.34	-10.75	-11.48	-11.63	-12.02	-13.16	-15.41	-15.12	-15.95	-19.30
145°	-5.96	-7.23	-9.49	-10.90	-11.03	-11.66	-12.81	-14.96	-16.54	-15.57	-16.01	-19.45
150°	-6.22	-6.63	-7.79	-8.30	-8.59	-9.74	-11.83	-14.16	-14.62	-14.82	-16.79	-21.06
155°	-5.22	-6.91	-8.91	-9.13	-9.03	-9.51	-10.70	-11.86	-12.24	-12.71	-15.12	-17.70
160°	-4.85	-5.30	-5.84	-6.12	-6.55	-7.80	-9.80	-11.82	-12.74	-13.89	-16.73	-15.68
165°	-6.16	-7.02	-7.91	-8.13	-8.35	-9.06	-10.26	-10.71	-10.66	-11.61	-13.71	-13.20
170°	-8.88	-9.91	-10.40	-10.39	-10.64	-11.72	-13.02	-13.47	-13.41	-14.63	-17.22	-15.93
175°	-6.61	-7.93	-8.96	-9.40	-9.91	-11.24	-12.82	-13.87	-14.33	-15.46	-18.96	-23.73
180°	-5.38	-6.34	-7.09	-7.43	-7.99	-9.07	-10.39	-11.16	-11.44	-12.48	-14.78	-15.56
185°	-6.85	-7.89	-8.67	-9.03	-9.99	-11.43	-13.15	-14.30	-14.92	-17.01	-19.84	-18.90
190°	-9.75	-10.44	-10.93	-11.73	-12.42	-13.26	-14.32	-14.58	-14.30	-14.54	-15.59	-16.66
195°	-6.40	-7.27	-8.01	-8.29	-8.61	-9.27	-10.33	-10.67	-10.26	-10.69	-13.18	-13.92
200°	-5.00	-5.60	-6.04	-6.09	-6.30	-7.24	-8.95	-10.75	-11.39	-12.76	-15.39	-15.86
205°	-4.90	-6.34	-8.08	-9.10	-9.58	-9.72	-10.44	-11.54	-11.60	-11.91	-14.97	-16.03
210°	-6.37	-6.70	-7.60	-8.12	-8.41	-9.07	-10.55	-13.05	-13.46	-13.20	-15.48	-17.82
215°	-5.86	-6.70	-8.28	-9.99	-10.70	-11.55	-13.47	-13.47	-15.06	-14.59	-14.07	-18.34
220°	-7.61	-7.72	-8.40	-9.75	-11.23	-11.25	-11.30	-12.46	-15.04	-14.36	-13.31	-16.99
225°	-7.01	-7.84	-8.46	-9.54	-10.77	-11.35	-10.97	-11.05	-13.54	-13.21	-14.45	-15.12
230°	-7.03	-7.08	-8.23	-9.08	-9.78	-10.59	-10.88	-10.83	-12.41	-13.25	-14.86	-15.96
235°	-7.08	-6.77	-7.78	-8.64	-9.74	-9.87	-10.51	-11.18	-11.71	-13.32	-14.38	-16.54
240°	-6.45	-7.32	-6.78	-8.52	-9.07	-9.60	-11.04	-11.04	-11.88	-13.04	-13.53	-15.98
245°	-5.86	-7.12	-7.18	-7.54	-9.82	-9.78	-9.86	-10.48	-12.11	-12.78	-14.60	-15.14
250°	-5.89	-5.99	-7.68	-7.78	-8.65	-9.23	-9.93	-10.59	-12.16	-12.41	-13.01	-14.96
255°	-6.10	-5.83	-6.58	-7.75	-9.17	-9.67	-9.78	-9.85	-10.98	-12.07	-13.57	-14.35
260°	-5.54	-6.26	-6.37	-7.52	-8.38	-8.80	-9.02	-9.55	-10.42	-11.27	-13.15	-14.46
265°	-5.01	-5.94	-6.39	-7.29	-7.97	-8.60	-9.03	-9.36	-10.16	-10.72	-11.81	-13.72
270°	-4.80	-5.16	-5.87	-6.72	-7.47	-8.06	-8.23	-9.15	-10.08	-9.92	-10.80	-12.11
275°	-4.37	-4.86	-5.70	-6.15	-6.81	-7.50	-8.18	-8.17	-9.41	-9.41	-10.16	-11.28
280°	-4.15	-4.88	-5.20	-5.69	-6.63	-7.22	-6.83	-7.88	-8.03	-8.98	-9.37	-10.58
285°	-3.97	-4.38	-4.78	-5.50	-6.29	-6.10	-6.69	-6.47	-7.64	-8.01	-8.59	-9.82
290°	-3.45	-3.95	-4.43	-5.09	-5.47	-5.54	-5.71	-6.31	-6.61	-7.29	-7.76	-8.98
295°	-3.18	-3.60	-3.96	-4.63	-4.57	-5.11	-5.03	-5.47	-6.12	-6.48	-6.76	-7.75
300°	-2.80	-3.02	-3.48	-3.96	-3.98	-4.42	-4.49	-4.84	-5.30	-5.74	-5.90	-6.50
305°	-2.28	-2.79	-3.11	-3.47	-3.49	-3.67	-4.00	-4.13	-4.56	-4.72	-4.93	-5.86
310°	-1.96	-2.54	-2.68	-2.90	-2.81	-3.12	-3.32	-3.52	-3.75	-3.81	-4.08	-4.80
315°	-1.54	-2.01	-2.39	-2.29	-2.71	-2.94	-2.94	-2.94	-3.14	-3.08	-3.42	-4.07
320°	-1.37	-1.81	-2.06	-1.78	-1.93	-2.27	-2.50	-2.43	-2.46	-2.58	-2.88	-3.35
325°	-0.98	-1.50	-1.52	-1.39	-1.47	-1.91	-1.94	-1.88	-1.83	-2.13	-2.39	-2.73
330°	-0.79	-1.16	-1.11	-0.98	-1.11	-1.47	-1.54	-1.30	-1.35	-1.65	-1.76	-2.10
335°	-0.62	-0.82	-0.78	-0.61	-0.82	-1.05	-1.01	-0.82	-0.86	-1.15	-1.12	-1.51
340°	-0.37	-0.44	-0.45	-0.30	-0.50	-0.67	-0.64	-0.45	-0.59	-0.74	-0.73	-1.04
345°	-0.21	-0.23	-0.22	-0.12	-0.27	-0.42	-0.31	-0.20	-0.31	-0.40	-0.36	-0.60
350°	-0.08	-0.08	-0.07	-0.03	-0.11	-0.20	-0.10	-0.06	-0.12	-0.14	-0.13	-0.25
355°	0.01	0.02	0.03	0.04	0.02	-0.01	0.03	0.03	0.01	0.02	0.03	-0.02

Table A.23 *Sensitivity variations of the sound level meter with Windscreen UA-1650, at sound incidence angles within $\pm\theta$ ° from the reference direction*

Nominal Frequency	Exact Frequency (6 digits)	Max Variation $\pm 30^\circ$	Max Variation $\pm 90^\circ$	Max Variation $\pm 150^\circ$
Hz	Hz	dB	dB	dB
250	251.189	0.08	0.18	0.22
315	316.228	0.43	0.43	0.51
400	398.107	0.44	0.44	0.47
500	501.187	0.05	0.19	0.28
630	630.957	0.37	0.47	0.70
800	794.328	0.23	0.36	0.48
1000	1000.00	0.12	0.25	0.48
1250	1258.93	0.07	0.32	0.57
1600	1584.89	0.23	0.52	0.73
2000	1995.26	0.11	0.65	1.07
2240	2238.72	0.25	0.77	1.14
2500	2511.89	0.17	1.28	1.55
2800	2818.38	0.19	1.07	1.37
3150	3162.28	0.13	0.98	1.52
3550	3548.13	0.35	1.10	1.67
4000	3981.07	0.10	1.35	1.93
4500	4466.84	0.32	1.64	2.63
5000	5011.87	0.57	2.51	3.44
5600	5623.41	0.65	2.68	4.09
6300	6309.57	0.60	2.98	4.20
7100	7079.46	0.47	2.97	4.65
8000	7943.28	0.92	3.22	5.78
8500	8413.95	1.05	4.20	6.41
9000	8912.51	0.79	4.81	6.72
9500	9440.61	0.76	4.74	7.31
10000	10000.0	0.70	4.76	7.37
10600	10592.5	1.04	4.84	7.88
11200	11220.2	1.34	5.69	8.27
11800	11885.0	1.42	6.59	9.72
12500	12589.3	1.16	7.15	10.94
13200	13335.2	1.32	7.75	11.51
14000	14125.4	1.64	8.50	11.76
15000	14962.4	1.76	8.91	12.85
16000	15848.9	1.63	10.45	15.01
17000	16788.0	1.73	10.94	16.60
18000	17782.8	2.13	11.26	15.62
19000	18836.5	2.19	12.01	16.84
20000	19952.6	2.18	13.04	21.47

Periodic Testing of Acoustical Frequency Responses

This section gives the correction data that must be applied to sound levels displayed in response to the sound pressure produced by Multifunction Acoustic Calibrator Type 4226, or in response to simulation of sound pressure by Electrostatic Actuator UA-0033, in order to obtain the equivalent sound levels that would be displayed under reference environmental conditions in response to plane progressive sinusoidal sound waves incident from the reference direction or from random directions. See Table A. 24 and Table A. 25 to view the data.

Table A. 24 *Acoustical test with Multifunction Acoustic Calibrator Type 4226. Correction data that must be applied to the readings of the sound level meter in order to obtain equivalent sound levels that would be displayed in response to plane progressive sinusoidal sound waves incident from the reference direction or from random directions*

Calibrator Frequency	Correction Data For Type 2245 Free-field 0° Without Windscreen	Expanded Uncertainty	Correction Data For Type 2245 Free-field 0° With Windscreen	Expanded Uncertainty
Hz	dB	dB	dB	dB
32	0.0027	0.15	0.00	0.21
63	0.0514	0.13	0.05	0.20
125	0.061	0.12	0.06	0.20
250	0.075	0.12	0.07	0.20
500	0.185	0.14	0.15	0.20
1000	0.080	0.16	-0.08	0.22
2000	0.257	0.18	0.28	0.27
4000	0.829	0.24	0.67	0.31
8000	2.862	0.31	2.60	0.40
12500	5.153	0.48	4.85	0.54
16000	6.377	0.59	5.93	0.66

Table A. 25 *Acoustical test with Electrostatic Actuator UA-0033. Correction data that must be applied to the readings of the sound level meter in order to obtain equivalent sound levels that would be displayed in response to plane progressive sinusoidal sound waves incident from the reference direction or from random directions*

Nominal Frequency	Exact Frequency (6 digits)	Correction Data For Type 2245 Free-field 0°	Expanded Uncertainty	Correction Data For Type 2245 Free-field 0°	Expanded Uncertainty
Hz	Hz	dB	dB	dB	dB
63	63.0957	0.02	0.11	0.02	0.19
80	79.4328	0.03	0.11	0.03	0.19
100	100.000	0.03	0.11	0.03	0.19
125	125.893	0.04	0.11	0.04	0.19
160	158.489	0.05	0.11	0.04	0.19
200	199.526	0.06	0.11	0.05	0.19
250	251.189	0.07	0.11	0.06	0.19
315	316.228	0.12	0.11	0.11	0.19
400	398.107	0.16	0.11	0.15	0.19
500	501.187	0.19	0.12	0.16	0.19
630	630.957	0.12	0.12	0.07	0.19
800	794.328	0.01	0.13	-0.08	0.20
1000	1000.00	0.12	0.13	-0.04	0.20
1060	1059.25	0.13	0.13	-0.03	0.20
1120	1122.02	0.13	0.13	-0.02	0.20
1180	1188.50	0.14	0.13	-0.01	0.20
1250	1258.93	0.15	0.13	0.01	0.20
1320	1333.52	0.18	0.13	0.06	0.20
1400	1412.54	0.21	0.13	0.09	0.20
1500	1496.24	0.22	0.13	0.11	0.20
1600	1584.89	0.22	0.14	0.13	0.21
1700	1678.80	0.26	0.14	0.20	0.21
1800	1778.28	0.30	0.14	0.25	0.21
1900	1883.65	0.30	0.14	0.29	0.21
2000	1995.26	0.37	0.14	0.39	0.24
2120	2113.49	0.16	0.15	0.21	0.25
2240	2238.72	0.41	0.18	0.49	0.27
2360	2371.37	0.67	0.18	0.77	0.27
2500	2511.89	0.62	0.19	0.74	0.27
2650	2660.73	0.46	0.19	0.61	0.27
2800	2818.38	0.61	0.19	0.77	0.27
3000	2985.38	0.90	0.19	1.06	0.27
3150	3162.28	0.85	0.19	0.99	0.27
3350	3349.65	0.75	0.19	0.83	0.27
3550	3548.13	1.08	0.19	1.07	0.27

Nominal Frequency	Exact Frequency (6 digits)	Correction Data For Type 2245 Free-field 0°	Expanded Uncertainty	Correction Data For Type 2245 Free-field 0°	Expanded Uncertainty
Hz	Hz	dB	dB	dB	dB
3750	3758.37	1.17	0.19	1.07	0.27
4000	3981.07	1.06	0.20	0.91	0.28
4250	4216.97	1.46	0.20	1.26	0.28
4500	4466.84	1.41	0.20	1.17	0.28
4750	4731.51	1.46	0.20	1.22	0.28
5000	5011.87	1.69	0.21	1.47	0.28
5300	5308.84	1.77	0.21	1.60	0.33
5600	5623.41	2.04	0.21	1.91	0.33
6000	5956.62	2.02	0.22	1.93	0.33
6300	6309.57	2.36	0.22	2.32	0.33
6700	6683.44	2.52	0.22	2.45	0.34
7100	7079.46	2.77	0.22	2.59	0.34
7500	7498.94	2.98	0.26	2.74	0.36
8000	7943.28	3.20	0.26	2.94	0.36
8500	8413.95	3.49	0.26	3.20	0.36
9000	8912.51	3.78	0.26	3.54	0.36
9500	9440.61	4.13	0.29	3.92	0.39
10000	10000.0	4.56	0.36	4.35	0.44
10600	10592.5	5.11	0.37	4.84	0.45
11200	11220.2	5.59	0.38	5.28	0.46
11800	11885.0	6.07	0.39	5.71	0.47
12500	12589.3	6.32	0.40	6.02	0.47
13200	13335.2	6.60	0.42	6.26	0.48
14000	14125.4	6.88	0.43	6.48	0.50
15000	14962.4	7.30	0.45	6.91	0.54
16000	15848.9	7.85	0.47	7.41	0.56
17000	16788.0	8.40	0.48	7.84	0.57
18000	17782.8	8.87	0.50	8.29	0.59
19000	18836.5	10.00	0.52	9.48	0.59
20000	19952.6	10.77	0.53	10.29	0.61
21200	21134.9	11.74	0.55	11.33	0.63
22400	22387.2	12.90	0.57	12.69	0.64

Appendix B

Cross-references to Standards

Introduction

This appendix provides cross-references between specific paragraphs in the standards that require topics to be documented in an instruction manual and the corresponding sections in this manual that conform to those paragraphs.

Section 0 contains the cross-reference tables to the following relevant standards: IEC 61672–1 and IEC 61260.

Section 0 provides a list of cross-references to topics that are not provided in, or are irrelevant to this product. (For example, the cross-reference '0 a' in the table refers to section 0, item a.)

A normal index can be found at the end of this manual.

Cross-references to Standards

IEC 61672–1:2013	
Standard's Paragraph	This Manual's Section
5.1.4	1.2.3, 3.9.5
5.1.5	4.2
5.1.6	4.5, 0
5.1.7	B.3 a
5.1.8	1.2.2
5.1.10	2.13
5.1.12	B.3 b, 4.9.7
5.1.13	4.4, 3.9.2, 4.5
5.1.14	2.14.2
5.1.15	3.3.2
5.1.17	4.9.1, 3.3.2
5.1.18	B.3 c
5.1.19	4.16
5.2.1	Error! Reference source not found.
5.2.3	Error! Reference source not found.
5.3.2.1	4.6.4, 4.6.5, 0, 0

5.3.3.1	Error! Reference source not found., Error! Reference source not found., Table A.14 - Table A.16
5.3.5.1	3.6, 0
5.5.5	4.7, 0
5.5.8	2.13
5.6.10	4.9.7
5.6.11	4.9.7
5.7.1	4.8.1
5.7.3	4.8.1, 3.3.2
5.7.5	2.10
5.8.1	2.14.1
5.11.1	2.14, 2.15
5.12.2	2.14, 2.15
5.13.1	4.9.8
5.17	B.3 d
5.18.1	2.14
5.18.2	2.14, B.3 e
5.18.3	2.14
5.18.4	4.10, 2.14.2
5.18.5	0, 1.2.2
5.18.6	B.3 e
5.19.1	4.13, 4.14.2
5.20.1	4.17, 0
5.20.2	4.10.2
5.21.1	1.2.3
5.21.2	3.9.5
5.22.2	B.3 c
5.23.2	4.15
5.23.3	4.15.2
5.23.4	4.15.2
5.23.5	1.2.3, 4.15.1
5.23.6	4.15.1
6.1.2	4.12.1

6.2.2	2.11
6.3.2	B.3 f
6.5.2	B.3 g
6.6.1	3.9.5
6.6.3	4.12.6
6.6.5	B.3 h
6.6.10	B.3 i
6.7	Error! Reference source not found.
7.1	B.3 a
7.2	Error! Reference source not found., REF_Ref503791841 \n \h 4.6, 4.7
7.3	4.2
7.4	0
7.5	1.2.3, 4.6, 4.7
9.1 b	1.2.3
9.2.1 a	4.2
9.2.1 b	1.2.3, 3.9.5, 2.8
9.2.1 c	4.5
9.2.1 d	B.3 a
9.2.1 e	B.3 c
9.2.1 f	Error! Reference source not found.
9.2.2 a	2.14
9.2.2 b	0
9.2.2 c	2.13
9.2.2 d	2.14.1
9.2.2 e	4.9.7
9.2.2 f	B.3 b
9.2.2 g	4.10, B.3 e
9.2.2 h	4.9.2
9.2.2 i	4.9.8
9.2.2 j	1.2.1
9.2.2 k	4.2, 2.13
9.2.3 a	4.15.2
9.2.3 b	0
9.2.3 c	4.15.1, 0

9.2.3 d	4.15.1
9.2.4 a	Error! Reference source not found.
9.2.4 b	Error! Reference source not found.
9.2.4 c	Error! Reference source not found.
9.2.5 a	0, 0, 0
9.2.5 b	4.6.4, 4.6.5, 0, 0
9.2.5 c	0, 4.6.4, 4.6.5, 0, 0
9.2.5 d	3.6, 0
9.2.6 a	4.5
9.2.6 b	2.8, 2.9, Error! Reference source not found.
9.2.6 c	2.10
9.2.6 d	4.16
9.2.6 e	2.11
9.2.6 f	2.14.2, 0
9.2.6 g	4.10.2
9.2.6 h	2.14.2
9.2.6 i	2.14.2, 4.10.2
9.2.6 j	2.14.2, 2.15
9.2.6 k	B.3 d
9.2.6 l	1.2.2
9.2.6 m	1.2.3
9.2.6 n	4.13
9.2.7 a	4.2, 4.6, 4.7
9.2.7 b	B.3 a
9.2.7 c	0
9.2.7 d	1.2.3, 4.6, 4.7
9.2.8 a	B.3 f
9.2.8 b	B.3 g
9.2.8 c	4.12.6
9.3 a	4.4
9.3 b	4.4
9.3 c	4.5
9.3 d	3.6, 0
9.3 e	4.7, 0

9.3 f	4.9.7
9.3 g	4.9.7
9.3 h	3.3.2
9.3 i	4.8.1
9.3 j	4.9.1, 3.3.2
9.3 k	4.15
9.3 l	4.12.1
9.3 m	B.3 h
9.3 n	3.9.5
9.3 o	3.9.5, 4.12.6, 3.9.2

IEC 61260:2014	
Standard's Paragraph	This Manual's section
5.1.4	1.2, 3.8, 3.9.4, 3.9.5
5.9.1	4.11
5.9.2	B.3 j
5.13.1	4.11.3
5.13.6	B.3 b
5.13.8	4.11.3
5.14.4	4.11.1, 4.11.2
5.17.1	2.15.1
5.18.1	B.3 k
5.19	3.3.2, 4.11.3
5.20.1	B.3 l
5.22.2.1	4.12.2, 4.12.3
5.22.2.5	B.3 f
5.23.3.11	3.9
5.23.4.3	3.9
7.1 a)	4.2
7.1 b)	4.11.1, 4.11.2
7.1 c)	4.11
7.2 a)	4.11.3
7.2 b)	4.11.3
7.2 c)	3.3.2, 4.11.3
7.2 d)	2.15.1
7.2 e)	4.11.1, 4.11.1
7.2 f)	2.15.1
7.2 g)	4.12.2, 4.12.3
7.2 h)	0
7.2 i)	B.3 m
7.2 j)	B.3 k
7.2 k)	4.16
7.3 a)	4.4
7.3 b)	4.4

7.3 c)	B.3 j
7.3 d)	B.3 l
7.3 e)	B.3 m, 4.13
7.3 f)	1.2, 3.8, 3.9.4, 3.9.5
7.3 g)	B.3 g
7.3 h)	4.12.6
7.3 i)	3.9
7.3 j)	3.9
7.3 k)	3.8, 3.9

Irrelevant Topics

This section provides a list of the cross-references to topics that are not provided in, or are irrelevant to this product. References in the previous tables are made to the following items:

- a. "No microphone extension device or cable can be used, the microphone is mounted directly on the sound level meters build in preamplifier"
- b. "The sound level meter have only one level range"
- c. "The sound level meter have only one channel"
- d. "No user-selectable thresholds are provided."
- e. "Only one display in the sense of IEC 61672, is provided."
- f. "No components of the sound level meter are intended to be operated only in an environmentally controlled enclosure."
- g. "No performance degradation or loss of function specified."
- h. "No greater field strengths specified."
- i. "No sound level less than 74 dB is specified"
- j. "No adjustment procedures needed. Reference attenuation is specified relative to the sound level meter calibration"
- k. "The band-pass filters are not an integral part of an instrument for the measurement of reverberation time"
- l. "Not applicable."
- m. "The filter is an integral part of the sound level meter."